

University of Tasmania Open Access Repository

Cover sheet

Title

Science narratives : the construction, mobilisation and validation of Hydro Tasmania's case for Basslink.

Author

Duncan, R

Bibliographic citation

Duncan, R (2004). Science narratives : the construction, mobilisation and validation of Hydro Tasmania's case for Basslink.. University Of Tasmania. Thesis. <https://doi.org/10.25959/23211953.v1>

Is published in:

Copyright information

This version of work is made accessible in the repository with the permission of the copyright holder/s under the following,

Licence.

If you believe that this work infringes copyright, please email details to: oa.repository@utas.edu.au

Downloaded from University of Tasmania Open Access Repository

Please do not remove this coversheet as it contains citation and copyright information.

University of Tasmania Open Access Repository

Library and Cultural Collections

University of Tasmania

Private Bag 3

Hobart, TAS 7005 Australia

E oa.repository@utas.edu.au

CRICOS Provider Code 00586B | ABN 30 764 374 782

utas.edu.au

**SCIENCE NARRATIVES:
THE CONSTRUCTION, MOBILISATION AND VALIDATION OF
HYDRO TASMANIA'S CASE FOR BASSLINK**

By

**RONLYN DUNCAN
BSc., BA (Hons) (UNSW)**

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy,
Centre for Environmental Studies, Department of Geography and Environmental
Studies, University of Tasmania
(April 2004)

This thesis contains no material that has been accepted for the award of any other higher degree or graduate diploma in any tertiary institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person, except when due reference is made in the text of the thesis.

.....
Ronlyn Duncan

This thesis may be made available for loan and limited copying in accordance with the *Copyright Act 1968*.

.....
Ronlyn Duncan

ABSTRACT

The central focus of this thesis is the role of narratives in the construction, mobilisation and validation of scientific knowledge claims. With an epistemological commitment to constructivism, which conceptualises scientific knowledge as the product of a process (and not something revealed), the regulatory domain of impact assessment in respect of Basslink, a 350 kilometre power cable that will link Tasmania to the Australian mainland across Bass Strait, has been used as a case study to undertake the task of tracing the translations that intervened between assessment process inputs and outputs – contributions deemed ‘scientific’ and ‘independent’ by the project’s proponents and supporters. Specifically, the knowledge claims tendered by Hydro Tasmania, Tasmania’s hydro-electricity generator, in respect of predicted environmental impacts on the Gordon River arising from changes to river flows required to generate and export hydro-electricity across Basslink, have been examined. The central epistemological question has been how, given the extent of the contingencies and indeterminacies in predictive economic and environmental modelling inputs and outputs used to substantiate the impacts and benefits of Basslink (which have been detailed in the thesis), was Hydro Tasmania’s case in support of the development made durable and, thereby, legitimated by the decision-making body charged with the task of assessing the project. This study follows Hydro Tasmania’s knowledge claims in respect of the Gordon River impacts through the process and demonstrates the pivotal role of narratives and the extent to which they can bridge empirical gaps, explain and obscure inconsistencies, erase unexpected model outputs, contextualise findings and mobilise ontological claims. The tension between the fulfilment of disclosure

requirements upon proponents by means of 'scientific facts' and the extent to which issues such as trust, accountability and past track record, bear upon people's uptake of these 'facts' is also examined in this work.

ACKNOWLEDGMENTS

There are, of course, many people to acknowledge for their valuable contributions in helping to bring this project to completion. In the first instance, though, my move from Sydney to Hobart and this work would not have been possible without the Australian Postgraduate Award. For this, I am especially grateful.

From within the Centre for Environmental Studies, I'd like to thank my supervisor, Peter Hay, for his intuition and understanding of what must have appeared, at times, to be a student going round-and-round in circles. For enriching my academic experience and for caring so much, I'd like to give thanks to Elaine Stratford. Thank you, too, to John Todd for his archival treasures. I must also mention two friends and colleagues. First, Andrew Harwood, whose questioning of my theoretical ideas prompted considerable reflection. Although I came back to my starting point, it was well worth the trip. Second, Colin Winkler, who was always so generous with his time, particularly on computer matters. I would also like to acknowledge the many other wonderful friends I have made during my time at the Centre, particularly Denbeigh, Julie, Elizabeth, Peat, James, Greg, Jo, Dave, Emma, Kete and Mary, without whom my time there would have been greatly diminished.

Having had access to the tape recordings of the Basslink hearings taken by the Resource Planning and Development Commission was vital for the project. In this respect, I'd like to thank the Executive Commissioner, Julian Green, as well as the staff of the RPDC who always managed to find a place for me to do my work. I enjoyed, very much, the conversations that took place with the people from the RPDC who wandered past my door.

I'd also like to thank Steven Halliday, Michael Connarty and Helen Locher from Hydro Tasmania for their prompt attention to my queries. The wealth of information provided by Ralph Mitchell from the Tasmanian Fishing Industry Council and Dagmar Nordberg on marine issues was also very much appreciated. I am also grateful to the many people with whom I came in contact at the public hearings, who provided information or answered queries, especially David Jeffrey, Peter Davies, Bruce Davis, Stuart Morris, Margaret Blakers, Helen Gee and Michael Kirlew.

There were so many others that I called on for assistance and who gave it gladly; among them were, Alan Pears, Bill Dockrill, Taylor Bildstein, Daniel Cooper, Andrew

Durran, Andrea Bunting, Gavan McDonell, Ben Northcott, Gabrielle Kuiper, David Miller and Hugh Outhred.

Last, but not least, I'd like to thank my partner, Arthur, who has had to endure what accompanies a research project such as this, and our daughter, Laina, who has had to tolerate some absences in the first months of her life.

TABLE OF CONTENTS

FIGURES	13
GLOSSARY OF TERMS	14
INTRODUCTION	17
Thesis Structure	20
Chapter 1	
THE BASSLINK PROJECT, ASSESSMENT PROCESS BOUNDARIES	
AND ISSUES OUT OF REACH.....	26
THE BASSLINK PROJECT.....	27
Rationale and Goals of Basslink.....	27
Legislative Context.....	30
A Project of State and National Significance	32
Tasmania's Resource Planning and Development Commission.....	33
Joint Advisory Panel.....	34
Process Structure	35
Praise for the Process	36
DIIAS Critique	37
Merits of the Process.....	38
PROJECT AND PROCESS BOUNDARIES.....	39
Tracing the Limits	39
Basslink Development Steering Committee	39
Basslink Development Board	41
Close Ties.....	43
Draft Scope Guidelines.....	46
PROJECT FINANCES AND MODELLING ISSUES	47
Commercial Arrangements.....	47
Finances of Hydro Tasmania and the State of Tasmania	49
Fiscal Evidence	50
Indicative Figures.....	52
Changing the Cable Technology on Environmental Grounds	54
Hydro Tasmania's Cost Limitations.....	62
Project Cost Hike	64
Chapter 2	
A HYDRO PAST BUT A RENEWABLES FUTURE	70
THE TRANSFORMATION OF THE HYDRO-ELECTRIC COMMISSION	70
Hydro-industrialisation.....	70
Load and Demand Forecasts	71
Effects of Hydro-industrialisation	72
Consumer Pain and Confusion in the 1980s.....	75
Retaining Expertise and Skills.....	77

Cultural and Fiscal Change	77
Past Basslink Proposals	79
Basslink in the 1990s	81
A New Future for the Hydro-Electric Commission	82
Selling the Public Asset	84
Bacon Government's Energy Policy	85
No Threat from Debt	86
Talking Up the Tasmanian Economy	90
Hydro Tasmania's Solutions to the World	92
Environmental Credentials.....	94
A Renewables Future.....	94
Mandatory Renewable Energy Targets.....	95
Ambitious Wind Power Plans.....	97
Dampening Wind Power Claims	99
Hydro Tasmania's Economic Imperatives.....	100
THE GREENS' PERSPECTIVE AND THEIR DILEMMA.....	102
Geographical Links to Basslink.....	102
Political Links to Basslink	103
Response to the DIAS.....	104
Raising the Broader Issues	105
Overpowering Tasmania.....	106
Problems with the Mandatory Renewable Energy Target	107
Mandatory Renewable Energy Target Baselines	108
Mandatory Renewable Energy Target Review	111
Climate Change	112
People's Hearts and Minds.....	115
Evocative Imagery.....	116
The Contradiction	119
Linking Basslink with Wind Power.....	120
Chapter 3	
THEORETICAL CONTEXT AND METHODOLOGICAL FRAMEWORK.....	123
THEORETICAL CONTEXT	123
Epistemology	124
Realism	124
Constructivism	125
Boundary-Defining Language.....	127
Conditional Knowledge	127
Conditionality as Indeterminacy	130
Contextual Factors	132
Inverting 'Reality'	133
Constructing Facts, Obscuring Conditionality	133
Moving Modalities	134
Constructing 'Reality'	135
Modality-Shedding Devices	136
STS THEORETICAL DISPUTES AND CONCEPTUAL TOOLS.....	137
Science Wars	137
Relativism.....	138
Realists and Constructivists.....	139

Ontology	140
Social Realism, Finitism and Interests	142
Co-construction	144
Certainty Trough.....	146
ANALYTICAL FOCUS.....	149
A Constructivist Epistemology	149
Links with Environmental Impact Assessment Theory and Practice	150
Predictive Models.....	152
Adaptive Management.....	153
Preventive Paradigm	154
Fiducial Science	154
Dispensing with Objectivity	156
METHODOLOGICAL FRAMEWORK	157
Discourse Analysis Literature Review	157
Discourse as Action.....	158
Ethnomethodology and its Origins	159
A Foucauldian Approach.....	161
Discursive Practice – Discourses-in-Practice.....	162
Fairclough’s Critical Language Study	163
Ideology and Hegemony.....	164
Conceptual Interpretative Repertoires.....	166
Narrative Analysis	169
Narratives Travel	171
Central Questions.....	173
RESEARCH DESIGN	174
Case Study and Theory Testing Approach.....	174
Empirical Resources.....	175
 Chapter 4	
TWO CASES FROM HYDRO TASMANIA IN SUPPORT OF BASSLINK	177
Conceptual Distinctions.....	178
Call for Science.....	179
Benefits of Basslink for the Gordon River	180
With and Without Basslink Baselines	183
Two Cases for Basslink	184
Operational Changes on the Gordon River from Basslink.....	185
Discharge Zones on the River Banks	186
Environmental Impacts of Case 1.....	187
Environmental Impacts of Case 2.....	190
Mitigation Measures	191
Conditions on Mitigation	193
Modelling Mitigation Effects	202
A New Without Basslink Baseline	206
 Chapter 5	
IDENTIFYING CONTINGENCIES IN	
PREDICTIVE MODELLING AND PROJECTED BASELINES	207
The Truth About Basslink	207
Past Studies.....	208

Hydro Tasmania's Scientific Studies	208
A Crucial Conditionality	209
Multiple Uses of TEMSIM.....	209
TEMSIM Origins.....	212
TEMSIM Structure and Performance.....	213
Inputs and Outputs of TEMSIM.....	214
Disclosure of TEMSIM Model Assumptions, Limitations and Uncertainties.....	215
Sensitivity Analyses of Basslink Drivers.....	216
Victorian Prices	217
National Electricity Market.....	219
Reduced Wholesale Electricity Prices.....	219
PROPHET Simulation Model	220
PROPHET Price Scenarios.....	222
PROPHET Knowledge Connections.....	223
PROPHET Inputs.....	226
Repeating the Past in the Future	227
Strategic Bidding Strategies	228
Modelling Behaviour	229
Future Changes for a Market Environment.....	230
PROPHET Core.....	231
Knowledge Distances.....	233
Tasmanian Hydro-generation Load.....	233
Load Sensitivity Analyses	234
Changes in Tasmanian Load.....	236
Natural Gas	237
Loss of a Major Industrial Consumer	237
Hydro-system Capacity	238
Future Supply Options	238
Wind Power Potential.....	239
Additional Sensitivity Analyses	240
Downstream Impacts of Changes in Load and Price	242
Historical Without Basslink Baseline.....	246
Historical Record the Best Baseline.....	246
Chapter 6	
NARRATIVES AND CONSTRUCTIONS	249
ANALYSIS OF NARRATIVES	250
Narrative Certainty.....	250
Narratives and Concept Constructions as Argumentative Strategies.....	251
Constructions of the Model Outputs.....	251
Overstated Impacts	252
Load Constraints at the Gordon Power Station.....	252
Load Constraints Narrative	253
TEMSIM Model Bias Narrative.....	254
Mobilising Constructions	255
Contextualisation	257
A New 'Without Basslink' Baseline.....	260
TEMSIM-SYSOP Comparison	261
Revised Conclusions.....	261

Without Basslink (Historical) and Without Basslink (SYSOP)	262
Construction of Model Outputs as Further Understanding	263
A Matter of Scale	263
Hydrological Variability	264
A New Brief.....	264
Updating the Science	265
Moving the Boundaries	267
Constructions of the Gordon River.....	271
Juxtaposing Existing with Future Impacts	272
Ecological Management Based on Trade-Offs	273
Construction of the River as Not Having Reached Equilibrium.....	274
Diminishing the Value of the River	275
What's on the River?	276
Conflating the Equilibrium Construction with the River Narrative.....	277
Conflating the Equilibrium Construction with the Load Constraints Narrative...	278
Riparian Vegetation Loss	283
LEGITIMATION OF 'REALITIES'	285
Load Constraints Narrative	285
TEMSIM Model Bias Narrative.....	286
What is Reasonable?	288
Gordon River Narrative	288
Environmental Protection (Impact of Proposals) Act 1974	289
World Heritage Properties Conservation Act 1983	291
Precautionary Principle	295
Chapter 7	
CHARTING THE MOBILITY OF 'NO NET BASSLINK IMPACT'	298
'NO NET BASSLINK IMPACT': A USEFUL DISCURSIVE DEVICE	299
Origin and Definition	299
Tasmanian Wilderness World Heritage Area	300
Hydro Tasmania's Case 1.....	302
A Different Reading of the Load Constraints Narrative?.....	303
Hydro Tasmania's Case 2.....	304
Legal Case Linchpin.....	304
'Done to Death' River	305
'No Net Basslink Impact' Boundaries	307
Defining 'Long-Term Presently Occurring Trends'	308
Translocating Evaluation into the Future	311
Evidencing the Inapplicability of World Heritage Convention Legislation.....	312
Evidencing Compliance with the Tasmania Wilderness World Heritage Management Plan 1999	315
Evidencing Sustainable Development	318
Evidencing an Application of the Precautionary Principle.....	318
REGULATORY OUTCOMES AND INSTRUMENTS.....	320
Monitoring, Reporting and Disclosure	321
JAP's Rejection of 'No Net Basslink Impact'	324
Management Restricted by 'No Net Basslink Impact' Limits.....	327
Trade-Offs	328
Disclosure and Compensation	329

Chapter 8

THE CRITICS:

IGNORANT ILLITERATES OR PERCEPTIVE RECALCITRANTS?	332
Drawing the Boundaries.....	334
Process Inequity	334
Raising Scientific Literacy	336
Reframing Indeterminacy as Uncertainty	338
Changing Contexts and Deepening Conditionality	340
Certainty Trough	340
Embedding Worldviews.....	342
Closed 'Black Boxes'	343
Loss of Agency	343
Issues of Dependency	345
Scepticism	345
Disbelief	346
Unintended Costs and Consequences	347
Trust and Suspended Doubt.....	348
The Past Informs the Future.....	350
A Loss of Social Identity	351
Inside the 'Black Box'	352
Challenging Proponents' Claims.....	352

Chapter 9	
LINKING NARRATIVES WITH THEORY	357
Epistemology and Ontology	358
Boundary-Work	359
Predictive Models	363
Can the 'Facts' Speak for Themselves?	364
Shedding Modalities	366
Prescriptive Social Framings and Worldviews	367
Contextual Factors	370
Co-construction	373
Fiducial Science	376
Certainty Trough	378
The Role of Narratives and Constructions	381
Indeterminacy	382
Multiple Constructions, Same Narrative	383
Validating Stories	384
Interpretative Repertoires	385
No Net Basslink Impact	386
Intermingled Discourses	387
Chapter 10	
CONCLUSIONS	389
REFERENCES	403
APPENDICES	427
APPENDIX 1-1	428
APPENDIX 1-2	428
APPENDIX 2	431
APPENDIX 3	433
APPENDIX 4-1	434
APPENDIX 4-2	437
APPENDIX 4-3	439
APPENDIX 4-4	441
APPENDIX 4-5	443
APPENDIX 5	446
APPENDIX 6	448
APPENDIX 7	449

FIGURES

Figure 3.1 The Uncertainty Trough.....	129
Figure 5.1 PROPHET Data Sources.....	198

GLOSSARY OF TERMS

AEA	Australian EcoGeneration Association
AM	Adaptive Management
ANT	Actor Network Theory
BCSE	Business Council for Sustainable Energy
BDB	Basslink Development Board
BPL	Basslink Pty Limited
CAAP	Combined Approvals and Assessment Process
COAG	Council of Australian Governments
CREA	Centre for Regional Economic Analysis
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DIIAS	Draft Integrated Impact Assessment Statement
DPIWE	Department of Primary Industries, Water and Environment (an agency of the Tasmanian State government).
ECITA	Environment, Communications, Information Technology and the Arts Senate Committee
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth legislation).
EMPC Act	<i>Environmental Management and Pollution Control Act 1994</i> (Tasmanian legislation).
EPA	Environment Protection Agency
EPIP Act	<i>Environment Protection (Impact of Proposals) Act 1974</i> (Commonwealth legislation).
GCM	Global Circulation Models
HEC	Hydro-Electric Corporation
HECEC	Hydro-Electric Commission Enterprises Corporation
HT	Hydro Tasmania

HVDC	High Voltage Direct Current
IES	Intelligent Energy Systems
IIAS	Integrated Impact Assessment Statement
JKMRC	Julius Kruttschnitt Mineral Research Centre
JAP	Joint Advisory Panel
LWM	Low Water Mark
MW	Megawatt (= 1,000 kilowatts of electricity generation)
MWh	Megawatt hour (use of 1,000 kilowatts of electricity per hour)
MRET	Mandatory Renewable Energy Target
NCP	National Competition Policy
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NGIL	National Grid International Limited
NGG	National Grid Group
NGMC	National Grid Management Council
NIEIR	National Institute of Economic and Industry Research
ORER	Office of Renewable Energy Regulator
PMSEIC	Prime Minister's Science, Engineering and Innovation Council
POSS	Project of State Significance
REC	Renewable Energy Certificate
RGP	Real Gross Product
RMPS	Resource Management and Planning System (Tasmanian legislation)
RPDC	Resource Planning and Development Commission
SAFMA	<i>State Authorities Financial Management Act 1990</i>
SECV	State Electricity Commission of Victoria
SOEB	State Owned Energy Businesses
SOO	Statement of Opportunities (issued annually by NEMMCO)
SP&P Act	<i>State Policies and Projects Act 1993</i> (Tasmanian legislation)
SRMC	Short Run Marginal Cost
STS	Science and Technology Studies
SYSOP	SYStems OPeration model
TCCI	Tasmanian Chamber of Commerce and Industry
TEMSIM	Tasmanian Electricity Market Simulation Model

TFIC	Tasmanian Fishing Industry Council
TNGP	Tasmanian Natural Gas Project
TWWHA	Tasmanian Wilderness World Heritage Area
TWWHMP	Tasmanian Wilderness World Heritage Management Plan
VPX	Victorian Power Exchange
WHA	World Heritage Area
WHPC Act	<i>World Heritage Properties Conservation Act 1983</i>

INTRODUCTION

The central focus of this thesis is the role of narratives in the construction, mobilisation and validation of scientific knowledge claims. With an epistemological commitment to constructivism, which conceptualises scientific knowledge as the product of a process (and not something revealed), the regulatory domain of impact assessment in respect of Basslink, a major energy infrastructure development in Australia, has been used as a case study to undertake the task of tracing the translations that intervened between assessment process inputs and outputs – contributions deemed ‘scientific’ and ‘independent’ by the project’s proponents and supporters. Foregrounding these aspects demonstrates the conditional nature of knowledge used in the regulatory sphere to justify the operation of technological developments and the imposition on communities of environmental and economic risks (Wynne 1992a; Irwin and Wynne 1996). Specifically, the knowledge claims tendered by Hydro Tasmania, Tasmania’s hydro-electricity generator, in respect of predicted environmental impacts on the Gordon River stemming from changes to river flows required to generate and export hydro-electricity across Basslink, have been examined.

Over a distance of 350 kilometres, the Basslink electricity cable will connect Australia’s most southerly state to its mainland by linking the power grids of Tasmania and Victoria. There were two components to the impact assessment process – the cable across Bass Strait and the Tasmanian hydro-electric generation system. Basslink Pty

Limited (BPL), the principal proponent, was responsible for providing an assessment of “intrinsic” impacts of the former; for instance, construction impacts, impacts of the transmission line and cable on the natural environment and visual amenity, as well as effects on the sea and the seabed (DIIAS 2001b:1-5). BPL also provided evidence in respect of the social and economic impacts of the project. Hydro Tasmania (HT)¹, was responsible for the assessment of what were termed “consequential” impacts on the hydro-electric scheme in Tasmania stemming from expected changes to discharges from rivers, lakes and hydro-power generation systems for the operation of Basslink (DIIAS 2001b:1-5). Both proponents engaged consultants to undertake the necessary impact assessment work. NSR Environmental Consultants Pty Limited for BPL prepared the principal document of the process, the *Draft Integrated Impact Assessment Statement*, hereafter referred to as the DIIAS. HT used its in-house Resource Analysis Group and Environmental Services Division (Clayton Utz 2001a:2-3).

Notwithstanding its designation as a World Heritage Area, with the proposal for Basslink the Gordon River once again became a site of political struggle between Tasmania’s hydro-electric power generator and those wanting to conserve the natural environment of the area. Compared to the fight in the early 1980s to save the Gordon’s major tributary, the Franklin, from inundation in a hydro-electric power scheme – the Australian environment movement’s finest hour – the encounter over Basslink was

¹ For consistency, unless referred to in a quotation, references to the HEC stand for the Hydro-Electric Corporation and are distinct from those to its predecessor, the Hydro-Electric Commission, which will always be stated in full. It should be noted that although reference is made to Hydro Tasmania (HT), this is a brand name, and the organisation remains the Hydro-Electric Corporation. Hence, there are references to both the HEC and HT through the thesis. In terms of documents presented to the impact assessment process, if they were not specifically noted as having been prepared by or for the HEC, I refer to them as having been tendered by HT. At all other times I refer to Hydro Tasmania (HT), as this is how the organisation is now described.

considerably muted. At a broad level, this thesis seeks to understand how things were different.

In terms of HT's case in respect of Basslink, it is important to acknowledge the difficulties HT's representatives faced in identifying Basslink's potential environmental impacts. Data gaps, conversion disjunctures and modelling limitations are explained in HT's documentation and outlined in the chapters that follow. Hence, the task faced by HT to present a case which aligned with the process guidelines, which required predictions into the future, is not underestimated here. However, what was incongruous was that HT's presentation of its findings was accompanied by claims about the implausibility of the model outputs from which it derived its conclusions. This begged the question – if the assessment of Basslink was based on empirical 'scientific' evidence (JAP 2000b:41), how did HT fulfil the process requirements and have its regulatory proposals substantially approved?

Accordingly, the question that has guided this work is *how*, given the extent of the disclosed uncertainties and limitations in the inputs and outputs of the predictive environmental and economic modelling used to substantiate the impacts of Basslink, was HT's case in support of the development constituted, deployed and, thereby, legitimated by the decision-making body charged with the task of assessing the project? To answer this question, this study follows Hydro Tasmania's knowledge claims through the impact assessment process and demonstrates the pivotal role of narratives and the extent to which they can bridge empirical gaps, explain and obscure inconsistencies, erase unexpected model outputs, contextualise findings and mobilise ontological claims. In summary, this work examines the origins, mobility and

durability of three stories. Mapped from their tenuous beginnings, through the assessment process and then into the regulatory outcomes, I examine how these narratives were packaged, how they stabilised knowledge claims as well as what influence they had on judgments about impacts, and the regulatory outcomes of the Basslink impact assessment process.

Thesis Structure

To give an overall picture of this thesis, Chapters 1 and 2 provide contextual material. Chapter 3 sets out my theoretical context and methodological framework. Chapters 4 and 5 detail contingencies identified in the predictive modelling from which conclusions were derived, and Chapters 6 and 7 set out my analysis of HT's knowledge claims in respect of environmental impacts on the Gordon River. Chapters 8 and 9 weave these sections together and provide the foundations for my conclusions set out in Chapter 10.

Placement of the contextual material before my theoretical context and methodological framework reflects my attempt to delineate the issue of Basslink from my analysis of it. As the latter has focused so specifically on the scientific inputs and outputs, it is necessary to spend some time describing how the impact assessment process proceeded and to outline the links between Basslink, past conflicts, the transformation of HT since the halting of the Gordon below Franklin Dam, as well as the current issues HT faces. Whilst this contextual material contributes to the analysis of later chapters, and is particularly important in understanding the context of the public submissions outlined in Chapter 8, it sits slightly askew of my epistemological analysis – hence its placement in advance of Chapter 3.

Chapter 1 provides an overview of the Basslink impact assessment process, its institutional and policy context and the public consultation phases. It also traces the development of the case for Basslink by the constituent agencies of the Tasmanian government. It will be argued that it was predominantly environmental matters that remained open for discussion during the impact assessment and public hearing process, with issues of social benefit having been uncomplicatedly linked to conclusions about the project's economic viability, which had been determined as positive at least as far back as 1997. As it demonstrates the crucial role of critique in such processes, which in the case with Basslink forced a change to the proponent's project specifications on environmental grounds, I will also discuss the dominant issue in contention at the public hearings in Hobart, the Basslink cable technology.

The political landscape of Tasmania has been polarised between bipartisan governments and conservationists since the flooding of Lake Pedder in the 1970s and the halting of the Gordon below Franklin Dam in the 1980s. Although these controversies set the context for this study of Basslink, both politically and geographically, they will not be retraced here. However, Chapter 2 will make links between these conflicts and Basslink, and outline the transformation of the Hydro-Electric Commission into the Hydro-Electric Corporation (HEC), now branded 'Hydro Tasmania – the renewable energy business'. Also, as a participant at the Basslink public hearings, with a designated role in cross-examining the proponents and their witnesses, the position of The Greens on Basslink will also be outlined in Chapter 2. This chapter will close with a discussion of the difficulties The Greens faced in mounting a provocative case against Basslink.

Chapter 3 sets out the theoretical context and methodological framework for this study. Beginning with an overview of the field of Science and Technology Studies (STS) and the fissures within it, this chapter outlines the analytical focus of the thesis and introduces a number of theoretical insights which are used as conceptual tools in the analysis of the Basslink process and HT's case in respect of the Gordon River. This is followed by an overview of my methodological framework. A review of the discourse analysis literature precedes an outline of a methodology in which insights from STS are combined with a form of narrative analysis. This chapter also details the questions posed by this thesis.

The use of predictive models by proponents in the impact assessment process is a central issue for this thesis. Chapter 4 sets the scene for my narrative analysis and introduces the models and associated issues that will be discussed in the ensuing chapters. This section also draws attention to the substantial difference between the case presented by HT in the DIIAS in respect of impacts and changes to Tasmania's hydro-system, and its case presented at the public hearings some three months later.

Chapter 5 outlines a range of modelling limitations and data difficulties disclosed in HT's reports. Going a step further, it uncovers a range of contingencies and indeterminacies contained in the predictive modelling tendered by HT and BPL and used in support of the case for Basslink. It will be shown that the economic business case for HT; predictions for Tasmanian government businesses revenues; national and regional economic growth and employment figures; greenhouse gas emission changes; electricity price reductions; and, the environmental impacts predicted to occur with

Basslink are all anchored to one predictive model, PROPHET, which received only passing comment in the assessment documentation. The origins of PROPHET, its inputs and outputs and how it was used by the Basslink proponents will be examined here.

Chapter 6 applies a narrative analysis to the case put by HT in respect of Basslink. Here, I identify particular constructions of the model outputs advanced by HT in regard to the Gordon River and three narratives that mobilised them. I argue that these configurations stabilised HT's case for its external researchers, its in-house consultants, its legal team and the assessment panel. This section also identifies which configurations of HT's narratives and constructions were validated by the assessment panel.

To fulfil my aim of tracing the mobility of HT's knowledge claims through the impact assessment process, Chapter 7 concentrates on the concept of "no net Basslink impact" (Bludhorn 2001:5) which, I argue, coalesces the narratives and constructions identified in Chapter 6. I map its origin, its interpretation in respect of World Heritage Convention legislation, Tasmanian resource management legislation and the precautionary principle. I then discuss how this precept was incorporated into the regulatory outcomes of the process and its ramifications for future decisions about impacts of Basslink on the Gordon River.

Although the practice of using predictive modelling seems inevitable if the objectives of the existing impact assessment process are to be met, the extent to which they obscure from view important conditionalities diminishes transparency and accountability, and

impedes independent analysis and verification. This issue will be discussed in Chapter 8, which draws on the public submissions and responses to the DIAS. It will be shown that project critics demonstrated an astute sensibility about the limits of knowledge and viewed claims from the proponents about their ability to predict and control impacts as overstated and indeterminate. The extent to which issues such as trust and past track record bear upon people's uptake of 'scientific facts' presented by proponents will be considered in this chapter.

Chapter 9 sets out the findings of this study. As such, it returns to the issues discussed in Chapter 3 to link the conceptual tools from the field of STS set out therein with the contextual material in Chapters 1 and 2, the modelling contingencies outlined in Chapters 4 and 5 and the narrative analysis in Chapters 6 and 7. It begins with a discussion of theoretical and methodological issues, then retraces issues of interest in the Basslink impact assessment process in light of the STS theory set out in Chapter 3 before making links between STS theory and the narrative analysis.

My final chapter will discuss some implications of insights drawn from my analysis. Whilst the primary focus will be the operationalisation of environmental legislation and future regulatory assessment processes, I will also describe what I have termed 'knowledge risks' that reside, but are obscured, in the translations that occur with the movement of knowledge.

In summary, then, this thesis will demonstrate the rhetorical utility of science and the contingency of HT's knowledge claims presented as 'scientific' and 'independent'. Although data gaps and modelling limitations were disclosed by HT, it will be shown

that HT's conclusions obscured from view a string of estimates, extrapolations and worldviews that served as "unnegotiated social prescriptions" (Irwin and Wynne 1996:9) in terms of the past and the future which were made by an array of third parties across different domains and over long distances. It is these conditionalities that critics of Basslink were well aware. It will be further shown that in-house configurations intervened to merge knowledge claims in respect of predicted environmental impacts on the Gordon River with HT's organisational, economic and political imperatives. An assessment of the extent to which HT's claims were contextualised by qualifying stories and constructions about its model outputs and the state of the Gordon River will highlight the stabilising effects of narratives and the constructions they mobilise, and demonstrate the ability of narratives to travel virtually unhindered across domains (Turnbull 2002).

Chapter 1

THE BASSLINK PROJECT, ASSESSMENT PROCESS BOUNDARIES AND ISSUES OUT OF REACH

The purpose of this chapter is to set out the rationale and goals of the Basslink project outlined by the project proponent in the DIAS (2001a). It will also cover the institutional and legislative context of the Basslink impact assessment process and explain how the latter proceeded, and it will trace the development of the case for Basslink by the constituent agencies of the Tasmanian government. This will include details about the project's commercial arrangements and issues in respect of its economic viability. It will be argued that predominantly environmental issues remained open for discussion in the impact assessment process, while issues of social benefit were uncomplicatedly linked to the project's economic viability, which had been decided upon as positive at least as far back as 1997. As it links with the project's economic viability, and illustrates the pivotal role of critique in challenging assumptions of proponents, I will also discuss the dominant issue in contention at the public hearings in Hobart, namely, BPL's technology choice and how the monopole cable system proposal was changed from one with a sea-earth return to a metallic return.

THE BASSLINK PROJECT

Rationale and Goals of Basslink

Basslink will allow Tasmania to export a maximum of 600 megawatts (MW²) of electricity to the Australian National Electricity Market (NEM), and import a maximum of 300 MW to Tasmania³. The idea is that HT will export hydro-power to the NEM in peak periods at high demand intervals during the week and import coal-fired power in off-peak periods at night and on weekends. This means that HT can save its water resources in off-peak times by using low-priced coal-fired power from the mainland to supply Tasmania and export hydro-power at mainland peak times, which differ to that of Tasmania. This allows HT to obtain a premium price for its hydro-power.

Predictive modelling undertaken by HT, which will be detailed in later chapters, calculates the revenue it can raise from a trading scenario such as this in what is known as the spot or wholesale market⁴. In simple terms, HT's revenue is calculated as the difference between the prices received for sales of peak power and the prices it pays for the NEM's off-peak power. Importantly, the economic modelling from which these revenues have been calculated has also been used to predict the project's financial viability; changes to electricity prices in Tasmania and Victoria; Tasmanian government businesses' profit increases; macro-economic changes in terms of employment and real

² A megawatt is equal to 1,000 kilowatts of electrical power generation.

³ The 300 MW import to Tasmania is not due to a limitation of the cable but relates to the capacity of the Tasmanian power system should there be an outage on Basslink. The figure of 300 MW has been determined as the maximum allowable in this regard (DIAS 2001b:6-6). If the Tasmanian system was upgraded, greater quantities of power could be imported to a maximum of 600 MW, under the same conditions required to export.

⁴ It should be noted that HT could secure contracts with mainland retailers to supply hydro-power outside the spot market. This would be desirable as it would provide HT with revenue and operational security. Potential revenue from such contracts which would reflect lower prices, and how this could change the model outputs was not considered in the impact assessment process.

gross product for each state as well as nationally; changes in greenhouse gas emissions; and, the environmental impacts to Tasmania's rivers and lakes used to generate hydro-electric power.

The Basslink cable's design accommodates the envisaged participation in the peak market. Specifically, it has a continuous rating of 480 MW. Exports of 600 MW can occur but for only ten hours (DIAS 2001b:6-6), as long as the cable has been pre-cooled for six hours at a load of 300 MW, and 600 MW exports are to be followed by eight hours of a load at no more than 480 MW (HT 2001b:7). This seems restrictive, but the mainland peaks do not last for long and so it is envisaged that there will not be any trouble operating within these constraints.

The DIAS (2001b:xxv-xxvi) characterises the electricity generation systems of Victoria and Tasmania as constrained – in Victoria, “peak generating capacity is inadequate” whereas in Tasmania the system is “energy-constrained by rain and snowfall in hydro catchments”. Basslink, it is proposed, creates a “synergy ... by allowing existing generation to be used more efficiently” (DIAS 2001b:xxvi). According to the DIAS, Basslink's strategic goals are:

- To enable Tasmania to become a full participant in the NEM.
- To meet reserve requirements and to better manage peak demand in Victoria.
- To improve the potential for economic growth in Tasmania by providing additional energy for industrial and manufacturing developments.
- To introduce competition into the electricity supply industry in Tasmania and thus enable electricity prices to be set by competition rather than regulation (DIAS 2001b:2-1).

There are several issues to note in respect of these goals. First, Tasmania's entry into the NEM aligns with a number of reforms approved by the Council of Australian Governments (COAG) and its National Competition Policy (NCP) (Freehills 2001a:4-5). Compliance with NCP entitles Tasmania to payments from the Commonwealth government. Between 1997 and 2001 the Tasmanian government received around \$56 million in NCP payments and is estimated to receive a further \$88 million between 2002 and 2006 (National Competition Council 2002a). It is important to note that the application of NCP is not mandatory but subject to a public interest test which involves the consideration of a number of factors, including environmental and social issues, for governments to determine the merits of reform (National Competition Council 2002b).

Second, the problem with peak demand in Victoria is that it is highly sensitive to temperature and is driven by an increase in the number of air conditioners that are operated on hot days in summer. Hence, when demand skyrockets the system becomes insecure for only a few days in the year. This makes system management difficult as, despite the small number of days involved, reserve levels have to be met (NEMMCO 2002a:1-18). The general approach to deal with this situation has been to increase power generation and Basslink is represented in the DIIS as part of the solution.

Third, although the DIIS (2001b:2-3) indicates that Tasmania's domestic demand is above the long-term average capacity of the hydro-system, Tasmania's electricity demand is projected to grow at an average of only 0.7 per cent per year to the year 2020

(Department of Infrastructure, Energy and Resources 2004)⁵. In addition, natural gas is now being piped to the state. Not only will it augment supply for industrial and manufacturing purposes with the conversion of Bell Bay Power Station from oil to gas, 20 per cent of Tasmania's electricity needs are now being met by electricity generated from natural gas⁶. Despite the expected low level of demand growth and this boost to energy supply for the State, Basslink is represented as the centre-piece of the State's future energy needs. Importantly, Basslink provides a solution to the predicament of what to do if any of the major industrial customers shut down their operations and another industrial customer cannot be found. With Basslink in place, the unused capacity could be exported to the mainland, although this would be limited by the capacity of the cable.

Legislative Context

The land and sea affected by the power cable infrastructure come under the jurisdictions of Tasmanian and Victorian State legislation and that of the Commonwealth. By means of a Memorandum of Understanding signed by the Ministers for the Commonwealth and the States, a Combined Assessment and Approvals Process (CAAP) (DIIAS 2001b:2-1) was established. Three pieces of legislation guided the impact assessment process for each jurisdiction. These were the *State Policies and Projects Act 1993* (SP&P Act) in Tasmania, the *Environment Effects Act 1978* in Victoria and the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act)

⁵ It is noted by the Department that this growth rate does not take account of electricity that would be required by a proposed magnesium smelter and its electricity supply from Tasmania's Bell Bay Power Station that has been converted from running on oil to natural gas (Department of Infrastructure, Energy and Resources 2004).

⁶ Media Release, Hydro Tasmania, 23 January 2004, 'Bell Bay Power Station to Operate Both Machines'. This media release notes that the decision to operate both machines at Bell Bay is due to falling lake levels due to low rainfall over the past six years. It is also noted that with the gas conversion, the cost of running Bell Bay has been reduced by two-thirds.

for the Commonwealth⁷. The DIIAS was designed to meet the legislative requirements of each jurisdiction (DIIAS 2001b:2-1), namely, an Environmental Impact Statement required by the Commonwealth, an Environment Effects Statement required by Victoria and both an Environmental Impact Statement and a Social, Economic and Community Impact Statement required by Tasmania (DIIAS 2001b:1-3)⁸.

The EPIP Act was repealed by the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) on 16 July 2000. As it had already been determined by the Commonwealth Minister for Environment and Heritage that a Commonwealth IES would be required for Basslink, the assessment process remained under the auspices of the EPIP Act. This was conditional upon the project assessment recommendation report being submitted to the Commonwealth government by 17 July 2002 (DIIAS 2001a:2-7). Otherwise, the EPBC Act would have come into effect in relation to the project which would have imposed a different and more onerous set of environmental tests on the project. Indicative of the race against time, the *Final Environmental Impact Statement and Supplement to the Draft Integrated Impact Assessment Statement* (NSR Environmental Consultants Pty Ltd 2002), referred to hereafter as the Final EIS and Supplement to the DIIAS, was released on 24 June 2002⁹. With this in hand, in late June the JAP prepared and issued its *Final Panel Report* (JAP 2002b) for submission to the

⁷ It is beyond the scope of this study to go into detail in relation to the legislation and policies applicable to the project other than the discussion set out in this chapter. This discussion will be confined to Tasmanian issues and legislative requirements. Details of the legislation relevant to the project, which is extensive, are set out in Chapter 2 and Appendix 2 of the DIIAS (2001a).

⁸ In accordance with the Victorian legislation, a community group, the Basslink Consultative Committee, was established in Victoria to advise the proponent and the JAP on the scope of the DIIAS. Although there was no such legislative requirement in Tasmania, the George Town Consultative Committee was established to allow input from the local community in this area where the cable sets down in Tasmania (DIIAS 2001a:2-2).

⁹ Media Release, Tasmanian Government, Minister for Infrastructure, Energy and Resources, Paul Lennon, 25 June 2002, 'Another Milestone for Basslink'.

Commonwealth and Victorian governments, and the Resource Planning and Development Commission (RPDC) in Tasmania. At the beginning of July, the RPDC made its recommendations to the Tasmanian government (RPDC 2002). Obviously, these final reports were prepared and reviewed with considerable haste.

A Project of State and National Significance

In Tasmania, the SP&P Act was invoked when the Tasmanian Premier, Jim Bacon¹⁰, as the Minister for State Development, declared Basslink a Project of State Significance (POSS) in April 1999. Under Tasmania's *Environmental Management and Pollution Control Act* 1994 (EMPC), a POSS project is a Level 3 activity (Harvey 1998:47). The criteria for determining a POSS include at least two of:

- Significant capital investment;
- Significant contribution to the State's economic development;
- Significant consequential economic impacts;
- Significant potential contribution to Australia's balance of payments;
- Significant impact on the environment;
- Complex technical processes and engineering designs; and
- Significant infrastructure requirements

(*State Policies and Projects Act* 1993).

As a POSS, an "integrated assessment" of Basslink was required to be undertaken, which meant a "consideration of environmental, social, economic and community issues relevant to that project and such other issues as may be prescribed" (*State Policies and Projects Act* 1993:9)¹¹.

Premier Bacon (1999:1) directed the RPDC to "address the environmental, social, economic and community impacts of Basslink". This direction drew the assessment process wider than environmental impacts ordinarily covered by Tasmania's EMPC Act

¹⁰ In early March 2004, the Premier of Tasmania, Jim Bacon, stepped down from his position due to illness. I will refer to him in his capacity as Premier throughout the thesis as this was the position he held during the events I am describing.

(DIAS 2001a:2-14). Although a POSS designation conveys a message that, in principle, the government is keen for a project to proceed, in the case of Basslink the legislative criteria for its invocation indicate an intent for a broad-ranging assessment of issues other than environmental ones, due to the scale of the project and its potential social and economic impacts for Tasmania.

Basslink also received special treatment at the federal level. In November 2000 the federal government granted it Major Project Facilitation Status (HT 2001a:14). Hence, not only was the project deemed to be of state significance, but also of national significance.

Tasmania's Resource Planning and Development Commission

The RPDC is an independent statutory body in Tasmania, established in 1997. It has a central planning role in relation to land and resource use under Tasmania's Resource Management and Planning System (RMPS). An application of the SP&P Act requires conformity with the RMPS and directs that an integrated assessment by the RPDC "must seek to further the objectives set out in Schedule 1" (SP&P Act 1993, Section 20 Subsection 5), which states:

1. The objectives of the resource management and planning system of Tasmania are –
 - to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and
 - to provide for the fair, orderly and sustainable use and development of air, land and water; and
 - to encourage public involvement in resource management and planning; and
 - to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c); and

¹¹ A POSS project can also override existing planning schemes (Harvey 1998:47).

- to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.

2. In clause 1(a), “sustainable development” means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while –

- sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and
- safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
- avoiding, remedying or mitigating any adverse effects of activities on the environment

(*State Policies and Projects Act 1993*, Schedule 1:18-19).

The SP&P Act designates the RPDC as the responsible body for POSS assessments in Tasmania and to give advice to the government on whether such projects should proceed, and if so, on what basis.

In the case of Basslink and under the CAAP, a Joint Advisory Panel (JAP) was established to meet the requirements of all jurisdictions to “review IIAS documentation, conduct panel hearings and report to decision-making ministers in the three jurisdictions” (DIIAS 2001a:2-1). In Tasmania, the JAP acted as a delegate of the RPDC (DIIAS 2001a:2-16) and “the recommendations of the JAP as a whole ... constitute[d] the recommendations of the RPDC for the purposes of the Tasmanian component of the process” (DIIAS 2001a:2-14).

Joint Advisory Panel

The JAP members consisted of two delegates from the RPDC representing Tasmania, namely, Julian Green and Bruce Davis; two appointed by the Victorian Minister for Planning, Jenny Love and Peter Davies; and one appointed by the Commonwealth

Minister for Environment and Heritage, John Ashe (RPDC 2001a). Profiles of the JAP members indicate a group of people well-versed in impact assessment at state and federal levels of government, with qualifications and experience in law, environmental law and science, economics, surveying, planning, cartography, civil engineering, business and public administration, public policy and history (RPDC 2001a).

To assist in the scrutiny of the Basslink project proposal and the DIIAS the JAP engaged the services of an independent consultant, Brown & Root Services Asia Pacific Pty Ltd, which is now known as Halliburton KBR Pty Limited (referred to hereafter as Brown and Root). These consultants conducted a review of the DIIAS to report on how well it met the requirements of the JAP. They also reviewed methodologies used in the identification of potential impacts as well as the “validity” and “robustness” of assumptions and conclusions (Brown and Root 2001:Foreword).

Process Structure

The CAAP had four stages (DIIAS 2001b:xxi). The first was the identification of a proponent, and consultation with stakeholders. These tasks were carried out by the Basslink Development Board, which will be discussed further on in this chapter. The second was the release of *Draft Scope Guidelines for the Integrated Impact Assessment Statement (IIAS)* (JAP 2000a) in May 2000 (referred to hereafter as Draft Scope Guidelines), its public exhibition and then the issue of *Final Scope Guidelines for the Integrated Impact Assessment Statement (IIAS)* (JAP 2000b) in October 2000 (hereafter referred to as Final Scope Guidelines). These too will be discussed later in this chapter.

The third phase involved the preparation of the DIIAS by NSR Environmental Consultants Pty Ltd on behalf of BPL, its public exhibition from 2 July 2001, and public comment and subsequent public hearings in Tasmania and Victoria during the months of October and November 2001. It also involved the preparation and issue of the JAP's *Draft Panel Report* (JAP 2002a), which occurred in March 2002, its exhibition, public comment and further public hearings in Victoria. Interested parties had three opportunities to comment in writing; in response to the Draft Scope Guidelines, the DIIAS and the *Draft Panel Report*. In Tasmania there was one set of public hearings at which people were permitted to make a presentation before the JAP. In Victoria there were two sets of hearings.

Stage four involved the preparation and exhibition of the Final EIS and Supplement to the DIIAS (NSR Environmental Consultants Pty Ltd 2002) in June 2002, the release of the JAP's *Final Panel Report* (JAP 2002b) in June 2002, and reports to each government. After the Draft Scope Guidelines (JAP 2000a) were issued, the process took just over two years.

Praise for the Process

Having designated Basslink a project of state significance under Tasmania's SP&P Act, which established the JAP as an independent body to oversee the assessment of the project, the Premier, Jim Bacon, stated in his submission to the JAP in response to the DIIAS that:

The Tasmanian Government is confident that all issues associated with Basslink will be fully canvassed by the JAP through what is one of the most comprehensive assessment processes undertaken for any major project in Australia (Bacon 2001:4).

The Tasmanian Chamber of Commerce and Industry (TCCI) went a large step further in its praise for the comprehensiveness of the impact assessment process:

TCCI views the combined assessment process for Basslink as among the most extensive of its type in the world. It encompasses a detailed assessment of environmental, economic, social and community impacts and will take account of all interested parties interests. The TCCI applauds the decision of the three Governments to remove this project from the political domain (TCCI 2001:9)

Espousing the rigour of the process, HT claimed that the RPDC's assessment would be:

the toughest and most thorough environmental approval process ever undertaken in Australia, and the Basslink IIAS is one of the largest and most comprehensive environmental impact statements ever produced (HT 2001a:14).

Of course, this rhetoric is intended to convey a message that no stone would be left unturned. Given such grandiose assurances, and how difficult it would be to step back from them if the project did not get approval, one cannot help thinking that these actors were confident the project would get the endorsement of the JAP. These ambitious claims, which appear to be intended to discredit the project's critics, were recapitulated in the editorial of *The Examiner* on 11 October 2002:

No infrastructure project has undergone such detailed technical and environmental assessment or so many public hearings. Few projects have been the subject of such an intensive misinformation campaign by its political opponents.

DIIAS Critique

If stacked, the Basslink DIIAS would stand over one-metre high. Hence, if size was the criterion by which the rigour of an impact assessment statement and process should be judged, then Basslink's would be in the running. In terms of comprehensibility, however, it would rank low. I found the DIIAS extraordinarily difficult to navigate. I was not alone. The public submissions are replete with accounts of difficulties (eg T26;

T61; T63; T133; audio evidence Andrew Wadsley, 12 October 2001 and audio evidence, Peter Smith, 26 November 2001). The JAP's consultants, Brown and Root (2001), too, noted its unwieldy structure and shortcomings.

Following the release of Brown and Root's report which reviewed the DIAS on behalf of the JAP, the media headlines were not complimentary. The *Sunday Tasmanian* (30 September 2001), which dedicated two pages to the story, ran the headlines, "Rocket for Basslink: Impact Statement Slammed" (Bevilacqua 2001a:3) and "Basslink Review a Scorching" (Bevilacqua 2001b:8) and characterised the review as "scathing", explaining that the "Basslink report on the social, environmental and economic impacts of the project has been accused of 'creative interpretation' of poll results and 'selective editing'", and that the "glossy pro-Basslink TV commercials tell only part of the story, says an independent review".

Merits of the Process

Aside from the rhetoric and difficulties with the DIAS document, the JAP assessment process had a number of merits. The public consultation component was certainly extensive, with the publication of draft and final guidelines which were intended to allow interested parties to play a role in the direction of the preparation of the DIAS. Many suggestions made by submitters were incorporated into the Final Scope Guidelines (JAP 2000a; 2000b). From my observations, I believe that the JAP was acting independently, though within the confines of its own political objectives¹². Its success

¹² For example, this is indicated by the following reprimand from the JAP Chairman to Counsel for BPL: "During your address yesterday you indicated to the Panel that we should be cautious about being seduced by other proponents and bodies of evidence to, I'm probably not doing justice to your words, but to load up an indicative approval or recommendation with so many conditions that it becomes non-viable. ... I can assure you and your principals that the Panel is not into that sort of game and is very conscious of that position, but also, you should understand, your principals should understand, that we would not shrink from recommending appropriate conditions where the evidence is compelling and also where we

was within very strict limits, however, which had been set by the agencies of the Tasmanian government well before the project reached the RPDC¹³.

PROJECT AND PROCESS BOUNDARIES

Tracing the Limits

For the rest of this chapter I will discuss what boundaries were set for the project by the impact assessment process. In essence, I will argue that the JAP was given a *fiat accompli* and was left to do the best it could with the project within the constraints already imposed upon it. Relatedly, I will also argue that the CAAP was not an integrated assessment that focussed on social, economic, environmental and community impacts, as required by Tasmania's SP&P Act, but predominantly an environmental impact assessment. Consequently, the broader implications of this project of state and national significance, particularly its economic aspects, were cordoned-off from discussion.

Basslink Development Steering Committee

The approval of Basslink started with the Tasmanian government from within the Department of Treasury and Finance. With its mandate to provide the government with "economic, financial and commercial advice and information" (Department of

have a statutory duty to give effect to certain things. I could not let that cautionary wagging of the finger go without comment (audio evidence, 3 October 2001).

¹³ The Tasmanian government's actions in respect of the development of a large irrigation dam in Tasmania, Meander Dam, illustrates the political reality for the JAP. When the Resource Planning and Development Appeal Tribunal effectively disapproved the dam in early 2003 on economic and environmental grounds, the Tasmanian government introduced enabling legislation to allow it to proceed (Media Release, Tasmanian Government, Brian Green, Minister for Primary Industries, Water and Environment, 3 February 2003, 'Meander Dam Proposal to go to Parliament'). The legislation was passed through the Parliament in April 2003 (Media Release, Tasmanian Government, Brian Green, Minister for Primary Industries, Water and Environment, 10 April 2003, 'Legislation Prepares Way For Dam Project'). Of course, it is not known what would have happened if the JAP had disapproved Basslink, but this

Treasury and Finance 2002a:1), in November 1997 the Department of Treasury and Finance set up the Basslink Development Steering Committee, headed by Don Challen, the Department's Secretary (Lupton 2000:413), which subsequently reported on the viability of Basslink and made recommendations on how the government should proceed¹⁴. In its final report, the Basslink Development Steering Committee opens with the following statement:

The Government's decision to develop Basslink as a private sector project is one of the most significant energy policy measures announced in recent years. Basslink will be a major investment project and enable Tasmania's growing demand for electricity to be met. It will also allow opportunity trading in electricity between Tasmania and the mainland, capturing the economic benefits of exchange between an energy constrained hydro-electric power station and a capacity constrained thermal-based system. This fundamental synergy permits energy to be sold into the mainland peak when capacity is constrained and the price is high as a result, and the Tasmanian energy constraint to be managed by import at other times (Department of Treasury and Finance 1997:1).

Accordingly, not only would Basslink augment energy supply in Tasmania, it will deliver a revenue stream for the State via HT.

In relation to the project's viability, the report set out the following findings:

A study of the economic benefits of Basslink has been undertaken by the Steering Committee using a model of the national electricity market developed by the Victorian Power Exchange (VPX)¹⁵. The study results are highly promising indicating that Basslink is economically viable and will bring major benefits to Tasmania and Victorian customers (Department of Treasury and Finance 1997:2-3).

example gives a good indication – the government more than likely would have proceeded in a similar way.

¹⁴ According to its 1998 Annual Report, the HEC (1998:13) contributed to the development of this report.

¹⁵ The VPX ran the Victorian electricity market prior to the existence of the NEM and the establishment of the National Electricity Market Management Company (NEMMCO). A group within the VPX carried out simulation and modelling consultancy work. Andrew Campbell of Intelligent Energy Systems, a consultancy firm that presented economic evidence at the hearings on behalf of BPL, worked with the VPX between 1994 and 1997 (IES 2000b:3).

The following statements from the report confirm the project's economic viability and technical feasibility but also highlight that environmental questions remain open:

1. Basslink is economically viable. Proponents have indicated that the development cost for Basslink is likely to range between \$350 million and \$400 million for a 300 MW interconnector.
2. Basslink is technically feasible. Increasing numbers of undersea interconnectors are being installed around the world, with major technological advances in recent years which will benefit the Basslink project.
- ...
8. Discussions with proponents reveal that the successful progression of the project will require support (non-financial) by Tasmanian and Victorian Governments in areas such as environmental approvals and in negotiations with national electricity bodies.
9. The construction and operation of Basslink will have a number of environmental implications which will need to be considered through a public assessment process.
10. The key next step is for the Government to make an 'in principle' decision on how to progress the project and obtain Victorian Government agreement to the approach (Department of Treasury and Finance 1997:7).

With the economic and technical issues essentially resolved at this point, this report foreshadows that the impact assessment process would deal with the project's environmental aspects. As noted, with the POSS designation the assessment process was required to take a much broader view.

Basslink Development Board

In February 1998, the Basslink Development Board (BDB) was established, again as part of the Department of Treasury and Finance. The entity was set up "administratively ... to facilitate the establishment of Basslink as a commercial opportunity in the National Electricity Market" (Department of Treasury and Finance 2002a:1). The Board's members in 1998 were Michael Vertigan, Executive Chairman; Don Challen, Secretary of Department of Treasury and Finance; Anthony Kjar, Managing Director of Gibson

Crest Pty Limited [and former Managing Director of Comalco (JKMRC 2002)] and; Michael Perry, Director of Perry Partners Pty Ltd. The Board was supported by the office of Chris Gillies, the Director of Basslink Development, who reported to the Minister for Infrastructure, Energy and Resources, the Deputy Premier, Paul Lennon¹⁶ (Department of Treasury and Finance 2002d). Subsequently, following a “restructure”, the Board was reduced to consist of Michael Vertigan, Don Challen and Chris Gillies (Department of Treasury and Finance 2002b)¹⁷.

The first task of the BDB in 1998 was to find a private sector company to build, own and operate Basslink. In the meantime, it created a “nominal” entity, Basslink Pty Limited, “to initiate preliminary environmental planning and impact assessment studies in advance of the selection of the ultimate proponent” (DIIAS 2001b:4-2). Between 1999-2000 the BDB commissioned a number of initial studies, for example, in respect of visual assessment, flora and fauna, cultural heritage, geology and hydrology, marine and coastal, social impacts and electro-magnetic fields (DIIAS 2001a:2-3). During this time, the BDB, acting in the capacity of Basslink Pty Limited, also engaged the consultants Intelligent Energy Systems (IES) to undertake studies of the NEM and further economic modelling of trading over Basslink¹⁸. The BDB was keen to progress the project as far as possible so that when the preferred proponent was found, no time would have to be wasted in obtaining assessments and approvals. This intent is

¹⁶ In early March 2004, Paul Lennon ascended to the position of Premier when Jim Bacon stood down due to illness. I will refer to Paul Lennon throughout the thesis as the Deputy Premier or the Minister for Infrastructure, Energy and Resources as these were the positions he held during the events I am describing.

¹⁷ An enquiry was made to webmaster@treasury.gov.au as to why Anthony Kjar and Michael Perry had been removed from the BDB members web page.

¹⁸ Although the DIIAS denotes these studies as having been undertaken by BPL, the IES website confirms that the work was carried out for the BDB (IES 2003). This is also confirmed in the DIIAS (2001a:11-114), which states that the BDB commissioned IES to undertake Supporting Study 20 (IES 2000a).

explained in a Memorandum of Understanding between the state and federal governments¹⁹.

Hence, via the BDB, the Tasmanian government was the initial proponent of the Basslink project. In February 2000, the Government selected the subsequent proponent (Department of Treasury and Finance 2002d:1), National Grid International Limited (NGIL), a wholly-owned subsidiary of National Grid Group (NGG), an English transmission company, to build, own and operate the link (DIIAS 2001b). NGIL is now known as National Grid Transco Limited. Arrangements were finalised in December 2000 when NGIL took over the Basslink Pty Limited entity created by the BDB (Department of Treasury and Finance 2002d:1; DIIAS 2001b).

Close Ties

The Basslink Development Steering Committee and the Basslink Development Board were set up by the Department of Treasury and Finance, which appears to have driven the facilitation process for Basslink and Tasmania's entry into the NEM. As indicated, entry into the NEM is one of the reforms under the Commonwealth government's National Competition Policy (NCP) and Tasmania's compliance qualifies it for payments from the Commonwealth government. A performance measure of the

¹⁹ A relevant excerpt from the Memorandum of Understanding is as follows: "upon the initiative of the [Basslink Development] Board, a company which is wholly owned by the Crown in the right of the State of Tasmania, Basslink Pty Ltd, has written to each of the governments of Tasmania, Victoria and the Commonwealth, indicating that it wishes to proceed with the development of Basslink as the proponent. The purpose of so doing is to expedite the process of obtaining planning and environmental approvals for Basslink, to enable Basslink to commence operation by the date specified in Recital A [ie 30 October 2002]. The intention is that the Preferred Proponent will, once selected, acquire the shares of Basslink Pty Ltd, use that company as the vehicle for proceeding with the development, and so continue the process of obtaining the necessary approvals. It is intended that considerable progress would have been made in the preparation of the necessary Environmental Impact Statement/Environment Effects Statement and Social and Economic Community Impact Statement by the time that the Preferred Proponent is selected" (DIIAS 2002b:Annexure 2).

Department of Treasury and Finance is NCP payments (Department of Treasury and Finance 2002a:20-21).

Close ties are evident between HT, the bodies established to facilitate Basslink and entities of the Tasmanian government with financial interests in its development. For instance, Don Challen, the Secretary of the Department of Treasury and Finance, is common to both Basslink advisory groups, having established and headed the initial steering committee (Lupton 2000:413) and then as a member of the BDB. He has been a member of the HT Board of Directors for many years (HT 2002a:15) as well as the Chairman of the Tasmanian Public Finance Corporation (or Tascorp) (Department of Treasury and Finance 2002b), a Tasmanian government business enterprise responsible for borrowings and investments on behalf of the general government sector, public trading enterprise sector and local government. A relationship between HT and Tascorp was formalised in 1999 when a Ministerial Charter from the Minister for Infrastructure, Energy and Resources, Paul Lennon, under the *Government Business Enterprises Act* 1995, directed the HEC to reduce the cost of its borrowings by “using the services of the Tasmanian Public Finance Corporation to the maximum extent practicable” (Lennon 1999:5). Repayments on HEC’s borrowings from Tascorp, which have grown to over \$1 billion as at 2002 (HT 2002a:68), would make a significant contribution to the viability of Tascorp. With income tax equivalents, loan guarantee fees and dividends (to be discussed) to be paid by HT to the Tasmanian government, the Department of Treasury and Finance as well as Tascorp have significant financial interests vested in the prospect of windfall revenues for HT from Basslink and potentially a lot to lose if the project goes awry.

The revolving door of the Tasmanian government and its associated entities is also evident with a company that undertook preliminary consultancy work for the BDB, Trinitas Pty Limited²⁰. For its advisory services Trinitas Pty Limited was paid \$30,250.00 in 1998-99 (Department of Treasury and Finance 1999) and \$206,683.00 in 1999-2000 (Department of Treasury and Finance 2000). One of its directors is Daniel Norton (Australian Securities & Investments Commission 2003), former Secretary of the Department of Premier and Cabinet, former CEO of the HEC between 1996 and mid 1997 and then Aurora Energy Pty Limited (Tasmania's energy retailer), following the disaggregation of the HEC (University of Tasmania 2004:2). Another director of the company is Steven Haines, also a former Secretary of the Department of Premier and Cabinet (Department of Treasury and Finance 2004)²¹.

Also, the Basslink development was highly lucrative for the company of at least one member of the BDB. Perry Partners Pty Limited, of which Michael Perry is a director (Australian Securities & Investments Commission 2004), received a total of \$581,811.00 for financial advisory services for the Basslink project - \$187,644.00 in 1998-1999 (Department of Treasury and Finance 1999), \$252,144.00 in 1999-2000 (Department of Treasury and Finance 2000), \$88,897.00 in 2000-01 (Department of Treasury and Finance 2001) and \$53,126.00 in 2001-2002 (Department of Treasury and Finance 2002c)²².

²⁰ Consultancy reports of Trinitas Pty Limited did not form part of the DIAS.

²¹ Daniel Norton's decision to step down as CEO of Aurora Energy Pty Limited was brought up in the Tasmanian Parliament by the Deputy Premier, Paul Lennon, on 7 October 1998. In his thanks to Norton for his services to the Tasmanian public service, Lennon disclosed that Norton and Haines intended to set up a consultancy business (Lennon 1998). A company search indicates that the company, Trinitas Pty Limited, was registered on 3 August 1998 with Daniel Norton appointed on the same date and Steven Haines appointed on 5 October 1998 (Australian Securities & Investment Commission 2003). Lennon also stated that Norton would "formally leave" Aurora Energy at the end of 1998.

²² Consultancy reports by Perry Partners Pty Limited did not form part of the DIAS.

Draft Scope Guidelines

Although the RPDC issued its Draft Scope Guidelines (JAP 2000a) for public comment in May 2000, this document did not originate with the RPDC or the JAP. To facilitate the assessment and approvals process for the prospective proponent, the BDB (with the assistance of the consultancy firm Woodward-Clyde²³) prepared a preliminary version of the Draft Scope Guidelines for review by the community consultative groups. After NGIL was chosen as the proponent, Part 1 of the guidelines was changed to reflect the specifications of the link with which it had won the contract (DIIAS 2001a:2-3). According to the DIIAS (2001a:2-3), after comments from the consultative committees were incorporated into the guidelines, they were then submitted to the JAP.

As noted, the Draft Scope Guidelines (JAP 2000a) went on public exhibition in May 2000 and comments were received from interested parties. It can be seen, however, that the scope and parameters of the impact assessment process set out therein were, at least in the beginning, established by the BDB, an entity charged by the Department of Treasury and Finance with facilitating the project, not critically examining it. With the Tasmanian government as its initial proponent and judgments from the Department of Treasury and Finance, which were supported by predictive modelling originating back to 1997, the economic viability of the project had been decided long before the impact assessment process began. The extent to which this aspect of the project did not receive the scrutiny that a process such as this would warrant will be examined in the following chapters.

²³ Woodward Clyde acted as the BDB's environmental consultants to carry out preliminary studies (DIIAS 2001a:2-3). In terms of remuneration, this company received \$160,833.00 in 1998-1999 (Department of Treasury and Finance 1999), \$420,545.00 in 1999-2000 (Department of Treasury and Finance 2000) and \$2,547.00 in 2001 (Department of Treasury and Finance 2001) for its consultancy services.

The Draft Scope Guidelines (JAP 2000a) is divided into two sections. This structure deemed some issues assessable but not others. Part 1 is entitled “Outline of the project and the Integrated Impact Assessment Statement” and covers issues such as the project rationale, goals, objectives and benefits, as well as the physical components of the power cable and cable corridor options. The latter, entitled “Contents of the Integrated Impact Assessment Statement”, describes the project in detail, and sets out cable route details, issues to be considered in relation to need for the project, alternatives, potential environmental, social, economic and World Heritage Area impact and their management, as well as the impact of the project not proceeding. The Final Scope Guidelines (JAP 2000b) incorporate summaries of the issues raised in the public submissions. Some requests for changes were adopted here (JAP 2000b:87-177), whilst others were rejected on various grounds. Submitters who commented on the rationale of the project, its goals, objectives and benefits contained in Part 1 were responded to with the comment from the JAP: “Part 1 will no longer form part of the guidelines, and therefore will not be amended” (JAP 2000b:87-177).

PROJECT FINANCES AND MODELLING ISSUES

Commercial Arrangements

The commercial arrangements of Basslink are that HT will pay to BPL a facility fee for the use of the power cable when it is built. This fee is not dependent upon the revenues HT will make from the cable, so the facility fee is payable no matter what the outcome of trading across the link. Although the amount of the facility fee was not disclosed for commercial-in-confidence reasons at the public hearings, the JAP was briefed in a

private session. Hints were, however, made publicly by counsel for BPL that it was probably around \$60 million per annum, and certainly no more than this figure (audio evidence, Stuart Morris questions to Bob Brown, 17 October 2001). It was also made clear that the figure, at that stage, was derived by a calculation, dependent upon, *inter alia*, foreign currency exchange rates. It was as a result of the latter that Tasmania's State Owned Electricity Businesses (SOEB) profit figures had to be revised down by \$4 million in evidence presented by Andrew Campbell of IES to account for exchange rate fluctuations that had occurred since the calculations reported in the DIIAS.

Questioning from The Greens at a Government Businesses Scrutiny Committee hearing in the Tasmanian Parliament in February 2003 revealed that NGIL's proposal for Basslink required HT to accept changes in exchange and interest rates over the 25-year term of the Basslink agreement (House of Assembly 2003a:37). Geoff Willis, HT's CEO, explained that as NGIL was not prepared to take on the risk of rate changes (House of Assembly 2003a:37) and nor was HT, HT utilised "derivative transactions" to hedge against increases in these rates and fix them, the cost of which had been incorporated into the facility fee when contractual arrangements were finalised in November 2002 (House of Assembly 2003a:3)²⁴. As there was a cost attached to the mitigation of NGIL's financial risk, which remained undisclosed, The Greens viewed these negotiations as HT taking on and paying for risk that should reside with NGIL. HT's Chairman, Peter Rae, preferred to describe it in the following terms:

²⁴ It was explained that a "fully hedged locked-in interest rate" for 25 years, which would be used to calculate the facility fee, was 7.4 per cent. The process involved to ascertain this figure was explained by Willis as follows: "I looked back at the average interest rate of the preceding 25 years and it is more than 10 per cent. So from a prudent risk-management point of view, we took the steps to eliminate that exposure on the interest rate" (Geoff Willis, House of Assembly 2003a:8).

part of the ebb and flow of negotiation in a very complex arrangement in which somebody gives a little here and somebody gives a little there. It was one of the facets, so that it would be, I think, quite unrealistic to separate it out and suggest that we have assumed a risk. What we did was agree both to accept and then cover that risk, so that then quantified it. So we know in building the total business case as far as possible we wanted to be able to quantify it (House of Assembly 2003a:37).

Finances of Hydro Tasmania and the State of Tasmania

To put the amount of the facility fee into perspective with respect to HT's finances, for the financial year 2002 HT made an after tax profit of \$27.8 million, a \$12.6 million increase on the previous year, and paid a total of \$88 million to the Tasmanian government, as it is required to under the *Government Business Enterprises Act* 1995 (to be discussed in the next chapter). This amount of \$88 million included a dividend of \$9 million and a special dividend of \$40 million (also discussed in the next chapter). The balance of \$39 million was income tax equivalents and loan guarantee fees (HT 2002a:2).

In terms of the state's finances, the Bacon Labor government prides itself on its fiscal responsibility and has endeavoured over the past several years to bring state budgets into surplus. In 1994, the State's total net debt peaked at around \$3.8 billion. Since then, it has been reduced by nearly 50 per cent (Parliament of Tasmania 2002a:10). Although the total government debt in 2000 exceeded \$2.2 billion (as it included the debt of the government's public trading enterprises, such as, Hydro Tasmania) (Parliament of Tasmania 2002a:10), during this year Tasmania's budget had a small consolidated fund surplus for the first time in 100 years (Parliament of Tasmania 2002a:16). With HT's contribution, the 2002-03 budget surplus was \$8.5 million.

In October 2001, the economic rating agency, Standard and Poors, upgraded Tasmania's credit rating to the AA band for the first time (Parliament of Tasmania 2002a:10), and this was later upgraded from AA- to AA²⁵. In July 2002, Moody's upgraded the State's credit rating from Aa2 to Aa1. Premier Bacon was clearly delighted:

This is the second highest rating provided by Moody's and takes Tasmania above both South Australia and the Northern Territory on the Moody's rating scale and only one level behind the other states and territories. We are living in an era of unprecedented confidence and optimism and this news further reinforces that we are on the right track. ... Moody's has acknowledged the success of the State Government's financial management strategy, and the stronger economic base that has been created by the State's major infrastructure projects. By investing in infrastructure for the 21st century, this Government has paved the way for a more sustainable economic future in Tasmania²⁶.

Apart from talking up the Tasmanian economy and the success of his government, it can be seen that the Premier attributes the State's economic 'progress' to the infrastructure projects, of which Basslink is the linchpin, brought to fruition during his government's terms in office. It can also be seen that the Tasmanian State budget has relied heavily on funds and dividends from HT to bring about this economic position.

Fiscal Evidence

Evidence with regard to the fiscal dimensions of the Basslink project was presented in two reports annexed to the DIIS. Both took the form of predictive modelling. One identified changes to NEM electricity prices from which SOEB profit changes were derived (IES 2000a). This work was undertaken by IES and is known as Supporting Study 20 (IES 2000a), which will be discussed in detail in Chapter 5. The outputs of this

²⁵ Media Release, Tasmanian Government, Premier Jim Bacon, 23 July 2003, 'Moody's Upgrade Another Sign of Economic Progress'.

²⁶ Media Release, Tasmanian Government, Premier Jim Bacon, 23 July 2003, 'Moody's Upgrade Another Sign of Economic Progress'.

IES study were used as inputs to the other study, undertaken to identify macro-economic changes by the Centre for Regional Economic Analysis (CREA), a now-disbanded unit of the University of Tasmania. This report is referred to as Appendix 1 to the DIIAS (Centre for Regional Economic Analysis 2000).

From these two reports, the DIIAS (2001b) makes a number of economic assessments of the project's sustainability. First, economic growth is to "arise from its contribution to the diversity and robustness of the NEM and lower electricity prices (than would otherwise have been the case)" (2001b:12-1). The IES study predicted the level of these price reductions. Second, Basslink would also provide government revenue in terms of taxes. The CREA study calculated the regional and national effects of these revenue streams. Third, economic productivity is derived from the "ability of markets to lower prices to customers" (2001b:12-1). Again, this was evidenced by the IES study.

On the other side of the project viability equation, the cost of the project was cast in stone. The figure of \$500 million was constantly quoted by the proponents, HT, the Tasmanian government and in the media. At the hearings, discussion as to the variation of this cost extended only to issues of changing the technology and what that would add to the \$500 million, if such a change was recommended by the JAP. Information about repayment of the capital cost by HT was confidential. Consequently, with the economic aspects of the project embedded within predictive modelling and information about how the use of the link would be paid for deemed not for discussion, assessment of the viability of project was cordoned-off from independent analysis and verification and expected to be accepted on trust.

Hence, despite the provisions of the SP&P Act, which declared the project of state significance and, as such, requiring an integrated assessment of the social, economic, environmental and community impacts, issues of economic, social and community benefit had been conflated and determined as positive, and only one option to meet the government's objectives would be considered – a connection of Tasmania to the mainland via a subsea power cable. With social and community benefits equated with economic benefits, the only issues that remained open for discussion were environmental²⁷.

Comments from counsel for BPL, in his opening submission, set the scene for an impact assessment process dominated by environmental issues. His words illustrate the assumption that macro-economic benefits are social benefits and the issues in question were environmental:

We say that the Basslink project will deliver substantial economic and social benefits to the people of Tasmania and Victoria without causing unacceptable environmental impacts. Second, we say that appropriate steps will be taken to mitigate any environmental impacts and that Basslink will provide a net community benefit for existing and future generations (Stuart Morris, audio evidence, 2 October 2001).

The task for BPL and HT, therefore, was to demonstrate that the environmental impacts would not be significant and, if there was any doubt, that they could and would be mitigated.

Indicative Figures

In terms of the macro-economic impacts, the JAP had this to say:

Perhaps the most realistic assessment was provided by counsel for the proponent, who argued the benefits of Basslink are real and

²⁷ Incidentally, indicative of the minimal extent to which economic issues featured in the assessment process, in the DIIS Summary Report (DIIS 2001b:7-72), which is over 1.5 centimetres thick, "Economic Impacts" are reported in Section 7.8 and take up one-third of one column on a three column page.

substantial, but predicted economic outcomes are indicative only (JAP 2002b:43).

In its conclusion on the economic impacts, the JAP (2002b:45) states “estimated gains in real gross product and employment in both States should be regarded as indicative only”. This assessment suggests that the JAP was of the view that there was little to be gained by getting into too much detail on the macro-economic figures. The contingency of the inputs to this modelling will be detailed in Chapter 5.

Despite the JAP’s determination on the macro-economic modelling numbers, when detail about the commencement of construction of Basslink was required, the “indicative” figures of 360 jobs in the construction phase in Tasmania were rolled out in a media release from the Premier and their source attributed to “an independent advisory panel”, that is, presumably, the JAP, not the consultants engaged by the proponent to calculate these figures²⁸. This claim from the Premier was reported by *The Examiner* (Curtayne 2003:14) and *The Advocate* on 25 March 2003. Although *The Mercury* on 25 March 2003 did not make this mistake and referred to the figures as contained in the consultant’s report from CREA, there is no indication in any of the media reports of the contingency of these figures. Claims of 360 construction jobs, 994 indirect permanent jobs and \$110 million per annum for the Tasmanian economy by 2010 were presented as factual.

Furthermore, the Final EIS and Supplement to the DIAS (NSR Environmental Consultants Pty Ltd 2002), which incorporated information about decisions from the

²⁸ Media Release, Tasmanian Government, Premier Jim Bacon, 24 March 2003, ‘Basslink Begins Construction’.

JAP and finalised negotiations between HT and BPL, omitted the details of the JAP's determination on the economic impacts as "indicative". Instead the report states:

As the CREA report (Appendix 1 to the DIIAS) submitted by BPL to the Panel (this report is still valid) identified, there will be significant economic benefits delivered by Basslink. These benefits flow to a wide range of parties who benefit from the link's existence but are not required to contribute (NSR Environmental Consultants Pty Ltd 2002:11).

By way of a further example, there is also a striking correlation between the commentary on 'Economic Impacts of Metallic Return' set out in the Final EIS and Supplement to the DIIAS (NSR Environmental Consultants Pty Ltd 2002:11) and the submission of HT (2002b:5-6) in response to the *Draft Panel Report* (JAP 2002a). The above excerpt appears *verbatim* in both, as do seven other points about the benefits of Basslink derived from the CREA modelling. This illustrates the level of liaison between proponents and the consultants they engage to undertake purportedly independent assessments of projects. These translations also highlight the durability of the outputs of predictive modelling and how easy it is to background contingencies or reconfigure the source of what are presented as certified claims.

Changing the Cable Technology on Environmental Grounds

I have argued that although economic issues were cordoned off from close scrutiny, environmental issues remained open for discussion. It is in this area that a major change was made to the project. An issue that dominated the public hearing process in Hobart was BPL's proposal to install a monopole (ie single) cable across Bass Strait with a sea-earth return. The cause for concern with this configuration of the monopole system was that it would not have a designated return-cable through which current could flow to complete the electrical circuit. Instead, sea electrodes (with the cathode

on the Victorian side and the anode on the Tasmanian side) would be installed several kilometres off-shore and away from the power cable, to return the current through the sea and sea bed. It is for this reason it is called a monopole with sea-earth return. Marine environmental impacts relating to a sea-earth return system, which were disclosed in the DIIAS, are threefold: electro-chemical reactions take place at the anode whereby chlorine is produced; metallic infrastructure, within a specified radius of the anode and with specific orientation and length, would be susceptible to accelerated metallic corrosion due to stray currents from the system's electrodes; and the power cable generates a magnetic field which combines with the earth's magnetic field (DIIAS 2001b:7-38-55).

In terms of the technology options and the scale of these disclosed environmental impacts, The Greens made contact with Dagmar Nordberg in Sweden. Nordberg had made a major contribution to a successful campaign to change the technology of a proposed transmission cable between Sweden and Poland from monopole with sea-earth return to monopole with metallic return on the basis of its adverse environmental impacts (Ralph Mitchell, TFIC, personal communication; Wiklund 2002). The Greens brought Nordberg to Tasmania to address a public forum in early 2001. It is from here that the Tasmanian Fishing Industry Council (TFIC) was mobilised in its campaign on marine issues against the Basslink monopole sea-earth return system (Ralph Mitchell, TFIC, personal communication; see also Duncan 2003). TFIC's position was that it did not take a stand on whether Basslink should proceed or not, but that if it did, then the technology should be appropriate in the form of a bipole system, not monopole with sea-earth return (TFIC 2001a). Although The Greens opposed Basslink, they supported the submission of TFIC as did a number of public submissions. It seems that a stance

on a change in technology resonated better with the public than outright rejection of the project. This issue will be discussed further in Chapter 2.

TFIC undertook a sustained campaign against the monopole with sea-earth return technology. It disseminated information it obtained in Scandinavia about environmental impacts of the system to the media, via a public forum, directly to major infrastructure owners as well as state and federal government departments (Ralph Mitchell, TFIC, personal communication). Brought into contention by its actions were the magnitude, extent and mitigation costs of the effects of the monopole cable with a sea-earth return. TFIC claimed that the anode's chlorine could have detrimental effects on the marine environment, and that the magnetic field could affect the migration of marine species, as well as navigation instruments (TFIC 2001b). Infrastructure owners who were briefed and assisted by TFIC, such as Duke Energy and Esso, were concerned that their ports, pipelines and submarine installations would corrode faster than expected. It was evident at the hearings that it was this issue of metallic infrastructure corrosion that caused the greatest concern for the JAP.

The gallery at the Basslink hearings was filled with members of the public and press on 11 October 2001 when a corrosion expert for Duke Energy, Brian Martin, set out the massive extent to which Basslink could accelerate the corrosion of the gas pipeline it was about to lay across Bass Strait, and which had been ordered under design specifications that did not take account of the corrosive effects of Basslink. Counsel for BPL did not accept Martin's assertions and retorted by pointing out that when Duke Energy had placed an order for the pipeline it knew it was likely it would have to co-exist with Basslink and that Duke Energy had not yet obtained all the necessary

approvals to lay it. It was proposed by BPL's Counsel that since neither party had full approvals, they should co-operate to find a solution rather than have a public stoush (questions from Stuart Morris during audio evidence, Brian Martin, 11 October 2001). This was evidently not how Duke Energy wanted to play the game. Clearly, the media had been alerted to what was going to be presented on the day and a press conference was held by Duke Energy representatives outside the hearing room after Brian Martin's evidence. Whilst articulating co-operative sentiments, the CEO of Duke Energy was adamant that Basslink would corrode its pipeline, that it was sceptical about mitigation and unwilling to incur any corrosion costs associated with Basslink.

TFIC argued that a bipole system, without sea electrodes, would eliminate marine impacts (TFIC 2001b). BPL claimed that a bipole system was much more expensive and would cost an extra \$150-200 million, which would make the project economically unviable (Freehills 2001b; 2001c). The additional cost is for an extra cable through which current flows to complete the electrical circuit and the cost of laying it²⁹.

Another technology option floated during the hearings was a monopole system with a metallic return. This system does not need sea electrodes. As well as its additional cost of \$75-100 million³⁰, the cost of transmission losses of up to \$20 million would have to

²⁹ There was considerable confusion at the hearings about the technology options and what each comprised. TFIC claimed that a bipole system, without sea electrodes, would solve the marine issues. However, the bipole system and its cost presented by BPL was essentially a dual monopole cable system with sea electrodes. The idea with this design is that if one of the cables cannot function, the existence of sea electrodes allows the remaining cable to transmit electricity. This meant that BPL's conception of a bipole system had sea electrodes. TFIC opposed this design as overseas experience indicated that often bipole systems such as this were run as monopole systems, which meant the sea electrodes were brought into use. TFIC insisted there were bipole systems available overseas which did not require sea electrodes (Ralph Mitchell, TFIC, personal communication).

³⁰ Victorian Exhibit VE10 sets out a breakdown of marginal capital costs of the metallic return system.

be added to the cost of this technology compared to a monopole system with sea-earth return (Freehills 2001b:3). In his opening presentation, counsel for BPL stated:

Now [in respect of a metallic return cable] this involves an extra capital cost of \$75-100 million. It involves two subsea cables not one. The metallic return does save the cost of putting in sea electrodes. ... it's the cost of the cable and laying the cable that's the critical extra cost. Now in addition to that, there are transmission losses, those transmission losses have been estimated to be in the order of an additional 5.5 MW at the rated capacity of 480 MW. One can capitalise that cost by applying a figure for energy cost and one can then capitalise that number using a net present value calculation. And applying that exercise, National Grid estimates that the capital value of the transmission loss of using a metallic return is in the order of \$12-20 million. So the total cost is greater. The extra transmission losses also produce some additional greenhouse gases, although in the context of the world's concern about greenhouse gases, that's probably, well, every bit helps I suppose, but we're obviously talking about a small increment (Stuart Morris, audio evidence, 2 October 2001)³¹.

BPL's emphasis on the additional environmental and economic costs of a change to the original proposal was clearly intended to dissuade the JAP from recommending a modification to the project. Counsel for BPL indicated that its client's reason for concern was primarily related to its future projects:

When you come to make your recommendations, it's important to bear in mind that you will not only make recommendations that affect this project, but they are bound to have some precedent value, and they're bound to have some effect on interconnectors generally (Stuart Morris, audio evidence, 2 October 2001)³².

³¹ BPL's technology expert from NGIL, Steven Swingler, reiterated the comments from BPL's Counsel: "Manufacturing capacity for submarine cable is limited. Depending on the number of other projects in progress, the time taken to manufacture the metallic return cable could add significantly to the overall construction program of Basslink. The resulting increase in interest charges would add significantly to the cost of the project. The high additional costs of both the bipole design and the monopole design with metallic return would reduce the proponent's rate of return on Basslink to an uneconomic level. ... Losses from sea return are negligible when compared with metallic return at 22 watts for each metre of cable, which equates to 6.6 MW for the entire link. This loss will have to be replaced by extra generation. To replace it with electricity from brown coal at Loy Yang would result in the production of an extra 310,000 tonnes of carbon dioxide over the expected life of the link. Thus, the losses in the metallic return has an impact on the environment in terms of the resulting increase in greenhouse gases" (Steven Swingler, audio evidence, 9 October 2001).

³² This message was reiterated in evidence the following day: "National Grid does have an interest in supporting the project in its current form, even if the rate of return was identical, because it's in the business of interconnectors. It believes in the interconnectors as an economic and environmental option for ensuring good electricity supply, and even if the rate of return was identical, the effect of increasing the cost by undergrounding or metallic return or both would be to make the next project less likely to happen whether this next project is in Australia or in the United States or in Britain, or anywhere in the world. So

The JAP rebuffed this attempt to constrain the options open to it. This is illustrated in the following exchange between the JAP Chairman, Julian Green (JG), and counsel for BPL, Stuart Morris (SM). Importantly, an explanation is provided as to where responsibility and risk would lie for any increase in the cost of the Basslink project and how this would be negotiated:

JG: *During the directions hearing you mentioned about the affordability of the project and that was a lead to you indicating the sorts of witnesses you will be calling during the assessment process for us to hear about the costs associated with it and also the costs of alternatives. You sharpened that introduction, in my opinion, somewhat yesterday, and it left me with the impression that the Panel may be faced with, more or less, a take it or leave it situation as regards to this project. Is that a reasonable interpretation of where your client is coming from, that there is no scope really to pursue alternatives, notwithstanding the number of submissions we have received which had raised this issue?*

SM: *Well, the answer to that is, that firstly it depends on the size or the cost of the change, but lets sharpen that up by assuming that the change could be undergrounding in Victoria or a metallic return, both of which would cost in the order of \$80 million or thereabouts, that is each. If either of those or both of those were required by the Panel then it would be a leave it situation as far as National Grid is concerned based on the existing commercial arrangements. Obviously, if the facility fee was altered to reflect the additional cost so that the rate of return remained about the same, then it would not be a leave it situation, it would probably be a take it situation as far as National Grid is concerned. However, for that to occur the person paying the facility fee would have to be confident it was in a position to earn sufficient revenue from the project to cover that increased fee and to account for risks. And obviously, the risks to Hydro Tasmania are, I won't say obviously, it might be thought that the risks to Hydro Tasmania are higher than those to National Grid. Obviously, there are risks to National Grid, particularly the construction risks and the ability to ensure that the engineering is appropriate so that it does the job, but the principal market risk is obviously being faced by Hydro Tasmania. Now, it may be thought that the rate of return required by Hydro Tasmania would need to be higher than that required by National Grid in the light that the market risk is one that might be regarded as requiring a higher rate of return than the construction*

even if the rate of return was identical, National Grid's position is that it believes that the better solution, or the best solution, is the one that's been put forward as being appropriate for environmental and economic and technical reasons" (Stuart Morris, audio evidence, 3 October 2001).

risk. I hope I've explained that, it was a long-winded answer. So, if the project is required for environmental reasons, after taking into account mitigation and the like, to be altered so as to impose a major new cost element, and if the facility fee was increased commensurately to reflect that, then whether the project goes ahead is very much in Hydro Tasmania's hands rather than National Grid's hands (audio evidence, 3 October 2001).

National Grid's concern about increased costs related primarily to the effect the JAP's decision could have on its future projects, not necessarily the viability or risks involved with this one. Furthermore, it can be seen from this discussion that any increase in the cost of the project would have to be made up by an increase HT's facility fee to keep NGIL's rate of return at a level it considers is commercially viable. Hence, decisions about viability of the project rest with HT not NGIL. HT's commitments to NGIL are dependent upon HT's evaluation of the revenues it can make from selling power across Basslink and what it can afford to pay in terms of a facility fee. HT's judgments in this respect are underpinned by predictive economic modelling carried out by IES which will be explored in detail in Chapter 5.

Initially, BPL allowed \$10 million for metallic corrosion mitigation costs (Stuart Morris, audio evidence, 2 October 2001). On the second last day of the hearings, counsel for BPL raised the prospect of BPL agreeing to install a monopole system with a metallic return if the cost of mitigation was going to be higher (Stuart Morris, audio evidence, 28 November 2001). What happened in the interim was that additional modelling to identify metallic corrosion levels, which BPL had proposed to undertake after approval of the project but which the JAP insisted be done during the hearing process, raised the mitigation costs to around \$20 million (plus or minus five per cent). However, not all infrastructure had been identified, which was proving difficult, and agreement had not

been reached with the relevant stakeholders (ie the major infrastructure owners) by the end of the hearings (Jan Erik Skog and Henrick Rosenberg, audio evidence, 28 November 2001).

In the end, in its *Draft Panel Report* (JAP 2002a), the JAP recommended that the cable technology be changed from a monopole system with sea electrodes to a monopole system with a metallic return *if* agreement on mitigation could not be reached between BPL and the major infrastructure owners whose facilities were likely to be affected by corrosion from stray currents of the electrodes (JAP 2002a). Hence, whether or not the disclosed environmental impacts were to be imposed upon Tasmania's marine environment was left up to the major infrastructure owners. Agreement was not forthcoming. Duke Energy, for instance, stood its ground and insisted it did not believe the impacts could be sufficiently mitigated (Duke Energy International 2001). On 4 April 2002, before submissions closed for comment on the JAP's *Draft Panel Report*, BPL announced that it would scrap the original proposal and use a metallic return system (Basslink Pty Limited 2002)³³. Consequently, public disclosure of the new technology design, its specifications and environmental impacts were limited to a 12 page document released by BPL 12 days before the end of the public comment period on 16 April 2002. No further hearings were held. The JAP had conferred with its consultants

³³ This new cable would "bundle the metallic return cable with the main HVDC [high voltage direct current] and fibre optic cables in a single installation" (Basslink Pty Limited 2002:T7.2 iii). This design of bundling the cables together was not assessed in detail during the hearings. The discussion that took place in this regard was with BPL's witness, Steven Swingler from NGIL early in the hearings in Hobart, and related to the distance between the cable and its return conduit, and how costs would increase as the cables were brought closer together. This was because the closer the cables, the more copper that would be needed to reduce the heating effects of overlapping magnetic fields. The prospect of putting the cables side-by-side, to eliminate the heating effects, which is the new design, was raised. The response from Swingler was that in this case, the cable would have to be redesigned and its copper content substantially increased, which would increase the cost. If the cable remained as it had been designed, with less copper, two ships would be required to lay the two cables five metres apart (Steven Swingler, audio evidence, 9 October 2001). In either case, the cost of the metallic return was substantially higher than the sea-earth return originally proposed (ie between \$75-100 million).

and was satisfied with the new design (JAP 2002b:7). In response to calls for further assessment of the new technology option the JAP determined that the “change from a sea-earth return to a metallic return is not a change in the project requiring a further integrated impact assessment statement” (JAP 2002b:21).

Hydro Tasmania’s Cost Limitations

Concerns about cost increases and the implications of the JAP imposing onerous conditions on the project were also raised by HT at the hearings. Its CEO, Geoff Willis, revealed:

the break even point for the project for Hydro Tasmania has about a 65% probability of being achieved. Moving outside this envelope increases the risks to Hydro Tasmania, as the sole party underwriting the costs of the link, to an unacceptable level. With an increase in the link costs changing the project viability. ... an increase in costs of the order of 10% changes the project’s viability to having a 50% probability of not achieving break even. While sound commercial arrangements exist between BPL and Hydro Tasmania, the viability of the project is finely balanced and returns to both companies are tight. Moderate cost increases, in the absence of offsetting cost reductions would render the project non-viable (Willis 2001:10-11).

Despite this startlingly honest disclosure by HT’s CEO about HT’s business case, and the evidence presented by BPL that a metallic return would cost an additional \$75-100 million (Freehills 2001b; 2001c), after the release of the *Draft Panel Report* (JAP 2002a) and the launch of BPL’s new technology proposal, the exorbitant cost of the metallic return and concerns about HT’s business case evaporated. In the media, the HT CEO rejected assertions made by project critics that the cost of the new system would be \$100 million and stated:

It’s certainly not \$100 million. It is nowhere near that ... There will be an increase in this cost to Hydro Tasmania ... We don’t expect to be paying all of the cost of the metallic return but the higher proportion of it ... will be paid by Hydro Tasmania (Rose 2002:10).

In another media report HT's CEO stated that "the figure [for the metallic return] was closer to \$20 million than the \$100 million that some groups opposed to the project had claimed" (Long 2002:5). On 10 April 2002, the media reported that HT's Basslink Program Director, Steve Halliday, had stated that the cost of the metallic return "was expected to cost closer to \$20 million than the \$70 million initially estimated" (Wood 2002). Capitalised over a term of 40 years (NSR Environmental Consultants Pty Ltd 2002:12), which consists of an initial period of 25 years and an option of a further 15 years (Willis 2001:5), an extra cost of \$20 million was not an issue³⁴.

In the Final EIS and Supplement to the DIAS (NSR Environmental Consultants Pty Ltd 2002) submitted to the Commonwealth and state governments for approval of the project, it was explained that the change in BPL's original cost predictions of around \$80 million for a metallic return to something closer to \$20 million was due to the identification of a solution "at an incremental cost substantially lower than 2001 estimates" (NSR Environmental Consultants Pty Ltd 2002:11). It was further explained that a design that would reduce shipping and cable laying costs had been proposed and agreed upon. Increased projected revenues for HT also contributed to making up the cost difference. The details were explained as follows:

Work undertaken by BPL and Hydro Tasmania recently has resulted in a substantial reduction in net additional costs for the metallic return approach compared to the sea return. Since the 2001 hearings, Hydro Tasmania has been able to refine its projections of the revenues that it now believes will be generated if Basslink is constructed. The

³⁴ Notably, there appears to be a discrepancy in respect of the term of the agreement between BPL and HT. During the hearings and in HT's reports about its business case, the term of the agreement with BPL referred to by HT's CEO was 25 years (Willis 2001:5). This was also the case at a Government Businesses Scrutiny Committee (House of Assembly 2003a:8). However, after the release of the *Draft Panel Report*, in its submission to the JAP, HT (2002b:6) notes that the additional cost of the metallic return would be spread over 40 years. Obviously, capitalisation of the cost over 40 years rather than 25 would reduce the annual facility fee. However, given that the additional 15 years is an option period, HT would not have yet committed to paying the facility fee for 40 years.

combined effects of lower costs and improved revenue projections are such that it is still possible to maintain the project within the commercial parameters outlined to the Panel during the public hearings in October 2001 (NSR Environmental Consultants Pty Ltd 2002:12).

As noted, the predictive economic modelling that underpins HT's judgments in this regard will be discussed in Chapter 5.

Project Cost Hike

A year down the track since Basslink was given the green light, media reports claimed that the cost of the construction of Basslink had escalated by over 50 per cent. With a front page headline "Basstink: Row erupts over electricity project's \$250m blowout" (Bevilacqua 2003:1), the *Sunday Tasmanian* of 15 June 2003 explained that BPL's external affairs manager, Jon Richards, attributed the project cost increase from \$500 million to \$750 million, to the metallic return, rising insurance costs and sections of undergrounding of the cable in Victoria. In particular, it was noted that "insurance costs had skyrocketed since the September 11 terrorist attack" (Bevilacqua 2003:7)³⁵.

³⁵ Notably, the size of the cost hike varies. The media report on 15 June 2003 (Bevilacqua 2003) put the increase at \$250 million, making the total cost of Basslink \$750 million. Prior to this, in Parliament on 28 May 2003, the Deputy Premier, Paul Lennon, stated that the project cost was \$870 million (House of Assembly 2003b). On 3 June 2003, The Greens put the total cost at \$780 million while the Deputy Premier stated it was \$870 million at one point (House of Assembly 2003c:Part 1) and then \$800 million later in the proceedings (House of Assembly 2003c:Part 2). The increase appears to have been welcomed by the Deputy Premier. In fact, his comments in Parliament on 28 May 2003 suggest that the higher the figure, the better for spruiking about the amount of investment in infrastructure in Tasmania. He states: "Basslink is an \$870 million project in terms of its cost and financial closure, which was achieved around November last year. That takes the total [state infrastructure spending] to nearly \$1.3 billion. Add to that the fact that we are now Australia's leading wind farm developer, with the Woolnorth project taken from conceptual stage through the business case planning to the planning approvals stage and to the point where we now have that farm under construction, together with proposals for a public viewing centre to be built there ... So that takes the total to something in the order of \$1.5 billion over the past four years in Tasmania on infrastructure. If that is what I am being criticised for then I am happy to accept it" (House of Assembly 2003b:no page). Clearly, the Deputy Premier is keen to promote the new, progressive Tasmania in which private companies are making considerable investment. An increase in the cost of Basslink pushes this along nicely.

According to Bevilacqua (2003), the Tasmanian government had known about the cost increase since November 2002 but had not raised the issue publicly. When questioned on this lack of disclosure, the Deputy Premier was quoted as saying:

The announcement of the costs is not a Tasmanian Government responsibility ... Any increase in costs must be measured against the commercial viability of the project. That measurement is a matter for National Grid Transco, which is pressing on with the project, so obviously is satisfied with the project's viability (Bevilacqua 2003:7).

As divulged in the exchange between the JAP Chairman and counsel for BPL above, if NGIL (referred to here as National Grid Transco) is happy to proceed with the project, then it would have received guarantees from HT that NGIL's required rate of return would be met by a commensurate increase in the facility fee. National Grid Transco's decision to continue to commit to build Basslink and its judgments about the viability of the project are dependent upon commitments from HT and its judgments about the economic viability of trading across the link and its capacity to pay a revised facility fee. What is not being acknowledged by Lennon is that HT will reimburse NGIL for these costs, via the facility fee. What the facility fee is, however, is a secret³⁶.

Clarification about the cost rise was sought from Hydro Tasmania. I was advised that the increase in costs simply reflects project modifications imposed by the impact assessment process and that whilst HT was responsible for a proportion of the additional cost, this did not extend to the entire \$250 million. Specifically, according to HT, the extra \$250 million represents the cost of environmental approvals added to the original price of the project of \$500 million, namely, the metallic return,

³⁶ On 29 November 2003, contracts between HT and BPL were signed (House of Assembly 2003a:19). This means that arrangements between the parties, specifically, the facility fee as well as the interest and exchange rates discussed above, have been locked-in. Any *further* increase in costs above the estimated \$750 million will be borne by NGIL (Steven Halliday, HT Basslink Program Manager, personal communication).

undergrounding of transmission cables and mitigation in Victoria, as well as NGIL's costs of insurance, process delays and capitalised interest (Steven Halliday, HT Basslink Program Manager, personal communication). In a letter to *The Examiner* of 5 June 2003, published on 6 June 2003, HT points out:

Basslink was subject to an exhaustive, independent review process over 2001 and 2002. The end result of this process was a commitment by Basslink Pty Ltd, the developer of Basslink, to undertake a number of additional measures to further minimise environmental impact of the project. These measures are costly. They involve the inclusion of a metallic return cable to remove any concern of erosion of nearby infrastructure, such as gas pipelines; further undergrounding of some of the cable route in Victoria; and lengthening of the route to avoid certain environmentally sensitive features. Each of these additional commitments contributed substantially to the overall cost of the project. This overall cost is for Basslink Pty Ltd to manage, as it is charged with building, owning and operating the cable. Hydro Tasmania's cost is the annual facility fee it has negotiated with Basslink Pty Ltd for access to the cable for 25 years. What Hydro Tasmania has weighed up against its facility fee cost are the considerable benefits Basslink brings to Hydro Tasmania and the State as we enter the National Electricity Market (HT 2003a:1)³⁷.

So, with claims in the media and Final EIS and Supplement to the DIAS that the additional cost for the metallic return would not be around that originally proposed by BPL of between \$75-100 million but more like \$20 million effectively forgotten, the additional requirements are now represented as "costly" and their price fully disclosed. Clarification on the discrepancy was sought from HT. I was advised that it was initially thought possible by HT to procure the specified cable for around \$20 million. However, this was later found to be not the case. When this was discovered, it appears to have not been considered necessary to inform the people of Tasmania.

³⁷ It is noted that this letter was submitted to the media and published before the media reports of Bevilacqua (2003) referred to earlier, which were published on 15 June 2003. HT's media interjection coincided with that of the government's in its media release, Deputy Premier, Paul Lennon, 5 June 2003, 'Greens Contrive Outrage on Basslink'.

The hosing-down given to the cost hike revelations by HT and Lennon was conveyed by *The Examiner* in a pointed fashion. Clearly prompted by Lennon's media release of 5 June 2003 entitled 'Greens Contrive Outrage of Basslink', on 6 June 2003 the editorial of *The Examiner* led with the line, 'Greens Rehash Old Lost Causes'. It claimed that NGIL would be paying the increased costs and that these were already known about. The Greens were admonished for suggesting otherwise:

The Basslink cost increases were no secret, having been announced to the London Stock Exchange last November. Moreover, those costs would be borne by the private company which is building and operating the link. That was never in doubt. ... Politicians need to have passion, but if they are to be taken seriously by the electorate, they also need to mount a cogent and accurate case.

Putting to one side the peculiar claim that announcement on the London Stock Exchange somehow equates to public disclosure in Tasmania, the extra costs involved with the metallic return certainly were canvassed at the hearings, and information in this regard is set out above. However, when BPL announced that the metallic return would be adopted and the question of cost was raised with HT, its CEO indicated that the cost was not even close to that originally proclaimed by BPL and the project critics. It is this assertion, as well as the claim that the whole economic case originally presented by HT had become much more positive, that are contained in the Final EIS and Supplement to the DIAS which informed the three governments and their decisions to approve Basslink.

When the Deputy Premier was asked in Parliament whether there would be implications for the Tasmanian taxpayer in respect of the cost increase, he replied:

At different stages during the process some costs went up, some costs went down. As the member for Franklin, McKim [of The Greens], so poignantly put it, the responsibility lies with the government of the day being reassured that the business case for Basslink is robust. In

doing that, we have not stood over the Hydro board and told them that they must say it is a robust business case if it is not. I have on all occasions provided advice to Cabinet which has been the unabridged, unchanged advice that I have received from time to time from the board of the Hydro. They have rigorously assessed the business case of Basslink as it has gone forward. ... The Government is satisfied with the advice provided to it by the Hydro Board that the Basslink business case is robust (Lennon 2003).

Clearly, the Tasmanian government is confident that HT's Board of Directors has made robust judgments about the viability of the project and, as far as the government is concerned, responsibility for decisions on Basslink rest with HT.

As far as HT is concerned, the economic prospects of Basslink just keep getting better. Despite its claims at the public hearings about the fine balance of the project's economics and the cost hike, HT remains confident that the potential project revenues have also substantially increased. It was stated in the Final IES and Supplement to the DIIS that HT revenue calculations had improved from the time of the hearings. This is confirmed by HT's Basslink Program Director who indicated that at the conclusion of the assessment process the position was as follows:

We found that while costs were increasing, revenues were doing likewise due to issues such as:

1. Revised external expert estimates of Victorian prices;
2. The impact of the mandated renewables legislation which had recently been passed;
3. The addition of contract positions in the NEM rather than just spot trading;
4. The optimisation of the Hydro system that the Basslink enabled;
5. The interaction of Basslink with the wind and gas program.

As a result, at the end of the JAP process, we still had a business case that was viable and commercial, but very tight.
(Steve Halliday, personal communication)³⁸.

When claims about the cost rise were aired, the new-found profits were reported in the media as follows:

Hydro spokesman David Jeffrey said a revision of the opportunities to sell power to Victoria at peak times in the morning and evening – and in the summer – ensured the venture was profitable ... “The costs have changed and so have the benefits” (Bevilacqua 2003:7).

At a Government Businesses Scrutiny Committee hearing in February 2003, HT’s CEO, Peter Rae, indicated that with continual additional assessments, HT’s business case at the end of November 2002, when the final agreement between HT and BPL was signed off, was a lot stronger than that presented at the Basslink hearings.

Conclusion

Despite the add-ons and their cost, HT remains unceasingly confident that it will win on the NEM. Of course, it may well do and for the sake of the financial management of HT and the State of Tasmania, one hopes that it does. However, this chapter has already shown that in terms of the economic case for Basslink, evidence for the impact assessment process was aimed at demonstrating rather than investigating the project’s benefits. With issues of economic viability and the cost of the project out-of-bounds, the Tasmanian government and the people of Tasmania have only the HT Board to rely on to make decisions about the viability of Basslink. This is not to criticise the integrity or calibre of the Board, but it may be that zealous adherence to the idea of Basslink has blinded the representatives of HT and compromised their judgments about the economic viability of the project. If this is the case, it will appear to many in Tasmania that history is repeating itself. This past and the future envisaged by HT that Basslink will bring is the focus of the next chapter.

³⁸ This information was presented to the Government Businesses Scrutiny Committee in February 2003 by HT’s CEO, Geoff Willis (House of Assembly 2003a:19).

Chapter 2

A HYDRO PAST BUT A RENEWABLES FUTURE

Although the conflicts over the flooding of Lake Pedder and the building of the Gordon below Franklin dam set the scene for this study of Basslink, they are well-covered in a number of publications (see for example: Thompson 1981; Lupton 2000; Jones 1972; Tighe 1992; Herr and Davis 1982; Davis 1972, 1986; Bates 1983; Lowe 1984; Crowley 2000; Hay 1992). Having said this, it is important that I outline what has come to pass with the transformation of Tasmania's Hydro-Electric Commission into a corporatised entity known as the Hydro-Electric Corporation (HEC), now branded 'Hydro Tasmania: the renewable energy business', and taking on the role as a joint venture proponent with NGIL to develop Basslink (Rae 2001). This chapter will also outline the critique of the Basslink project by The Greens and will close with a discussion of the difficulties they faced in mounting a provocative case against Basslink.

THE TRANSFORMATION OF THE HYDRO-ELECTRIC COMMISSION

Hydro-industrialisation

At the centre of the Lake Pedder and Gordon below Franklin Dam struggles was the policy of successive Tasmanian governments of hydro-industrialisation. With the promise of cheap power, large power-consuming industries were enticed to locate to the State. Charged with the implementation of hydro-industrialisation, the Hydro-

Electric Commission was the spearhead of state development. The policy generated economic growth by creating jobs for dam-builders and from industries that used the hydro-power (Thompson 1981). A policy speech in 1969 of the long-standing Labor State Premier, Eric Reece, articulates the rationale that underpinned hydro-industrialisation and the standard by which his government measured its success:

Growth in the demand for power is everywhere regarded as a reliable index to industrial activity and material progress. Our notable industrial expansion, together with population growth, reflects this (quoted in Lowe 1984:32).

The following proportions of government capital expenditure in 1982 indicate the government's commitment to hydro-industrialisation: education 7 per cent, housing 7 per cent, health 5 per cent, water supply 7 per cent, other services 7 per cent, construction and public building 7 per cent, and the Hydro-Electric Commission 52 per cent (Turnbull 1982:1). On the basis of figures like these, Turnbull (1982) claims that Tasmanian governments became dependent upon the Hydro-Electric Commission's funds to create jobs.

Load and Demand Forecasts

Load and demand forecasts from the Hydro-Electric Commission were a flashpoint in the controversies of the past [see Wilderness Society (1984), Davis (1972); Saddler and Donnelly (1982); Australian Conservation Foundation (1980)]. Lowe (1984:35) provides an example. To ensure supply could meet the Hydro-Electric Commission's projected demand, power stations and dams were built in advance. In 1971 the Hydro-Electric Commission presented a report to Parliament for approval of the Pieman River Power Development Scheme on the basis of its forecast that demand would increase by between 80-100 per cent in the following decade. This was based on the assumption that future consumption would follow that of the past ten-year period when it had

doubled. Lowe (1984:35) notes the “HEC [Hydro-Electric Commission] thought that the trend would continue, and said that unless the scheme was in operation by 1978 power restrictions could result”. The threat of power restrictions and the political and social backlash that was likely to ensue from limits on electricity use ensured the Hydro-Electric Commission got the funds and approvals it applied for.

Effects of Hydro-industrialisation

The effects of hydro-industrialisation and such ultimatums are important to consider. In the first instance, vast natural areas were sacrificed to deliver cheap power, economic stimulus and jobs. Continued employment and economic growth relied upon building more dams and flooding more areas. This meant that people’s livelihood depended upon the destruction of their natural environment. Furthermore, the policy was criticised for having situated energy-intensive, not job-intensive, industries in the state (Wilderness Society 1984; Thompson 1981; Davis 1972:35-36). Having taken up large blocks of power, the projected energy demands of these companies regulated the state’s infrastructure development. If the power was not actually needed, there was debt and excess supply. This left the Hydro-Electric Commission with little bargaining power to profitably recoup the cost of building the dams and generating the power (Wilderness Society 1984; Thompson 1981).

As well as the political clout wielded by the Hydro-Electric Commission, hydro-industrialisation placed considerable economic and political power into the hands of a few large companies (Tighe 1992:134). For instance, Thompson notes:

The key to understanding the HEC’s power in Tasmania is to examine its relationship to industry. Tasmania is effectively a Hydro-Industrial complex. Since the establishment of the Hydro-Electric Department in 1914, the aggressive marketing of electricity to large

industrial consumers has been the lynchpin of Tasmania's economic progress. Cheap and abundant electricity brought industry – EZ, Electrona Carbide, pulp and paper manufacturers, Comalco and BHP's Temco – and these became the heavyweights of the Tasmanian economy. Tasmania was handicapped by the difficulties of a small home market and a 240 kilometre stretch of water separating it from the Australian mainland. Opportunities for industrial and manufacturing expansion were limited. By regulating the nature and pace of industrial development, the HEC became critical to Tasmania's political economy. The State's industrial development strategy was dominated by investment in power (Thompson 1981:23).

Indicative of the power still exercised by the state's major industrial customers are comments of Anthony Kjar, a former Managing Director of Comalco Australia (JKMRC 2002:13), currently HT's largest electricity consumer, and a former member of the Basslink Development Board. In 1995, Kjar made representations to a Commonwealth Senate hearing on the draining of Lake Pedder, seen by Comalco as a threat to its secure and uninterrupted power supply in Tasmania. The Senate report makes reference to his evidence:

Dr Kjar told the Committee it is a 'pretty likely scenario' that Bell Bay [aluminium smelter which employs several hundred Tasmanians] would be closed if Lake Pedder were drained but retaining Lake Pedder would not guarantee that Bell Bay would not close. Comalco's concern about the possible draining of Lake Pedder was explained on the grounds that Comalco 'cannot see our way clear to expanding the facilities, to put money into a system that does not have the power to sustain us in the longer term' (Parliament of Australia 1995:53).

The report also extracts the following statement from the submission of Comalco Aluminium (Bell Bay) Ltd:

the loss of Lake Pedder's 65 MW would have a major negative influence on both the ability to reach a satisfactory power arrangement and the assessment of Comalco directors and shareholders concerning any major investment in Tasmania ... (Parliament of Australia 1995:63).

The message is that if Lake Pedder is drained, Comalco's operations would most probably close and jobs would be lost. If it is not drained, the plant could still close. According to Thompson (1981) and the Wilderness Society (1984), ultimatums such as this, where there are threats to close down operations if demands are not met, have driven dam-building in Tasmania in the past.

The submission from Comalco Aluminium (Bell Bay) Limited (2001) to the JAP indicates that Basslink has been driven by similar supply augmentation imperatives. The considerable fiscal clout of Comalco in Tasmania derives from the amount of electricity it uses and the number of people it employs. Its submission notes that its operations consume more than a quarter of the capacity of the hydro-system (ie 286 MW), which approximates the electricity used by the city of Hobart. It is also noted by the company that it directly employs over 600 people and 100 contractors, and creates employment for 1,800 more. In addition, it spent more than \$100 million in Tasmania in the year 2000 [Comalco Aluminium (Bell Bay) Ltd 2001].

According to its submission, Comalco believes Basslink will provide security of supply, competition and most importantly, a reduction in sovereign risk. It also believes that Tasmania's entry into the NEM will induce competition and lower prices, which will put "Tasmanian customers on a more equal footing with their interstate and/or international competitors" [Comalco Aluminium (Bell Bay) Ltd 2001:6]. Comalco's submission also notes that it has a take-or-pay contract with HT until 2014. On this basis, if Basslink is operational in 2005, it will be nine years before Comalco could take advantage of any benefits of competition.

The Greens argue that Comalco already gets its power at extraordinarily low prices. Although the specifics of the contract prices are unknown (as they are confidential), The Greens claim that in 1996/97, the average price paid by the 16 major industrial customers was 2.8 cents per kilowatt hour (Greens 2003). In 2004, residential customers are paying around 13 cents per kilowatt hour. The disparity is justified on the basis that it is easier and, thereby, cheaper to supply larger customers than it is smaller ones (Andrew Campbell, audio evidence, 4 October 2001).

In the days of hydro-industrialisation, with the Hydro-Electric Commission's attempts to meet energy demands of existing and potential customers, dam projects did not meet their schedules for various reasons, costs blew out, interest rates increased and debts accrued. The legacy of hydro-industrialisation remained with the Hydro-Electric Commission for a considerable period of time. In 1998, its total debt from past years was around \$1 billion (HEC 1999:50). This more than halved with the financial restructure and disaggregation of the Hydro-Electric Commission into three electricity businesses, the Hydro-Electric Corporation (HEC), Transend Networks Pty Limited (the transmission company) and Aurora Energy Pty Limited (the energy retailer) from 1 July 1998 (HEC 1999:50). Today, the organisation still carries around \$1 billion of debt. Although commitments from the past have been whittled away, according to its 2002 Annual Report (HT 2002a:69), HT has taken on around \$800,000 million of debt during 1997 and 2002.

Consumer Pain and Confusion in the 1980s

Indicative of the financial difficulties the Hydro-Electric Commission faced in the 1980's (which were passed onto consumers) between 1981 and 1986 the price retail customers

were paying for their electricity doubled (Lupton 2000:340). By 1986, there were too many dams and not enough power consumption. Hence, the message from the Hydro-Electric Commission changed from the need to build more dams if power restrictions were to be avoided, to the need for consumers to use more power³⁹.

³⁹ The following editorial opinion of *The Mercury* (9 October, 1986) draws attention to this turn-around. It also provides a comprehensive overview of the last vestiges of hydro-industrialisation with an account of the political tensions and the financial difficulties this policy eventually created for the Hydro-Electric Commission, the Tasmanian government and the Tasmanian community: "Consumers of electricity in Tasmania are entitled to ask what sort of game the HEC is playing. For years, Tasmanians have been told that their State needs a greater capacity to generate electricity. They were told that an energy crisis was on their doorsteps, and that it could be beaten only by them building new dams, conserving energy by such measures as turning off their lights when not needed, and insulating their homes so that their power consumption would diminish. Now, in a series of hard-sell advertisements on television and in the Press, Tasmanians are being told that they are not using enough electricity. They are being asked to believe that if they give up smoking cigars, they will be able to pay for the power that will melt the snow in the bedrooms of their children, and also afford for the whole family to have a warm shower. This message comes on top of increased HEC charges with another rise tipped for early next year. What has happened? Why the change? From a complex set of circumstances, there seems to be a simple answer. The HEC appears to have run out of new customers to buy its power, so it needs the old to use more so that it can continue to build more generating schemes. It is apparent that the HEC has over-estimated the amount of power that Tasmania will need. Such a miscalculation is the result of a combination of factors, with the major one undoubtedly being the slowdown in growth which has affected the whole of the industrial world. Unfortunately, the HEC, along with many other institutions, allowed little room in its planning philosophy for years of almost nil-growth. Now, the HEC is faced with the prospect of servicing massive debts worsened by interest rates which have soared because of a national economic slump and a plummeting Australia dollar. In the circumstances, a market not matching anticipated growth was the last thing it needed. The HEC's position is exacerbated by a moral obligation to its workforce. It is the biggest single employer in Tasmania. During its confrontation with the conservation movement over the Franklin River, the HEC sought and received strong support from its employees. It was this support which helped turn traditional Labor supporters on the West Coast into Liberal voters, assisting Robin Gray in his bid to become Premier. The support also sustained the State Government in its battle with the conservationists and the Federal Government, a battle which finally ended when the High Court of Australia ruled against Tasmania. Now, because of the predicament facing the HEC, the conservation movement is claiming that it was right all the time, and that the HEC had got its numbers wrong. It is a claim the HEC will undoubtedly dispute, but existing circumstances must make many Tasmanians start to think that the commission may not be infallible. This is not in any way a denigration of the contribution that the HEC has made to Tasmania. However, even the most pro-development person in the commission must have had at the back of his mind the thought that the day would come when the building of dams would have to stop. It is possible that this day may have arrived sooner rather than later. Some such view must exist in the State Government. Why else would it be considering changing the HEC's charter so that it can compete for work away from the generation of electricity? There seems little reason to doubt that the HEC is in something of a financial quagmire. Evidence of this can be found in it starting an austerity drive. Apart from massive sackings which would have dreadful social consequences for Tasmania, there are probably few ways other than increasing its charges for it to improve its economic performance in the short term. The HEC would, however, improve its credibility by letting the Tasmanian community know the full extent of its problem, rather than trying to fudge its dilemma behind a less-than-subtle advertising campaign".

Retaining Expertise and Skills

In 1986, with the prospect of “the end of the hydro construction era less than a decade away” (Lupton 2000:350), Premier Robin Gray raised the issue of the fate of employees of the Hydro-Electric Commission who possessed extensive expertise and skills that had been built up over many decades⁴⁰. Peter Rae, the then Minister for Education and the Arts, Technology, Deregulation, Industrial Relations, Youth Affairs and Antarctic Policy, who would eventually chart the course of a renewables future for the HEC, was given the responsibility of making recommendations on this issue to Cabinet (Lupton 2000:352).

Cultural and Fiscal Change

In 1987, the Gray Liberal government amended the *Hydro-Electric Commission Act* 1944 to change the structure at the top of the Hydro-Electric Commission to separate “policy-making and executive roles” with the appointment of a Chairman and a General Manager (Lupton 2000:350). The reason, according to Robin Gray, was that he “wanted the Hydro to go down a more commercial path” (Lupton 2000 citing Gray:350). Following recommendations of Rae, this legislative amendment also established a consulting arm for the organisation, the Hydro-Electric Commission Enterprises Corporation (HECEC), which allowed the commission to undertake “a wide range of non-electricity supply type work on a commercial basis” (Lupton 2000:352).

According to Lupton (2000:355), the Gray government’s vision marked the beginning of a decade of significant cultural change in the Hydro-Electric Commission. Backed by a

⁴⁰ “As the King and Anthony schemes were completed, many of the Hydro’s more talented people would be leached out of the organisation – and Tasmania – unless some fresh challenge could be found to keep them gainfully employed. There was the prospect that the government could earn significant additional income selling these skills worldwide” (Lupton 2000:350).

new corporate charter, published in its Annual Report of 1986-87 (Lupton 2000:354), the Hydro-Electric Commission was now required to:

Encourage the development and efficient use of all the State's energy resources (including solar, wind and wave power); promote all forms of energy (not just electricity); enhance development of the State's commerce and industry; give preference to Tasmanian firms in its purchasing policies; balance its books by reducing its reliance on external borrowings and government subsidies; maintain a small and more productive workforce; and give weight to environmental as well as economic and technical considerations in its activities (Lupton 2000:355).

By 1989, the Commission's debt was just over \$1.6 billion (Lupton 2000:366). At this time the Gray Liberal government lost an election to the Field Labor government, which formed an alliance with The Greens to take power. Lupton (2000:367) points out that a feature of the new Labor government "was in line with an increasingly popular perception that balanced State budgets improved State credit ratings and attracted private investment". This was in line with the federal Labor government's push for state governments to take a "businesslike approach to managing their financial affairs and their State-run businesses" (Lupton 2000:367). Hence, under the *State Authorities Financial Management Act* 1990 (SAFMA), later replaced by the *Government Business Enterprises Act* 1995, the Hydro-Electric Commission was required to transform into a commercial and profitable enterprise. This meant not only that the Commission had to be run "as a profitable arm of the Government" and deliver it an annual dividend, it also had to operate in a "corporate environment" whereby taxes and fees to the government were also payable (Lupton 2000:372)⁴¹:

This six-year exercise set out to create business autonomy for government enterprises, eliminating day-to-day interferences while

⁴¹ Peter Rae was the "principal architect" of these reforms in his role as the Chairman of the Senate Standing Committee on Finance and Government Operations (Lupton 2000:372).

ensuring full accountability to both the Government and the Parliament (Lupton 2000:372).

Initially, the Hydro-Electric Commission was reluctant to pay the required dividend as it struggled financially in its new commercial environment. However, the government insisted that the dividend be paid in accordance with SAFMA. By 1993 the Commission had contributed around \$40 million a year to public coffers which included dividends of around \$6 million in most years since 1990 (Lupton 2000:374).

In late 1991 the alliance between the Field government and The Greens ended. An election brought into power the Groom Liberal government in which Robin Gray was given the portfolio of Primary Industry and Energy. This brought Gray back into close contact with the Hydro-Electric Commission (Lupton 2000:381). Lupton (2000:381-382) reports that Gray was not impressed with the implications of SAFMA and, although he had set the organisation off on a commercial footing in 1987, he was “reluctant to see its operations corporatised and thus further isolated from the policy objectives of the government”. Apparently Gray believed that privatisation would be the next step, and this would sever the organisation from government policy objectives and the public purse. It was during Gray’s time as Energy Minister that the prospect of Basslink was raised as a serious option to be pursued by the Hydro-Electric Commission. However, Gray was not in favour of it (Lupton 2000:382).

Past Basslink Proposals

A Bass Strait interconnector has been proposed several times in the past. According to Lupton (2000:383) it has been talked about since the 1950s. In 1979, it was advanced by the Hydro-Electric Commission as a supply augmentation alternative in its assessment report on Stage 2 of the Gordon below Franklin Dam development (Hydro-Electric

Commission 1979). At that time, the development, which was viewed as one that would only draw 300 MW of power from Victoria, was considered by the Commission as economically unviable.

In 1980, the federal member for Bass, Kevin Newman, issued a discussion paper suggesting a re-examination of the link proposal in terms of an off-peak import to Tasmania and peak export to the mainland. Newman believed over 20 years ago that an interconnector to the mainland was destined to happen. In 1980, he saw it as an opportunity to displace the Gordon below Franklin scheme⁴².

Newman's 1980 paper illustrates the margin for error in forecasting energy use. At the time, the Hydro-Electric Commission's low energy demand forecast for the year 2000 was 1,506 MW and its high projection was 1,648 MW. As at 2003, the long-term average demand for Tasmania was somewhat short at 1,110 MW (Connarty 2001a) and is expected to increase at less than one per cent per annum in the future (Department of Infrastructure, Energy and Resources 2004). In terms of environmental issues, the paper states:

⁴² Salient sections of the discussion paper are as follows:

"This concept [of a Bass Strait interconnector] would allow Tasmania two very important options in the development of its energy resources:

(a) If the concept proved viable it could initially be used as an alternative to the H.E.C. [Hydro-Electric Commission] preferred integrated [Gordon] scheme. Indeed, it could provide even greater electricity capacity than would be provided under the proposed Gordon Stage II development;

(b) On the other hand, it could be developed in conjunction with the construction of the H.E.C.'s proposed Gordon Scheme thus giving Tasmania a very large energy capacity before the end of the century. This could well mean that Tasmania would be in a position to sell large quantities of peak power to Victoria and perhaps (even more importantly) South Australia (Newman 1980:2). ... Whatever decision is made by the State Government on the current H.E.C. proposal, the fact remains that inevitably a cable will have to be developed between Tasmania and the mainland to meet Tasmania's long-term requirements. All the alternatives, including a coal based thermal station, will simply prove to be far too expensive to introduce. I have discussed this matter with senior H.E.C. officers who privately concede that such a cable will eventually become a reality. The essential argument in this paper is that Tasmania would benefit if this proposal were seriously and honestly considered now before a part of our heritage is lost forever" (Newman 1980:3 of Summary).

The cable clearly meets environmental objections. It is totally clean, will be easily connected to the existing grid and of all the schemes that are being debated as alternatives to the proposed hydro scheme, this is the most environmentally clean (Newman 1980:3).

As we have seen, the environmental credentials of the link became a flashpoint in the assessment of the Basslink project in 2001.

Basslink in the 1990s

In the 1990s, an Industry Commission report of 1991 found that “Australia was being denied the benefits of rationalised supplies and pricing that a competitive national market could bring about” (Lupton 2000:383) and recommended a restructuring of the electricity supply industry. In July 1991, a group entitled the National Grid Management Council (NGMC) was established. It comprised representatives of state and federal governments as well as private and public electricity bodies (Lupton 2000:383). At the end of 1993, Tasmania joined the NGMC and became a party to the simulations the latter was conducting of a national electricity market. By June 1994, “the imaginary Basslink cable had yielded the Hydro a paper profit of \$47 million” (Lupton 2000:399).

During 1991, the media was reporting on the proposed link and discussions were taking place between state and federal governments about its feasibility. It was reported that a preliminary study showed that the project’s estimated economic benefits would be around \$570 million between 1996 and 2020 for the two states of Victoria and Tasmania (Diwell 1991). On an annual basis, that is around \$23 million. An editorial in *The Mercury* (14 October 1991) called for a balanced assessment of several forms of energy augmentation, including a submarine cable, so that the

community would “know the negative as well as positive sides of each type of generating system”.

For Tasmania to join the national electricity market, a physical undersea interconnector would be required. Lupton (2000) explains that the then chairman of the HEC, Brian Gibson, was keen for Tasmania to join a national market, and in conjunction with the State Electricity Commission of Victoria (SECV), a feasibility study for Basslink was carried out. However, this report was not made public until February 1992, as Robin Gray, as Energy Minister, “was as uncomfortable as the previous [Field] Labor administration with the idea of Tasmania’s electricity supply system being linked with that of Victoria” (Lupton 2000:385). Although Gray believed the link was “inevitable”, he “wanted to proceed slowly” (Lupton 2000:385). When the report was released, Gray insisted it be accompanied by a statement stressing that neither the Government nor the Hydro-Electric Commission were committed to the project “in the foreseeable future” (Lupton 2000:385). Lupton (2000:385) goes on to explain that when the cost/benefit calculations were redone by Hydro-Electric Commission and the SECV in a report of June 1993, it presented a “less optimistic picture of the link’s economic benefits”. Whereas Gray had stalled on releasing the previous report, there was no such hesitation with this one (Lupton 2000:385). Hence, despite the paper profit of the NGMC, enthusiasm for the project waned.

A New Future for the Hydro-Electric Commission

Dam building ended in Tasmania in 1994 with the completion of the Anthony Power Development (Lupton 2000:403). Lupton (2000:403) notes that “[w]hile significant water power potential remains, it is unlikely, for economic and environmental reasons,

to be tapped". Recognising the end of a long and important era in the history of Tasmania and his organisation, Peter Rae, Chairman since 1993, set the following course for the Hydro-Electric Commission with the following words:

No longer are we a construction authority ... instead, we are an energy utility in the business of marketing our product in open competition. In doing so, we are managing the largest commercial business in the State (Lupton 2000:401).

This simple declaration marks off the past, not as an end to hydro-industrialisation, but in recognition of its integral contribution to an overall strategy that is yet to come to fruition. Building dams was merely stage one. Basslink is pivotal to the next phase envisaged by Rae.

Also during 1993-94, the "transition to operation on the basis of commerciality and accountability was achieved" (Lupton 2000:398) when Hydro's capital works program was funded internally with no new borrowings. This meant compliance with a policy of no new debt for capital works and permitted actions to substantially reduce borrowings (Lupton 2000:398).

In November 1995, Robin Gray resigned from Parliament and Tony Rundle replaced him as Energy Minister (Lupton 2000:406). The 1996 state election saw both major parties with insufficient seats to govern. As The Greens retained four of its five seats, again, it held the balance of power in the House of Assembly. A "partnership" with The Greens returned the Liberals to government, although in a minority position (Crowley 2000:63-4). Tony Rundle took over from Ray Groom as Premier and Christine Milne took over from Bob Brown to lead The Greens (Crowley 2000:63-4).

It was during the term of the Rundle Liberal government that the ball really started to roll on Basslink with the resurrection of previous studies and steps taken to identify its commercial prospects in the now deregulated national electricity market (Lupton 2000:407). John Cleary took over from Robin Gray as Minister for Energy (Lupton 2000:407) and the search began for future energy augmentation options for Tasmania. In August 1996, Premier Rundle announced that the state's next power source would most likely be built, owned and operated by the private sector and the best options were a Bass Strait cable and gas from Bass Strait.

Selling the Public Asset

By 1996, 40 per cent of the HEC's costs were allocated to servicing debt (HEC 1996:5) and by 1997 its borrowings totalled \$1.5 billion (Lupton 2000:414). In April of that year, Premier Rundle announced that Basslink should proceed and that although its generation assets would be retained, the HEC's network, distribution and retail assets should be sold (Lupton 2000:408). This sparked a number of campaigns against the sale. The Corporation's debt was used to support the government's case for the sale. For instance, John Cleary incorrectly pegged the "massive" debt at \$2 billion in a letter to *The Mercury* on 28 July 1997 (Lupton 2002:414). He was corrected by the opposition who pointed out that one-quarter of the \$2 billion was accrued staff entitlements. In the same month, a report from Peter Nixon on the economic future of Tasmania supported Basslink and recommended the total sale of the HEC for \$3.7 billion (Lupton 2000:414). Labor rejected the proposition.

In August of 1997, in his budget speech, Premier Rundle confirmed the government's intention to split the HEC into three with a generation business remaining as is, and

two privately owned businesses, one for retail and distribution and the other for transmission. Although the Rundle government eventually rejected Nixon's recommendation for a total sale, it wanted to embark upon a partial-sale to retire state debt and that of the HEC, and to finance government reforms. To meet the latter objective, Rundle announced that the HEC would be required to pay a special dividend of \$40 million per year from 1998-99 "to fund government tax cuts" (Lupton 2000:415). Although legislation for the split was passed by the State Parliament in December 1997 with the *Electricity Companies Bill* 1997 (Lupton 2000:417), in 1998 there were still questions for the government about whether the HEC's split-off assets would be leased or sold. At that time there was eight per cent approval for a full sale, 27 per cent for a part sale and 53 per cent saying they wanted no sale at all (Lupton 2000:415). Disaggregation of the HEC came into force on 1 July 1998. The Labor government's policy was that all three electricity businesses should be retained in public hands and a state election in 1998, which brought the current Bacon Labor government into power, saw this position prevail.

Bacon Government's Energy Policy

Enthusiasm for Basslink did not waver with the Bacon Labor government. Its energy policy, *Meeting Tasmania's Energy Needs for the 21st Century* (Department of Treasury and Finance 2003a), represents significant reform and infrastructure investment with the

building of not only Basslink but also a gas pipeline across Bass Strait, referred to as the Tasmanian Natural Gas Project (TNGP)⁴³.

No Threat from Debt

The new Bacon Labor Government did not waver on the requirement for HT to pay the \$40 million special dividend either. This is despite, according to the Tasmanian Audit Office (2000:123), this dividend having contributed to “steadily decreasing” profits for HT. The report notes:

Return on equity continues to be below that which would be expected for a commercial undertaking, however returns to the state are boosted by the special dividend of \$40 million each year. ... The interest cover ratio of between one and two over the past five-years indicates that revenues are low compared to the borrowing costs required to service the loan portfolio (Tasmanian Audit Office 2000:123)⁴⁴.

Although the low return on equity results also from the cost of servicing debt, as at February 2003 HT had no intention of reducing debt. HT’s stance in this regard was revealed at a Government Businesses Scrutiny Committee (House of Assembly 2003a). When it was raised by The Greens that HT’s debt as at 30 June 1999 was \$1.46 billion and \$1.36 billion as at 30 June 2002 – a reduction of only \$10 million over three years –

⁴³ The objectives of its energy policy are: “securing additional sources of electricity generation to meet the State’s growing electricity needs; introduction of natural gas to the State to diversify the energy sector, which will introduce strong modal competition and underpin economic development, particularly in the industrial sector; ensuring that Tasmanian electricity users have access to competitively priced electricity; developing mechanisms to effectively deal with the risks associated with drought and the loss of one or more major electricity users; developing a regulatory framework which maintains the reliability of the electricity supply industry and protects electricity customers, while encouraging new entrants and the development of market outcomes; promoting the development of Tasmania’s renewable energy resources, consistent with policy at the national and international levels; and ensuring the financial implications of reform are manageable in the context of the Government’s medium-term Fiscal Strategy” (Department of Treasury and Finance 2003a:4).

⁴⁴ *Hansard* from the Government Businesses Scrutiny Committee of February 2003 reveals HT’s Board of Directors disagree with the formula for calculating its return on equity, which relates to the way assets are depreciated. Geoff Willis, HT’s CEO, indicated that a “cash rate of return” formula, which uses earnings before interest, tax and depreciation are taken off, is used internally (House of Assembly 2003a:7). The effect is to increase the return on equity from 4 per cent to 6.49 per cent and it is this calculation by which the Hydro Tasmania board members measure the performance of the organisation (House of Assembly 2003a:7).

the question was put as to whether this was good business practice. HT's Chairman, Peter Rae, replied:

I regard as good business practice the way Hydro Tasmania prior to disaggregation reduced the total debt of the business which had aggregated the debt over the construction era of \$1.5 billion. During the period leading up to disaggregation, that debt was very substantially reduced. ... We have a gearing ratio which is probably better than most of our competitors in the electricity supply industry (House of Assembly 2003a:6-8).

When asked what the ratio was, Rae's reply articulates HT's position on the issue of debt reduction and its commitment to growth:

Just a fraction under 40 percent. At that percentage we would probably be much better than many of the corporations in New South Wales, Victoria and elsewhere in Australia. It is one where we believe that there is not a case for allocating funds to reduction of debt at this stage when we have a growth program which we are undertaking out of internally generated funds. So their whole objective in 1994, at the end of the construction era, was to change from increasing debt to stabilising and then reducing debt. That was done over the succeeding years to a stage where we are now in a competitive and reasonable balance between the equity and the debt and we can manage that satisfactorily. I have no reason to think that, whilst it would be nice always to reduce debt, there is no business urgency to reduce debt (House of Assembly 2003a:7).

Later on in the proceedings, Rae reiterated this point:

We do not have a ... particular need to reduce debt and we believe that it is more important to be able to utilise the funds that we have available for investment in new developments of wind farms and small hydro and refurbishment which is taking place in various parts of Tasmania and also interstate. ... We believe that adequate risk management is being applied as we look at what the opportunities are and which ones should be taken (House of Assembly 2003a:11).

The Greens queried whether, given the uncertain environment HT would be operating in with Basslink – for instance, the vagaries of the NEM, potentially increasing interest rates, the prospect of changes to the Mandatory Renewable Energy Targets legislation (to be discussed) and large maintenance issues with which to contend – the \$40 million should go towards reducing HT's debt rather than consolidated revenue for the

government to spend. The Deputy Premier, Paul Lennon, took this opportunity to berate The Greens and accuse them of suggesting a withdrawal of funds from social services:

If I could just explain something, the proposition you are putting to this committee now is that the Government should reduce the payments it gets from the Hydro by \$40 million, and therefore we should reduce the money available on the revenue side of the budget by \$40 million, so presumably at some stage during this debate you are going to identify which parts of the Budget should be cut by \$40 million. Is it \$40 million out of Health? Is it \$40 million out of Education and \$20 million out of Health, or should it all go from the pensioners (House of Assembly 2003a:11)?

In stark contrast to Lennon's comments in February 2003, which were clearly emphatic that the government would not give a second thought to foregoing HT's special dividend, in the Tasmanian Parliament on 28 May 2003 the Premier, Jim Bacon, announced that the HT special dividend would be phased out. This information was forthcoming upon questioning to the Premier from the Leader of the Opposition, Rene Hidding, about the budget papers having allocated only \$20 million instead of \$40 million from HT. Bacon said:

The Government has taken a decision, ... to phase out the Hydro Tasmania special dividend to more closely mirror the circumstances that will apply after Tasmania's entry into the national electricity market ... The special dividend has contributed to delivering Government's financial flexibility over the past five budgets. This has once and for all proven that Hydro Tasmania did not need to be sold for the Government to achieve elimination of general government debt, as proposed by the Liberals and supported by the Greens in 1998. ... our successive budgets have proved once and for all that it was a giant hoax being perpetrated on the Tasmanian people that it was necessary to sell our most valuable assets, the electricity companies, in order for the State to reduce debt and provide proper services to the community. Particularly the five budgets since the 1998 one, which was a hangover from the Rundle-Greens Government of the time, have shown an improving path. One of the contributors to that has been the Hydro special dividend. Equally as the budget situation has improved the need for that dividend has reduced and the Budget papers reflect that (House of Assembly 2003b:1-2).

It is important to note that the 2002-03 budget papers (Parliament of Tasmania 2002a) introduced a new phase of the Bacon government's fiscal policy, which has the aim of reducing total state net debt to less than \$1 billion by June 2008 (Parliament of Tasmania 2002b:1). This would require HT to substantially reduce its debt.

The testimony of Peter Rae indicates that HT's debt management strategy does not concur with that of the government. A phase out of the special dividend would allow HT to progressively allocate such funds to retire debt, and this intention is intimated in the comments of Premier Bacon. However, the HT Chairman's testimony reveals an unwavering commitment to the organisation's "growth program", which does not align with the retirement of debt as a priority. Not unlike its past growth phase of dam building, HT is confident that maintaining a high debt level is not risky business practice.

Talking Up the Tasmanian Economy

Basslink and the TNGP provide the government with significant opportunities to talk-up the economic potential of these infrastructure-related projects for the future of Tasmania. Making the link between Basslink and an expansion of industrial and manufacturing enterprises in Tasmania in 1998, the Premier had this to say:

Basslink is a key plank of the Tasmanian Government's energy strategy and a critical factor in Tasmania's future economic development. Together with the Government's resolve to bring natural gas ashore to Tasmania, Basslink will maximise the potential for economic growth in the State. With Basslink in place, Tasmania will be in a position to secure major industrial and manufacturing developments that will mean sustained investment and job growth for Tasmanians well into the next century (DIAS 2002b:2-1).

More recently, Basslink has been consistently linked with renewable energy. For instance, expounding the renewable energy credentials of Basslink, the Deputy Premier made the following comments, with considerable zeal, in 2002:

Strategically Basslink is crucial for the State and for Australia. It is crucial for jobs and investment in Tasmania and has a key role to play in reducing Australia's greenhouse emissions. Basslink, wind energy, the gas project, water storage and irrigation, and a fibre optic network will accelerate an already impressive performance by the Tasmanian economy. These large infrastructure projects will herald an unprecedented era of private investment in the state. Add to this the purchase of the two new monohulls [ferries] for the state and the future looks very bright indeed⁴⁵.

Basslink's approval has been pivotal for promoting confidence in the Tasmanian economy.

Prior to the approval of Basslink by the JAP, the President of the TCCI claimed Basslink would have greater benefits than hydro-industrialisation:

Add to that [the gas pipeline] Basslink and Tasmania joining the national electricity market which unfortunately is not yet a certainty and the effects will be even more positive than the hydro-industrialisation immediately post World War 2. It is imperative that commerce and industry strive to assist Basslink to become an early reality (Kemp 2002:8).

Representatives of business viewed the approval of Basslink as critical to the neutralisation of a perception that Tasmania was "closed for business"⁴⁶. Hence, as far

⁴⁵ Media Release, Tasmanian Government, Minister for Infrastructure, Energy and Resources, Paul Lennon, 12 March 2002, 'Another Step Closer for Basslink'.

⁴⁶ The rejection of the Wesley Pulp Mill by the Commonwealth government on environmental grounds in 1989 (Whinnett 2003) loomed large in this respect. The TCCI stated the following in its Basslink submission: "Tasmania is currently at the crossroads in deciding whether significant capital investment projects are welcome or not. The State Government has been working hard to overcome the significant handicap to arise from the debacle of the Wesley Vale Pulp Mill that sent a very real message that Tasmania was closed for business. Approval of the Basslink Project provides a great opportunity to send to investors a signal that Tasmania is once again seriously open for business" (TCCI 2001:4). The submission from Comalco Aluminium (Bell Bay) Limited (2001:7) contained a similar message: "With the exception of the Duke Tasmanian Natural Gas Pipeline, Tasmania has not secured a major investment for many decades. While there has been the promise of a number of projects taken to pre-feasibility or even full-feasibility status, Tasmania is seen nationally and internationally as a difficult destination. Many

as the business sector was concerned, the approval of Basslink was symbolic. Without it, Tasmania would be “doomed”. Such warnings are reminiscent of those made when the construction of the Gordon below Franklin Dam was in doubt⁴⁷. With the start of the construction of Basslink, the symbolism was confirmed by the Premier:

Basslink is a crucial part of the energy revolution that is transforming Tasmania’s energy production landscape. It will deliver unprecedented opportunities for Tasmania to market renewable energy and to attract new industrial investment translating to jobs and opportunities. ... There is now greater confidence in the Tasmanian economy as a result of the Government’s \$1.25 billion energy plan coming to fruition. ... Things are happening. There is a very real sense of excitement and achievement in Tasmania for the first time in many years. That sense is confirmed by data from the ABS State Accounts publication released late last year, which showed that Tasmania is experiencing strong economic progress. Private investment has grown by around \$460 million which reflects a combination of strong business confidence and the diverse range of major infrastructure projects underway in the state⁴⁸.

For government and business, there was a lot riding on the approval of Basslink – not only jobs and growth, but economic confidence in Tasmania.

Hydro Tasmania’s Solutions to the World

At the 2001 Basslink public hearings, Peter Rae, the HT Chairman, stated that following “strong submissions from the Corporation” in 1997, the Bacon Labor government agreed to support Basslink (Rae 2001:1). Notable in Rae’s presentation was his passion. His belief in the potential of a world class renewable energy industry emanating from

people still refer to the failed Wesley Vale Pulp Mill project as a victim of the State’s perceived anti-development mindset. Should the Basslink project fail to gain approval, it is likely that this view will be further entrenched”. In addition, Peter Rae is categorical that Tasmania’s economy is now being driven by decisions made in respect of energy projects over the last five years to overcome past economic misfortune, such as the loss of the Wesley Vale Pulp Mill. He is quoted as saying: “There was almost a national conspiracy to prove Tasmania could not succeed and that it was a rust-bucket economy not worth saving ... We lost the Wesley Vale mill, we had minority governments that could do no more than compromise and confidence fell” (Caples 2002).

⁴⁷ For example, the Tasmanian Chamber of Industries had this to say in the 1980s: “It is clear that, if conservation groups are successful in preventing development of the Lower Gordon-Franklin scheme, the economic consequences for Tasmania will be most serious” (Thompson 1981:96 citing the Tasmanian Chamber of Industries).

Tasmania was fervent. A media report of December 2002 points out that Rae has been “accused of being greener than the Greens” (Caples 2002) and that he believes the Greens are “missing the big picture”.

Illustrating how ‘big’ Rae is thinking, Caples (2002) reports that he is not only considering a second Basslink cable, which would “more efficiently” connect wind farms on the west-coast of Tasmania to the grid in Victoria, but also that Tasmania could take a leading role in solving the most basic global socio-economic problems.

Rae is quoted as saying:

Australia has the opportunity, led by Tasmania, to reduce global tensions caused by inequalities created by the lack of those basic things – water, sanitation and energy ... (Caples 2002).

Hence, according to Rae, Tasmania not only has the capacity to export renewable energy to mainland Australia, but also its expertise to the world⁴⁹. In terms of the latter, in this opening presentation, Rae emphasised the importance of projects like Basslink for the survival and expansion of HT’s consulting business⁵⁰.

⁴⁸ Media Release, Tasmanian Government, Premier, Jim Bacon, 12 March 2003, ‘Basslink Construction Start’.

⁴⁹ These comments from Rae are perhaps not surprising given his stamina. Apparently requiring only three to four hours sleep at night and with seemingly inextinguishable verve, he most probably considers issues of global security an undaunting task. Lupton (2000) tells the story of Rae calling John Knight, the then assistant to the Commission’s chief executive, to go over some ideas, only to have it pointed out to Rae that it was three in the morning. He had become “so entrenched in his extended working day that he had lost track of the time” (Lupton 2000:395).

⁵⁰ A relevant excerpt is as follows: “The consulting business employs nearly 300 expert staff particularly engineers and scientists, with nearly fifty people in the environmental section. It is, by itself, a major business within the State of Tasmania operating nationally and overseas. However, this part of the business needs a significant flow of well planned internal work to support its continued existence and, hopefully, further growth. It needs continuing growth within Hydro Tasmania to maintain its position. Hence, at this stage of its growth, the Consulting Business relies substantially on projects such as Basslink, which will underpin the wind development, to provide the desirable opportunity for the consulting division” (Rae 2001:4).

Environmental Credentials

Under the stewardship of Peter Rae, HT has embraced the concept of renewable energy. According to Rae, this is not rhetoric. Since 1992, the organisation has worked to raise its environmental credentials, and has “given very great weight to environmental considerations in all matters” (Rae 2001:1). Anticipating changes to the state’s environmental legislation, in 1992 the Hydro-Electric Commission produced an environment policy which harnessed its operations to performance guidelines, standards and protocols (Lupton 2000:392). In 1994 it adopted an environmental management system to ISO 14001 standard and produced its first annual Environmental Report (Lupton 2000:406). In 1997 the HEC erected a trial wind farm on King Island and in 2001 it won an environmental award, the Blue Planet Prize (Rae 2001:5)⁵¹. As far as Rae is concerned, achievements such as these demonstrate that the culture of HT has been irreversibly transformed into an organisation that is environmentally conscious and sustainable. Hence, he cannot see what The Greens could possibly have to complain about in a project like Basslink that will not only generate but also export renewable energy.

A Renewables Future

Capitalising on global concerns about climate change, and the non-fossil fuel content of hydro-electricity, HT has defined its hydro-power as renewable energy and classed itself as Australia’s largest renewable energy generator. The prospects it has raised with respect to wind power are considerable. In its submission to the JAP, HT claims:

Tasmania has one of the best wind resources in the world. It is estimated that Tasmania could viably support up to 1000 MW of wind turbines, producing over 3000 GWh of renewable energy per year. With this abundant wind and water resource Tasmania can meet around one third of the National greenhouse gas reduction target,

⁵¹ This prize was sponsored by the International Hydropower Association and UNESCO.

provided development of the wind resource is enabled. Consequently Tasmania is envisaged as a major contributor to the attainment of reduction in Australia's greenhouse gas emissions levels (HT 2001b:17).

To fit its new image and the strategic direction envisaged by its Chairman in 1994, as of May 2000 the HEC trades under the brand name of 'Hydro Tasmania - the renewable energy business' (HT 2000a:10), which encapsulates HT's new direction:

Our new image accurately reflects the organisation and cultural changes which have taken place in our business and provides us with a very clear and competitive edge in Tasmania, in the national market when we enter it and for our consulting business in Australia and overseas (HT 2000a:10).

This is phase two of Rae's vision and, as stated, Basslink is pivotal to this new direction and the future of HT's consultancy business.

Mandatory Renewable Energy Targets

The development of wind power in Tasmania is underpinned by the Mandatory Renewable Energy Targets (MRET) scheme. MRET, in effect, is a government subsidy, established and funded by the Commonwealth government to encourage the development of a renewable energy industry and facilitate the generation of additional renewable energy in Australia (Australian EcoGeneration Association 2001). The scheme originates from the Commonwealth government's 'Safeguarding the Future: Australia's Response to Climate Change', announced in the lead up to the Kyoto climate change negotiations in 1997. It requires two per cent of Australia's electricity to be generated from renewable sources by 2010 (Department of Industry Tourism and Resources 1999:16)

The two per cent commitment has been translated into a renewable energy target of 9,500 gigawatt hours to be met by 2010, and maintained through to 2020 (Office of the Renewable Energy Regulator 2003). At the heart of the scheme are Renewable Energy Certificates (RECs). Wholesale purchasers of electricity are legally required to buy RECs, which means a proportion of their energy requirements is met from renewable sources (Office of the Renewable Energy Regulatory 2003). The penalty for non-compliance is \$40/MWh (Office of Renewable Energy Regulator 2003), hence RECs sell for around this figure and are capped at \$40 (House of Assembly 2003a:9). With RECs, the scheme makes the generation of wind energy, for example, comparable to the cost of generating non-renewable energy. For instance, if the regulated price of electricity from conventional sources is \$45 per MW and the cost of generating wind power is \$70 per MW, the sale of RECs at around \$40 per MW makes the generation of wind power not only feasible but profitable.

It is important to understand HT's unique position in terms of developing and profiting from wind power. Most NEM wind generators have to take the prices on the wholesale market that they can get for their wind power when the wind is blowing and their turbines are running power into the grid. This could be at any time of the day or night. Yet, for HT, combining wind farms with the hydro-system allows HT to get peak prices for its wind power. When the wind blows, power can be generated and run into the Tasmanian grid. This saves water and the use of hydro power until it can be exported at peak times into the NEM:

Basslink will allow us to fully exploit our hydro-electric generation system's key natural advantages. These are its renewable nature and its ability to store energy in water, then release and supply it to customers at peak value times. The further development of wind power complements the system, given an alternative energy source

and enabling us to reserve water storages for peak demand periods (HEC 1999:10).

In this way, the hydro-system will operate as a battery, which will allow HT to get peak prices for its wind energy and have it subsidised by MRET. This combination is an advantage for HT.

Ambitious Wind Power Plans

As noted, HT's plans for wind power are ambitious. Rae's aim is that Tasmania will contribute to at least one-third of the MRET target – 3,000 gigawatt hours of electricity per annum⁵². In his view, this is not an idealistic goal, but HT's realistic and ultimate objective:

The objective is to ensure that Tasmania provides at least 30 per cent of the 9,500 GW hours of new renewable energy mandated for 2010 by the Federal Government in response to the Kyoto Protocol ... The total generating capacity from the sites already available in Tasmania exceeds 1000MW. Hydro Tasmania's involvement in these developments gives the organisation a second opportunity to be a driving force in the economic development of Tasmania. The 20th Century saw the development of hydro-electric schemes as a main thrust to the State's overall development. The 21st Century will see generation of electricity from wind, together with improvements and further development of our existing hydro-electric schemes, provide significant employment opportunities and improve the business activities of the Corporation. This will happen while supplying significant quantities of green electricity into the National Electricity Market (HT 2000a:4)⁵³.

To generate 1,000 MW of wind power in Tasmania, based on the capacity of the turbines installed at its Woolnorth wind farm of 1.75 MW each⁵⁴, 570 turbines across Tasmania would be required. This would be development on a grand scale, the likes of

⁵² Media Release, Hydro Tasmania, 18 October 2002, 'Two of Tasmania's Natural Advantages Brought Together'.

⁵³ According to HT's CEO, Geoff Willis, at the Government Businesses Scrutiny Committee hearing, HT's objective is to earn 20 per cent of the annual income stream from the MRET scheme which totals \$400 million, namely, \$80 million per annum (House of Assembly 2003a:9).

which has not been seen since the construction phase of the hydro-system. HT already has several projects in the pipeline which will make a substantial contribution to meeting its challenge – Woolnorth will deliver 130 MW, Heemskirk 160 MW and Musselroe 140 MW⁵⁵.

The jobs these developments are expected to provide are emphasised at every opportunity. The state government has been pro-active in capitalising on Basslink and the State's potential for wind power to create jobs. For example, with HT, it brokered a deal with Vestas Wind Systems, a Danish wind energy developer, to establish a manufacturing facility for the assembly of parts for wind turbines at Wynyard on Tasmania's north-west coast. Having provided an assistance package of roads, electricity connections, water, stormwater and sewerage, the government announced that this enterprise will deliver 60 manufacturing jobs and investment of \$15 million⁵⁶. With assurances that local companies would be used to build the facility at Wynyard and that local manufacturers would be utilised for other components, the government was obviously keen to demonstrate that its energy policy is generating jobs and economic growth, and that there is considerable potential for the future.

HT, too, is keen to demonstrate that wind farms mean jobs locally. In relation to its proposed Heemskirk wind farm, it has conveyed the following:

We expect over 150 jobs would be generated in constructing the wind farm, including road improvements, transport, earth moving and

⁵⁴ Media Release, Hydro Tasmania, 18 January 2002, 'Clean Renewable Energy – Tasmania's Continuing Vision – Wind Farms – The New Renewable Energy Source'.

⁵⁵ According to Media Release, Hydro Tasmania, 3 March 2004, 'Hydro Tasmania and EHN joint venture on Cathedral Rocks wind farm', Hydro Tasmania has also committed to joint venture arrangements with a Spanish renewable energy group Energia Hidroelectrica de Navarra (EHN) to develop a 66 MW wind farm at Cathedral Rocks on the Eyre Peninsula in South Australia.

⁵⁶ Media Release, Tasmanian Government, Deputy Premier, Paul Lennon, 3 June 2003, 'Nacelle Assembly Factory Construction Underway'.

crane operation. "As much as possible the workforce will be sourced from the local area." The energy potential of the Heemskirk wind farm is world class and is larger than any currently proposed wind farm in Australia. Its construction and operation will inject more than \$50 million into the west coast economy over the life of the wind farm, including local jobs associated with the operation and maintenance of the wind farm⁵⁷.

In addition, the Premier has made representations to Vestas to locate its Asia-Pacific blade manufacturing facility in Tasmania, a further job-creator⁵⁸.

Dampening Wind Power Claims

Notwithstanding the ambitious and enthusiastic claims of its Chairman, by early 2003, HT was dampening claims about its wind power plans. This is evidenced in its response to claims from The Greens that Tasmania will end up with an over-supply of power, reminiscent of 'the old days'⁵⁹. In contrast to Rae's pronouncements, the staged nature of the wind developments was being emphasised. For instance, in the media report of Johnson (2003), it was confirmed by David Jeffrey, HT's Corporate Affairs Manager, that Woolnorth was generating only 10.5 MW. A further 54 MW is to come on line in 2004, and the balance in 2006. Although no information was provided in relation to Heemskirk, comments indicated that the Musselroe development was far from finalised. Jeffrey is quoted as saying, "[b]ut what we're doing there (at Musselroe) is still more wind monitoring and we haven't even lodged a development application with the Dorset Council yet" (Johnson 2003:13). Confirming Jeffrey's comments on the staged developments, but contradicting his claim that the wind farms are far-off, an HT

⁵⁷ Media Release, Hydro Tasmania, 5 February 2003, 'West Coast Wind Farm to Generate More Than 150 Jobs'. This wind farm is still at the approval stage. See footnote 60.

⁵⁸ Media Release, Tasmanian Government, Premier, Jim Bacon, 1 February 2003, 'Premier Talks with Vestas'. A media report in *The Advocate* on 28 February 2004 indicates that the blade manufacturing plant for north-west Tasmania could be in jeopardy as Vestas has merged with NEG Micon, another wind technology company. According to the report, which quotes Deputy Liberal Leader, Will Hodgman, the latter has been promising to build a blade manufacturing facility at Portland in Victoria and it is unlikely that two such plants will be built in Australia. Hence, he expects that Tasmania will miss out.

information sheet, *Hydro Tasmania's Musselroe Wind Farm*, indicates that “[i]f the feasibility study proves its viability, the Musselroe project will proceed as a staged development, with construction planned to begin in late 2003”. The initial stage would consist of between 5-25 turbines. The *Heemskirk Wind Farm Newsletter* (HT 2003b) identifies a similar “approvals stage” position with a construction phase that “could begin in 2003/04”⁶⁰.

Hydro Tasmania's Economic Imperatives

Aside from claims that HT is, once again, over-powering the state, which will be discussed later in this chapter, it is important to account for the new economic imperatives put in place for HT since 1994. Within this context, contradictory claims about the commencement of wind farm projects can be seen as HT's attempts to match supply with demand and in doing so, obtaining the highest possible price for its peak hydro/wind power. If HT brought 1,000 MW of additional capacity on line to the NEM over a short period of time, it would augment the capacity of the peak and shoulder markets in the NEM which are currently limited by supply. The effect would be to reduce NEM wholesale prices. Whilst this would be good for consumers and retailers, it would not be so for generators such as HT. A staged strategy, therefore, one driven by mainland demand is what will drive wind power developments in Tasmania (HEC 2001b; Willis 2001, Parliament of Tasmania 2002a:229⁶¹). This approach indicates that HT has perhaps learned from the past and now understands the cost and implications

⁵⁹ *The Advocate*, 27 February 2003, 'Greens Claim State has Too Much Power'. *The Examiner*, 1 March 2003, 'Energy Not That Great, Hydro says' (Johnson 2003:13).

⁶⁰ According to two Hydro Tasmania media releases, 3 March 2004, 'Hydro Tasmania and EHN joint venture on Cathedral Rocks wind farm' and 11 February 2004, 'Hydro Tasmania begins commissioning Woolnorth wind farm stage two', both Heemskirk and Musselroe wind farms are still at the development approval stage.

⁶¹ See also Media Release, Tasmanian Government, Deputy Premier, Paul Lennon, 4 December 2002, 'Another Milestone for Basslink'.

of over-capacity. It also shows how the organisation's economic imperatives have changed.

For the time being then, despite the lofty claims about renewables and wind power, for HT, Basslink is primarily about sending hydro-power into the peak market, which will allow it to expand its customer base from the one it currently has, Aurora Energy Pty Limited, and, it solidly believes, increase its revenue. It will also be a driver for HT's consultancy business. For the Tasmanian government, apart from the symbolism of Basslink, with an additional 300 MW of energy capacity coming into the state, the link should secure further major industrial and manufacturing enterprises and jobs. The government is also keen to lever jobs from a renewable energy industry apparently poised to take off in Tasmania with Basslink.

The question is, how does a government, with the objective of job creation and state development, conduct responsible planning and make financial commitments to, for instance, renewable energy companies like Vestas, when the wind power developer, HT, has the objective of maximising prices by matching supply with demand in staged developments? Unlike the days of hydro-industrialisation, when the objectives of the government and the Hydro-Electric Commission coincided, it is possible that this tumultuous but enduring accommodation could be fractured with Basslink. Despite the pronouncements of the HT Chairman that the renewable energy business represents a second round of economic progress – hydro-industrialisation II – the fiscal environment for HT and its economic imperatives have changed. It is the extent to which these will move out of alignment with those of the government that will be of interest in the future, particularly with the phase-out of the \$40 million special

dividend. Hence, whilst the link between cheap power, energy developments and jobs is imperative for the government, it no longer will be for HT. With hydro-industrialisation remaining a policy direction for governments in Tasmania, even in its new form with the development of renewables, this might not necessarily be so for HT. Ominously, if HT is beholden only to profits, which corporatisation inevitably brings, is it possible that in the future, hydro-industrialisation (or its incarnate) will be viewed, even by The Greens, as socially responsible government policy? Time will tell.

THE GREENS' PERSPECTIVE AND THEIR DILEMMA

Turning now to the critique of Basslink by The Greens, this section will, first, make some geographic and political links between the now iconic Lake Pedder and Gordon below Franklin Dam conflicts and Basslink. It will then outline the position of The Greens on Basslink and the difficulties they faced in mounting a provocative case against the development. I will argue that this was more due to their success than their failure.

Geographical Links to Basslink

The flooded Lake Pedder augments water storage for Lake Gordon and contributes to power generation at the Gordon Power Station, built under Stage 1 of the Gordon Scheme. The Gordon River, the Gordon Power Station and the large storages of Lake Gordon, supplemented by Lake Pedder, is one of three systems in the hydro scheme that is pivotal to the operation of Basslink. The Franklin River, which was to be dammed by Stage 2 of the Gordon Scheme, is situated at the end of the Middle Gordon section of the river (see Appendices 1). In terms of the operation of Basslink, the Franklin is the most distant river in the Middle Gordon from the Gordon Power Station. HT's zone 5 of the Gordon River ends at the confluence with the Franklin, and begins

with that of the Olga River about 11 kilometres upstream (see Appendix 1-1). This area is protected by the *World Heritage Properties Conservation Act 1983*, which was put in place by the first World Heritage declaration over the area in 1982 during the Gordon below Franklin Dam conflict. An important component of the scientific and legal case put by HT was to demonstrate that the link's operation would avoid invoking this legislation.

Political Links to Basslink

Politically, the Lake Pedder and Gordon below Franklin Dam controversies were catalytic for changes to the political landscape not only in Tasmania (Hay 1992), but Australia as a whole (Crowley 2000). Starting with the unsuccessful political campaign against the flooding of Lake Pedder and then the political and legal victory that stopped the Franklin Dam (Crowley 2000), The Greens have established themselves as a political party with slowly increasing electoral support (Crowley 2002).

In terms of Basslink, The Greens were given a seat at the impact assessment process table. Although some witnesses were permitted to ask brief questions here and there, The Greens cross-examined the proponents' witnesses and spent more than a day giving evidence against the project and its technology proposal. Hence, critique of the project was, in large part, left to The Greens. Represented by the protagonist of the Franklin campaign, Senator Bob Brown, the people who had saved the lower reaches of the Middle Gordon, particularly the Franklin River, from inundation almost twenty years ago, were back to fight a battle they thought they had previously won.

The representatives of HT and its consultants, on the other hand, were confident that Basslink would not have a significant impact on Tasmania's lakes and river systems, and any impacts that were likely to occur could and would be mitigated. In essence, HT's position on the potential impacts upon the Gordon River could be summed up with the phrase, 'it's not that big a deal'. Of course, it had massive amounts of evidence to back up its position. I got a sense from talking to the people from HT that, as HT had not been allowed to build the Gordon below Franklin scheme, it should be permitted to proceed with Basslink as, in comparison, the environmental impacts were minuscule.

Response to the DIIAS

The submission of The Greens in response to the Basslink DIIAS (Brown 2001) made the following claims: Basslink was illegal under the World Heritage Convention legislation; mitigation would not limit Basslink impacts as claimed; the proposed technology was not appropriate and would damage the environment; the proposed land routes threatened endangered species and so pylons, particularly in Victoria, should be underground; Basslink would result in an additional one million tonnes of greenhouse gases as an increase in coal-fired power would displace closed cycle gas turbines; all greenhouse scenarios included wind projects in Tasmania that have not yet been implemented; climate change had not been factored into HT's calculations; and feasible and prudent alternatives had not been assessed as required under the EPIP Act. In terms of the economics, The Greens commissioned their own economic analysis by the Atech Group (2001). From this it was claimed that the project would raise wholesale electricity prices on average, not reduce them; and that the confidential facility fee would be around \$90 million. In relation to the generation system, The Greens claimed that the machines at stations required for Basslink were not capable of

supplying peak load power and that this use would reduce their life span and represent significant costs in the future. Another issue for The Greens was the transmission loss from sending power across the link. They claimed that “[a]ll the power generated by a wind farm the size of Woolnorth (100-130 MW) is needed just to cover transmission losses when Basslink is exporting at maximum capacity” (Greens 2003:16). They argued that energy conservation is a consistent blindspot within Tasmanian government policy.

Raising the Broader Issues

In their submission to the JAP, The Greens also raised the broader issue of Tasmania’s future direction. They argued that Tasmania’s current and future success as a clean, green and clever state would be in jeopardy with the approval of Basslink. This was on the basis that Basslink will import coal-fired energy and the claim that Tasmania uses 100 per cent renewable energy would no longer be accurate, and, as well as exporting wind power, it will send power generated from the burning of forests in Tasmania into the mainland (Brown 2001). Basslink, it was claimed, would be the catalyst for the development of several forest furnaces⁶². The Greens claim that this will “entrench the further clearfelling of native forests” (Brown 2001:4).

The Greens saw Basslink and commitments to a heavy industry future as endangering future tourism prospects and the production of high quality food and water products in Tasmania. They maintained that Tasmania’s future energy needs could be met by “a

⁶² Information about plans for such developments are contained in submissions to the Environment, Communications, Information Technology and the Arts (ECITA) Senate Legislative Committee hearing in Canberra on Friday 15 November 2002 in respect of the Renewable Energy (Electricity) Amendment Bill 2002, from Forestry Tasmania (Forestry Tasmania 2002) and the Huon Resource Development Group in relation to the Southwood Huon project (Huon Resource Development Group 2002).

mix of hydro, wind and solar power and energy conservation" (Brown 2001:4). Basslink, then, is not needed at all. Whilst they advocate renewable energy generation, it is not on the scale proposed by HT and not at such a distance from the site of use. Instead of an adherence to a "wood-chip mentality", which means exporting the "lowest value-added product", The Greens advocate an "embedding" of Tasmania's prime renewable energy resource in products exported from the state (McKim 2003).

Overpowering Tasmania

An issue raised at the hearings, but which gained momentum thereafter, was that the government and HT were, once again, overpowering Tasmania and creating an "energy glut" (Greens 2003:11)⁶³. Harking back to the past, The Greens open their discussion paper on this issue, *Power Without Purpose*, with the following statement:

The current rush for energy in Tasmania is reminiscent of the over-investment in dams by the Hydro Electric Corporation in the 1970s. The government boasts of a '\$1.25 billion hydro, gas and wind energy plan' which will provide 'huge opportunities for development' (Mercury, 17 May 2003). The reality is \$2.6 billion of government-initiated expenditure on energy infrastructure with no plan whatever for using the power. This discussion paper maps Tasmania's energy glut, Hydro Tasmania's ambitions and the federal government's contribution through flaws in its scheme to promote renewable energy (Greens 2003:3).

In essence, The Greens see Basslink as a re-run of hydro-industrialisation in a new, but familiar guise. Once again, the government wants to secure jobs and economic growth for the state by encouraging major industrial developments with the promise of secure

⁶³ Environmentalists have raised these concerns before. For instance, the 1994 publication, *Overpowering Tasmania: A Briefing Paper on Power Demand and Supply*, with a cartoon of the Energy Minister, Robin Gray, in his office, wearing a smiling face mask and surrounded by downward trending graphs, opens with the following statement: "Tasmania continues to invest a considerable proportion of its capital-works budget in power schemes in the belief that this is a cost-effective way of addressing the severe economic problems facing the state. This paper presents new information which questions the efficiency of this policy for creating new jobs, challenges the need for the further expansion of the electricity supply, and looks at the economic effect that new power schemes may have on Tasmanians" (Wilderness Society 1994:no page).

and cheap power. HT is seen as a willing instrumentality. The Greens have raised the issue of the consequence of, once again, linking energy developments, which have environmental impacts, and which are limited by, *inter alia*, energy demand, to job creation and economic growth. If the government's new strategy is, in fact, a re-run of the past, the economic well-being of communities and people's jobs will be made dependent upon, for instance, the erection of wind turbines across more and more of the landscape. As far as The Greens are concerned, conflicts over Lake Pedder and the Gordon below Franklin Dam attest that what eventually becomes justifiable, in the name of jobs and economic growth, might not have been foreseen at the outset, and future directions need to be well-considered before policies and economic imperatives are put in place. The Greens are asking, therefore, whether the means to meet the government's objectives are fiscally responsible, or too risky and not needed at all (Brown 2001). Indeed, as noted above, HT's Chairman has confirmed The Greens' worst fears – a second round of hydro-industrialisation is certainly his vision⁶⁴.

Problems with the Mandatory Renewable Energy Target

MRET was a particular focus for The Greens at the hearings, and has since also received attention in the media. Currently, HT earns around \$30 million per annum from MRET (*The Mercury*, 28 December 2002). Although there was no disclosure at the Basslink hearings as to the extent of this state of affairs, the following testimony of HT's

⁶⁴ The following quote from The Greens submission (Brown 2001) illustrates the disparity between their position and the Labor Government on the future direction for Tasmania, and how The Greens view Basslink as more of the past and the economic risks involved: "Basslink is an old economy project which claims to deliver to Tasmania a second wave of hydro industrialisation and heavy industry. It is the 21st Century equivalent of heavily subsidised bulk power contracts. Like former premiers Eric Reece and Robin Gray, Jim Bacon has placed his faith in an industrial future for Tasmania. By signing a 25 year contract for the use of the cable for a set annual fee, he is gambling the financial future of the state on Hydro Tasmania's capacity to make a profit in the highly competitive National Electricity Market. ... In an age where growth is predicated on the knowledge embedded in the product rather than the amount of raw materials and energy used in its production, it is astounding that anyone in a leadership position could espouse such a direction and generate headlines like "Hydro confident of energy-led recovery" (Brown 2001:3).

Chairman states that the business case for Basslink is underpinned by MRET (Commonwealth of Australia 2002:24)⁶⁵:

It [the Parer Report] supports ... Basslink whilst at the same time saying that the Basslink decision, which is based on the MRET, should be completely ignored, because they want to abandon the MRET and substitute an international emissions trading system. That would mean the end of the business case for Basslink (Commonwealth of Australia 2002:24).

Obviously, HT and the Tasmanian government have a lot riding on MRET staying in place and this message was clearly put forward in written submissions from the Tasmanian government to the Commonwealth Government's Senate Committee which has reviewed the scheme (Lennon 2002)⁶⁶.

Mandatory Renewable Energy Target Baselines

Importantly, HT has been able to earn the \$30 million a year from MRET, not by generating wind power, but from its hydro-system. It has done this by benefiting from the baseline over which redeemable RECs are created. This has been a contentious issue. The Australian EcoGeneration Association (AEA), now known as the Australian Business Council for Sustainable Energy (BCSE), has been most vocal. In July 2002 it released a report, *RECs, Baselines and Industry Development* (Australian EcoGeneration Association 2002), which claims that \$1 billion of public money could be spent on MRET without any reduction in greenhouse gas emissions. The reason for this, it is

⁶⁵ Rae refers here to what is known as the Parer Report, the findings of a Committee established by COAG to conduct an independent review of energy market directions (Department of Industry, Tourism and Resources 2002:5). The committee recommended that MRET be replaced by an emissions trading scheme on the basis it would be the most cost-effective option.

⁶⁶ The dependence of wind power developments on MRET has also been emphasised in Tasmanian government media releases, for example: Media Release, Tasmanian Government, Deputy Premier, Paul Lennon, 3 June 2003, 'Nacelle Assembly Factory Construction Underway; Media Release, Tasmanian Government, Premier, Jim Bacon, 4 March 2003, 'Federal Government Must Recommit on Renewable Energy'. Also, the Premier raised the issue in his address to the National Press Club in Canberra in March 2003 stating in a subsequent media release: "It is imperative that the legislation is not watered down in any way because Tasmania has made substantial investment decisions based on the legislation as have other parts of Australia" (Media Release, Tasmanian Government, Premier, Jim Bacon, 4 March 2003, 'Federal Government Must Recommit on Renewable Energy').

claimed, is that existing large-scale hydro schemes, such as that in Tasmania, can create RECs without making any new investment⁶⁷. The point of contention, as far as the BCSE is concerned, is that the baselines for existing hydro schemes from which generation to create RECs is measured have been set too low. A further issue it raised is that the baseline calculations have not been publicly disclosed.

The legislative requirement to calculate baselines is for an average of three years generation prior to 1997. However, because hydro generation is variable and dependent upon a long range of hydrologic variability, 14 years of generation figures (ie ten years prior and four years after 1997) were used by the Office of the Renewable Energy Regulator (ORER) to calculate, for instance, HT's baseline (Commonwealth of Australia 2002:3). Although the baseline figures have not been disclosed by the ORER, the BCSE calculated from RECs already created that HT's baseline has been set below its system's long term annual average capacity⁶⁸. This would mean that HT could create and redeem RECs year after year, because its generation was consistently above the calculated baseline. Of further concern to the BCSE is that the legislation is such that if generation falls below the baseline, there is no penalty. This means that RECs could be created without the hydro operators having to do anything, without any new investment, and if production did not meet designated levels, there was no recompense. The Greens also took up this issue in their discussion paper (Greens 2003).

⁶⁷ According to a Media Release from the Australian EcoGeneration Association, 23 July 2002, 'Key Greenhouse Program May See Australians Pay \$1 Billion for No Greenhouse Reduction': "Most of these projects were built decades ago. For example, the Gordon Power Station in Tasmania was the largest generator of RECs in 2001, the first year of MRET. This plant was commissioned in 1978 and is supplied from Lake Pedder and Lake Gordon ... The MRET initiative was designed to stimulate a new Australian renewables industry and reduce greenhouse gas emissions growth in the electricity generation sector. However, the study shows old power stations can obtain RECs if they increase electricity output above established baselines".

⁶⁸ Specifics of AEA's calculation of baselines are set out in its paper, *Determining Baselines for Pre-existing Generators* of July 2002.

HT argues that the baselines were put in place to ensure that existing renewable energy assets remain in place so that the target above existing operations could be met:

Existing generation assets are on average 45 years old and there is no certainty that they will still be in place in 2010. While these assets are expensive to maintain and/or upgrade, the cost of replacing them would lead to significantly higher costs of new renewable generation, and would therefore add to the overall costs of implementation of the measures. The baseline approach outlined in the November 1999 Cabinet decision provides the financial incentive to keep existing renewable generation assets in operation (HT 2000b:5).

So, the money received by HT in terms of the baseline is to help keep its existing generation system in operation for the benefit of the MRET scheme.

In its submission to a Senate Committee, the BCSE (2002:2) states that it “understands that the legislation was always meant to provide an incentive for old hydro projects to improve their performance”. The problem, however, is that the number of RECs that could be created with the baseline formula adopted was not envisaged at the outset and what is occurring is not improving anything – it is simply an unforeseen outcome of novel legislation:

Unfortunately, the manner in which the baselines have been set means that more than 28.5 million RECs representing over \$1 billion will be created without generating any additional renewable energy and without requiring any new investment or any changes in operating practices. This was never intended by the legislation ... (Business Council for Sustainable Energy 2002:2).

Despite these assertions, HT believes it is entitled to the funds and receiving them is within the mandate of the legislation. It is confident that it has complied with the requirements of the legislation and done what was required of it by the ORER (Commonwealth of Australia 2002:3 Evidence of Titchen). The critical task for HT, and

the Tasmanian government, has been to ensure that the legislation remains in place and, as set out, both have made representations to the Commonwealth in this regard⁶⁹.

Within this context, contradictory statements about the scale and timing of wind developments in Tasmania could reflect HT's difficult task of balancing its attempts to match supply with demand in the NEM to get the highest possible prices for its hydro and wind power, whilst at the same time sending the message that Tasmania is proceeding 'full steam ahead' on wind energy projects to the Commonwealth government so that MRET is not modified or repealed as well as wind energy joint venture developers like Vestas. As noted, HT and the Tasmanian government are keen for Vestas to set up a blade factory in Tasmania, not Victoria. As Vestas bases its investment decisions on the potential number of turbine orders⁷⁰, Tasmania needs to demonstrate its commitment, progress and future plans for wind power.

Mandatory Renewable Energy Target Review

As required by the Act that operationalises MRET, on 25 March 2003 the bi-annual review of the Renewable Energy (Electricity) Act 2000 was announced (MRET Review Panel 2003). Its terms of reference included the extent to which the Act had: "contributed to reducing greenhouse gas emissions; encouraged additional generation of electricity from renewable energy sources"; "the level of penalties provided under this Act"; "a cap on the contribution of any one source"; and "baselines for pre-existing generators" (Parliament of Australia 2003). On 16 January 2004, the Commonwealth government announced that it remained committed to the MRET scheme which the

⁶⁹ Incidentally, when corrosion mitigation for the sea-earth return monopole system was still on the table, HT's CEO indicated that "better-than-anticipated returns from renewable energy certificates made it feasible for Hydro Tasmania to subsidise the cost of corrosion mitigation" (Haley 2002:5).

⁷⁰ Background Briefing, ABC Radio National, 4 April 2004, 'Energy in the Wind'.

review panel had found had met its objectives⁷¹. The review panel did not recommend any changes to the baselines. In this respect, the arguments of the large-scale hydro players prevailed, with the review panel having determined that the “baselines methodology is appropriate and is operating as intended” (MRET Review Panel 2003:151). The review panel also recommended that legislation be changed so that the ORER could publish baselines. Hence, at this stage, HT’s revenue stream of at least \$30 million per annum from the Commonwealth government, which underpins Basslink, remains in place.

Climate Change

Climate change was another focus area for The Greens at the public hearings. In particular, they were concerned that HT’s modelling had not incorporated future predicted changes to hydrological inflows. HT responded as follows:

Over the last six years approximately three studies have been undertaken on the climate change effects on HT inflows, the annual inflows into the system ... there’s very little statistical evidence that the annual yields in the hydro-system have changed over the last 20 years ... Basically what was found was that there was a slight positive trend in January and February, that is a slight increase in actual rainfall. There was a negative trend in March, April but there was no statistical significant effect of climate change on the Tasmanian inflows over the last 20 years ... from the Australian Government report on climate change 1997 ... winter rainfall is estimated to decrease over most of mainland Australia and increase over Tasmania ... Climate models ... still aren’t detailed enough to actually show whether there is climate change, so in that respect climate change has been considered with the modelling we’ve actually, we’ve undertaken for Basslink (Michael Connarty, audio evidence, 15 October 2001).

The Greens asserted that new information available from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) should have been used to inform the modelling. HT subsequently responded to these queries with the following conclusion:

⁷¹ Media Release, Commonwealth Government, Senator Robert Hill, Acting Minister for the Environment and Heritage, 16 January 2004, ‘Mandatory Renewable Energy Target to Continue’.

The report (CSIRO, 2001), predicts that overall there would be a range of change in the annual precipitation of -5% to +5% (2030). Therefore it is reasonable to expect little to no change in rainfall in Tasmania. Also such a change is far less than the normal annual variability in rainfall. It also indicated a greater chance of increased rainfall in winter (-5% to 20%) and possible decreases in the other months (ie -10% to +5%). Given this new information it is not expected that there would be any change in the conclusions of the TEMSIM [the Tasmanian Electricity Market Simulation Model] analysis (HEC 2001b:6).

Although HT maintained it was unnecessary to take account of climate change in 2001, this was not the case in 1990 when a System Load Study was prepared by the Business and Corporate Planning Division of the Hydro-Electric Commission (1990). At that time, it was assumed that the increased temperatures of the “Greenhouse Effect” would reduce the projected load on the hydro-system by 37 MW if normal temperatures increased by 0.2 degree Celsius over a given time period (HEC 1990:7). An increase in temperature would reduce heating requirements and, thereby, load on the hydro-system.

More recently, in domains outside the Basslink impact assessment process, changes to the climate, with their effects on hydro inflows, are thought to be well and truly underway. For instance, evidence from John Titchen, HT’s Renewable Strategy Manager, at the Senate hearing on the Renewable Energy (Electricity) Amendment Bill 2002 in November 2002, linked HT’s low MRET baseline, above which hydro power generation accrues RECs, with unusual hydrological variability and declining inflows.

Titchen states:

It is interesting that in the last 20 years we have noted a concerning change in weather patterns with the hydro system. While the statistics are hard to pin down, there does appear to be a lessening of inflows into the hydro system over the later period compared with the earlier period, so the use of the baselines over this period probably

reflects that as well. But the trend seems to be in a negative direction, with harsher autumn periods – very dry this year and very dry last year. That did create some difficulties for running the hydro system, which needed thermal back-up this year. Fortunately, with Basslink now committed that will assist in relieving the pressure in autumn. I hope that has provided you with some perspective (Parliament of Australia 2002:3).

Also in contrast to the assessment of Connarty at the public hearings, the Deputy Premier, Paul Lennon, is certain that flows into the hydro-system are decreasing. In responding to questioning from The Greens he stated:

As the Hydro could tell you, for those who are interested, the average rainfall in the areas that are important to us from the Hydro point of view across the State has been decreasing constantly now over a number of years – it is not something that has just started to happen (House of Assembly 2003a:25).

Hence, the effects of erratic weather are invoked in one domain but not in the other. For Connarty, an admission that the past will not be repeated in the future would invalidate HT's modelling. For Titchen, the prospect of the future being different from the past is intended to provide some consolation to critics who accuse HT of receiving unwarranted RECs. Lennon, who clarifies what is believed to be the case by the Tasmanian government and, presumably, people within HT, invokes decreasing inflows to justify supply augmentation, in particular, the need for Basslink.

At the public hearings, HT's CEO, Geoff Willis (audio evidence, 11 October 2001), stated "we are willingly prepared to exchange hydrological risk for market risk. Market risks are much more manageable from a business standpoint, whereas hydrological risks are not". He also claimed:

[With Basslink] our business is substantially insulated from hydrological risk but still a wet sequence has more revenue for us than a dry sequence where we need to import, and that's shown on this chart that, dealing with the probabilities from the rainiest end of the chart, it's very much more profitable for us than the other end, the dry end of the chart where it is still negative

cash flow from the payment for the facility fee compared with the revenue stream (Geoff Willis, audio evidence, 11 October 2001).

Given declining inflows to the hydro-system (and despite claims of insulation from hydrologic risk), HT's revenues remain linked to the advent of wet years and dry years, as revenue from exports is dependent upon available water (Geoff Willis, audio evidence, 11 October 2001). Hence, it seems that HT will not be exchanging hydrological risk for market risk, but will have to contend with both in the future.

People's Hearts and Minds

It was noted in the previous chapter that change in Basslink's technology, instead of outright opposition to the project, appears to have resonated with the media and members of the public. This was the position of a considerable proportion of the public submissions to the JAP in Tasmania. In terms of media, *The Mercury* ran articles in March and August 2001 about the environmental issues of the technology options⁷². This focus upon the technology must have made Basslink supporters nervous. In an article headed 'Business Alert on Basslink Complacency' in *The Mercury* (17 August 2001), the TCCI CEO urged the business sector to speak out in support of the development and said, "[i]t is crucial that Tasmanian companies provide objective comment to counter the often hysterical and uninformed comment of minority groups".

Support for changing the technology instead of rejecting the Basslink project *per se* indicates that, unlike opposition in the previous controversies, which were sustained by

⁷² In *The Mercury* (5 March 2001:7) with an article headed 'Warning on Basslink Plan' environmental issues are raised with reference to Dagmar Nordberg. In *The Saturday Mercury* (10 March 2001:10) an article headed 'Basslink to Counter Cable Risk', BPL attempts to allay fears by disclosing the extent of metallic corrosion risks, which are manageable. In *The Mercury* (21 August 2001:9) an article headed 'Fishing Body says World's Worst Technology Threatens Industry: Warning on Basslink Cable' highlights the environmental concerns about the monopole with sea-earth return technology brought back from Scandinavia by the Tasmanian Fishing Industry Council.

images of the white sands of Lake Pedder and of Rock Island Bend on the Franklin River, it was difficult for The Greens to mount a case to rally the public against Basslink. Within the confines of the impact assessment process, which can be described as a 'paper contest' of facts and figures, such imagery was not welcome or relevant. Also, the predicted environmental impacts of the operation of Basslink were visually subtle, unlike the flooding of a lake or the creation of an expansive dam. Of course, the extent of anti-Green sentiment which remains within the Tasmanian community since the Franklin Dam High Court decision in 1983 also needs to be taken into account (Crowley 2002:59). However, I think the difficulty in mounting a case opposed to the project goes further than this, and argue that it was not necessarily due to a deficiency on the part of The Greens, but more to their success.

Evocative Imagery

Environmentalists demonstrated in the Lake Pedder and Franklin Dam campaigns that evocative imagery can win people's hearts and minds, and spur them into action. With Basslink, I contend that HT followed their lead. The crucial impediment for The Greens was HT's success in taking over and transforming, on its own terms, the renewable energy discourse previously (and still) advocated by The Greens. The disjuncture does not relate to wind technology itself but the mode of its implementation, a subtlety missed by most Tasmanians who see wind turbines as renewable energy and obviously good for the environment.

The imagery of 'Hydro Tasmania – the renewable energy business', has the wind turbine as its focal point and tells a story of a reconstructed organisation at the forefront of the development of renewable energy, something many people would categorise as

common sense if it can be done profitably. The reverse side of employees' business cards display the pervasive wind turbine, as do job advertisements. Not forgetting the hydro side of its business, and illustrating the complementarity of wind and water, the covers of the HEC Annual Reports of 1999 (HEC 1999), 2000 (HT 2000a) and 2002 (HT 2002a) feature images of wind turbines and hydro lakes. The cover messages have changed over this period from 'Growth for the future' in 1999 to 'People, Planet, Profit' in 2000 and 2001 to 'Natural Advantage' in 2002. HT's support for action against climate change in terms of using nature, in the form of renewable energy, is portrayed in, for instance, living bookmarks. Featuring a transparent image of a section of the globe through which can be seen either a hydro lake or a wind turbine, a tear-off section has seeds affixed seeds – just plant and water.

The concept of a natural advantage is also portrayed in an advertisement that has featured in a number of magazines in and outside Tasmania (see Appendix 2). Against a dark and stormy background stands a solitary, white wind turbine with the words in the foreground "Nice day for it." The following words sit below the picture:

Each year on Tasmania's west coast over three metres of sleet and rain is dumped onto a rugged landscape.

Along exposed coastlines and Bass Strait islands, howling gale-force winds often make it impossible to stand upright.

Isn't it fantastic?

More than 60% of Australia's renewable energy is generated in Tasmania... from nothing but water and wind. This is the power of nature. It is one of our greatest assets. And soon, with Basslink in place, it will be one of our greatest exports.

This is persuasive and clever advertising, although it is selling a message, rather than a product⁷³. Notably, HT is drawing on evocations of wilderness and untamed nature to deliver a message to people both within and outside Tasmania about how ‘natural’ it is for Tasmania to generate and export renewable energy. Also, a firm link is being made between wind power and Basslink. Within the context of this imagery, the question from a public perspective would not be whether Basslink should proceed but, rather, why would it not?

Tasmanians’ support for wind power was tabulated in market research commissioned by HT in December 2001 when the JAP was deliberating over its assessment of the development. The stated aim of this study was to gauge awareness of and attitudes towards Basslink. When 1,111 participants were asked whether they “would like to see Tasmania expand its renewable energy industry through the use, in particular, of wind power”, 91 per cent responded positively (Enterprise Marketing and Research Services 2001:3)⁷⁴.

Clearly, support for wind power in Tasmania is high. I believe this level of support can be attributed, at least in part, to The Greens and advocates of sustainable energy who have been talking about alternative forms of energy generation, including wind power, as a replacement for more dams before and leading up to the Franklin campaign (eg

⁷³ For instance, a black and white version of this advertisement was seen in *Project Progress*, a newsletter to Basslink interested parties (November 2001:1) and the *Tasmanian Business Reporter* (January 2002:19). Full page colour versions were also seen in *Australian Energy News*, Issues 17 (September 2000), 21 (September 2001), 22 (December 2001), 23 (March 2002) and 24 (June 2002). They also feature regularly in the Tasmanian magazine *40 Degrees South, Tasmania* and in HT’s information packages promoting Basslink.

⁷⁴ The report notes: “these very high levels of support were recorded in all 3 regions, both sexes and all age groups except those over 70 years of age. Even in this older age group support for expanding renewable energy is still high at 84%” (Enterprise Marketing and Research Services 2001:3).

Centre for Environmental Studies 1978; Brown and Fraser 1982; Vivian 1983; Australian Conservation Foundation 1980; Todd 1981). In his policy speech for the 'No Dams' Independent Group in 1982, Bob Brown stated:

Wind power is now economic in many parts of the world. Wind power contracts are being fulfilled in several countries. Tasmania has some of the best sites in the world for development of a wind system. Wind power is ideal to fit with a hydro system since the characteristics of wind and water power are such that they form an ideal mix. Wind energy can be much more easily matched to demand-growth, avoiding the cost penalties associated with bringing larger blocks of power generation on line. These energy sources are renewable and local. They extend our ability to become self reliant. They can reduce our oil needs and extend the life of our hydro electric system. These are the sources which require our investment priorities (Brown and Fraser 1982:12).

Demonstrating the success of The Greens and sustainable energy supporters in Tasmania in promoting the merits of renewable energy, with the exception of the goal of self-reliance, one could be forgiven for thinking that these statements were made by HT's Chairman, Peter Rae.

The Contradiction

To reject Basslink, as The Greens did, was to argue against wind power, which was a contradiction and could not have made sense to many members of the public in Tasmania. This is certainly the way the Deputy Premier played The Greens' conundrum:

Strategically Basslink is crucial for the State and for Australia. It is crucial for jobs and investment in Tasmania and has a key role to play in reducing Australia's greenhouse emissions. Because of this the Government is keeping its options open regarding any assistance [on corrosion mitigation]. Mr Lennon said he couldn't understand why Greens Senator Bob Brown continually talked Basslink down. "Surveys have shown that an overwhelming majority of Tasmanians want the project to go ahead. "I can't understand why Dr Brown talks down a project that involves clean, green hydro energy and will be

the catalyst for the massive expansion of sustainable, clean, greenhouse friendly, wind power in Tasmania, Mr Lennon said⁷⁵.

Comments from the Labor member for Braddon, Steve Kons, also highlight The Greens' dilemma:

Greens Senator Bob Brown was taking his radical environmentalism to the extreme by opposing wind power. Senator Brown's opposition to Basslink is bizarre given that without Basslink Tasmania won't be able to maximise the development of wind power ... How much more clean, green and greenhouse friendly can you get than wind power? Senator Brown's position is clearly out of step with other green bodies like Greenpeace. People should be asking Senator Brown why, as the Leader of the Australian Greens, he opposes wind power when Greenpeace is an advocate for it ... ⁷⁶.

The predicament for The Greens is well-expressed in media statements such as these, which their opponents did not hesitate to exploit.

Linking Basslink with Wind Power

What was critical for HT's public relations to engender support for Basslink, which took place outside the impact assessment process, was to create and sustain a link between Basslink and wind power, and that, I argue, is what was achieved by the organisation's imagery and advertisements. For instance, the connection was made in the preliminary information given to market research survey respondents:

Hydro Tasmania is supporting the development of the Basslink cable which will connect Tasmania to the National Energy Grid. Basslink will enable Tasmania to export premium priced electricity to mainland markets and also import cheaper off peak power. It will encourage the development of Tasmania's substantial wind power resources. *Prior to this call, were you aware of the Basslink project* (Enterprise Marketing and Research Services 2001:5)?

94 per cent of people indicated they were aware of Basslink. In terms of this poll, 62 per cent of respondents saw Basslink as an opportunity and 17 per cent saw it as a threat.

⁷⁵ Media Release, Tasmanian Government, Deputy Premier, Paul Lennon, 12 March 2002, 'Another Step Closer for Basslink'.

Hence, while most people supported wind power, the same could not be said for Basslink. However, 62 per cent is a sizeable approval rating and is a measure of HT's success with its imagery and advertising in making and maintaining the connection between Basslink and wind power. In a media release that reported the results of the market research, HT continued to make this link:

An independent poll has found overwhelming support for Tasmania to expand its renewable energy industry, particularly wind power. It also found that a majority of those sampled were supportive of the Basslink undersea cable project, which will provide the means for the export of this renewable energy into the National Electricity Market (NEM). ... "What this tells us is that Basslink has strong majority support from Tasmanians and the project must be developed in order for the State to expand its renewable energy industry," Mr Halliday said. "All we need is the green light from the Joint Advisory Panel and the three Governments for the project to proceed and investment in wind power in Tasmania will boom. "Tasmania will then be able to fulfil its potential to be Australia's green energy powerhouse."⁷⁷

Conclusion

We have seen that HT's commercial and political operating environment has changed markedly over the past two decades. Consequently, in recent times, HT has contributed significantly to the current economic buoyancy of the state of Tasmania. During this period and under the stewardship of its Chairman, Peter Rae, the Corporation has embraced its torrid dam-building past as just one piece of a much bigger picture – the renewables future – and reinvented itself. It remains to be seen how HT's competing objectives of maximising profitability and implementing its "growth" plans align with the Bacon Labor government's debt-reduction strategy.

⁷⁶ Media Release, Tasmanian Government, Steven Kons, Secretary to Cabinet, 2 May 2002, 'Bob Brown Out of Step'.

⁷⁷ Media Release, Hydro Tasmania, 24 January 2002, 'Tasmanians Support Wind Power and Basslink'.

We have also seen that The Greens and HT remain adversaries despite what appears to be considerable common ground on renewable energy. The gulf between them represents the different values each one brings to the implementation of renewable technologies. I have shown that the connection made by HT between Basslink and wind power outside the impact assessment process bolstered support in Tasmania for the interconnector. I contend that the effect of this discursive link was to sideline arguments from The Greens against Basslink and overshadow issues related to the non-renewable energy sources that would pass across Basslink, the role that natural gas, energy efficiency and demand management could play in meeting the government's energy policy objectives, and the financial risks of the project.

This and the previous chapter comprise the contextual material of this thesis. As noted in the introduction, this section appears before my theoretical context and methodological framework, coming up next, as I want to separate the macro-view of Basslink, which unfolded continually as my work has progressed, from my analysis of it. The latter takes a micro-view and will delve behind HT's evocative imagery and its predictive modelling to look at the knowledge claims that underpin HT's case in respect of Basslink and the JAP's decision to approve it. My next chapter will explain how I propose to do this

Chapter 3

THEORETICAL CONTEXT AND METHODOLOGICAL FRAMEWORK

THEORETICAL CONTEXT

As noted in the previous chapter, the analytical chapters to come delve behind HT's evocative imagery and its predictive economic and environmental modelling to examine the knowledge claims that underpin HT's case for Basslink and the JAP's decision to approve it. The field of Science and Technology Studies (STS) provides a number of theoretical and analytical resources to undertake this task. In general, STS seeks to critically analyse the methods, knowledge claims and institutional contexts of science, as well as the modes and effects of the translation and deployment of scientific knowledge claims within and beyond the domain of science. As such, it provides a useful theoretical context within which to trace and map the mobilisation of scientific discourse within the bounds of the Basslink impact assessment process.

In terms of a theoretical stance, STS is underpinned by an epistemological commitment to constructivism (Lidskog 1996; Irwin 2001). As a methodology, a common approach within the STS field is the analysis of discourse. Relevant for this thesis is the work that has analysed competing discourses in scientific controversies within environmental and health regulatory disputes, for example, Jasanoff (1987; 1990), Gillespie *et al.* (1979), Shackley and Wynne (1995a; 1995b; 1996) and Wynne (1996b).

In this chapter I will outline the theoretical commitments of STS and constructivism. This will include a review of the major theoretical fissures within the field and a discussion of the value of STS for my analysis. To begin an outline of my methodology, I review the discourse analysis literature. From these contributions I propose an STS-style of discourse analysis. In addition to challenging the 'objectivity' and 'naturalness' of the knowledge claims in support of the Basslink project, I intend to combine the concept of "interpretative repertoires" (Potter 1996:115) from ethnomethodology, applied at a conceptual level and following the work of Macnaghten (1993), with insights from narrative policy analysis (Roe 1989; 1994). This conceptual framework will allow an identification of narratives embedded in the knowledge claims presented by HT in support of the Basslink project, and how they were mobilised into and out of the political realm.

Epistemology

An epistemology describes a particular conception about how knowledge is produced and the factors which contribute to its validation or, in other words, *how* it is that we know (Irwin 2001). Epistemology is distinct from ontology, which asks *what* it is that we know (Gubrium and Holstein 2000). Currently, western science tops the knowledge hierarchy of intellectual authority (Bohme 1997). In terms of epistemology, this status rests on the assumption that science produces 'rational' and 'objective' knowledge.

Realism

A realist epistemology underpins western science and constitutes it as the authoritative producer of neutral knowledge and, as such, an apparently value-free arbiter. Declarations of 'objectivity' and 'neutrality' rest on the notion of the universality of the scientific method, whereby it is assumed that the method's correct application at any

location and under any circumstances by adequately qualified and trained personnel will yield consistent and 'objective' scientific results. Under these conditions, nature is apprehended by the correct application of the scientific method. Within this context, social factors are viewed as unfortunate aberrations – the cause of 'wrong' scientific theories or scientific fraud (Merton 1973). Universality rests on the premise that a unified scientific method exists and is accessible to those wishing to apply it, as well as the existence of fixed and 'objective' criteria by which the validity of scientific knowledge claims are tested and made authoritative within the scientific community (Barnes *et al.* 1996; Chalmers 1976). With these elements in place, scientists, and actors expounding scientific claims are deemed to act as neutral intermediaries (Lidskog 1996; Collingridge and Reeve 1986) in the articulation of 'facts' which, it is assumed, can speak for themselves (Shapin 1984; Irwin 2001:14).

Constructivism

STS challenges the realist epistemology of western science and claims that "nature alone" cannot be the final arbiter in determining the validity or otherwise of scientific knowledge claims (Knorr-Cetina and Mulkay 1983:4; Wynne 1994:177). For instance, the "thesis of underdetermination" claims that "any theory can be maintained in the face of any evidence, provided that we make sufficiently radical adjustments elsewhere in our beliefs" (Knorr-Cetina and Mulkay 1983:3). This means that "alternative theories which are equally consistent with the evidence" could be adopted (Knorr-Cetina and Mulkay 1983:3). Therefore, what we accept to be 'real' could have been other than it is. Further, the "thesis of the 'theory-ladenness' of observation" claims that what is accepted as relevant observation or evidence is, in large part, determined by a

scientist's paradigmatic frame of reference, rather than an 'objective' assessment of data alone:

Observations cannot serve as independent arbiters in questions of theory choice if their relevance, their descriptive identification and their proper measurement depend on the theories involved (Knorr-Cetina and Mulkay 1983:4).

In support of these theses of 'underdetermination' and 'theory-ladenness', empirical work from STS demonstrates an absence of a universal scientific method, and the non-existence of fixed and 'objective' criteria or rules by which to measure the validity or otherwise of scientific claims (Barnes *et al.* 1996; Chalmers 1976:52-72). Therefore, from a constructivist perspective, knowledge is not revealed or discovered by scientists objectively applying the scientific method but instead is socially negotiated, constrained and constituted. Furthermore, evaluative criteria represented as universal in the scientific method, are local, contingent and contestable (Turnbull 2000, 2002; Collins 1982). From this view, social factors are not contaminants but an inherent part of the knowledge-production process. Wynne explains the STS position, thus:

Sociology of scientific knowledge has shown repeatedly, and often in great detail, how a sacred canon of scientific method such as the replication of empirical observations – another 'standard epistemic factor' – is a fundamentally underdetermined normative principle 'controlling' scientific knowledge building. The same is true of inference rules and logical commitments which define entities as belonging to the same class or different collective categories depending upon which properties are taken as salient. The actual meaning of these 'natural' terms and rules have to be negotiated as research goes along. This is a fundamentally more open-ended process of knowledge construction than is recognized in conventional perspectives, which treat scientific knowledge as fully determined by nature alone, and which correspondingly treat scientific uncertainty as a kind of temporary pathology awaiting more rigour or precision which will supposedly reveal the 'true' determinism underlying things (1994:177).

Boundary-Defining Language

In environmental controversies participants seek to uphold notions of 'universality', 'objectivity' and 'rationality' of science. This is the case for administrative agencies that defer to science in their decision-making; scientific institutions, experts and consultants that are engaged and remunerated for their advice in regulatory processes; as well as interest groups that challenge regulatory decisions. Jasanoff (1987; 1990) demonstrates that the turf staked out as 'scientific' becomes sacred ground in the regulatory process, and stakeholders squabble over it. Contention occurs because what is designated as authoritative has the potential to deliver legitimacy. What is at stake is where the line is to be drawn to designate what is science and thereby credible and defensible, and what is political, which is considered to be arbitrary and contestable. Jasanoff (1987:199) argues that "boundary-defining language", which designates what is and is not authoritative, is the key to these manoeuvres – it determines where power will be held. Her work illustrates the rhetorical utility of science and its negotiability.

Conditional Knowledge

The rhetorical dimension of science obscures its conditionality. In the domain of environmental regulation where defensibility is a prime objective of regulators, decision-makers and stakeholders, the limited variables and narrow sets of circumstances to which knowledge claims apply are usually not made explicit (Wynne 1992a). Wynne makes this point:

ignorance is endemic to scientific knowledge, which has to reduce the framework of the known to that which is amenable to its own parochial methods and models. This only becomes a problem when (as is usual) scientific knowledge is misunderstood and is institutionalized in policy making as if this condition did not pervade all competent scientific knowledge. This institutionalized exaggeration of the scope and power of scientific knowledge creates a vacuum in which should exist a vital social discourse about the

conditions and boundaries of scientific knowledge in relation to moral and social knowledge (1992a:115).

From his particularly culturalist and constructivist perspective (1994:170), Wynne has sought to dissolve the demarcation that constitutes scientific knowledge as authoritative, and lay knowledge as lacking in 'objectivity'. He argues that within the domain of regulatory science and policy (where debates over risks are prominent) this cleavage obscures from view the social contingencies and open-endedness of scientific knowledge claims, and nullifies the dialogue necessary to make explicit the limits of scientific knowledge. His central tenet is that *all* knowledge is embedded in a social and cultural milieu and is, thereby, conditional:

Scientific definitions of risk require a prior framing, which is not normally subject to explicit formulation and examination. This framing involves setting an assumed context of actors, behaviors, and processes, in which a particular kind of risk is thought to arise. In addition to introducing a particular social meaning of risk (such as probable fatalities per unit of time), scientific risk discourses depend upon such foundational social models in order to begin to analyse risks. They abstract the risk analysis from such risk situations, or context, and rarely carefully examine the dependence of the analysis on the implicit model of the risk situation, nor question the validity of the framing model. Hence expert risk knowledge is only artificially divorced from social and organizational dimensions and is conditional upon the validity of those unstated situational precommitments. This is what is meant by expert knowledge being conditional knowledge (Wynne 1992c:281).

Pre-figurative Social Framings

With assertions that all knowledge is conditional, Wynne is not necessarily advocating a "democratization of science" (Funtowicz and Ravetz 1991:151), a resolution that tends to accompany the case to elevate the status of lay knowledge (eg Irwin 1995; Cribb 2003). His fundamental premise is that experts "adopt naively idealistic models that assume that social and organizational behaviour follows dependable laws" (Wynne

1992c:281). Crucially, Wynne (for instance 1980; 1989a; 1989b; 1992c; 1996b) argues that lay people, upon whom risks are imposed, are intuitively aware of the existence of these simplistic models adopted by experts and proponents about how things are assumed to be or could be. It is these framings that become obscured from view in the regulatory process and which Wynne contends should be foregrounded and negotiated. For Irwin and Wynne (1996:9), the problem is that "scientific knowledge frequently embodies tacit commitments about audiences or user-situations which may then serve as unnegotiated social prescriptions".

An example of the importance of making the limits of knowledge explicit within the regulatory sphere, and the importance of access to challenge 'scientific' decisions, is a determination made some years ago by the Environment Protection Agency (EPA) in the United States that formaldehyde was a non-carcinogen (Jasanoff 1987; Wynne 1992b). The EPA claimed that its decision was based on scientific evidence. In essence it was, however, a court challenge found that an EPA administrator had been selective in assembling the evidence. The social framing that underpinned the initial claim was that formaldehyde was a non-carcinogen only if humans did not inhale the substance, and were exposed at low doses or for only short periods of time. Hence, the non-carcinogen knowledge claim was conditional, but this conditionality was hidden in the scientific evidence and obscured from view by the rhetoric of science. As such, until challenged, the substance had been claimed to be a non-carcinogen under any circumstances. The conditional knowledge had been deemed universal (Wynne 1992b; Turnbull 2002).

Conditionality as Indeterminacy

Wynne (1992a:114) conceptualises the conditionality and open-endedness of scientific knowledge as “indeterminacy” and illustrates the connection between conditionality and indeterminacy as follows:

Science can define a risk, or uncertainties, only by artificially 'freezing' a surrounding context which may or may not be this way in real-life situations. The resultant knowledge is therefore conditional knowledge, depending on whether these pre-analytical assumptions might turn out to be valid. But this question is indeterminate - for example, will the high quality of maintenance, inspection, operation, etc, of a risk technology be sustained in future, multiplied over replications, possibly many all over the world (1992a:116)?

Hellstrom and Jacob (2001) describe Wynne's conception of indeterminacy as an articulation of the failure of the methods and practices of science to recognise that natural and social systems interact, and the infinite number of ways in which they do so. An appreciation of this concept is critical in the regulatory sphere, as it is here that the natural and social worlds collide and decisions are made which either limit or extend their interaction. In essence, when issues move from the confines of the laboratory or modelling exercise, social issues come into play. Hence, questions are no longer merely technical, but also social, and it is the social dimensions that need to be explicated to understand how a regulatory decision is likely to operate in the 'real' world (Irwin 1989:24).

These models or "constructions of society" that Irwin and Wynne (1996:8) argue are embedded in scientific knowledge claims are normative, as they embody presumptions about how things ought to be – how people might interact with their environment and technological systems, how management practices, for instance, should proceed or how the environment could respond to technological interventions. For instance, chemicals

are deemed safe when used under prescribed conditions. Those conditions are that of the laboratory, which are impossible to recreate in the 'real' world. Scientific claims of safety, therefore, embed unrealistic notions about how people use chemicals and their expectations of safety in application (Wynne 1989a). It is these constructions, which exist as implicit assumptions or limits to knowledge that, Wynne (1992c:282) argues, need to be drawn out during assessment processes in an exercise of "social learning", the goal of which would be to broaden the factors of risk which are explicated and negotiated.

It [social learning] would thus enlarge the dimensions of 'risk' recognized in social debate and decision making, from elaborated technocratic definitions and attributes alone, to include relevant institutional track records, social demeanor, intentions, and institutional structures in the whole area of social practice in question (Wynne 1992c:282).

The failure of regulations intended to guard against BSE (Bovine Spongiform Encephalopathy) in England illustrates this point. Concerns about a link between BSE in cows and CJD (Creutzfeldt-Jakob Disease) in humans led to a bovine offal ban. In declaring this ban, it was assumed by scientists and government officials that cross-contamination between cows and humans could not occur. This assertion was based on the assumption that offal would be easily removed from abattoirs, and inspectors would verify its disposal. Unfortunately, this is not what happened. For various apparently justifiable reasons, offal was stored at abattoirs (and elsewhere) and not destroyed. Assurances that cross-contamination had not occurred could then not be made (Hellstrom and Jacob 2001:83-101; Yearley 2000). The consequences were dire, and the irony is well expressed by Woollacott:

That we should be reduced to animal sacrifice at the end of the twentieth century was not expected. Yet that is what is happening when a British government explains that it is contemplating the mass

slaughter of cattle not on scientific grounds but to restore public confidence. That the action, if it is taken, is highly unlikely to do so adds to the surreal nature of the exercise (1998:47).

This catastrophe highlights the indeterminacy that was created between the natural and social worlds when the scientific claim was made that there was no link between BSE and CJD. The claim embedded normative social and organisational commitments about the removal of offal and its verification that could not be imposed and maintained at every abattoir in England.

Contextual Factors

Wynne contends that the approach taken by people upon whom risks are imposed, when they make judgements about those risks, is different to what is expected by those imposing the risks, and to what is enshrined in existing regulatory procedures. He maintains (1996b:20) that "contextual factors" are the key to understanding people's responses and attitudes to not only the calculations and probabilities of risk but also the 'facts' related thereto:

it is now accepted that trust and credibility are major contextual factors influencing the uptake and understanding of scientific messages, and the public perception of risks (Wynne1996b:20).

As things stand in terms of the impact assessment process, members of the public are expected to suspend their assessment of issues such as the track record, trustworthiness, impartiality and credibility of proponents and governments. Instead, they are expected to respond to a technical frame of reference, as issues tend to be defined (Irwin 1989:19), and then evaluate and comment on the 'scientific facts' which are assembled by proponents in impact assessment statements. It will be shown in Chapter 8 that it was these very issues that were of greatest concern to critics of the Basslink project.

Inverting 'Reality'

From an STS perspective, although scientific categories, concepts and entities might appear 'real' or 'factual', this was not always the case and what appears 'real' could have been other than it is currently constituted (Latour and Woolgar 1979, Latour 1987, Collins 1982, Knorr-Cetina and Mulkay 1983). Of course, it is difficult to imagine that the laws of Newtonian physics or categories such as speed and wavelength or male and female, that are taken so much for granted, could be socially constructed and contingent (Gubrium and Holstein 2000). However, this is precisely the constructivist position. Collins (1982) illustrates the inversion in terms of ships in bottles, where a ship is knowledge and the bottle represents validity. To the casual observer it appears that the ship has always been in the bottle. What the observer does not see are the methods, imperatives, constraints and values that were required and which contributed to the ship being constructed the way it appears inside the bottle. Time and disconnection render conditionalities invisible. On this basis, 'reality' is a consequence of scientific discourse – a social accomplishment (Potter and Wetherell 1987:116).

Hence, from this standpoint, claims of 'objectivity' for scientific knowledge are untenable. Like all forms of knowledge, scientific knowledge, too, is thoroughly enmeshed in social contingencies, and judgments about its validity or otherwise are contextual. Wynne (1992c:277) and others in the STS field (eg Turnbull 2002:275; Irwin 2001) maintain that what we agree as in existence is not, and cannot be, determined by nature alone and is, therefore, socially constructed, constrained and negotiated.

Constructing Facts, Obscuring Conditionality

Latour and Woolgar (1979) and Latour (1987) provide some insight into how the conditionality of science becomes obscured by the 'fact'-construction process in science.

They argue that 'facts' do not start out as such, but as statements (or knowledge claims) that have the potential to become 'facts'. 'Facts', these authors argue, are products of natural, social, cultural and technological interactions, negotiations and translations:

"reality" cannot be used to explain why a statement becomes a fact, since it is only after it has become a fact that the effect of reality is obtained. ... We do not wish to say that facts do not exist nor that there is no such thing as reality. In this simple sense our position is not relativist. Our point is that "out-there-ness" is the consequence of scientific work rather than its cause (Latour and Woolgar 1979: 180,183).

'Facticity' is a "collective process" (Latour 1987:29). By observing science-in-the-making and how knowledge claims are deployed within the scientific community, Latour and Woolgar (1979:182) introduce the concept of a process and, consequently, the dimensions of time and distance to 'facts'. They are not discovered, these authors argue; 'facts' are constructed, and start out as signals (ie 'artefacts') and ideas. Becoming 'reality' takes time.

Moving Modalities

Latour (1987) describes the 'fact'-making process as involving statements made by scientists being moved along a continuum polarised between 'facts' and 'artefacts' with 'facts'-in-the-process-of-being-constructed in between (Latour 1987). This takes place through the processes of interaction, review and publication within the scientific community. Movement involves a statement accruing and shedding positive or negative modalities (Latour 1987:22). Modalities are a type of marker. They indicate how or under what circumstances a statement is conceived or constructed. Modalities gauge a statement's conditionality. For example, reference to the use of an ordinal regression analysis (Fuchs 1992:49) contributes to pushing a statement made in a scientific paper in a positive direction (Latour and Woolgar 1979:181). This movement

in the direction of the status of 'fact' is because an ordinal regression analysis is viewed within the particular scientific community as a legitimate and credible means of analysing results. These analytic methods are described as "inscription devices" because they transform the readings taken from technical apparatus in laboratories or the field into forms of representation that are socially acceptable and decipherable, such as graphs, figures and models (Fuchs 1992:68). They create and maintain distance between the observer and the observed. It is these negotiated legitimization devices, apparatus and methods, which include computer software for statistical computations, scenario modelling, and predictive exercises, that contribute to the rhetorical dimension of science by packaging knowledge claims as 'scientific' and 'objective'. In effect, they create distance.

For example, the Basslink DIAS makes reference to hundreds of scientific papers and reports. The pages display innumerable graphs, tables, diagrams and pictures. These forms of representation depict a social, natural and economic 'reality' that is the product of the inscription devices described by Latour and Woolgar (1979) and Latour (1987), and project the authoritative dimensions of science, namely 'objectivity', 'defensibility' and 'credibility'. They give the impression that the 'facts' do speak for themselves.

Constructing 'Reality'

Modalities denote the credibility, or otherwise, of the methods underlying a statement's production. They help a statement to be assessed within the scientific community, and, thereby, moved towards the status of 'fact', or not, as the case may be. Negative modalities result in a statement's movement back towards the pole of 'artefact' if, for

instance, a given statistical analysis method is superseded or new methods are agreed as a better representation of 'reality'. A statement becomes a 'fact', Latour and Woolgar (1979) argue, when it is no longer connected to the modalities about how, when or where it was produced. It no longer needs them. Retrospectively, it appears universal and to have always existed (Fuchs 1992). It has become 'reality'.

Modality-Shedding Devices

If a statement is no longer connected to its modalities, it is no longer connected to its source of production. Under these circumstances, 'facts' are difficult to deconstruct, or re-open (Latour 1987). Latour and Woolgar claim:

Facts and artefacts do not correspond respectively to true and false statements. Rather, statements lie along a continuum according to the extent to which they refer to the conditions of their construction. Up to a certain point on this continuum, the inclusion of reference to the conditions of construction is necessary for the purpose of persuasion. Beyond this point, the conditions of construction are either irrelevant or their inclusion can be seen as an attempt to undermine the established fact-like status of the statement. Our argument is not that facts are not real, nor that they are merely artificial. *Our argument is not just that facts are socially constructed. We also wish to show that the process of construction involves the use of certain devices whereby all traces of production are made extremely difficult to detect* (1979:176).

It is these ideas of Latour and Woolgar (1979:176) and Latour (1987), which describe how modalities, or "traces of production", can be obscured, revealed and made resistant to deconstruction, that have contributed to my conception of impact assessment statements as "modality-shedding devices" (Duncan 2003). I have argued that when scientific knowledge claims are translated by consultants acting on behalf of, and engaged by, development proponents, and incorporated into an impact assessment statement (by way of published papers in support of proponents' claims), the modalities, that is conditionalities, of these scientific claims are shed. The act of doing this represents scientific statements as 'factual' – black boxes – that are difficult to re-

open. The error is that publication does not equate with 'fact'-status. Publication is the process by which modalities are changed and statements moved between the continuum of 'artefact' and 'fact' within the scientific community. The consequence is that the conditionalities of scientific knowledge claims used by proponents can be obscured from view. Bringing them back into view can be particularly difficult. As such, proponents' claims are fortified and made resistant to independent critique, analysis and verification. In Duncan (2003) I describe the translation process by outlining how the Tasmanian Fishing Industry Council deconstructed the case put by BPL in respect of the monopole sea-earth return cable technology by reconnecting claims presented by BPL to their originators in Scandinavia. This highlighted the contingency of BPL's claims and prompted the JAP to question whether findings from the northern hemisphere could be extrapolated to Tasmania (JAP 2002b:6).

STS THEORETICAL DISPUTES AND CONCEPTUAL TOOLS

Science Wars

If there is no universal scientific method and no fixed and 'objective' criteria or rules by which to validate the 'facts', then the 'facts' cannot speak for themselves. Therefore, scientists and actors drawing their intellectual authority from notions of 'objectivity' and 'rationality' of science (for example experts, researchers, consultants and interest groups) cannot, strictly speaking, act as neutral intermediaries (Lidskog 1996). Claims that are portrayed as 'scientific' and, thereby, 'objective' and 'rational' cannot be relied upon to be value-free. The arbitrating power of science is, therefore, brought into question by a constructivist epistemology. Such allegations challenge the current public policy orthodoxy which, to function as currently configured, is reliant on a realist conception of science. Not surprisingly, claims from STS have met considerable

criticism, particularly from physicists, the intensity of which culminated during the 1990s in what has been termed the 'Science Wars'. Some authors have provided an overview of the controversy and its context (Sardar 2000) and others have set out the claims of physicists against social constructionism (von Baeyer 1998). Bloor and Edge (2000) provide a response to these sorts of claims. The 'Science Wars' have even received coverage from the popular press in *Nature* (1997).

Relativism

The principal criticism made against STS for its challenge to scientific 'objectivity' and 'rationality' is that STS is relativist, which means that there can be no reference point from which to make a value-free judgment about knowledge claims. It is argued by critics of STS that to deny the existence of such a standpoint equates to an acceptance of the position that any knowledge claims could be deemed valid – everything is made relative and, thereby, of equal standing (Knorr-Cetina and Mulkay 1983). For example, a commitment to relativism would make it difficult to argue against, for instance, the introduction of creationism in schools, or the validity of witchcraft. There is also the important issue of where the claims of constructivism leave the findings from the field of STS. If scientific theories are socially constructed, 'underdetermined' by evidence, and observation is 'theory-laden', then so are those from STS. Therefore, the theoretical framework of STS is claimed to be "self-refuting" (Knorr-Cetina and Mulkay 1983:5).

Knorr-Cetina and Mulkay (1983:5) attempt to deal with the relativist critique of STS by making a distinction between "epistemic relativism" and "judgmental relativism" whereby the former is located in "time and culture" and the latter is associated with

claims about "equally good" forms of knowledge. They claim that the latter does not follow from the former and assert:

The belief that scientific knowledge does not merely replicate nature in no way commits the epistemic relativist to the view that therefore all forms of knowledge will be equally successful in solving a practical problem, equally adequate in explaining a puzzling phenomenon or, in general, equally acceptable to all participants. Nor does it follow that we cannot discriminate between different forms of knowledge with a view to their relevance or adequacy in regard to a specific goal (Knorr-Cetina and Mulkay 1983:6).

Irwin (2001:173) makes the point that constructivism is not relativist in terms of ontology but anti-realist in relation to epistemology. This clarification places STS enquiry squarely within the domain of epistemology.

Realists and Constructivists

Irwin (2001) contends that arguments between realists and constructivists reflect the divide between the natural and social sciences whereby nature has been left to the natural scientists and society to the social scientists. Each tries to convince the other that 'reality' is respectively all natural or all social – natural realism versus social realism. The former is accused by the latter of naivety in assuming that the natural world is predefined and awaiting transcription by 'objective' scientists applying a universal scientific method. Conversely, the latter is charged with the denial of the existence of an external world 'out-there'. In relation to environmental issues, this allegation has transformed into the view that constructivism denies the existence of environmental degradation, and that this form of analysis is more of a hindrance than a help (Irwin 2001).

Burningham and Cooper (1999) provide a helpful review of realist critiques of constructivist studies in environmental sociology. These authors suggest that the

criticism levelled at constructivism is misplaced on the basis that claims of realists who contend that constructivism dismisses the existence of environmental problems as figments of the imagination was not evident in the literature utilising a constructivist stance. In fact, many claims were found to be consistent with the "mild" form of social constructivism that critics had described as acceptable. Thus Dickens, cited by Burningham and Cooper (1999:299), states: "all knowledge must in some sense be a social construction. No knowledge has fallen out of the sky with a label attached pronouncing 'absolute truth'". Similarly, Burningham and Cooper maintain:

the realist critique of social constructionism is misplaced, as the version of social constructionism attacked bears little resemblance to the approach actually used in empirical studies (1999:307).

It can be seen that there are different stances and degrees of constructivism. The study of Burningham and Cooper (1999:308) suggests that the "strict constructivist position" does not deny the existence of environmental problems but problematises modes of knowledge validation about environmental issues. In other words, from this standpoint, the analyst attempts not to attribute 'truth' to knowledge claims but instead seeks to understand *how* environmental problems are framed, negotiated and agreed upon.

Ontology

Burningham and Cooper (1999), like Irwin (2001), isolate the misinterpretation of constructivism to misunderstandings about its ontological stance and set out how constructivist studies have been incorrectly construed as denying the existence of an external world, which effectively amounts to making ontological claims:

a strict constructionist position adheres to Spector and Kitsuse's recommendation that the sociologist should remain agnostic about the existence and extent of the conditions and simply consider the claims

made about them. This does not amount to denying their existence. Indeed, we suggest that a recurrent problem in reading social constructionist formulations is that the systematic suspension of judgement about ontological matters can too easily be taken as an ontological claim (Burningham and Cooper 1999:308).

Burningham and Cooper (1999) further argue that when constructivists have ventured into making ontological claims, they have still been misunderstood. The review suggests that the denial of environmental change has not been one of their claims. The realist critique of constructivism gives the impression that as long as constructivists do not make ontological claims about what is and is not in existence, then their work might have some credibility. In resolution of the disparity, Burningham and Cooper conclude:

The strict constructionist position, then, can be summarised as a radical scepticism about ontological claims, and not as an ontological claim about the non-existence of (in this case environmental) reality (1999:309).

I suggest that a sceptical ontological position referred to here is useful for two reasons. First, it brackets off issues relating to ontology sufficiently to dispel claims that a constructivist epistemology equates with a denial of an external world. Second, it maintains issues of ontology within the constructivist purview. This is important because ontologies and epistemologies have been found to be mutually constitutive. For example, Hess and Adams (2002) describe how, in the realm of public policy, ontological and epistemological claims, commitments and relationships move together and have constructive effects in shaping 'reality' and, thereby, directing policy choices:

the ontology of the public sector as being like a market producing goods and services usually travels with an epistemology that constructs and privileges knowledge premised on rational individuals making free choices based on supply and demand regulated by price. Both ontologies and epistemologies carry with them words, symbols and actions (combining to form discourses) that then frame how we

construct meanings about issues and how we deal with them (Hess and Adams 2002:6).

Assumptions about markets and rational individuals are impossible to separate. Which is the chicken and which is the egg? Therefore, a focus on epistemology, whilst remaining sceptical of ontologies, is analytically useful.

Social Realism, Finitism and Interests

Social realism, whereby social factors replace nature as the prime determinant of the validation (or not) of knowledge claims, is another area of theoretical questioning and fissure within the field of STS (Irwin 2001; Fuchs 1992; Miller 1997). Such research has been criticised for its tendency to reify interests and motives, and unreflexively link them with actors and groups (Woolgar 1991; Wynne 1996a; Miller 1997). This can result in the imposition on a text of an analyst's view of what interests are active. To reify something is to attribute causal power to an entity that is actually an abstraction – the "fallacy of misplaced concreteness" (Marshall 1994). The role of 'interests', that is, causal social factors, in determining the direction of knowledge is outlined by Barnes *et al.* (1996) and Barnes (1981; 1982). The interests approach is underpinned by a "finitist account of classification" (Barnes *et al.* 1996:53). From this perspective, any application of language usage (past, present or future) requires our judgment anew on each application because terms or concepts do not have inherent properties which determine what is 'correct' and how such concepts will or should be applied in the future:

If an individual subordinates his inclinations to the routinely accepted mode of use of a term, it is to the practice of his fellow men that he defers, not to any set of rules or instructions for use which, as it were, come with the term. Proper usage is simply that usage communally judged to be proper. ... nature itself sets no constraints on the form of the routine which is produced (Barnes 1982:29)

Usage and knowledge are, therefore, revisable depending on the commitment or the changing circumstances of a community making the contingent judgments. Important for understanding concerns about interests-based research is that what is deemed "correct" usage can, according to Barnes, differ depending on the goals and interests of the different communities or groups with an interest in determining the application and usage of a concept. Indeed, the most persistent and consistent goals and interests are expected to determine the accepted concept application at a particular time. This is possible, Barnes argues, because of the existence of a gap between observation and what becomes accepted as knowledge. When knowledge is still in the process of being constructed, which is usually the case in regulatory issues, connections across this 'interpretative gap' can be made by different groups or communities in pursuing their goals and interests and, ultimately, what becomes accepted as knowledge (Duncan 1997).

The issue which has come under scrutiny in the STS field is that goals and interests are not readily identifiable. Therefore, they have to be designated by the analyst (Woolgar 1991). The reification of interests has received broad agreement within the field as being problematic. In recognition of this consensus, and in defence of the interests approach, Miller (1997:27) makes the point that the field has moved on and that "[t]here is now ample recognition that 'interests' are themselves constructed and variable and that particular attributions of interests are just that, attributions". The designation of interests, therefore, can become an analytic focus to be argued and substantiated by the analyst, instead of deemed pre-existing.

Co-construction

Irwin (2001) is critical of the dualistic natural-or-social-but-never-both conception of the world which separates entities as bounded and pure. For instance, governments demarcate the domains of science and policy and allocate the identification of environmental risks, for example, to scientists and risk management to policy-makers. It is argued by Jasanoff (1987; 1990) and Wynne (1992a) that these demarcations conceal the contingent and negotiated nature of scientific evidence, policy imperatives and regulatory decisions.

In a move that attempts to bypass social realism, Latour (1993:10) maintains that 'reality' consists of "hybrids" whereby the human and non-human cannot be separated. Within this context, society and nature are inextricably linked. What becomes the focus of analysis from this perspective is the strategies adopted by actors to give entities, such as the domains of science and policy, their bounded and 'natural' appearance. These concepts are useful as they can foreground power relations (Latour 1993)⁷⁸.

Irwin (2001:173) draws on the concept of co-construction as a means by which to move past dualistic notions of the world, which have served to perpetuate a separation

between the domains of nature and society and elicit claims anchored in either natural or social realism. In relation to the debate over genetically modified foods, Irwin notes:

Such a stark dichotomy [between nature and society] misses the dynamism, richness and significance of this important case. Faced with competing knowledge claims, shifting political alliances, ethical ambiguities, divisions within the biotechnology industry, arguments between nations and ferocious disputes among environmentalists, the insistence that we must distinguish between social and natural factors takes on a sterile and almost theological character. Rather than engaging with the complex processes involved, over-emphasis on the social-natural duality represents a form of disengagement and retreat to the more comfortable world of established social theory and unchallenged natural science (Irwin 2001:174).

The concept of co-construction has been adapted in the work of Shackley and Wynne (1995a:218), who use the term "mutual construction" in their description of the relationship between climate change science and its associated policy community. These authors contend that climate change science has been directed not by scientific observation but policy imperatives whereby a reliance on Global Circulation Models (GCMs) has sidelined other methods for measuring climate change. Conversely, policy is directed by promises about the availability of inputs and outputs in the future from science:

⁷⁸ It is noted that it is this mutually constitutive relationship that underpins what is known as Actor Network Theory (ANT), a form of analysis which sits within the discipline of Science and Technology Studies but which challenges constructivism, particularly its focus on epistemology and the social dimensions of science. Although it is beyond the scope of this thesis to delve too far into ANT, its specifics and the arguments for and against, it is important to note that, notwithstanding his studies in social constructivism (1979) and constructivism (1987), Latour now takes an "alternative position" – one of "realistic realism" (Stalder 2000:1). Stalder (2000) points out that unlike realists who contend that reality exists and is apprehended by modern science, or relativists who argue that there is an interpretative gap between what exists and what we come to agree is in existence, Latour argues that a gap does not exist between the "ontological domains-language and nature" and, further, that "two distinct ontological domains" do not exist (Latour 1999:24). Hence, the concept of a network with conceptual devices such as a "circulating reference" (Latour 1999:24) is used for analysis with ANT. An important feature of ANT is that both human and non-human entities are deemed to act, hence the rejection of a focus on the social. Whilst I support a recognition of the non-human and Latour's objective of bypassing the stagnant debate between what are categorised as realists and relativists, with its glossary of entities, concepts and terms and directions on how to apply them (Latour 1999), I found ANT too prescriptive and potentially prone to difficulties similar to that of the imposition on a situation of an analyst's dichotomised view, which Latour's ideas have sought to overcome (Latour 1993).

The projected future evolution of the policy agenda may instead be structured according to scientific expectations of when certain key technical issues will be resolved, or technical means to answer specific policy questions become available. The domain of science helps to reinforce the belief that particular knowledge, ideas or 'needs' in the policy field are realistic and valid, driven by policy-relevance and/or by the criteria defining 'best science', and vice versa for the effects of policy on science (Shackley and Wynne 1995a:221).

Given the mutually constitutive way in which each domain's methods and imperatives are influenced by the other, it can be seen that to assume these arenas of science and policy are bounded and definable could fail to reveal important insights into policy obstacles and potential alternatives. Miller (1997:27) cites this work as an example of "how finitism is consistent with co-construction approaches". In this way, interests would not be the defining determinant but a fundamental contributing factor.

Certainty Trough

The work of MacKenzie (1990), which focuses on the sociological issues contributing to technological change and accuracy of nuclear weapons systems, integrates issues related to distance and disconnection discussed earlier by Latour and Woolgar (1979) and Latour (1987), and those of interconnection and mutual construction set out above. MacKenzie (1990:169) observes what he calls "the fatalism of the metaphor of trajectory", and notes that when issues are viewed in this way, people are reluctant to intervene or cannot see that things could be other than they are assumed to be, as it appears that the path is pre-determined. To counter this preconception, MacKenzie's central theme is that neither technological nor political determinism are single driving forces of technological change and that technological advances, for instance, in terms of accuracy, are not foregone conclusions. MacKenzie (1990) attempts, successfully I think, to dispel the notion of a "trajectory" of technological change. The specific point

he makes in conclusion is that having shown the development of the accuracy of nuclear weapons to be socially negotiable, there is potential for them to have been other than they are and, thereby, for these systems to be undone.

Having identified nuclear weapons systems as multi-layered black boxes⁷⁹ and found that neither technology nor politics dominates outcomes in respect of them, he advocates a position of mutual construction:

as we enter the black box we find that the distinction between politics and technology becomes harder and harder to make ... there is no categorical distinction to be made between the two. The web has no intrinsic seams ... [however] out of the seamless web, participants do construct relatively separate spheres of the "technical" and the "political." It is a distinction central to how they talk and, ... a distinction central to their success or failure (MacKenzie 1990:412).

The point that I want to emphasise from these comments is that the domains of the technical and the political are intrinsically intermingled and it is their separation that is artificial. Hence, *how* this separation is constructed and held in place should be the focus of an epistemological study.

In attempting to answer this 'how' question, MacKenzie (1990:370) proposes a useful conceptual mechanism, the "certainty trough", as contributing to the durability of paths taken or not in the complex array of interactions of technological change. A key STS insight about the location of knowledge production and distance underpins this concept:

Certainty about natural phenomena ... tends to vary inversely with proximity to the scientific work ... proximity makes visible the skilful, inexplicable and therefore potentially fallible aspects of experimentation, it lends salience to the web of assumptions that underlie what counts as an experimental outcome ... distance from

⁷⁹ Although MacKenzie (1990:393) warns that the analogy should not be taken too literally, he contends that technology could be seen as a Russian doll – inside one black box is another and another inside that.

the cutting edge of science is the source of what certainty we have (MacKenzie 1990:371 citing Collins).

With its axes of uncertainty and distance from the site of knowledge production (Figure 3.1), MacKenzie (1990:419) illustrates on the left side that uncertainty can exist where there is no controversy. On the right hand side, it is at its highest at greatest distance, where there is potential for controversy. A certainty trough exists in the centre, where uncertainty is at its lowest level.

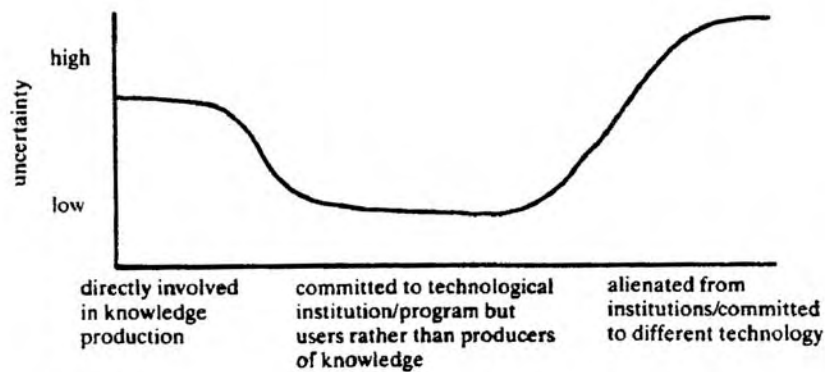


Figure 3.1 The Certainty Trough (MacKenzie 1990:419).

What this diagram shows is that those closest to where knowledge is constructed will hold uncertainties, but they will not usually be disclosed or seen to be necessarily significant. For instance, a group of researchers will recognise the uncertainties associated with their findings, but as these are agreed within the group, they will be viewed as unavoidable. Hence, as MacKenzie (1990:371) puts it, this is "doubt of a more private and more limited, but nevertheless real, kind". He suggests (1990:419) these uncertainties can be identified and used as a resource by those in opposition in a controversy to undermine claims supporting a technological project

At the centre, where the certainty trough is located, MacKenzie (1990:371) refers to a group of "program loyalists" who sit between those close to the production of knowledge and those "alienated" from it. This group "believes what the brochures tell them" (MacKenzie 1990:371) – they are the users of the knowledge, not its producers or antagonists. Hence, by the time knowledge reaches this group, the uncertainties have receded. The durability of technical facts are "hardest" at this location and without resources to contest them they are likely to remain so (MacKenzie 1990:419). This conceptual construction of the certainty trough is useful for tracing the mobility of knowledge claims, their durability and their disconnection from their source of production in relation to Basslink.

The above discussion, which has sought to explain as well as defend an STS theoretical framework, has only touched the surface of the epistemological and ontological debates within and outside the field of STS. It is beyond the scope of this thesis to delve into them any further. The arguments on both sides have been well covered in a broad range of literature, for example, Yearley (1988), Myers (1990), Proctor (1991), Woolgar (1991), Cole (1992), Hannigan (1995), Shapin (1995), Barnes *et al.* (1996), and Hull (2000).

ANALYTICAL FOCUS

A Constructivist Epistemology

For my purposes, I find a constructivist epistemology useful. It prompts me not to pre-judge what is natural and what is social, and it provides a conceptual framework with which to challenge existing 'scientific' categories, concepts and assumptions. As such, it provides a schema by which to map modality-shifts and foreground how knowledge claims have been translated and deployed within the Basslink impact assessment

process. It also highlights the extent to which conditionalities embedded within knowledge claims can be shielded from view behind 'scientific', 'objective' and 'rational' packaging.

Once it is recognised that categories, framings and conceptions of issues, that attempt to separate the natural from the social to purify their ontological status, are socially negotiated, constrained and constructed, the point of analysis becomes one of examining how these entities are aggregated, anchored and stabilized as well as challenged and unsettled. Hence, it is concluded that STS, which problematises epistemological assumptions and remains sceptical of ontological claims (Burningham and Cooper 1999), is a fruitful theoretical framework to analyse the Basslink impact assessment process.

Links with Environmental Impact Assessment Theory and Practice

Although the focus of this thesis is not Environmental Impact Assessment (EIA) or its supplements, such as Social Impact Assessment, my work is intended to link with its theory and practice. This is on the basis that impact assessment processes are useful sites for STS analyses as they are inherently epistemological – knowledge claims are an input and an output, with intervening translations, configurations and mobilisations the analytical focus.

The limitations of the impact assessment process are well known. A particular criticism is that proponents engage consulting firms to prepare impact assessment statements that are inevitably in their favour. This putative conflict of interest is defended on the basis that consulting firms will not risk their reputations by producing compromised

reports (Beder 1993). An underlying epistemological commitment that supports this defence is that 'scientific facts' speak for themselves (Shapin 1984; Irwin 2001) and consultants are neutral intermediaries (Lidskog 1996; Collingridge and Reeve 1986). As this thesis applies a constructivist epistemological perspective to the Basslink assessment process, it is assumed that knowledge claims can be reconfigured both within and across the constructed domains of science and policy by intermediaries that are not neutral. On this basis, the 'facts' cannot speak for themselves but are socially and politically constrained, negotiated and constructed.

From within the domain of EIA, the work of Thomas (1998) stakes out some of the terrain of this thesis by making important links between STS and the theory and practice of EIA. The relevant connections include: the political nature of EIA and its use as a means to political ends; the difficulty of excluding bias from any account of a development; issues of objectivity and uncertainty; the limitations of quantitative risk assessment; the negotiable nature of numbers; the need for a recognition of project proposals as partisan accounts; and the complex issues relating to public participation in processes bounded by scientific discourse.

These are topics of investigation and analysis for the field of STS, which, as discussed, provide the theoretical context for my work. As an empirical epistemological study, which is intended to test STS theory, I hope to put some flesh on the bones laid out by Thomas and the authors he cites (eg Spry 1976), and provide some insight into how knowledge claims are constructed, stabilised and validated in the context of risk, uncertainty and prevention.

Predictive Models

An empirical focus not elaborated in detail by Thomas (1998), but which involves the issues he raises, is how bias, partisanship, value judgments and negotiable numbers, for example, get packaged into predictive environmental and economic models and deployed by proponents in the EIA process. Despite the claim of Thomas (1998) that there is an awareness of these issues on the part of assessors and decision-makers, proponents' claims continue to derive considerable credibility and defensibility from these persuasive rhetorical 'black boxes'. Yearley (1999) notes that the use of predictive models is on the rise as computer power increases and costs diminish. The use of such tools by proponents, where their underlying structure and assumptions are not adequately disclosed and understood, raises questions about the extent to which this form of knowledge production and presentation hinders public participation. Hence, as well as charting the mobility of knowledge claims anchored to predictive models in Chapters 4, 5, 6 and 7, people's responses to predictive modelling and the claims deriving therefrom will be outlined in Chapter 8.

In terms of mobility, what goes into an EIA process directly influences what comes out. Hence, if inputs are biased, partisan or exaggerated, the regulatory outputs are likely to be misdirected. Under these circumstances, the "trial and error" approach advocated by Wildavsky (cited by Thomas 1998:36), whereby monitoring programs would be mechanisms for response to "put out the bush-fires as they develop", is likely to miss its target. Although this approach has merit in terms of reducing costs by eliminating the requirement of low risk on all counts by applying management to specific areas, if the locations are wrong or not recognised, the system will have failed.

The Basslink case study shows how the translation and deployment of science by proponents and their consultants, particularly in the form of predictive modelling, can create barriers which obstruct the critique and verification of their conclusions; analyses not only expected by members of the public and interest groups, but required by government agencies with oversight and regulatory responsibilities. To shed light on what can be shielded from view, and how this is achieved, this case study provides an opportunity to trace and map the construction and movement of knowledge claims derived from predictive modelling through an EIA process, from their origin in consultants' reports to their legitimization as regulatory outputs.

Adaptive Management

The philosophy advocated by Wildavsky (cited by Thomas 1998:36) is embodied in what is known as Adaptive Management (AM), whereby "policies are experiments" and, most critically, lessons are to be learned from them (Lee 1993:9). AM is currently viewed as best practice in environmental management (Lee 1993; Dovers and Mobbs 1997; Dovers 1999). Hence, if proposals for AM are not an input to an EIS, they are likely to be a regulatory output of an EIA process.

With commitments to AM, decisions by assessment bodies are streamlined. Projects can be approved with the promise of monitoring and assessment at a later stage. Although adaptive management is a useful tool, it can be used to translocate contentious issues into the future and out of the purview of public process, effectively casting aside questions about whether or not a project should proceed. Furthermore, whilst continued evaluation of environmental impacts is necessary, if AM is developed

from inputs commonly accepted as biased, partisan and potentially incomplete, then monitoring and management is likely to be misdirected.

Preventive Paradigm

Of course, it is important to acknowledge the tension that exists in environmental impact assessment between the requirement for certified knowledge and the impossibility of providing it. This tension derives from the "preventive paradigm" (Wynne 1992a:111). Prevention mandates prediction and forecasting. When consultants and researchers are engaged to conduct studies tailored to EIA and the needs of an EIS, their methods, analyses and findings are often novel. Although computer packages can be consistent, their application and the mixture of techniques and analysis tools means that methodologies are variable. Hence, replication and testing of findings by others is impossible. In any case, cost and time imperatives of the EIA process would usually preclude this. On this basis, peer review, too, is virtually non-existent. Hence, the legitimacy of a consultant's report rests not on the validation of its scientific content, but the credibility of the expert that produced it, and trust between the people in the domains that use the knowledge. It is within this context that the work of MacKenzie (1990), Latour and Woolgar (1979) and Latour (1987), which demonstrates the effects of creating distances between knowledge production and its users, is useful.

Fiducial Science

Shackley and Wynne (1995a:226-229) refer to these relationships as "fiducial science", due to the high levels of trust required between researchers and policymakers when the knowledge required and the circumstances to which it is applied are inherently novel. When knowledge is in the process of construction, as it often is in EIA regulatory

matters, trust binds, and makes mutually constitutive, the domains of science and policy⁸⁰. Importantly, these relationships of trust are, on the one hand, difficult to disentangle but, on the other, they are ultimately drawn into question in the public domain, particularly in the contentious setting of EIA (cf Jasanoff 1987, 1990; Wynne 1992b).

Within this context, which could be described as a crisis in 'objectivity' and 'impartiality', proponents and decision-makers view conflict as deriving from a gap in knowledge. With the aim of reducing uncertainty and minimising contention, the solution is seen to lie in the filling of knowledge gaps. Wynne argues that this reasoning needs to be inverted:

One of the most generally relevant, and subversive, insights from SSK [sociology of scientific knowledge, a branch of STS] has been to show that this supposed relationship [that uncertainty creates conflict] is the wrong way round – that it is social dissensus which exposes consensus about nature to de-construction by questioning taken-for-granted premises; and that, in principle, there is no limit (other than social or cultural limits) to this demolition process. There is only retreat to stronger bastions of claimed social 'agreement' or 'black-boxing' (1992b:751).

I conceive predictive modelling in EIA as part of the retreat to which Wynne refers, which will be examined in this thesis.

⁸⁰ In Duncan (1997) I distinguished fiducial science (Shackley and Wynne 1995a) from regulatory science (Jasanoff 1990) on the following basis: In terms of the latter, trust is embodied in well-established procedures and protocols, such as toxicological extrapolations, which have previously been agreed to be 'good science' amongst stakeholders. Fiducial science exists when direct policy actions are being developed and the relationship between science and policy needs to be much closer. In this case, policy imperatives actually encroach upon core science and become a determinant of knowledge itself. This is not to suggest that regulatory science is not contentious. As analytic methods, political imperatives and values change, so too will established protocols and thresholds.

Dispensing with Objectivity

Given the tenets of STS, my commitment to a constructivist epistemology, and issues relating to relativism and reflexivity discussed above, I cannot expect that my work should be given any more or less intellectual authority than the scientific claims I intend to examine. Nor can I claim that my work is 'objective'. The STS paradigmatic filter through which I undertake my analysis of the Basslink impact assessment process influences my view of the scientific claims in support of the Basslink project and my focus areas. Not taking anything for granted puts one into a position of being sceptical, often critical, of most claims, but particularly those presented as 'scientific' and 'objective'. Hence, my work is a political undertaking (Burningham and Cooper 1999).

I do not see these tensions as a problem, on the basis that I do not believe that I need to invoke notions of 'objectivity' for my work to be viewed as useful. Burningham and Cooper (1999) address this issue quite specifically. They reject claims of Benton and Newby, cited by Burningham and Cooper (1999:310), who argue that realism is necessary for "political engagement". The latter argue against the realists and maintain that "objectivism is not indispensable". Their position is as follows:

There is therefore no reason why a constructionist should not engage in political debate, or make political interventions: however, such an intervention will not justify itself in objectivist terms by making reference to, by suggesting non-mediated access to, or by claiming knowledge of an assumed incontestable reality. In other words, the social scientist is put in the same position as a participant in an environmental dispute; his or her epistemological privileges have been withdrawn. He or she can, as do participants, engage in argument, deconstruct claims and so forth. *Similarly, as before, the acid test of one's argument remains its plausibility and its ability to convince. All that has been removed is the capacity to ground one's own arguments in, or to discredit opposing arguments by comparing them unfavourably with, objective reality. ...* It can be argued that an explicitly non-foundationalist position is, in some respects, an ethically preferable one (Burningham and Cooper 1999:310-11, emphasis added).

Irwin (2001) sums up the role that a constructivist critique can play in environmental and regulatory issues:

by avoiding inevitably contestable claims to 'know better' than one's opponents, constructivism opens up the ethical and political choices at the core of environmental engagement. Rather than presenting sociology as bringing 'truth' to environmental disputes, the constructivist responsibility is to highlight value choices, challenge epistemological assumptions and avoid recourse to unjustifiable uncertainties. ... By refusing to accord 'truth' to any party to environmental disputes (including, of course, sociologists), we can be open and imaginative in our exploration of the social reconstructions and alliances at work within environmental politics. Crucially also, constructivist approaches encourage the challenging of existing political and cognitive framings of the environment rather than simply taking them at face value. ... It is also reasonable to argue that there is no absolute requirement on constructivist sociology to maintain a neutral stance within environmental disputes (2001:170-171).

I can only wholeheartedly concur with this view and convey that it is on this basis, and that set out by Burningham and Cooper (1999), that I undertake my study. Hence, I see my work as providing an interpretation, of which there could be many, of the Basslink process and HT's environmental impact work in respect of the Gordon River.

METHODOLOGICAL FRAMEWORK

Discourse Analysis Literature Review

As stated in the introduction, discourse analysis has been a common approach in STS empirical studies. Knorr-Cetina and Mulkay (1983:9) set out a number of questions that "the 'linguistic turn' in the social studies of science" has sought to answer:

a series of new questions has been raised about scientific communication. What are the persuasive functions of scientific speech acts and how do speech acts further participants' goals? How do speech acts become organized into orderly sequences of discourse? How are they turned into patterns of argument which appear 'rational' and 'coherent' to participants?

To gain an understanding of how STS modes of discourse analysis fit in with those outside the field, a review of the discourse analysis literature was undertaken. My findings concur with comments of Alversson and Karreman (2000) and Bacci (2000), who observe that the term 'discourse' is often used in different contexts and for different purposes, but without its definition being made explicit. Potter and Wetherell (1987) suggest that discourse analysis has become a generic term for language research, and attribute this to simultaneous approaches to language originating from different disciplines, such as linguistics, sociology and social psychology. This has resulted in a variety of discourse formulations.

Discourse as Action

Despite the variability, there is agreement that discourse is a conception of language as social practice. As such, language is action – it has force (Wood and Kroger 2000). This means that, not only is our world described by our talk, but it is constituted in and by that talk. Burman and Parker (1993:3) make the point that language also "constrains meaning" and that discourse analysis "offers a social account of subjectivity by attending to the linguistic resources by which the sociopolitical realm is produced and reproduced". These interpretations highlight the constitutive yet restrictive nature of discourse.

The field of discourse analysis can be divided up in a number of ways (for example, Alvesson and Karreman 2000; Bacchi 2000; Potter and Wetherell 1987; Wood and Kroger 2000; Potter 1996). Following the distinction of Gubrium and Holstein (2000),

two streams are differentiated here, namely ethnomethodology and Foucauldian, the latter drawing on the work of the post-structuralist theorist, Michel Foucault.

Ethnomethodology and its Origins

Ethnomethodological research analyses the linguistic methods people use in their social interactions. This focus provides insight into how order and regularity are created by people and groups in their everyday worlds (Potter and Wetherell 1987). From this perspective:

the social world's facticity is accomplished by way of peoples' constitutive interactional work, the mechanics of which produce and maintain the accountable circumstances of their lives (Gubrium and Holstein 2000:490).

Ethnomethodology draws on the work of Garfinkel who, in response to Talcott Parsons' theory that social order is created by the uptake of externally imposed norms and values, argues that, with their "practical reasoning", people create "contingent" social order (Gubrium and Holstein 2000:490). This conception accepts that social groups have shared sets of values, beliefs, experiences, theories and images and that they have the capacity to create and maintain intersubjectivity and social order without external intervention. Importantly, shared meanings and social contexts, for example, rules, become resources in reasoning and justifications about actions. It is important to note that a person's account of their actions as following a rule does not necessarily mean that the rule has been successfully imposed, applied or agreed upon (Gubrium and Holstein 2000). A rule is a resource and its constitution in social interaction perpetuates it as a context, and constitutes its shared meaning. The use of social contexts and meanings as resources instead of their reification as accounts of 'reality' points to the constructivist epistemology that underpins ethnomethodology.

Potter and Wetherell (1987:138) describe these socially contextual and shared meaning resources as "interpretative repertoires", that is, "a lexicon or register of terms and metaphors drawn upon to characterize and evaluate actions and events". Repertoires are not constantly created, but selectively reproduced, reconfigured and translated from existing social resources (Burman and Parker 1993). The point of analysis, therefore, is the function of language. This focus illuminates what people do with language, for example, accuse, persuade and direct (Potter and Wetherell 1987:33). It also draws attention to how objectivity, credibility and defensibility are attributed to categories and descriptions of the world, as well as strategies used to challenge these accounts (Potter 1996:97).

An important dimension of the conception of interpretative repertoires is that they are available to all and their use can vary in different contexts. This is illustrated in the work of Gilbert and Mulkay from the field of STS, cited by Potter and Wetherell (1987:146). This work describes how scientists "portray their actions and beliefs in contextually appropriate ways". Scientists, it is claimed, use an "empiricist" repertoire in published papers, which conveys an image of the formulaic application of the scientific method in the discovery of natural phenomena (1987:146). In this way, data precede theory. In direct interviews, however, a "contingent" repertoire was drawn upon which highlights the contribution of speculation and pre-existing theoretical commitments in identifying phenomena (1987:146). Potter and Wetherell (1987, citing Gilbert and Mulkay 1984) claim that the function of the contradictory repertoires is to allow scientists to maintain credibility for their own work, which conforms to empiricist principles, while attributing mistakes of others or changes in hypotheses to

social factors. The critical point is the selective and, therefore, contextual use of interpretative repertoires. Multiplicity, selectivity and contextuality are foundational dimensions in this conception of discourse envisaged by Potter and Wetherell (1987:156). Again, this illustrates the constructivist stance of this form of analysis. These ideas link up with the finitist view of knowledge production of Barnes (1981; 1982) to the extent that the use of repertoires, like terms and concepts, is revisable, contextual and selective.

A Foucauldian Approach

In contrast to ethnomethodology, a Foucauldian approach takes a more structural view of discourse and focuses on the effects of its deployment, particularly at an institutional level. Drawing on Foucault, Alvesson and Kärreman provide the following description of discourse:

discourses, or sets of statements, constitute objects and subjects. Language, put together as discourses, arranges and naturalizes the social world in a specific way and thus informs social practices. These practices constitute particular forms of subjectivity in which human subjects are managed and given a certain form, viewed as self-evident and rational (2000:1127)

To emphasise the constitutive nature of discourse, Gubrium and Holstein (2002:494, citing Foucault) state:

discourses are not 'a mere intersection of things and words: an obscure web of things, and a manifest, visible, coloured chain of words', but rather 'practices that systematically form the objects of which they speak'.

Instead of focusing on the micro level of social interaction, as with ethnomethodology, a Foucauldian approach attends to institutional settings and practices, and how categories as objects, and people as subjects, are constituted by culturally and

historically specific systems of power. For instance, in medical discourse, the roles of a professional health practitioner and the patient are taken for granted and continually constructed and reconstructed in our talk about medical issues (Gubrium and Holstein 2000). It is pointed out by Prior (1997) that in Foucault's *The Archaeology of Knowledge*:

discourse not only restricts, limits and arranges what can and cannot be said about the phenomena within its domain; it also empowers (and disempowers) certain agents to speak on this or that question of fact. In many respects one might say that discourse empowers certain agents to create representations, and thereby to authoritatively pronounce on the shape and form of the world (Prior 1997:70-1).

Discursive Practice – Discourses-in-Practice

In summary, ethnomethodology attends to the linguistic, grammatical and rhetorical strategies that contribute to the validation of provisional categories – "discursive practice" (Gubrium and Holstein 2000:494), and Foucauldian analysis examines how institutional discourses create categories, and as such, how they are maintained and reproduced – "discourses-in-practice" (Gubrium and Holstein 2000:494). Gubrium and Holstein (2000) make a distinction between ethnomethodological and Foucauldian discourse analysis and link the former with asking "how" questions, and the latter with predominantly "what" questions. This demarcation separates questions of epistemology (that is, how do we know?) from ontology (that is, what do we know?) The distinction in relation to ethnomethodology is confirmed in comments from Potter (1996):

I do not think that analysts of fact construction need do more than consider reality constitution as a feature of descriptive practices; the concern is with interaction, such that philosophical questions of ontology can be left to the appropriate experts (1996:178).

And further:

To avoid becoming ensnared by epistemological questions about the correctness, say, or adequacy of some realm of knowledge, he

[Foucault 1972] brackets these questions off. The benefit of this move is the same. He is free to focus on the production of knowledge through institutions such as psychiatry or criminology, and on what that knowledge is used for, without being side-tracked by the participants' concern as to whether the knowledge is true or not (1996:86).

These comments illustrate the difference in analytic focus between ethnomethodological and Foucauldian approaches. Potter wants to bracket off ontological questions and claims the same for Foucault in terms of epistemological questions. As discussed above, in contrast, ontologies and epistemologies would seem to be mutually constitutive. Hence, although my theoretical focus is epistemology, for the type of analysis I want to undertake, it is important to have an eye on both of these dimensions. The review of Burningham and Cooper (1999:309) indicates that this is not an untenable position for a "strict constructionist".

Fairclough's Critical Language Study

Gubrium and Holstein (2000) see ethnomethodological and Foucauldian discourse analysis as parallel projects, but argue both have limitations and each could be enhanced by the other. These authors do not advocate a synthesis between these micro and macro realms, but advance the idea of an "interplay" between the two (Gubrium and Holstein 2000:495). Along these lines, an approach that encourages an examination of social interaction and interpretation without losing sight of the power structures that constitute such responses has been advanced by Fairclough (1989; 1992).

His Critical Language Study approach envisages a "relationship between texts, interactions, and contexts" (1989:26). According to Fairclough (1989) a text is an outcome of the process of discourse. The link between social interaction and

institutional contexts is made by focusing on the concept of "text production". This means that a "text is a product rather than a process" (Fairclough 1989:24). Importantly, "members' resources" (that is, shared meanings or intersubjectivity) are needed for both the production and interpretation of texts. These capacities, "which people have in their heads", are drawn upon to not only produce but also interpret texts. A text provides "traces of the productive process" and "cues in the process of interpretation" (Fairclough 1989:24). Fairclough (1992:4) elaborates on the relationship between the production and interpretation of texts and describes it as three-dimensional, whereby a text becomes the intermediary between "discursive practice" and "social practice"⁸¹.

Ideology and Hegemony

Importantly, the social and discursive practices that Fairclough analyses are assumed to embed "ideology" (1989:2) and "hegemony" (1992:91). Power relations are pivotal to Fairclough's work, which he claims extends the work of Foucault by explicitly recognising the unstable nature of these forms of power and their potential for change.

There have ... been studies of the ways in which power is exercised in conversation and other forms of talk between people ... These studies have generally set out to describe prevailing sociolinguistic conventions in terms of how they distribute power unequally; they have not set out to explain these conventions as the product of relations of power and struggles for power. The point is that sociolinguistic conventions have a dual relation to power: on the one hand they incorporate differences of power, on the other they arise out of – and give rise to – particular relations of power (Fairclough 1989:1-2).

⁸¹ "Any discursive 'event' (i.e. any instance of discourse) is seen as being simultaneously a piece of text, an instance of discursive practice, and an instance of social practice. The 'text' dimension attends to language analysis of texts. The 'discursive practice' dimension ... specifies the nature of the processes of text production and interpretation, for example which types of discourse ... are drawn upon and how they are combined. The 'social practice' dimension attends to issues of concern in social analysis such as the institutional and organizational circumstances of the discursive event and how that shapes the nature of the discursive practice, and the constitutive/constructive effects of discourse ..." (Fairclough 1992:4).

The need for a synthesis of the social interactive and institutional level of analysis is evident in these comments. To the extent that Fairclough (1989:4) provides a framework to bridge this gap and analyse relationship between discursive and social practice, which brings together "language analysis and social theory", this work is useful.

However, the pursuit of an identification of ideology and hegemony in the analysis of discourse is a concern. It raises the issue of the reification of interests and motives and their linkage to actors and groups which has received considerable critical attention within the field of STS (discussed earlier under the heading of Social Realism, Finitism and Interests). Bacchi (2000) argues that conceptions of ideology and hegemony as explanations of unequal power relations can be problematic as these forms of analysis have tended to focus on "the effects upon those who are considered to be lacking power", which has led to the idea that it is predominantly the holders of power who deploy discourse. Bacchi's view aligns with the ethnomethodological stance outlined earlier whereby discourses are viewed as resources instead of externally imposed relations. As with a focus on the identification of interests, the effect of the unreflexive attribution of ideology and hegemony and its reification, is the evaporation of complexity and hybridity. Gill (1993) in her study involving broadcasters and their accounts about why the numbers of women disc jockeys were so low (which draws on the work of interpretative repertoires in Potter and Wetherell [1987]), claims that the most interesting insight from her work was that "what is ideological cannot be straightforwardly read off: propositions do not come with their ideological significance 'inscribed on their backs' ...". On this basis, as with interests, "what is ideological is an analytic question" (Gill 1993:91-2).

This overview has drawn out some of the differences between the ethnomethodological and Foucauldian approach to discourse. I find the delineation of epistemology from ontology and its separation of 'how' from 'what' questions particularly useful when attempting to apply the epistemological theory of STS whilst, at the same time, keeping an eye on ontological claims. Although the work of Fairclough has considerable merit in that it would, at least to some extent, integrate these approaches, its focus on the identification of ideology and hegemony conflicts with STS theory at a fundamental level in terms of the reification of interests.

Conceptual Interpretative Repertoires

An STS frame of mind encourages scepticism about the utility of quantitative research and analytic methods, for example, content analysis [cf Hagedorn and Allender-Hagedorn (1997); Schotland and Bero (2002)]. In light of the discussion about social realism, relativism and reflexivity, this scepticism also extends to many forms of qualitative analysis. My primary concern with these methodologies is that they have a tendency to smooth-out complexity and fail to recognise "hybridity" with the designation and deployment of putatively 'natural' and 'pure' categories and entities (Turnbull 2002:274; Latour 1993). In an attempt to maintain these latter qualities in my work, but to also propose a method by which to conduct a coherent analysis, the following section will weave together the threads that I have left hanging in my review of the theoretical issues relating to discourse analysis into a methodological framework with which to conduct an analysis of how HT's knowledge claims have been translated and deployed in the Basslink impact assessment process.

As a methodology, the forms of discourse analysis which have been reviewed require the minute dissection and examination of talk and texts. For instance, Potter (1996:102), with his focus on "fact construction", sets out a suite of rhetorical and linguistic methods that can be drawn out of texts by the analyst to identify strategies adopted by actors to construct versions of 'reality'. For instance, credibility and defensibility can be engendered by using "offensive" and "defensive" (1996:106), "stake inoculation" and "stake confession" (1996:125-30), "category entitlement" (1996:132), and "footing neutrality and alignment" (1996:142) statements and strategies.

Macnaghten (1993:55) is critical of the ethnomethodological discourse approach [for example, Potter and Wetherell (1987) and Potter (1996)] to the extent that its focus on individuals and each one's consistency or variability in the use of grammatical terms to identify their selective use of repertoires is the wrong "analytical unit". What is problematic, Macnaghten argues, is that it assumes discourse is "primarily located in grammar" of individuals:

Discursive constructions obviously use grammar but what lies central to each construction is not the use of the same grammatical terms but the social relationship encapsulated by these terms, the outlook they engender, and the activities they legitimate (whether these will be achieved or not depending, however, on the process of argumentation) (Macnaghten 1993:55).

Adopting a conceptual rather than a grammatical level of analysis, described as "social function", Macnaghten (1993:55-6) identifies different conceptions of 'nature' which were used in a public hearing process to determine the location of a landfill site. His methodology runs as follows (1993:55-6): identify in texts the "variety" of constructions (of a concept) used; identify how these constructions are used as "argumentative strategies"; connect the variable constructions to the "different realities legitimated";

and, analyse the interplay of argumentative strategies and process outcomes. In his study, Macnaghten (1993:68) identifies four discourses of nature, namely, that of wilderness, passive visual harmony, the visual harmony of activities, and ecological balance, and claims that these different formulations challenge taken-for-granted notions of nature and wilderness as "pre-existing".

Like Macnaghten (1993), I do not favour the grammatical "analytic unit" espoused by Potter (1996) or Fairclough (1989; 1992). Therefore, it is not my intention to dissect the Basslink documentation for the purpose of identifying metaphorical, grammatical and rhetorical strategies to the level they suggest. I do not believe that this level of dissection will meet the objectives of an STS analysis outlined earlier. In any case, it is simply not feasible to do so given the number of documents that would require scrutiny. The recommendations of these authors can be used, however, as linguistic cues to highlight larger formulations in the texts for analytical examination (cf Bridgman and Barry 2002).

Along with Macnaghten (1993), I consider the idea of interpretative repertoires, applied at a conceptual level, to be useful. As a theoretical concept, this idea embodies the strict constructionist stance, which does not attribute 'reality' to the epistemological claims that circulate in, for instance, an environmental debate. As a methodological concept, it directs the analytic focus towards understanding how a single discourse can be deployed by different actors with divergent agendas, or multiple discourses by a single actor, in the construction of talk and text. It raises questions about the source of these discourses, their translation, their mobility and their mutually constitutive nature.

Narrative Analysis

Taking Macnaghten's suggestion that variant discourses can be identified at a conceptual level, interpretative repertoires can be conceived as narratives. The use of narratives or stories, like interpretative repertoires – is selective, contextual and multiple. They embody shared meaning, and, as already stated, "peoples' constitutive interactional work, the mechanics of which produce and maintain the accountable circumstances of their lives" (Gubrium and Holstein 2000:490). As such, narratives, like discourses, can accuse, persuade and direct (Potter and Wetherell 1987:33). Viewed as social practice, narratives are discourses:

Narratives are not just stories told within social contexts; rather, narratives are social practices, part of the constitution of their own context. Because narratives are social practices that are constitutive of, not merely situated within, social contexts, they are as likely to bear the imprint of dominant cultural meanings and relations of power as any other social practice (Ewick and Silbey 1995:211).

In policy issues, which are "uncertain, complex, and polarised", Roe (1994:3) maintains that narratives are the single point of analysis, "... the only things left to examine are the different stories policymakers and their critics use to articulate and make sense of that uncertainty, complexity, and polarization". Environmental issues, such as Basslink, which are inextricably linked to contentious social, political and economic issues, certainly fit Roe's criteria. The four steps required to carry out a narrative policy analysis are: identify the "policy narratives", that is, the stories which have "beginnings, middles, and ends, as in scenarios" – "if arguments, they have premises and conclusions"; identify narratives that run counter to the dominant narrative of a controversy, described as "nonstories or counterstories"; make a comparison between the two groups of narratives "in order to generate a metanarrative 'told' by the comparison"; and, use the metanarrative to reconceive the policy issue (Roe 1994:155-6).

Roe (1994) uses narrative analysis to unravel policy deadlocks and draws the conclusion that a critique of a policy narrative will not displace it. Instead, it will increase uncertainty and, therefore, maintain it in place. Roe (1994:5) argues that a better way to "undermine" a narrative is a "counternarrative" that rewrites the dominant narrative. The important point about narratives which is significant for this thesis is:

Stories commonly used in describing and analyzing policy issues are a force in themselves. ... Further, these stories ... often resist change or modification even in the presence of contradicting empirical data, because they continue to underwrite and stabilize the assumptions for decision making in the face of high uncertainty, complexity, and polarization (Roe 1994:2).

Bridgman and Barry (2002:144), who use Roe's method, identify the metanarrative "regulation is evil" to have underpinned a stalemate that developed in New Zealand over the transferability of mobile phone numbers. They conclude that narratives tend to have "strong pre-figurative effects and to be more pervasive than previously recognised" (Bridgman and Barry 2002:141). Other studies that have drawn on Roe (1994) to identify a "metanarrative" include Garvin and Eyles (1997) and Iannantuono and Eyles (1999).

Unlike these studies, Roe (1989:255) outlines what he describes as "asymmetrical" circumstances where the dominant story in a controversy was countered only by critique. Roe (1989:252) argues that a critique is not a story, but "point-by-point rebuttals of other, more conventionally structured stories and arguments about the policy issue in question". Hence, a critique forces responses to a policy issue to be framed within the confines of the dominant story. As an "antistory", Roe (1989:266)

argues that a critique is very difficult for policymakers, decision-makers, and members of the public to read, as it simply "amplifies the ambiguities". This view aligns with Campbell (1985) and Wynne (1992b) from the STS field, who argue that uncertainty derives from conflict, not the other way around.

Within this context, the impact assessment process in Australia can be viewed as an administrative procedure that institutionalises critique and constitutes members of the public in the role of executing it. Consultation processes require interested parties to respond to 'scientific facts' set out in an impact assessment statement prepared by consultants, working in close liaison with proponents who engage and remunerate them. Ironically, in light of the arguments of Roe, "uncertainty, complexity and polarization" (1994:2) and the amplification of ambiguity would be outcomes of the impact assessment process. The analytical task, therefore, is not to identify the specifics of uncertainty or the technical arguments in relation thereto, but how it has been managed. To meet this aim, I do not intend to follow each step of the narrative analysis of Roe (1994) set out above to compare stories and counter stories and identify a metanarrative, but instead to utilise the work of Roe (1989) which reflects the circumstances of the Basslink process in the context of EIA in Australia.

Narratives Travel

The work of Turnbull (2002) substantiates the link I have made between narratives and knowledge production and the utility of the study I am undertaking to the field of STS. Importantly, Turnbull (2002:275) contends that narratives, like knowledge, travel, and cogently points out that 'universality' and 'objectivity' are not inherent in knowledge, but rather they are "effects produced by the collective work of the technoscientific

community". These characteristics, then, are derived from socially configured standardisation and homogenisation mechanisms, which facilitate the movement of knowledge claims from a local site of production, where things are inconsistent, fractured and irregular, into other domains (Turnbull 2002:275). Turnbull gives prominence to narratives in this process and sees them as an integral part of the agency and hybridity that eventually become obscured from view as knowledge claims are packaged into 'facts':

We construct ourselves, our relationships and our understandings of the world through narratives that forge meaningful links between the otherwise fractured components of our lives. Yet the processes of spatial translation inherent in narrative and knowledge construction are not readily apparent, partly because of the very power of those narratives. Our modernist predilections for displaying our knowledge as objective and universal denies human agency or movement in making knowledge. Our whiggish tendencies to retrospective linear analysis underline the need to recognise the key difference that Latour emphasises, between accounting for the construction of the 'black box' before it is closed – where agency and hybridity are exposed, and after – when it has been purified and networked into 'reality' (Turnbull 2002:273-274).

Turnbull (2002:287) claims that "every culture" has had to devise ways of moving knowledge that are fundamentally "messy and complex, replete with unbridged gaps and overlapping spatialities". He sees narratives as a means by which to bridge the gaps and "move through knowledge spaces by making connections" (Turnbull 2002:287).

What we now count as a specially authoritative form of knowledge – Western or modern science – is a tradition which has devised social strategies, narrative forms and instrumental practices that enable local knowledge to travel, to be assembled at the centre of calculation and then to be put into use or transmitted as a unified body to other centres. This process of assemblage and unification is accompanied by the erasure of the local, the heterogeneous and the narratological, but closure is never complete, heterogeneity always reemerges ... (Turnbull 2002:288).

These thoughts sum up the analytical focus of this thesis, which attempts to bring together the epistemological, ontological and narratological aspects of knowledge production and the role of narratives in this process.

Central Questions

To examine the proposition of the power of narratives as social practice and their potential to dissolve inconsistency, my central epistemological question is *how*, given the extent of the disclosed uncertainties and limitations in the inputs and outputs of predictive economic and environmental modelling used to substantiate the impacts of Basslink, was HT's case in respect of the project made durable and legitimated by the JAP? This question is accompanied by several others in terms of narratives. Specifically, as well as seeking to understand the relationship between constructions and narratives, I have also sought to identify what narratives helped HT bridge empirical gaps, what was their origin, how were they packaged and what influence did they have on judgments both within and outside HT as well as the regulatory outcomes?

I contend that a combination of the conceptual methodology of Macnaghten (1993) with the narrative analysis of Roe (1989; 1994) has considerable merit for answering the questions I have posed. Importantly, it allows me to adopt a "strict constructionist" stance in terms of epistemology, but also to take account of ontological claims (Burningham and Cooper 1999:308). The identification of narratives will shed light on my epistemological question about how consensus has been formed around particular knowledge claims put forward by HT in the Basslink impact assessment process. The concomitant isolation of the variable constructions of 'reality' mobilised by these

narratives allows a questioning of the ontological claims made by HT. Thus, this combination sheds light on both the epistemological and ontological facets of the Basslink impact assessment process.

RESEARCH DESIGN

Case Study and Theory Testing Approach

A case study and theory testing approach has been adopted in this thesis (de Vaus 2001). The theory of STS has been discussed in this chapter, and links with it will be made in the chapters to follow, particularly in Chapters 8 and 9. The unit of analysis is the integrated impact assessment process of Basslink. Although it is a single case study, the Basslink process provides a means to adequately test STS theory, and render a picture of the assessment process potentially useful for future public policy reform. I make this judgment on the basis of several reasons. First, I had the opportunity to witness the lengthy public hearing process in Hobart first-hand. Hence, I was able to track events as they occurred. Second, in this case there was an enormous amount of information publicly available for analysis. As well as HT's studies and reports and the RPDC documents, there were the public submissions. These were a valuable source of responses to the project and process, and reflect no intervention on my part. Third, the process itself, as well as the nature of the assessment panel, particularly its Tasmanian chairman, instigated a considerable level of disclosure on the part of the proponents and critics. Fourth, extensive cross-examination of the proponents' witnesses was undertaken, recorded and made available to me for this work. Finally, the structure of the process and the documents produced therefrom allow me to follow and map the movement and translation of knowledge claims and narratives. It can be seen that,

although a single case, the Basslink impact assessment process is rich in research source material.

Empirical Resources

The primary empirical resources for this study are extensive. The impact assessment documentation includes: Draft Scope Guidelines (JAP 2000a); Final Scope Guidelines (JAP 2000b); the DIIAS (2001a); Draft IAS Summary Report (DIIAS 2001b) and the Final EIS and Supplement to the DIIAS (NSR Environmental Consultants Pty Ltd 2002). The DIIAS contains approximately 6,000 pages of text. Overall, it consists of ten volumes and 75 additional reports. The former consists of a 16-chapter summary report, a 21-chapter main report, three annexures, eight appendices, as well as plates and figures for each chapter. The latter consists of 59 supporting studies and 16 update reports. Of these, 30 supporting studies were tendered by BPL. HT presented 29 supporting studies and the 16 update reports. Two other document components are the *Draft Panel Report* (JAP 2002a) and the *Final Panel Report* (JAP 2002b), both of which have separate Appendix documents that list the submissions and evidence tendered during the process and annex agreements, notices and deeds between the parties.

Added to this are the public submissions. In respect of the Draft Scope Guidelines, 29 submissions were received in Tasmania and 59 in Victoria. In response to the DIIAS, 155 were received in Tasmania and 381 in Victoria. In response to the *Draft Panel Report*, 35 were received from Tasmania and 215 in Victoria. In Victoria, health and visual effects of electricity pylons and overland transmission were of particular concern. Also, in terms of evidence tendered at the public hearings, 165 exhibits were collected in Tasmania and 112 in Victoria. Given the extent of this evidence, I have

concentrated on the Tasmanian side of Basslink. Also, my focus is the documents related to the Gordon River and the changes Basslink is expected to bring to the operation of Tasmania's hydro-electric system related thereto.

Over many months, I attended the RPDC and read through all of the Tasmanian public submissions and transcribed relevant sections. These are the subject of Chapter 8. In Tasmania there were 16 days of hearings, which I attended (with the exception of one day). I was given access by the RPDC to the 67 audio tapes of evidence. These recordings were made solely for the use of the RPDC, so there is no official transcript. Although I attended the hearings and took considerable notes of the proceedings, this resource was invaluable for recounting and documenting what was actually said. I attended the RPDC to listen to the tapes and transcribe relevant sections of the presentations and exchanges at the hearings.

As this is an epistemological study, the primary source material consists of the documents set out above that were tendered to and published by the JAP, and the tape recordings of what was said at the hearings. In light of the amount of this material that was available in both written and verbal form and what I was able to extract from it, I have chosen not to undertake formal interviews. The amount of time taken in transcribing from the public submissions and the audio-tapes was an important consideration in this decision. Informal conversations at the hearings with representatives of HT and its researchers, representatives of the JAP, The Greens, BPL, TFIC and public submitters, and clarifications on technical issues sought from HT afterwards were of considerable assistance. Secondary sources include press reports and media releases of HT, The Greens, BPL and the Tasmanian government; Annual

Reports of HT and Tasmanian government entities; various reports related to energy use and Basslink; archival material sourced from the Centre for Environmental Studies at the University of Tasmania; websites; *Hansard* and HT promotional material.

Conclusion

In this chapter I have outlined the theoretical commitments of STS and constructivism and, as such, established the foundation for this epistemological study. As well as challenging the 'objectivity' and 'naturalness' of the knowledge claims tendered in support of the Basslink project, I will apply the concept of interpretative repertoires at a conceptual level (Macnaghten 1993) to carry out a narrative analysis (Roe 1989; 1994) of HT's case in respect of Basslink on the Gordon River. It is intended that this conceptual framework will allow me to identify narratives embedded in the scientific knowledge claims presented by HT, and how they were mobilised into and out of the political realm.

Chapter 4

TWO CASES FROM HYDRO TASMANIA IN SUPPORT OF BASSLINK

This chapter sets the scene for the chapters that follow. As set out in Chapter 3, HT tabled many reports that make it possible to follow the translation, mobilisation and deployment of its knowledge claims through the impact assessment process and into the regulatory outcomes. Here, I outline the substantial difference between the case presented by HT in the DIAS documentation in respect of environmental impacts on

the Gordon River and then at the public hearings that took place three months later. This chapter also introduces the predictive models, baselines and mitigation issues that will be discussed in the ensuing chapters.

Conceptual Distinctions

Before moving on, it is necessary to outline the conceptual distinctions in terms of actors that I have made in conducting my analysis. HT used its internal resources to develop its case for Basslink. Two divisions of the organisation were prominent – its Resource Analysis Group and Environmental Services Division (Clayton Utz 2001a:2-3). The actors involved were Michael Connarty in respect of the former, and Helen Locher in respect of the latter. As a senior environmental consultant with HT and the manager of HT's Basslink environmental investigations, Locher brought together HT's environmental evidence. She authored what are referred to as the *Summary Report* (Locher 2001a), which integrated HT's DIAS investigations, and the *Overview Report on Tasmanian Waterway Issues Arising from Basslink* (Locher 2001b), referred to hereafter as the *Overview Report*, which summarised subsequent supplementary and update reports for the public hearings (Clayton Utz 2001a:2).

I have viewed these two reports, which integrated HT's findings derived from its Resource Analysis Group, in-house hydrologists, and the studies conducted by both internal and external environmental researchers as 'in-house' documents, and the role of Locher in preparing them as an 'in-house consultant'. The distinction of 'environmental researcher' is made on the basis that these actors were engaged or directed by HT to carry out specific empirical studies in respect of the Gordon River, and to do so, they were provided with modelling outputs from HT to delineate *with*

and *without* Basslink impacts. With her contribution to the fluvial geomorphology investigations, Locher also takes on the role of environmental researcher (Koehnken *et al.* 2001). In his role of reporting on and running modelling scenarios to establish the *with* and *without* Basslink baselines with HT's Resource Analysis Group, Michael Connarty is also viewed as an 'in-house consultant' (2001a; 2001b). With these distinctions, the transformation of HT's case in respect of Basslink can be followed.

Call for Science

The Final Scope Guidelines (JAP 2000b) set out the JAP's expectations in respect of the information it would require for its assessment of the potential environmental impacts of Basslink. It required information about the present conditions, what potential impacts there could be, what measures would be taken to avoid, manage or mitigate any such impacts, and the expected environmental conditions with avoidance, management or mitigation measures taken into account (JAP 2000b:40). This information was expected to be 'scientific':

Predictions on environmental impacts should be based on scientifically supportable data including analogy with relevant developments elsewhere with due reference to the precautionary principle. The methodologies used or relied upon should be referenced, together with the relevant research and investigations supporting them. Assumptions, simplifications and scientific judgements should be stated clearly and the nature and magnitude of uncertainties should be clearly defined. Where relevant, the choice of a particular methodology over alternative methodologies should be explained (JAP 2000b:41).

This direction to the proponents for their preparation of the DIIAS documentation demonstrates the JAP's belief in the predictive power of science, as well as a view that human decisions related thereto can and will be readily explicated. A belief that uncertainty is tangible is also evident. On this basis, the 'facts' can speak for themselves and uncertainty can be quantified.

In contrast, I have argued that ‘facts’ cannot speak for themselves and that uncertainty is not readily identifiable. I have also argued that a realist view of science underpins the impact assessment process which does not give sufficient weight to the intervening translations from consultants engaged by proponents to prepare a relatively favourable case in support of a project (Duncan 2003). In terms of uncertainty, I outlined in Chapter 3 that its existence and magnitude depends upon one’s standpoint and proximity to the site of knowledge production (MacKenzie 1990). Also, uncertainty can be used as a rhetorical discursive resource (Campbell 1985; Roe 1994), to make issues that are essentially “indeterminate” appear “tractable” and “soluble” (Grove White and Wynne 1994:9). Within this context, knowledge claims and uncertainty can be contextualised or simply reconfigured as a product of distance between the site of knowledge production and its use. Thus, calls for additional knowledge to fill uncertainty gaps, whether by way of more in-depth studies or commitments to adaptive management, result in an avoidance of the need for reflexivity on the “unnegotiated social prescriptions” embedded within knowledge claims advanced in regulatory processes (Irwin and Wynne 1996:9). In essence, this chapter sets the foundation for challenging the notion that scientific facts can speak for themselves and that uncertainty is readily identifiable and quantifiable.

Benefits of Basslink for the Gordon River

With the completion of HT’s initial environmental studies and the publication of the DIIAS, HT’s conclusion, pronounced in its promotional material, was that there would be no significant impacts from the operation of Basslink on Tasmania’s rivers and lakes, and in respect of the Gordon River, Basslink would be beneficial. For example, this

message is conveyed in an information sheet produced by HT, *Basslink Empowering*

Tasmania: Safeguarding the Environment (see Appendix 4) states:

Over the past two years, Hydro Tasmania has commissioned 29 high-level studies, conducted by leading Australian riverine environmental scientists and costing \$2.5 million, to look into the possible impacts of Basslink on Tasmania's rivers and lakes.

A detailed modelling analysis of the Hydro Tasmania generating system operating in the National Electricity Market found that Basslink will alter flows downstream of only three of the 27 Tasmanian hydro-electric power stations ...

The 29 environmental studies showed that for many aspects of the downstream river systems there are no Basslink impacts, and in some cases Basslink provides environmental benefits. Where impacts are identified, Hydro Tasmania has proposed a significant package of riverine enhancement measures, including regular monitoring, to ensure that these changes have no significant social or environmental impacts ...

Over one-and-a-half million dollars will be spent on water flow management measures to improve riverine conditions for the world heritage area downstream from the Gordon power station. The key measure will be maintenance of a seasonally-appropriate minimum environmental flow in the Gordon River throughout the year. Hydro Tasmania's commitment to a minimum summer flow of 19 cumecs and winter flow of 38 cumecs is believed to [be] the largest environmental flow commitment ever made in Australia, larger than that proposed for the Snowy Mountains hydro scheme. Many benefits arise from this commitment, namely an increased habitat area for fish and aquatic insects, an improved food supply for platypus and fish, and a lessening of erosive forces due to scour and seepage. Additional to the environmental flow, Hydro Tasmania has committed to a measure for the Gordon River to improve the stability of the riverbanks even beyond the benefits already provided by the minimum flow.

Very importantly, an independent assessment concluded that Basslink even without any mitigation measures in place has no significant implications for the values for which the World Heritage Area was declared. In fact, this report notes that Basslink may provide the opportunity to enhance values with the substantial mitigation measures to which Hydro Tasmania commits.

To communicate the message that Basslink presented no harm and would actually be good for the Gordon River, HT has drawn on the rhetorical utility of science in emphasising the length of time involved in its studies, their cost, the calibre and independence of the researchers, and the number of studies. Also, the 'objectivity' of predictive modelling is invoked. These statements are intended to demonstrate the scientific rigour with which the potential impacts of Basslink were investigated and, importantly, that the conclusions reached were formed outside HT. To demonstrate its pledge to best-practice environmental management and that it has acted on the recommendations it has received, HT discloses the extent of its financial commitments to mitigate the identified impacts.

Within the context of the complete absence of environmental management or conservation of the Gordon River in the past, and no legal or regulatory requirement endowed upon HT to do so at the time of the Basslink assessment process (JAP 2002b:345), HT's view that Basslink represents benefits for the Gordon River is perhaps justifiable. However, in contrast to the picture painted here by HT that represents Basslink as not having a significant impact and that it will benefit the Gordon River, the studies to which HT refers depict a substantially different and somewhat less optimistic image of the Gordon River with Basslink. This chapter reviews the difference between the rhetoric, the contents of the reports of HT's environmental researchers and HT's in-house consultants' reports which contributed to the statements set out in the above promotional material, and how HT's case in respect of Basslink changed over the course of the impact assessment process.

With and Without Basslink Baselines

Three baselines were used by HT to make an assessment of environmental impacts on the Gordon River – one *with* Basslink and two *without* Basslink. The *with* Basslink baseline was derived by HT from a simulation model known as the Tasmanian Electricity Market Simulation Model, or TEMSIM. The first *without* Basslink baseline that was used is referred to as ‘Historical’. It utilises data from records of the operation of the Gordon Power Station and represents what has happened in the past. The second *without* Basslink baseline is represented by the simulation model known as SYSOP, or HT’s SYStem OPeration model, “used for decades by Hydro Tasmania to manage its operations” (Peterson and Locher 2001a:2). SYSOP was used by HT to predict what would happen in the future *without* Basslink.

SYSOP was introduced at the request of HT’s regulator, the Department of Primary Industries, Water and Environment (DPIWE). In its response to the DIAS, DPIWE called for more modelling work to be done:

Due to the critical importance of the modelling on the overall impact assessment, the project should be re-described in terms of SYSOP – TEMSIM comparison using the entire 1924 – 1998 simulated inflow data set to account for a representative range of climatic variability. The 4-year data set [ie the historical data] put forward by Hydro Tasmania to DPIWE on 29 August 2001 is not considered representative. A comprehensively representative sample must be analysed at an hourly time-step. This issue has been raised with Hydro Tasmania but has not as yet been addressed (DPIWE 2001:9).

In other words, in respect of the Historical baseline, DPIWE’s concerns were the lack of data at an hourly time-step and a sufficiently long sequence of hydrological variability. With the three baselines, two comparisons were undertaken. TEMSIM was compared to Historical and its outputs presented in the DIAS studies, and later TEMSIM was compared to SYSOP and the findings presented in update and supplementary reports

tendered at the public hearings. The implications of the change in the *without* Basslink baselines and considerably more detail in respect of these baselines will be provided in the chapters that follow.

Two Cases for Basslink

HT's scientific case for Basslink changed between the time of the publication of the DIIAS in July 2001 and the public hearings in October and November 2001. The following section summarises the case presented in the HT Appendix Reports annexed to the DIIAS. This is followed by the case set out in HT's update and supplementary reports, and the *Overview Report* (Locher 2001b) presented at the public hearings. The latter group of reports make substantially different claims about the *scale* of the environmental impacts of Basslink than the former presented in the DIIAS.

Case 1 – The DIIAS: These studies make an assessment of impacts derived from a comparison of modelling to represent the operation of the Gordon Power Station *with* Basslink (ie TEMSIM) compared to the Historical baseline, *without* Basslink. The majority of HT's Appendix Reports to the DIIAS are authored by HT's environmental researchers and describe present conditions, findings of investigations of Basslink *without* mitigation, as well as recommendations in relation to monitoring, and the possible effects of suggested mitigation options. In this respect, HT met the JAP's requirements by providing information in relation to present conditions, what potential impacts there could be, what measures could be taken to avoid, manage or mitigate any such impacts, and the expected environmental outcomes of avoidance, management or mitigation measures. However, it should be noted that with the exception of the quantification of a small range of minimum environmental flows and risk levels for

macroinvertebrates (Davies and Cook 2001a), information about measures to avoid, manage or mitigate was only in the form of recommendations made by the environmental researchers.

Case 2 – The Public Hearings: The HT update and supplementary reports tendered at the public hearings present an assessment of impacts derived from a comparison of modelling with the same *with* Basslink baseline (ie TEMSIM) to the new *without* Basslink baseline, SYSOP. Locher (2001b) integrates these reports and their findings. In addition, a number of further reports were prepared by HT. Relevant for my study are the *Gordon River Basslink Monitoring Program and Adaptive Management Plan 2001-2010* (Bluhdorn 2001), *Gordon River Basslink Modelling and Hydrology Update Report* (Peterson and Locher 2001a) and the *Gordon River Basslink Hydrology with Mitigation Measures* (Peterson and Locher 2001b). Again, Locher takes on the role of in-house consultant in preparing the *Overview Report*, and environmental researcher with her contribution to these latter reports, which presented the updated hydrology dataset derived from SYSOP and quantified the effects of the minimum environmental flow mitigation measure. With this updated information and modelling inputs and outputs, the environmental researchers were directed to update the conclusions of their initial reports which had been used in the preparation of the DIAS.

Operational Changes on the Gordon River from Basslink

Under either scenario, Basslink is expected to change the operation of the Gordon Power Station. It is the extent of these changes that was in contention at the public hearings and what differs between the DIAS and the public hearings. Gordon Power Station operations will change as its discharges will be influenced by NEM peaks and

prices in Victoria, rather than base load in Tasmania (Locher 2001a). The changes were identified by comparing the *with* Basslink baseline (ie TEMSIM) in the form of power station discharge information, to the *without* Basslink baselines (ie Historical and SYSOP). A comparison of these baselines indicated that the hydro-system's operation would be much more variable with Basslink. The extent of this variability, the change in flows, and the implications were the subject of HT's environmental investigations (Locher 2001a:22). My focus in this and the chapters to follow is the reports prepared by the environmental researchers in respect of fluvial geomorphology (Koehnken *et al.* 2001; Koehnken 2001a), riparian vegetation (Davidson and Gibbons 2001a; 2001b) and macroinvertebrates (Davies and Cook 2001a; 2001b).

Discharge Zones on the River Banks

In terms of the riparian vegetation and fluvial geomorphological studies, the area in contention in relation to Basslink impacts is between 2.5 and 4.5 metres above low water mark (LWM) on the riverbanks of the Gordon River (Davidson and Gibbons 2001a:11; 2001b:10). This is the area that would be affected by running the Gordon Power Station at capacity, with its third turbine in full operation. Davidson and Gibbons (2001a) observed that zones of degraded riparian vegetation along the river corresponded with discharge levels of each turbine from the power station. The impact of the operation of one turbine at 70 cumecs⁸² could be seen between the LWM and 1.5 metres up the river bank. Flows from two turbines at 140 cumecs were visible to 2.5 metres. At this level, Davidson and Gibbons (2001a:1) identified what they termed a plimsoll-line, below which "leaves are absent on the branches of trees and shrubs". The existence of the plimsoll-line physically demonstrates that most discharges from the power station have been at or below 140 cumecs in the past. The river bank zone

between 2.5 and 4.5 metres is affected by the running of three turbines, which release discharges to a maximum of around 240 cumecs (Davidson and Gibbons 2001a:10-11)⁸³.

Environmental Impacts of Case 1

Chapter 12 of the DIIAS sets out the changes Basslink is expected to bring to the operation of the Gordon Power Station. Although this is not a comprehensive description, they include: increased on/off operation; higher discharges in winter than in summer; increased weekend shutdowns; and increased discharges over 150 cumecs and 210 cumecs. The environmental impacts of the changes in operation reported in HT's environmental researchers' reports set out below represent Basslink *without* mitigation.

The fluvial geomorphology assessment (HT Appendix 4) concludes that a "significant increase in sediment transport capacity at the bank toe would be associated with changing from the present flow regime to the Basslink flow regime" (Koehnken *et al.* 2001). And further:

It is concluded that the proposed Basslink flow regime will result in an increase in the sediment transport capacity within the Gordon River. This increase will be additional to the observed sediment transport impact of the present regulation. The magnitude of the increase will vary along the stream depending on local hydraulic conditions (Koehnken *et al.* 2001:271).

In general, the riparian vegetation (HT Appendix 6) report concludes:

The changes to the patterns of riparian vegetation on the Gordon River arising from Basslink may be substantial. Generally, in

⁸² A cumec is a flow rate and equals one cubic metre of water per second.

⁸³ It should be noted that the 2.5 metre level of the plimsoll-line is a general demarcation as it varies between 2.0 and 3.5 metres at different locations along the river as constrictions cause ponding, when it rises, or where the river broadens, when it is lower. The specifics are detailed in Davidson and Gibbons (2001a:10-11).

comparison with the current regime, Basslink will result in an increased frequency of both high-flow and low-flow events ... (Davidson and Gibbons 2001a:23).

Specifically:

It is expected that the Basslink Power Scheme would lead to further changes in riparian vegetation on the Gordon River in particular a rise in the height of the plimsoll line on the bank of the Gordon River to approximately 4.0 [metres from around 2.5 metres] in the region from Abel Gorge to Second Split, 7-12 km from the dam (Davidson and Gibbons 2001a:2)⁸⁴.

The macroinvertebrate report (HT Appendix 7) concludes as follows:

Under a 480 MW cable Basslink scenario, the Gordon power station becomes a predominantly hydropeaking power station. The flow regime downstream in the middle Gordon will be dominated by periods of rapidly and widely fluctuating discharge. Compared to current conditions, the frequency of highly fluctuating discharge events would greatly increase. There will be little amelioration of this

⁸⁴ "The causes for this are:-

- Direct injury to plant leaves caused by increased inundation of vegetation up to 4.0 m on the river bank
- Direct injury to plant roots arising from waterlogging to 4.0 m on the river bank. However this will be at a reduced intensity to the current regime for the interval 0-1.5 m on the river bank, because flow will be low for short periods during most days allowing banks to drain.
- Reduced light and time available for plants to photosynthesise, grow and reproduce in summer, in comparison with the current regime, because of inundation up to 4.0 m on the river bank during the day. Typically, in the summer months, the power station operates at flow rates greater than 140 cumecs between 9.00 a.m. on one day and 2.00 a.m. on the following day. There is then a short period of low flow (less than 70 cumecs) between 3 a.m. and 8 a.m.
- Reduced light and time available for plants to photosynthesise, grow and reproduce in summer, in comparison with the current regime, because there are fewer days during summer that are free from flood.
- Greater frequency and amplitude of water level fluctuation under Basslink would reduce recruitment of riparian species. New germinants would be exposed to greater disturbance by inundation, waterlogging, erosion of substrate, dumping of sediments and light limitation.
- Higher peak flows under Basslink would accelerate the rate of loss of the principal tall shrub (*Leptospermum riparium*) stabilising river banks in the Gordon River.
- Higher peak flows under Basslink would increase the frequency of landslips on steep river banks (initially as river adjusts to new flow regime)
- The rare moss, *Rabdodontium buptonii* known only from the Gordon River (Albert Gorge to Ewerts Gorge) is expected to thrive under Basslink.
- All these effects are expected to be most severe immediately below Abel Gorge 7-12 km below the dam and decrease with distance from the dam" (Davidson and Gibbons 2001a:2).

Notably, the conclusions set out in the body of this report are as they appear above except for an additional sentence at the end of the last point, which states: "However, effects would be expected to be detectable at least to the junction of the Franklin River" (Davidson and Gibbons 2001a:25). It will be shown in chapters to follow that the distance to which impacts were expected to extend down the Gordon River were pivotal to the interpretation of World Heritage Convention legislation.

regime downstream, and rapid fluctuations in depth, velocity, bed shear stress and area of wetted channel would be dominant features of the flow regime as far downstream as the Franklin River junction.

We anticipate that this flow regime would be accompanied by further decreases in diversity and abundance of macroinvertebrates throughout the middle Gordon (as well as fish, see Howland *et al.* 2001). This would be more significant in the section upstream of the Denison River, but would also occur throughout Section 2, downstream of the Denison River.

We also believe that populations of platypus and Australian water rat are likely to experience further negative, though perhaps not substantial, impacts in what is already a degraded environment.

Overall, the middle Gordon River downstream of the Denison River under the proposed Basslink scenario would contain a macroinvertebrate assemblage significantly less diverse and abundant than other, similar rivers of the Gordon catchment and south-western Tasmania (Davies and Cook 2001a:110).

It is important to note that it is these conclusions of its environmental researchers that HT is reporting on in its promotional brochure referred to earlier. In these DIIAS Appendix Reports, mitigation exists only as suggestions and proposals, with the exception of a small set of calculations by Davies and Cook (2001a) to identify minimum environmental flow levels and risk bands for macroinvertebrates. Quantification of the effects of HT's mitigation choices was not known until SYSOP was introduced and calculations made after the publication of the DIIAS. These are outlined in Peterson and Locher (2001a; 2001b) and were tendered at the public hearings. Hence, the claims made in the promotional piece outlined at the beginning of this chapter, where HT assures its readers that mitigation measures would not only ameliorate any Basslink impacts, but would benefit the river, were made without the 'scientific' evidence to back them up.

Environmental Impacts of Case 2

With the new modelling comparison, TEMSIM-SYSOP, the conclusions of HT's environmental researchers changed substantially. In the fluvial geomorphology report, conclusions for the two comparisons are provided:

If a comparison between Historic/TEMSIM flow regimes is used as a basis for comparison, Basslink will lead to an increase in scour in the middle Gordon River due to longer duration full capacity discharge.

If a comparison between SYSOP/TEMSIM flow regimes is used as a basis for comparison, Basslink will lead to little change in scour due to similarities in full capacity discharge between the two scenarios (Koehnken 2001a:13).

The riparian vegetation update report had this to say:

If both SYSOP and TEMSIM model power station operating regimes are achievable, in the long term, the effect on the riparian vegetation of each of these would be similar. Therefore, looking 30 years or more in the future, it is likely that the two options from the Gordon Power Station management currently being considered, domestic use in Tasmanian (SYSOP model) and Basslink (TEMSIM model), would produce similar effects on the riparian vegetation of the Gordon River (Davidson and Gibbons 2001b:13).

In respect of the lower reaches of the Gordon River, it was concluded that "based on comparisons between TEMSIM and SYSOP there would appear to be no net effect of Basslink for this reach of the river" (Davidson and Gibbons 2001b:14). It can be seen from these conclusions that there was a substantial shift in the assessment of the environmental impacts predicted to arise from the operation of Basslink. With the TEMSIM-Historical comparison the impacts would be significant, with the TEMSIM-SYSOP comparison, there would be hardly any difference at all. The macroinvertebrate report did not make such a substantial shift:

It is expected that the lower incidence of full-gate operation under Basslink than originally described, as indicated by the SYSOP-TEMSIM comparison, will negate some of the concerns relating to

high discharges, but only slightly as the frequency of high flow events is still substantially greater under Basslink (Davies and Cook 2001b:4).

Several factors contributed to the reposition in conclusions reflected in these reports. Those emphasised by HT were the effects of mitigation, which were possible to quantify with the use of the SYSOP baseline, and an extended hydrological dataset. There were also assertions about how the TEMSIM model over-estimated the number of instances when the Gordon Power Station ran all three of its turbines. These issues, in particular the problem with the model structure and the extent to which the subsequent modelling exercise moved a proportion of these high flow discharges from the *with* Basslink side of the equation to that *without* Basslink to represent how the Gordon Power Station would operate in the future, as opposed to what had occurred in the past, are the aspects of HT's case that will be examined in detail in the following chapters.

Mitigation Measures

As noted, the assessment of environmental impacts in respect of fluvial geomorphology, riparian vegetation and macroinvertebrates set out in the reports annexed to the DIIAS do not quantify the effects of mitigation. Even so, Chapter 12 of the DIIAS sets out three mitigation measures proposed by HT to minimise the anticipated impacts of the operation of Basslink on the Gordon River: first, a minimum environmental flow of 19 cumecs between December and May (summer) and 38 cumecs between June and November (winter) at a cost of between \$1-2 million per annum; second, a 'ramp down rule' which imposes a requirement on power station operation for discharges greater than 210 cumecs, to step down discharges to 150 cumecs for one hour before shutting down. In effect, it is expected that this measure will allow the

river banks to drain more slowly, thus helping to maintain their stability for longer⁸⁵. Third, HT proposed an adaptive management and monitoring program at a cost of \$275,000.00 per year.

The benefits of these mitigation measures are that, with a minimum environmental flow, consistent habitat will be available for macroinvertebrates. It will also help reduce the impact of discharge draw-down. With the ramp-down rule, seepage-induced erosion leading to river bank scour is expected to be reduced. The ramp down rule has positive and negative effects on the riparian vegetation (audio evidence, Neil Davidson, 15 October 2001; Davidson and Gibbons 2001b:10). The minimum environmental flow has indirect implications for riparian vegetation and these will be discussed at the end of this chapter.

There were considerable differences between the mitigation proposals recommended by the environmental researchers and those committed to by HT. For instance, Davies and Cook (2001a) recommended a minimum environmental flow of between 19-26 cumecs to be maintained in summer and between 36-66 cumecs in winter. The researchers note that, “[i]f discharges fall below these levels significant risks to the integrity of the biota will occur due to habitat loss” (Davies and Cook 2001a:114). HT chose the minimum of these recommendations, with 19 cumecs in summer and 38 in winter, and proposed to halve the flow to 10 and 20 cumecs respectively for the first three years of operation (to be discussed).

⁸⁵ The ramp down rule was later revised whereby “whenever discharges from the power station exceed 180 m³/s, reductions in discharge must not exceed a rate of 30 cumecs per hour until discharge reaches 150 m³/s” (Bluhdorn 2001).

The riparian vegetation researchers recommended that flow rates be reduced to below 50 cumecs from January to March each year to allow the vegetation to grow, colonise and recruit (Davidson and Gibbons 2001a:25). However, this would mean the shutdown of the Gordon Power Station for three months. Plantings of riparian vegetation to stabilise the banks was also suggested, but this, too, would impact upon the operation of the power station.

Conditions on Mitigation

In terms of the effectiveness of mitigation, the macroinvertebrate update report (Davies and Cook 2001b) notes that benefits of mitigation are dependent upon the minimum environmental flow being measured at the Gordon Power Station, the flow being maintained at the proposed minimum level at all times and not shut-off for prolonged periods of time during maintenance shutdowns or varied according to inflows to Lake Gordon. HT sought to modify each of these aspects of the minimum environmental flow mitigation measure. HT's provisos were strongly contested in the DIIAS submissions as well as by DPIWE, HT's regulator.

First, HT proposed that the site for measurement of the minimum environmental flow should be upstream of the Denison River, which is about 15 kilometres downstream from the Gordon Dam (JAP 2002b:324 – see Appendices 1). This was at odds with the advice of HT's macroinvertebrate consultant, Peter Davies, who asserted that the compliance site should be just downstream of the Gordon Power Station. Davies argued that the greatest impact of HT operations was closest to the water release point, the power station. The effect of measuring the minimum environmental flow upstream of the Denison River would perpetuate the environmental degradation that power

generation has had and would continue to have, between the dam and the Denison River, particularly up from The Splits (Davies and Cook 2001b). Measurement at the Denison site would increase the likelihood of zero flows in the upper region of the river.

The point of contention was that if the environmental flow was measured upstream of the Denison River, the amount of water that HT would need to release from Lake Gordon would be measured after natural flows from the Orange and Albert Rivers had made their way into the Gordon River above the Denison River. If less water is released from the power station for the environmental flow, then the section between the dam and the natural flow tributaries (the first being the Albert River) would not receive sufficient flow for macroinvertebrates. Davies gave the following evidence before the JAP in relation to the compliance site for the minimum environmental flow:

This is quite a critical issue from my point of view. Hydro proposes establishing a minimum flow compliance monitoring site just up from the Denison River rather than just downstream of the power station. The minimum environmental flow recommendation that we've made was specifically derived from just downstream of the power station as a point essentially to provide habitat for the Gordon from that point on downstream between the flow peaks. The point of delivery of the recommended flows is reasonably critical to the environmental outcomes from our point of view. The proposal by the Hydro to shift the compliance monitoring location down to the Denison significantly increases the duration and incidence of zero and very low flows particularly from zero to five kilometres downstream of the power station down to the Albert River. ... If the compliance monitoring is conducted at the power station, essentially for the upper reach of the river in zone 1 you end up with no zero flow events, no days of the year in which zero flows occur and no days per year in which high risk flows occur, that's apart from maintenance shut down that I'll come to in a moment. If the compliance is monitored just up from the Denison River, we end up with 77 zero flow events per year in this reach totalling to 29 days of duration of zero flows and higher risk flows ... When you come down to just above The Splits ... these numbers reduce somewhat, you end up with no days of zero flow events because there is some pick up from the Orange and Albert. ... So, our overall conclusion from that is that this proposal has the potential to compromise the mitigatory effects of the minimum environmental flow severely up through the Albert River. The diversity and abundance

anticipated of invertebrates is anticipated to fall to levels expected with no mitigation between the power station and the Albert (Peter Davies, audio evidence, 16 October 2001).

Prior to the public hearings and this evidence of Davies, Locher (2001a) outlined the costs issue in locating the minimum environmental flow compliance site:

Measurement of the environmental flow upstream of the Denison River is considered the most practical, and it is this environmental flow measuring site which has been considered in terms of potential costs to Hydro Tasmania. Measurement at the power station was not further considered because it is likely to result in larger than required releases from the Gordon Power Station if downstream natural inflows are significant (Locher 2001a:119).

These statements indicate that HT was more concerned about releasing too much water from its dam than the state of the river above the Albert River confluence. It is a financial issue for HT. An explanation of how revenue would be lost if the measurement site was placed away from the Denison location is as follows:

The delivery of a minimum environmental flow results in lost Basslink revenue and a cost for replacing a deficiency in the Energy in Storage (EIS) in the system ... These costs are partially a result of the Gordon Power Station generating power at times when the small storages (e.g. run-of-river) are full which results in greater amounts of spill (i.e. lost energy). In addition, running Gordon Power Station more (i.e. in winter) results in the lowering of Lake Gordon which causes a loss of efficiency at Gordon power Station (i.e. through loss of head). This efficiency loss is compounded as more water is required to generate the same energy which further reduces the lake level and thus increases the efficiency loss. The loss of Basslink revenue can be attributed to the lower lake level, as when the Gordon Power Station is operated at its maximum flow the loss of efficiency transfers directly into a lower power output and lost Basslink revenue (Locher 2001a:120).

Hence, a reduction in lake levels, to which an environmental flow contributes, reduces Basslink revenue. It will be discussed later how lake levels, which relate directly to the Tasmanian water value, have market implications for HT's exports across Basslink. The above comments from Locher (2001a) indicate that natural flows have been taken into

account in the calculation of the cost to HT of the environmental flow and that HT is relying on natural flows to contribute to the overall minimum environmental flow. Measurement at another site closer to the dam, which would not take up flows from the tributaries, would have a higher cost. Clearly, there is an incongruity here with HT's use of the Denison River as the reference point in its economic calculations for the environmental flow and the macroinvertebrate study's use of the Gordon Power Station.

The difference of opinion on the location of the compliance site for the environmental flow created a situation whereby HT was arguing against the researcher it had engaged to carry out a major component of the environmental impact work. Hence, notwithstanding claims of independence and the impression in the promotional material that scientific studies guided HT's decisions and mitigation measures, this was evidently not the case. Instead, it appears that HT used the reports it commissioned as a resource from which options were chosen or negotiated within parameters it considered economically viable and which did not constrain its expected use of the Gordon River to operate Basslink. With corporatisation and the economic imperatives now placed upon it, HT would view its recommendations in this respect as not only justifiable, but fiscally responsible.

The issue of the compliance site was resolved by deliberations between HT and DPIWE. DPIWE's submission to the *Final Panel Report* indicates that from extensive discussions with HT it was agreed that the minimum environmental flow compliance site would be upstream of the Denison. This was on the basis that, "in summer (the highest risk time) the tributary inflow to the Gordon will be minimal above this [Denison] point" (DPIWE

2002:23). The claim that tributary flows would be minimal does not accord with statements of Locher (2001a) quoted above, which are quite specific about the cost implications of moving the compliance site and the contribution of natural flows. Also, this agreement does not solve the problem raised by Davies. In fact, it appears to confirm the likelihood of zero flows above the Albert River during summer.

At the public hearings, as well as confirming the contribution of natural flows, another reason was revealed for HT's insistence on measuring the environmental flow upstream of the Denison River and not at the power station:

But the rationale with measuring the minimum flow upstream of the Denison River confluence rather than at the power station was twofold. First of all, you do have considerable natural inflows downstream of the power station and if we measured the minimum flow at the power station you're delivering the flow on top of natural inflows for a certain percentage of the year, so ... by measuring it upstream of the Denison River you're taking those natural inflows into account. Secondly, by having a compliance site upstream of the Denison River, it's implicitly requiring some acknowledgment of a zone of impact at the power station. We found in our research that the Denison River confluence is the real boundary in environmental condition in the Gordon River, however, in the World Heritage Area Management Plan the entire Gordon River is within a wilderness zone that's setting 'natural' as an objective. There's no recognition of some effect, so we thought by putting our compliance site at a point where there's clearly effect of the power station, that allows some recognition of that fact (Helen Locher, audio evidence, 15 October 2001).

As well as confirming HT's unwillingness to put more water into the river than is necessary, it can be seen that for HT, the Denison River confluence marks off what it believes can and cannot be classed as 'natural'. In effect, this delineation separates the past from the future. HT does not believe it is responsible for what has occurred on the river in the past, but it is prepared to make some concessions in the future, on the condition that Basslink is approved.

A further proviso from HT on the minimum environmental flow was that it would be reduced in proportion to inflows to Lake Gordon. The DIIAS states:

Minimum flow targets will be lowered proportionately if inflows to Lake Gordon are lower, because the flow targets of 19 and 38 m³/s are based on average pre-dam minimum flows, and the river under pre-dam conditions would experience flows lower than these during dry years (2001a:12-17).

In contrast, HT's researchers insisted the minimum flow should be maintained at all times (Davies and Cook 2001a). DPIWE did not accept HT's proposal or its justification either:

environmental flow releases should not be based upon inflows to the storage since one of the key elements of the minimum flows is to mitigate the impact of hydropeaking. Hydropeaking will continue whenever the power station is operated regardless of inflow conditions (JAP 2002b:348 citing DPIWE).

In its *Final Panel Report* (JAP 2002b:348), the JAP determined that this issue was "complex" and left it for clarification by the Scientific Reference Committee to be established by virtue of a *Deed of Amendment to Hydro Tasmania's Special Water Licence* (JAP 2002b:609) which contains provisions for the Gordon River Basslink Monitoring Program (JAP 2002b:Appendix 18, Attachment 3, clause 4).

A third condition, noted earlier, was that the minimum environmental flow of 19 cumecs in summer and 38 cumecs in winter would be reduced to 10 and 20 cumecs respectively, for the first three years of the operation of Basslink. In their initial report, HT's researchers claimed that flows below their recommendations (for which HT chose the minimum of this range) would endanger the biota (Davies and Cook 2001a)⁸⁶.

⁸⁶ The magnitude of the proposed reduction in flow (ie by almost 50 per cent) is not made explicit in the DIIAS, where it is stated: "This minimum flow will be phased in over a period of years, to allow adequate monitoring of environmental benefit and understanding of environmental response to progressively increasing minimum environmental flows" (DIIAS 2001a:12-17).

HT insists this '10/20' trial is for scientific purposes and not about costs:

The 10/20 experiment that we're proposing – there are several reasons why we are proposing this and cost was not the reason. The cost implications of these different options are not huge. There are scientific reasons that are very compelling. ... the definition of the 19/38 minimum flow is based on two conservative models. The TEMSIM model, which we know overestimates full-gate discharge, and the biological model used by Peter Davies which predicts an ideal minimum environmental flow is conservative in favour of the fauna. He has stated this clearly in all of his documentation and I think you should certainly ask him to expand on this when he speaks. So there's a real chance that putting in a lower minimum flow is not going to have profound implications for the biota, but the increase in scientific knowledge that we can gain with this experiment is probably the most compelling reason why we want to do it. Minimum environmental flows are a major river management tool, and we have an opportunity here to test the biological response to a variation in the magnitude of the flow under a hydropeaking flow regime. The third reason is that again there are opportunities for the fish. ... those are long term gains in fish at the cost of short term impacts on the macroinvertebrates. These are not permanent irreparable effects on macroinvertebrate populations. Macroinvertebrates respond over short time scales to change in flows. ... Long term gains in knowledge and fish for short term implications on the biota (Helen Locher, audio evidence, 15 October 2001).

Accepting the scientific justification, this experiment could be very useful to HT for application by its consultants in other parts of the world. On the other hand, depending on storage inflows, an environmental flow will reduce lake levels. In terms of the TEMSIM modelling, reduced lake levels increases the Tasmanian water value and, thereby, the Tasmanian electricity price relative to the Victorian price (to be discussed further in Chapter 5). This would reduce the capacity for HT to export across Basslink. Halving the environmental flow in the first three years of the operation of Basslink might facilitate Tasmanian exports and revenue for HT in its fledgling years in the NEM. Under these circumstances, the cost implications could be substantial.

In its *Draft Panel Report* (JAP 2002a), the JAP concurred with HT and determined that the minimum environmental flow should be measured upstream of the Denison River and that the three year '10/20' trial was permissible. Notably, although Davies

conceded it was not scientifically justified, the trial was not expected to have long term effects (Davies and Cook 2001b:5). However, he was adamant that the environmental flow should not be delivered in proportion to lake inflows (Davies and Cook 2001b:5) and that the compliance site should be downstream of the power station (Davies and Cook 2001b:6-7). For Davies, having an environmental flow in the river at all times was clearly the critical issue and movement of the compliance site would compromise the effectiveness of HT's mitigation, claimed in its promotional material to "improve riverine conditions for the World Heritage Area downstream of the Gordon power station". We can see that this claim could not apply to the upper reaches of the river, particularly upstream of the Albert.

In its response to the *Draft Panel Report*, DPIWE did not accept HT's assertion that the '10/20' trial was for scientific purposes (DPIWE 2002) or the JAP's decision to allow the trial. To clarify this issue, DPIWE engaged Leon Barmuta from the School of Zoology at the University of Tasmania, who undertook an *Expert Review of Basslink In-Stream Biota Studies: Proposed Mitigation Options and DPIWE Position* (DPIWE 2002, Appendix 1). Predictably, Barmuta supported the DPIWE position. He concluded that the '10/20' trial was too much of a risk and that its implementation would violate the precautionary principle⁸⁷.

⁸⁷ An excerpt from the Barmuta's advice is as follows:

Having received this advice, and after discussions with HT, DPIWE's response to the *Final Panel Report* and HT's condition of a '10/20' minimum flow for the first three years of Basslink, was:

The minimum environmental flow for the Gordon River should be set at 19/38 unless agreed studies, undertaken in the period from project approval to commencement of Basslink operations, indicate the scientific validity of a 10/20 environmental flow experiment or such other experimental flow as may be agreed between the Licensee and the Minister. Whether this experiment should occur, and the starting point for such a trial, i.e. at commencement of Basslink or three years later, should be determined after scientific justification is provided and reviewed. The Minister would require advice from the Scientific Reference Group confirming the scientific validity of the proposed experiment prior to giving approval for it to proceed (DPIWE 2002:23).

So, the door is not shut on the '10/20' trial, but the onus has been placed on HT to present a 'scientific' case for the reduction in flows, which needs to be approved by the Minister on advice from the Scientific Reference Committee⁸⁸.

"Evidence presented by Davies and Cook (2001, especially their Figures 23 - 29) clearly show that anything less than a 19/38 scenario constitutes a high to very high risk to many of the taxa in terms of the amount of habitat that would be lost. Indeed, the figures of 19 m³/s and 36 m³/s are at the lowest end of the discharge ranges for these two periods of the year and are already, therefore, at the limit of what they would consider to be "moderate risk" (Davies & Cook, 2001 p. 114). Even if the full 19/38 scenario were implemented, planned shutdowns, outages and other unplanned and uncontrollable events would likely result in periods of lower flow with attendant loss of usable habitat. Depending on the timing and duration of such stochastic events, their consequences could include stranding of fish, interruptions to the life cycles of macroinvertebrates, and consequent loss of secondary production (i.e. food) available to fish and platypus. Maintenance of higher environmental flows would also seem prudent to mitigate some of the deleterious effects of the hydropeaking flows to which the river will be subject ... Pursuit of a scenario that is known to be highly risky violates the Precautionary Principle, and may even threaten the "adaptiveness" of the proposed adaptive management. Pushing the system to its limits requires evidence *a priori* that any deleterious changes will be reversible. Management can't adapt if its actions have damaged key components of the ecosystem beyond repair. The justification for implementing a "trial" 10/20 scenario is to allow managers to learn more about the responses of the system, but whether some of these responses will be irreversible or result in changes that will take a long time to recover remains moot. It would seem more prudent to pursue a less risky option" (DPIWE 2002:34).

⁸⁸ Permission to carry out the '10/20' trial has not yet been sought from the Minister (Steven Halliday, HT Basslink Program Director, personal communication).

Modelling Mitigation Effects

With the introduction of SYSOP, the two reports, Peterson and Locher (2001a; 2001b) referred to earlier, were prepared by HT for the public hearings. The former sets out details of changes in hydrology and modelling baselines to compare, *inter alia*, TEMSIM with SYSOP and Historical baselines. The latter quantifies the effect of the minimum environmental flow and compares, *inter alia*, TEMSIM *with* and *without* mitigation against SYSOP. A comparison of these reports illustrates two important issues; first, the extent of the change in discharges greater than 240 cumecs (ie full-gate load) *without* Basslink with the introduction of SYSOP; and second, it highlights the effect of the minimum environmental flow in reducing full-gate discharges from the *with* Basslink baseline.

A comparison of Figures 7 and 8 in Peterson and Locher (2001a:10 – see Appendix 4-1) with Figure 11 a,b,c of Peterson and Locher (2001b:18 – see Appendix 4-2) shows that with the former, the annual number of events greater than 240 cumecs in the Historical baseline is just below 50. With SYSOP (ie *without* Basslink) they are over 100 and for TEMSIM (ie Basslink *without* mitigation) they are over 200. The latter report shows the discharges of Basslink *with* mitigation to be between 80 and 100. Hence, SYSOP (*without* Basslink) represents more full-gate discharges than Basslink *with* mitigation. It should be noted that when compared to the Historical baseline, Basslink *with* mitigation represents a 50 per cent increase in events greater than 240 cumecs.

Figures 7 a,b,c, of Peterson and Locher (2001b:13, see Appendix 4-5), which are time series plots of operations at the Gordon Power Station during a dry period when it is assumed that the power station would be operating constantly, give a visual

impression of the extent to which full-gate flows for Basslink with and without mitigation are of less duration and volume than SYSOP (ie *without* Basslink). To understand how it is possible that SYSOP (*without* Basslink) flows could be greater than Basslink *with* and *without* mitigation, it needs to be understood that SYSOP is a predictive model projection of how the hydro-system could be run in the future to meet a demand that is in excess of the system's long term average capacity, and which does not incorporate future supply options in Tasmania. The substantial difference between how the system has been run in the past and how it is expected to be run in the future will be elaborated further in the chapters to follow.

The mitigation depicted in the modelling is important to consider. It will be shown in chapters to follow that assurances about mitigation are invoked in the interpretation of World Heritage Convention legislation, Tasmanian resource management legislation and the precautionary principle. According to Peterson and Locher (2001b), with the minimum environmental flow, discharges greater than 240 cumecs are substantially reduced. This is illustrated in the above figures which show that full-gate flows of Basslink *without* mitigation are around 200 but between 80 and 100 *with* mitigation. Hence, the environmental flow has a significant effect on the modelling. This is confirmed by the riparian vegetation report which notes that it has indirect mitigative effects for riparian vegetation:

The 'minimum environmental flow' would have benefits for riparian vegetation. This is not because of the flow itself but because this measure would reduce the store of water in the Gordon Dam and increase the price of electricity generated at flow rates $>240 \text{ m}^3\text{s}^{-1}$ The effect of the 'minimum environmental flow' would be to reduce incidence of flooding events [from 22 per cent to 8 percent] in the upper region of operation of the third turbine (e.g. 4.5 m to 4.0 m in the region Abel Gorge to the Splits), where riparian vegetation might be affected by Basslink (Davidson and Gibbons 2001b:10).

In other words, according to HT's TEMSIM modelling, the minimum environmental flow reduces lake levels which, in turn, increases the Tasmanian water value. This means that in summer, for instance, the chances of dispatch of discharges exceeding 240 cumecs, according to the modelling, reduce from 22 per cent to 8 per cent (Davidson and Gibbons 2001b:10; Peterson and Locher 2001b).

Problematically, however, whilst the minimum environmental flow is a mitigation measure to which HT has committed, its effect in the modelling is not. The reduction in full-gate discharges is merely a product of the TEMSIM modelling derived from the circuit of prices, values and lake levels it iterates from predicted market scenarios. It is contingent upon market, pricing and model variables. With different pricing and market assumptions in TEMSIM and the NEM modelling or changed hydrological inflows, the model would show a different proportion of full-gate bids accepted by the NEM. As noted, this model derivative of a reduction in full-gate discharges, reified as mitigation in Peterson and Locher (2001b), had important implications for HT's World Heritage Area environmental researcher, legal counsel engaged by HT, and the JAP in their interpretation of relevant legislation. This will be discussed further in Chapters 6 and 7.

The environmental researchers claimed that if discharges greater than 240 cumecs were significantly restricted, Basslink impacts could be reduced. For example, the impact zone for riparian vegetation would be confined to 4.0 metres up the riverbank instead of 4.5 m (Davidson and Gibbons 2001b:10). According to Peterson and Locher (2001b), these flows have been restricted. In contrast, when it comes to discharges greater than

210 cumecs (ie efficient load) mitigation makes very little difference to Basslink flows. This is confirmed by Davidson and Gibbons (2001b:10) who maintain there is “no similar reduction of flows exceeding 210 m³s⁻¹”. Concern about the remaining high discharges with Basslink were also expressed in the macroinvertebrate report:

It is expected that the lower incidence of full-gate operation under Basslink than originally described, as indicated by the SYSOP-TEMSIM comparison, will negate some of the concerns relating to high discharges, but only slightly as the frequency of high flow events is still substantially greater under Basslink (Davies and Cook 2001b:4).

Figure 12 a,b,c of Peterson and Locher (2001b:19 – see Appendix 4-3), show that when SYSOP is compared to Basslink *with* or *without* mitigation, the number of events greater than 210 cumecs increases substantially in winter, from 40 to 120 events, and annually from around 140 to 240 *with* Basslink. Hence, in this case, the environmental flow makes very little difference as discharges greater than 210 cumecs, on an annual basis, are substantially increased with Basslink *with* or *without* mitigation. Of course, the contingencies in the modelling set out above also apply here.

Putting to one side the reification of the mitigation of full-gate discharges set out above, according to the assessments of Peterson and Locher (2001a; 2001b), Basslink still represents a significant number of high flow discharges from the Gordon Power Station, which are not substantially reduced with mitigation. Hence, based on the modelling, it appears that HT’s mitigation measure will have only limited bearing on minimising impacts. However, this is not what was eventually taken-up in the assessment process and validated by the JAP. This disparity will be explored in the following chapters.

A New Without Basslink Baseline

Notwithstanding the above, with SYSOP, the essential conclusion of Peterson and Locher (2001a; 2001b) was that there would be little difference between the presence or absence of Basslink (with mitigation). In terms of overall flows from the Gordon Power Station, on an annual basis this is illustrated in Figure 1a of Peterson and Locher (2001b:7, see Appendix 4-4). From this graphical representation, it appears that Basslink is better for the Gordon River than no Basslink – a claim HT had already made in its promotional material but did not have empirical evidence to support until it used SYSOP as the *without* Basslink baseline and compared it with TEMSIM after the publication of the DIIAS.

Conclusion

This chapter has set the scene for the chapters to follow. I have outlined the substantial difference between the case presented by HT in the DIIAS in contrast to that presented at the public hearings in respect of environmental impacts on the Gordon River. I have also introduced the predictive models, baselines and mitigation issues that will be discussed in greater detail in the ensuing chapters. The next chapter will elaborate these models and baselines as well as the predictive modelling fed into HT's TEMSIM model. Looking behind its knowledge claims about the environmental impacts on the Gordon River, I will trace what underpins HT's conclusions, demonstrate their contingency and highlight the social framings embedded therein.

Chapter 5

IDENTIFYING CONTINGENCIES IN PREDICTIVE MODELLING AND PROJECTED BASELINES

This chapter and the next will focus directly on the evidence tendered by HT during the Basslink process, which reported on the predicted consequential impacts of changes to operations at the Gordon Power Station and flows on the Gordon River with the introduction of Basslink. This chapter will go into considerable detail in respect of the models and baselines used by HT as well as the predictive modelling fed into its *with* Basslink simulation model, TEMSIM. I will focus on the relationship between the inputs to TEMSIM, the model itself, and the environmental impacts as outputs. I will also discuss HT's *without* Basslink baselines (ie Historical and SYSOP) to which TEMSIM was compared.

The Truth About Basslink

For HT and BPL, the 'facts' about the benefits of Basslink were simple and unequivocal. Such was their confidence that they placed a full-page advertisement in *The Mercury* during the public hearings in Hobart on 17 October 2001 (see Appendix 5) with the intention of dispelling "misleading claims" of Basslink opponents and to "set the record straight on some key issues". It is headed "The Truth about Basslink" and spells out a number of assurances to Tasmanians. Amongst them were that Basslink will: "be profitable for Hydro Tasmania"; stimulate the Tasmanian economy to grow by \$110 million a year; create 200 construction jobs and around 1,000 indirect Tasmanian jobs; cause electricity prices to be on average six per cent lower, and reduce greenhouse gas

emissions at a level equivalent to taking two million cars off the road⁸⁹. Each of these pieces of 'truth' is anchored to predictive economic modelling which also underpins HT's assessment of the environmental impacts on the Gordon River. This chapter looks behind HT's 'truth' claims and examines its environmental assessment to identify and trace the conditionalities embedded in its case in respect of Basslink.

Past Studies

Prior to the Basslink process, very little was known about the impacts of power generation on the Gordon River (Davies and Cook 2001a). In 1999, when HT's environmental researchers started their work, essentially, they had to start from scratch to assess the present condition of the river with which to make a comparison of the potential impacts of Basslink. There is no doubt that this was a considerable challenge given the effects of power generation that had already occurred, the lack of relevant data of power station discharges and river flows and the need to separate these out to identify Basslink impacts.

Hydro Tasmania's Scientific Studies

HT's evidence was extensive and impressive, both in terms of its written reports and its presentations at the public hearings in Hobart. In addition to 29 Appendix Reports and the *Summary Report* of 283 pages of Locher (2001a) (collectively referred to in the DIIAS as Appendix 7 to Chapter 12), there are eight update reports, seven supplementary reports, and an *Overview Report* (Locher 2001b); in total around 2,400 report pages.

Although the JAP's consultants, Brown and Root, were critical of the lack of detail in Chapter 12 of the DIIAS, they applauded the quality of the scientific work contained in

⁸⁹ In addition, it was conveyed that Basslink would not mean that HT would be sold but provided good

the Appendix Reports authored by HT's environmental researchers. In relation to the fluvial geomorphology and karst system reports they comment:

[these studies] are well written and strike a good balance between the need to present sometimes complex technical information and to present the findings so they can be understood by the lay person (Brown and Root 2001:12-8).

In relation to the riparian vegetation report, they note "[i]t is meticulous in detail through observation, measurement, depiction and prediction" (2001:12-10). The macroinvertebrate report was described as "the most detailed methodology for any of the supporting studies done for the Draft IAS and is of very high quality" (2001:12-11).

A Crucial Conditionality

Importantly, Brown and Root (2001) noted a crucial conditionality embedded in HT's environmental assessments. Specifically, if the modelling which underpinned the scientific work carried out by HT's environmental researchers was inaccurate, then so too would be HT's conclusions. As noted in Chapter 4, TEMSIM, which represents discharge flows from the Gordon Power Station *with* Basslink, underpins all of HT's environmental impact work. In this regard, Brown and Root state:

TEMSIM is used as the basis of impact prediction and assessment for all the Hydro Tasmania's investigations. If the model is not accurate for operational scenarios then the predicted impacts will be wrong (2001:12-27).

Importantly, TEMSIM, in turn, is anchored to another set of predictive economic modelling, which will be discussed in detail further on in this chapter.

Multiple Uses of TEMSIM

In addition to underpinning HT's environmental investigations, TEMSIM was utilised for two other important tasks. Firstly, it was and continues to be used to develop HT's

reasons for the Tasmanian government to keep it.

business case. The model forecasts revenues for HT from the operation of Basslink (HEC 2001a:4; House of Assembly 2003a). Secondly, it was used at the outset of HT's environmental investigations to identify which areas of the hydro-system could be most affected by the operation of Basslink, and which would require studies for the impact assessment process. In relation to the environmental impacts, the following statements were made in HT's initial scoping report (HT Appendix 1) of February 2000:

The aims of this scoping report are to identify the type and extent of likely changes to the Tasmanian non-marine aquatic environment arising from the changed operation of hydro power stations after the installation of Basslink, and to identify further work required to clarify potential environmental and social issues resulting from these changes (Hydro Consulting 2000:1)⁹⁰.

Three areas within the hydro-system were identified as likely to be most impacted:

Results of analyses using a predictive model known as TEMSIM (Tasmanian Electricity Market Simulation Model) showed that only three power stations in the State had significantly different patterns of operation with Basslink. These are the Gordon Power Station in the southwest of the State, the Poatina Power Station in the north-central part of the State, and the John Butters Power Station in the middle of the West Coast (Locher 2001a:i).

Gordon and Poatina Power Stations draw on the State's largest hydro storages, respectively, Lake Gordon and Great Lake. TEMSIM, therefore, underpins projections about Basslink's commercial viability, the most probable areas of environmental impact, and the magnitude of such impacts. Hence, if TEMSIM is inaccurate, not only will the magnitude of the environmental impacts be misjudged, but so too will be their extent and location as well as HT's business case.

In terms of the business case, as outlined in Chapter 2, the financial prospects of Basslink just keep getting better, despite the increase in the project cost. In February

⁹⁰ The process involved is set out in Figure 2.1 of HT Appendix 1 (Hydro Consulting 2000:25).

2003, HT's Chairman, Peter Rae, and its CEO, Geoff Willis, confirmed that HT has been re-running its modelling each month with updated NEM information (House of Assembly 2003a:10;19). Willis explained the process involved in updating its business case as follows:

The business forecasts which we make for the review of Basslink have been updated every month, as the Chairman indicated, and each month we take into account new factors. Principally in the period between the joint advisory panel hearings and the time that the final Basslink business case was reviewed by the board and the final contracts signed on 29 November [2002] – so that is more than a year later – the principal changes were improved forecasts of pricing in Victoria based on independent expert modelling of those future forecasts, and the impact of greater flexibility in the operation of our system from our being more familiar with the way that Basslink is going to work. In other words, the closer that Basslink comes to being a reality the more finetuned the systems and procedures are – and therefore our modelling of the way that we would operate them (House of Assembly 2003a:19).

The inclusion of new entrants into the modelling is important as additional generators in the NEM deliver new capacity, which is likely to reduce prices and impact on HT's business case. When asked by The Greens what new energy developments in Victoria were included in the analysis, Willis replied:

What we have been doing and the nature of the probability statements that you saw in earlier submissions that we put to the joint advisory panel [which indicated a 65 per cent chance of HT breaking even] is that we are modelling many different price paths going forward with many different assumptions about who the new entrants would be and what the impact of those new entrants would be. In the final analysis we have 100 different price paths going forward and 100 different rainfall sequences in Tasmania, and that gives 10 000 different projections, and then we look within those projections to the confidence limits that you can have about the median of all of that being the business case. So it is a very sophisticated modelling, not just of one simple assumption, but a sophisticated modelling of many different things that could play out in the future, and then an assessment by the board that the business case is viable and robust in a lot of different circumstances (House of Assembly 2003a:19).

For the HT CEO, it appears that the validity of the model outputs derives from the model's complexity.

TEMSIM Origins

As noted, TEMSIM is represented by HT as a baseline of operations *with* Basslink. Its output of power station discharges (ie flow volume, variability, timing, *etc.*) has been used to predict environmental impacts and it is these outputs of TEMSIM that were provided to HT's environmental researchers to carry out their work. Before going into the specifics of TEMSIM, it is important to know the model's origin, as this has implications for its outputs.

TEMSIM is derived from SYSOP. The validation of TEMSIM during the Basslink process derived, in large part, from an external assessment of SYSOP. HT confirmed that SYSOP and its inflow database were audited by BC Hydro in 1996 with a favourable report (Hydro Consulting 2000:30; HEC 2001b:6), and that the dispatch process of TEMSIM was "reviewed and approved" by Macquarie Bank in 1999 (Hydro Consulting 2000:29; HEC 2001b:6)⁹¹.

TEMSIM was originally developed in 1997 when plans were afoot to disaggregate the HEC (Michael Connarty, HT, personal communication). The idea at that time was for five generation companies to be established. It was recommended by the Nixon Report of 1997, which made an assessment Tasmania's economic future, that disaggregation should precede the full sale of the HEC (Lupton 2000:414). To save time and money,

⁹¹ I made a request to HT to view the Macquarie Bank report but was advised that this was not possible as the report was confidential. I was, however, offered an opportunity to speak to Michael Connarty to clarify queries about the TEMSIM model.

TEMSIM was used for the Basslink investigations (Michael Connarty, HT, personal communication). As such, TEMSIM models a hypothetical market system within Tasmania with five “virtual generators”, and these correspond to the hydro-system’s five major catchments (Connarty 2001a:4).

It is noted in Hydro Consulting (2000) that this results in a reduction of water efficiency in TEMSIM of five per cent when compared to SYSOP. Because of the competitive structure, TEMSIM allocates water between the virtual generators before bidding into the NEM, which means it runs less efficiently in terms of water allocation than SYSOP. It is expected that HT’s bidding in the NEM will be by way of “aggregated generator units” or “groups of power stations”, which are “similar” to the virtual generator configuration in TEMSIM (Michael Connarty, audio evidence, 15 October 2001).

TEMSIM Structure and Performance

The structure of TEMSIM has implications for its performance. Given its ability to model a competitive market in Tasmania, TEMSIM is characterised as an “improvement on previous models” (Hydro Consulting 2000:37). However, this competitive configuration means that TEMSIM offers a whole power station into the NEM at one price instead of individual generators being bid-in at different prices. For example, the Gordon Power Station has three machines. Each generates 144 MW of electricity. In TEMSIM the output of its three machines (ie 432 MW) is bid into the NEM instead of providing for the option of one, two or three machines at variable discharges.

Importantly, as noted in the previous chapter, it is the high-level discharges from running all three turbines at the Gordon Power Station that are expected to have the most significant environmental impacts, such as riverbank scour and the removal of riparian vegetation at heights beyond 2.5 metres of LWM along the Gordon River. Appendix 6 sets out a selection of photographs which show the current state of the riparian vegetation on the Gordon River compared to its tributaries. These images, which show the effects of hydro-power generation, confirm that the scale of high-level events was a critical issue for HT to clarify.

Inputs and Outputs of TEMSIM

With a projected Tasmanian load forecast of 1135 MW, inputs to TEMSIM include projections of Victorian wholesale (or spot) electricity prices, generator efficiency curves and a 75-year hydrologic inflow database from 1924 to 1998 (Hydro Consulting 2000:21). In terms of the efficiency of the generators, this is assumed to be ideal as, in most instances, the model uses efficiency curves provided by the generator manufacturers (Connarty 2001a:8)⁹². Outputs of TEMSIM reflect lake level fluctuations and power station discharges (Hydro Consulting 2000:21). With these inputs and outputs, TEMSIM predicts when imports and exports can occur across Basslink.

The Tasmanian price is affected by Tasmanian demand, competition and lake storage levels. In terms of lake levels, for instance, if they are high, water values in Tasmania will be low and *vice versa*. This feedback system is designed to ensure that the hydro lakes are not overdrawn. The model works such that when lake levels are high, there will be more chance of the Tasmanian price being lower than that in Victoria and power

⁹² Connarty (2001a:8) notes that “there may be a degree of unquantified error in ... the exact form [of the efficiency curves]” and that “[m]ost turbines are operated as close to the maximum efficiency as possible”.

from Tasmania being dispatched for export into Victoria. This would mean that there should be more exports in wet years than in dry years. This also means that hydrological variability will continue to influence HT's operations and its revenue prospects. The simulation of transfers across Basslink by TEMSIM provided power station discharge information from which environmental impacts were modelled and assessed by HT's environmental researchers.

Disclosure of TEMSIM Model Assumptions, Limitations and Uncertainties

It is important to note that HT's reports for both Case 1 and Case 2 set out in Chapter 4 do not claim that the outputs of TEMSIM are certain. Although the term "uncertain" or "uncertainty" is rarely used, there is considerable disclosure of the limitations of the modelling, its assumptions and inputs⁹³. Importantly, it was disclosed by HT that TEMSIM models the Tasmanian generation system as it currently exists. The Basslink component of TEMSIM is represented by the Victorian prices module which depicts imports and exports. The effects of changes in demand on the Tasmanian hydro-system in the future with, for instance, wind and gas infrastructure are not incorporated into the model. Hence, a model which is to represent the future contains parameters related only to the present.

⁹³ A computerised word search on "uncertain*" was undertaken in respect of HT's Appendix Reports as well as the update and supplementary reports. In respect of references in reports related to the Gordon River, five references to uncertainty were made in Hydro Consulting (2000) in respect of predicting future market behaviour and SYSOP. One reference was made in the macroinvertebrate report (Davies and Cook 2001a), four in Connarty (2001a), again in respect of predicting future market behaviour and SYSOP's performance. Most references (ie greater than ten) were made in the fluvial geomorphology report (Koehnken *et al.* 2001). In terms of the update reports, two references were made in the Overview Report (Locher 2001b) and one in Bluhdorn (2001). The considerable amount of information about TEMSIM is presented in *Appendix 1: Scoping Report Basslink Aquatic Environmental Project* (Hydro Consulting 2000), *Appendix 2: Gordon River Hydrology Assessment* (Palmer *et al.* 2001), *Appendix 29: TEMSIM Sensitivity Study on Implications of Basslink* (Connarty 2001a) and the *Summary Report* (Locher 2001a).

TEMSIM contains further contingencies. Connarty (2001a:23) notes in his DIAS report that “outputs [of TEMSIM] are reliant on the assumptions made with regard to key variables such as price, inflow and load”. In terms of the broader issues that could affect the validity of TEMSIM’s outputs, Connarty notes:

Provided there are no significant changes in the market structure (ie more regional reference nodes), system (additional generation or transmission lines) or risk profile (level of risk taken by Hydro Tasmania), TEMSIM adequately highlights the areas of change in operation of the generating system that are likely to arise with Basslink (2001a:1).

These statements illustrate that the outputs of TEMSIM embed significant social and organisational contingencies. Specifically, TEMSIM assumes a lot about the future, namely, how the NEM will run, how HT will service Tasmania and how the Tasmanian market will operate. In addition, from the TEMSIM inputs discussed earlier, its outputs are underpinned by assumptions that Tasmania’s hydro-system load will not change, that storage inflows will not be artificially increased by cloud seeding and that Tasmania’s system will not falter or be constrained by systems outside HT’s control (eg the transmission system controlled by Transend Networks Pty Limited). Notably, with changes in HT’s business case that have accommodated the project’s inordinate increased cost, already the relationship between TEMSIM’s outputs and the environmental impacts disclosed at the public hearings has been broken.

Sensitivity Analyses of Basslink Drivers

Two key components of the TEMSIM model are Tasmanian load, which determines what excess power is available to be sent across Basslink, and the Victorian spot price, which determines when transfers can occur:

The two variables which would have the greatest impact on Hydro Tasmania system operations with Basslink were identified as the Tasmanian load and the Victorian spot price projection. The

Tasmanian load influences the net energy balance in Tasmania, and hence the net load on the Hydro Tasmania system and the net energy available for transfer on Basslink. The Victorian price is the primary driver of short-term variability in Basslink flows (Locher 2001a:240).

Instead of presenting multiple scenarios of TEMSIM model outputs, which would be difficult for HT to translate into a coherent assessment of the environmental impacts (not to mention the time and cost involved), sensitivity analyses of the key TEMSIM inputs, Tasmanian load and Victorian prices, were undertaken and reported in Connarty (2001a). The purpose of these tests was to assess the robustness of the conclusions drawn from the TEMSIM modelling reported in Hydro Consulting (2000).

These tests are represented by HT as showing how changes in price and load would affect imports and exports. The balance between imports and exports has implications for the predicted economic viability of the project as well as the environmental impacts. More exports at high prices mean higher revenues for HT. More exports would also mean a greater proportion of discharges from the three Basslink-affected power stations that would be changed from delivering consistent base load in Tasmania to highly variable peak load as required by the NEM. More opportunities to export could result in greater environmental impacts than those identified.

Victorian Prices

Although it is the differential between Tasmanian and Victoria prices that will determine when exports and imports occur, it is Victorian prices that will drive the day-to-day trading across Basslink (Locher 2001a:240). When peak prices in Victoria are sufficiently high, and HT has the water resources available, HT will want to export.

A particular criticism of the TEMSIM modelling in the public submissions was its reliance on what were viewed as out-dated NEM power prices. HT defended the modelling and its outputs by claiming it had used the best available information and it was the relative prices (ie the difference between peak and off-peak prices), not absolute figures, that were important:

Prices used in the TEMSIM modelling may well be considered “out-of-date”, but so would any prices used from now on due to the dynamic nature of the market. While the absolute prices may be out-of-date, it is considered that the relative nature of prices which drive Basslink trading and thus hydro generation are consistent with what can be expected any time in the future (Locher 2001b:35).

This argument, which effectively sidelined criticism about prices, is dependent upon relative prices remaining around the same level. This, in turn, is dependent upon an imbalance of supply and demand in the NEM. This argument about relative prices embeds a prefigurative construction of the NEM – that it will remain the same in the future as it has in the past. HT’s commitment to Basslink is a minimum 25 years and a maximum of 40 years.

National Electricity Market

In the NEM, at peak times demand for electricity comes close to reaching the level of supply. The closer demand is to supply, the higher peak prices go (Connarty 2001a:12). Any new development that delivers peak power into the NEM has the potential to reduce peak prices if it is not accompanied by a corresponding increase in demand. At off-peak times, there is an oversupply of capacity in the NEM. Notably, Basslink’s entry into the NEM will narrow the gap as it will inject capacity into the under-supplied peak market and add demand to the over-supplied off-peak market. This means that Basslink is expected to reduce peak prices (IES 2000a). Presumably, it would also increase off-peak prices. This issue was not quantified or reported on.

Reduced Wholesale Electricity Prices

The extent to which Basslink is expected to reduce wholesale electricity prices was quantified and reported by IES in Supporting Study 20 (IES 2000a). IES calculated that Basslink would reduce the wholesale price of electricity in both Tasmania and Victoria

by 6.7 per cent by 2004 and 1.4 per cent by 2010 respectively. The reduction in percentage by 2010 assumes that over time the peak market will again become under-supplied (due to increased demand) and so prices will head back up. It is important to note that these percentages represent changes from prices that are *predicted* to exist in the future *without* Basslink. For example, in 2004, *without* Basslink, the wholesale energy price in Victoria is projected to be \$30 per MW/h. With Basslink it is estimated to be \$28. This difference represents a 6.7 per cent reduction in peak price (IES 2000a:8).

Hence, both electricity price projections from IES, *with* and *without* Basslink, are hypothetical. The latter is an untestable proposition, which invalidates the former. Moreover, both projections are dependent upon forecasts about future demand, which are underpinned by, for instance, economic growth predictions (NIEIR 2002) and competing generators' commitments to new supply. What was known about these factors in the year 2000 when the modelling was carried out has been incorporated into the IES calculations, and it is these forecasts that are embedded in TEMSIM and, thereby, HT's environmental impact studies and conclusions. The contingencies, indeterminacies and social commitments here are virtually endless.

PROPHET Simulation Model

As Victorian prices will be the prime driver of exports across Basslink over the short-term, a critical input to TEMSIM is the prices module. Using its "proprietary market simulation model PROPHET", IES supplied HT with projections of Victorian spot prices for use in TEMSIM (IES 2000a:4). The DIIAS (2001a:12-9) states that the PROPHET model "replicates the principal elements of the National Electricity Market Management Company (NEMMCO) scheduling, pricing and dispatch model, and is

widely used by participants in all NEM regions". Statements to this effect accompany references to PROPHET throughout the Basslink documents. The close association made between PROPHET, the NEM and its users imbued PROPHET with considerable credibility. With the exception of what is discussed below, I was unable to find any further information about PROPHET in the Basslink assessment or approval documentation. Brown and Root (2001), the JAP's consultants, made a similar observation:

The study by Intelligent Energy Services (Supporting Study No. 20, Macro-economic NEM modelling), which was an important input to the [CREA] modelling, used a model [PROPHET] that is not detailed or explained. It also appears that the information used was at least a year out of date with respect to supply capacity and demand in the mainland electricity market (Brown and Root 2001:9-40)⁹⁴.

The validity of PROPHET appears to have been accepted at face value by HT and the JAP. In respect of HT, this was revealed when Michael Connarty was questioned by The Greens at the hearings on 15 October 2001 about how price changes would affect the operating environment for HT over the 25-year agreement period. Connarty responded:

it's been based on the prices input from the IES data, so as far as that goes we're relying on them to model the market as accurately as possible and so they provided us with the price input data.

When questioned further about the price data, Connarty replied:

I'd have to get IES to actually discuss that. We weren't privy to the assumptions put into it. We were just supplied with that data and assumed it was representative of future Victorian prices. Again, we had no input. ... the assignment was to IES to supply suitable data for us to model the Basslink situation.

⁹⁴ It is noted that it is not only the CREA modelling that is anchored to PROPHET. The other models and conclusions will be discussed in this chapter.

Connarty was obviously keen to stress HT's impartiality in relation to the price information. In doing so he illustrated that the figures had been assumed to be accurate and representative, and that they were accepted on trust.

PROPHET Price Scenarios

HT's argument about the validity of relative rather than absolute prices is supported by its sensitivity analysis of Victorian prices derived from PROPHET set out in Connarty (2001a). Two scenarios were tested for their movement away from a Base Case. Connarty (2001a:17) describes their different patterns: the IES Price is "distinctly different" to the Base Case and the Scaled Price Case, with "reduced extreme values and a more constant annual price than the other prices". The Scaled Price has increased peaks and decreased troughs that correspond to those of the Base Case, with Victorian prices low in March-May and high in June-August. The IES Price was used in the assessment of the business case for Basslink in 1997 and the Base Case was used in the original environmental assessment of 2000, reported in HT Appendix 1 (Hydro Consulting 2000). It is the Base Case scenario that drives the TEMSIM outputs for the environmental studies and to which the Scaled Price and the IES Price are compared in the sensitivity analyses.

A comparison of the price scenario statistics gives an indication of the variability in the price cases tested. For the Base Case, the mean price of \$27.50 per MWh has a standard deviation of \$30.90. Similarly, for the Scaled Price, the mean is \$27.80 but with a standard deviation of \$40.20 per MWh. The IES Price has a mean of \$28.30 with a standard deviation of \$26.80 per MWh. Connarty notes:

As can be seen the three price scenarios have a reasonably close mean ... but very different standard deviations. This infers that the price

scenarios will have various levels of fluctuations with the Scaled Price having the greatest variability (2001a:11).

With the smallest standard deviation, the IES Price reflects the lowest level of price volatility and the Scaled Price the highest. Hence, HT has used the median scenario. However, with standard deviations greater than the mean price per MWh in two out of the three scenarios, and virtually the same in the third, each scenario has so much variability the mean prices would be rendered meaningless.

PROPHET Knowledge Connections

With PROPHET outputs, Supporting Study 14 reports on changes in the dispatch of fuel types in the NEM with the introduction of Basslink (IES 2000c). This assessment is foundational to the greenhouse gas assessment of URS New Zealand Ltd (2001) (hereafter referred to as URS), presented in Supporting Study 15. In this respect, IES provided inputs in terms of functional relationships derived from PROPHET of changes to power generation in the NEM. With this information, URS predicted changes in NEM greenhouse gas emissions with Basslink.

Also, the forecast changes to wholesale electricity prices in Tasmania and Victoria in Supporting Study 20 (IES 2000a) were used to calculate profit increases expected from Tasmania's State Owned Energy Businesses (SOEB), that is, HT, Transend Networks Pty Limited and Aurora Energy Pty Limited (Andrew Campbell, audio evidence, 4 October 2001).

These SOEB profit predictions are based on scant information. At the public hearings Andrew Campbell, representing IES, gave evidence in relation to calculations which required information about the components of customer charges:

[information in relation to] households and non-major industrials were fairly clear and that showed that on the wholesale energy side, the component of retail costs was pretty close to 40 per cent and for those two components the retail margins were as shown at 13 per cent and 8 per cent. There was not a lot of public information on the MIs, the major industrials [as contract prices are confidential]. What was done there was to invoke a discussion that I had and CREA [Centre for Regional Economic Analysis] had at the time with Aurora [Tasmania's electricity retailer], and from our general knowledge, we assessed that the pass-through rate [ie retail costs] for major industrials was about 10 per cent [giving a retail margin of 2 per cent]. ... The retail margins are also substantially less for the large industrials than the normal customers – they are a lot more easily serviced; there's only a few of them. Not really knowing what that was, we decided to just apportion that in proportion to the wholesale energy pass-through rate. And we see the set of numbers that we have in front of us. And I, well I think we consider these as fairly robust ... (Andrew Campbell, audio evidence, 4 October 2001).

The references in support of the above figures for the major industrial customers set out in Supporting Study 20 are: “National Competition Policy Review of the Structure of the HEC Distribution and Retail Business – October 1997” and “Investigation into Hydro-electric Corporation pricing policies” (IES 2000a:16). This evidence indicates the extent to which IES had no other choice but to rely on whatever information it could locate which, evidently, was limited.

Supporting Study 20 also indicates that the SOEB are not expecting much competition. IES notes that cost savings of “over 20% have been reported from companies trading in the NEM” (IES 2000a:10). The figures used for this study were one per cent in 2004 and two per cent in 2010. IES (2000a:10) notes these figures to be “very conservative”. Andrew Campbell's evidence describes how these figures were derived:

Firstly, let's just look at the cost savings due to Basslink due to the introduction of competition. Now during this we had some discussions with the Hydro through this process and they did a sort of survey and it looked like they could achieve 1 per cent and 2 per cent in those time frames and that was just a quick sort of survey about what they could achieve. Certainly that would be a conservative estimate just looking at those numbers, but nonetheless that's what we decided to use for this report (Andrew Campbell, audio evidence, 4 October 2001).

Demonstrating the level of liaison between purportedly independent consultants and proponents, HT told IES what to put in their modelling in respect of the SOEB figures and this was arrived at from a “sort of survey” by HT.

A low percentage of SOEB cost savings has the effect of reducing the calculation of increased SOEB profits (Andrew Campbell, audio evidence, 4 October 2001). As it stands in Supporting Study 20, with gas in Tasmania the SOEB profit increase in 2004 would be \$15.2 million, and in 2010, \$29.2 million. Both of these figures were reduced by \$4 million during the public hearings due to an increase in the facility fee as a result of changes in exchange rates (Andrew Campbell, audio evidence, 4 October 2001). Thus, after the facility fee was taken out, between the SOEB, that is, HT, Transend Networks Pty Ltd and Aurora Energy Pty Ltd, they are looking at an extra \$11.2 million by 2004 and \$25.2 million by 2010 between them due to Basslink. On the basis that the “financial returns provided by the State’s electricity entities are a major source of revenue for the State’s annual Budget” (Department of Treasury and Finance 2003b:1) which, as noted in Chapter 2, is in the process of changing in respect of HT, these figures indicate there is not much in store for the state government’s bottom line or HT from Basslink. As an increase in the facility fee reduces SOEB profits, the revised figures above would now be further diminished by the facility fee required to cover the rise in project costs outlined in Chapter 1. Given the enthusiasm for the project and the business case modelling discussed in other arenas by HT’s CEO and Chairman, it is unlikely this modelling reflects what HT actually believes Basslink will deliver.

The profit information and changes to wholesale electricity prices from Supporting Study 20 were inputs to the macro-economic modelling undertaken by CREA (2000),

reported in DIIAS Appendix 1. This study concluded that in Tasmania, Basslink would generate around 485 jobs and real gross product (RGP) to the value of \$60 million by 2040 and by 2010, approximately 944 positions and \$110 million RGP (CREA 2000:ii-iii).

This network of reports from IES, URS and CREA was commissioned by the Basslink Development Board and presented, with the exception of the CREA modelling, by consultants on behalf of BPL at the public hearings. Hence, as well as HT's business case for Basslink and its assessment of environmental impacts, SOEB profit increases, Victorian and Tasmanian employment forecasts, wholesale electricity price change forecasts, state and federal macro-economic projections, and changes in greenhouse gas emissions are all anchored solely to the findings of IES and the outputs of its model, PROPHET.

PROPHET Inputs

The DIIAS lists the following PROPHET data inputs: "electricity demand; existing generator costs; generator reliability (forced outage rate); entry of new generation; new generator costs; type of new generation; retirement of old generation; participant behaviour" (DIIAS 2001a:4-9). Providing more detail is Supporting Study 14 (IES 2000c).

Power System Data Sources	
Power System Data	Source
Mainland Load Forecasts ⁹⁵	NEMMCO 2000 Statement of Opportunities.
Inter-Regional and Intra-Regional Marginal Loss Factors	NEMMCO document “Marginal Loss Factors for the 2000/2001 Financial Year”.
Historical Load Traces 1998/1999	NEMMCO web site.
Generator Capacities	NEMMCO 2000 Statement of Opportunities
Generation Forced Outage Rates	IES estimates from historical performance
Short Run Marginal Costs	IES estimates. Only relative values are important.
Generator Maintenance Schedules	IES estimates sourced from medium Term PASA (Projected Available System Adequacy).
Demand Management behaviour	IES estimates.
New Plant Assumptions	IES estimates.
Network Loss Factors	NEMMCO web site.

Figure 5.1 PROPHET Data Sources (IES 2000c:10)

It can be seen that a number of variables have been estimated and extrapolated by IES⁹⁶.

Repeating the Past in the Future

To run PROPHET, IES has to assume that the past will be repeated in the future. This is particularly the case for generators being dispatched in the NEM in a predictable manner on the basis of short run marginal cost (SRMC) (Andrew Campbell, audio evidence, 28 November 2001). IES explained that this is possible as the market has to-date been “highly contracted” (IES 2000c:12). The variable of SRMC in PROPHET allows a model user, which can be any participant in the NEM, to add new entrants and

⁹⁵ As the NEMMCO Statement of Opportunities (SOO) 2000 did not give a load forecast for 2011/2012, IES extrapolated from “average annual growth rate over the last five years of the NEMMCO forecast period” (IES 2000c:10).

⁹⁶ Although it appears that the data sources will be at least five years old if Basslink begins operation in 2005, it is these variables that were referred to earlier in this chapter by HT’s Chairman and CEO which have been continually updated for HT’s business case.

make changes to the mode of operation of existing generators (IES 2002). Given this, in principle, SRMC represents predicted bidding strategies of generators in the NEM. Without it, IES's model would not have justifiable and predictable inputs to forecast how the market will behave in the future. Hence, SRMC is a model imperative – a normative social commitment – which is dependent upon the future being the same as the past (cf Evans 1997).

Importantly, SRMC reflects the dispatch of fuel types, which drive the marginal cost. For instance, brown coal has the lowest SRMC and, therefore, is dispatched in the NEM first before black coal and gas-fired generators (Andrew Campbell, audio evidence, 28 November 2001). During his evidence, Andrew Campbell emphasised that it was the dispatch order that was important for its modelling, not pool prices, and that this facet of the model reduced uncertainty. Notwithstanding, SRMC is contingent upon the future being the same as the past and it does not reflect *strategic* bidding strategies that can be adopted by generators to out-bid competitors.

Strategic Bidding Strategies

Whether or not PROPHET incorporated *strategic* bidding strategies adopted by generators in the NEM was an issue that received attention in the public submissions, HT's reports and the JAP's assessment reports. Andrew Wadsley, a Basslink submitter with a long career in the energy business, and in particular forecast modelling, claimed that strategic bidding behaviour could represent a significant market risk for HT as a new player in the NEM as competitors would be able to predict the Tasmanian water value and, thereby, the Tasmanian price:

it will be easy for other generators to “reverse engineer” the [Tasmanian price] function and therefore predict Hydro Tasmania's

bidding strategy since storage levels and run-of-the-river water flows are easily obtainable. ... The recent market behaviour seen in the NEM, including rebidding to manipulate market prices, shows that a game theoretic approach to the market would be more appropriate than that of equilibrium economics (Wadsley 2001:15).

In evidence at the public hearings, Connarty addressed this issue:

strategic bidding strategies to maximise revenue in the short term could occur. In response to that, to date we have put in bidding strategies to take all the relevant issues into account as far as can be anticipated. The market is changing rapidly, we are still three years away from the market so there are a lot of issues that are still undefined, but as of today, we have put into those bidding regimes what we know (Michael Connarty, audio evidence, 15 October 2001).

In a subsequent report, HT responded to Wadsley's claims, thus:

Hydro Tasmania's modelling does take into account the projected bidding responses of Victorian Generators. Dr Mike Connarty has briefed the Panel on the basis of our modelling. ... Hydro Tasmania has undertaken very extensive modelling with significant external review and is very confident in the analysis which it has undertaken (HEC 2001a:2)⁹⁷.

The projected bidding strategies included in HT's modelling are represented by SRMC, that is, dispatch order reflected in fuel type. This is how the PROPHET model has been designed (see IES 2002).

Modelling Behaviour

Notably, the DIIS (2001a:4-9) and the *Final Panel Report* (JAP 2002b:40) state that "participant behaviour" in the NEM has been incorporated into the PROPHET simulations. However, as Figure 5.1 shows, the behaviour component of PROPHET relates only to demand side management. This variable reflects contractual arrangements made between retailers and customers (and, in some instances, with NEMMCO) to shed load at times when energy demand reaches designated levels. In

⁹⁷ This report also points out that PROPHET produces outputs similar to "modelling undertaken by other credible organisations working in this field. Specifically the work of the ACIL consulting organisation

its discussion about what is not included in its modelling, URS confirm that PROPHET does not take account of “[s]trategic behaviour by competing power generators to retain market share” (URS 2001:2-3). URS notes that this and other factors “have the potential to influence dispatch patterns by overriding the least cost market mechanism” (URS 2001:2-3) and, thereby, the dispatch order reflected in SRMC. Hence, due to the nature of PROPHET, and despite its 10,000 price projections, HT has not been able to take account of strategic bidding strategies in developing its business case.

Future Changes for a Market Environment

Importantly, Connarty (2001a:22) suggests that the use of water value to trigger exports and impacts might change in the future, depending on the drivers of HT:

One aspect of the TEMSIM model which may vary depending on the future drivers for Hydro Tasmania, is the allocation of water value and energy. Currently TEMSIM allocates the energy based on the most efficient operation of the system to meet a particular load. The price at which this energy is bid into the market is then based on rule curves derived to maintain an integrated system operation and operation similar to the current system. ... This area is one which may change in the future depending on Hydro Tasmania’s drivers. However, based on the assumption that the general system operation will not change and it will be based on water values, the methods used are seen as a good approximation (Connarty 2001a:22).

The normative social framing embedded in TEMSIM, that the future will be the same as the past, is here made explicit. The disclosure that in a market environment circumstances could be different means the forecasts of TEMSIM and, in turn, HT’s business case, the location of environmental impacts and their assessment on the Gordon River presented during the impact assessment process, could be irrelevant in the future, a future assumed in the modelling to be the same as the past.

which has been presented at recent conferences. This indicates that the view developed by IES is a reasonable and suitable outcome” (HEC 2001a:2).

It was also mentioned by Locher (2001a) that in a market environment the system probably would not be run as predicted by TEMSIM:

TEMSIM models the patterns of import and export of electricity through Basslink using NEM spot price differentials in Victoria and Tasmania. These are based on the Victorian spot price projections derived from the PROPHET model, and Tasmanian storage inflows and levels which simulate 'water value' prices in Tasmania. *However, with Basslink, Tasmania will be entering a market environment in which strategies will be employed to maximise energy trading values, and patterns of bidding will also reflect these broader financial objectives* (Locher 2001a:17 emphasis added).

Hence, although the outputs of TEMSIM and the assessment of environmental impacts derived therefrom are dependent upon the hydro-system running as it has done in the past, both Connarty and Locher foreshadow that this is unlikely within a national market context. The implications of this important contingency were not addressed by HT or the JAP, but it is an issue that was raised repeatedly in the public submissions, which will be outlined in Chapter 8.

PROPHET Core

Figure 5.1 also shows that information obtained from NEMMCO was an important input to PROPHET, for instance, the NEMMCO Statement of Opportunities (SOO), which is issued annually and is a mechanism used by NEMMCO to assist in balancing supply and demand in the NEM. It provides market players (existing and potential) with information about what generation is anticipated to be coming on-line to meet projected demand and reserve generation levels, the latter being set by the NEMMCO to protect the market from under-supply (NEMMCO 2001:2-4). The SOO draws on various sources of information, for instance, direct contact with potential and existing generators (NEMMCO 2001:4-5), and forecasts of economic growth and power demand

from the National Institute of Economic and Industry Research (NIEIR) (DIIS 2001a:4-20).

Illustrative of the distance that exists between the site of knowledge production and its users, and the extent of the estimates and extrapolations that underpin NEMMCO's forecasts, the SOO contains the following disclaimer:

The purpose of this document is to provide technical and market data and information regarding opportunities in the NEM. This document is not intended to be used for other purposes. Parts of this document contain:

- information provided by, and reports prepared by, a number of third parties (including customers, generators, network service providers and the Inter-regional Planning Committee);
- certain predictions, estimates and statements and reflect various assumptions concerning, amongst other things, economic growth scenarios, load growth forecasts supply forecasts, forecasts of requirements for ancillary services, inter-regional transfer capabilities and developments in the NEM; ... This document does not purport to contain all of the information that a prospective investor or participant or potential participant in the NEM may require. ... (NEMMCO 2001:no page).

To illustrate the difficulty for NEMMCO in predicting market futures in the short-term, in 2001 it issued its SOO in March, an Addendum in June, and then another in September. The reason was a concern about generation in Victoria, South Australia and New South Wales not meeting the designated reserve levels. If there is no prospect of NEMMCO's reserve level being met, it is required to engage additional generation (NEMMCO 2001:2-2). In 2001, there was conflicting information in terms of supply and demand forecasts and so new generation and demand side participation were closely monitored and reported publicly (NEMMCO 2001). In September of 2001, NEMMCO was less concerned about a lack of supply meeting its reserve levels than it was in March when it first issued the SOO. This procedure was repeated in 2003 with a 2002

SOO Update issued in January 2003 (NEMMCO 2002b) prior to the 2003 SOO publication on 31 July 2003. Given that predictions on an annual basis are problematic, forecasts taken in the year 2000 for the 2003/04, 2007/08 years and extrapolations for 2011/2012 would appear, at best, speculative.

Knowledge Distances

In summary then, HT's assessment of environmental impacts is derived from its TEMSIM modelling, with its inherent social framings, for instance, about how the hydro-system in Tasmania will run in the future, which is presumed to be the same as the past. TEMSIM, in turn, is underpinned by simulations of PROPHET, which also contain, for instance, the social commitment that the past will be repeated in the future and that SRMC sufficiently represents what will be encountered by HT in the NEM. In addition, PROPHET contains estimates and extrapolations made by IES as well as forecasts from NEMMCO and NIEIR, which, in turn, are dependent upon assessments of third parties and forecasts about international and national economic growth, which tend to vary with individual economists. The distances traced here between knowledge producers and its users are considerable indeed.

Tasmanian Hydro-generation Load

As well as Victorian prices, the load on the hydro-generation system in Tasmania is a critical variable in TEMSIM as it determines what electricity will be available to be sent across Basslink. As mentioned, the Tasmanian load assumption in TEMSIM is 1135 MW (Connarty 2001a:10). This load forecast is from the System Controller's 1999 Planning Statement (Connarty (2001a:9). As the State's sole power generator, 1135 MW represents the amount of electricity HT would be expected to produce for Tasmania by 2003. So, it is also a hydro-generation demand forecast.

It was disclosed in HEC (2001b:3) that “[t]he specified load of 1135 MW average was that estimated to be required in 2003/04 and it is a load that is expected to drive a small amount of imports over the long term”. If this forecast is designed to drive imports in TEMSIM, that is, draw electricity from Victoria, then as at 2003/04, 1135 MW would not meet the expected Tasmanian demand. Even though balance between the States varies over a 24-hour period, this means that the TEMSIM *with* Basslink baseline will also reflect a low level of exports. In other words, if virtually all HT’s water resources are allocated to meet Tasmanian load and draw imports, which is what a load set at 1135 MW means (a figure slightly above the system’s long term capacity), in relative terms, there will be little left to export. If this is what is reflected in TEMSIM, then the number of export opportunities captured by the model will be low compared to what would be the case with a lower system load/demand figure.

This being the case, the assessment of the environmental impacts on the Gordon River is unlikely to adequately reflect what will happen with Basslink, particularly now that the business case has changed so much. For HT to meet its revenue expectations, which have increased since the public hearings, HT has to export. However, the TEMSIM modelling that underpins the environmental impacts on the Gordon River presented to the impact assessment process reflects only a modest level of exports. This is confirmed by the sensitivity analyses to be discussed below.

Load Sensitivity Analyses

To test the effect of changes in the load figure of 1135 MW, sensitivity analyses were undertaken by HT. It was explained earlier that testing changes in load in a sensitivity

analysis simulates potential scenarios without being specific about what they are. With a set load figure and the sensitivity test, the idea is that shortfalls on either side of the load/demand figure would be made up by either imports or exports across Basslink. An increase in exports, for instance, which would be possible with reduction in HT demand/load in Tasmania or the availability of additional water resources (eg a wet year), could mean changes to power station operation and/or discharges, which, in turn, could have additional environmental impacts. Variability in terms of the availability of water resources is taken into account in TEMSIM with its hydrological dataset, which extrapolates the past into the future.

The Tasmanian load/demand changes tested were from 1135 MW down to the hydro-system's "long term average load" of 1110 MW and up to its "Economic Rating" of 1151 MW (Connarty 2001a:10). These represent, respectively, a reduction in load of 25 MW and an increase of 16 MW.

Both loads [ie 1110 and 1151 MW] will stress the system differently and will lead to variation in operation. It is expected that the major changes will be lake level variations, which will lead to changes in Basslink flows (Connarty 2001a:10).

In other words, a change in load was expected to lead to changes in lake levels which would affect the price differential and subsequently, change Basslink flows (ie imports and exports). This is because lake levels are a primary long-term driver of Tasmanian price – if lake levels are high, then the Tasmanian price is expected to be below the Victorian price in peak periods. This means exports can occur when capacity in the HT system is available.

In terms of how the model works, generation of a load at or higher than 1135 MW would draw storages down. This would raise the Tasmanian water value and price to induce imports to meet the load shortfall. Imports replenish HT's water storages, which would raise storage levels over the long-term and bring down the Tasmanian price, which, in turn, would trigger exports. For exports to occur, the Tasmanian price needs to be lower than that in Victoria. In peak times, this is probable given the imbalance in the peak market. However, this will depend on the water value and the differential between Victorian and Tasmanian prices. It is important to note that changes to Tasmanian lake levels occur over long time scales and so, as noted by Connarty (2001a), it is Victorian price that will drive the short-term variability of the Basslink flows. The interactions I have described reflect the equilibrium economics referred to by Andrew Wadsley. Balance is achieved in the model by the application of positive and negative feedback triggers, in particular, the Tasmanian water value and lake levels, which affect and are affected by the Tasmanian/Victorian price differential.

Changes in Tasmanian Load

A reduction in HT load in Tasmania from 1135 MW would result from competition in Tasmania in the future, whereby HT loses some of its market share to natural gas, wind power, biomass or co-generation supply generators. In essence, the provision of base load in Tasmania from sources other than the hydro-system will free up hydro-power for HT to export across Basslink. Importantly, HT expects its wind power projects will displace hydro-power away from Tasmanian base load to NEM peak load (HEC 2001a:5).

Natural Gas

In the meantime, natural gas, which is now being piped to the State, is displacing base load. With the conversion of the Bell Bay Power Station from oil to gas, the running costs of the first converted turbine have been so favourable it is now being run as a base load generator for Tasmania (Cole 2003), providing an initial load of 60 MW and “ramping up over time to its full generating capacity” (HT 2002a:28)⁹⁸. Running Bell Bay to provide base load in Tasmania for as long as possible will replenish hydro storage lakes in readiness for entry into the NEM (Allie 2002). According to comments at a Government Businesses Scrutiny Committee hearing in February of 2003 from Paul Lennon, the Deputy Premier, and Geoff Willis, HT’s CEO, when fully converted to gas, Bell Bay Power Station will produce 700 MW of electricity. This represents over 60 per cent of hydro-system’s current generating capacity. Hence, a full conversion and its use in Tasmania for base load would free-up considerable hydro resources for export across Basslink, particularly from the Gordon Power Station⁹⁹.

Loss of a Major Industrial Consumer

A reduction in demand for Tasmania’s hydro resources would also result from the loss of a major industrial customer. This would make more water available for the export of hydro-power across Basslink. The ability to export excess power is a persuasive argument in favour of Basslink – it means electricity generators will not have stranded assets if Tasmanian demand does not meet the supply available. Of course, there is a

⁹⁸ Statements about the future generating capacity of the Bell Bay Power Station appear to change with their context. *Hansard* from the Government Businesses Scrutiny Committee in February of 2003 indicates that the total capacity of Bell Bay Power Station will be 700 MW, with 365 MW from each machine when converted to gas (House of Assembly 2003a:28). At the time of the public hearings, the capacity of the first machine to be converted to gas was indicated to be capable of supplying 114 MW (HEC 2001a:7). HT’s Annual Report of 2002 (HT 2002a:28) indicates that the capacity of the second turbine is to be around 235 MW.

⁹⁹ HT expects minimal impact on its sales and to lose only around three per cent of its market share to gas (Allie 2002). The expectation is that gas will replace wood heating. According to the Deputy Premier, Paul

limit on what can be exported due to the capacity of the Basslink cable. An increase in load would be brought about by an increase in the domestic, commercial or industrial demand in Tasmania.

Hydro-system Capacity

To put the 1135 MW HT load figure into context, HT's system has an installed capacity of 2262 MW (Hydro Consulting 2000:21). However, output is dependent upon the volume and location of precipitation. So, the system cannot actually generate at the latter level or if it could, it would not be for very long. As at 2000, the system's average output was 1104 MW with its peak at around 1562 MW (Hydro Consulting 2000:21). A considerable difference can be seen between the projected load figure of 1135 MW and the system's peak of 1562 MW. To raise the average output, consistent high inflows from rainfall and snow melt are required. Output at higher levels would only be possible with high system inflows, that is, in a wet year, or by drawing down storages.

Future Supply Options

A reduction in HT load of 25 MW or an increase of 16 MW are small figures, particularly when viewed within the context of the Tasmanian government's \$1.5 billion energy plan for Tasmania, for which Basslink is the linchpin, and plans for Bell Bay Power Station already canvassed. To get an idea of the competitive pressures that the operation of Basslink could put on HT's market share, a "snapshot of market supply options" in Tasmania in 2006 was provided by HT in its submission to the JAP in response to the DIIS (HT 2001b:28). Of course, whether these sources are used in Tasmania or exported across Basslink remains to be seen. The point is, as hydro resources are displaced from base load to peak load in the NEM, the potential for

Lennon, gas will "complement electricity", and is "not in competition with electricity" but with oil, wood

environmental impacts increases as river flows become more variable, and discharged at higher levels and more often. The minimum environmental flow is expected to mitigate some of these impacts.

The submission from HT (2001b) shows a total of 2024 MW of potential Tasmanian supply capacity. It includes 114 MW from Bell Bay Power Station Phase 1, 360 MW from Bell Bay Power Station Phase 2¹⁰⁰, 300 MW from Basslink, 1150 MW from the hydro-system, 30 MW from new wind energy, 40 MW from biomass generation and 30 MW of co-generation¹⁰¹. Of course, with the exception of imports across Bassink, suppliers have to fulfil demand in Tasmania first. This demand varies substantially throughout a 24-hour period, and so any excess can be bid into the NEM and if dispatched, sent across Basslink.

Wind Power Potential

Importantly, the above figures do not take into account HT's ambitious wind power plans. HT envisages that it will be a net exporter of wind power, although this is dependent upon NEM demand:

In evaluating Basslink over the long term, it is expected that a net export scenario [ie more exports than imports] will be reached through the development of wind options in Tasmania. Without Basslink and thus the Victorian demand, there will be a reduction in the need for Wind energy. However with Basslink the Victorian demand and price will provide the drivers for additional export to use the existing supply and thus create an accelerated need for new developments (ie wind) (HEC 2001b:9).

and coal (Allie 2002).

¹⁰⁰ It is noted that the 700 MW disclosed as the capacity of Bell Bay Power Station at the Government Businesses Scrutiny Committee in February 2003 (House of Assembly 2003a:28) exceeds this total of 474 MW.

¹⁰¹ In addition, HT has a number of small-scale hydro-systems being installed around the State of between 1-3 MW, and it is making improvements to its existing hydro generation and storage systems, both of which will increase the hydro-system's capacity, although marginally (HT 2002a).

Taking account of HT's wind farm plans that are already under way, another 400 MW can be added to the above 2024 MW. If the full wind power potential of 1000 MW is achieved, as envisaged by Peter Rae, a further 570 MW (taking account of the 30 MW of new wind above) can also be included, making a total of 2994 MW of power generation capacity available in Tasmania. On the basis that Tasmania requires on average 1110 MW, and Basslink can export continuously at 480 MW, 600 MW under strict conditions, it is difficult to see where the power will be used in the short or long term. Hence, if these projects are not brought on line in stages and over the long term to meet existing demand in Tasmania and in the NEM there would be an "energy glut" as forecast by The Greens (2003:3). This would not necessarily be the case, however, if a second Basslink cable was installed to transmit wind power into Victoria from Tasmania's west coast, as envisaged by HT's Chairman.

Additional Sensitivity Analyses

In any case, we can see that the changes in load from 1135 MW with a reduction by 25 MW or an increase of 16 MW reported in Connarty (2001a) fall far short of what is expected in the future with Basslink and Tasmania's entry into the NEM.

Although it had not been disclosed, it came to light during questioning at the public hearings on 15 October 2001 by Margaret Blakers for The Greens (MB) to Michael Connarty (MC) about which future supply scenarios HT had included in TEMSIM, that additional sensitivity analyses of larger changes in load had been undertaken by HT:

MB: What I'm trying to get at is what range of factors have you taken into account over a 25 year period to come up with some range of effects on price or value of your water?

MC: Again, I reiterate that to take into consideration every possible situation would then create a multitude of scenarios that would be, would be impossible to model to any extent. Therefore, you do a price,

or a load sensitivity, which takes into consideration different assumptions of gas coming to the state, different demand options coming to the state, new wind coming on, etc. And it gives you a relative nature of what the water value within HT storages is worth. So for that aspect, we've done a load sensitivity by decreasing the load by 100 MW, increased load by 100 MW, etc.

MB: *And what was the range of that testing? Plus or minus 100, or plus or minus how many?*

MC: *I'll have to get back to you on the exact range we actually used, sorry.*

At the end of Connarty's evidence, counsel for HT wanted to clarify the load sensitivity issue for the JAP. Connarty responded as follows:

With regard to the load sensitivity, basically, we look at the load Hydro Tasmania, that is on Hydro Tasmania. So, for instance, if gas or other generating units come in, Hydro Tasmania load decreases. Basically, it allows you with greater supply of water for importing/exporting or greater security of supply in dry period times. So rather than detail every scenario that could actually occur, you do load sensitivities to give you the range of what could happen under the various scenarios. So, 100 MW off can be either increase, decrease in demand by a new supplier coming in, or various other situations, or higher load could be the fact that you have a new industry come in without the actual supporting supply coming in. So, by analysing the two cases you actually get a feel for how things like power station discharge or lake levels will vary with those two scenarios. So, a load sensitivity actually covers a lot more scenarios than you know, gas in whatever year, more wind whatever year, etc. So, it provides a range of information so that you can actually decipher what the effects of Basslink under various scenarios with supply in Tasmania will be, which is what has been done in a load sensitivity analysis that we went through. We took load off and put load on to analyse how the downstream power station flows would change, how lake levels would change (Michael Connarty, audio evidence, 15 October 2001).

These tests of plus and minus 100 MW had not been disclosed in Connarty's DIAS Appendix 29 report (Connarty 2001a) or his update report (Connarty 2001b), the subject of his presentation at the hearings. The only load sensitivities reported up to this point were those already discussed – a reduction in load of 25 MW and an increase of 16 MW, demand changes that are minuscule compared to the future plans of HT and the Tasmanian market mix envisaged to occur with Basslink.

This omission was acknowledged in HEC (2001b), tendered after Connarty's evidence. In this report a distinction is made between the TEMSIM modelling and the sensitivity analyses – the TEMSIM modelling represents the existing system, and new power generation developments are captured in the variable scenarios of the sensitivity analyses:

It should be stated that the [TEMSIM] analysis concentrated on the operation of the existing hydropower generation system and not future developments. Future development effects on the existing system were modelled implicitly as part of the load sensitivity analysis (as mentioned previously) [ie the plus 100 MW and the minus 100 MW and 200 MW] (HEC 2001b:9).

Given what is predicted in the future with Basslink, the initial sensitivity analyses as well as those subsequent miss the mark by a considerable degree.

Downstream Impacts of Changes in Load and Price

The initial sensitivity analyses outlined in Connarty (2001a) concluded that the tested changes to load (ie an increase of 16 MW and a decrease of 25 MW) and Victorian prices would not significantly affect power station discharges or lake levels:

The results of this study showed no significant changes to those conclusions derived in Appendix 1 [the Scoping Report – Hydro Consulting 2000 - that originally reported on the TEMSIM modelling]. These results reinforce the need for the [environmental] studies indicated in Appendix 1 but indicated no significant additional concerns when examining differing loads or Victorian prices (Connarty 2001a:23).

Also, from Locher:

None of the possible changes in load or price influenced the predicted power station discharge patterns significantly enough to reconsider the scope or conclusions from the environmental research presented in this report series (2001a:251).

The subsequent report (HEC 2001b) refers to the initial tests and then provides a commentary on the additional sensitivity analyses:

It was seen in the Appendix 29 analysis, that when the load was increased to 1150 MW the operation of Gordon Power Station did not change. The reason for this is that this case showed an increase in imports such that the net load on the hydro system was still in the region of 1100 – 1135 MW. This showed that with Basslink the system can still only supply generation equal to its long term average capacity. A reduction or increase in net Hydro load (in Tasmania) merely increases or decreases the net exporting/importing of energy across Basslink. In other words the change in load (ie whether reduction or increase) is made up by Victorian demand or supply (HEC 2001b:3).

HT is confirming here that a reduction in Tasmanian load on the hydro-system will result in more exports across Basslink. It is an increase in exports, from a reduction in HT net load, that would change the operation of the Gordon Power Station to meet peak load in the NEM. Although denied by HT (to be discussed below), I believe these circumstances would have additional environmental implications for the Gordon River.

The additional sensitivity analyses increased load by 100 MW as well as reduced it by 100 MW and 200 MW (HEC 2001b). In contrast to the initial sensitivity analyses which, it is claimed, showed no significant change in downstream flows, the results of these tests showed a two per cent shift. This was not, however, considered by HT to be significant:

The lower loads [ie 900 MW and 1000 MW] show a slightly higher full gate flow [ie greater than 240 cumecs] for Gordon for an extended period of time. The lower load on the Hydro Tasmanian system results in less use initially of Gordon Power Station such that Lake Gordon starts to approach its full supply level. The higher the water level in Lake Gordon, the greater the possible generation due to what is termed “head” effects, that is, the higher water level provides greater power as the water falls from a greater height. Full gate operation goes from 20% of the time for the base case (ie 1135 MW case) to 22% of the time for the lower load cases. The same is seen at a flow of 210 cumecs but at a flow of 180 cumecs the base case operates at a marginally higher percentage of the time (HEC 2001b:4).

...

In general there is not a significant change to the operation of Gordon Power Station with the lower loads on the Hydro system. While there

is a marginal increase in full gate duration, it is not significant (HEC 2001b:5).

As this result was not viewed as significant, the environmental impacts were assumed negligible. However, if there was virtually no perceptible change from the base case of 1135 MW in the original sensitivity analyses (see Figure 10.2 in Connarty 2001a), but a change of two per cent in flows greater than 240 cumecs and 210 cumecs when load was reduced by 100 MW and 200 MW, presumably further load reductions would change the flows even more (to the limit of the power station of 432 MW). There is no information in this regard. As noted, it is these high-level flows that have the potential to cause the greatest environmental impacts.

The reason advanced by Connarty (2001a) for no significant changes to power station discharges from a decrease in load on the hydro-system, which would make more hydro-power available for export, is that there is only so much water to go through the power station:

in all cases examined the downstream power station flows showed little change. This highlights that while some critical assumptions will change it is unlikely to cause a significant effect on the power station output. The primary reason is that there is only a certain amount of water available to be released and the variation in load and price, only changes the timing of the releases (Connarty 2001a:23).

During the questioning of Connarty, this point was reiterated by Helen Locher:

But mean flows don't change out of any of the power stations, and lakes stay at; we aren't drawing lakes down so over the long term there's no difference. We can't get more water through the power stations ... (Helen Locher, audio evidence 15 October 2001).

The point Connarty and Locher are making is that the discharges do not increase in magnitude, they are just shifted in time and released in a different fashion. However, to say there will be no change to the environmental impacts because the magnitude of

flows will be the same with or without Basslink is conditional upon the variability of Basslink flows not having an impact on the river and its inhabitants. The macroinvertebrate report (Davies and Cook 2001a), for instance, indicates that flow variability is critical for this fauna.

Moreover, this assertion, that mean flows from the Gordon Power Station are the same under either *with* or *without* Basslink scenario, is also contingent upon which *without* Basslink baseline is used to compare *with* Basslink discharges and which dataset you look at. This issue of which baseline is used to make a comparison will be discussed in following chapters. In terms of datasets, Palmer *et al.* (2001:25) set out two comparative flow tables, current versus Basslink, from the Gordon Power Station (see Appendix 7). Both note that the current operation record has missing values. Table V uses daily flow records over a 10-year period (1989-1998) and shows a mean flow of 78 cumecs for current operation and 96 cumecs for Basslink – a 23 per cent difference. Table VI uses hourly flow records for one year (1997-1998) and shows a mean flow of 116 cumecs for current operation and 115 cumecs for Basslink – a less than one per cent difference. If the latter is used, there is no difference in mean flows, as stated by Locher. This is not the case with the former. While it is noted that this is a comparison of daily versus hourly flow records, the latter being preferable, in this instance a short dataset supported HT's claims. It will be shown in the section that follows and subsequent chapters that in other contexts, longer datasets were deemed more valid. The point here is that, again, the contingencies are virtually endless.

Historical Without Basslink Baseline

In addition to the contingencies embedded in the TEMSIM baseline (ie *with* Basslink), there were also problems with the Historical baseline (ie *without* Basslink), particularly the availability of hydrological data recorded in a form that could be used for the modelling exercise (Palmer *et al.* 2001). TEMSIM uses hourly data. For an adequate comparison, hourly data in the historical comparison was also needed. However, only two years, 1997 and 1998, were available from the Gordon Power Station. The difficulties were extensive and included missing data records, data not collected, changes to the generation system configuration over time, data standardisation problems as well as load and transmission constraints in the past¹⁰².

Historical Record the Best Baseline

Although the limitations were considerable, HT's hydrologists believed the historical record was better than a simulated baseline produced by SYSOP. The following statements discuss the options of comparing TEMSIM (*with* Basslink) with the Historical versus the SYSOP (*without* Basslink) baselines:

¹⁰² A range of the difficulties were described as follows: "Hydrological data for the Gordon River is restricted due to the lack of previously installed instrumentation or lack of overlap in monitoring periods between various downstream stations. Also diminishing the direct applicability of data is the fact that only 2 turbines were present in the power station in the first 10 years of record rather than 3, thus reducing the record that is representative of the current set of operating parameters. Because of this, the majority of comparisons made in the report have used data beginning from 1989" (Palmer *et al.* 2001:5). And further: "The majority of the power station record exists in the form of daily average data, with only 2 years of hourly power station discharge data available (some of which is not of good quality) [ie 1997 and 1998]. Consequently, many of the plots developed for comparison and analysis of the various scenarios use daily average data. This is only likely to affect the presentation of the time series plots, which may have more short-term variability than indicated. Flows from the power station are calculated using a rating from Energy or Power to flow. This is an average rating only, therefore there will be some error associated with the flow estimates when the level in Lake Gordon is very high or very low. As this is the only estimate of power station flow, this record was used for analysis" (Palmer *et al.* 2001:7). In terms of an analysis of a wet year, for instance, 1996, there were further problems: "In 1996 the parameter used when recording power station output was changed from energy (in MWh) to power (in MW). During this parameter conversion there was a period of over a month where no output was recorded from the power station. The year has still been chosen for analysis despite the missing data because it is the only obvious wet year throughout the available period of analysis. Load and transmission constraints affect the two years of hourly data available for the power station between 1997 and 1998. This limited the total output from the power station" (Palmer *et al.* 2001:8).

Another consideration in interpretation of the comparative plots produced from this model [ie TEMSIM-Historical], is the form of the original data. All data from the TEMSIM model is hourly data, whereas historical data for the power station is converted from energy output. A daily average energy value for the power station has been calculated and is then converted to discharge. This has two implications, the first being that there are undoubtedly errors associated with the conversion of energy to discharge, the second being that the historical data sets would not indicate full gate operation of the power station if this occurred for less than 24 hours. ... The SYSOP model could be used to determine historic operations but by using SYSOP as a comparison to TEMSIM, two different models are being compared inducing modelling errors. It was found that due to the flaws associated with each scenario, historical data would provide the best means for comparison (Palmer *et al.* 2001:9).

The rationale for a comparison of historical data with TEMSIM stated in the DIIAS is that the former is:

the most realistic baseline against which model predictions can be compared, rather than comparing TEMSIM outputs with outputs from another model of present system operations (DIIAS 2001a:12-10).

Notwithstanding its limitations, the Historical baseline was considered by the hydrologists to be more 'real'. However, after the exhibition of the DIIAS, as explained in the previous chapter, HT was urged by DPIWE, its regulator, to carry out a TEMSIM-SYSOP comparison.

Conclusion

To recap, this chapter has outlined a range of data gaps, contingent judgments, forecasts, estimates, extrapolations and predictions made by consultants and modellers working for or engaged by HT as well as those far removed. Hence, it has been shown that an array of future indeterminacies, normative social commitments and indeterminacies sit behind PROPHET, TEMSIM and the Historical baseline as well as the economic and environmental impact findings derived therefrom. In particular, it was outlined that the outputs of PROPHET and TEMSIM and, thereby, HT's

environmental impact assessment for the Gordon River, are contingent upon the past being repeated in the future, which has been freely acknowledged by HT as unlikely to be the case. Importantly, as already canvassed, it is not sufficient for an epistemological study to simply highlight the contingencies of predictive models and their inputs. The point of analysis needs to be one of understanding *how*, within the context of so much ambiguity, HT's environmental researchers, consultants and modellers, and Basslink decision-makers constituted and redefined the multiple layers of unknowns to construct a credible and robust case for Basslink, which received approval from the JAP with the imposition of minimal regulatory conditions. This will be the task of the next chapter.

Chapter 6

NARRATIVES AND CONSTRUCTIONS

In the previous chapter, I outlined how HT's case in respect of Basslink embodied an array of data gaps, conversion disjunctures and methodology limitations as well as a string of guesstimates, forecasts and extrapolations of third parties and consultants engaged to provide evidence. Moreover, the normative social framing that the past will be repeated in the future has been shown to have underpinned HT's predictive modelling inputs and outputs and the subsequent environmental impact assessment. That review highlighted the rhetorical nature of BPL's assertion that a "hard nosed, objective, scientific assessment" (Freehills 2001c:3) had been presented by the proponents in respect of Basslink.

In Chapter 3 I proposed to adopt the discursive methodology of interpretative repertoires (Potter 1996) at a conceptual level and, following the work of Macnaghten (1993), apply this methodology in a narrative analysis (Roe 1989; 1994). Roe (1994:110) suggests that the "mix of certainty and uncertainty" is a good place to start a narrative analysis. Recognising scientific uncertainty as a persuasive discursive resource in policy debates, he identifies the analytical focus as describing how actors are "certain of uncertainty" rather than how they persuade others about certainty (Roe 1994:110). Indicative of his "strict constructionist" epistemology (Burningham and Cooper 1999:308), Roe (1994:112) makes a distinction between empirical 'reality' and "narrative certainty", so that the existence of the former is not denied, and argues that the analyst

should not ask if empirical claims are true or verified but rather, “[h]ow have the structure and logic of the scenario ... affected what the scenario tells us, independently of what the scenario is describing” (1994:111)?

It was also explained in Chapter 3 that a critique of an issue effectively “amplifies the ambiguities” (Roe 1989:266) and that “uncertainty, complexity and polarization” (Roe 1994:2) can be viewed as outcomes of the impact assessment process in Australia, not what it is intended to deliver. Hence, as noted, the analytical task is not to judge whether HT’s claims are true or not, or to delve too far into technical debates over ambiguities (or create them), but to understand how the ambiguities have been managed and a consensus formed around final outcomes. It will be shown in this chapter that narratives are integral to this process.

ANALYSIS OF NARRATIVES

Narrative Certainty

Roe (1994:2) identifies stories as conceptions that “often resist change or modification even in the presence of contradicting empirical data” and which “underwrite and stabilize the assumptions for decision making in the face of high uncertainty, complexity and polarization”. On the basis of Roe’s claim that narratives are “the only things left to examine” in perplexing controversies (1994:3), it can be seen that ‘certainty’ can derive from and is mobilised by stories:

It is only when the reality being described is so uncertain ... that we must look to how the structural features of narratives enable their narrators to speak with such certainty about the policy relevance of what is so uncertain, without thereby being implicated in the uncertainty being described (Roe 1994:112).

Narratives and Concept Constructions as Argumentative Strategies

To apply the theory of interpretative repertoires at a conceptual level and, thereby, focus on the structural elements of narratives, the work of Macnaghten (1993) is particularly useful. As outlined in Chapter 3, he suggests that the “variety” of constructions of a concept in a text should be identified as well as how these have been used as “argumentative strategies” (Macnaghten 1993:55-6). In this chapter I conceive argumentative strategies as stories. With this conceptual framework, I have mapped HT’s variable constructions of the Gordon River and its model outputs and shown that these constructions were mobilised by three narratives, which, in effect, managed and stabilised the contingencies of HT’s case for Basslink for its environmental researchers, its in-house consultants, its legal team and the JAP.

Constructions of the Model Outputs

It will be shown in Chapter 8 that many of those opposed to Basslink and who made submissions to the JAP considered the model outputs described in the DIIAS (2001a) and HT’s initial reports to be; for instance, “guesswork” (T76 audio evidence, 5 October 2001) and “too glib by far” (T65 2001). Demonstrating their implausibility, HT described its model outputs as “highly conservative” (Locher 2001a:8), “a worst case scenario” (Connarty 2001a:23; 2001b:4), “biased” (Connarty 2001a:6), “overestimated” (DIIAS 2001a:12-10), “believed to be a significant over-estimate” (DIIAS 2001a:12-14), “blocky”, “extreme in range”, (DIIAS 2001a:12-10), “not ... as severe as indicated” (Connarty 2001a:23), “not representative”, and “an underestimate” (Davidson and Gibbons 2001b:4). The following section will discuss two stories that mobilised these constructions of the model outputs.

Overstated Impacts

The DIIAS states that the environmental impacts of Basslink along the Gordon River “are likely to be over-estimated” (DIIAS 2001a:12-10). Drawing direct from the DIIAS, two reasons are offered. The first relates to load constraints at the Gordon Power Station in the past, and the second is due to the structure of the TEMSIM model:

Gordon Power Station discharges greater than 150 m³/s occur much more often under Basslink than historically. Flows greater than 210 m³/s (3 turbines efficient load) are shown to increase from 9 to 29% of the time with Basslink. This is *believed to be a significant over-estimate*, as generator and transmission line constraints were in place during the years for which hourly data were available, and the TEMSIM model has a *bias* towards full power station discharge rather than one or two generators operating. As of the time of writing of this report, the majority of the generator and transmission constraints which limited output during 1997-98 have been removed, and the Gordon Power Station at present is more capable of generating at full capacity (DIIAS 2001a:12-14, emphasis added).

The qualification of the model outputs as overstated was critical for HT as the reports from its environmental researchers indicated that high discharge flows (ie at greater than 210 cumecs and 240 cumecs) would have the greatest environmental impacts along the Gordon River and its banks; for instance, increased probability of river bank scour (Koehnken *et al.* 2001), the loss of riparian vegetation up to a height of 4.5 metres of the riverbank (Davidson and Gibbons 2001a) and the loss of macroinvertebrate assemblages (Davies and Cook 2001a).

Load Constraints at the Gordon Power Station

The problem of load constraints is related to the Historical baseline, used initially by HT to represent the *without* Basslink scenario:

The significant departure in full capacity power station discharges from the Gordon Power Station between the historical and Basslink hourly datasets for the years 1997-98 raised questions about whether the historical hourly dataset was representative. Analysis of Gordon Power Station operations during the years 1997-98 revealed that the power station maximum discharges were capped during this period

due to a temporary restriction in transmission capacity (Locher 2001b:10).

Transmission constraints at the Gordon Power Station meant the amount of energy that could be sent into the Tasmanian electricity grid had been restricted during the dataset years of 1997 and 1998. It can be seen from the above statements of Locher that the model outputs did not accord with what was expected by HT. In evidence to the JAP, HT's predicament was expressed, thus:

It was only until we got into the analysis and at a later date that we found that the historical data was severely constrained through constraints: transmission constraints and constraints on the Gordon machines that limited the full gate output and therefore the particular item that was of concern in this analysis (Michael Connarty, audio evidence, 15 October 2001)¹⁰³.

Load Constraints Narrative

I have identified the following statement from HT's documentation, which relates to load constraints, as one of the narratives that mobilised constructions of the model outputs as essentially overstated:

Analysis of Gordon Power Station operations during the years 1997-98 revealed that the power station maximum discharges were capped during this period due to a temporary restriction (Locher 2001b:10).

In line with the criteria of a narrative from Roe (1994), the premise is that discharges from the power station have been capped, with the conclusion that power generation has been constrained in the past. Although HT would see these words as merely stating the 'facts' of the matter, I argue they acted as a story. The message it conveyed, and it was repeated again and again by HT's in-house consultants, was that the data used in the analysis were anomalous and, thereby, the environmental impacts were

¹⁰³ It is noted that the DIAS (2001a:12-14) and Connarty (audio evidence, 15 October 2001) make reference to problems with the generation machines and transmission constraints, yet Locher (2001b:10) refers only to transmissions constraints. This discrepancy will be clarified later in this chapter.

overstated. I contend that this narrative assisted HT's researchers and in-house consultants make sense of the data they analysed and the results derived therefrom. The mobilisation of this story justified judgments about the scale of the environmental impacts of Basslink on the Gordon River.

TEMSIM Model Bias Narrative

To recap, the effect of the load constraint story is that the *without* Basslink baseline was moved closer to that *with* Basslink. This reduced the gap of significant difference between the *with* and *without* Basslink baselines. The TEMSIM model bias is a different story and is embodied in the following statements from the DIIAS:

The TEMSIM model in its present configuration makes offers on a power station-by-power station basis without consideration for use of individual generators in the multiple generator power stations. TEMSIM offers an entire power station into the market at one price, rather than considering efficiency losses of generators and thus a range of different offers for one power station. In practice, it is more likely that power stations with more than one generator will operate over the range of available generators (one, two or three etc. generators operating at any one time), rather than always operating the whole power station. Output from the TEMSIM model for multi-generator power stations is therefore *biased* towards efficient load [ie greater than 210 cumecs] or full gate discharge [ie greater than 240 cumecs] for all generators at that power station, rather than showing the more likely scenario in which power stations experience fluctuations between numbers of generators in operation. This bias makes predicted patterns of water discharge under a Basslink operating regime appear very “*blocky*” and *extreme in range*, going from zero discharge (power station shutdown) to full capacity discharge to zero discharge without utilising intermediate discharge levels (DIIAS 2001a:12-10, emphasis added).

Thus, the second story I have identified, which relates to the TEMSIM model bias, is:

The TEMSIM model in its present configuration makes offers on a power station-by-power station basis without consideration for use of individual generators ... Output from the TEMSIM model ... is therefore biased (DIIAS 2001a:12-10).

The premise is that the model offers a whole power station into the market at one time and the conclusion is that the model is biased. Although the message being conveyed

is the same as the load constraints story – that the environmental impacts are overstated – this time the anomaly relates to the model structure, not the data. With the TEMSIM model bias story, and the constructions it mobilised, HT was able to restrict what was viewed as anomalous to a specific section of the model, namely, its “course bidding module” (Michael Connarty, audio evidence, 15 October 2001).

This story affects the *with* Basslink side of the equation by raising the prospect that the model outputs, once again, show too many high flow discharges in TEMSIM. As with the load constraints issue, discharges at this level represent greater environmental impacts. An acceptance of this story brings the *with* Basslink baseline closer to that *without* Basslink, further reducing the gap of significant difference (which will be elaborated later in this chapter). This story, too, justified a shift in judgments about the scale of environmental impacts of Basslink. Both narratives conveyed the message that the environmental impacts were overstated.

Mobilising Constructions

HT's foregrounding of these narratives mobilised the various constructions of the model outputs outlined at the beginning of this chapter. For instance, the following statements relate to the TEMSIM model bias story and constitute the model outputs as overstated, but specifically as a worst case scenario:

It is impossible to model all future electricity market and water management scenarios. Nevertheless the output of the modelling provides a good indication of potential water management issues. The limitations of TEMSIM lead to the results of this study representing a *worst case scenario* in regard to more on/off's of major storage power stations and variation in Lake levels. It is expected that under Basslink the issues raised in this study will not be as severe as indicated (Connarty 2001a:23, emphasis added).

In the report for the public hearings, this construction is used again:

It was considered that the extreme changes [of all three turbines at the Gordon Power Station going from on to off instead of intermediate levels] represented the greatest change and impact. Therefore the TEMSIM modelling is a “worst case” scenario in terms of changes (Connarty 2001b:4).

Consequently, HT argued that although they had not been modelled, all scenarios had been tested. In other words, despite the model’s structural limitation, TEMSIM as it was had modelled the most extreme of situations, namely, that when exports are occurring in the model, all water resources are dedicated to the NEM. It needs to be remembered, however, that the pricing module in TEMSIM models only a modest level of imports and exports. Hence, although all water resources are dedicated to exports with the operation of all three machines, the frequency of exports would be limited by assumptions in the model, for instance, the HT load/demand figure. This premise that the most extreme of situations had been modelled is also dependent upon assumptions in TEMSIM about how the Tasmanian hydro-system will be run in the future with Basslink, how the electricity market will unfold in Tasmania in the future and the pricing module, which depicts how the NEM will operate into the future – constructions of the world configured by HT.

The following exchange between Michael Connarty (MC) and the JAP Chairman (JG) at the hearings, and the former’s response to public submissions in his presentation, illustrates the utility of the TEMSIM model bias story and the construction of the model outputs as a worst case scenario in closing-off questioning and highlighting the futility of the JAP’s request for further evidence:

JG: I would have thought there would be some modelling or some advice you could give us about stepping back from the greatest case scenario to a lesser case scenario which might be more realistic in the real world when you use

your generators in Tasmania, be they run-of-river or these catchment ones in order to meet prices in Victoria ... ?

MC: We've acknowledged that within TEMSIM it is a coarse bidding module and it would be preferable to bid on a machine by machine basis. To offset that we've also analysed the fact that doing that will not increase the variability in discharge from the Gordon power station, so we're stuck with a more or less worst case scenario. ...

MC: The next question came from two submitters and that's a question on the coarse bidding. ... they've said that a limitation of TEMSIM is coarse bidding; does that have any effect on the actual downstream power station discharges from Gordon and Poatina? Well a more sensitive bidding module would result in a decrease in full gate and higher flow discharges because generally you would have a more intermediate power station or machines running, so greater operation at the intermediate machines levels, therefore less extreme changes in the downstream power station flows. So, from that, oh, and also there'd be no change expected in the lake levels. Basically they would not be changed by having a finer bidding module. So, in conclusion the existing outputs are still a worst case scenario. In the market, in this situation you won't get a worst case, and therefore, a more sensitive bidding module will actually decrease the number of high flow on/off situations. The case presented is still a valid case for comparison (Michael Connarty, audio evidence, 15 October 2001).

Despite the limitations of the structure of the TEMSIM model, the limited sensitivity analyses undertaken and the contingency of its inputs in terms of prices for HT's exports (detailed in Chapter 5), Connarty was confident that the worst case had been modelled and that a worst case would not occur in the market. We can see that in the midst of counter-intuitive outputs and the prospect of endless modelling, this narrative provided empirical stability and confidence to the claims of HT's in-house consultants.

Contextualisation

Despite the problems with the TEMSIM model bias and load constraints, HT's environmental researchers were instructed to use the TEMSIM model outputs, which represented Basslink *without* mitigation, in their investigations for the DIAS:

Any modelling approach requires a number of assumptions to be made, and the set-up of a model can introduce biases to the model

output. In recognition of these factors, the approach used for this present analysis has been *highly conservative*. The characteristics of the TEMSIM model used for this study ... *undoubtedly lead to an over-estimation* of the Basslink impacts to Hydro Tasmania operating patterns. To be *conservative*, researchers undertaking the environmental investigations summarised in this report were asked to assess the environmental implications of Basslink with the given model predictions. As a consequence, environmental impacts identified for Basslink are *likely to be over-estimated* (Locher 2001a:8, emphasis added).

As well as the construction of the model outputs as over-estimated and a worst case scenario, the TEMSIM model bias story and that of load constraints also constituted them as highly conservative.

In their Appendix Reports to the DIIAS, HT's environmental researchers did not make reference to the TEMSIM model bias or load constraints at the Gordon Power Station, nor did they make qualifying statements about the model outputs or the environmental impacts they had identified. This left HT's in-house consultants to contextualise the researchers' findings with stories and constructions of the model outputs in their reports and presentations (Locher 2001a, 2001b, 2001c; Connarty 2001a, 2001b). To illustrate the modality shifts, it will be seen in the following example that the TEMSIM model bias intensified as the process advanced. In February 2000, Hydro Consulting (2000:37) makes reference to a "marked increase in full gate discharges" in TEMSIM:

TEMSIM uses full-gate operation for many of the power stations even when there is no imminent risk of spill, and so modelling results indicate a marked increase in full gate discharges from power stations. This represents inefficient usage of the Hydro's water resource. In reality, full gate discharge is likely to occur only when the electricity market is accepting high priced bids (Hydro Consulting 2000:37).

In June 2001, with the finalisation of reports and wording for the DIIAS, this "marked increase" was now referred to as a "bias" (DIIAS 2001a:12-10). For instance, seven

references are made to the bias in the 28 pages of Chapter 12 of the DIIAS and 14 are made in the 283-page summary report of Locher (2001a). Two examples from the DIIAS are:

Fluvial geomorphology: Basslink is predicted to change the geomorphic processes controlling stability of the Gordon River banks relative to the present processes. Notably, this will be an increase in the probabilities of scour (*this is believed to be over-estimated because of the TEMSIM model bias of increased full capacity power station discharge*) and an alteration to conditions leading to bank saturation, thus modifying seepage erosion processes ... (DIIAS 2001a:12-15 and Locher 2001a:254, emphasis added)¹⁰⁴.

And:

Riparian vegetation: Basslink is predicted to accelerate present rates of loss of riparian vegetation communities. As part of this, Basslink is projected to cause migration of the existing vertical zonation in the river banks up the bank (*also believed to be over-estimated because of the TEMSIM model bias*). The majority of riparian vegetation, particularly upstream of the Splits to a height of 2.5 m above low water mark on the river banks, is anticipated to die and not be replaced in the long-term under existing conditions, and this would not change with Basslink (DIIAS 2001a:12-15 and Locher 2001a:254, emphasis added)¹⁰⁵.

In addition, reference to the TEMSIM over-estimation is made four times on page 10 of Locher (2001b). At the end of the public hearings, in Locher's summation presentation, "full capacity discharges" were no longer something "believed to be overestimated" (DIIAS 2001:12-15) or "likely" (Locher 2001a:8) but "*known* to be over-estimated" (Locher 2001c:5 emphasis added), even though this over-estimation issue had not been

¹⁰⁴ The TEMSIM model bias relates to both full-gate discharges (ie greater than 240 cumecs) as well as efficient load discharges (ie greater than 210 cumecs). These are both full capacity power station discharges. It is also noted that the original comments in relation to the bidding of TEMSIM set out in Hydro Consulting (2000:37) make reference to only full-gate discharges. Connarty (personal communication) confirmed that the TEMSIM modelling is "biased" towards both full-gate and efficient load discharges.

¹⁰⁵ The conclusions of the impact of Basslink on riparian vegetation documented by Davidson and Gibbons (2001a) have not been properly disclosed in Chapter 12 of the DIIAS (2001a:12-15) and Locher (2001a:254). Specifically, the section on riparian vegetation referred to in these documents, which is set out here, makes reference to impacts to a height of 2.5 metres, which is the impact zone of present operations, but not to 4.5 metres, the impact zone of running three turbines which, as far as these researchers were concerned, was the critical zone in respect of Basslink (Davidson and Gibbons 2001b).

clarified any further at this late stage of the proceedings than it had in the DIAS (see Peterson and Locher 2001a).

The repetition and configuration of the constructions of the model outputs mobilised in the stories of load constraints and the TEMSIM model bias illustrate how HT's in-house consultants contextualised the environmental impacts identified by the environmental researchers it engaged. The former's foregrounding qualified the conclusions of the latter about the severity of the environmental impacts. Theoretically, the stories and the constructions they mobilised bridged empirical gaps, stabilised the contingencies of the TEMSIM model and its inputs and allowed assurances to be confidently given that the impacts of Basslink had been sufficiently assessed.

A New 'Without Basslink' Baseline

As noted in Chapter 5, to overcome difficulties with the Historical dataset, DPIWE insisted HT use SYSOP as a *without* Basslink baseline. HT's case for Basslink turned on this recommendation. It will be shown that with its introduction, HT was able to substantiate the case it had made all along – that Basslink would not have a significant impact on the Gordon River. In particular, although the TEMSIM model bias remained unquantified (see Peterson and Locher 2001a), with SYSOP a new future without load constraints could be quantified. Hence, it was possible to wipe the load constraints issue from the *without* Basslink data set. Crucially, it allowed HT to run the future as an ideal of the past.

TEMSIM-SYSOP Comparison

As noted, TEMSIM is derived from SYSOP. Unlike the Historical baseline, which draws data from past operations, SYSOP is a predictive model that draws on a 75-year hydrological inflow database to run future scenarios at an hourly time-step:

SYSOP is a predictive model that indicates how the system would be operated under assumed loads and generation configuration. Actual historical inflow patterns are fed through as input data on the assumption that future hydrological inflows will resemble those experienced in the past. Output from SYSOP shows a view of what, for example, Gordon Power Station discharge patterns could look like over a period in the future without Basslink with a given system configuration, load growth in Tasmania and for a range of hydrological inflow conditions (Peterson and Locher 2001a:4).

The system configuration and load growth in Tasmania that SYSOP depicts were set by HT and are the same in SYSOP as TEMSIM. Hence, in terms of model structure, assumptions, and social framings, TEMSIM and SYSOP are virtually identical, except for the former's competitive bidding and Victorian price module derived from PROPHET.

Revised Conclusions

With the TEMSIM-SYSOP comparison, changes to power station operations due to Basslink were concluded to be as follows:

From these and the previously undertaken analyses of Basslink changes, it can be confidently concluded that:

- Basslink would increase the number of times in a year that the Gordon Power Station turns on, with most increase in number of times occurring in winter (based on SYSOP-TEMSIM 1924-2000 comparisons, increases are 1.9x for total year, 1.3x for summer and 3.3x for winter); and
- Basslink would increase the number of short-duration shutdown events (<24 hours) for the Gordon Power Station (based on SYSOP-TEMSIM 1924-2000 comparisons, increases are 3.5x for total year, 3.2x for summer, and 4.2x for winter).

A slight increase in the duration of power station shutdown events during the summer period is indicated by the SYSOP-TEMSIM comparisons (1.5x), although there is no significant increase for the winter duration of shutdown.

Other aspects of the flow regime are not clearly changed by Basslink. *Notably, based on the inconsistencies in comparisons depending on baseline and time period selected, it is concluded that Basslink does not represent a significant departure from projected operating patterns without Basslink with respect to percent exceedance of full capacity discharges* (Peterson and Locher 2001a:27, emphasis added).

An increase in the number of flow events between seasons and the annual short-duration shutdowns were viewed as not of consequence. Confirming the extent of the contingencies and the role of HT's narratives in their stabilisation, full capacity discharges were concluded to not significantly increase with Basslink with the TEMSIM-SYSOP comparison. This is in contrast to an increase of, for instance, efficient load discharges from 9 to 29 per cent with the Historical-TEMSIM comparison (DIIAS 2001a:12-14).

Without Basslink (Historical) and Without Basslink (SYSOP)

The difference between the TEMSIM-Historical and TEMSIM-SYSOP comparisons is that the former compares "what is projected to occur with Basslink *against what has actually happened in the past*" and the latter is "what is projected to happen with Basslink *against what is projected to happen in the absence of Basslink*" (Peterson and Locher 2001a:4, emphasis added). The projection of each *without* Basslink baseline (ie Historical and SYSOP) is substantially different. This is because what happened in the past, which is reflected in the Historical baseline and on the river, is considerably different to the future projected in SYSOP by HT *without* Basslink. Importantly, as noted above, with SYSOP the past could be rewound and the future replayed as an ideal of the past without load constraints and with the Tasmanian parameters of TEMSIM, which might or might not reflect the future of the hydro-system.

As such, with SYSOP, the number of full capacity events is increased as part of ‘current operations’ and extrapolated over the time period 1924 to 2000. This reduced the number of these events attributable to Basslink. On this basis, the gap between *with* Basslink (ie TEMSIM) and *without* Basslink (ie SYSOP) is reduced to virtually zero, whilst the gap between what happened in the past *without* Basslink (ie Historical) and what is projected to happen in the future *without* Basslink (ie SYSOP) is considerable.

Construction of Model Outputs as Further Understanding

HT characterised the difference between the two sets of model comparisons as a means of further understanding:

Both the TEMSIM-Historical and the TEMSIM-SYSOP methods of comparison have validity, each contributes to providing a picture of Basslink change, and *further understanding can be gained* from both approaches. The first approach to these investigations was the Historical-TEMSIM comparison to assist with interpretation of the present environmental condition in the rivers under investigation. SYSOP-TEMSIM comparisons have an advantage in assisting interpretation where the historical data set is limited or the results unclear, because model runs over a 77 year period reflect a wide range of hydrological variability.

There is great potential to cause confusion by introducing another method of comparison at this point in the Basslink assessment process. A “Basslink change” to an aspect of power station hydrology is concluded to occur if it is seen regardless of whether TEMSIM is compared to SYSOP or historical data, and no matter what time period is used for comparison. Basslink changes are sometimes seen for one method of comparison for certain time periods but not seen for other methods of comparison and time periods. This update report has shown that the major Basslink changes from present operation are clear, no matter what baseline and data sets are used for comparison (Locher 2001b:9).

A Matter of Scale

Although the changes between *with* and *without* Basslink were claimed to be clear and similar, what was at issue in this impact assessment process, as it is in most, was the

scale of the environmental impacts, and this is precisely what changed with the introduction of the new modelling comparison, TEMSIM-SYSOP. This was confirmed by HT:

[Whilst the type of impacts are similar] [t]he scale of the Basslink changes differs, however, depending on what baseline and what time period are used for comparison with TEMSIM, and this merely illustrates the influence of hydrological variability which is an important context for this assessment (Locher 2001b:9).

Crucially, this change in scale meant the difference between the invocation or not of the precautionary principle and World Heritage Convention legislation, which will be discussed further in this and the next chapter.

Hydrological Variability

The need for a wider range of hydrological variability, to which the change in scale of impacts between the Historical and SYSOP *without* Basslink baselines was attributed (Locher 2001b:9), was to allow the environmental impacts to be viewed over the long-term. Statistically, its introduction in SYSOP broadened the comparative data set. This dampened peaks and troughs. Consequently, impacts are greater in scale under the TEMSIM-Historical comparison than in the TEMSIM-SYSOP comparison. However, although this is the case, and greater hydrological variability was used to justify an acceptance of the TEMSIM-SYSOP comparison over TEMSIM-Historical, it was not the only factor that reduced the magnitude of the impacts with Basslink. This is demonstrated by a comparison of the initial and update riparian vegetation reports (Davidson and Gibbons 2001a; 2001b) outlined below.

A New Brief

As TEMSIM predicts an increase in the use of the third turbine and high flow discharges (ie greater than 210 and 240 cumecs), the original conclusions of Davidson

and Gibbons (2001a:1) were that the riparian vegetation in the zone along the Gordon's riverbank between 2.5 and 4.0 metres above LWM would be significantly affected by Basslink, particularly upstream of The Splits. Their conclusions have been set out in Chapter 4. After publication of the DIIAS, with a new SYSOP baseline for comparison with TEMSIM, HT's researchers were asked to update their reports. With the provision of the update reports of Peterson and Locher (2001a; 2001b), the new brief provided HT's environmental researchers with: revised hydrological data (ie the SYSOP-TEMSIM comparison); HT's conclusions that Basslink represented no significant difference; the quantification of mitigation measures, and instructions to take account of the TEMSIM model bias¹⁰⁶.

Updating the Science

Initially, Davidson and Gibbons (2001a) expected impacts to decrease with distance down the Gordon River. However, in their update report they note:

¹⁰⁶ The new brief from HT required the following issues to be addressed: "A brief background of research work undertaken and its conclusions. Implications for this research area of any updated information on modelling, hydrology and mitigation measure since the IAS was publicly released (experts were provided with two update reports for the JAP hearings, entitled 'Gordon River Basslink Modelling and Hydrology Update Report', and 'Gordon River Basslink Hydrology with Mitigation Measures') [Peterson and Locher 2001a and 2001b]. Very specific responses to issues raised in public submissions, particularly in light of updated information provided at Step B (experts were provided with copies of public submissions making comment in areas relevant to the individual researcher's discipline, as well as the relevant section of the Brown & Root report). Review and comment on the relevant monitoring section of the update report for the JAP hearings entitled 'Gordon Basslink Monitoring Program and Adaptive Management Plan'. Response to the question 'What is the projected influence of Basslink on the Gordon River between Ewerts Gorge and the Franklin River, [Zones 4 and 5] after allowing for: The mitigation commitments (19/38 minimum flow plus ramp-down); The over-estimation of full-gate discharges by TEMSIM; and The conclusions of the 'Gordon River Basslink Modelling and Hydrology Update Report'; Conclusions" (Davidson and Gibbons 2001b: Attachment).

Davidson and Gibbons (2001) indicated that they expected the effects of the Historical regime, to decrease with distance down the Gordon River. However, a recent visit to the region of the Gordon River between Ewarts Gorge and the Franklin River [ie zones 4 and 5] on 5/10/01 indicated this assumption was incorrect. Although there is a decrease in the width of the Gordon River of about 20% below Ewarts Gorge, constrictions in the river (e.g. at the junctions with the Sprent River and the Franklin River) cause the plimsoll line to rise substantially. The plimsoll line varies in height from 1.5 to 2.0 m above LWM for much of this section of the river, but reaches 2.5 m at the Sprent and 3.0 m 1 km upstream of the Franklin River junction [in zone 5]. The plimsoll line, 1.5 m above LWM at the junction between the Franklin and Gordon Rivers, extends up the Franklin River for approximately 1 km. The plimsoll line declines rapidly to 0 m on the Gordon River 2 km below the junction with the Franklin River junction [ie past zone 5 and into the Lower Gordon River] (Davidson and Gibbons 2001b:11)¹⁰⁷.

Clearly, the researchers' expectation, which framed their initial findings, was disproved when they were directed by HT to look further down the river. Fortuitously for HT and its interpretation of World Heritage Convention legislation, however, the initial observations and conclusions about potential impacts of Davidson and Gibbons (2001a) based on the Historical-TEMSIM comparison, as well as the subsequent observations detailed above, became irrelevant when the SYSOP (*without* Basslink) baseline was used. The researchers concluded in their update report:

In the section of the river between Ewarts Gorge and the Franklin River [ie Zones 4 and 5] water level recorders indicate third turbine operation raises the water level by approximately 0.6 m. Therefore, in comparison with Historic Basslink is expected to cause a rise in the plimsoll line of approximately 0.6 m with consequent effects on riparian plant species cover and diversity. *However, based on comparisons between TEMSIM and SYSOP there would appear to be no net effect of Basslink for this reach of the river* (Davidson and Gibbons 2001b:11 emphasis added).

¹⁰⁷ It is noted from Chapter 5 that in their conclusions, Davidson and Gibbons (2001a:25) expected effects of the TEMSIM-Historical comparison would be detectable at least to the junction of the Franklin River. These updated observations indicate that the effects were found to be greater than expected.

These conclusions mean that under a comparison of TEMSIM-Historical baseline, the plimsoll-line below which vegetation is essentially dead would be expected to rise in height by 0.6 m in Zones 4 and 5 of the river (ie downstream of Ewarts Gorge to the Franklin River confluence). However, outputs from the new TEMSIM-SYSOP modelling derived a difference that was negligible.

Moving the Boundaries

To specify how the *with* and *without* Bassline boundaries were moved together, initially, Davidson and Gibbons (2001a) calculated that inundation of riparian vegetation from the use of the third turbine at the Gordon Power Station *with* Basslink would increase from 11 to 34 per cent, a 23 per cent rise; a significant level of inundation compared to current operations. This changed with the new brief. In their update report the authors explain that, according to HT, the 11 per cent, which represented existing operations, was an under-estimate:

In the Gordon River Basslink Modelling and Hydrology Update Report (October 2001), it is suggested that the Historical data of hourly flow rates from the Gordon Power Station (1992 to 1999), from which decisions were made by Davidson and Gibbons (2001) in the IIAS, are *not representative* of the third turbine use by Power Station operation over the last 12 years. It was assumed that the third turbine (generating flows $>210 \text{ m}^3\text{s}^{-1}$) was operating for 11% of the time. This figure was based on average daily flow data and is likely to be *an underestimate*. Hydro Tasmania indicates the flow rates were likely to have been somewhere between 11% and 23% (the 23% figure is based on SYSOP model predictions). If Historic flows were greater than was originally assumed to be the case by Davidson and Gibbons (2001), then the impact of the third turbine operation under Basslink on vegetation should be less. However, this depends on the size of the underestimation (Davidson and Gibbons 2001b:4, emphasis added).

Given the range of between 11 and 23 per cent, and with the help of SYSOP, the figure of 16 per cent was taken by Davidson and Gibbons (2001b) to represent the Historical inundation instead of 11 per cent:

A good indication of the inundation experienced ... under the Historic regime during the life of the third turbine can be gained from percent exceedances of the SYSOP model for flows $>210 \text{ m}^3\text{s}^{-1}$ (Figure 11, in the update report for the JAP hearings entitled "Gordon River Basslink Modelling and Hydrology Update Report") between 1988 and 1996 in conjunction with actual for Historic flows for 1997-2000. The mean exceedance is assumed on this basis to be 16% (Davidson and Gibbons 2001b:5).

In relation to the TEMSIM model bias, the researchers made the following comments:

In the Gordon River Basslink Modelling and Hydrology Update Report (October 2001), Hydro Tasmania indicates that TEMSIM *does not accurately reflect* the way power will be supplied to a mainland market because TEMSIM bids whole power stations into the market (i.e. all three turbines of the Gordon Power Station) and does not bid in single turbines. If single turbines were bid into the market place, TEMSIM would look less *blocky* and some of the surges from on-off events would be removed, reducing the risk of bank erosion and undermining and slumping of vegetation. A reduction in operation of the third turbine (flow rates above $210 \text{ m}^3\text{s}^{-1}$ at efficient flow and full gate) would reduce the impact of Basslink on riparian vegetation in this zone on the bank, although the degree of this reduction is unquantified (Davidson and Gibbons 2001b:5).

Although the TEMSIM model bias was unquantified, it appears that Davidson and Gibbons (2001b) reduced the 34 per cent figure of inundation *with* Basslink to 24 per cent to account for the assumed overestimate of full-gate discharge flows derived from the structure of the TEMSIM model.

With a four-year model run (1997-2000) of TEMSIM compared to SYSOP, the difference between *with* and *without* Basslink went from a significant difference of 23 per cent (ie between 11 and 34 per cent in the original Historic-TEMSIM comparison) to an apparently non-significant difference of eight per cent (from 16 to 24 per cent). Notably, with a longer model run between 1924 and 2000, which picked up a wider range of hydrological variability, the SYSOP-TEMSIM comparison virtually evaporated the difference in the operation of the third turbine between *without* Basslink (ie SYSOP) and *with* Basslink baselines to between one and two per cent (Davidson and Gibbons 2001b:5). Based on the last set of findings, the authors provide the following concluding statement, which is repeated four times in the section of their report dealing with responses to issues raised in public submissions:

It is expected that there would be little difference in the long term effects on riparian vegetation based on these two model comparisons [ie SYSOP and TEMSIM] (Davidson and Gibbons 2001b:6).

It can be seen that the choice of the *without* Basslink baseline and the time scale chosen for comparison makes a considerable difference in terms of the scale of impacts. This was noted by Locher (2001a:27). However, the difference cannot be attributed only to hydrological variability, represented by HT as the reason for the change in scale of impacts between TEMSIM-Historical and TEMSIM-SYSOP comparisons (Locher 2001b:9; Peterson and Locher 2001a:6). With the figures from Davidson and Gibbons (2001b) we can see that hydrological variability accounted for only a small proportion of the change in the scale of impacts between the Historical and SYSOP *without* Basslink baselines. The initial difference in inundation between TEMSIM and Historical baselines of 23 per cent went down to eight per cent (ie a move of 15 per cent) due to changes in the figures – ten per cent was due to accounting for the TEMSIM model bias and five per cent to a change in assumptions about past operational modes of the third turbine. Only eight per cent down to two per cent (ie a six per cent shift) can be attributed to hydrological variability, which was demonstrated when the different timescales were chosen for the TEMSIM-SYSOP comparison.

What has been outlined here demonstrates the success of the TEMSIM model bias narrative. In respect of the riparian vegetation report, the story justified a reallocation by the environmental researchers of ten per cent inundation from the Basslink side of the equation to that *without* Basslink and, to a lesser extent, the story about load constraints a move of five per cent.

Constructions of the Gordon River

Another story mobilised by HT relates to the river. Members of the public in their submissions viewed the Gordon River system as “icon status” for “not only Tasmania’s but all Australians” (T93 2001), a “jewel of the planet” (T74 2001), a “treasure” (T60 2001), “unique” (T60 2001; T115 2001), a “cohesive unit” with vegetation “respected, valued around the world and held to be precious” (T64 2001), and to “not be compromised further by industrial development of any kind” (T61 2001).

In contrast, HT constructed the Gordon River ecosystem and its components as “degraded by present operations” (Locher 2001a:109), “regulated” (Locher 2001a:109), “substantially modified” (Locher 2001a:257), “already modified ecosystems” (Locher 2001a:258), “a functional but modified ecosystem”, “significantly altered by flow regulation” (Locher 2001b:64), “still experiencing adjustments to flow regulation” (Locher 2001a:7), “still in a state of adjustment”, “not totally equilibrated to the regulated flow regime” (Locher 2001b:5), “altered from the natural condition” (Locher 2001b:6), and “cannot be considered in equilibrium” (Locher 2001a:46)¹⁰⁸.

These conceptions of the river as fundamentally changed from its original condition were a consistent theme throughout HT’s case for Basslink and are embodied in the following statements that set the context for the HT’s *Overview Report* (Locher 2001b):

It is important to recognise and acknowledge that:

- all of the waterways affected by Basslink changes have experienced regulated flow regimes for a number of years to decades;
- that the environmental condition of these rivers is modified from the natural condition; and

¹⁰⁸ Incidentally, in an interview on ABC Television’s *Stateline* program on 27 June 2002 to mark the 20 year anniversary of the Franklin controversy, the then Premier, Robin Gray, explained his now-infamous description of the Franklin River as a “leech-ridden-ditch” on the basis that it was not a place he enjoyed.

- the environmental condition of these rivers is still in a state of adjustment and not totally equilibrated to the regulated flow regime ...
(Locher 2001b:5).

And further:

In recommending management solutions to issues of concern it is important to recognise that these aquatic systems are managed systems that are fundamentally altered from the natural condition, and cannot be returned to their original condition (Locher 2001b:6).

Hence, the third narrative I have identified is:

These aquatic systems are managed systems that are fundamentally altered from their natural condition, and cannot be returned to their original condition (Locher 2001b:6).

The premise that the river has already been substantially changed leads to the conclusion that the past cannot be wound back. Even though HT was able to wind back the past in respect of discharges from the Gordon Power Station with its simulation of a new *without* Basslink baseline, SYSOP, the message being conveyed here in respect of the river is that there is no going back.

Juxtaposing Existing with Future Impacts

The above excerpts and the story about the river contained therein illustrate that, despite assertions to the contrary from HT and the JAP, Basslink impacts were assessed within the context of existing operations. This alignment served not only to lessen the impact of the former, but to make Basslink appear beneficial for the Gordon River. This is illustrated in the following conclusion from Kriwoken, HT's World Heritage Area (WHA) environmental researcher:

Basslink without mitigation represents a *further modification to the present impacts of river regulation*. There are, however, substantial river improvement measures to which Hydro Tasmania commits, namely a minimum environmental flow, a measure to address bank instability, a major monitoring program, and a commitment to adaptive management. Basslink in fact offers the potential for implementation of substantial river rehabilitation measures, which is in keeping with

Australia's commitments to restoration of WHA values wherever possible. Therefore, this assessment concludes that Basslink does not substantially degrade the WHA values for which the TWWHA [Tasmanian Wilderness World Heritage Area] was declared, and in fact may provide some opportunity to enhance values (Kriwoken 2001a:2, emphasis added).

Stories about the state of the river and its ultimate destiny are contained in the first sentence. Within this context, just about anything would be an improvement. Hence, despite assertions that Basslink impacts had to be assessed outside existing impacts (JAP 2002b:366), they were conflated in the WHA values assessment. Because the river was constructed as already so degraded, Basslink was viewed as an improvement.

Ecological Management Based on Trade-Offs

The story about the Gordon River, and the constructions of its ecological components as substantially degraded mobilised by this narrative, justified a rather perverse management approach which relied on the concept of trade-offs between scientific disciplines:

The Gordon River Basslink Monitoring and Adaptive Management Plan (page 8) notes that the potential for conflicts in management objectives between aspects of the ecosystem must be recognised. Thresholds set may ultimately represent a trade-off between aspects of the river ecology.

This is clearly seen with consideration of a minimum environmental flow, where flows $<10 \text{ m}^3/\text{s}$ are optimal for fish, but flows $>20 \text{ m}^3/\text{s}$ are optimal for macroinvertebrates. The Gordon River is now a managed river, with releases out of the power station being the management tool. Management objectives that are derived from a study of one aspect of the river ecology must be considered alongside the other aspects, as they may disadvantage one aspect of the ecosystem to the benefit of another (Locher 2001b:56).

This notion of trade-offs, substantiated by the preference of fish for a smaller environmental flow than other members of the ecosystem, was used by HT to support its case for virtually halving the minimum environmental flow for the first three years

of Basslink. It will be recalled from Chapter 5 that the University of Tasmania was engaged by DPIWE to make an assessment of HT's case for reducing the minimum environmental flow and no conflict between the needs of fish and macroinvertebrates or the necessity for trade-offs was raised. The assertion that there has to be trade-offs between disciplines was a consistent theme in Locher's evidence (eg audio evidence, 15 October 2001). Hence, within the context of the operation of the hydro-system taking account of the components of the ecosystem it degrades, the components of that ecosystem, such as fish and macroinvertebrates, were constituted not as interrelated, as in ecological theory, but as partially dispensable and in opposition.

Construction of the River as Not Having Reached Equilibrium

The notion of the river as not having reached equilibrium (Koehnken *et al* 2001) was also a powerful construction¹⁰⁹. Koehnken *et al.* (2001) maintains that a form of equilibrium was identified in the zone of the riverbank affected by two turbine flows from the Gordon Power Station (ie to a height of around 2.5 metres by discharges of about 140 cumecs):

In general, seepage erosion is most prominent following the use of all three turbines in the power station with fewer seepage features present following power station operations involving 1 or 2 turbines. This leads to the conclusion that the area of banks subjected to water level changes involving 1 or 2 turbines are in at least *quasi equilibrium* with respect to seepage erosion, and is probably related to the dominant usage of 2 turbines over the past 30 years. Simultaneous use of all three turbines has only been possible since 1988 when the third machine was installed, and historically has been limited to <10% of the time. Given this, it is not surprising that the higher bank areas

¹⁰⁹ Comments from Koehnken *et al.* (2001) illustrate that the identification of equilibrium can be somewhat elusive and transitory, and that HT's observations to identify it were sparse: "Theoretically, banks controlled by drawdown induced seepage will continue to reduce slope until a stable 'seepage slope' is obtained, roughly estimated to be 1/2 of the angle of repose for the material, and generally between 13° and 17° (Taylor, 1948, Howard and McLane, 1988; Budhu and Gobin, 1996). Some bank toes in Zone 2 are similar to these values, whereas banks and toes in Zones 1 and 3 exceed this angle. This suggests that either the river is not in equilibrium or other facts are contributing to final bank slope. Scour of the bank toe, which produces steeper slopes can also explain the steeper slopes. It must be recognised that the numbers of measurements are very limited" (Koehnken *et al.* 2001:94).

inundated by three-machine use are still showing a marked response to inundation (Koehnken *et al.* 2001:111).

And further:

Seepage erosion has been widely observed in the upstream Zones 1 and 2, where river levels fluctuations are high and dominated by power station releases. Sediment flows are most common following extended periods of three-turbine power station operation, when bank saturation is at a maximum. The lack of sediment flows following one or two turbine power station operation suggests the slope of the banks are in *quasi-equilibrium* with two-turbine flow regime with respect to seepage. Sediment flows are a response to higher water levels associated with the operation of the third turbine (Koehnken *et al.* 2001:115).

The point being made here is that whilst there is a form of equilibrium up to the height of the use of two turbines (ie to 2.5 metres above LWM), and this is evidenced by sediment no longer being transported away, this is not the case in the upper zone (ie above 2.5 metres), where it is impacted by discharges from the third turbine. Hence, in the upper area, where transportable sediments still exist due to the relatively low number of third turbine discharge events that have occurred to date, geofluvial deposits are still being moved out. In other words, degradation is not yet complete in this upper zone of the riverbank. In contrast, the equilibrium reached in respect of the zones affected by turbines 1 and 2 (Koehnken *et al.* 2001) is identifiable by the plimsoll-line below which vegetation is essentially dead. On this basis, the endpoint, the ultimate destiny of equilibrium in the third turbine zone would be the same – a higher plimsoll-line below which vegetation no longer survives.

Diminishing the Value of the River

Construction of the ecological components of the river as “altered from the natural condition” (Locher 2001b:6), “degraded by present operations” (Locher 2001a:109), “regulated” (Locher 2001a:109), “substantially modified” (Locher 2001a:257), “already

modified ecosystems” (Locher 2001a:258) conveyed the message that the ecological value of the river had already been diminished and that *all* of the river was irretrievable. Yet, these constructions conflict with the observations of Davidson and Gibbons (2001a; 2001b) who maintained that *above* 2.5 metres (the impact zone of the third turbine), there are “no obvious effects on the health of the vegetation” (2001a:11) and that the riparian vegetation has “not departed significantly from the Natural regime” (2001a:4).

What’s on the River?

To elaborate, Davidson and Gibbons (2001a; 2001b) observed that there was a substantial difference between the magnitude of change that had occurred to the riparian vegetation along the Gordon River between the height 1.5 and 2.5 metres above LWM and that between 2.5 and 4.5 metres. The authors observed:

Generally, between 1.5 and 2.5 m riparian vegetation cover is reduced and it shows signs of scouring by water (Plates 11). Below 1.5 m on the riverbank vegetation is under water whenever the power station is operating, most riparian vegetation has disappeared and mineral substrate predominates (Plates 12). At heights above 2.5 m on the riverbank riparian vegetation is only underwater during the operation of the third turbine, used at its efficient load for approximately 11% of the time for the last 10 years. Although there are no obvious effects on the health of the vegetation, structural changes have occurred (see below) (Davidson and Gibbons 2001a:11)¹¹⁰.

Reiterating the difference between the two zones, in their update report, Davidson and Gibbons state:

Davidson and Gibbons (2001) studied the bank zone affected by third turbine operation and demonstrated only a slight shift [in] riparian

¹¹⁰ Structural change to the vegetation above 2.5 metres is outlined as follows: “At heights on the bank greater than 2.5 m in the region where major natural floods no longer occur there is increased tall shrub cover but a decreased fern and tree cover. The increased tall shrub cover is probably the result of reduced physical damage to tall shrubs caused by natural flood. The Gordon may have fewer trees, as it is a broad river, and may have had fewer sites with overhanging trees. Alternatively, a lower tree cover may reflect reduced tree health as a result of waterlogging of roots or water and nutrient deficit following the absence of flood. Lower tree cover will result in greater light penetration, which may cause reduction in fern cover” (Davidson and Gibbons 2001a:16).

vegetation in comparison with that observed in control rivers [namely, the Denison and Franklin]. On the other hand the imprint left on the river bank and riparian vegetation by operation of 1 and 2 turbines was quite distinct and was readily detected as a marked shift in plant species cover and diversity in these zones. The lack of change in the riparian vegetation affected by three turbines, except for the loss of cover and abundance of ferns, is an indication that the frequency and duration of inundation in this region have not departed significantly from the Natural regime. Ferns are a good indicator group in the riparian vegetation, and along with mosses, are likely to be lost following only a slight change in inundation regime (2001b:4 emphasis added)

Given the plimsoll-line occurs at 2.5 metres, below which vegetation has lost its leaves and above which "there are no obvious effects on the health of the vegetation" (Davidson and Gibbons 2001a:11), the findings of Davidson and Gibbons (2001a; 2001b) indicate that 10 years operation of three turbines has not degraded the river bank zone between 2.5 and 4.5 metres as much as 22 years operation of two turbines up to 2.5 metres. This observation concurs with the comments of Koehnken *et al.* (2001) that some zones of the river had not yet reached equilibrium, that is, they have not yet been substantially denuded of their vegetation from the loss of fluvial sediments by power station discharges. Although these observations are contained in the reports of HT's environmental researchers, they do not accord with HT's story which implied that modification and regulation applied to *all* of the river.

Conflating the Equilibrium Construction with the River Narrative

Construction of the river as not in equilibrium clarifies the divergence between the observations of Davidson and Gibbons (2001a; 2001b) and Koehnken *et al.* (2001), and HT's construction of *all* of the river as irretrievably degraded. This linkage was anchored to, and contextualised by, existing impacts. This is notwithstanding HT's claims that these issues had to be dealt with separately (which meant HT was not

responsible for the impacts of the past) and the JAP's assurances that they had been (JAP 2002b:366). In this respect, HT would argue that although the third turbine zone on the river had not yet reached equilibrium (ie become substantially degraded) and the riparian vegetation had "not departed significantly from the Natural regime" (Davidson and Gibbons 2001b:4), it was well on its way and merely a matter of time.

Conflating the Equilibrium Construction with the Load Constraints Narrative

This premise is underpinned by what are defined as current operations. Within the context of the assessment process, there were two options: what has happened in the past (ie Historical) or what was projected to occur in the future *without* Basslink (ie SYSOP). As the latter allows the future to be replayed as an ideal of the past (ie without load constraints), SYSOP can be viewed as current operations. In this way, the construction of the river as not having reached equilibrium was linked to the story about load constraints. This linkage had implications for the future monitoring and adaptive management program as it delivers an advantageous outcome to HT in terms of the future running of the hydro-system. HT argued that the Historical baseline was not representative as it reflected discharges restricted by load constraints in the past and, thereby, did not reflect how the system would be run in the future *without* Basslink. SYSOP rectifies the discrepancy. The critical point is that the use of SYSOP as a *without* Basslink baseline will allow HT to re-run the past.

This means that two sets of impacts are conflated by the load constraints narrative and construction of the river as not in equilibrium. The first relates to impacts physically occurring on the river now, due to the past and present operation of the Gordon Power Station (ie with load constraints). The second relates to impacts projected to occur if the

power station was to run as depicted in SYSOP, *without* Basslink. The difference between the two is the gap between the Historical and SYSOP *without* Basslink baselines. Importantly, the gap represents impacts that have not yet occurred. This is the case as load constraints at the Gordon Power Station have been "temporary" (Locher 2001b:10) only to the extent that they are expected to change in the future. What is important to note is that load constraints have been in existence since the power station began operations.

The following statements from HT give the impression that the load constraints existed only during the years of 1997-98:

Duration curves from Gordon Power Station plotted in Figure 21 show that the TEMSIM predictions of Gordon Power Station discharges greater than 210 cumecs are much greater than were historical discharges greater than 210 cumecs during 1997 and 1998. This is due to turbine and transmission line constraints during 1997 and 1998 which limited the total output from the power station. The transmission lines and turbine operations are subject to continual upgrades and refinements which may periodically impose constraints on power station output. As of the time of writing of this report, the transmission constraints which limited output during 1997-98 have been removed, and the work on the turbines to minimise vibration has been completed. The Gordon Power Station at present is capable of generating at full capacity (Palmer *et al.* 2001:19).

Exchanges at the public hearings and submissions relating to the readiness of HT for Basslink confirm the long-term nature of the constraints on generation at the Gordon Power Station. For instance, according to evidence presented by Roger Gill, HT's Operations Manager, generation from machines one and two had been restricted due to vibration problems since the machines were installed:

I have to put on record that since 1978 when Gordon, the first two Gordon machines were installed, we've had vibration problems with these machines, which has limited their performance characteristics and basically, that means that if you were standing on top of those machines when they were operating

at one point of their range, you would actually feel the vibration in your feet and clearly that would concern you and concern me and it has concerned us for some years. We are addressing this problem now, regardless of Basslink ... (Roger Gill, audio evidence, 12 October 2001).

Although the vibration problem had not been fixed, rectification was in progress:

Hydro Tasmania has engaged Voith Fuji Siemens, the original Gordon equipment manufacturers, to permanently rectify the vibration problems in the #1 and #2 Gordon generating sets. ... The source of vibration was identified and interim modifications were made to limit the impact of the problem. The generating unit has operated satisfactorily with the interim measures in place, however vibration concerns have re-emerged on both units during the last 3 to 5 years. It is now considered that both generating sets should be dismantled in order to complete permanent modifications (HEC 2001c:3).

Problems with machines one and two at the Gordon Power Station were elaborated at the hearings in considerable detail by Robert Gregg, a former engineer of HT who had worked closely with the machines in question. The following exchange between the JAP Chairman (JG) and Robert Gregg (RWG) describes the source and extent of the vibration problem, due to cracks in the foundations:

RWG: *... perhaps I should go back to why have the machines in Gordon got cracks in the foundations. I think the answer is, we as designers, made a mistake. We overlooked something, this was, we bought machines which were the largest machines that Fuji had ever built and there was a, we anchored the machines on the power station wall (they go through an inlet valve straight onto the spiral casing, the water goes through before it goes into the runner to turn the turbine). Now the forces on that spiral casing, we didn't make any, we didn't make any allowance for anchoring the spiral on the downstream of the inlet valve, so the forces have split the concrete. Why has that split up right through the generator? Because our civil people didn't put any heat reinforcing in the concrete, which, you know, what can you do about it now? You can dig it out but it would be a massive job.*

JG: *So you're saying that means a rebuild of the structures on which the turbines are located?*

RWG: *Yes, it does.*

JG: *Is that all three?*

RWG: *No, no, all three have got cracks, but by the time number 3 was being built, we had a look at what was happening with the first two. That was when I came, and we put some hoop reinforcing around the generator so that when it cracked up through the turbine, it didn't have a great deal of effect on the generator.*

JG: *So, it's one and two.*

RWG: *Yes, it's one and two that have major problems. We did at one time, we had our civil friends building a prestressed cable around the generator foundation to hold it together on 1 and 2 but they came to the conclusion that it wouldn't really work. So then we thought, well, the problem arises when you start and stop the machine because the part of the generator which keeps the bearings in place has little wedges that drop in to keep it tight. If you don't keep it tight, then the shaft wobbles around and the pole gaps change and you can wreck the machine. I think that's just about happened on no. 1 already. I think it has happened. So, yes, ... (Robert W. Gregg, audio evidence, 17 October 2001).*

Although it is not entirely clear, a specific point Gregg made is that when the machines are run for base load, within a set range and with minimal stops and starts, the cracks in the foundations are not a problem. However, with the continual stop/start functions through a series of loads expected with the operation of Basslink in the NEM, problems are likely to arise due to the cracks and vibration. In other words, in the past, despite the failure of rectification attempts, the machines could be run within a range that did not allow the vibration problem to affect their operation. The extent and status of the foundation cracks at the Gordon Power Station are set out in a HT report tendered after Roger Gill's evidence:

In 1980 cracks were observed in the concrete supporting structure for generating sets #1 and #2. Detailed investigations and computer based modelling by Hydro Tasmania, using leading experts such as the CSIRO, was used to determine the reasons for the cracking. The cracking has stabilised and no further movement or growth is expected to occur. The concrete structures for the Gordon generating units are considered to be structurally sound and safe for continued operation (HEC 2001c:3).

These exchanges contradict the statement from Palmer *et al.* (2001:19), that the vibration problem had been rectified. Hence, it appears that the Gordon Power Station was not, at the time of publication of the DIIAS nor the public hearings, capable of generating at full capacity, and that it could be some time before it is, given the extent of the work required. However, as Basslink is not expected to begin operation until 2005, there should be ample time for the works to be completed. The crucial point about the load constraints is that they have been in existence for a time period much longer than the 1997-98 dataset for the Historical baseline.

The following exchange between HT's counsel, Ian Lonie (IL), and HT's Michael Connarty (MC) at the public hearings confirms that it is these load constraints that were problematic in the modelling represented as underestimated in the Historical baseline:

MC: *The constraints were basically on transmission lines from Gordon to Chapel Street which restricted the amount of generation that could come from Gordon and therefore the full gate output, and also there were some machine constraints due to problems with the machines.*

IL: *Those are the ones discussed by Mr Roger Gill on Friday morning?*

MC: *Yes.*

(Michael Connarty, audio evidence, 15 October 2001).

This evidence confirms that the operation of the Gordon Power Station has been constrained in varying degrees from the very beginning. Therefore, the physical environment along the Gordon River will reflect impacts of many years of historical operations, whereby high flow discharges have been constrained by limitations on the total output of the power station. This is evident in the third turbine zone of the riverbank observed by Davidson and Gibbons (2001a) and Koehnken (2001a). Hence, it will be some time before the physical environment of the river reflects the operations depicted in the TEMSIM-SYSOP comparison.

Riparian Vegetation Loss

To illustrate what was modelled away by the load constraint under-estimation and the TEMSIM model bias over-estimation of full capacity discharges, and the success of the three narratives and the constructions they mobilised, Davidson and Gibbons (2001b:4) provide a calculation of the area of vegetation that has "not departed significantly from the Natural regime". The original inundation delineations are used, namely, 11 per cent for Historical (*without* Basslink) and 34 per cent for TEMSIM (*with* Basslink) (Davidson and Gibbons 2001b:8). They maintain the change in inundation between Historical and TEMSIM (ie 23 per cent) represents 18.8 hectares of riparian vegetation. The authors note that their calculations are "back of the envelope", but are expected "to be in the right order of magnitude" (Davidson and Gibbons 2001b:8)¹¹¹.

Having set out their calculation, the authors explain that with the TEMSIM-SYSOP comparison, this conclusion is substantially modified. They state as follows:

However, given the discussion of updated hydrological information in this report, a reduced impact of Basslink on the riparian vegetation is expected. ... It is expected that there would be little difference in the long term effects on riparian vegetation based on these two model comparisons (Davidson and Gibbons 2001b:7).

There is little difference in the long term effects because SYSOP depicts a future substantially different to what has been occurring in the past – a future with many

¹¹¹ To arrive at this area, Davidson and Gibbons (2001b) divide the 43 kilometre stretch of the Gordon River into a section between the Gordon Dam and Ewerts Gorge, and between Ewerts Gorge and the Franklin River. An area of 18.6 hectares has already been impacted along the former from the operation of two turbines discharging 140 cumecs of water. The height of the impacted zone is delineated by the plimsoll-line, which varies between 2.5 metres and 1.5 metres. In the latter section the plimsoll-line height is, on average, two metres high, and approximately 16 hectares has been degraded with a "reduction in species cover and abundance" (Davidson and Gibbons 2001b:7). With Basslink, compared to the Historical baseline, an additional area expected to be impacted is 14 hectares between the Gordon Dam and Ewerts Gorge (where the plimsoll-line would move up by 1.5 metres) and 4.8 hectares between Ewerts Gorge and the Franklin River junction (where the plimsoll-line would move up by 0.6 metres). This is a total of 18.8 hectares of riparian vegetation that was originally expected to be impacted (ie removed) by Basslink with the TEMSIM-Historical baseline.

more high level power station discharges and one that currently appears incapable of being achieved until the problems with machines and foundations at the Gordon Power Station are overcome.

In terms of the boundaries of impacts, due to the increase in the number of high flow discharges depicted in SYSOP, impacts *without* Basslink are projected to occur between 2.5 and 4.0 metres along the river bank, the same zone as *with* Basslink impacts, whereas Historical impacts have been occurring for the most part below 2.5 metres¹¹². Hence, with the SYSOP *without* Basslink baseline, HT was able to construct future impacts, the subject of the impact assessment process, as belonging to the past.

It has been shown in this section that three narratives in respect of the TEMSIM model bias, load constraints at the Gordon Power Station, and the state of the Gordon River mobilised specific constructions of HT's model outputs and the river. The extent to which these stories and constructions bridged empirical gaps and stabilised contingencies, with the effect of qualifying the significance of Basslink's environmental impacts and reconfiguring the future as belonging to the past, has also been demonstrated. The success of these stories and constructions has been illustrated with the movement of baselines depicting *with* and *without* Basslink scenarios so close together that the difference was classified by HT as "negligible" (Bludhorn 2001:4). Having identified these narratives and the variable constructions they mobilised, the

¹¹² Incidentally, Davidson and Gibbons emphasised the importance of the riparian zone, despite the size of the area predicted for impacts: "Although the total area damaged by the Historic regime (34.6 ha) and the area predicted by Davidson and Gibbons (2001) to be damaged by Basslink (18.8 ha) are small, the region affected contains the full extent of the riparian community (in the Gordon River above the junction with the Denison River). The riparian community is highly specialised and highly diverse (species rich) and has high aesthetic value" (2001b:8).

next step of this narrative analysis is to connect them with the different 'realities' legitimated by the JAP. This will be the task of the following section.

LEGITIMATION OF 'REALITIES'

From the perspective of the theoretical framework of interpretative repertoires, the stories and constructions advanced by HT can be viewed as discursive resources, the uptake of which can be multiple, selective and contextual (Potter and Wetherell 1987:156). Isolating which stories and constructions were appropriated and, thereby, endorsed by the JAP contributes to understanding how and on what basis knowledge in relation to Basslink was constructed. Accordingly, to continue the narrative analysis, in this section I will connect the variable constructions mobilised by the three narratives with the "different realities legitimated" (Macnaghten 1993:55-6) by the JAP.

Load Constraints Narrative

The load constraints narrative set out earlier was:

Analysis of Gordon Power Station operations during the years 1997-98 revealed that the power station maximum discharges were capped during this period due to a temporary restriction (Locher 2001b:10).

Initially, this narrative lined up with the TEMSIM model bias story in constructing the model outputs as overstated. As set out in the above section, with the introduction of the SYSOP (*without* Basslink) baseline, HT's story about load constraints at the Gordon Power Station remained the same, but construction of the model outputs it mobilised changed from being one of overestimation to providing "further understanding" (Locher 2001b:9).

It is this latter construction of the model outputs mobilised by the load constraints narrative that was endorsed by the JAP:

The Panel is satisfied that the use of the historical-TEMSIM comparison to assist with interpretation of the present environmental condition in the rivers under investigation was a reasonable approach to adopt. The Panel also considers that the additional work undertaken by Hydro Tasmania using the TEMSIM-SYSOP method of comparison has essentially corroborated the predicted outcomes from historical-TEMSIM, with the general nature of the conclusions remaining the same (JAP 2002b:327).

In support of the JAP's determination that the new modelling provided corroborative evidence, in its *Final Panel Report* the JAP drew directly from statements from Peterson and Locher (2001a):

based on the inconsistencies in comparisons depending on baseline and time period selected, it is concluded that Basslink does not represent a significant departure from projected operating patterns without Basslink with respect to present exceedance of full capacity discharges. Original conclusions remain about no change with Basslink in mean or median Gordon Power Station flows, and no change to the pattern of much higher summer compared to winter median flows (JAP 2002b:325 citing Peterson and Locher 2001a).

In other words, not that much has changed with the new modelling. The JAP concurred.

TEMSIM Model Bias Narrative

The TEMSIM model bias narrative has been read as:

The TEMSIM model in its present configuration makes offers on a power station-by-power station basis without consideration for use of individual generators ... Output from the TEMSIM model ... is therefore biased (DIAS 2001a:12-10).

The JAP's *Final Panel Report* (2002b:322-327) dedicates several pages to HT's claims about how the TEMSIM model overestimates full capacity discharges and environmental impacts, and its responses to queries raised in the public submissions.

The JAP's commentary confirms it was satisfied with HT's explanations and concludes:

Hydro Tasmania has clearly acknowledged the specific limitations of TEMSIM, nevertheless TEMSIM has been shown to be a reasonable predictive model in the context of the NEM. Criticisms of the TEMSIM model have been addressed by Hydro Tasmania in their

presentations at the Panel hearing. Importantly, submitters suggested no other models or significant changes to TEMSIM. Hydro Tasmania has addressed issues that were raised in submissions and at the hearing to the satisfaction of the Panel in the reports that were tabled at the hearing and evidence presented (JAP 2002b:327).

Disclosure of limitations of TEMSIM appears to have contributed to the model's validation. On this score, as far as the JAP was concerned HT had demonstrated it was certain about a specific aspect of 'uncertainty' in its model and its outputs. Hence, the TEMSIM model bias narrative confined issues of uncertainty to one part of the TEMSIM model structure, namely, the coarseness of the bidding module. Importantly, it also closed off questioning in this respect. We have already seen this with the narrative's construction of the model outputs as a worst case scenario in the evidence of Michael Connarty, who indicated he was confident that all scenarios had been tested.

It is important to note that during the impact assessment process, HT did not tender information to evidence its claim that TEMSIM over-estimated full capacity discharges (see Peterson and Locher 2001a). This was a structural problem with the model. Hence, there was only HT's story. Whilst it was plausible, judgments about whether TEMSIM overestimates full capacity discharges (or underestimates them – a scenario not contemplated) need to also take account of other parts of the TEMSIM model, for instance, HT's assumptions about how the hydro-system might be run in the future with greater competition and the displacement of base load in Tasmania to the NEM, both of which represent more opportunities to export hydro-power across Basslink. Within the context of a set Tasmanian load/demand of 1135 MW, what was presented as a worst case scenario reflected only a modest level of imports and exports. Such was the success of the TEMSIM model bias story that in its commentary on riparian vegetation impacts, the JAP espoused the story as its own.

While there is uncertainty as to the actual rate of accelerated present rates of loss of riparian vegetation communities, it is reasonable to assume that these may be less than predicted using the TEMSIM model, which overestimates full gate discharge (JAP 2002b:345).

What is Reasonable?

What is notable from the above statements of the JAP is the use of the word 'reasonable'. TEMSIM was viewed by the JAP as a "reasonable predictive model" (2002b:327); it was "reasonable" to assume an overestimation of impacts due to the TEMSIM model bias (2002b:345); and the Historical-TEMSIM comparison was a "reasonable approach to adopt" (2002b:327). It seems that the JAP linked its judgments about the existence and extent of the limitations of the TEMSIM model with what it considered reasonable to disclose in the circumstances. In other words, it was concluded by the JAP that HT had taken reasonable steps to identify the environmental impacts and then justify its position when questioned – what was considered 'reasonable' was sufficient. Hence, validation of HT's knowledge claims in this respect rested not exclusively on the content of the evidence presented, but on the JAP's judgments about what it considered was reasonable. In essence, then, not only were judgments restricted to one aspect of the model's structure, the JAP configured the disclosed limitations of the model into judgments about what it considered reasonable and feasible. As a discursive device, this conceptualisation constituted a person or group disagreeing with the JAP's recommendations as unreasonable and demanding of the infeasible.

Gordon River Narrative

The narrative in respect of the Gordon River has been read as:

These aquatic systems are managed systems that are fundamentally altered from their natural condition, and cannot be returned to their original condition (Locher 2001b:6).

It was explained earlier that this narrative constructed the river in a number of ways. In general, these can be divided into two categories, one that constitutes the river as substantially degraded and the other as not having reached equilibrium. Both are relevant to the JAP as it applied them to different sections of the river (JAP 2002b:355) to which legislation applied.

Specifically, the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act) was deemed applicable to four zones delineated by HT downstream from the power station (see Appendix 1-1). Zone 1 is a five-kilometre region from the power station near the Serpentine River confluence to Abel Gorge. Zone 2 is a three-kilometre section from Abel Gorge (near the Albert River confluence) to The Splits (near the Orange River confluence). Zone 3 is a five-kilometre stretch between The Splits and Ewerts Gorge (the Denison River confluence), and Zone 4 is a five-kilometre section between Ewerts Gorge and the Olga River¹¹³. The *World Heritage Properties Conservation Act 1983* was deemed applicable to the section referred to in the legislation as the "Proclaimed Area" (JAP 2002b:358) and by HT as Zone 5, a 14-kilometre region downstream of the Olga River to the Gordon's confluence with the Franklin River (see Appendices 1-1 and 1-2).

Environmental Protection (Impact of Proposals) Act 1974

In respect of the EPIP Act and the assessment of WHA values, the JAP accepted the two sets of HT's constructions of the Gordon River mobilised in the narrative of its past, specifically, that the river was already "degraded by present operations" (Locher 2001a:109) and that it "cannot be considered in equilibrium" (Locher 2001a:46). Importantly, it drew on these constructions in different contexts.

The JAP's introductory overview of its assessment of WHA values utilised the construction of the river as not having reached equilibrium and took on HT's narrative and constructions as its own:

It is important to note from the outset that this assessment is focused on potential Basslink impacts, not on existing impacts. The inherent difficulty in ascertaining Basslink impacts is that the impacts occurring under current Gordon Power Station operations are dynamic and have not reached an 'end-point'. This is particularly the case in relation to fluvial geomorphology where the alluvial riverbanks in the middle Gordon River are continuing to adjust to three-turbine flow (JAP 2002b:366).

In respect of the fluvial geomorphology impacts, the equilibrium construction was also used:

Hydro Tasmania has stated that changes to the flow regime under Basslink will alter rates of river adjustment rather than the overall 'endpoint'. The actual erosion processes operating in the middle Gordon River are predicted to be unlikely to change regardless of the flow regime. Essentially it is Hydro Tasmania's proposition that Basslink will accelerate the rate of erosion processes currently occurring in the River but not change the 'endpoint'. ... The Panel considers that the proposed mitigation measures will effectively reduce impacts from Basslink operations to those currently occurring under existing power station operations (JAP 2002b:367).

In contrast, in its commentary on the macroinvertebrate report the JAP adopted the degraded state of the river construction, and stated:

It is recognised that the middle Gordon River is a highly regulated and modified river. Investigations have not established that it has most important and significant habitats where threatened species of plants and animals of outstanding universal value survive (JAP 2002b:369).

In respect of the riparian vegetation impacts, whilst the JAP was "not satisfied that it can be unequivocally stated that there will be no Basslink impacts on riparian

¹¹³ Zones 2 and 3 are divided by a two-kilometre stretch between the gorges of The Splits and Snake Rapids (Koehnken *et al.* 2001). Zone distances set out here have been taken from Koehnken *et al.* (2001:60-72).

vegetation" (JAP 2002b:368), and having accepted the "possibility" that the vegetation is "not in equilibrium under the current regulated flow regime and further changes may occur or be occurring" (JAP 2002b:369), the JAP's determination was based on a construction of the river system as fundamentally degraded. Specifically, it drew on evidence from HT's riparian vegetation researcher who explained at the hearings that the river's tributaries were more biologically diverse than the Gordon River:

Accepting the evidence of Dr Davidson that the biodiversity in the middle Gordon River is less than its tributaries, the Panel considers that under a worst case scenario the operation of Basslink would not result in a dramatic decline in the population of a species or threaten or endanger a species. The operation of Basslink is therefore not likely to have a significant impact on natural criterion iv of the World Heritage values of the TWWHA (JAP 2002b:368-69).

Thus, within the context of an already substantially degraded river, the JAP expects that World Heritage values will not be compromised, even if the worst case scenario (ie predictions from the TEMSIM-Historical baseline) came to fruition.

World Heritage Properties Conservation Act 1983

An interpretation of the WHPC Act required judgments about what constituted damage to the World Heritage Area within the Proclaimed Area (ie HT's Zone 5). This was particularly important as Section 10, subsection 2 of this Act deems unlawful action by a "foreign or trading corporation ... to kill, cut down or damage any tree on any property" or "any act that damages or destroys any property" (Clayton Utz 2001b:4).

Whilst the JAP concurred with HT's proposition that Basslink presented no significant impact to this region of the river and, therefore, would not be required to obtain Commonwealth government consent to utilise it, the JAP did not directly accept HT's principal argument in support of its position, namely that there would be "no net

Basslink impact” (Bludhorn 2001a:5), a concept that will be the focus of the next chapter. The consent waiver endorsement from the JAP was based on the argument put by HT’s legal team, that Basslink power station operation impacts would reduce with distance downstream, as shown here:

The impacts of changes from power station operations under Basslink progressively decrease the further down the Gordon River from the Dam tailrace. The proclaimed section of the Gordon River is in Zone 5 (Clayton Utz 2001b:4).

In concurrence, the JAP stated:

All HT appendices report that existing impacts under current power station operations and impacts of changes from power station operations under Basslink decrease the greater the distance down the Gordon River from the tailrace. This is particularly true for Zone 5 (JAP 2002b:365).

And, the JAP concluded:

Hydro Tasmania’s scientific studies indicate there will be no impacts on fluvial geomorphology, fish, and macroinvertebrates in Zone 5 under Basslink operations (JAP 2002b:366).

Whilst claims about impacts decreasing with distance downstream were made in HT’s in-house reports, they were not as succinct as that presented above by its legal team or the JAP. For instance, in respect of geomorphological impacts, Locher states:

Overall, the geomorphic effects of flow regulation appear to decrease with increasing distance from the power station, as the proportion of regulated flow to total flow diminishes and water level fluctuations associated with power station operation decrease (2001a:49).

However, the report also states:

there is still some water level fluctuation in response to power station operation ... downstream of the Franklin River confluence. This power station influence diminishes within a short distance further downstream [ie past Zone 5], as the estuarine reach broadens considerably (2001a:37).

And further:

Downstream of the Splits in Zones 4 and 5, the banks and bed show a moderate response to power station operations which diminishes with distance downstream (2001a:68).

The fish update report (Howland 2001), too, confirms that, although impacts are expected to decrease with distance downstream, it is not expected to be the case that they will be non-existent in Zone 5:

The Gordon River between Ewarts Gorge and the Franklin River correspond with Zones 4 and 5 as reported in Howland et al., (2001). These zones are the least impacted under current operations and will remain far less impacted than the upper three zones (ie Zones 1, 2 and 3) post-Basslink. Despite this, changes to power station operations post-Basslink still have the potential to be significant as the hydrology of this zone is still heavily influenced by the Gordon Power Station, particularly during dry periods. The range of water level variation at the Franklin River junction has been recorded up to 1.7 m in response to the power station during low rainfall periods, with far less variation during wetter times (Howland 2001:12).

Hence, whilst the JAP's assertion that impacts will decrease with distance down the river is based on evidence from HT, this knowledge claim does not substantiate the further claim that there will be no impacts in Zone 5, the section of the river to which the WHPC Act applies.

Reference to the riparian vegetation reports by the JAP is made separately, as follows:

The predictions regarding impacts on riparian vegetation in Zone 5 appear inconclusive, and largely depend on whether the TEMSIM-Historical comparison or the TEMSIM-SYSOP comparison is adopted. However, the Panel considers that the likelihood of Basslink operations resulting in damage to riparian vegetation is extremely low, and that in all probability any impacts that may occur would not be significant (JAP 2002b:366).

Within the context of the load constraints narrative and a construction of the model outputs as providing further understanding, this assertion is perhaps justifiable. However, the determination that riparian vegetation impacts of Basslink will be insignificant in Zone 5 rests on a validation of the TEMSIM-SYSOP comparison and a

rejection of that of TEMSIM-Historical as, with the latter, Davidson and Gibbons (2001b) predicted that 4.8 hectares of riparian vegetation would be lost in Zones 4 and 5 between Ewarts Gorge and the Franklin River. Although an assessment still depends on what are considered to be significant impacts, under the WHPC Act the loss of any vegetation would be deemed significant and require consent. If the JAP viewed the change in the *without* Basslink baseline (from Historical to SYSOP) as a change in scale instead of a means of further understanding, it is doubtful that it could have determined that impacts on riparian vegetation in Zone 5 would not be significant and that consent was not required under the WHPC Act.

In any case, to single out the riparian vegetation report overlooks that the fluvial geomorphology report, too, was guided by which comparison was used. In each case, with the Historical-TEMSIM comparison the impacts of Basslink were predicted to be substantially greater than the TEMSIM-SYSOP comparison, with or without mitigation. The details are set out in the DIAS. Each set of researchers stated in their DIAS Appendix Reports that mitigation could reduce these impacts, but the extent of mitigation was not extensively quantified at the time of its publication. With a new brief from HT, the researchers concluded that there should be no significant difference between SYSOP (*without* Basslink) and TEMSIM (*with* Basslink) flows. For instance, the fluvial geomorphology update report states:

The DIAS fluvial geomorphology report [which used the Historical without Basslink baseline] predicted an increase in scour in the middle Gordon River for Zones 4 and 5 downstream of the Denison River, based on sediment transport modelling work using data from Zone 4. The modelling showed that the increase in the cumulative duration of 3-turbine discharge under Basslink would translate into an increased sediment transport capacity of the river downstream of the Denison (scour). This increased sediment transport capacity

would be countered to some unknown degree by vegetation present on the banks.

The mitigation commitments, over-estimation of full-gate by TEMSIM and the conclusions of the 'Gordon River Basslink Modelling and Hydrology Update Report' [which used the SYSOP without Basslink baseline] all lead to a decrease in the cumulative duration of full capacity power station operation, either directly or indirectly. Therefore, the increase in scour predicted under Basslink is likely to be less than predicted in the IIAS fluvial geomorphology report ... (Koehnken 2001a:11-2).

It can be seen that, like the riparian vegetation reports, the conclusions of the fluvial geomorphology researcher were dependent upon the updated data inputs, the direction from HT to take account of the TEMSIM model bias, and which baseline was used. With the Historical-TEMSIM comparison, although the impacts were predicted to be less in Zone 5 than Zone 1 or 2, impacts of scour in Zone 5 were still expected to increase substantially with Basslink. Given this, to deem the riparian vegetation impacts as inconclusive is to do the same to the fluvial geomorphology conclusions. In both cases, the predictions of impacts depend on which baseline is chosen for comparison.

Precautionary Principle

The JAP's interpretation of the precautionary principle followed that offered by counsel for BPL, who emphasised that it should only be applied "where there were threats of serious or irreversible environmental damage" (Freehills 2001c:4; JAP 2002b:266). Hence, the JAP was provided with a means by which to operationalise the precautionary principle – a threshold below and beyond which judgments could be made about the seriousness or irreversibility of environmental damage. Within this context, the task of a proponent is to demonstrate that its project does not over-step the mark. This mark, of course, is a matter of judgment for decision-makers to determine.

The acceptance of this threshold proposition by the JAP is expressed in the following comments in its *Final Panel Report*:

The Panel is of the view that the precautionary principle should not be applied to the Basslink project. In considering the application of this principle, the Panel has had due regard to the concept of 'serious and irreversible damage' to assess where and how the principle should be invoked (JAP 2002b:266).

An application of the threshold test by the JAP determined that the precautionary principle should not be invoked in relation to the overall project. However, it was applied to different aspects. As set out in Chapter 1, the precautionary principle was applied in relation to the cable technology. Despite its best efforts, BPL was not able to convince the JAP that the impacts of the sea-earth return monopole technology would be insignificant and not serious or irreversible. In relation to HT's evidence and the predicted impacts on World Heritage Area values, however, the JAP made the following determination on the application of the precautionary principle:

For impacts such as the ... changed Hydro Tasmania operations on World Heritage Area values, the Panel has considered the potential impacts by the proponent and submissions, and has determined that based on the evidence before it, the level of impact that is likely to result would be acceptable, subject to appropriate management (JAP 2002b:266).

It was the JAP's view that the impacts of changed hydro-system operations would not go beyond the mark of serious or irreversible. Therefore, the JAP endorsed HT's definition of what is acceptable and deemed dispensable the possible loss of around 18.8 hectares of riparian vegetation along the Gordon River, the effects of which for other parts of the ecosystem are unknown.

Conclusion

In this chapter I have identified multiple constructions of HT's model outputs and the Gordon River contained in HT's submissions to the Basslink assessment process, and how these constructions were mobilised in three narratives about the TEMSIM model bias, load constraints at the Gordon Power Station and the state of the Gordon River. I have also traced the origin of the three narratives, how they were packaged and what influence they had on judgments both within and outside HT. It is on this basis that I argue that these narratives helped bridge empirical gaps for HT's in-house consultants who were confronted with an extraordinary number of data analysis sets and information gaps, as well as a predictive model structured for purposes other than the assessment of environmental impacts of Basslink. The narratives also helped reconcile outputs that did not fit the premise that Basslink would not have a significant impact on the Gordon River. Also, it has been demonstrated that the constructions these narratives mobilised changed with different contexts and their uptake by the JAP was multiple, selective and contextual. The movement of these narratives and constructions into the Basslink regulatory outcomes and instruments via the concept of "no net Basslink impact" will be examined in the next chapter.

Chapter 7

CHARTING THE MOBILITY OF 'NO NET BASSLINK IMPACT'

In the previous chapter I identified the multiple constructions of HT's model outputs and the Gordon River, and how these constructions were mobilised by three narratives. I also connected the variable constructions mobilised by these stories with the "different realities legitimated" by the JAP (Macnaghten 1993:55-6). In line with the methodology of Macnaghten (1993), this chapter will undertake the last step of my narrative analysis and look at the interplay of argumentative strategies (read as narratives) and the impact assessment process outcomes. To do this I will, first, focus on how the three narratives, together with the constructions they deployed, coalesced in and became mutually constitutive of what was termed, "no net Basslink impact" (Bludhorn 2001:5). It will be shown that HT's arguments about what is acceptable in terms of environmental impacts on the Gordon River embody this concept. As such, it will be demonstrated that the no net Basslink impact concept was a useful discursive device. As such, it reconciled the difference between the two *without* Basslink baselines, the problems with the TEMSIM model structure outlined, and the incongruence between HT's story about the river and observations from its environmental researchers. Following this, I will describe how this concept was utilised by HT in its interpretation of legislation in respect of the World Heritage Convention, Tasmanian resource management legislation, and the precautionary principle. I will then review the *Gordon River Basslink Monitoring Program and Adaptive Management Plan* as well as

the final regulatory instrument, the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence*, to identify the narratives and constructions incorporated therein.

'NO NET BASSLINK IMPACT': A USEFUL DISCURSIVE DEVICE

Origin and Definition

It is important to note that the notion of no net Basslink impact did not exist when the DIIAS was published. Yet, it was pivotal to HT's case presented at the public hearings. No net Basslink impact is outlined in the *Gordon River Basslink Monitoring Program and Adaptive Management Plan* as the "goal" of HT's mitigation measures and is defined as "impact that remains within the present boundaries, recognising inherent variability in the environmental indicators as well as long-term presently occurring trends" (Bludhorn 2001:5). What this means for the Gordon River, particularly the phrases "present boundaries" and "long-term presently occurring trends", will be discussed in this chapter.

It is also important to note that the JAP did not endorse the concept of no net Basslink impact. Indeed, in its *Final Panel Report*, it emphatically rejected the notion:

The Panel does not accept the proposition by Hydro Tasmania that there will be no net Basslink impacts. It is considered that this is not a sound premise on which to proceed to assess impacts on World Heritage values as it is predicated on uncertainty. Whilst the proposed monitoring program and adaptive management regime provide flexibility and enable management responses to be undertaken where necessary, the areas of uncertainty remain. It will also be extremely difficult, if not impossible, to extricate existing impacts from Basslink impacts, and say with any precision that an impact is say 75% pre-Basslink and 25% post-Basslink in origin (JAP 2002b:366)¹¹⁴.

¹¹⁴ Environment Australia (2002) concurred with the JAP's determination that the proposition of "no 'net environmental impacts' associated with Basslink" should be rejected on the basis it was "not a sound premise on which to proceed to assess impacts on World Heritage values".

Despite this definitive determination, and a glimpse at the problematic implications the JAP believed would arise from its application, no net Basslink impact is an integral component of the regulatory outcomes of the impact assessment process for HT that were validated by the JAP with its approval of the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* annexed to the *Final Panel Report* (JAP 2002b:Appendix 18). It is the *Final Panel Report* that accompanied the recommendations from the RPDC (2002:1) to the Tasmanian government for the approval of Basslink.

Tasmanian Wilderness World Heritage Area

The Ministerial Direction to the RPDC from the Tasmanian Premier, Jim Bacon, stated that the potential impacts of Basslink on the “natural heritage or cultural heritage values” of the Tasmanian Wilderness World Heritage Area (TWWHA) were to receive specific consideration by the JAP in the assessment process (Bacon 1999:1). To fulfil the requirements of this directive, HT tendered three reports in relation to the TWWHA. Two were prepared by Lorne Kriwoken, a Senior Lecturer with the Centre for Environmental Studies at the University of Tasmania – one for the DIAS (ie Case 1) and the other for the public hearings (ie Case 2). The third was prepared by Clayton Utz, the lawyers representing HT at the public hearings, which was tendered to the JAP after Kriwoken's evidence.

The TWWHA was formally recognised under the World Heritage Convention in two stages – 1982 and 1989 (Kriwoken 2001a). With the first nomination, the area included was that between the Olga River and the mouth of the Gordon (see Appendices 1). The 1989 nomination included the Middle Gordon above the Olga River to, but not including, the Gordon Power Station. As set out in Chapter 6, it was determined by the

JAP that two pieces of legislation were relevant to the assessment of Basslink impacts in the TWWHA. The *World Heritage Properties Conservation Act* 1983 applied only to the lower section below the Olga River confluence and the *Environment Protection (Impact of Proposals) Act* 1974 was relevant to the area upstream of the Olga to the power station¹¹⁵. As the Gordon Power Station started operation with two turbines in 1978 and the third in 1988, Kriwoken (2001a:1) noted that, “[b]y the time of the 1989 nomination the Gordon River experienced more than 11 years of flow regulation associated with power generation”.

The TWWHA values expected to be impacted by Basslink identified by Kriwoken (2001a) were natural criterion (i) as “outstanding examples representing the major stages of the earth’s evolutionary history” and (iv) for areas that “contain the most important and significant habitats where threatened species of plants and animals of outstanding universal value from the point of view of science and conservation still survive” (Kriwoken 2001a:23-4). In relation to Basslink impacts and criterion (i) Kriwoken concluded:

The operations of the Gordon Power Station and Basslink will mean that geomorphological and hydrological changes *will continue to occur in a highly modified and regulated flow regime*. There may be localised impacts associated with the extraglacial areas of the Gordon River as a result of Basslink, in the absence of any mitigation measures in place, limited to ongoing modifications to riverbanks and bars which are evolutionary features. These features are well-represented in the TWWHA, and it is unlikely that the Basslink changes to the Gordon River will change the status of the TWWHA as an example

¹¹⁵ There was disagreement between The Greens and HT on this issue. The JAP concurred with Griffith (2001) and Gough (2001:28) for HT who asserted that the two pieces of Commonwealth legislation applied to the TWWHA. The JAP (2002b:324) noted in its *Final Panel Report* that a number of submitters were mistaken on this issue in their claims about the applicability of the WHPC Act. There was also disagreement on whether a ‘values’ approach, taken by HT and called for in the Final Scope Guidelines (JAP 2000b) or an ‘area’ approach, advocated by The Greens and its expert, should be used to assess the Basslink impacts. A discussion of this issue is set out in the *Final Panel Report* (JAP 2002b:351-353). I will not elaborate on it further.

representing major stages of the earth's evolutionary history with respect to geology, glaciation, glacio-karstic features and Gondwanan flora and fauna. Hydro Tasmania has in fact committed to measures to address riverbank instability, which is in keeping with Australia's commitments to restoration of WHA values wherever possible (Kriwoken 2001a:30, emphasis added).

In relation to criterion (iv), Kriwoken (2001a) concluded that the riparian vegetation expected to be lost due to current operations and with Basslink did not provide habitat for species listed under the *Tasmanian Threatened Species Protection Act 1995*, or if species of concern were in the area, they could be found elsewhere. Thus, a reduction in riparian vegetation would not affect the WHA values:

The current operations of the Gordon Power Station generally reduce the species cover and diversity of the riparian vegetation of the Gordon River. Under Basslink this reduction of species cover and diversity will be accelerated. It is likely that Basslink will affect riparian habitats, however it is unlikely that Basslink will significantly affect any threatened species of plants and animals in the Gordon River (Kriwoken 2001a:33).

Hydro Tasmania's Case 1

It will be seen from the following statements that constructions of the Gordon River as "degraded by present operations" (Locher 2001a:109), "substantially modified" (Locher 2001a:257) as well as "not totally equilibrated to the regulated flow regime" (Locher 2001b:5) and "altered from the natural condition" (Locher 2001b:6), were drawn on in the initial WHA values assessment of Kriwoken:

At the outset it is important to state that the impact of the Gordon River from hydro-electric power generation predates the nomination of the TWWHA by four years. The Gordon River was therefore a regulated, highly modified river environment and not representative of a pristine ecosystem when the nominations were put forward. Therefore, references to the pristine nature of a natural value, as detailed in Table 2 [TWWHA Commonwealth Environment Australia World Heritage Values], are not applicable to the Basslink project and impacts on the Gordon River TWWHA values (2001a:28).

This statement, and the conclusion of this report (below), mobilised another set of constructions about the ecological components of the Gordon River, namely, that they were “not representative of a pristine ecosystem” (Kriwoken 2001a:28), “not unique” and “well-represented throughout the TWWHA” (Kriwoken 2001a:2):

The two of the seven TWWHA criterion which have been identified refer to features that are represented in the Middle Gordon River, and are influenced by both present and Basslink operating regimes for the Gordon power Station. Given that these features are *not unique* and are *well-represented* throughout the TWWHA, the influence of the power station does not substantially impact on the overall integrity of the TWWHA (2001a:2, emphasis added).

Rejection of the benchmarks ‘natural’ and ‘pristine’ as unrealistic countered arguments from critics, in particular The Greens. Such putative expectations were deemed as residing with the critics, which constituted them as impractical and unreasonable.

A Different Reading of the Load Constraints Narrative?

As noted in Chapter 4, the area in contention in relation to Basslink impacts is between 2.5 metres and 4.5 metres above LWM on the riverbank of the Gordon River (Davidson and Gibbons 2001a:11; 2001b:10). This is the area that would be affected by running the power station at capacity, with the third turbine in full operation. Notably, as set out in Chapter 6, problems with the generators at the Gordon Power Station have meant that discharges to these levels have not been possible for most of the past, and according to the evidence of HT’s Operations Manager at the hearings, this would continue to be the case until the problems with the generators are rectified. Thus, despite Kriwoken’s assessment, the load constraints narrative could have been read another way. For instance, the presence of load constraints could have been construed such that part of the river is still in relatively good condition and worth conserving. This is plausible given the state of the river observed and reported by Davidson and Gibbons (2001a;

2001b). However, constructions of the river mobilised by the river narrative, such as “degraded by present operations” (Locher 2001a:109) and “substantially modified” (Locher 2001a:257), constituted *all* of the river as irretrievable and meant that the narrative was read in the negative.

Hydro Tasmania’s Case 2

In contrast to constructions of the ecological components of the Gordon River in Kriwoken’s first report as “not unique” and “well-represented throughout the TWWHA” (Kriwoken 2001a:2), in his second report (Kriwoken 2001b) a different argument was used. Armed with the concept of no net Basslink impact, Kriwoken (2001b) concludes:

Having reviewed the updated Hydro Tasmania information contained in the Monitoring Program and the Adaptive Management Plan as well as other expert updates and supplementary reports to the JAP, this Supplementary Report concludes there will be no net Basslink impacts on the TWWHA and the Gordon River associated with the Basslink. In light of the ‘no net Basslink impact’ commitment and advice from the researchers that management tools can be employed to ensure this commitment is met, this assessment concludes that the Basslink project falls within acceptable limits and does not threaten the overall integrity of the TWWHA (Kriwoken 2001b:21).

In this second report, no net Basslink impact made Kriwoken’s position much simpler – there are no (net) impacts.

Legal Case Linchpin

The concept of no net Basslink impact was placed at the forefront of HT’s legal case at the public hearings. Indeed, its interpretation of the WHPC Act hinged on it. In his opening submission, Ian Lonie from Clayton Utz stated:

Now, it’s crucial to our presentation over the next few days to make it quite clear that the work that we’ve done, and which is summarised in the Overview Report to be presented by Dr Locher, is based on the fact that no Basslink impacts are anticipated beyond the, upon the proclaimed stretch of

the Gordon [ie between the Olga and Franklin Rivers in accordance with the World Heritage Properties Conservation Act], beyond the changes associated with the present operations. We're talking about a regulated river system where there have already been changes, which have occurred as a result of the power station operations and are still continuing to occur, and that Basslink operations, we say, will be maintained within the current boundaries of the existing operations, recognising that those boundaries, if you like, change from time to time (Ian Lonie, audio evidence, 12 October 2001)¹¹⁶.

Of concern to HT was the JAP's interpretation of the WHPC Act and whether or not HT would be required to apply for Commonwealth ministerial consent to utilise the area to which this legislation applied. Obviously, the preference for HT was to avoid consent requirements as this could delay or potentially obstruct the project. Without the no net Basslink impact concept, it might well have done. With it, the legal question about what constituted damage (Clayton Utz 2001b:4) was answered – there was no damage, that is, beyond existing operations.

'Done to Death' River

The Greens had trouble understanding the concept of no net Basslink impact and under questioning, HT's witnesses had difficulty explaining it. This is illustrated in the following exchange between Lorne Kriwoken (LK) and representatives of The Greens, Christine Milne (CM) and Bob Brown (BB), at the public hearings on 16 October 2001:

CM: *In relation to your whole conclusion in relation to World Heritage, whether its values or area being set aside, is based on the assumption that there's no net Basslink environmental impact?*

LK: *That's correct.*

CM: *OK, no net Basslink environmental impact; is that a scientific assessment?*

¹¹⁶ HT's claim that Basslink impacts will not go beyond changes associated with present operations relate here to the 'proclaimed stretch' of the Gordon River, to which the WHPC Act applies. This assertion, embodied in the concept of no net Basslink impact, was applied by HT to all zones of the river. The JAP's rejection of the notion (JAP 2002b:366) was made in its commentary on impacts in respect of the World Heritage Convention under the EPIP Act. The JAP did not make reference to no net Basslink impact in its discussion of the WHPC Act. It is assumed that the JAP's rejection of the notion was intended to apply to both sections of the river to which these Acts apply.

- LK: *From the documents that I've received from the Hydro Tasmania consultants, yes, ... in terms of the work that I've been doing, they're all scientific, they're all scientific approaches, they've all got valid methodologies, they're all experts in the field, they've been hired to do specific tasks within the broader scope of the Basslink project and I think what we've seen today, I think, are testimony to that expertise.*
- CM: *Dr Peter Davies this morning indicated that no net Basslink impact is a social construct and is not a scientific assessment. Is that not your view then?*
- LK: *My view is that within the existing operational guidelines of the Gordon Power Station, that Basslink is not going to add any additional, no net additional impact, with respect to operations from Basslink on existing operations and that the data that's been shown to me during a whole range of things from geomorphology to instream fauna and invertebrates, suggests that is a scientific construction.*
- ...
BB: *There won't be any difference?*
- LK: *That's right, if you're working within the operational regime, that's my conclusion, that's my personal feeling, that's my opinion.*
- ...
BB: *Well I'll put it to a clear question once again, because we've had different answers here. Dr Kriwoken, do you subscribe to no net impact or no impact?*
- LK: *As I said before, no net Basslink impact. ... On the conditions that have been described by the researchers and the evidence that I've been given to hand.*
- BB: *And you've also told us that that does not mean no impact.*
- LK: *Exactly, there is impact, but you can't say that the Gordon River hasn't got any impact.*
- BB: *That's true.*
- LK: *It's done to death.*

These statements indicate the extent to which Kriwoken's WHA values assessment was directed exclusively by inputs originating from or commissioned by HT. It is unclear whether Kriwoken was aware of the boundaries set by no net Basslink impact. In any case, the success of the narrative about the degraded state of the Gordon River is reflected in his evidence, particularly the final statement, that the river is "done to

death”, a view of the Gordon River that, given its past, Basslink will not make much difference.

‘No Net Basslink Impact’ Boundaries

From the audio evidence of Ian Lonie above (12 October 2001), HT’s proposition was that there would be no damage from Basslink beyond “present operations” and that Basslink operations “will be maintained within the current boundaries of the existing operations”. These statements delineate what was canvassed in the previous chapter. In particular, notwithstanding constructions of the TEMSIM-SYSOP comparison as providing further understanding and its validation by the JAP as corroborative evidence, the assertions from HT, that Basslink will not have impacts beyond existing operations, are dependent upon the validation of the TEMSIM-SYSOP baseline and a rejection of the TEMSIM-Historical comparison. With the former in play, “current boundaries of the existing operations” are defined not only in terms of what actually exists in the physical environment on the river, but also what is expected to happen in the future. In this way, “current operations” are linked to “long-term presently occurring trends” (Bludhorn 2001:5). Hence, SYSOP sets a definitive boundary at around 4.0 metres above LWM. It is from here that Basslink impacts will be measured, not the Historical baseline, which is evident on the river at the existing plimsoll-line. This scenario demonstrates the success of the Gordon River narrative and the construction of the river as not in equilibrium embodied in the concept of no net Basslink impact.

Consequently, this move puts the potential *without* Basslink impacts so close to that *with* Basslink that they can virtually be defined as one and the same, and it can be

justifiably claimed by HT that Basslink represents no net impact. This unfolding has been possible, although virtually imperceptible, with the coalescence of HT's narratives and its constructions of the model outputs and the river in the notion of no net Basslink impact. As such, this precept embodies a reliance on the TEMSIM-SYSOP comparison and constitutes the boundary it marks as "long-term presently occurring trends" (Bludhorn 2001:5).

Defining 'Long-Term Presently Occurring Trends'

The following exchange between Helen Locher (HL) for HT, Margaret Blakers (MB) for The Greens, and a member of the JAP on 15 October 2001 clarifies what is represented by "long-term presently occurring trends" in the definition of no net Basslink impact, which I have argued represents the gap between the Historical and SYSOP (*without* Basslink) baselines:

MB: *The concept of no net Basslink environmental impact; can you elaborate on what that is? Where it comes from and what it means?*

HL: *What it means is that Basslink, any Basslink changes would be assessed against the present variability. No net Basslink impact we've defined as impacts under or ecosystem responses under a Basslink flow regime would stay within the present boundaries of ecosystem response under existing flow regulation, taking into account the inherent variability under present conditions. So we're talking about boundaries and taking into account presently occurring long term trends. Our instructions in the guidelines were to assess impacts of changes to hydro-power generation so we're trying to separate out what would happen without Basslink and what would happen with Basslink. Aspects of the ecosystem aren't in equilibrium, so we need to understand what are these presently occurring trends to separate out what the Basslink trends would be on top of those.*

MB: *So what do you mean by boundaries? ... So taking for example, river bank vegetation, how would you define boundaries of damage in that context?*

HL: *Spatial boundaries for a start, so the boundaries are to some degree quite well defined now in terms of what height on the river bank is*

affected by the power station. There's a plimsoll-line and a height above it we can say to what height the regulated flow influences the river bank. So there's one boundary, a spatial boundary. The other is, the other aspect of the vegetation is needing to understand the long-term presently occurring trends that we are getting. We have issues with, you know, recruitment to the area of power station influence and some species thrive under this regulated flow regime and others don't. So there will be a long period of adjustment that we're in the middle of and this is something Neil Davidson will expand on when he gives his presentation.

MB: *I'm not so much interested in the detail as trying to get an idea of how you set the boundary. So, OK, you've got a boundary on the river bank which is the extent of, you know, in a very high flow, it might go up very high, but under Basslink if that frequency changes so that you get more high flows and more damage but still within the boundary, is that no net impact.*

JAP: *That'll come out of your investigations.*

MB: *No, I'm asking for a definitional; this is a definition I'm asking for.*

JAP: *Well, I think it's very difficult for her to be able to define some of these things, because, they've done a significant amount of preliminary work. When you read through the whole of the reports and the analysis, and some of these elements will obviously be expanded as the investigation and the data comes to hand and you can't at this stage give a definition, it's more a philosophical approach which I think's been outlined here, isn't it? ... Influences that may lie within the analysis and at this stage to try to be prescriptive in terms of boundaries, I think, is inappropriate. You're dealing with generalities and they'll be ongoing in terms of the areas which are being investigated as it's refined and moved through a six year period of time. I would have thought that the objectives and aims of what the monitoring plan was about and the analysis is the main thing that we should be interested in.*

MB: *The point that I'm interested in is that the concept of no net impact has been introduced. It is crucial for World Heritage where the test is, not about no net impact, it's about likely to damage or destroy, and that's what I'm trying to draw out. What is the relationship between those two concepts. If you say that boundaries is what is important and not about the pattern within those boundaries, that's the question I'm trying to get a response to.*

HL: *I think we're mostly focused on the boundaries. The boundaries of Basslink impact are very similar to the boundaries of present impacts. There's a spatial zone of impact in the river that shows changes to flows and ecosystem response and there's a, there are community changes as well.*

MB: *So, just to wrap it up, if I'm understanding you correctly then, to say that your definition of no net Basslink environmental impact is about no change in the boundaries, not about changes in patterns within those boundaries.*

HL: *I really couldn't answer that right now. I think that we move closer to that point with time.*

It can be seen from this exchange that whilst HT has undertaken a considerable amount of work to separate out existing from Basslink impacts, the two are conflated by the narrative about the state of the Gordon River and the construction of its ecological components as not having reached equilibrium. Together, they reify the river's 'natural' destiny as a repeat of the past (MacKenzie 1990:169).

This exchange also confirms, once again, HT's focus on two boundaries for present operations. The first exists in the physical environment and is visible at the plimsoll-line on the river. The second is defined by SYSOP. The delineation of these two boundaries is also explicated in HT's clarification on the riparian vegetation update report:

It is necessary to understand that the vegetation report predictions were from the present condition [ie Historical] to a future condition with Basslink in operation [ie TEMSIM], NOT taking into account presently-occurring trends [ie SYSOP]. The aspect of the Basslink change which had the most implications for the vegetation was the percent of three turbine use. The conclusions were drawn from a two year Historical-TEMSIM comparison (1997-98), during which period there were load constraints limiting the power station maximum discharges. As with the fluvial geomorphology, it must be recognised that the state of the riparian vegetation is not in equilibrium with the regulated flow regime (Locher 2001b:55).

The linkage of the story about load constraints at the Gordon Power Station with the construction of the Gordon River as not in equilibrium blends the past into the future and legitimises an acceptance of the categorisation of the gap between Historical and SYSOP as "long-term presently occurring trends". It is within this context that Ian

Lonie (audio evidence, 12 October 2001) was able to claim that there would be no damage from Basslink beyond “present operations” and that Basslink operations “will be maintained within the current boundaries of the existing operations”.

As detailed above, the end-point of what HT has defined as “long-term presently occurring trends” is a plimsoll-line at around 4.0 metres above LWM, at least 1.5 metres higher than what currently exists at around 2.5 metres and below which vegetation will be dead (Davidson and Gibbons 2001a; 2001b). This scenario allows HT to make up for generation lost in the past due to load constraints. On this basis, the notion of equilibrium explained away the change in scale that occurred with the introduction of the SYSOP baseline and the substantial gap that exists between these two *without* Basslink baselines.

Translocating Evaluation into the Future

The exchange between The Greens and Locher also illustrates the success of HT’s narratives and constructions, with at least one member of the JAP who endorsed a shift in the evaluation of the impacts into the future, based on HT’s commitment to monitoring and adaptive management. Consequently, The Greens’ attempt to identify a trigger for an invocation of the WHPC Act was thwarted. Assessment in this respect was effectively positioned outside the process and delayed in time, potentially until after the impacts will have occurred, at which time an adaptive response can be considered. This relocation which was assisted by a construction of the river as not in equilibrium and the story about load constraints.

It has been shown that the notion of no net Basslink impact mobilises and is mobilised by the three narratives and constructions of the model outputs and the Gordon River set out in Chapter 6. It embodies the contingencies of the TEMSIM model, the SYSOP baseline and the comparison of the two. Importantly, the reconfiguration of these narratives and baselines into the definition of "impact that remains within the present boundaries" and "long-term presently occurring trends" (Bludhorn 2001:5) reconciles the gap between the two *without* Basslink baselines.

Evidencing the Inapplicability of World Heritage Convention Legislation

No net Basslink impact was useful for HT in obtaining affirmative advice on the interpretation of the WHPC Act. In response to a legal opinion from David Haigh, Senior Lecturer in the School of Law at Queensland's James Cook University, submitted to the JAP by The Greens, about the illegality of Basslink, HT briefed Gavan Griffith, a Queens' Counsel and former Solicitor-General of Australia with a *curriculum vitae* of formidable qualifications and knowledge of issues related to the World Heritage Convention and its application.

Griffith was briefed after HT had carried out the new modelling. He was asked by HT to respond to the assertions of Haigh and to advise on the interpretation of the WHPC Act. The opinion of Griffith (2001:4) was "based upon these given facts and assumptions":

For the purpose of this opinion I have been instructed that the expected effects of relevant changes to the pattern of operation of the Gordon Power Station are–

- (a) increases in the annual number of power station on and off events and percentages of annual power station shutdowns with more winter utilisation of the power station;
- (b) that the aspects of the environmental condition of the Middle Gordon River identified as potentially affected by Basslink

change, in the absence of mitigation measures, are riparian vegetation, macro-invertebrate communities, fish and condition of river banks;

- (c) that the degree of change in the hydrology and in the environmental impacts is incapable of exhaustive quantification because of a range of uncertainties as results of hydrological comparisons differ depending on the baseline utilised and the time period selected, notably for the duration of three turbine power station discharge. Given these uncertainties, the approach to the Basslink IIAS investigations is considered conservative and the Basslink impacts over-estimated;
- (d) that mitigation measures were defined based on the outcomes of Hydro's IIAS and further investigations, and comprise a minimum environmental flow and a ramp-down rule for the Gordon Power Station. With mitigation measures it is concluded that Basslink is likely to result in some (possibly unquantifiable) adjustments to present environmental indicators. However, such adjustment is predicted to be within the boundaries of present variability and current long-term occurring trends of these indicators. This conclusion is based on:
 - the determination from the IIAS investigations of the boundaries of present modifications from the natural conditions, although the full range of present variability and the rates of presently-occurring trends is not as of yet fully understood;
 - the understanding of Basslink hydrological changes within a range determined by different approaches to comparison of these changes;
 - the understanding of model characteristics that over-accentuate aspects of Basslink change;
 - the understanding of variability in baseline and Basslink conditions over long periods encompassing a range of hydrological variability, provided by updated model comparisons;
 - the understanding of the processes that the mitigation measures address;
 - the recognition that the Middle Gordon River is a managed river and that flow patterns can be managed to achieve desired environmental outcomes; and
 - the knowledge that the mitigation measures which have been identified are appropriate to the processes that they are intended to address, and that there is adequate scope for refinement of these measures if required;
- (e) that an extensive monitoring program, guided by a monitoring and adaptive management plan, has been commenced. This will continue after Basslink. Survey and monitoring work over the next three years (prior to the commencement of Basslink) will further define the boundaries of influence of the existing

- flow regime on key environmental indicators in the Gordon River, with the expectation that these will be presented to the Minister administering the Water Management Act 1999, being the Minister for Primary Industry, Water and Environment, to enable agreement to be reached on the limits of acceptable change and environmental outcome targets to contain Basslink impacts within the existing operational boundaries;
- (f) that the proposed adaptive management plan has the objective of “no net Basslink environmental impact”. This is defined by Hyro as *“impact that remains within present boundaries, recognising the inherent variability in the environmental indicators as well as long-term presently occurring trends”* (Griffith 2001:2-3).

HT’s stories about load constraints, the TEMSIM model bias and the state of the Gordon River, together with constructions of the model outputs as overstated and the river as already substantially degraded, coalesce here in the notion of no net Basslink impact. All are evident and were accepted from HT by Griffith as the ‘facts’ of the matter. He concludes:

My opinion is based upon these given facts and assumptions. Section 10 consents obviously would be required if the present expectation of no net Basslink impacts is not realised. However, on the basis of my instruction I take it that consents under section 10 are not presently required for the reason that there will be no additional or different impact under Basslink (Griffith 2001:4).

Griffith maintained that the WHPC Act would only apply to what he termed the “proclaimed stretch” of the TWWHA (ie HT’s Zone 5) (Griffith 2001:4; Clayton Utz 2001b:4). Griffith further claimed that given the ‘facts’ from HT, that there would be no net damage to this area, consent should not be required by the Commonwealth government.

Evidently, no net Basslink impact was a useful discursive device for HT’s legal team. It encapsulated HT’s entire case, without being explicit about the baselines, the contingencies and the disjuncture between them. In summarising Griffith’s advice, Clayton Utz stated:

The section [10 of the WHPC Act] would regulate “any damage” to the proclaimed section. The further studies undertaken by Hydro Tasmania, summarised in the *Overview Report* prepared by Dr Helen Locher, conclude that **no net Basslink impacts** are anticipated in the proclaimed section of the Gordon River, meaning that impacts remain within boundaries of the present operation. The impacts of changes from power station operations under Basslink progressively decrease the further down the Gordon River from the Dam tailrace. The proclaimed section of the Gordon River is in Zone 5 (2001b:4).

Griffith expressed the view that the monitoring program would test HT’s claims about the potential Basslink impacts on the proclaimed stretch, and if this expectation was not realised, consent would then need to be obtained. Of course, under these circumstances, an application for consent would be made after damage had occurred – an extraordinary outcome of legislation designed to protect against the killing, cutting down or damage to “*any tree on any property*” (Clayton Utz 2001b:4, emphasis added).

Having defined the scale of the predicted impacts within the bounds of no net Basslink impact, HT was able to argue that Basslink impacts would not be significant. Consequently, HT could justifiably argue that Basslink did not invoke the WHPC legislation. Thus, it could also be claimed that the integrity of the WHA would not be compromised by Basslink and, in fact, it would be enhanced.

Evidencing Compliance with the Tasmania Wilderness World Heritage Management Plan 1999

The notion of no net Basslink impact was also utilised in explaining the consistency of HT’s Basslink commitments and the objectives of the Tasmania Wilderness World Heritage Management Plan 1999 (TWWHMP). Clayton Utz (2001b:14) drew attention to objectives three and four of the management plan, namely:

Objective 3

to identify and take appropriate protective action to prevent, mitigate or manage within acceptable limits, adverse impact on, or threats to, the world heritage and other natural and cultural values of the WHA;

Objective 4

to conserve the values of the WHA in a manner consistent with their natural and cultural significance, and where appropriate, feasible and sustainable, to rehabilitate or restore degraded values. In particular to:

- 4.1 maintain or restore natural diversity and processes
- 4.2 maintain or enhance wilderness qualities
- 4.3 maintain or enhance environmental quality and
- 4.4 maintain or enhance landscape quality ...

Clayton Utz (2001b:14-5).

Impacts “within acceptable limits” (Clayton Utz 2001b:7), in accordance with Objective 3, were an issue that received particular attention and which was well served by the concept of no net Basslink impact. On the basis of Kriwoken’s conclusion that “acceptable limits must take into account the Gordon Power Station’s right to operate”, Clayton Utz state:

In light of the further scientific studies and Hydro’s “no net Basslink impact” commitments (including adoption of the minimum environmental flow, ramp down rule, monitoring and adaptive management plan), Dr Kriwoken concluded in his report to the JAP that “*the Basslink project falls within acceptable limits and does not threaten the overall integrity of the TWWHA*” ... (2001b:7).

Expanding upon the above objectives, Clayton Utz also point out concessions made in the TWWHMP about how impacts “may be acceptable”:

there may be some situations where the containment or control of processes or other factors may be beyond financial and/or management capacity of the managing authority (Clayton Utz 2001b:15 citing from the TWWHMP).

In relation to Objective 4, Clayton Utz paraphrased, stating that the TWWHMP “acknowledges that some areas of the WHA have been degraded by past human activities including ... hydro electric development”, and citing from the TWWHMP that “it is also recognised that in some cases past actions or their ongoing impacts cannot practicably be reversed” (2001b:15). Of course, whilst it might not be practicable to

reverse impacts that have already occurred, it has been shown that HT intends to cause impacts under the pretext that they are already occurring, when they are not, or that they are inevitable, when this is not necessarily the case.

Within the context of the concessions made in the TWWHMP, Clayton Utz conclude:

To the extent that the Management Plan may be relevant to the monitoring and management impact of Hydro's existing and Basslink operations (restricted to those areas within the TWWHA), it is significant that the key objectives are expressed to prevent, mitigate or manage within "*acceptable limits*" and can serve in a consistent manner, and rehabilitate where "*appropriate, feasible and sustainable*". In this context, it is submitted that Hydro's monitoring and mitigation objective of "no net Basslink environmental impact" is consistent with the objectives of the Management Plan (Clayton Utz 2001b:16).

We can see that the concept of no net Basslink impact aligned Basslink with the management objectives of the TWWHMP and the provisions of World Heritage Convention legislation. These representations were accepted by the JAP. I do not think this would have been possible with the argument set out in the first WHA report (Kriwoken 2001a), that the potentially impacted significant features were not unique and well-represented elsewhere. For instance, this argument was rejected out-of-hand by Environment Australia, the Commonwealth government's environmental agency:

The fact that some or any of these values may be found elsewhere within the TWWHA does not diminish their world heritage significance. This view is embodied in section 12 of the *Environment Protection and Biodiversity Conservation Act 1999*. Hydro Tasmania's Appendix 14 to the IIAS takes a reductionist approach when claiming that any impact on world heritage values as a consequence of post-Basslink flows 'will not substantially impact on the overall integrity of the TWWHA (Environment Australia 2001:no page).

With the operationalisation of the no net Basslink impact concept, it can be expected that riparian vegetation, and the geofluvial deposits it holds in place, between 2.5 and 4.0 metres above LWM could be lost and attributed to existing or what could be termed

‘inevitably-occurring operations’, not Basslink. It is difficult to see how this outcome would accord with the spirit of the TWWHMP or the WHPC Act.

Evidencing Sustainable Development

No net Basslink impact was drawn on again to link HT’s Basslink commitments with the requirements for sustainable development, in accordance with the objectives of the Tasmanian Resource Management and Planning System. HT states:

Basslink is an excellent example of promoting sustainable development of Tasmania’s water resources. Hydro Tasmania is committed to no net Basslink impact, with present condition of the waterways as a baseline (HEC 2001d:17).

In meeting the objectives of the *Water Management Act 1999*, HT states:

The Gordon River downstream of the Gordon Power Station hosts a functional but modified ecosystem. With mitigation measures in place and the commitment to adaptive management, ecosystems will remain within the boundaries of present variability and long-term presently occurring trends. It is likely with the instream biota that there will be some adjustments in community composition but these are unlikely to fall outside the present range of variability. The Gordon River riparian vegetation is affected by present power station operations within a defined zone, within which the ecosystem is significantly altered by flow regulation. This zone of influence does not change with Basslink operations (HEC 2001d:23).

The proposition of no net Basslink impact was useful and persuasive in validating the regulatory commitments proposed by HT and, importantly, aligning them with Tasmania’s legislative objectives.

Evidencing an Application of the Precautionary Principle

The precautionary principle received special mention from the Basslink proponents at the public hearings. This was in response to many public submissions arguing for its invocation on the basis that there were too many unknowns with the Basslink project. As detailed, the proponents argued that Basslink would not have significant environmental impacts and their scientific evidence sought to demonstrate this; any

impacts that were likely could and would be mitigated. The proponents argued that the precautionary principle did not mean that a project should be postponed until there was scientific certainty, but that in decision-making a “cautious approach” was required, which was the intent of the Basslink process (Gough 2001:22; Stuart Morris, Counsel for BPL, audio evidence, 2 October 2001).

HT argued that its mitigation measures were in accordance with an application of the precautionary principle and maintained:

Hydro has acknowledged the lack of ability to fully quantify ecosystem response to Basslink changes to its hydro power generation systems. However, the aspects of hydrological change are well-understood within an acceptable range of certainty and the nature of the ecosystem response up to a worst case identified. In accordance with the precautionary principle, Hydro has proposed a range of mitigation measures to mitigate potential impacts. In addition to the mitigation measures proposed by Hydro Tasmania, Hydro proposes to provide, through its adaptive management plan, for ongoing monitoring and assessment of impacts to ensure that decisions *are ‘guided by a proper process of evaluation to avoid damage and of assessment of the consequences of possible choices’* (per Cox CJ, *R v Resource Planning and Development Commission*). Importantly, further management tools are known which can be considered for application if the adaptive management regime shows this is warranted. Again, it is beyond question that Hydro Tasmania’s rigorous and extensive approach to the IIAS investigations (30 IIAS reports and 16 further reports) and its mitigation and adaptive management commitments are fully consistent with the precautionary principle (Gough 2001:24).

These are persuasive arguments. Enough is known about the riverine ecosystem responses to be confident that the chosen mitigation measures are adequate. The most extreme case has been identified. The prospect of additional mitigation measures is raised if it is found later that those committed to have failed, and the extent of HT’s investigations justifies its position.

In terms of mitigation, however, its effectiveness is questionable given HT's attempts to modify the crucial components of the minimum environmental flow, and that the advice HT received in this respect was based on a compliance site at the Gordon Power Station, not upstream of the Denison River, HT's reference point. Assurances about mitigation are further eroded with the revelation that the restriction of the most damaging discharges on the river (ie greater than 240 cumecs), reflected in the TEMSIM-SYSOP modelling and set out in Peterson and Locher (2001b), is merely a model derivative and not a committed mitigation measure.

REGULATORY OUTCOMES AND INSTRUMENTS

In the previous section I have explained how HT's narratives, and the constructions they mobilised, coalesced in the concept of no net Basslink impact. I then described how this concept was used by HT to interpret World Heritage Convention legislation and the precautionary principle and to align Basslink with Tasmanian resource management legislation and sustainable development objectives. In the following section I turn to the regulatory outcomes of the process and identify where the narratives and constructions already identified became embodied in the process regulatory outcomes. This is in line with the final step of the methodology of Macnaghten (1993), set out in Chapter 3, which suggests an analysis of the interplay of argumentative strategies (read as narratives) and process outcomes. To do this, I will review the changes made to the provisions of HT's Special Water Licence outlined in the *Gordon River Basslink Monitoring Program and Adaptive Management Plan* (Bludhorn 2001) and the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* approved by the JAP in its *Final Panel Report* (JAP 2002b:Appendix 18).

Monitoring, Reporting and Disclosure

The means by which HT's mitigation commitments, that is, the minimum environmental flow, the ramp-down rule, and the adaptive management and monitoring program for the Gordon River have been made binding is by their incorporation into HT's Special Water Licence, granted to HT by the Minister for DPIWE under the *Water Management Act 1999*. Bludhorn (2001:7) explains some specifics of the licence:

The Water Licence is a legally enforceable document which, inter alia, establishes a sustainability and compliance monitoring regime that requires Hydro Tasmania to monitor and report to the Minister on a wide range of matters such as water quality, flow, power station discharge, lake levels and biological indicators (Bludhorn 2001:7).

In terms of monitoring, first, HT proposes to undertake three years of pre-Basslink monitoring, the purpose of which is to understand the "present condition, trends, and spatial and temporal variability of potentially Basslink-affected aspects of the Middle Gordon River ecosystem" (Bludhorn 2001:6). Second, six years of post-Basslink monitoring would be undertaken to "determine the effects of Basslink operations and to assess the effectiveness of mitigation measures" (Bludhorn 2001:6). Third, "long-term datasets" would be obtained to "allow refinement of theories and more precise quantification of spatial and temporal variability, processes and rates" (Bludhorn 2001:6). At the end of each twelve month period, both pre- and post-Basslink, HT will prepare a 'Gordon River Basslink Monitoring Annual Report'. This report "will include succinct analysis and discussion as appropriate to the aims of the mitigation, monitoring and adaptive management" and in September of each year it will be provided to the Minister for DPIWE and the Commonwealth Minister who administers the *Environment Protection and Biodiversity Conservation Act 1999* (Bludhorn 2001:7).

These reports will be public documents and after publication of the report HT will meet with the Minister for DPIWE to discuss the findings (Bludhorn 2001:7).

Utilising the pre-Basslink monitoring information, and prior to the commencement of Basslink, HT will also prepare a 'Gordon River Baseline Report'. Bludhorn explains that this report will:

- present trends from the first three years of data (including data from the IIAS investigations) based upon full monitoring information;
- discuss if and how the data changes the present understanding from the IIAS, Update and Supplementary Reports for JAP Hearings, and previous Gordon River Basslink Monitoring Annual Reports;
- evaluate the adequacy of Gordon River Basslink Monitoring Program and analytical methods and if necessary propose refinements;
- evaluate the spatial and temporal influences on the data trends and results, and discuss their implications;
- evaluate the appropriateness and effectiveness of the proposed mitigation measures based on this further data;
- discuss whether a reconsideration of the mitigation measures is warranted;
- make recommendations if appropriate; and
- consider, and if appropriate and practicable, define "limits of acceptable change" and "environmental outcome targets", which recognise the regulated nature of the Gordon River (Bludhorn 2001:8).

For six years after the commencement of Basslink, at two three-year intervals, HT will also prepare a 'Gordon River Triennial Report', which will also be public documents provided to State and Federal governments as outlined above. The triennial report will consider the issues of the Baseline Report set out above as well as "reconsider the appropriateness of any defined limits of acceptable change and environmental outcome targets" (Bludhorn 2001:8).

The expected environmental impacts in relation to fluvial geomorphology, riparian vegetation, macroinvertebrates and fish, which the mitigation commitments are designed to minimise, are presented in the *Gordon River Basslink Monitoring Program and Adaptive Management Plan* (Bludhorn 2001) as they appear in the DIIAS. Hence, the stories about load constraints at the Gordon Power Station, the TEMSIM model bias and the Gordon River, as well as the constructions they mobilised, are incorporated into this management plan. For instance, accompanying each qualification that the model outputs are “believed to be over-estimated” (Bludhorn 2001:4) is a footnote about the updated modelling, which states:

Further modelling work shows that there is negligible departure in the percent of full capacity power station discharge between the ‘with Basslink’ and ‘without Basslink’ scenarios. See the Update Report for the JAP hearings entitled “Gordon River Basslink Modelling and Hydrology Update Report” (Bludhorn 2001:4).

As detailed earlier, there are two components to reaching the position of a “negligible departure”. Specifically, the TEMSIM-SYSOP (*without* Basslink) comparison quantifies the load constraints at the Gordon Power station and effectively takes up a large proportion of the high flow discharges from the *with* Basslink (ie TEMSIM) side of the baseline equation. The other is the TEMSIM model bias which the *Gordon River Basslink Modelling and Hydrology Update Report* (Peterson and Locher 2001a) does not quantify but which continued to qualify representations of expected impacts.

HT highlight a number of disclosure mechanisms embodied in its monitoring and management program. Under the water licence, the Minister for DPIWE can request an independent audit of HT’s monitoring systems. In addition, in the absence of agreement with HT about changes to the water licence in respect of the Basslink monitoring program, the Minister for DPIWE can act independently on a

recommendation of an advisory committee to be established under Section 116 of the *Water Management Act 1999* (Bludhorn 2001). To demonstrate HT's commitment to disclosure, and presumably to make the point that, unlike the past, it is now subject to regulatory oversight, Bludhorn concludes:

The inclusion of the mitigation measures, the Gordon River Basslink Monitoring Program and the adaptive management regime as legally enforceable conditions of Hydro Tasmania's Water Licence reflects a best practice environmental management approach to dealing with Basslink consequential riverine impacts. The Water Licence is also transparent as Hydro Tasmania has undertaken to make all Gordon River Basslink Monitoring Annual Reports, the Gordon River Baseline Report and Gordon River Triennial Reports public documents. Importantly, breach of a condition of the Water Licence is an offence, which confers upon third parties civil enforcement rights (2001:9).

JAP's Rejection of 'No Net Basslink Impact'

As noted in the introduction of this chapter, the JAP explicitly rejected the notion of no net Basslink impact. This was on the basis that it was "predicated on uncertainty" and "extremely difficult, if not impossible, to extricate existing impacts from Basslink impacts" (JAP 2002b:366). However, the proposition of no net Basslink impact is underpinned by the TEMSIM-SYSOP comparison; a rejection of the former would invalidate the latter and the conclusions derived therefrom. Consequently, despite its dismissal of no net Basslink impact, the JAP validated it indirectly with its acceptance of the TEMSIM-SYSOP comparison. It accepted the TEMSIM-SYSOP comparison with its determination that mitigation "will effectively reduce impacts from Basslink operations to those currently occurring under existing power station operations" (JAP 2002b:367). It was shown in Chapter 4 with the mitigation of full-gate Basslink flows does not come into close range of the Historical baseline. Hence, claims about the effectiveness of mitigation are dependent on a comparison with SYSOP. The JAP's assessment of HT's mitigation is also problematic on the basis that, according to the

modelling (Peterson and Locher 2001b), whilst full-gate discharges are restricted, this is not the case for efficient load discharges (greater than 210 cumecs). In any case, both of these scenarios are model derivatives and, importantly, HT made no commitment to limit either of the full capacity discharges.

Notwithstanding this, the JAP did, in effect, endorse the no net Basslink impact concept. It did so with its approval of HT's adaptive management and monitoring program annexed to the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* contained in the JAP's *Final Panel Report* (2002b)¹¹⁷. The following wording appears in Schedule 4 Pre-Basslink Commitments and Schedule 5 - Post-Basslink Obligations (JAP 2002b:Appendix 18).

The aims of adaptive management are:

- a) To make changes to the Gordon River Basslink Monitoring program as needed, to optimise the information gained; and
- b) To assess, and if necessary and practicable, make changes to the Mitigation Measures or implement other management strategies which seek to achieve no nett Basslink impact, which term is defined to mean impact that remains within the present boundaries, recognising inherent variability in the environmental indicators as well as long-term present occurring trends.

Notably, the aims of adaptive management changed somewhat from their initial articulation in Bludhorn (2001) where they were set out as follows:

1. To ensure timely responses to the information arising from the monitoring program;

¹¹⁷ The Final EIS and Supplement to the DIIAS (NSR Environmental Consultants Pty Ltd 2002:29) notes that representatives from HT, DPIWE and Environment Australia met "frequently" after the 2001 public hearings to discuss the terms of the Deed drafted by HT to change its water licence (JAP 2002b:Appendix 18). A revised version of the Deed arising from these meetings is Appendix G to the Final EIS and Supplement to the DIIAS (NSR Environmental Consultants Pty Ltd 2002). In respect of the excerpts from the Deed discussed here, the only changes relate to the insertion of quotation marks around words such as "conflicts" and "limits of acceptable change". The RPDC's final recommendation to the Premier and Minister for State Development was to amend HT's water licence as proposed in Appendix 18 of the *Final Panel Report* (RPDC 2002:5).

2. To make changes to the monitoring program as needed to optimise the information gained in terms of the mitigation and monitoring aims; and
3. To assess, and if necessary and practicable, make changes to the mitigation measures or implement other management strategies (Bludhorn 2001:7).

The goal of a “timely response” (Bludhorn 2001:7) to information has been removed. Also, necessary and practicable changes to the Mitigation Measures, which is a defined term in the Deed and, therefore, relates only to the minimum environmental flow and the ramp down rule, have been set within the bounds of no net Basslink impact. This means that an evaluation of impacts and decisions about changes to mitigation would have to ignore impacts between 2.5 and 4.0 metres above LWM along the river, which have not yet occurred, as they are marked out by the SYSOP (*without* Basslink) baseline, and categorised as part of “long-term presently occurring trends” (Bludhorn 2001:5).

Hence, the construction of the river as not in equilibrium, embodied in the story of the state of the Gordon River, and the concept of no net Basslink impact, which was linked to stories about load constraints and the TEMSIM model bias, have made their way into the regulatory outcomes of the impact assessment process. This is confirmed in the *Gordon River Basslink Monitoring Program* endorsed by the JAP in its *Final Panel Report*, where it is stated:

The aim of the Gordon River mitigation package accompanying Basslink is no net Basslink environmental impact, and hence no Basslink-related impacts to WHA values. No nett Basslink impact is defined as impact that remains within the present boundaries, recognising inherent variability in the environmental indicators as well as long-term present occurring trends (JAP 2002b:Appendix 18, Attachment 3, Part 2, clause 2).

Given the extent to which HT’s legal case for Basslink in terms of the World Heritage Convention legislation ended up resting singly on the concept of no net Basslink

impact, and the multiple stories and constructions to which it was inextricably linked, it could hardly be set aside. Indeed, assurances that there would be no net Basslink impacts was a determining factor in the final assessments of Kriwoken (2001b) and Griffith (2001) in respect of this legislation.

Management Restricted by ‘No Net Basslink Impact’ Limits

Stories about load constraints at the Gordon Power Station, the TEMSIM model bias and the state of the Gordon River and the constructions they mobilised will become linked to the physical environment on the Gordon River by the requirement for HT to submit a Draft and Final *Basslink Baseline Report* to the Minister for DPIWE, four months prior to the commencement of Basslink for the former and two months prior for the latter. The requirements are as follows:

The Licensee must, no later than four months prior to the Basslink Commencement Date, subject a draft report to the Minister, which draft report must:

- present trends from all consolidated data collected subsequent to the Licensee’s IIAS investigations;
- evaluate the adequacy of the Gordon River Basslink Monitoring Program and if necessary propose refinements;
- evaluate the appropriateness of the proposed Mitigation Measures based on this further data; and
- consider, and if appropriate and practicable, propose limits of acceptable change for each of the key scientific disciplines which: are consistent with the aims of adaptive management [ie no net Basslink impact]; recognise the regulated nature of the Gordon River; and recognise the potential for conflicts between the management objectives of difference disciplines (referred to as the Draft Basslink Baseline Report) (JAP 2002b:Appendix 18, Attachment 2, Schedule 4, Pre-Basslink Commitments, clause 1.3(b)).

Hence, limits of acceptable change for the ecological components of the river are to be determined within the boundaries of no net Basslink impact. Again, this means that the spatial boundary set by discharge outputs of SYSOP will define presently or, rather, ‘inevitably-occurring operations’, that is, between 2.5 and 4.0 metres above LWM.

Additionally, judgments about the limits of acceptable change will be contextualised by HT's story about the river's past. This will ensure that unrealistic benchmarks such as 'pristine' and 'natural' will not hinder future evaluation processes¹¹⁸.

Trade-Offs

The concept of trade-offs has also been incorporated into the *Gordon River Basslink Monitoring Program*, where the following is stated:

The potential for conflicts in management objectives between scientific and other disciplines must be recognised – any limits of change set for the Gordon River may ultimately represent a trade-off between disciplines (JAP 2002b:Appendix 18, Attachment 3, Part 2, clause 2.4).

In the outline of the duties of the Scientific Committee, which is to be established under the *Water Management Act 1999*, it is stated:

In performing its functions, the Committee must:

- (a) only consider issues associated with the mitigation of Basslink impacts; and
 - (b) recognise the potential for conflicts in management objectives and the need for trade-offs between scientific disciplines
- (JAP 2002b:Appendix 18, Attachment 3, Part 2, clause 4.1.12).

The notion of trade-offs between scientific disciplines, which I have argued derives from the construction of the river as substantially degraded and which is mobilised by the Gordon River narrative, gives HT priority-use of the river. If it is found that full-gate discharges from the Gordon Power Station are not restricted as depicted in (Peterson and Locher 2001b), or that full capacity discharges are not over-estimated as envisaged by the TEMSIM model bias story, it might be expected that this clause would allow the Scientific Committee to consider the issue. However, this is unlikely as

¹¹⁸ Provisions are the same for the final Basslink Baseline Report, but there is an additional requirement that the report should respond to any submission received from the World Heritage Area Consultative Committee, which is to be provided with a copy of the Draft report by HT and invited to comment within 28 days.

mitigation measures are specifically defined as the “proposed minimum environmental flow and the ramp down rule” (JAP 2002b:Appendix 18, Attachment 2, Schedule 4, clause 1.1). Given that the restriction of full-gate discharges is not a mitigation measure, but a product of the modelling, it would be possible for HT to argue that this issue and its environmental impacts are outside the mandate of the Scientific Committee. This would leave the issue in the hands of the Minister for DPIWE and HT, both of which will have an economic interest in not limiting discharges from the Gordon Power Station, which will be generating exports and revenue across Basslink.

Disclosure and Compensation

There are two other issues to note with regard to the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* (JAP 2002b:Appendix 18). First, in this Deed annexed to the *Draft Panel Report*, it is stated:

The results of all monitoring and analysis required to be undertaken pursuant to this monitoring program must be presented in the relevant Gordon River Basslink Annual Report (JAP 2002a:Appendix 18, Attachment 3, clause 3).

In the Deed annexed to the *Final Panel Report* (JAP 2002b), the word *all* has been deleted. This allows scope for HT to pick and choose what results are to be included in the annual reports it prepares.

Second, the JAP notes in its *Final Panel Report* that according to the *Water Management Act 1999*, amendments to the water licence between HT and DPIWE, which would be required to modify the agreed Mitigation Measures after Basslink begins operation, for example, to change the volume of the environmental flow or the provisions of the ramp down rule, “may give rise to compensation claims by ... Hydro Tasmania” (JAP 2002b:394). Again, in the event of unforeseen environmental impacts after Basslink

begins operation, the Minister for DPIWE, who is the only person other than representatives of HT with the authority to change the licence agreement, would be discouraged from altering the Mitigation Measures or developing new ones as the government would have to compensate HT for any loss in revenue.

Conclusion

It was shown in Chapter 6 that narratives related to the state of the Gordon River, the TEMSIM model bias and load constraints at the Gordon Power Station mobilised multiple constructions of the model outputs and the Gordon River, and that different versions of these constructions were appropriated and applied in different contexts. It has been described here how these stories and constructions, initially advanced by HT, coalesced in the concept of no net Basslink impact, which was a useful discursive device drawn upon by HT's WHA environmental researcher, its legal counsel, its legal team and the JAP. Despite the JAP's explicit rejection of the concept, it is integral to the regulatory outcomes of the impact assessment process by its incorporation into the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* approved by the JAP (2002b:Appendix 18) and, thereby, the Tasmanian government.

Although HT did not get all that it wanted, for example, the '10/20' trial is still in question, it was successful on most fronts. With the concept of no net Basslink impact HT was able to define what is 'acceptable', which accords with its political, economic and organisational needs and expectations for the use of the Gordon River. With its adaptive management, monitoring and disclosure proposals it was able to move evaluation of the project's compliance with the World Heritage Convention legislation into the future, and potentially until after impacts have occurred. In this respect,

despite assurances about public documents, HT has managed to confine scrutiny of its use of the Gordon River to the administrative procedures of government bodies instead of the wider community. It has also constrained the scope of the Scientific Committee by being able to align the body's mandate with its imperatives in terms of no net Basslink impact, trade-offs and the specified mitigation measures. Indeed, HT has set the mark above which Basslink impacts are to be measured at least 1.5 metres higher than would have otherwise been the case if it had stayed with the Historical (*without* Basslink) baseline. And failing all of this, it has a change-discouragement mechanism to fall back on in the *Water Management Act 1999*, which will require the government to compensate HT if anyone changes their mind.

Chapter 8

THE CRITICS:

IGNORANT ILLITERATES OR PERCEPTIVE RECALCITRANTS?

Having reached the end of my narrative analysis, and before weaving together the threads of this thesis, this chapter will turn to the submissions from members of the Tasmanian public that were critical of the Basslink project. This review is embedded in a theoretical framework that explores the issue of “indeterminacy” (Wynne 1992a:114) outlined in Chapter 3, a concept of risk that elevates an understanding of the interaction of the natural and social worlds (Hellstrom and Jacob 2001) in the domain of regulatory science and policy to critical status.

It will be shown that members of the public critical of Basslink demonstrated an astute sensibility about the limits of knowledge and viewed claims from the proponents about their ability to predict and control impacts as overstated and indeterminate. The tension between what is presented by proponents to meet disclosure requirements and the extent to which “contextual factors” (Wynne 1996b:20), such as trust and the track record of proponents, have considerable bearing on people’s uptake of ‘scientific facts’ will also be considered. In light of what has been revealed in previous chapters, this chapter will, at least to some extent, vindicate the critics.

Of the 155 Tasmanian submissions received in response to the DIAS, more than 75 per cent were critical of the project, particularly its monopole sea-earth return technology.

Importantly, although most submitters entered into the scientific discourse of the assessment process by responding to impact issues raised in the DIAS, before signing off they made their heart-felt and most adamant thoughts clear. It is these snippets I found intriguing and where I identified an alignment with issues canvassed in the work of Wynne (1975; 1980; 1988; 1989a; 1989b; 1992a; 1992b; 1992c; 1996a; 1996b; 2001) and Irwin and Wynne (1996). It will be argued that, despite attempts by the proponents and their supporters to characterise them as 'ignorant illiterates', the critics would be better described as 'perceptive recalcitrants'.

In line with Irwin and Wynne (1996) and the many works of Wynne, my analysis reveals a gap between the normative ideals of transparency and disclosure of the 'scientific facts' that drive the impact assessment process, and issues that contextualise people's judgments, which are only tangentially related thereto. A submitter to the Basslink process, in response to the Draft Scope Guidelines (JAP 2000a), illustrates the tension:

Let's cut to the chase. People are fed up with being dished up this sort of grinding bureaucratic "consultative" process. If I were to restrict my comments to dispassionately pleading for certain rewordings and new clause inclusions, I would be tacitly and passively complying with this "grind down the opposition" approach to streamrollering yet another dubious large scale technological fix over an unsuspecting public. The proponents, especially the Tasmanian government (which should be neutral), are so far along the track of being publicly committed to the project, and sunk so much time and effort into glossy supporting literature, that Basslink already seems to have developed an enormous momentum, and ordinary citizens are presumably supposed to feel yet again disempowered and hopeless that this "unstoppable" project could on common-sense and even economic grounds be killed off (Sub.T.15 2001).

In support of the many works of Wynne and of Irwin and Wynne (1996), people's insights were expressed as concern about the indeterminate nature of the proponents'

claims, disbelief about the benefits of the project, and scepticism towards the claimed level of impacts, future ramifications of the project and the motives of the proponents. In addition, there was a deep feeling of invalidation of their social identity, and anxiety about the lack of agency and loss of control that it was believed the project would bring.

Drawing the Boundaries

It was noted in Chapter 2 that the TCCI CEO branded critics as “hysterical and uninformed”. Further, in its final submission to the JAP, counsel for BPL states: “the case of those opposed to Basslink has largely consisted of assertion, concerns and comment, rather than hard nosed, objective, scientific assessment” (Freehills 2001c:3). In light of the STS studies of Jasanoff (1987), this statement can be characterised as a rhetorical ploy, or an exercise in boundary-work, intended to cast the proponents’ case as ‘scientific’ and, thereby, authoritative and neutral, in contrast to that of the critics’, portrayed as lacking in substance and partisan.

Process Inequity

Despite the intention, counsel’s comments highlight an inherent inequity of the impact assessment process. Proponents with extensive resources engage consultants to construct a case which is inevitably in their favour. The inequity of the process is brought into stark relief by Basslink, where members of the public were given 60 days to respond, in their spare time and without dedicated resources, to vast amounts of scientific information about environmental impacts, framed by the proponent and presented as the ‘facts’ in the DIAS; a document that stood over a metre-high. In respect of HT’s case, this included an additional eight update reports, seven

supplementary reports, and an overview report which were tendered before the public submission closing date. One critic's feelings were expressed in the following terms:

I had a look at your draft study and it was a major undertaking; one whole display stand taken up at the library! Thanks! ... I think you have tried to blinker us with so much material, and hoped that environmentalists would just give up and go away when confronted by this avalanche of stuff. ... Thanks for the information on 26 Victorian Acts, 18 Tasmanian Acts, 8 policies, etc, etc. Very interesting, but the gut feeling is that not one of them has been persuasive enough to make you see the folly of this deal (T133 2001).

The mammoth size of the DIAS was not viewed by submitter T133 as an exercise in transparency and disclosure, but a deliberate strategy to curb opposition to the project.

BPL specifically addressed the issue of equity and resources (Freehills 2001c:7). Ignoring individuals and The Greens, lawyers for BPL discussed "opposing submitters" in terms of organisations and government departments. Making reference to Duke Energy, for instance, it was noted this company had extensive resources at hand, coming to the hearings not only with "its lawyer and consultant, but also with its senior executives and, naturally, its publicity agent". It was also emphasised that government departments such as Environment Australia at the Commonwealth level, as well as DPIWE in Tasmania and the Department of Natural Resources and Environment in Victoria "have, or may be expected to have, the core competencies to assess a project such as Basslink and put at least one aspect of the public interest before the panel" (Freehills 2001c:7). The JAP too, with its secretariat and consultant, Brown and Root, was characterised as representing the public interest. On this basis, as far as the proponents were concerned, the process was not inequitable and the public interest adequately represented. To the contrary, it has been shown that opposing submitters were prevented from challenging the proponents' assumptions and social framings in

terms of the project's economic viability and, subsequently, the environmental impacts on the Gordon River, by virtue of the pervasive use of predictive modelling to substantiate the case for Basslink.

It is important to note that despite the contempt proponents have for their critics (and *vice versa*), and this was expressed in conversations at the Basslink hearings, approvals that proponents seek derive considerable legitimacy from the contribution of those critical of a project. If critics were excluded, decisions would not be publicly defensible. The importance of constructing this defensibility is illustrated in the *Draft Panel Report* (JAP 2002a) and the *Final Panel Report* (JAP 2002b), where issues raised by critics have been quoted, paraphrased and responded to. People's opposition has been used to demonstrate that matters of concern have been addressed with responses from the proponents and commentary from the JAP. As public disclosure documents, they are persuasive. Without the critics, the legitimacy and defensibility of the JAP's findings and the process would be diminished. Giving The Greens a seat at the hearings table was clearly important in this respect.

Raising Scientific Literacy

Opposition to a technological development is often recast by proponents and governments as an intellectual deficit in those critical of a project (Irwin and Wynne 1996). This leads to calls for peoples' scientific literacy to be raised so that they can respond more intelligently to science. It is assumed that if critics understood the 'facts', they will not oppose technological change (Irwin and Wynne 1996)¹¹⁹. The

¹¹⁹ This was the rationale of a report undertaken by the Australian Prime Minister's Science, Engineering and Innovation Council (PMSEIC) in 1999, which was called upon to consider "the issue of science and technology awareness in Australia" (PMSEIC 1999:1). Underpinned by the belief that "economic growth" is delivered by "technological progress", this report provides the government with recommendations for a

foundational premise is that scientific literacy will raise an acceptance of technological change. Contradicting this preconception are the findings of a survey on the acceptance of genetically-modified foods conducted in the European Union and presented at the 2000 UNESCO World Conference on Science. It indicated that the more scientifically literate people were about genetically-modified foods, the more hostile they were towards them (Lowe 2001).

When it is assumed that those who oppose technological change do not understand the 'facts', the task of overcoming resistance is viewed as one of educating people about the benefits of scientific progress and technological change. From this standpoint, the 'facts' are assumed to stand alone as final arbiters. Under these circumstances, resources would be channelled toward indoctrinating members of the public to accept predetermined goals and systems, based on the questionable premise that technological change is good for everyone and that proponents, scientists and governments will always act in good faith. A constitution of this distinction between scientific and lay knowledge elicits this form of response as it frames critics as deficient. Its effect is to devalue the input of critics, so that their submissions merely have to be suffered, but not taken seriously. This 'public understanding of science' discourse constitutes the 'public' as the problem (Irwin and Wynne 1996:8), which obviates reflection on the social framings that underpin assumptions about the purported benefits of technological change, and the motives of, for instance, proponents, scientists and

national strategy to raise the awareness and literacy of the Australian public in relation to science and the benefits of its technological products (PMSEIC 1999:1): "A society that has the flexibility to deal with ongoing rapid technological and other forms of change, will maintain its democratic institutions and will generate prosperity. Science literacy facilitates public acceptance of scientific and technological change. It is, however, important for people to feel comfortable with science as part of their lives and understand how it can improve their social and environmental well being. If we are to involve the community in debates about the use of science and technology, that community will need a high level of scientific awareness" (PMSEIC 1999:3-4).

technological entrepreneurs (Grove White and Wynne 1994). It is not recognised that knowledge claims, which can never be fully verified, have to be accepted on trust, both within and outside the domain of science (Yearley 1994:246). In the public domain, a dismissal of contextual factors, such as track record, future credibility and in whose interest a proponent will act when things go awry, diminishes trust (Wynne 1980; McDonnell 1997; Yearley 2000). It has been shown in the previous chapters that trust between actors was an integral factor in their construction of HT's case for Basslink.

Reframing Indeterminacy as Uncertainty

Within the context of his conceptualisation of risk as indeterminacy, Wynne (1992a, 1992c) argues that an expression of contextual factors is often misinterpreted by proponents as demands for zero-risk, which are easily dismissed by proponents and decision-making bodies as unrealistic. In contrast, he maintains this is not what people are reacting to. Rather, they are wary of inflated claims of prediction and control, which are inevitably conveyed by experts or proponents in their attempts to persuade people of the benefits of their proposals.

Wynne argues that in their rejection of or scepticism towards technological change, people are responding to a misplaced framing of issues by institutions, regulatory agencies and proponents as uncertainty, instead of indeterminacy. Wynne (1992c:277) maintains that an "[o]bsession with uncertainty rather than indeterminacy" has hindered the reflexivity which is necessary to appreciate the conditionality and open-endedness of scientific knowledge and its technological derivatives. The reason for this, Grove White and Wynne (1994:9) explain, is that the uncertainty frame is "tractable" and "soluble" in that it elicits a response to gather more information, call on

more experienced experts or to conduct further monitoring, instead of opening-up knowledge claims to scrutiny and analysis that an acceptance of indeterminacy would necessitate.

The incongruence of these two frames was illustrated at the Basslink hearings with an exchange between a member of the JAP and a public witness. The former sees the NEM forecasts as uncertain but manageable, whereas the latter views them as indeterminate:

JAP: At the end of the first page [of your submission] you indicate that there is no data on what will happen if Hydro Tasmania enters into the national electricity market as it would if Basslink is constructed. On what do you base that statement?

Witness: Nobody knows what other power generating facilities are going to be set up on the mainland ... those other power companies might then start selling power to Victoria at much cheaper rates than Hydro Tasmania provides with Basslink.

JAP: Are you aware that the proponent has undertaken a detailed appraisal of what would be the manner in which the economics of entry into the national electricity market would emerge?

Witness: But it can only be guesswork I would maintain.

JAP: Well it depends what you mean by guesswork, isn't it?

Witness: Because it's into the future.

JAP: Of course it's into the future, but people can make reasoned assessments at what's going to happen in the future.

Witness: I don't think they know, and I don't think they can do that, that's my opinion anyway.

JAP: OK, I won't pursue that any further.
(T76, audio evidence, 5 October 2001).

The witness is expressing doubt about the proponent's ability to predict the financial implications for HT when it joins the NEM. The submitter is not demanding zero-risk,

she is conveying her concern that the proponent's projections, although portrayed as knowable within reasonable bounds, are inherently indeterminate in that it is not possible to know, for instance, how competing market players will behave in the future. Hence, the witness recognises that the proponents have used a particular, yet contingent, social frame to derive their figures. From the witness's perspective, benefits of the project and assurances from the government that the project will be viable rest on modelling assumptions that are optimistic, naïve and assume too much about the future.

Changing Contexts and Deepening Conditionality

Important for this thesis is that when proponents engage (often multiple) consulting firms to develop an impact assessment statement for their project, the social framings that become obscured from view derive from a string of forecasts, projections and extrapolations made by a number of third parties across many areas of expertise. Hence, the assessment of impacts, presented as 'scientific' and, thus, determined by nature alone, is pervaded by considerable disjunctures between pre-figurative "constructions of society" (Irwin and Wynne 1996:8). This means that risks exist not simply as uncertainty and, as such, a gap in knowledge to be filled at a later date, perhaps with monitoring and strategies for adaptive management, but as indeterminacy which represents an underlying deficiency in the knowledge that underpins regulatory decisions.

Certainty Trough

Whilst a gap to be filled does not adequately describe the deficiency in the knowledge we have to rely on, distance is important. It was shown in Chapter 3 with the "certainty trough" (MacKenzie 1990:370) that the perception of the extent of uncertainty

and certainty depends upon proximity to the production of knowledge. Shackley and Wynne use this concept and observe:

The perceived certainty of knowledge claims of a research speciality is greatest some way from the actual site of knowledge production ... So, practitioners may attribute greater certainty to knowledge from another speciality than the practitioners in the first specialty would attribute to it themselves (Shackley and Wynne 1995b:114).

In the impact assessment process, with multiple consultancy groups and sets of projections, extrapolations and forecasts, and the pervasive use of predictive modelling, distances extend far indeed. These gulfs can be conceptualised as overlaid certainty troughs, with acute effects – both the peaks and troughs are amplified¹²⁰.

Where this places consultants engaged by proponents who might not wholeheartedly support a project but whom are required to present a case, is important to note. In the context of the impact assessment process, where the inputs of one set of consultants is dependent upon the outputs of another, which was the case with Basslink, distances between knowledge producers and users can be considerable. The distances created when one set of numbers, for instance, is moved from one domain to another, locates recipients, willingly or not, within the certainty trough. They have little choice but to attribute at least a relative level of credibility to the inputs they receive and which they have to use to generate their own claims. Conversely, those at even greater distance from the site of knowledge production but who do not support the project will perceive potentially inordinate levels of uncertainty¹²¹.

¹²⁰ This idea of combining certainty troughs comes from Shackley and Wynne (1995b:122) in their discussion of “overlapping certainty troughs”. A distinction is being made as overlapping would put the troughs out of phase, whereas when overlaid, the trough and peaks are amplified.

¹²¹ This is reflected in several submissions of critics who made lengthy comments on the DIAS in excruciatingly minute detail.

Embedding Worldviews

With the approval of regulatory instruments that derive from the impact assessment process, which are delimited and driven by the inputs of proponents, the contingent social framings that start out as normative become “prescriptive” (Wynne 1992c:281). Accordingly, their embodiment in the implementation of technology means that the ideals or constructions of proponents become “constitutive” (Wynne 1992c:285). Latour (1983:167) describes this process as one whereby “the whole of society” is transformed “according to laboratory experiments”. In other words:

science confirms its truth by reorganizing the world beyond the laboratory to fit the implicit models in the scientific program in question (Wynne 1992c:286).

In this mode, with the operation of technological systems, the conditions of the laboratory (or predictive modelling), which exist as implicit normative assumptions are translocated inflexibly into the community and the natural environment. The effect is that communities, the environment, economies and institutions are forced to change their behaviour to accommodate a proponent’s worldview about how things *might*, *could* or *should* proceed, which has become embedded in a technological system approved for operation through the impact assessment process (Wynne 1980; 1988; 1996b)¹²².

¹²² A salient passage from Wynne elaborates this point: “... technology is a central element in the *symbolic* networks of society, legitimating certain forms of social conduct and organization by moulding our consciousness via that implicit, condensed information which it transmits to us. The existence of space stations reflects certain social interests and values that are politically open to question. Once those space stations and related technologies have become established, they are social institutions in their own right. They have developed around their existence a whole set of social and economic dependencies and interests – status, livelihood, national prestige and so on. If this situation prevails, then their existence *expresses* those social values and interests that are founded and furthered thereupon. Whereas certain original interests and values ‘created’ the technology, now it is the technology which ensures the vitality and survival of those (modified) values. In a sense, the tail now wags the dog. Technology itself now embodies certain institutional values, interests and purposes. It becomes an integral part of a network of dominant symbols that serve to hold the social order together. ... technology is, in a real sense, an agent of social control” (Wynne 1975:135-36).

Closed 'Black Boxes'

Once at the public hearing stage of an assessment process, social framings internalised into an impact assessment statement are no longer visible or negotiable. Importantly, they are also difficult to re-open and verify. Yet these inputs are used to frame policy instruments and regulatory outcomes as well as publicly justify the safety, viability and benefits of the application of complex technological systems.

In the case of Basslink, despite the vast amount of information provided, submitters faced significant difficulties in verifying claims and isolating the assumptions that backed-up the conclusions contained in the DIIAS. This issue was raised by a number of witnesses at the hearings. For instance, the exasperation of Margaret Blakers for The Greens is evident in the following statements:

Supporting Study 15 is the one I'm looking at. It's confusing, contradictory and in the Executive Summary they say one thing and in the body of the report they say another thing and in the Appendix they flip back again. It takes quite a while to try and work out, and in fact, it's not possible to work out what they've done (Margaret Blakers, audio evidence, 17 October 2001).

In relation to the economic modelling, the submitter, Andrew Wadsley, despite having extensive experience in this area (Wadsley 2001), complained bitterly of the time it had taken him, over several weekends, to reach the conclusion that it was impossible to find the necessary information within the documents to undertake a critical review (Andrew Wadsley, audio evidence, 12 October 2001).

Loss of Agency

Wynne (1992c:282) maintains that people upon whom risks are imposed are acutely aware of the conditional social models embedded in knowledge claims and the

implementation of technology, and that it is these “pre-commitments” which intensify people’s perception of risk. Wynne notes:

This, often legitimate, social anxiety tends repeatedly to be misinterpreted by experts as ignorance, irrationality, or naïve expectations of zero risk, thus morally denigrating the relevant public. This in turn exacerbates the public’s sense of being threatened by institutions that do not respect its identity, rationality, and legitimate standing in the issue in question, hence further expanding the sense of risk, in a negative cycle of polarization (Wynne 1992c:282).

An awareness of the extent to which knowledge claims are underpinned by unrealistic social models, and that technology embeds and imposes values, is evident in the Basslink public submissions as an expression of a loss of agency:

Market forces will rule in regards to price and hence [river] cycle times. ... Our economy and waterway management will be driven by mainland requirements for power at call. ... unplannable variable market forces will rule the decision making process. ... Tasmania is a self contained functioning state. When plugged into the massive mainland market forces, any advantages we have will be instantly lost forever (T8 2001).

Tasmanian’s are taken for a ride once again because the politicians fall for an idea that is larger than life, a kite to fly, a big fancy development, under the guise of the need for security!! This is not the sort of future many Tasmanians care to see – a future where we lose more and more control. ... Tasmanian politicians are taking the simple option, allowing someone else to plan for us, and their faith is unfounded; we will lose control of our future (T19 2001).

We have seen too many projects approved that then grow incrementally into large and serious problems that trade on their incumbency to the detriment of the Tasmanian environment (T63 2001).

There are no guarantees that if the Tasmanian hydro schemes were connected to the national grid that Tasmanians would be immune from corporate profit driven pricing structures (T42 2001).

Basslink is a voyage of no return. Victoria should be practicing power conservation rather than simply looking for another source of power (T60 2001).

Issues of Dependency

These statements about a loss of agency also express an awareness of changes in dependency perceived as likely to arise with Tasmania's entry into the NEM (Wynne 1992c). Citing Bailey (1968), Wynne describes this perspective on dependency:

Bailey noted that Third World peasants were fully aware of the unstated social uncertainties and social control – including extra dependency on unfamiliar outsiders – that were inadvertently embedded in “objective” technical advice from outside experts. The peasants often resisted passively if not explicitly on the reasonable grounds that they were effectively being asked to hand over social control to aliens. This was falsely defined by those same aliens – Western scientific experts – as incompetence or unreasonable resistance based supposedly on a naïve expectation of certainty and of complete protection from risk (Wynne 1992c:276).

Concerns about dependency were explicit in the following submission:

We have been pushed around by the Hydro before. In particular I am remembering when Hydro wanted to dam the Franklin River. With the help of people all over the world, the Franklin River was not dammed and since then the West Coast has begun a new era of development with tourism. This is generating income that is gently growing and bringing much needed stimulus to our local economy. Our unique, beauty-filled land is our future. It is in our hands, we know, we care. Anything that will have a detrimental impact on the health of our rivers from now on must be avoided at all costs (T71 2001).

Scepticism

What were seen as inflated claims of prediction and control elicited scepticism and cynicism in a number of submissions:

The truth is, we have no real idea how the [river] banks will stand up to the massive (unnaturally massive) fluctuating flows over the years and it will be too late to address the problems that jump up to surprise us all then (T19 2001).

There is no way of knowing if Basslink will return a financial benefit to Tasmania. There is not enough information in the report to work out the financial costs and benefits. There is a good chance that power prices may actually increase (T26 2001).

The environmental assurances given appear at first glance to be well put but forgive my cynicism if I take them with a large dose of salt. The wording of the statements are too glib by far. 'Mitigation optimisation from environmental and cost perspectives' I take to mean that if anything goes awry the response will be "We'll fix it if it doesn't cost us anything (T65 2001).

There is no way of knowing if Basslink will return a financial benefit to Tasmania. All financial losses will be born by Tasmanian consumers if the project fails (T68 2001).

The number of occasions through the [DIAS] document where it states " ---have been assumed---" "---are assumed." "---it is assumed." "---there is no evidence." "---on present evidence." "---is more likely" "A review of the literature did not reveal---" "---can be expected—" are used to justify a position favourable to the developers. In most of these instances the statements could also be used to justify a position unfavourable to the developers (T50 2001).

National Grid International appear to be the only winners in the Basslink proposal, despite the inference in lavish, jargon-rich and information-poor publicity material sent out to me recently (T63 2001).

Disbelief

Evident throughout these submissions is disbelief in the claims of the proponents. This is further expressed in the following submissions:

With due respect to the environmental consultants, I still have grave concerns about the diurnal flow variations in the streams and water stores. I do not believe that the end effects can have been accurately determined (T65 2001).

In respect of the assertion that Basslink will deliver real gross product in Tasmania of \$60 million by 2004 and \$110 million by 2010, and 485 jobs by 2004 and 940 by 2010, a submitter responded as follows:

It is very common for companies to project hundreds of jobs to accompany their proposed investments ... (T21 2001).

Once again, the motive of the proponent is being assessed along side what are presented as the 'facts'. The former has influenced the assessment of the latter.

Unintended Costs and Consequences

Concern about unintended costs and the ownership of HT were viewed as out of the hands of Tasmanians with the operation of Basslink:

Basslink will hook Tasmania into the National Electricity Market which means we become a small player in a big field, where our sovereignty will not count for much. Electricity is big business and competition is ruthless. Hydro Tasmania is gambling on the spot prices of electricity at peak times being high enough to return enough profit to justify a \$500 million capital cost. If this gamble does not work, which is quite possible in this shaky market, Tasmania power consumers will bear the loss (T72 2001).

The likelihood of Basslink enabling Hydro Tasmania to earn the necessary revenue from power deals to compete successfully with the much bigger privately owned power utilities would be subject to a range of industrial and market pressures, such that no guarantees whatsoever are possible for the future. Indeed Hydro Tasmania may well finish up in private hands, with Tasmanians still liable for the huge debt (T34 2001).

If Tasmania enters the National Electricity Market, a public utility will find itself competing in an aggressive privately owned market. Surely this will increase pressure to sell off the Hydro. Once Basslink is up and running, there will be no turning back. Analysis of interstate electricity providers show that once utilities are in public hands, workforces are reduced and maintenance procedures are cutback resulting in unreliable supply. Do we want that for Tasmania (T9 2001)?

In conclusion, this proposal has too many flaws, is too much of a risk, and could be seen as a back door way of privatising the Hydro (T37 2001).

The above excerpts illustrate the issues that came 'into play' in people's assessment of the project, in particular, the track record of HT, the NEM and private enterprise. In light of the past attempt to sell the HEC set out in Chapter 2 and the costs borne by the community for past miscalculations of demand, people's scepticism, even cynicism, is understandable. It can be seen that the above submitters simply did not believe the assurances given to them by the proponents and the Tasmanian government that

Basslink will be a 'good thing'. They see a situation that Wynne describes, where technology will rule and, despite assurances to the contrary, control will no longer reside with the people of Tasmania, the Tasmanian government or HT.

Trust and Suspended Doubt

McDonell (1997:841) describes this cognitive process as "suspended doubt", whereby people do not necessarily trust institutions, but make "provisional" assessments of their claims, which are continually monitored. McDonell, like Wynne, is of the view that it is not the 'scientific facts' that foster public approval and confidence but assessments as to accountability, past track record, and in whose interests the proponent will act when circumstances change, or when problems arise. McDonell emphasises that trust is a critical factor in the acceptance of any knowledge claims:

the primary ingredients of the societal management of risk and uncertainty in everyday life, and in particular in the conduct of environmental initiatives, turns out to be, not knowledge and rational choice, but trust and experiential judgement. ... knowledge is never so complete that trust is not necessary – indeed, trust is a presupposition of all socially produced knowledge ... (1997:822).

Wynne makes a similar point:

the real burden of social evaluation of technologies falls not on the 'facts' of effects and risks, but on the credibility of the *institutions* regarded as having responsibility. Impartiality, accountability and social identification become key factors (1980:185).

A lack of trust in the Tasmanian government and HT, as well as concerns about the motives of the proponent, were expressed in the submissions:

The Tasmanian government does not make the connection that the international company will bring old technology to set up Basslink, they will make money (how can they not make money when the government is in such a contract that they are basically underwriting the installation of sea cables and Transend bears the cost for the transmission lines?), and if they do not continue to have success they will leave (T58 2001).

National Grid International is a multinational organisation who has no obligation other than to maximise profit for its (overseas) shareholders and therefore proposes a project at minimum cost. The result of this cost minimisation is the use of old out-dated environmentally destructive technology (T73 2001).

The proponents have stated that the reason for this project is primarily economic, yet the economic studies done are far from convincing that the project will actually break even in the next few years let alone over the next 25 years. The economic risk to the Tasmanian taxpayer is too great. We already have debt from the Hydro and we do not want to be saddled with more and another white elephant development that costs us \$90 million per year. I don't want to risk the current viability of the Hydro as an organisation by engaging it in a risky scheme, which may lead to the privatisation of our biggest public asset. I do not believe that the Basslink project is economically viable and therefore not economically in the best interests of the Tasmanian or Australian public (T44 2001).

I have lived in Tasmania for 41 years and been a PAYE [pay as you earn] taxpayer for 30 of those. ... I have watched successive state governments do endless harm to our Tasmanian economy and community with "get-rich-quick" schemes usually to benefit their own political careers and please their mates who have vested financial interests (T18 2001).

A concern that fuelled expressions of a lack of trust was that the provisions of the contracts between the parties to Basslink were not made public, especially the facility fee payable by HT to BPL. The Greens commissioned an economic study which estimated that the fee would be around \$90 million per annum. This was reported in the media and taken up by submitters, as seen above and below. Concerns were expressed, thus:

With the \$500 million capital cost and all financial risk for the project to be carried by Tasmanian power consumers, it is a major concern that Premier Bacon has already signed a contract, the terms of which remain secret. Why is it secret and what risks and concessions are we being committed to, without our knowledge or consent (T34 2001)?

The price the Hydroelectric Corporation (Hydro) will pay to lease the Basslink line is not being disclosed. This displays a lack of trust in the public who, after all, are the owners of the Hydro (T44 2001).

It is not enough for the Premier, the Hon. Jim Bacon, to claim in State Parliament that the project will succeed. It is not enough for him to state that the project is commercially viable. The Tasmanian public have a right to information about the liquidity of Hydro Tasmania and financial aspects pertaining to the contract with NGIL. If he wants informed support for the project, then he must release information about the financial arrangements between the Government of Tasmania, Basslink Pty Ltd and National Grid International. The project is too large and highly questionable on a number of fronts to accept the mere say so of the Premier (T52 2001).

There is a “commercial in confidence” clause at least with the Tasmanian government, but why? With a project of this magnitude, with so much of the public’s money and welfare at stake, why is there no transparency of process? It should not, I believe, be made a project of state significance, because this goes towards protecting the business interests of companies involved, and not the public’s interest (T58 2001).

It can be seen that the non-disclosure of the facility fee fostered considerable distrust amongst the submitters. They considered the stakes were too high for this information to be kept secret. From their perspective, despite the vast amount of disclosure by way of the DIIAS, it did not contain this crucial piece of information. It is evident that given past experience, they felt that HT would act in its own best interests not theirs.

The Past Informs the Future

The use of the past to inform the future, which links into issues of trust, track record and accountability of successive Tasmanian governments and the HT, was another common theme:

I have watched the operations of successive Tasmanian Governments for eighteen years now, and as a taxpayer I have failed to be impressed by the way they and their instrumentalities keep on contracting into large enterprises, on terms that are kept secret from the taxpaying public, that ultimately turn out to be losers. The old Hydro Electricity Commission was the largest offender in this respect, by overcapitalising on dam building. A decade or two later, the Field Government had the courage to retire some [of] that debt, at great cost to Tasmanians – for example, the State public education system,

previously a source of pride, was decimated. But Hydro debt – as with debt incurred by the Forestry Commission – remains intact, so that our present Government is forced into heinous revenue-raising practices such as permitting widespread gambling in order to maintain the present reduced level of services (T95 2001).

The HEC has a history of determining its preferred option and constructing the load forecast to suit. ... For years the HEC had been building schemes that we did not need and then artificially stimulating the demand (T19 2001).

The track record of the Hydro-Electric Commission and how it behaved towards its customers when things went wrong in the past in terms of passing on charges and incurring more and more debt, which had wide social ramifications, is clearly an important consideration here.

A Loss of Social Identity

A number of submitters also believed that Basslink would invalidate the social identity of the Tasmanian community that had been built around concepts of Tasmania as an 'island' which was 'clean' and 'green':

The Tasmanian community, economy and environment has much to lose and nothing to gain by Basslink. Just as Tasmanians are beginning to realise the value of being on an island, and Tasmania's unique identity is being capitalised on in the global market place, it would be a tragedy to devalue it, actually and symbolically, by creating an umbilicus to the mainland power grid (T42 2001).

Tasmania's clean, green renewable hydro power, bought at the cost of huge social and political division in past decades, is integral to any viable industrial strategy, and will be one of Tasmania's major economic advantages in this new millennium - just as our island status, in terms of GE free marketing of produce, has been wisely acknowledged as being integral. ... Our current unique competitive advantage can only be copied by a small handful of regions throughout the world (T18 2001).

The argument that it [Basslink] will bring industries and therefore jobs to Tasmania lacks credibility ... we do not want any more outdated heavy industries in this State. We have a bright future as

‘Tasmania, the Natural State’ and we do not want anything to jeopardise this (T37 2001)¹²³.

Tasmania’s superlative natural resources and her “clean, green” image are a unique and globally scarce environmental blessing to be carefully safeguarded for the future. ... Heavy industry, large agricultural conglomerates, antiquated forestry practices including destruction of old growth timber and native forests for wood chipping are not for us. Tragically, and against all logic and common sense, many Tasmanians including (shamefully) many of our political leaders, have not yet awakened to the fact that this is the 21st century, not the 19th (T27 2001).

Inside the ‘Black Box’

These excerpts have demonstrated people’s awareness of the limits of the proponents’ knowledge claims and the way in which they contextualise such claims. In this light and the theoretical ideas of the many works of Wynne and of Irwin and Wynne (1996), issues that should be drawn out in the impact assessment process are the social framings that underpin what is represented as ‘scientific’ and indisputable. If they are not open to scrutiny, they are not brought to light and there is no possibility of them being negotiated. As long as such conditionalities are not made explicit, Wynne (2001) argues that the rhetorical utility of science will continue to arbitrarily demarcate knowledges, obscure conditionalities and alienate publics. The critical issue for Wynne, therefore, is for the regulatory regime to facilitate the explication and negotiation of these social factors.

Challenging Proponents’ Claims

Demonstrating the importance of access to scrutinise proponents’ claims and the value of critique is The Greens’ cross-examination of BPL’s experts at the Tasmanian public hearings. They unearthed a crucially important issue related to the impacts of stray

¹²³ Reference to ‘Tasmania, The Natural State’ is made in several submissions. This message is stamped on the State’s latest motor vehicle registration plates. It appears that critics saw Basslink as a betrayal of this

currents on metallic infrastructure in and around Bass Strait. That these impacts could occur was not in dispute by the proponent. In contention was the extent of the potential impact and the cost of mitigation. The DIAS set out a commitment by the proponent to carry out fine-scale modelling to determine the extent of the impacts, but this was programmed for “pre-construction” (which would be after approval of the project) (DIAS 2001a:10-42;Table 16.1). At the outset of the public hearings, BPL intended to follow this course of action and had committed \$10 million for mitigation of metallic corrosion (audio evidence, questioning of JAP member to Stuart Morris, 9 October 2001).

During cross-examination of BPL’s electrode expert by a retired cathodic protection engineer, Michael Kirlew, who appeared as a witness for The Greens, it was found that the proponent’s modelling had not taken account of Tasmania’s unique neutral earthing system (audio evidence, questions to Jan Skog by Michael Kirlew, 9 and 10 October 2001). This meant that more infrastructure could be affected by stray currents than was covered in the DIAS, including, for instance, fuel tanks at service stations within a very wide radius of the anode (Kirlew 2001). With this information, and concerns raised by infrastructure owners, the JAP put considerable pressure on BPL to deliver answers and propose solutions with respect to the corrosion issue (RPDC 2001b)¹²⁴.

highly publicised and government-backed ‘natural state’ commitment.

¹²⁴ For example, BPL was asked by the JAP for an indication of the financial liability for damage that it would accept, how corrosion fears would be allayed, how mitigation would actually work and to justify data extrapolations from the northern hemisphere used to calculate corrosion estimations for Bass Strait (RPDC 2001).

BPL responded with a Corrosion Mitigation Plan, which committed it to undertake finer scale “3D Finite Element Method” modelling than had already been undertaken for the DIIAS, as well as stakeholder negotiation and plans for monitoring (Basslink Pty Limited 2001). The modelling was completed and presented at the end of the hearings in Hobart in late November 2001¹²⁵. As a result, mitigation costs doubled from that originally allowed for, to around \$20 million (plus or minus five per cent), but this amount did not include all infrastructure that was potentially affected, as identification of ownership was proving difficult and time consuming (Jan Skog and Henrick Rosenberg, audio evidence, 28 November 2001).

On this environmental issue there was considerable discussion, evidence and deliberation. The JAP was clearly determined that it would need more information from BPL in respect of the potential corrosion impacts (RPDC 2001b) and foreshadowed that it would not be in a position to complete its report without satisfactory answers to deal with the concerns raised in the submissions (audio evidence, 10 October 2001, comments from Julian Green to Stuart Morris). Without the critics having had access to cross-examination, and their skilful use of that opportunity in highlighting what had not been taken into account by BPL, as well as the efforts marshalled by The Greens and TFIC outside the assessment arena to highlight this issue, important conditionalities of BPL’s modelling might not have come to light and the proponent’s potentially unpredictable costs would almost certainly have been externalised onto the Tasmanian community ¹²⁶.

¹²⁵ See Tasmanian Exhibit TE121, *Corrosion Mitigation Feasibility Report*, prepared by Jan Erik Skog and Henrick Rosenberg for Statnett SF on behalf of BPL.

¹²⁶ It is noted that concerns about the monopole with sea-earth return system, and a preference for a metallic return, were raised by the JAP’s consultants, Brown and Root (2001).

Conclusion

In light of what has been revealed in past chapters and compared to their observations set out here, characterisation of Basslink's critics by the TCCI CEO as "hysterical and uninformed" (*The Mercury* 17 August 2001:7) cannot be substantiated. In contrast, my analysis supports the many works of Wynne and Irwin and Wynne (1996) on several fronts. First, the critics demonstrated an acute awareness of the limits of scientific knowledge and its conditionality in terms of indeterminacy. The ramifications of a misplaced faith in the proponents' claims were recognised by the critics. Consequently, those critical of the Basslink project were not demanding zero-risk but reacting to inflated claims of prediction and control. Second, it has also been shown that contextual factors influenced people's questioning and rejection of the scientific facts set out in the DIAS. Critics expressed their concerns in terms of a sense of loss of agency, issues of future dependency, inevitability about unintended costs and who would pay, and an invalidation of social identity. Third, in light of the findings of Chapters 4 to 7, in the midst of so many unknowns, data gaps and disjunctures, the narratives I have identified and the constructions they deployed can also be viewed as "contextual factors". In this case, they were drawn on by HT. As such, they influenced how HT's predictive modelling inputs and outputs were interpreted and presented by its in-house consultants and its environmental researchers, and appropriated by its legal team and the JAP. In this respect, any breach between scientific and lay knowledge does not extend far at all as it has been shown that both proponents and critics draw on contextual factors to make sense of issues. Hence, my assessment supports the claim of Wynne (1992a) that *all* knowledge is conditional.

Chapter 9

LINKING NARRATIVES WITH THEORY

The central epistemological question for this thesis has been *how*, given the extent of the disclosed uncertainties and limitations in the inputs and structure of the predictive economic and environmental modelling used to substantiate the impacts and benefits of Basslink, was HT's case in support of the development made durable and, thereby, legitimated by the JAP? I have argued that stories were integral to this outcome. Hence, the further questions I posed related to the narrative analysis. As well as seeking to understand the relationship between the constructions mobilised by the located narratives, I sought to identify which narratives helped bridge empirical gaps, their origin, how they were packaged and what influence they had on judgments both within and outside HT and on the regulatory instruments.

In answer to these questions, in Chapter 6, I outlined the pivotal role of the deployment of three stories together with specific constructions of HT's model outputs and the Gordon River. The success of those narratives and constructions was demonstrated by the variable 'realities' legitimated by the JAP. In Chapter 7, I traced the coalescence of the narratives and constructions in the concept of no net Basslink impact, and its contribution to the formation of a consensus around HT's knowledge claims and the movement of this precept into the regulatory outcomes. It was shown that together, the stories and constructions deployed by HT contextualised judgments about the potential scale of the impacts of Basslink on the Gordon River, and guided the JAP's

interpretation of relevant legislation. In particular, concurring with the recommendations put forward by HT, the JAP determined that the WHPC Act and the precautionary principle were inapplicable in respect of the Gordon River.

Having traced this unfolding, in this chapter I return to Chapter 3 to link the conceptual tools from STS set out therein with the contextual material in Chapters 1 and 2, the modelling contingencies outlined in Chapters 4 and 5, the narrative analysis in Chapters 6 and 7 and peoples' responses to the process in Chapter 8. To begin, after canvassing some theoretical and methodological issues, the next section will retrace and summarise the modality shifts that occurred through the Basslink impact assessment process in light of the STS theory set out in Chapter 3. Following this, I will make connections between STS theory and the narrative analysis.

Epistemology and Ontology

In terms of understanding the relationship between the constructions mobilised by the located narratives, the combination of the methodology of Macnaghten (1993) and Roe (1989; 1994) has assisted in the identification of the stories advanced by HT, and the variable constructions of the model outputs and the river they mobilised. In line with my objective of taking a "strict constructionist" stance, whilst remaining sceptical of ontological claims (Bunningham and Cooper 1999:308), I have been able to shed light on both *how* and *what* we know of the Basslink process – its epistemological and ontological aspects. The inextricable linkage that was demonstrated between the stories and the constructions that I outlined illustrates the point made in Chapter 3, that epistemologies and ontologies are mutually constitutive (Hess and Adams 2000), and that epistemological studies should not exclude an examination of ontological claims

(Irwin 2001, Gubrium and Holstein 2000). In the case of Basslink, the ontological claims of HT, that is, its constructions of the Gordon River and the model outputs, were embedded in its stories about the state of the river as well as load constraints at the Gordon Power Station and the TEMSIM model bias. It was shown that the narratives could have mobilised different constructions of the model outputs and the river.

Boundary-Work

Returning to STS theoretical issues, it was explained in Chapter 3 that “boundary-defining language” (Jasanoff 1987:199) underpins the rhetorical utility and negotiability of ‘scientific’ knowledge claims in a regulatory context. Such language can be used to define where lines are drawn to designate what is political and, thereby, contestable, and what is ‘scientific’, which is generally deemed defensible. Hence, these contexts are constituted as consisting of two mutually exclusive domains – science and policy – where science is merely an authoritative input, from which ‘objective’ and ‘independent’ decisions are drawn.

The work of Jasanoff (1987; 1990) illustrates the extent to which the arenas of science and policy are not mutually exclusive, but interlinked. The work of Shackley and Wynne (1995a; 1995b) goes a step further and maintains that these domains are mutually constitutive, which will be discussed further under the heading of Co-construction. The theoretical point from both of these sources is that conceptions of these realms as separate are rhetorical, and the analytic task should be to identify the discursive means by which these spheres are made to *appear* distinct (Latour 1993), and to uncover the social framings obscured behind what is represented as ‘scientific’ (Irwin and Wynne 1996).

The science in/policy out model of regulatory procedures (Jasanoff and Wynne 1998), which renders the domains of science and policy as mutually exclusive, is institutionalised in the impact assessment process in Australia, as it is elsewhere. In general, the process runs such that, with varying degrees of consideration of intervening consultation, regulatory outcomes rely on and derive from the impact assessment statement prepared on behalf of, and in close liaison with, the proponent. This was demonstrated with the Basslink Final EIS and Supplement to the DIIAS. The rhetorical separation of the domains of science and policy accords considerable credibility and validity to the process outputs as they are assumed to derive from 'scientific' and 'independent' inputs and, in general, are portrayed as untainted by political considerations. Although this conception of the process has been challenged both within the field of environmental impact assessment (eg Thomas 1998) and outside (eg Jasanoff and Wynne 1998; Beder 1993; Spry 1976), it appears irrepressible.

HT based its case for Basslink on the science in/policy out model. The consultancy arms of HT, namely its Resource Analysis Group and its Environmental Services Division, were represented as engaged by HT and, thereby, at arms-length in providing inputs to the Basslink process and developing the case on behalf of HT (Clayton Utz 2001a:2-3; JAP 2002b:322). The attempted distinction is evident on, for instance, the cover pages of HT's 29 DIIAS Appendix Reports, which state they were "Prepared for Hydro Tasmania". It is also illustrated in HT's promotional material, *Basslink Empowering Tasmania: Safeguarding the Environment* set out in Chapter 4, where it is conveyed that HT acted solely on the recommendations of its environmental researchers.

HT and BPL, as well as groups such as the TCCI, claimed that the impacts of Basslink had been determined by an 'independent' and 'scientific' assessment. It will be recalled that the TCCI applauded the three governments for taking the process outside the "political domain" (TCCI 2001:9). A similar assertion, that science and politics had been separated, was made by counsel for BPL in his comment that "the case of those opposed to Basslink has largely consisted of assertion, concerns and comment, rather than hard nosed, objective, scientific assessment" (Freehills 2001c:3). In effect, however, although many of HT's environmental researchers were contracted from outside the organisation, HT's in-house consultants integrated the findings of these researchers with the political, economic and organisational imperatives of HT, which became embedded in HT's 'scientific' case for Basslink. Indications of these prefigurative considerations are set out in HT's evidence. For instance, Locher (2001a:119) highlights the cost implications of locating the minimum environmental flow compliance site too far away from the Denison confluence, and in audio evidence (Locher, 15 October 2001) it is revealed that HT believes a delineation is required to mark off what has occurred on the river in the past, for which HT does not believe it should take responsibility. Emphasising an alignment of HT's objectives with various pieces of Tasmanian legislation, Locher (2001a:iv; 124; 125; 257; 258) asserts that mitigation measures need to be both "environmentally and economically sustainable". In addition, HT's view of what will happen in the future was expressed by Connarty (2001a; 2001b) who set out the expected future hydro-system load changes to increase by only 16 MW or reduce by 25 MW.

What was not disclosed in HT's assertions about the rigour of the process and its environmental studies was its intervening translation of the researchers' findings by its Environmental Services Division and the extent to which the environmental studies became a resource from which HT could pick and chose which mitigation measures it considered feasible and acceptable. For instance, HT's conclusions often contradicted the findings of its environmental researchers on important issues; for example, the '10/20' minimum environmental flow trial and its compliance site, the need for flows during maintenance shutdowns (Davies and Cook 2001a) and the state of degradation of the riparian vegetation in the three turbine zone of the Gordon River (Davidson and Gibbson 2001a; 2001b).

Interaction and negotiation between HT's 'scientific' actors and its economic and organisational imperatives is evident in the role played by Locher. The scientific credentials of Locher and her contribution to the DIAS geomorphological studies (ie Koehnken *et al.* 2001), for instance, gave Locher considerable credibility in her role of bringing together all of the Basslink environmental reports for HT. Unwittingly or not, HT's science and politics were merged via Locher, and her boundary-work was well executed as the author of the *Summary Report* (Locher 2001a) and the *Overview Report* (Locher 2001b), and in her presentations before the JAP. Of course, from HT's perspective, it simply played an integrative role - it brought together the specialisms to present the Basslink impacts as a whole. HT constituted itself as taking an overarching view of the Gordon River ecosystem. Notwithstanding its rhetoric, however, which attempted to portray the existence of mutually exclusive domains of science and politics, and that the scientific findings were derived without HT's intervention, this demarcation cannot be substantiated.

Predictive Models

On close examination, we have seen that the case put by HT's environmental researchers was, in effect, channelled and delimited by the inputs of HT's Resource Analysis Group and, going back a step further, anchored to judgments about the financial viability of Basslink initially made by the Department of Treasury and Finance, via the Basslink Development Steering Committee, and were based on modelling undertaken by the Victorian Power Exchange (VPX) in 1997. With the movement of consultants in Victoria from the VPX to IES, and additional modelling with IES's predictive model PROPHET, further affirmative judgments were made about the project's viability by the Basslink Development Board, an agency charged with facilitating and bringing Basslink to fruition (rather than investigating its implications and merits).

Chapter 5 set out the pre-figurative social framings embedded in the PROPHET model and the indeterminacies of its outputs. PROPHET was shown to be the driver of HT's assessment of environmental impacts by way of its contribution to TEMSIM, HT's predictive model for running the hydro-system *with* Basslink. Hence, representations of HT's case for Basslink as 'scientific' and 'independent' overlook the extent to which its researchers' outputs were derived from inputs underpinned by contingent and indeterminate judgments about, for instance, how the future will reflect the past (which was shown to be unlikely), how HT's hydro-system might, could or should run in the future, and the future market mix in Tasmania.

The work of Evans (1997) outlined in Chapter 3, which reflects the epistemological stance of STS, assists in explaining the contradiction between the contingent findings

derived from predictive modelling and their 'scientific' appearance and representation. Evans (1997:397) contends that predictive economic models cannot be validated as authoritative on the basis of 'scientific' methodology as there is no criterion by which to determine whether one model is better or worse than any other. Indeed, he found it was difficult to invalidate any economic model. For instance, a model that fails to forecast a significant change in an economy can be retained as legitimate by attributing the failure to, *inter alia*, exogenous variables, external political influences, incorrect sample period or by redefining the character of failure (eg different types of economic recession). Conversely, a correct forecast can be attributed to a 'lucky guess':

No one model, theory or specification is unambiguously superior to the rest. Econometric testing is chronically ambiguous. Forecast mistakes are similarly ambiguous and, even when acknowledged, do not force any particular course of action on the modelling team (Evans 1997:419-420).

Evans (1997:427) concludes that macro-economic modelling "tells us little about how the world actually works". The findings of my study support the work of Evans (1997) by demonstrating that the utility of predictive models is not their predictive power, but their "interpretative flexibility" (Evans 1997:396; Barnes 1981, 1982).

Can the 'Facts' Speak for Themselves?

There are several theoretical points to be drawn from these observations about predictive modelling. Although the position that the 'facts' can speak for themselves is a convenient one for decision-making bodies with limited time and resources, it is not reliable. With it, consideration is not sufficiently given to the pre-figurative aspects of knowledge claims presented as authoritative in impact assessment documents and processes. As noted in Chapter 3, this premise is underpinned by a 'realist' epistemology that makes idealistic assumptions about the methods and practice of

science. The fallibility of this proposition has been demonstrated in this study with the aid of the STS insight that an epistemological study should look for the “traces of production” of scientific knowledge claims (Latour and Woolgar 1979:176) that become obscured or revealed and made resistant to deconstruction.

In the case of Basslink, the PROPHET model was most relevant. Even though its outputs underpinned: the business case for HT, estimates of Tasmanian government electricity businesses profits, regional and national economic growth and job forecasts, changes in greenhouse gas emissions in the NEM, projections about future electricity prices in Tasmania and Victoria, and all of HT’s environmental work, scrutiny of this model during the Basslink hearings and its coverage in the documentation is meagre indeed. It was shown from the evidence of Andrew Campbell of IES that his company’s assessment relied upon estimates relevant for the year 2000 and prior thereto, its own extrapolations and scant details about arrangements in electricity pricing in Tasmania that appeared not only out-of-date and unverifiable but also based on hearsay. Notably, a direction from HT about future cost efficiencies was incorporated into the modelling that defied the consultant’s experience of other companies’ entry to the NEM. Despite this, Andrew Campbell (audio evidence, 4 October 2001) considered the figures were “fairly robust”.

Illustrating the distance between knowledge translations, the outputs of one model, PROPHET, were the input for predictive models used by CREA (macro-economic modelling) and URS (changes in NEM greenhouse gas emission modelling). For HT, the modelling went even further than TEMSIM. Each of HT’s environmental researchers that utilised the outputs of the Historical, SYSOP and TEMSIM baselines

undertook their own predictive modelling to estimate the environmental impacts on the Gordon River (eg Davies and Cook 2001a; Davidson and Gibbons 2001a; Koehnken *et al.* 2001). Hence, the trail of contingencies, which extends to extrapolations, forecasts and estimates and which compound into layers of normative social commitments, is long and disparate indeed. When presented in the impact assessment statement, however, these fissures appear well and truly smoothed out and that the ‘facts’ can speak for themselves.

Shedding Modalities

Theoretically, when an impact assessment statement is conceived as a modality-shedding device (Duncan 2003), as outlined in Chapter 3, we can see that the traces of production of PROPHET were shed by the connections made by IES, BPL and HT between PROPHET, the NEM, and its users in the NEM. These linkages were taken up by the JAP (2002b:322) in its description of TEMSIM as operating “according to market rules of the national electricity market” (this capability derives from PROPHET). Hence, PROPHET was attributed the status of ‘fact’, with its outputs accepted on trust and reified by HT in its use of PROPHET to drive TEMSIM to assess the environmental impacts and its continued use to update the business case.

A further example of the backgrounding of contingencies is the use of the macro-economic modelling conclusions to promote the positive economic prospects of the project. Although the JAP considered CREA’s figures to be “indicative” (JAP 2002b:43), a media release from the Premier ignored the JAP’s assessment and presented the CREA figures as the ‘facts’ of the matter, without qualification¹²⁷.

¹²⁷ Media Release, Tasmanian Government, Premier Jim Bacon, 12 March 2003, ‘Basslink Construction Start’.

Prescriptive Social Framings and Worldviews

It was raised in Chapters 3 and 8 that normative social framings embedded in predictive modelling have the potential to become prescriptive when technology and the regulation applicable thereto are implemented. Importantly, within the context of the impact assessment process, by virtue of an enforced reliance on a single, virtually unchallengeable and potentially compromised input – the impact assessment statement – such social prescriptions can present varying levels of environmental and economic risks. For instance, if the positive fiscal predictions of TEMSIM are not realised, HT and the Tasmanian government will find themselves in a difficult financial position. What courses of political and financial action such circumstances would justify are unknown, but what has happened in Tasmania in the past gives a good indication. Concerns expressed in the public submissions about the social ramifications that could eventuate are based on tangible past experience.

A social framing that will become prescriptive with the operation of Basslink is that the past will be repeated in the future (Evans 1997). Although this is a proposition for which critics are admonished¹²⁸, it is fundamental to the predictive modelling that underpins the proponents' case for Basslink. This is evidenced in IES's reliance on short run marginal cost in PROPHET to predict, and be confident about how the market will behave in the future. It is also evident in TEMSIM, which assumes that demand on the hydro-system will not change substantially in the future. This is despite claims of increased competition and HT's ambitious wind power plans to displace base load in Tasmania. Also, notwithstanding assertions made in domains outside the Basslink process by prominent actors that precipitation inflows to the hydro-system

have been declining for many years, HT's hydrological database does not take account of climate change and its potential impact on demand or storage inflows. Given that it was also freely acknowledged that it was possible, even likely, that within the context of the market-driven NEM, the hydro-system would not be run in the future as depicted in TEMSIM (Connarty 2001a:22; Locher 2001a:17), the relationship between the economic and environmental models has been tenuous from the beginning. The potential ramifications of this normative social commitment for the Gordon River in terms of the loss of riparian vegetation, which is mobilised by the load constraints narrative, have already been described.

Relatedly, the worldviews of proponents shape the cultural, organisational and technical aspects of a technological development (Pacey 1983)¹²⁹. These facets of a technology, which can have far-reaching social implications, are also mobilised by the regulatory process which approves the conditions for the operation of technological systems. In respect of Basslink, justifications for its approval can be viewed as embodying and operationalising the worldview of HT and the Tasmanian government via the Basslink Development Steering Committee and the Basslink Development Board. This worldview is detailed in the work of Beder (2003), which outlines how 'economic rationalism' has dominated government policy formulation in Australia since the 1970s, whereby deregulation has been implemented to increase competition, efficiency and economic growth in the belief that markets can "allocate resources

¹²⁸ This important point derives from the work of Brian Wynne.

¹²⁹ Pacey (1983:6) makes a distinction between "technology" and "technology practice". He argues that the former is a "restricted" conception of "technology" as it takes into account only technical issues, such as "knowledge, skill and technique; tools, machines, chemicals, liveware; resources, products and wastes. On the other hand, "technology practice" incorporates the cultural and organisation dimensions of technology which involve "goals, values and ethical codes, belief in progress, awareness and creativity" in respect of the former and "economic and industrial activity, professional activity, users and consumers, trade unions" in terms of the latter.

efficiently and ensure optimum productivity” (Beder 2003:4). In respect of HT, Chapter 2 sets out the extent to which these principles have been imposed on the organisation since the 1980s and, with the appointment of its Chairman, Peter Rae, realised from within.

Other aspects of this worldview are that increased power generation is the only way to deal with rising energy use, rather than energy efficiency strategies and demand management. Further, it is assumed that cost efficiency is achieved not by minimising the need for supply augmentation, but by the application of market forces whereby the entry of a development like Basslink to the market is expected to delay commitments to additional generation by other market players. Of course, if energy demand is not curbed, nothing will be delayed for very long. In the context of Tasmania, energy use is not increasing at a rate sufficient for the growth plans of HT, so it is broadening its horizons to link into a much larger Australian mainland market. Hence, the rhetoric about the benefit of cost efficiencies for the community overshadows HT’s expansion plans.

The effect of this mindset is that infrastructure planning is handed over to the market (Beder 2003), which is driven solely by price, consumption and meeting demand. Hence, issues of energy efficiency and demand management can be externalised, for instance, to government departments charged with the somewhat insurmountable role of encouraging users to reduce their energy use¹³⁰. With the disaggregation of the HEC,

¹³⁰ In New South Wales such a government department is the Sustainable Energy Development Authority (SEDA). It is noted that SEDA is in the process of being transferred to a new entity within the NSW government, the Department of Energy, Utilities and Sustainability. No such statutory authority exists in Tasmania.

like other NEM generators, HT no longer has any responsibility to reduce energy consumption – all it does is generate and sell as much electricity as it can at the highest possible price. This commitment was revealed by a representative of HT, Michael Howland, at a public presentation in Hobart. When asked by a member of the audience about HT's contribution to reducing energy use, Howland replied with a puzzled look, "But we're generators"¹³¹.

Contextual Factors

The tension between the ideal of transparency, which is assumed to be met with the disclosure of a plethora of 'scientific facts', and issues that contextualise people's judgments was described in Chapter 8. It was seen that the polished veneer of the DIAS did not carry much weight with many of the critics who demonstrated an astute awareness of the limits of knowledge claims represented as 'scientific', their underlying social commitments and the indeterminacies derived therefrom. For instance, figures on jobs to be created were dismissed as speculative and part of the rhetoric that typically accompanies attempts to persuade a community about the benefits of a development. Indeed, assertions derived from the modelling, including how environmental impacts would be insignificant or that they could be satisfactorily mitigated were simply not believed, and assurances about profits and benefits were viewed as naïve.

It was shown that despite the extensive disclosure of the 'scientific facts' in the DIAS, people's judgments were principally guided by contextual issues, for instance, what

¹³¹Mountain Festival, Hobart, 15-24 March 2002. Co-ordinated by the Tasmanian Environment Centre to develop links between artists, scientists, community and environment. Presentation entitled 'Toward Sustainability' by Michael Howland, standing in for Helen Locher, of Hydro Tasmania at the Long Gallery, Salamanca Arts Centre.

would happen if the project did not meet its stated objectives and financial expectations, what were the contingency plans, who would pay unintended costs, what was not being disclosed and where would responsibility lie if things went awry. There were no answers to these questions. In essence, people were reacting against what they saw as inflated claims from proponents about their ability to predict and control impacts and future ramifications (Wynne 1989b, 2001; Grove-White and Wynne 1994; Irwin and Wynne 1996). The implications of a misplaced faith in such claims by proponents was recognised by critics and expressed, for instance, as a sense of loss of agency, concerns about future dependency, inevitability about unintended costs and who would pay, and an invalidation of social identity.

In light of the current state of the Gordon River documented in HT's environmental reports, and the contextual material set out in Chapter 2 which outlines the tumultuous history of the Hydro-Electric Commission and its more recent transformations, concerns raised in the public submissions appear well-founded. When the past is considered, scepticism, even cynicism, is understandable, if not warranted. For instance, unrealistic power demand projections from the Hydro-Electric Commission justified building more and more dams for which customers eventually could not be found to take up the power; the economic ramifications of escalating Hydro-Electric Commission debt for the Tasmanian government were cuts to social services and increased power prices for uncontracted consumers; the devastation of large tracts of landscape to maintain employment; the loss of Lake Pedder; and, the attempt by the Rundle Liberal government to sell the HEC to clear government debt. Given what has occurred in the past, the concerns expressed by many would seem to be a healthy

dimension of an impact assessment process for a project such as Basslink. Embracing criticism instead of rejecting it as obstructive could guard against the tendency to frame projects on the basis of the best case scenario and could ensure contingency plans are in place so that the past is not repeated in the future¹³². However, it was not seen as such. As set out in Chapter 1, with judgments about the nature of the project and its viability having been made prior to the impact assessment process, and such a tight delimitation on the project's specifications, such issues were cordoned off from discussion and those raising them were deemed uninformed, hysterical and unreasonable.

Objections expressed by project critics about who would pay if the project did not meet expectations, the lack of disclosure and unjustifiable risks for HT have been vindicated with the more than 50 per cent rise in the cost of the project, putting it at around \$750 million. HT and the Deputy Premier, Paul Lennon, stifled questioning on this subject and treated challenge on it as incredulous, and used the argument that the price-hike simply represents cost commitments known about and derived from the impact assessment process. The success of this hosing-down was expressed in media editorial, which regurgitated the HT- and Lennon-line, and accused The Greens of not getting their 'facts' straight.

In contrast to these rebukes, in the last days of the public hearings, Counsel for BPL stated that if the cost of mitigation exceeded the cost of a metallic return, then BPL

¹³² HT's rebuff of criticism was demonstrated at the Tasmania Power 2002 conference when two representatives from Victorian power generation companies who attended the Hobart conference expressed concerns about the viability of Basslink and the likelihood of it creating competition in Tasmania (Wood 2002). Both Andrew Bonwick and Paul Hyslop are reported to have asserted that "Hydro Tasmania would be the only winner in the project and Tasmanian small energy consumers and taxpayers would be the loser" (Wood 2002). HT dismissed their arguments on the basis that they were competitors. Steve Halliday, HT's Basslink Program Director is quoted as saying, "[t]hey're not here to be nice about Basslink. They're here to kill Basslink" (Wood 2002).

would upgrade the technology. The cost of metallic corrosion mitigation was pegged at around \$20 million, plus or minus five per cent, although not all infrastructure had been identified (Jan Skog and Henrick Rosenberg, audio evidence, 28 November 2001). When BPL later announced it would scrap the sea-earth return, claims from critics that the metallic return would cost \$100 million were strenuously denied on several occasions by HT's CEO. This is notwithstanding evidence of a cost in this range for a metallic return from BPL when it was attempting to discourage the JAP from going down this path. These machinations are set out in Chapter 1. Suffice to say, if HT was not able to procure the metallic return cable system for the price of around \$20 million initially floated and publicised, and did not disclose the updated cost, which it did not, then the critics' scepticism about the motives and trustworthiness of HT, BPL and the Tasmanian government is substantiated. Critics who were convinced that there were undisclosed costs associated with Basslink have been further vindicated with the phasing out of HT's special dividend of \$40 million a year. This is necessary to "more closely mirror the circumstances that will apply after Tasmania's entry into the national electricity market" (House of Assembly 2003b:1-2). What these circumstances might be was not specified.

Co-construction

Drawing on the work of Shackley and Wynne (1995a), the interaction between science and politics is conceptualised as mutually constitutive. With this analytical lens, political considerations embedded in what are presented as 'scientific' claims can be brought into sharp focus. In respect of Basslink, an example of the extent to which the domains of science and politics were mutually constructed relates to HT's assertion that changes to power station discharges were its principle management tool for the

mitigation of Basslink flows (Locher 2001a:120; 2001b:56; audio evidence 15 October 2001). It is noted in Locher (2001a:120) that a minimum environmental flow allows HT to generate electricity from its delivery through the Gordon Power Station, hence, it is a “financially sustainable method of delivery”. This organisational and economic imperative directed the scientific investigations. Although higher levels of environmental flow and other mitigation recommendations were made by the environmental researchers, they were dismissed as not feasible or inconsistent with the operation of the hydro-system (Davies and Cook 2001a, Davidson and Gibbons 2001a) or the wilderness status of the area (Koehnken *et al.* 2001a)¹³³.

That the science was directed by HT’s organisational imperative for mitigation is also illustrated in, for instance, the fluvial geomorphology study (Koehnken *et al.* 2001). Having undertaken work that facilitated an estimation of the potential reduction in seepage-induced erosion to limit river bank scour by ramping down high discharge flows, this initial study was followed-up by a more specific study entitled ‘*Development of Ramp Down Rule for the Gordon Power Station with Basslink*’ (Koehnken 2001b). This report was undertaken after the publication of the DIAS and contributed to HT’s updated findings presented at the public hearings.

As already noted, the mitigation tools suggested by HT’s environmental researchers became a resource from which HT could pick and choose to meet its political, organisational and financial needs. For instance, the focus of the work of Davies and

¹³³ Ironically, although the degradation along the Gordon River from running the hydro-system in the past was not viewed as detracting from its wilderness attributes, physical mitigation measures of Basslink were, such as a re-regulation weir to stabilise discharge flows or the installation of matting, sandbags and logs to stabilise banks and retain sediments in high risk areas (Koehnken *et al.* 2001:130-31). Of course, this

Cook (2001a) was to identify minimum river flow requirements for the macroinvertebrates as well as risk levels for these assemblages with different flows. This provided HT with a range of minimum environmental flow levels from which to select a mitigation discharge that was both affordable and within ecological risk bands that HT considered should be acceptable to the community and the Basslink decision-makers.

Mitigation that entailed only changes to power station discharges facilitated the quantification of mitigation effects undertaken after the publication of the DIIAS in Peterson and Locher (2001a; 2001b) when the TEMSIM-SYSOP comparison was introduced. This work claimed that with mitigation the number of the most damaging of high flow discharges (ie greater than 240 cumecs) were reduced to a level close to that *without* Basslink (ie SYSOP). Importantly, it was outlined in Chapter 4 that this reified model derivative, which was represented as mitigation, influenced judgments about the scale of the environmental impacts for HT's WHA environmental researcher, its legal counsel and legal team and, subsequently, the JAP. Within the context of one mitigation measure that met the political, economic and organisational needs of HT, the concept of 'trade-offs', whereby, for example, short term impacts on macroinvertebrates would have long term gains for fish (Locher 2001a; 2001b), has become a guiding principle of HT's adaptive management and the future regulation of the Gordon River (JAP 2002b:Appendix 18).

Hence, HT's political, economic and organisational imperatives with respect to mitigation constituted the scientific outputs in a specific direction, which met the needs

observation would be countered on the basis that the hydro-system was in operation prior to the WHA

of HT, not necessarily those of the ecosystem of the Gordon River. It constituted the boundaries of HT's policy recommendations and commitments, which, in turn, set the direction of further scientific work to refine the mitigation measures. With the focus of mitigation restricted to changes in flow regimes, the possibility of other options was ignored. These examples demonstrate the co-construction of science and policy. In respect of mitigation, for instance, the direction of one was constituted by that of the other and *vice versa*.

Fiducial Science

The contribution trust plays in the mutual construction of the domains of science and policy (Shackley and Wynne 1995a) was discussed in Chapter 3. When scientific knowledge is in the process of being constructed, what is agreed to be 'good science' and acceptable in the domain of policy has not been formalised in, for instance, procedures and protocols that render processes and outcomes 'trustworthy' on the basis of trials and testing. In the regulatory context of EIA, where consultants are engaged to undertake specific tasks, sometimes requiring the use of novel methodologies, it is usually not possible for these to be tested, repeated or otherwise validated. Hence, the acceptance and validation of knowledge claims rest on close working relationships and trust.

With Basslink, BPL relied mainly on desktop studies of published works. For BPL and its consultants, the publication of a scientific paper accorded the findings therein the status of 'fact' (cf Duncan 2003). Hence, trust was vested in the publication and peer review process. However, publication does not equate with 'fact' status. The assertion that knowledge claims are authoritative on the basis of their publication overlooks the

intervening translations that take place when a consultant engaged and remunerated by a proponent cites an author and his or her findings for inclusion in an impact assessment statement. Under these circumstances, the contingencies are lost and social commitments obscured from view (Duncan 2003). This situation persists on the premise that the 'facts' can speak for themselves. The necessity within the current system for access to challenge proponents' claims was demonstrated with The Greens drawing attention to Tasmania's unique electrical system. Consequently, this issue was pursued by the JAP and its revelation contributed to the change in the technology on environmental grounds.

In contrast to BPL, HT undertook extensive empirical research. Under these circumstances, the relationship between actors was much closer, and trust was pivotal to the construction of HT's case. To illustrate how information and trust circulated, the PROPHET outputs were passed to HT's Resource Analysis Group for input to TEMSIM. As explained in Chapter 5 by Connarty, HT accepted the Victorian prices module run by PROPHET from IES as representative and authoritative. The contingencies of PROPHET have been detailed in Chapter 5. The TEMSIM outputs as well as the *without* Basslink baselines were then passed to HT's Environmental Services Division, which coordinated the environmental studies (Clayton Utz 2001a:3). The foundation of the environmental studies carried out for HT by its environmental researchers was the output of TEMSIM (*with* Basslink), the Historical baseline (*without* Basslink), then SYSOP (*without* Basslink). The environmental researchers had little choice but to accept these inputs from HT on trust. Indicating how fundamental these inputs were to the environmental impact outputs, when the SYSOP baseline was introduced and HT requested its researchers to update their findings, it was simply a

matter of, for instance, the authors of the riparian vegetation report re-running its modelling in their laboratory (Neil Davidson, audio evidence, 16 October 2001) and then conducting an analysis¹³⁴. At this point along the knowledge claims trail, the contingencies had well and truly passed into the background.

Again, illustrating the mutually constitutive role of science and policy in the regulatory domain, the policy requirements of the process and the directions from the JAP to disentangle before and after Basslink impacts had also set the agenda for the scientific work. Specific inputs were required to deliver the required outputs. In turn, this policy objective was informed by expectations of what information would be forthcoming from the modelling work. Hence, from the perspective of HT, it had met its obligations under the process and, according to the JAP's consultants, Brown and Root, it had done so admirably. We have seen, however, that the mutual constitution of these domains went much further than this preliminary agenda-setting aspect of the process. It has been illustrated that knowledge claims derived from a mutually constitutive relationship between science and policy pivot on trust between actors.

Certainty Trough

It is difficult to see what alternatives were open to HT's actors other than to accept the inputs for their work on trust. If it is unavoidable, it is important to consider the epistemological implications. For this task, the work of MacKenzie (1990) is useful as it draws attention to the distances created between knowledge producers and its users. In the context of the impact assessment process, we have seen that these distances can be extensive indeed. For instance, assumptions about how the NEM will operate in the

¹³⁴ It is noted that with their new brief these researchers also looked further down the Gordon River below Ewerts Gorge. It is from these observations that they confirmed that impacts had not decreased with

future and social framings that conceive the future as a repeat of the past incorporated into PROPHET by IES were obscured from view when IES handed over its PROPHET model and its outputs to HT, and HT did not question them. Within HT, this move translated the PROPHET outputs from one configuration of speculative numbers that represented one slice of time (ie predictions made in the year 2000 as at 2003 and beyond), to represent all time periods from which environmental impacts over a 75-year time period could be calculated. In other words, the local and contingent nature of the construction of these predictions was obliterated and the outputs universalised (Turnbull 2000; 2002). As such, the PROPHET outputs were (and remain) accepted as authoritative by the Basslink Development Board, URS, CREA, HT's Resource Analysis Group, HT's decision-makers, and the Tasmanian government.

With respect to the use of PROPHET and its outputs run through TEMSIM, MacKenzie's differentiation between knowledge producers and its users, and the correlation between their perspective on uncertainty and distance from the site of knowledge production, locates the above actors within a certainty trough. MacKenzie (1990:371) refers to this group as "program loyalists" who believe "what the brochures tell them". From this location, the 'facts' are durable and unlikely to be contested. As believers in the aims of the project – or as a consultant engaged by a proponent to evidence specific issues – there is no reason, or means, by which to challenge what are represented as the 'facts'¹³⁵.

distance down the river as expected (Davidson and Gibbons 2001b).

¹³⁵ It is noted that the purpose of DIIRAS *Appendix 2: Gordon River Hydrology Assessment* (Palmer *et al.* 2001) was to fulfil a request from the researchers undertaking the geomorphological study (Koehnken *et al.* 2001) and macroinvertebrate study (Davies and Cook 2001a) for additional analyses of the hydrological data. Palmer *et al.* (2001:4) note the "additional analysis included comparisons between natural and current situations, to provide a background understanding of the current power station impacts so that the researchers could understand current trends in environmental parameters".

In terms of HT's Environmental Services Division and its environmental researchers, trust in the outputs of TEMSIM, the Historical baseline and SYSOP also placed these actors in a certainty trough. This was also the case for Kriwoken and Griffith who made assessments about the impacts of Basslink on the TWWHA. With the distances and contingencies that intervened between the environmental research reports they reviewed, and the modelling work within HT, and prior to that from IES, considerable distance had been created between the sites of knowledge production.

It is important to consider where the JAP was positioned in this respect. It would be a mistake to view members of the JAP as compliant in respect of their assessment of the claims put before them. This was certainly not the case, particularly in respect of evidence in relation to the cable technology. However, in terms of the changes to Tasmania's hydro system, the JAP members appeared mesmerised by presentations of HT's in-house consultants and its environmental researchers. This was evidenced in the exchange set out earlier where the JAP member interjected and cut short attempts by The Greens to identify from Locher the boundaries of impacts which could have triggered an application of the WHPC Act. Also, in question time after the presentation of Lois Koehnken, who reported on the fluvial geomorphology studies, another JAP member stated it was comforting to know that HT's scientists were committed to best practice management (audio evidence, 15 October 2001).

Apart from these anecdotes, the JAP's acceptance of the SYSOP (*without* Basslink) baseline as corroborative evidence, instead of a change in scale with legislative

implications, placed the JAP within MacKenzie's category of "program loyalists" and squarely in a certainty trough. Although the JAP's consultants, Brown and Root, had given the highest praise to HT's environmental research reports, and this could have influenced the JAP's attitude towards HT's presentations, their critical qualification about the modelling inputs upon which hinged all of HT's environmental work was not vigorously pursued. The JAP accepted the stories it was given. Indeed, one of the justifications for the JAP's acceptance of TEMSIM was that none of the critics had come up with another model or suggested "significant" changes ((JAP 2002b:327). As actors most distant from the site of knowledge production, The Greens were persistent, and challenged HT's knowledge claims in many respects. However, having read HT's documentation in detail since the hearings, it is clear that The Greens had not been able to become fully versed with the modelling issues, particularly the baseline change, before questioning HT's witnesses.

To this point I have linked the conceptual tools of STS set out in Chapter 3 with the contextual material in Chapters 1 and 2 and the modelling contingencies outlined in Chapters 4 and 5. The next section will continue along these lines and make connections between STS theory and the role of narratives outlined in Chapters 6 and 7.

The Role of Narratives and Constructions

Observations of Roe (1994:2), that stories are "a force in themselves", "resist change or modification even in the presence of contradicting empirical data" and "stabilize assumptions for decision making", are supported by this study of the Basslink process. So, too, is the work of Turnbull (2002), which maintains that narratives are part of the

hybridity and agency embedded in the 'black box' of knowledge claims and that narratives play a pivotal role in connecting inconsistencies and bridging gaps.

An examination of the DIIAS and HT's documentation has elucidated the extent to which HT's narratives and the constructions they deployed bridged empirical gaps, explained inconsistencies, erased unexpected model outputs and contextualised the findings of HT's environmental researchers. It has also been shown that the narratives and the variable constructions of the model outputs and the river they mobilised allowed HT to merge the findings of its environmental researchers with its political, economic and organisational imperatives. In other words, as pointed out in the previous chapter, these narratives and constructions acted as "contextual factors" for HT (Wynne 1996b:20). On this basis, a demarcation between the proponents' case as a "hard nosed, objective, scientific assessment" (Freehills 2001c:3) and the critics as "hysterical and uninformed" (*The Mercury* 17 August 2001:7) cannot be substantiated. Relatedly, nor can the demarcation between 'scientific' and 'lay' knowledge. As advocated by Wynne (1992a; 1992c), all knowledge is conditional and judgments as to its acceptability and validity are influenced by contextual issues, trust in particular.

Indeterminacy

It was noted in Chapter 6 that the JAP reconfigured the data and model limitations openly divulged by HT into judgments about what its members believed were reasonable and feasible to disclose. This conceptualisation constituted a person or group disagreeing with the JAP's recommendations as unreasonable and demanding of the not-feasible. Additionally, in its appropriation of HT's narratives and constructions, the JAP validated the stabilisation of not only HT's openly-disclosed data

gaps and model limitations, but also the prescriptive social framings embedded in its modelling that made its inputs and outputs indeterminate. These related, for instance, to the NEM, its participants' behaviour and its future as well as the future of the Tasmanian electricity market mix. These were set out in Chapter 5. Questions about the contingency of the environmental impacts deriving from these indeterminacies that could have been asked were, instead, translated into knowledge gaps and assumed fillable in the future with monitoring and adaptive management. From the theoretical standpoint outlined in Chapter 3, these judgements of the JAP about what was reasonable constituted the indeterminacies of the predictive modelling as "soluble" and "tractable" (Grove-White and Wynne 1994:9).

HT's narratives about the TEMSIM model bias and load constraints at the Gordon Power Station, and the constructions they mobilised, were integral to the JAP's validation of HT's knowledge claims and its conceptualisation of the environmental impacts as not significant. The implications of this convergence were that the WHPC Act and the precautionary principle were deemed inapplicable in respect of the impacts of Basslink on the Tasmanian hydro-system. In the translation of indeterminacy into more amenable issues, we can see that stories provide coherence and, as such, bridge empirical gaps for consultants and researchers, as well as policy-makers and decision-makers. Packaged into the discursive device of no net Basslink impact, HT's stories and constructions were translocated into the regulatory outcomes of the Basslink process.

Multiple Constructions, Same Narrative

HT initially characterised its model outputs as overstated. With the publication of the DIIAS, DPIWE, HT's regulator, wanted the extent of the over-estimation quantified. As

the TEMSIM model bias was a structural obstacle, its magnitude remained unquantified. The story related thereto constructed HT's conclusions as a worst case scenario, which provided empirical stability and confidence to HT's in-house consultants. It also closed-off questioning in respect of TEMSIM and its bidding module. With SYSOP (*without* Basslink), it was claimed that past load constraints had been quantified (Peterson and Locher 2001a). With the introduction of the SYSOP baseline, the construction of the model outputs remained qualified as overstated, but were also configured as providing "further understanding" (Locher 2001b:9). Hence, the narrative about load constraints at the Gordon Power Station mobilised multiple constructions of the model outputs at different stages of the process.

Validating Stories

It is important to note that from the beginning HT believed Basslink would not have a significant impact on the Gordon River. This is illustrated in the promotional material quoted in Chapter 4. We have seen that although HT's researchers in their work for the DIIAS identified that the impacts were likely to be significant, their findings were merged with HT's narratives about load constraints, the TEMSIM model bias and the state of the Gordon River. This contextualisation by HT's in-house consultants conveyed the message that the impacts would be insignificant on the basis that the evidence had been overstated and the river already substantially degraded.

Looking through a narratological lens, HT's essential claim in the DIIAS that Basslink would not have a significant impact, on the basis that the findings of its environmental researchers had been overstated, was based not on the empirical evidence of its researchers but the narratives and constructions of the model outputs and the river

used by HT to qualify its researchers' findings. Accordingly, the new modelling comparison (TEMSIM-SYSOP) corroborated HT's *stories* about the model outputs and the river, not the "predicted outcomes from historical-TEMSIM" as claimed by the JAP (2002b:327). In other words, the JAP's conclusion that with the TEMSIM-SYSOP comparison the "general nature of the conclusions" remained "the same" (JAP 2002b:327) relates to the stories HT initially told about the model outputs, not the outputs themselves. Such was the power of story that the empirical findings of the environmental impacts were overshadowed, and stories *about* the model outputs became the focus of validation. Thus, the narratives and the constructions contributed to the consensus built around the knowledge claims in a most fundamental way.

Interpretative Repertoires

On the one hand, these circumstances attest to how HT's narratives and the constructions they deployed contributed to the JAP missing the legislative implications of the change of scale in impacts with the introduction of the new *without* Basslink baseline (ie the move from Historical to SYSOP). On the other, they are, to some extent, consistent with the concept of interpretative repertoires outlined in Chapter 3. Potter (1996) contends that the methods people (or decision-making bodies) use to justify action or decisions are multiple, contextual and selective. It has been shown that the interpretative resources for use by the JAP with regard to Basslink were provided substantially by the proponents. HT's stories were accepted and recapitulated by the JAP in its *Final Panel Report* (JAP 2002b). The JAP selected variable constructions of the model outputs and the river advanced by HT to meet its requirements under the Premier's Ministerial Direction and the relevant pieces of legislation. The variability of the application of the narratives and constructions in different contexts and the

prospect that the narratives could have been read differently indicates the multiple, contextual and selective nature of discourses that are to be contended with in the regulatory sphere.

No Net Basslink Impact

In Chapter 7, I outlined how the narratives about load constraints, the TEMSIM model bias and the state of the Gordon River, as well as constructions about the model outputs and the river, coalesced in the discursive device, no net Basslink impact. It was illustrated how this maxim mobilised and is mobilised by the located narratives and constructions. Importantly, it embodies the contingencies of the TEMSIM model, the SYSOP baseline and the comparison of the two. The reconfiguration of these narratives and the baselines into the definition of "impact that remains within the present boundaries" and "long-term presently occurring trends" (Bludhorn 2001:5) reconciles the gap between the two *without* Basslink baselines. The end-point of what HT defined as "long-term presently occurring trends" is a plimsoll-line at around 4.0 metres above LWM, at least 1.5 metres higher than what currently exists and below which vegetation will be dead (Davidson and Gibbons 2001a; 2001b). This scenario allows HT to make up for generation lost in the past due to load constraints. On this basis, the notion of equilibrium explained away the change in scale that occurred with the introduction of the SYSOP baseline and the substantial gap that exists between the two *without* Basslink baselines. The increase in the number of high flow discharges depicted in SYSOP impacts *without* Basslink are projected to occur between 2.5 and 4.0 metres along the river bank, the same zone as *with* Basslink impacts, whereas Historical impacts have been occurring for the most part below 2.5 metres. It is on this basis that the gap between *with* and *without* Basslink can be classed as "negligible" (Bludhorn 2001:5).

Crucially, with the introduction of the SYSOP *without* Basslink baseline, HT was able to construct future impacts, the subject of the impact assessment process, as belonging to the past.

Intermingled Discourses

Armed with the no net Basslink impact discursive device, HT's legal team weaved together the discourses of science, risk, uncertainty and sustainability (Gough 2001; Clayton Utz 2001a, 2001b; HEC 2001d). In doing so, the concept of no net Basslink impact aligned Basslink with an application of the precautionary principle, HT's interpretation of World Heritage Convention legislation, Tasmanian resource management legislation and the principles of sustainable development. This deployment illustrates how stories are a means by which discourses can be intermingled. Thereby, the hybridity, selectivity and inconsistency of discourses in a regulatory setting should not be seen as an anomaly but something to be expected and analysed, to identify how these variabilities have been constituted. The relatively unimpeded movement of the concept no net Basslink impact from its tenuous origins to the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* (JAP 2002b:Appendix 18) demonstrates the mobility narratives accord knowledge claims.

Conceiving discourses and narratives as having the potential to be intermingled and their use as multiple, contextual and selective (Potter 1996) assists in understanding the difficulty for The Greens in mounting a case to rally Tasmanians against Basslink. As noted, from an epistemological perspective, these discursive devices are resources available to all. Hence, even though The Greens contributed to the formation of the discourses of sustainable development and renewable energy, they do not have a

monopoly on their definition and invocation. This is a matter of negotiation. Thus, although The Greens had a seat at the Basslink table, their role was confined to critique or, as Roe (1989:252) put it, “point-by-point rebuttals”, which are confined to the dominant story of the proponent. So, within the context of the impact assessment process, the ability of The Greens to negotiate the turf they had staked out, which they would have seen as being vandalised by HT with its claims of compliance with sustainable development and the combat of climate change with renewable energy, never got off the ground. Adding insult to injury, their involvement legitimised the assessment process. The JAP relied heavily on their questioning of the proponents’ witnesses during the public hearings. Indeed, in the *Final Panel Report* (JAP 2002b) their queries were used to substantiate the thoroughness of the JAP’s investigations by interceding their objections between claims and responses from the proponents. Hence, their input supported claims about the rigour and comprehensiveness of the process. At least when their actions were on the Franklin River, The Greens were able to tell their own story.

Conclusion

This chapter has brought together the threads of this thesis, namely, the contextual material of Chapters 1 and 2, the theoretical context and methodological framework set out in Chapter 3, the modelling contingencies outlined in Chapters 4 and 5, the narrative analysis of Chapters 6 and 7 and, lastly, responses from the public submissions detailed in Chapter 8. The next chapter, my conclusions, will discuss some implications of insights drawn from this study.

Chapter 10

CONCLUSIONS

In this final chapter, I will consider some implications of insights drawn from the findings of this study outlined in Chapter 9. Whilst they will primarily relate to the barriers my findings present for the operationalisation of environmental legislation and the regulatory assessment process, they will also take a much broader view. In respect of the latter, I will discuss what I have termed ‘knowledge risks’ which derive from the movement and uptake of knowledge, and the interchangeability of knowledge producers and users across scientific, political and organisational domains.

Whilst, of course, complete knowledge is never available or attainable, what this thesis has sought to do is bring into focus how the knowledge we rely on is constituted, deployed and validated. Such an analysis is warranted on the basis that, notwithstanding its well-known deficiencies (Spry 1976; Beder 1993; Thomas 1998), the impact assessment statement remains the principle source of information for impact assessment procedures and the regulatory instruments derived therefrom. Hence, it is the knowledge claims set out in an impact assessment statement that define the boundaries for the implementation of regulatory legislation. This was the case in respect of Basslink with the submission of the DIAS (2001a) to state and federal governments for approval as it was originally published, accompanied by supplementary documents to update issues covered during the public hearings and thereafter (NSR Environmental Consulting Pty Ltd 2002).

Within the context of the “preventive paradigm” (Wynne 1992a:111) and the extent to which scientific contributions are required and used to interpret environmental regulatory legislation as well as evidence its application, the pervasive use of predictive modelling to generate such inputs adds a new and challenging dimension to the existing intractabilities of the impact assessment process. Considerable credibility and defensibility are accorded conclusions derived from predictive models and what are deemed their scientific inputs and outputs.

We have seen in this thesis that these contributions can shield much from view, and that the value of predictive models is not necessarily their predictive power but their “interpretative flexibility” (Evans 1997:396). It has also been illustrated that the authority of such models and their outputs rests substantially on trust and is strongly influenced by the distances created between knowledge producers and users and the extent to which actors’ roles in this respect become interchangeable. These circumstances draw into question the transparency and accountability of the impact assessment process. Their implications are problematic not only for members of the public and interest groups, but also regulatory bodies with statutory oversight responsibilities and legal mandates to enforce instruments deriving from the impact assessment process.

It was explained in Chapter 3 that the impact assessment process can be viewed as constituting those who oppose a project in the role of critique. Roe (1989:252) argues that this positioning merely delivers “point-by-point rebuttals” which are difficult for decision-makers to read, and it prevents opponents telling a counter-story. This was

illustrated with Basslink in the role played by The Greens. The stories they tried to tell, such as the value of draining of Lake Pedder (Brown 2001; Rose 2001:7) and a future direction for Tasmania without Basslink (Brown 2001), were deemed irrelevant (JAP 2002b:349; 47). Whilst The Greens' critique highlighted many important issues, the Basslink process demonstrated the difficulty for parties constituted in this role to unravel proponents' claims derived from economic and environmental modelling. Also, whilst a range of social framings that made the proponents' claims indeterminate were well-recognised by The Greens and public submitters (the latter's viewpoints were set out in Chapter 8), these contributions were classed as unrealistic and unreasonable.

In light of the difficulties with a strict form of critique, and those with a recognition of the implications of normative social framings, I have asked *how*, given the extent of the disclosed uncertainties and limitations in the inputs and structure of the predictive economic and environmental modelling used to substantiate the impacts of Basslink, was HT's case in support of the development made durable and, thereby, legitimated by the JAP? To this end, I found the narrative analysis, which applied the conceptual methodology of Macnaghten (1993), a particularly useful analytical tool. An identification of stories and the constructions they mobilised provided a means by which to undertake a different form of critique. Its efficacy has been demonstrated by isolating both epistemological and ontological aspects of the process and by showing that narratives can stabilise empirical claims. In terms of future use, as well as highlighting how contingencies have been *used*, which can assist in isolating areas of vulnerability in a proponent's case, the identification of a proponent's ontological

claims provides a grounding from which opponents could narrate a counter-story within the parameters of an impact assessment process.

The narrative analysis I undertook started with the observation that presentations of HT's environmental modelling were accompanied by claims about its implausibility. I read these qualifications as narratives and variable constructions of HT's model outputs and the Gordon River, and argued that they were constitutive of HT's case in support of Basslink and its validation by the JAP. Amongst my conclusions was that the TEMSIM model bias story confined scrutiny of the model to its structure, specifically, the coarseness of its bidding module, rather than the bidding module itself, which could have led to a deeper examination of PROPHET and other aspects of the model and its outputs. Constructions of the TEMSIM model outputs as a worst case scenario effectively cut off further questioning in this respect. The load constraints story justified a significant shift in judgments about the scale of the predicted environmental impacts, particularly in Zone 5, on the Gordon River. This had pivotal ramifications for the interpretation of World Heritage Convention legislation and the precautionary principle. The story about the state of the Gordon River constituted *all* of the river as irretrievable. It was shown that this narrative could have been read differently. I also traced the coalescence of these stories and constructions in the "no net Basslink impact" (Bludhorn 2001:5) discursive device and the mobility of this precept into the process regulatory outcomes.

What is notable from this analysis is how HT's stories about load constraints, the TEMSIM model bias and the state of the Gordon River cleared the path for the movement of HT's ontological claims, which had considerable pre-figurative effects

and which changed in different contexts. Also, it was shown that the JAP's judgments in its *Final Panel Report* validated the stories mobilised by HT rather than the evidence with which it was presented. In other words, it was stories *about* model contingencies and limitations and the state of the Gordon River, which HT had told from the beginning of the process, that stabilised conceptions of the change in scale of the predicted impacts along the Gordon River with the introduction of the SYSOP baseline. Crucially, with the introduction of this baseline, and its contextualisation by the load constraints narrative and a construction of the river as not in equilibrium, HT was able to configure future impacts, the subject of the impact assessment process, as belonging to the past.

The power of narratives and their stabilising force to effect travel (Turnbull 2002) has also been demonstrated by this case study. It is reflected in their capacity to move, essentially unaltered, from their articulation in the DIAS to HT's update and supplementary reports and then into the *Draft Deed of Amendment to Hydro Tasmania's Special Water Licence* (JAP 2002b:Appendix 18). Importantly, imperceptibly, the identified narratives and the constructions they deployed blend together the past and the future and, as such, hold in place a boundary from which to measure Basslink impacts, which is at least 1.5 metres higher on the river bank than the existing plimsoll-line.

Hence, we have seen that HT's narratives and the constructions they deployed bridged empirical gaps, explained inconsistencies, erased unexpected model outputs and contextualised the findings of its environmental researchers. This contextualisation conveyed the message that the impacts would be insignificant on the basis that the

empirical evidence had been overstated and the river already so substantially degraded. Not only were HT's environmental researchers' findings contextualised by its in-house consultants, but the narratives and variable constructions of the model outputs and the river that they mobilised allowed HT to merge the findings of its environmental researchers with its political, economic and organisational imperatives. HT's environmental investigations and what it deemed acceptable for the environment and the community of Tasmania were driven by these considerations; for instance, the sole use of power station discharges to mitigate environmental impacts. Whilst concessions were made for the environment, for instance, a generous minimum environmental flow, bids to compromise it were made by HT all along the way, in terms of its compliance site, where approval was gained; to make it conditional upon storage inflows, where it was unsuccessful; to halve it for three years, where it has been temporarily unsuccessful; and to halt it during maintenance shutdowns, where it did succeed (JAP 2002b).

Another dimension which is important to consider in the construction of knowledge, which has been demonstrated here with the acceptance of model inputs and outputs between different groups of researchers and consultants, is the extent to which knowledge claims gain credibility when moved from one domain to another. The distance between knowledge producers and knowledge users can make all the difference (MacKenzie 1990). What has been presented here with respect to Basslink can be described as a "closed circle" (Lewis 2003)¹³⁶, whereby information is drawn

¹³⁶ This term has been adopted after listening to the discussion 'Journalism and the Internet and Improving Media Literacy' on ABC Radio National's Media Report on 4 September 2003 between its presenter, Mick O'Regan and Kieran Lewis, a PhD student from the Queensland University of Technology, which focussed on the latter's study of the information sources used by journalists, in particular the role of the internet. It was found that the internet provided journalists with faster access to authoritative sources that they had

from a confined set of sources. With Basslink, the orbit began with the predictive economic modelling commissioned by the Basslink Development Steering Committee in 1997 which evidenced affirmative economic returns from Basslink. This was followed up by further modelling commissioned by the Basslink Development Board. Its outputs were passed on to a range of other knowledge users who, in turn, became knowledge producers with their engagement to carry out further work, namely, URS, CREA, HT's Resource Analysis Group and HT's Environmental Services Division. The PROPHET modelling, accepted at face value by HT as representative of the NEM and how Basslink would operate in the future, was the driver of subsequent environmental modelling to identify the impacts of Basslink, and remains the driver of HT's business case. Consequently, PROPHET underpins a substantial portion of the case in support of the development. The close connection and rhetorical separation of these facets has been described. These origins delimited the scope of the assessment process and served to substantiate the claim that HT had advanced all along – that Basslink would not have a significant impact on the Gordon River and that the project must proceed for the sake of the future of HT, its consultancy division and the future of Tasmania. Hence, rather than *investigating* the merits and implications of Basslink, the outcome of these iterations was to *demonstrate* the project's social, economic and environmental benefits, the two former aspects having been deemed positive before the impact assessment process began.

What this illustrates is that knowledge claims can be accepted as authoritative not on an empirical or 'scientific' basis but with a simple move from one arena or from one set of

always relied upon. Hence, the internet was not being used to identify and follow-up counter-viewpoints or critiques. Lewis argued this had resulted in a closed circle in terms of data sources, stories and reporting.

actors to another. The acceptance and validation of knowledge claims rest not on verification but on close working relationships and trust. It was seen that trust was pivotal to the construction of HT's case for Basslink as knowledge users became knowledge producers. In Chapter 8 it was seen that trust was also central to peoples' attitudes towards the project and their uptake of the 'facts' presented in the DIAS.

The implications of the reconfiguration, translocation and mobilisation of knowledge claims between actors working in close relationships and connected by trust have been brought into sharp relief with the case made by the United States, England and Australia to invade Iraq in 2003. Prior to invasion, the so-called 'facts' were presumed to speak for themselves and they were presented as such. The case for war was substantiated by intelligence evidence. Afterwards, when weapons of mass destruction expected to be found were not, information that political judgments were based on and which influenced decisions about whether to support the leaders of these countries was brought into question and shown to have been less 'certain' than originally implied. An important issue has been the extent to which knowledge claims were assembled and guided by the need to meet the objectives of an agenda predefined by the United States. Demonstrating the power of the need for actors to appear somehow at arms-length from their decisions, to date, debate has centred on the veracity of intelligence claims, which is interminably arguable. Whilst this occurs, protagonists in this calamity are able to avoid disclosing their political motives for the incursion into Iraq. Hence, we can see that in the translation, configuration and deployment of knowledge claims across scientific and political domains, the stakes can be high indeed, and the consequences horrifying.

Putting to one side the epistemological implications of the insights from this study for international politics, they are also important to consider within the context of environmental legislation that is based on the premise of a 'balance' between social, economic and environmental considerations. This study, which has focused on the location where developments and impacts gain approval, provides an opportunity to verify the proposition of 'balance', the parity of which is claimed by its advocates to be commensurate and not for compromise. A 'balance' ethic was adopted in the DIAS, with its aim of providing an *integrated* assessment of the social, economic, environmental and community aspects of the Basslink project. This principle is also embodied in Tasmania's resource management and planning legislation.

An argument for 'balance' was a particular line of defence from BPL in support of Basslink to armour its case against the potentially unscrupulous tactics of environmentalists (eg Stuart Morris, audio evidence, 2 October 2001). The concern was that environmental considerations could outweigh others, as many viewed they had with Australia's High Court decision in 1983 that the Gordon below Franklin Dam should not proceed. With the Franklin conflict in the past, but its polarisation and social upheaval still palpable in the Tasmanian community, our political representatives insist we can and must balance social, economic and environmental considerations in terms of management and planning of the natural environment and resources. Indeed, the driving force of this precept (and its rhetorical value) is reflected in recent comments from the Commonwealth Environment Minister, David Kemp, on his approval of the Meander Dam in Tasmania:

I think this is going to be a very positive project, it's a win-win project for the environment and for the communities of northern Tasmania and more than that, it's going to, I think, change people's frame of

mind about what development is possible. We can have ecologically sustainable development, that's what this decision means. We can have a better environment and we can have improved standards of living and improved opportunities for enterprises at the same time (Kemp 2003)

In other words, we *can* have it all.

With Basslink, I found that its economic and social dimensions were uncompromisable, with the latter defined in terms of the former. Specifically, these were pre-figurative judgments that Basslink had to proceed for the sake of the future of HT and Tasmania, that the project was undoubtedly economically viable, that social 'goods' were uncomplicatedly economic, and that they could be adequately captured by predictive modelling. These unwavering principles are demonstrated, for instance, by HT's repeated iterations of its business case, which has managed to continually accommodate the inordinate rise in the cost of the project, despite initial assertions that it could withstand only a ten per cent cost increase.

In contrast to the claims of its pundits who espouse the virtue of 'balance', the same could not be said for the state of the environment. It was compromised on several fronts. First, although there was a change in the cable technology on environmental grounds, the monopole cable with a metallic return represents a different set of environmental impacts to that of a sea-earth return, for instance, additional transmission losses. Second, the JAP did not directly recommend a change to the technology. The decision on this score was left up to the proponents, and the outcome of their negotiations with the major infrastructure owners. As a settlement was not reached, the JAP's decision on a metallic return came into play. Third, whilst HT's mitigation measures are welcomed, according to my analysis of the two *without*

Basslink baselines, it is possible that the gains for the Gordon River ecosystem will be outweighed by its losses. Constituted as “long-term presently occurring trends” (Bludhorn 2001:5), this warrant, which exists as a boundary from which to measure Basslink impacts along the Gordon River well above the existing plimsoll-line, represents the loss of riparian vegetation along sections of the river (and other interrelated components of the ecosystem, for instance, fluvial deposits), part of which exist in Zone 5 to which the WHPC Act applies. By virtue of a string of predictive modelling, coupled with the inoculative effects of the narratives and constructions mobilised by HT, these delineations on the river bank have been proposed by HT and validated by the JAP as acceptable.

Hence, I suggest there is a special recipe for *having it all*. The ingredients include, firstly, the staple of boundaries set within strict limits. Added to this is the fortunate availability of proponents having firm control over process inputs and outputs by virtue of normative social framings, model inputs and distances created between them (MacKenzie 1990). With lashings of predictive modelling encased in persuasive narratives and sprinkled with descriptive constructions, one has a truly movable feast, the desirability of which, in terms of the operationalisation of legislation that constitutes the discourse of ‘balance’, rests with its “interpretative flexibility” (Evans 1997:396) rather than its predictive power. As such, those who spoke for the environment but who were not stuck in the “certainty trough” (MacKenzie 1990:419) were effectively silenced. On this basis, it would appear to be the case that the Basslink issue had been taken out of the political domain, as noted by the TCCI CEO.

Problematically, if the input of those speaking for the environment but not stuck in the certainty trough is obstructed and predictive models are our masters, I suggest we are in a state of what John Ralston Saul (1997) would describe as unconsciousness. Thus, the comfort we derive from the semblance of 'balance' is, I believe, misplaced. The consequence is that the natural environment is being frittered away in relative silence and with our endorsement – a devastating outcome twenty years down the track from the clashes on the Franklin River that wrought such passion and pain in the Tasmanian community and which instigated the development of legislation to protect the natural environment and achieve a so-called 'balance'. Whilst giving The Greens a seat at the table at the Basslink public hearings gave the impression that the environment was represented, so that a 'balance' could be effected, their representations were no match for the outputs of HT's scientific discourse and predictive modelling in respect of the Gordon River which, it has been shown, obscured much from view. It is unknown where this leaves DPIWE, HT's regulator, in its statutory responsibility to enforce the regulatory outcomes of the process.

Notably, this unconsciousness can also be problematic for proponents. During the Government Businesses Scrutiny Committee hearing in February 2003, in response to The Greens' questioning about the financial risks of Basslink, HT's Chairman, Peter Rae, assured the committee members that HT had exemplary risk management procedures in place:

We have produced a business risk management procedure which is extremely highly developed. It is something which prudent companies in the electricity industry have been developing and I believe that ours is at the forefront of it. We have a committee made up of board members and senior management members which has been working hard to develop this risk management system. Every form of risk is identified and then evaluated and these are put into

regular reports which come to the board. I believe that the risks to which you refer, and many others that exist in the operation of any business, have been fully evaluated by that committee and the board is satisfied that those risks are being managed in an appropriate way (Peter Rae, House of Assembly 2003a:11).

We have seen that knowledge claims are engendered with considerable credibility and authority when packaged as 'scientific', particularly if they are derived from predictive modelling. Their durability increases with time and distance. Although it could be argued that these translations are necessary to facilitate the transfer of knowledge, I argue that they also represent 'knowledge risks', a recognition of which should be incorporated into organisational risk management strategies. This is on the basis that these risks are not outside a corporate entity, say, in the market. They are, instead, internal. Importantly, they can be generated by an organisation itself – in its actions to minimise risk. As 'knowledge risks' derive from and accumulate in the distances between knowledge producers and knowledge users, they can accrue between organisations as well as solely within an organisation. Consequently, they reside in what are assumed to speak for themselves – the 'facts' which are, more and more, being derived from predictive models.

In terms of Basslink, it has been shown that the representatives of HT attribute considerable credibility to the offerings of its predictive model, TEMSIM, and its driver, PROPHET. Indeed, HT's Chairman and CEO appear to elicit considerable comfort from the models' complexity and their layers of derivatives (House of Assembly 2003a:11; 19). Within this context, and with a proponent's fervent commitment to a project which was exhibited with Basslink by HT and sections of the Tasmanian government, a recognition of 'knowledge risks' would be an essential contingency plan or safeguard mechanism for accountable corporate and political governance. Without

this recognition, there is a tendency to treat predictive models as crystal balls instead of the contingent 'black boxes' that they are and which are likely to tell you what you want to hear.

REFERENCES

- Allie, A. (2002) Hydro Admits Gas will Take Away Customers, *The Advocate*, 12 April 2002, Burnie.
- Alvesson, M. and Kärreman, D. (2000) Varieties of Discourse: On the Study of Organizations Through Discourse Analysis, *Human Relations*, **53**, 9, 1125-49.
- Atech Group (2001) *A Report on the Proposed Basslink Interconnector*. Prepared for the Office of Senator Bob Brown and Basslink Concerned Citizens Coalition. Available from Resource Planning and Development Commission, Hobart (Annexed to submission of Senator Bob Brown T112).
- Australian Conservation Foundation (1980) *Notes by Australian Conservation Foundation on Gordon River Power Development Stage II*, unpublished.
- Australian EcoGeneration Association (2002) *RECS, Baselines and Industry Development*. Available from Australian EcoGeneration Association (now known as the Business Council for Sustainable Energy), Suite 1, Level 2, 9-23 Prospect Street, Box Hill, Victoria.
- Australian Securities & Investments Commission (2003) *ASIC Company Extract*, Australian Securities & Investments Commission, Accessed on 11 August 2003.
- Australian Securities & Investments Commission (2004) *ASIC Company Extract*, Australian Securities & Investments Commission, Accessed on 19 February 2004.
- Bacchi, C. (2000) Policy as Discourse: What Does It Mean? Where Does It Get Us?, *Discourse: Studies in the Cultural Politics of Education*, **21**, 1, 45-57.
- Bacon, J. (1999) *Ministerial Direction to the Resource Planning and Development Commission in relation to the Basslink Project under State Policies and Projects Act 1993, Section 20*, Tasmanian Government, 19 April 1999.
- Bacon, J. (2001) Tasmanian Government Submission to the Basslink Joint Advisory Panel. Received and Published by Resource Planning and Development Commission, Hobart (T126).
- Barnes, B. (1981) On the Conventional Character of Knowledge and Cognition, *Philosophy of Social Science*, **11**, 303-33.
- Barnes, B. (1982) *T.S. Kuhn and Social Science*, Columbia University Press, New York.
- Barnes, B., Bloor, D. and Henry, J. (1996) *Scientific Knowledge: A Sociological Analysis*, The University of Chicago Press, Chicago.

Basslink Pty Limited (2001) *Basslink Corrosion Mitigation Plan*. Available from Resource Planning and Development Commission, Hobart (TE74).

- Basslink Pty Limited (2002) Submission to JAP on Draft Panel Report, Response by Basslink Pty Ltd to Draft Report of the Basslink Joint Advisory Panel. Received and Published by Resource Planning and Development Commission, Hobart (T*7.1, T*7.2, T*7.3, T*7.3B, T*7.3C, T*7.3D, T*7.3E).
- Bates, G. M. (1983) The Aftermath of Lake Pedder In *The South West Dam Dispute: The Legal and Political Issues*, Sornarajah, M. (Ed.), University of Tasmania, Hobart, 1-21.
- Beder, S. (1993) Bias and Credibility in Environmental Impact Assessment, *Chain Reaction*, **68**, 28-30.
- Beder, S. (2003) *Power Play: The Fight for the Control of the World's Electricity*, Scribe Publications, Melbourne.
- Bevilacqua, S. (2001a) Rocket for Basslink, *Sunday Tasmanian*, 30 September 2001, Hobart.
- Bevilacqua, S. (2001b) Basslink Review a Scorcher, *Sunday Tasmanian*, 30 September 2001, Hobart.
- Bevilacqua, S. (2003) Basstink: Row Erupts over Electricity Project's \$250m Blowout, *Sunday Tasmanian*, 15 June, 2003, Hobart.
- Bloor, D. and Edge, D. (2000) Knowing Reality Through Society, *Social Studies of Science*, **30**, 1, 158-60.
- Bluhdorn, D. (2001) *Gordon River Basslink Monitoring Program and Adaptive Management Plan 2001-2010*. Prepared by Hydro-Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE76).
- Bohme, G. (1997) The Structures and Prospects of Knowledge Society, *Social Science Information*, **36**, 3, 447-68.
- Bridgman, T. and Barry, D. (2002) Regulation is Evil: An Application of Narrative Policy Analysis to Regulatory Debate in New Zealand, *Policy Sciences*, **35**, 141-61.
- Brown and Root (2001) *Independent Review of the Draft Integrated Impact Assessment Statement*. Commissioned by and available from Resource Planning and Development Commission, Hobart.
- Brown, B. (2001) Tasmania - Quarry or Clever? A Submission regarding the Basslink Draft Integrated Impact Assessment Statement. Received and published by Resource Planning and Development Commission, Hobart (T112).
- Brown, B. and Fraser, T. (1982) *Policy Speech for 'No Dams' Independent Group in Denison*. Delivered at Hobart Town Hall by Dr Bob Brown, 27 April 1982, unpublished.

- Burman, E. and Parker, I. (1993) Introduction - Discourse Analysis: The Turn to the Text In *Discourse Analytic Research*, Burman, E. and Parker, I. (Eds.), Routledge, London, pp. 1-13.
- Burningham, K. and Cooper, G. (1999) Being Constructive: Social Constructionism and the Environment, *Sociology*, **33**, 2, 297-316.
- Business Council for Sustainable Energy (2002) Inquiry into The Renewable Energy (Electricity) Amendment Bill 2002. Submission received and published by Senate Environment, Communications, Information Technology and the Arts Legislation References Committee, Canberra,
http://www.aph.gov.au/senate/committee/ecita_ctte/renewable_energy/submissions
- Campbell, B. L. (1985) Uncertainty as Symbolic Action in Disputes Among Experts, *Social Studies of Science*, **15**, 429-53.
- Caples, J. (2002) Rae Energised by Hydro's Potential, *The Examiner*, 30 December 2002, Launceston.
- Centre for Environmental Studies (1978) Some Comments on the Recent Hydro-Electric Commission Report on the Capacity of the System to Accept Additional Load. University of Tasmania, unpublished.
- Centre for Regional Economic Analysis (2000) *The Economic Consequences of Basslink for the Tasmanian, Victorian and National Economies*. University of Tasmania, Hobart. DIAS Appendix 1. Available from Resource Planning and Development Commission, Hobart.
- Chalmers, A. (1976) *What is this Thing called Science?*, University of Queensland, St. Lucia.
- Clayton Utz (2001a) *Hydro Tasmania's Opening Submission - Part 1 - Introduction*. Available from Resource Planning and Development Commission, Hobart (T57).
- Clayton Utz (2001b) *Tasmanian Wilderness World Heritage Area Issues*. Prepared by Clayton Utz. Available from Resource Planning and Development Commission (TE114).
- Cole, S. (1992) *Making Science: Between Nature and Society*, Harvard University Press, Cambridge.
- Cole, D. (2003) New Energy Player: Bell Bay Power to Inject Healthy Competition, *The Advocate*, 17 May 2003, Burnie.
- Collingridge, D. and Reeve, C. (1986) *Science Speaks to Power: The Role of Experts in Policy Making*, Frances Pinter (Publishers), London.

- Collins, H. (1982) The Replication of Experiments in Physics In *Science in Context*, Barnes, B. and Edge, D. (Eds.), MIT Press, Cambridge, M.A., pp. 94-116.
- Comalco Aluminium (Bell Bay) Limited (2001) Submission to the Basslink Joint Advisory Panel. Received and published by Resource Planning and Development Commission, Hobart (T119).
- Commonwealth of Australia (2002) *Hansard*, Senate, Environment, Communications, Information Technology and the Arts Legislation References Committee, Renewable Energy (Electricity) Amendment Bill 2002. 15 November 2002. <http://www.aph.gov.au/hansard/senate/commtee/s5926.pdf>
- Connarty, M. (2001a) *Appendix 29: TEMSIM Sensitivity Study on Implications of Basslink*. DIIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.
- Connarty, M. (2001b) *Response to TEMSIM Modelling Issues Arising from the Basslink IIAS*. Prepared for the Hydro-Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE29).
- Cribb, J. (2003) *Sharing Knowledge*, Robyn Williams, Ockham's Razor, ABC Radio National, www.abc.net.au/rn/science/ockham/stories. Accessed on 19 October 2003. Broadcast on Sunday 10 August 2003.
- Crowley, K. (2000) Parliamentary Experiences of the Tasmanian Greens: The Politics of the Periphery, *Ecopolitics: Thought & Action*, **1**, 1, 53-71.
- Crowley, K. (2002) 'The Greens are Back in Town!' World Record Vote Achieved by Tasmanian Greens, *Ecopolitics: Thought & Action*, **1**, 4, 3-7.
- Curtayne, A. (2003) Basslink Launch Months Early, *The Examiner*, 25 March 2003, Launceston.
- Davidson, N. and Gibbons, A. (2001a) *Appendix 6: Gordon River Riparian Vegetation Assessment*. DIIAS report prepared for Hydro Tasmania. Available from Resource Planning and Development Commission, Hobart.
- Davidson, N. and Gibbons, A. (2001b) *Gordon River Riparian Vegetation Assessment Update to IIAS*. Prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart (TE78).
- Davies, P. D. and Cook, L. S. J. (2001a) *Appendix 7: Gordon River Macroinvertebrate and Aquatic Mammal Assessment*. DIIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.
- Davies, P. D. and Cook, L. S. J. (2001b) *Gordon River Macroinvertebrate and Aquatic Mammal Assessment Update to IIAS*. Prepared for the Hydro-Electric

- Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE36).
- Davis, B. W. (1972) Waterpower and Wilderness: Political and Administrative Aspects of the Lake Pedder Controversy, *Public Administration (Sydney)*, **31**, 21-42.
- Davis, B. W. (1986) Tasmania: The Political Economy of a Peripheral State In *The Politics of Development in Australia*, Head, B. (Ed.), Allen & Unwin, Sydney, 209-25.
- Department of Industry, Tourism and Resources (1999) Cabinet Decision Delivers: Decade of Industry Growth In *Australian Energy News*, **14**, Commonwealth Government, Canberra.
- Department of Industry, Tourism and Resources (2002) Energy Market Review In *Australian Energy News*, **23**, Commonwealth Government, Canberra.
- Department of Treasury and Finance (1997) *Basslink: Executive Summary Report of the Basslink Development Steering Committee*, Tasmanian Government, <http://www.treasury.tas.gov.au>. Accessed on 10 November 2002.
- Department of Treasury and Finance (1999) *Annual Report*. Tasmanian Government.
- Department of Treasury and Finance (2000) *Annual Report*. Tasmanian Government.
- Department of Treasury and Finance (2001) *Annual Report*. Tasmanian Government.
- Department of Treasury and Finance (2002a) *Department of Treasury and Finance Overview*, Tasmanian Government, <http://www.treasury.tas.gov.au>. Accessed on 10 November 2002.
- Department of Treasury and Finance (2002b) *Basslink Board Members*, Tasmanian Government, <http://www.treasury.tas.gov.au>. Accessed on 10 November 2002.
- Department of Treasury and Finance (2002c) *Annual Report*. Tasmanian Government.
- Department of Treasury and Finance (2002d) *The Department in Detail: Associated Entities*, Tasmanian Government, <http://www.treasury.tas.gov.au>. Accessed on 10 November 2002.
- Department of Treasury and Finance (2003a) *Meeting Tasmania's Energy Needs for the 21st Century*, Department of Treasury and Finance, <http://www.treasury.tas.gov.au>. Accessed on 27 March 2003.
- Department of Treasury and Finance (2003b) *Meeting Tasmania's Energy Needs for the 21st Century: Background to Reform*, Department of Treasury and Finance, <http://www.treasury.tas.gov.au>. Accessed on 27 March 2003.

- Department of Treasury and Finance (2004) *Speeches by Members of the Department, 1997-98*, <http://www.treasury.tas.gov.au>. Accessed on 12 March 2004.
- de Vaus, D. A. (2001) *Research Design in Social Research*, Sage Publications, London.
- DIIAS (2001a) *Draft Integrated Impact Assessment Statement*. Prepared by NSR Environmental Consultants Pty Ltd, 124 Camberwell Road, Hawthorn East, Victoria, 3123. <http://www.nsrenv.com.au>. Also available from the Resource Planning and Development Commission, Hobart or Basslink Pty Limited.
- DIIAS (2001b) *Draft Integrated Impact Assessment Statement Summary Report*. Prepared by NSR Environmental Consultants Pty Ltd, 124 Camberwell Road, Hawthorn East, Victoria, 3123. <http://www.nsrenv.com.au>. Also available from the Resource Planning and Development Commission, Hobart or Basslink Pty Limited.
- Diwell, S. (1991) High-power Backing for Bass Strait Cable, *The Saturday Mercury*, 12 October 1991, Hobart.
- Dovers, S. (1999) Adaptive Policy, Institutions and Management, *Griffith Law Review*, 8, 2, 374-93.
- Dovers, S. R. and Mobbs, C. D. (1997) An Alluring Prospect? Ecology, and the Requirements of Adaptive Management In *Frontiers in Ecology: Building the Links*, Klomp, N. and Lunt, I. (Eds.), Elsevier Science Ltd, Oxford, pp. 39-52.
- DPIWE (2001) (Department of Primary Industries, Water and Environment) Integrated Assessment - Basslink. Received and published by Resource Planning and Development Commission, Hobart (T121).
- DPIWE (2002) (Department of Primary Industries, Water and Environment) *Attachment 4 to Tasmanian Government Submission on the Draft Recommendations Report prepared by the Basslink Joint Advisory Panel*. Tasmanian Government. Received and published by Resource Planning and Development Commission (T*17).
- Duke Energy International (2001) Submission to JAP on Draft Panel Report. Received and published by Resource Planning and Development Commission, Hobart (T*20).
- Duncan, R. (1997) *Greenhouse Economics: The Australian Government Mobilises the Numbers in the lead up to Kyoto*, Honours Thesis in the School of Science and Technology Studies, Faculty of Arts and Social Sciences, University of New South Wales, Sydney.
- Duncan, R. (2003) Constructing Barriers in the Translation and Deployment of Science: Basslink - A Case Study, *Australian Journal of Public Administration*, 62, 1, 80-7.
- Enterprise Marketing and Research Services (2001) *Awareness and Attitudes to the Basslink Project*. Prepared for and available from Hydro Tasmania, Hobart.

- Environment Australia (2001) Submission to Joint Advisory Panel. Received and published by Resource Planning and Development Commission, Hobart (T143).
- Environment Australia (2002) Submission on the Draft Panel Report on the Basslink Proposal. Received and published by Resource Planning and Development Commission, Hobart (V*109).
- Evans, R. (1997) Soothsaying or Science?: Falsification, Uncertainty and Social Change in Macroeconomic Modelling, *Social Studies of Science*, **27**, 395-438.
- Ewick, P. and Silbey, S. S. (1995) Subversive Stories and Hegemonic Tales: Toward a Sociology of Narrative, *Law & Society Review*, **29**, 2, 197-226.
- Fairclough, N. (1989) *Language and Power*, Longman Group UK Limited, London.
- Fairclough, N. (1992) *Discourse and Social Change*, Polity Press, Cambridge.
- Forestry Tasmania (2002) Submission to ECITA with respect to the inquiry into the Renewable Energy (Electricity) Amendment Bill 2002. Submission received and published by Senate Environment, Communications, Information Technology and the Arts Legislation References Committee, Commonwealth of Australia, Canberra,
http://www.aph.gov.au/senate/committee/ecita_ctte/renewable_energy/submissions
- Freehills (2001a) *Submissions for Basslink Pty Ltd - Part A - General*. Available from Resource Planning and Development Commission, Hobart (TE4)
- Freehills (2001b) *Submission of Basslink Pty Ltd - Part C - System Configuration and Marine Issues*. Available from Resource Planning and Development Commission, Hobart (TE31).
- Freehills (2001c) *Final Submission on behalf of Basslink Pty Limited*. Available from Resource Planning and Development Commission, Hobart (TE154).
- Fuchs, S. (1992) *The Professional Quest for Truth: A Social Theory of Science and Knowledge*, State University of New York Press, Albany.
- Funtowicz, S. O. and Ravetz, J. (1991) A New Scientific Methodology for Global Environmental Issues In *Ecological Economics: The Science and Management of Sustainability*, Constanza, R. (Ed.), Columbia University Press, New York, pp. 137-52.
- Garvin, T. and Eyles, J. (1997) The Sun Safety Metanarrative: Translating Science into Public Health Discourse, *Policy Sciences*, **30**, 47-70.
- Gill, R. (1993) Justifying Injustice: Broadcasters' Accounts of Inequality in Radio In *Discourse Analytic Research: Repertoires and Readings of Texts in Action*, Burman, E. and Parker, I. (Eds.), Routledge, London, pp. 75-93.

- Gillespie, B., Eva, D. and Johnston, R. (1979) Carcinogenic Risk Assessment in the USA and UK: The Case of Aldrin/Dieldrin, *Social Studies of Science*, **9**, 265-301.
- Gough, S. (2001) *Hydro Tasmania's Opening Submission: Part 5 - Legal Submissions*. Prepared by Clayton Utz, Melbourne and Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart (TE70).
- Greens (2003) *Power Without Purpose: Tasmania's Energy Glut*. Report available from the office of the Tasmanian Greens, Hobart or http://www.tas.greens.org.au/publications/reports/Power_Without_Purpose_Jun_03.pdf
- Griffith, G. (2001) In the Matter of Basslink and Hydro Tasmania: Memorandum of Advice (Annexure to Hydro Tasmania Submission TE 70). Available from Resource Planning and Development Commission, Hobart.
- Grove White, R. and Wynne, B. (1994) *Science, Culture and the Environment, Report for Economic and Social Research Council*. Centre for the Study of Environmental Change, Lancaster University.
- Gubrium, J. F. and Holstein, J. A. (2000) Analyzing Interpretive Practice In *Handbook of Qualitative Research, Second Edition*, Denzin, N. K. and Lincoln, Y. S. (Eds.), Sage Publications, Thousand Oaks, pp. 487-507.
- Hagedorn, C. and Allender-Hagedorn, S. (1997) Issues in agricultural and environmental biotechnology: identifying and comparing biotechnology issues from public opinion surveys, the popular press and technical/regulatory sources, *Public Understanding of Science*, **6**, 233-45.
- Haley, M. (2002) Basslink's Taxing Add-On: Corrosion Mitigation Cost of \$500m Project may have to be Subsidised, *The Mercury*, 13 March 2002, Hobart.
- Hannigan, J. A. (1995) *Environmental Sociology: A Social Constructionist Perspective*, Routledge, London.
- Harvey, N. (1998) *Environmental Impact Assessment: Procedures, Practice, and Prospects in Australia*, Oxford University Press, Melbourne.
- Hay, P. R. (1992) Destabilising Tasmanian Politics: The Key Role of the Greens, *Bulletin of the Centre for Tasmanian Historical Studies*, **3**, 2, 60-70.
- HEC (1996) (Hydro-Electric Corporation) *Annual Report*. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>
- HEC (1998) (Hydro-Electric Corporation) *Annual Report*. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>

- HEC (1999) (Hydro-Electric Corporation) *Annual Report*. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>
- HEC (2001a) (Hydro-Electric Corporation) *Hydro Tasmania Business and Economic Issues*. Prepared by Hydro-Electric Commission. Available from Resource Planning and Development Commission, Hobart (TE110).
- HEC (2001b) (Hydro-Electric Corporation) *TEMSIM Modelling*. Prepared by Hydro-Electric Corporation. Available from Resource Planning and Development Commission, Hobart (TE111).
- HEC (2001c) (Hydro-Electric Corporation) *Technical and Operational Issues*. Prepared by Hydro-Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE112).
- HEC (2001d) (Hydro-Electric Corporation) *Hydro Tasmania Proposed Regulatory Framework*. Prepared by Hydro-Electric Corporation. Available from Resource Planning and Development Commission, Hobart (TE115).
- Hellstrom, T. and Jacob, M. (2001) *Policy Uncertainty and Risk: Conceptual Developments and Approaches*, Kluwer Academic Publishers, Boston.
- Herr, R. A. and Davis, B. W. (1982) The Tasmanian Parliament, Accountability and the Hydro-Electric Commission: the Franklin River Controversy In *Parliament & Bureaucracy - Parliamentary Scrutiny of Administration: Prospects and Problems in the 1980s*, Nethercote, J. R. (Ed.), Hale & Iremonger Pty Limited, Sydney, 268-353.
- Hess, M. and Adams, D. (2002) Finding Knowledge in a Changing Public Administration Environment, Policy Learning and Policy Transfer: 2002 Public Policy Network Conference, University of Tasmania, 31 January -1 February 2002.
- House of Assembly (2003a) *Hansard, Tuesday 18 February 2003: House of Assembly Government Businesses Scrutiny Committee*, Parliament of Tasmania, <http://www.hansard.parliament.tas.gov.au>. Accessed on 19 July 2003.
- House of Assembly (2003b) *Hansard, Wednesday, 28 May 2003, Part 2, Pages 31-106*, Parliament of Tasmania, <http://www.handsard.parliament.tas.gov.au>. Accessed on 19 July 2003.
- House of Assembly (2003c) *Hansard, Tuesday 3 June 2003: Estimates Committee A (Lennon)*, Parliament of Australia, <http://www.hansard.parliament.tas.gov.au>. Accessed on 19 July 2003.
- Howland, M. (2001) *Gordon River Fish Assessment Update to IIAS*. Prepared by Hydro Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE38).

- HT (2000a) (Hydro Tasmania) *Annual Report 2000*. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>.
- HT (2000b) (Hydro Tasmania) Submission to the Inquiry into the Renewable Energy (Electricity) Bill 2000 and the Renewable Energy (Electricity) (Charges) Bill 2000. Commonwealth of Australia, Canberra,
- HT (2001a) (Hydro Tasmania) *Annual Report 2000-2001*. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>.
- HT (2001b) (Hydro Tasmania) Basslink: Unleashing Tasmania's Renewable Energy for the Benefit of Australia. Received and published by Resource Planning and Development Commission, Hobart (T105).
- HT (2002a) (Hydro Tasmania) *Annual Report 2001-2002*. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>.
- HT (2002b) (Hydro Tasmania) Submission to the Basslink Joint Advisory Panel by Hydro Tasmania. Received and published by Resource Planning and Development Commission, Hobart (T*31).
- HT (2003a) (Hydro Tasmania) Letter to Editor, dated 5 June 2003. Received and published by *The Examiner*, Launceston, 6 June 2003.
- HT (2003b) (Hydro Tasmania) *Heemskirk Wind Farm Newsletter*, January 2003. Available from Hydro-Electric Corporation, Hobart or <http://www.hydro.com.au>.
- Hull, D. (2000) The Professionalization of Science Studies: Cutting Some Slack, *Biology and Philosophy*, **15**, 61-91.
- Huon Resource Development Group (2002) Inquiry into The Renewable Energy (Electricity) Amendment Bill 2002. Submission received and published by Senate Environment, Communications, Information Technology and the Arts Legislation References Committee for the Commonwealth of Australia, Canberra, http://www.aph.gov.au/senate/committee/ecita_ctte/renewable_energy/submissions
- Hydro Consulting (2000) *Appendix 1: Scoping Report, Basslink Aquatic Environmental Project*. DIIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.
- Hydro-Electric Commission (1979) *Report on the Gordon River Power Development Stage Two*. Hydro-Electric Commission, Hobart.
- Hydro-Electric Commission (1990) *System Load Study 1990, Part 1: Average Load Projections, Identification No. LTA/1990/2*. Prepared by Forecasting Department, Business Planning Group, Business and Corporate Planning Division, unpublished.

- Iannantuono, A. and Eyles, J. (1999) Environmental Health Narratives: An Analysis of Policy Making in Ontario, Canada, *Health & Place*, **5**, 139-56.
- IES (2000a) (Intelligent Energy Systems) *Supporting Study 20: Macro-economic NEM Modelling (VIC & Tas)*. DIIAS report available from Resource Planning and Development Commission, Hobart.
- IES (2000b) (Intelligent Energy Systems) *Andrew Campbell Resume*. Available from Resource Planning and Development Commission, Hobart (TE21).
- IES (2000c) (Intelligent Energy Systems) *Supporting Study 14: Greenhouse Gas NEM Modelling (Vic & Tas)*. DIIAS report available from Resource Planning and Development Commission, Hobart.
- IES (2002) (Intelligent Energy Systems) *PROPHET: The Essential Tool for Electricity Market Participants*, accessed on 8 December 2002.
<http://www.intelligentsys.com.au/ies/prophetintro.html>.
- IES (2003) (Intelligent Energy Systems) *People*, accessed on 25 February 2003.
<http://www.intelligentsys.com.au/ies/ies.asp?page=People/people1.html>.
- Irwin, A. (1989) Deciding about Risk: Expert Testimony and the Regulation of Hazard In *Environmental Threats: Perception, Analysis and Management*, Brown, J. (Ed.), Belhaven Press, London, pp. 19-32.
- Irwin, A. (1995) *Citizen Science: A Study of People, Expertise and Sustainable Development*, Routledge, London.
- Irwin, A. (2001) *Sociology and the Environment: A Critical Introduction to Society, Nature and Knowledge*, Polity Press, Cambridge.
- Irwin, A. and Wynne, B. (1996) Introduction In *Misunderstanding Science? The Public Reconstruction of Science and Technology*, Irwin, A. and Wynne, B. (Eds.), Cambridge University Press, Cambridge, pp. 1-17.
- JAP (2000a) (Joint Advisory Panel) *Draft Scope Guidelines for the Integrated Impact Assessment Statement (IIAS)*. Published by and available from the Resource Planning and Development Commission, Hobart.
- JAP (2000b) (Joint Advisory Panel) *Final Scope Guidelines for the Integrated Impact Assessment Statement (IIAS)*. Published by and available from the Resource Planning and Development Commission, Hobart.
- JAP (2002a) (Joint Advisory Panel) *Draft Panel Report*. Published by and available from the Resource Planning and Development Commission, Hobart.
- JAP (2002b) (Joint Advisory Panel) *Final Panel Report*. Published by the Resource Planning and Development Commission, Hobart.

- Jasanoff, S. (1987) Contested Boundaries in Policy-Relevant Science, *Social Studies of Science*, **17**, 195-230.
- Jasanoff, S. (1990) *The Fifth Branch: Science Advisers as Policymakers*, Harvard University Press, Cambridge.
- Jasanoff, S. and Wynne, B. (1998) Science in Decisionmaking In *Human Choice and Climate Change, Volume 1, The Societal Framework*, Rayner, S. and Malone, E. L. (Eds.), Battelle Press, Ohio, 1-87.
- JKMRC (2002) (Julius Kruttschnitt Mineral Research Centre) *Who's Who on the JKMRC Board*, http://www.jkmrc.uq.edu.au/whose_who/board.htm. Accessed on 10 November 2002.
- Johnson, C. (2003) Energy Not That Great, Hydro Says, *The Examiner*, 1 March 2003, Launceston.
- Jones, R. (1972) *Damania: The Hydro-Electric Commission, The Environment & Government in Tasmania*, Fullers Bookshop (Publishing Division), Hobart.
- Kemp, A. (2002) Energy Projects Give Cause for Optimism, *Tasmanian Business Reporter*, Published by Tasmanian Chamber of Commerce and Industry, Hobart, January.
- Kemp, D. (2003) *The Hon. Dr David Kemp MP, Federal Minister for the Environment and Heritage, Transcript, Decision on Meander Dam*, Commonwealth of Australia, <http://www.erm.gov.au/minister/env/2003/tr19sep203.html>. Accessed on 30 September 2003.
- Kirlew, M. (2001) Basslink and Stray Current Corrosion. Received and published by Resource Planning and Development Commission, Hobart (TE64).
- Knorr-Cetina, K. and Mulkay, M. (1983) Introduction: Emerging Principles in Social Studies of Science In *Science Observed: Perspectives on the Social Study of Science*, Knorr-Cetina, K. and Mulkay, M. (Eds.), Sage Publications, London, pp. 1-17.
- Koehnken, L. (2001a) *Gordon River Fluvial Geomorphology Assessment Update to IIAS*. Prepared for the Hydro-Electric Corporation. Available from Resource Planning and Development Commission, Hobart (TE55).
- Koehnken, L. (2001b) *Development of Ramp-Down Rule for the Gordon Power Station with Basslink*. Prepared for the Hydro-Electric Corporation. Available from Resource Planning and Development Commission, Hobart (TE54).
- Koehnken, L., Locher, H. and Rutherford, I. (2001) *Appendix 4: Gordon River Fluvial Geomorphology Assessment*. DIIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.

- Kriwoken, L. K. (2001a) *Appendix 14: Gordon River World Heritage Area Values Assessment*. DIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.
- Kriwoken, L. K. (2001b) *Gordon River World Heritage Area Values Assessment Update to the DIAS*. Prepared for the Hydro-Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE80).
- Latour, B. and Woolgar, S. (1979) *Laboratory Life: The Social Construction of Scientific Facts*, Sage Publications, Beverly Hills.
- Latour, B. (1983) Give Me a Laboratory and I will Raise the World In *Science Observed: Perspectives on the Social Study of Science*, Knorr-Cetina, K. and Mulkay, M. (Eds.), Sage Publications, London, 141-70.
- Latour, B. (1987) *Science In Action. How to Follow Scientists and Engineers Through Society*, Harvard University Press, Cambridge, M.A.
- Latour, B. (1993) *We Have Never Been Modern*, Harvester Wheatsheaf, New York.
- Latour, B. (1999) *Pandora's Hope: Essays on the Reality of Science Studies*, Harvard University Press, Cambridge, MA.
- Lee, K. N. (1993) *Compass and Gyroscope: Integrating Science and Politics for the Environment*, Island Press, Washington DC.
- Lennon, P. (1998) *Hansard, Wednesday, 7 October 1998, Part 1, Pages 1-36. Questions*, Parliament of Tasmania, <http://www.hansard.parliament.tas.gov.au>. Accessed on 14 March 2004.
- Lennon, P. (1999) *Government Business Enterprises Act 1995 Ministerial Charter, Hydro-Electric Corporation*. Issued by Minister for Infrastructure, Energy and Resources, the Hon Paul Lennon, MHA. Available from Parliamentary Library, Hobart.
- Lennon, P. (2002) *Inquiry into the Renewable Energy (Electricity) Amendment Bill 2002*. Submission received and published by Senate ECITA References Committee for the Commonwealth of Australia, Canberra, http://www.aph.gov.au/senate/committee/ecita_ctte/renewable_energy/submissions
- Lennon, P. (2003) *Hansard, Tuesday 8 April, 2003, Part 2, Pages 35-125. Electricity Supply Industry Amendment Bill 2003 (No. 16), Second Reading*, Parliament of Tasmania, <http://www.hansard.parliament.tas.gov.au>. Accessed on 19 July 2003.
- Lewis, K. (2003) *Journalism and the Internet and Improving Media Literacy, The Media Report*, ABC Radio National. Accessed 16 September 2003. www.abc.net.au/rn/talks/8.30/mediarpt/stories/s937246.htm.

- Lidskog, R. (1996) In Science We Trust? On the Relation Between Scientific Knowledge, Risk Consciousness and Public Trust, *Acta Sociologica*, **39**, 31-56.
- Locher, H. (2001a) *Summary Report*. DIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.
- Locher, H. (2001b) *Overview Report on Tasmanian Waterway Issues Arising from Basslink*. Prepared by the Hydro Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE73).
- Locher, H. (2001c) *Hydro Tasmania's Basslink Environmental Investigations*, Prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart (TE109).
- Long, H. (2002) Public to be Spared Cable Cost, *The Examiner*, 6 April 2002, Launceston.
- Lowe, D. (1984) *The Price of Power*, The Macmillan Company of Australia, South Melbourne.
- Lowe, I. (2001) Sustainability Science, *Ockham's Razor*, ABC Radio National, <http://www.abc.net.au/rn/science/ockham/stories/s317194.htm>. Accessed on 25 July.
- Lupton, R. (2000) *Lifeblood: Tasmania's Hydro Power*, Focus Publishing Pty Ltd, Edgecliff.
- MacKenzie, D. (1990) *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance*, MIT Press, Cambridge, MA.
- Macnaghten, P. (1993) Discourses of Nature: Argumentation and Power In *Discourse Analytic Research*, Burman, E. and Parker, I. (Eds.), Routledge, London, pp. 52-72.
- Marshall, G. (1994) *The Concise Oxford Dictionary of Sociology*, Oxford University Press, Oxford.
- McDonell, G. (1997) Scientific and Everyday Knowledge: Trust and the Politics of Environmental Initiatives, *Social Studies of Science*, **27**, 819-63.
- McKim, W. (2003) *Hansard, Tuesday 8 April, 2003, Part 2, Pages 35-125. Electricity Supply Industry Amendment Bill 2003 (No. 16), Second Reading*, Parliament of Tasmania, <http://www.hansard.parliament.tas.gov.au>. Accessed on 19 July 2003.
- Merton, R. K. (1973) *The Sociology of Science: Theoretical and Empirical Investigations*, University of Chicago Press, Chicago.
- Miller, D. P. (1997) Finitism Interruptus? 'Interests' and the Foundations of SSK, *Metascience*, **11**, 22-30.

- MRET Review Panel (2003) *Renewable Opportunities – A Review of the Operation of the Renewable Energy (Electricity) Act 2000*, submitted to the Commonwealth Government on 29 September 2003, available at <http://www.mretreview.gov.au/index.html>
- Myers, G. (1990) *Writing Biology: Texts in the Social Construction of Scientific Knowledge*, The University of Wisconsin Press, Wisconsin.
- Nature* (1997) **387**, 22 May.
- National Competition Council (2002a) *National Competition Policy - Payments*, Commonwealth Government, <http://www.ncc.gov.au>. Accessed on 30 April 2002.
- National Competition Council (2002b) *National Competition Policy - An Overview*, Commonwealth Government, <http://www.ncc.gov.au>. Accessed on 30 April 2002.
- NEMMCO (2001) (National Electricity Market Management Company) *2001 Statement of Opportunities Addendum 2*.
- NEMMCO (2002a) (National Electricity Market Management Company) *2002 Statement of Opportunities for the National Electricity Market: Executive Summary*.
- NEMMCO (2002b) (National Electricity Market Management Company) *2002 Statement of Opportunities Update*.
- Newman, K. (1980) *Energy Supplies in Tasmania: The Bass Strait Electric Cable - A Concept by the Hon. Kevin Newman*, Launceston, Tasmania, unpublished.
- NIEIR (2002) (National Institute of Economic and Industry Research) *The Economic Outlook for the NEM States to 2011-12*. Published by National Institute of Economic and Industry Research trading as National Economics.
- NSR Environmental Consultants Pty Ltd (2002) *Final Environmental Impact Statement and Supplement to the Draft Integrated Impact Assessment Statement*. Available from Resource Planning and Development Commission, Hobart or Basslink Pty Limited.

- Office of the Renewable Energy Regulator (2003) *Overview of Mandatory Renewable Energy Target*, Office of the Renewable Energy Regulator, www.orer.gov.au/overview.html#general. Accessed on 3 July 2003.
- Pacey, A. (1983) *The Culture of Technology*, Blackwell, Oxford.
- Palmer, L., McConarchy, F. and Peterson, J. (2001) *Appendix 2: Gordon River Hydrology Assessment*. DIIAS report prepared for Hydro Tasmania, Hobart. Available from Resource Planning and Development Commission, Hobart.
- Parliament of Australia (1995) *Standing Committee on Environment and Heritage: Inquiry into the Proposal to Drain and Restore Lake Pedder*, House of Representatives, <http://www.aph.gov.au/house/committee/enviro/pedding/peddrpt/chap4.pdf>. Accessed on 10 November 2002.
- Parliament of Australia (2003) *Mandatory Renewable Energy Target Review: A Review of the Operation of the Renewable Energy (Electricity) Act 2000*, <http://www.mretreview.gov.au>. Accessed on 20 August 2003.
- Parliament of Tasmania (2002a) *Budget Paper No. 1*. Available from Parliamentary Library, Hobart.
- Parliament of Tasmania (2002b) *2002-03 Tasmanian Budget Summary*. Available from Parliamentary Library, Hobart.
- Peterson, J. and Locher, H. (2001a) *Gordon River Basslink Modelling and Hydrology Update Report*. Prepared by the Hydro Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE37).
- Peterson, J. and Locher, H. (2001b) *Gordon River Basslink Hydrology with Mitigation Measures*. Prepared by Hydro Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE68).
- PMSEIC (1999) (Prime Minister's Science Engineering and Innovation Council) *Raising Awareness of the Importance of Science and Technology to Australia's Future*, Department of Education, Science and Training, Commonwealth Government <http://www.dest.gov.au/science/pmseic/meetings/4thmeeting.htm>
- Potter, J. (1996) *Representing Reality: Discourse, Rhetoric and Social Construction*, Sage Publications, London.
- Potter, J. and Wetherell, M. (1987) *Discourse and Social Psychology: Beyond Attitudes and Behaviour*, Sage Publications, London.
- Prior, L. (1997) Following in Foucault's Footsteps: Text and Context in Qualitative Research In *Qualitative Research: Theory, Method and Practice*, Silverman, D. (Ed.), Sage Publications, London, pp. 63-79.

- Proctor, R. N. (1991) *Value-Free Science? Purity and Power in Modern Knowledge*, Harvard University Press, Cambridge, Massachusetts.
- Rae, P. (2001) *Hydro Tasmania's Opening Submission: Part 2 Introductory Statement*. Hydro-Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE59).
- Roe, E. M. (1989) Narrative Analysis for the Policy Analyst: A Case Study of the 1980-1982 Medfly Controversy in California, *Journal of Policy Analysis and Management*, **8**, 2, 251-73.
- Roe, E. M. (1994) *Narrative Policy Analysis: Theory and Practice*, Duke University Press, Durham.
- Rose, D. (2001) Hydro Pledge on Basslink, *The Mercury*, 16 October 2001, Hobart.
- Rose, D. (2002) Hydro to Fund Basslink Backflip on Corrosion, *The Saturday Mercury*, 6 April 2002, Hobart.
- RPDC (2001a) (Resource Planning and Development Commission) *Joint Advisory Panel*, http://www.rpdc.tas.gov.au/projects_state_signif/Basslink/pages/joint.htm. Accessed on 4 October 2001.
- RPDC (2001b) (Resource Planning and Development Commission) Hearing on the Basslink Draft Integrated Impact Assessment. Letter to Freehills, Melbourne, Request for Information from JAP. Available from Resource Planning and Development Commission, Hobart (TE42).
- RPDC (2002) (Resource Planning and Development Commission) *Basslink - Project of State Significance: Report to the Hon J Bacon, MH, Premier and Minister for State Development*. Published and available from Resource Planning and Development Commission, Hobart.
- Saddler, H. and Donnelly, B. (1982) *The Demand for Energy in Tasmania, with particular reference to Electricity: Submission to the Senate Select Committee on South-West Tasmania*. Centre for Resource and Environmental Studies, The Australian National University, Canberra, unpublished.
- Sardar, Z. (2000) *Thomas Kuhn and the Science Wars*, Icon Books, Cambridge.
- Saul, J. R. (1997) *The Unconscious Civilization*, Free Press, New York.
- Schotland, M.S. and Bero, L.A. (2002) Evaluating Public Commentary and Scientific Evidence Submitted in the Development of Risk Assessment, *Risk Analysis*, **22**, 1, 133-40.
- Shackley, S. and Wynne, B. (1995a) Global Climate Change: The Mutual Construction of an Emergent Science-Policy Domain, *Science and Public Policy*, **22**, 4, 218-30.

- Shackley, S. and Wynne, B. (1995b) Integrating Knowledges for Climate Change: Pyramids, Nets and Uncertainties, *Global Environmental Change*, **5**, 2, 113-26.
- Shackley, S. and Wynne, B. (1996) Representing Uncertainty in Global Climate Change Science and Policy: Boundary-Ordering Devices and Authority, *Science, Technology & Human Values*, **21**, 3, 275-302.
- Shapin, S. (1984) Pump and Circumstance: Robert Boyle's Literary Technology, *Social Studies of Science*, **14**, 481-520.
- Shapin, S. (1995) Here and Everywhere: Sociology of Scientific Knowledge, *Annual Review of Sociology*, **21**, 289-321.
- Spry, A. (1976) A Consultant's Views on Environmental Impact Statements in Australia, *Search*, **7**, 6, 252-56.
- Stalder, F. (2000) Beyond Constructivism: Towards a Realistic Realism. A Review of Bruno Latour's Pandora's Hope, Produced by *The Information Society*, **16**, 3 <http://www.fis.utoronto.ca/~stalder/html/pandora.html>. Accessed 4 August 2000.
- State Policies and Projects Act (1993)
<http://www.thelaw.tas.gov.au/fullview/65++1993+GSI@EN+2002110100>.
Accessed on 1 November 2002.
- Sub.T.15 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T8 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T9 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T18 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T19 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T21 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T26 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T27 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.

- T34 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T37 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T42 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T44 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T50 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T52 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T58 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T60 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T61 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T63 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T64 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T65 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T68 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T71 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T72 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T73 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.

- T74 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T93 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T95 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T115 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- T133 (2001) Public Submission to JAP. Received and published by Resource Planning and Development Commission, Hobart.
- Tasmanian Audit Office (2000) *Report of the Auditor-General: Government Departments, Public Bodies and the Public Account 1999-2000*. Tasmanian Government.
- TCCI (2001) (Tasmanian Chamber of Commerce and Industry) Submission on the Draft Integrated Impact Assessment Statement to the Basslink Joint Advisory Panel. Received and published by Resource Planning and Development Commission, Hobart (T83).
- TFIC (2001a) (Tasmanian Fishing Industry Council) *Basslink Forum Presentation Notes*, Available from Tasmanian Fishing Industry Council, Hobart.
- TFIC (2001b) (Tasmanian Fishing Industry Council) Submission to Joint Advisory Panel. Received and published by Resource Planning and Development Commission, Hobart (T118).
- Thomas, I. (1998) *Environmental Impact Assessment in Australia: Theory and Practice, Second Edition*, Federation Press, Leichhardt.
- Thompson, P. (1981) *Power in Tasmania*, Australian Conservation Foundation, Hawthorn.
- Tighe, P. J. (1992) Hydroindustrialisation and Conservation Policy in Tasmania In *Australian Environmental Policy: Ten Case Studies*, Walker, K. J. (Ed.), New South Wales University Press, Kensington, pp. 124-55.
- Todd, J. (1981) Letter to Senate Select Committee on South-West Tasmania in Canberra dated 17 December 1981, unpublished.
- Turnbull, D. (2000) *Masons, Tricksters and Cartographers*, Harwood Academic Publishers, Amsterdam.
- Turnbull, D. (2002) Travelling Knowledge: Narratives, Assemblage and Encounters In *Instruments, Travel and Science: Itineraries of Precision from the Seventeenth to the*

- Twentieth Century*, Bourguet, M.-N., Licoppe, C. and Sibum, H. O. (Eds.), Routledge, London, pp. 273-94.
- Turnbull, S. (1982) *Political and Economic Solutions for Tasmania: An Appraisal of the Franklin River Dam*. Commissioned by the Business Association for Economical Power, Hobart, unpublished.
- University of Tasmania (2004), UniTas, No. 200, 11 December 2000, <http://www.admin.utas.edu.au/HANDBOOKS/UNITAS/home.html>. Accessed 12 March 2004.
- URS (2001) *Supporting Study 15: Greenhouse Gas Assessment (Vic & Tas)*. DIAS report available from Resource Planning and Development Commission, Hobart.
- Vivian, H. L. (1983) *Electricity Supply for King Island: An Evaluation of Small-Scale Wind Generators*, Board of Environmental Studies, University of Tasmania, Hobart.
- von Baeyer, H. C. (1998) Science under Siege, *American Journal of Physics*, **66**, 11, 943-44.
- Wadsley, A. (2001) Submission to the Joint Advisory Panel on the Basslink Draft Integrated Impact Assessment Statement. Received and Published by Resource Planning and Development Commission, Hobart (T57).
- Whinnett, E. (2003) Pulp Mill Bid Back on Table, *The Mercury*, 18 June 2003, Hobart.
- Wiklund, H. (2002) *Arenas for Democratic Deliberation: Decision-Making in an Infrastructure Project in Sweden*, Jonkoping International Business School, Jonkoping University, Jonkoping.
- Wilderness Society (1984) *Overpowering Tasmania: A Briefing Paper on Power Demand and Supply*. Hobart.
- Willis, G. (2001) *Hydro Tasmania's Opening Submission: Part 3 Hydro Tasmania's Business Case*. Hydro-Electric Corporation, Hobart. Available from Resource Planning and Development Commission, Hobart (TE60).
- Wood, D. (2002) Basslink Fends off Attacks on Costs, *The Mercury*, 10 April 2002, Hobart.
- Wood, L. A. and Kroger, R. O. (2000) *Doing Discourse Analysis: Methods for Studying Action in Talk and Text*, Sage Publications, Thousand Oaks.
- Woolgar, S. (1991) Interests and Explanation in the Social Study of Science, *Social Studies of Science*, **11**, 365-94.
- Woollacott, M. (1998) Risky Business, Safety In *The Politics of Risk Society*, Franklin, J. (Ed.), Polity Press, Cambridge, pp. 47-9.

- Wynne, B. (1975) The Rhetoric of Consensus Politics: A Critical Review of Technology Assessment, *Research Policy*, **4**, 108-58.
- Wynne, B. (1980) Technology, Risk and Participation: On the Social Treatment of Uncertainty In *Society, Technology and Risk Assessment*, Conrad, J. (Ed.), Academic Press, London, 173-208.
- Wynne, B. (1988) Unruly Technology: Practical Rules, Impractical Discourses and Public Understanding, *Social Studies of Science*, **18**, 147-67.
- Wynne, B. (1989a) Frameworks of Rationality in Risk Management: Towards the Testing of Naive Sociology In *Environmental Threats: Perception, Analysis and Management*, Brown, J. (Ed.), Belhaven Press, London, pp. 33-47.
- Wynne, B. (1989b) Building Public Concern into Risk Management In *Environmental Threats: Perception, Analysis and Management*, Brown, J. (Ed.), Belhaven Press, London, pp. 117-37.
- Wynne, B. (1992a) Uncertainty and Environmental Learning: Reconceiving Science and Policy in the Preventive Paradigm, *Global Environmental Change*, **June**, 111-27.
- Wynne, B. (1992b) Carving Out Science (and Politics) in the Regulatory Jungle, *Social Studies of Science*, **22**, 745-58.
- Wynne, B. (1992c) Risk and Social Learning: Reification to Engagement In *Social Theories of Risk*, Krimsky, S. and Golding, D. (Eds.), Praeger Publishers, Westport, 274-97.
- Wynne, B. (1994) Scientific Knowledge and the Global Environment In *Social Theory and the Global Environment*, Redclift, M. and Benton, T. (Eds.), Routledge, London, pp. 169-89.
- Wynne, B. (1996a) SSK's Identity Parade: Signing -Up, Off-and-On, *Social Studies of Science*, 1996, **26**, 357-91.
- Wynne, B. (1996b) Misunderstood Misunderstandings: Social Identities and Public Uptake of Science In *Misunderstanding Science? The Public Reconstruction of Science and Technology*, Irwin, A. and Wynne, B. (Eds.), Cambridge University Press, Cambridge, pp. 19-46.
- Wynne, B. (2001) Creating Public Alienation: Expert Cultures of Risk and Ethics on GMOs, *Science as Culture*, **10**, 4, 445-81.
- Yearley, S. (1988) *Science, Technology, and Social Change*, Unwin Hyman, London.
- Yearley, S. (1994) Understanding Science from the Perspective of the Sociology of Scientific Knowledge: An Overview, *Public Understanding of Science*, **3**, 245-58.

- Yearley, S. (1999) Computer Models and the Public's Understanding of Science: A Case-Study Analysis, *Social Studies of Science*, **29**, 6, 845-66.
- Yearley, S. (2000) Making Systematic Sense of Public Discontents with Expert Knowledge: Two Analytical Approaches and a Case Study, *Public Understanding of Science*, **9**, 105-22.