An Innovation Strategy for Tasmania

A New Vision for Economic Development

Conceptual Overview and Options Outline

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PART 1: CONCEPTUAL FOUNDATIONS*

Why Innovation Matters to Tasmania: The Role of Capability in Economic Development

For almost eight decades, between 1914 and 1983, a single focused and cohesive government strategy drove Tasmania's economic development. Known to all Tasmanians as 'hydro-industrialisation', the strategy was powerful and effective: energy-intensive private manufacturing industry would be attracted to Tasmania by an abundance of low-cost electricity, which would come in turn from harnessing Tasmania's endowment of water, through government-built dams and power stations.

It worked. By building a sophisticated manufacturing sector, the strategy transformed Tasmania from an isolated backwater, with an economy consisting mostly of subsistence farmers alongside a few wealthy landholders, into a confident, outward-looking, and capable industrial community.

But in 1983, when the era of public-private cooperation that created this transformation was closed by the High Court's decision to terminate the Franklin Dam project, Tasmania lost its development mainspring. For 25 years, our state has lacked a vision to replace hydro-industrialisation. Since 1983, repeated battles over specific projects, usually with environmental concerns at their centre, have punctuated efforts to find a new direction. None has produced the new vision Tasmania needs.

The strategy outlined here offers a perspective that can.

Hydro-industrialisation was at heart an innovation strategy. It consisted of a series of investments to reconfigure Tasmania's natural and human resources to create new industries, new products, and new services. It invigorated Tasmania's capabilities and created opportunity for entrepreneurship. Tasmania today needs a new innovation strategy. Innovation (which can be seen as increase in the *quality* of economic activity) has joined economic growth (an increase in the *quantity* of economic activity) as a primary objective of government policy. Innovation—the development of improved products, services, and processes, the creation of new markets, and the use of new products—is critical to productivity advance. And productivity advance is the essential underpinning of prosperity in any economy. In the long run, only by increasing their

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economic output per hour worked can Tasmanians ensure long-term sustainable economic development. Innovation increases productivity both by improving efficiency (reducing cost) and raising sales (increasing customer willingness to pay). The latter is particularly important. Tasmanian companies will need new products and services, that can satisfy sophisticated customer demand both at home and in export markets, if the state is to build on its recent improved economic performance.

Importantly, the role of government in hydro-industrialisation was to create 'policy platforms', which enabled innovation and economic growth. In addition to the provision of economic infrastructure, government followed a deliberate population settlement strategy (a 'community platform') to attract and retain immigrants. This increased diversity in the Tasmanian population and laid the creative foundations for a range of innovations, including the ultimate emergence of the wine and aquaculture industries. A governance platform (the Hydro Electric Commission) provided the organisational wherewithal to manage the developments, and key government fiscal and regulatory levers enabled changed patterns of land use to occur.

The economic development strategy for Tasmania proposed here, like hydro-industrialisation, aims to create new platforms for innovation. These platforms draw upon Tasmania's strengths, its physical capacity and human capability, to support a sustained vision for the Tasmania we want to live in. It combines economic prosperity with community development and environmental responsibility.

Timing is important. Many of the large manufacturing industries fostered by hydro industrialisation need—in today's global market—to shape different futures to retain competitiveness. More positively, the government has a major infrastructure strategy underway, education and skills strategies now in place, and a social-inclusion strategy under development. An innovation strategy will provide a key frame of reference, an integrating perspective, for each of these strategies and, in turn, will be supported by them.

In parallel to these major strategies, government has undertaken many other reforms which would benefit from guidance from an innovation strategy. The current Review of Land Use Planning Schemes, for example, would benefit from having as a key objective of the new Model Scheme to facilitate innovation. Regional planning provides the mechanism to better co-ordinate regional infrastructure, economic development, and environmental and social interests for the benefit of the region. It can also address local environmental, social, and economic issues which may necessitate a regional focus.

What is an Innovation Strategy and What Should Be its Aims?

'Too much capitalism does not mean too many capitalists, but too few capitalists.'

—G. K. Chesterton, *The Uses of Diversity*, 1921.

Over the past decade, Tasmania has experienced substantially improved economic performance. By and large, however, this performance has been driven by increased retail spending and housing construction, and has not been matched by significantly improved production or export performance. While on many economic measures Tasmania has closed the gap with the mainland states over the last decade, we have seen only small increases in the value of goods and services that Tasmania sells to the world, the mainland included.

In the credit-driven economic downturn of 2009, growth driven by consumption and housing will be in serious jeopardy. As the world undergoes debt deleveraging in 2009 and beyond, spending power will inevitably be undermined. Credit crises inflict more harm on the economy than those in which financial stress is concentrated in stock markets alone because they destroy purchasing and investment power over a wider front.

While in late 2009 the world appeared to be emerging from the crisis begun in 2007, the new normal is likely to be different to the old normal. Consumers and companies will necessarily operate with less debt: they will need to spend less and save more. As an example, between 1992 and 2007, the private sector of the world's largest economy, the United States, accumulated an incremental $66 trillion in debt, by far the largest buildup in history relative to income, net worth, and savings. But as consumers and companies rebuild their balance sheets, an estimated $24 trillion in wealth has been destroyed over the last two years (in home values, equities, fixed income bonds, and commodities), exacerbating the stress faced by families and companies. Australia's economy is similarly debt laden, and some leverage ratios (debt-to-income and debt-to-housing values) are even worse here than in the US. What cannot last won't last. In such a context, any economy whose prosperity is based on consumption and housing prices, supported by rising consumer debt, as has been Tasmania's, will be jeopardised.

The imperative now is to increase the capability of the Tasmanian economy to produce goods and services the world wants to buy. An instructive example for Tasmania is the experience of Finland in the 1990s. Like Tasmania, historically Finland's economy has been based on its natural resource endowment and long

coastline. Finland's major industries in 1970 were pulp and paper (40% of exports), wood products (16%), and engineered products (including shipbuilding) at 23%. Forests and woodland cover 76% of the country. A shipbuilding cluster focused on specialised ships, including icebreakers and ferries. But as traditional export markets in the Soviet Union collapsed at the beginning of the 1990s, Finland entered the most severe economic crisis in its history; GDP fell by 6.2% in 1991 and a further 3.3% in 1992, and exports by 13% in dollar terms in 1991. Government deficits and inflation soared, and Finland's government was forced to cut spending.

But contrary to conventional wisdom of the time, Finland decided to *increase* its commitment to innovation. It launched what became known as the Center of Expertise program, focusing on "strengthening regional competitiveness by increasing innovation, renewing the regional production structure, and creating new jobs in selected expertise areas." It tripled its commitment to education, and launched a Cluster Program to back the country's key export sectors. The result has been spectacular, with Finland emerging as one of the world's most dynamic and sophisticated economies. Based on renewed capability in its traditional strengths, coupled with an electronics industry based on mobile telephony, Finland has built a diverse export-oriented economy.

It is now time that each major sector of the Tasmanian economy, especially the private sector but including the public sector, should develop comprehensive innovation strategies. These should formulate coherent sets of initiatives to upgrade the sectors' capability to introduce new products, new processes, and new business models. The Government's role in these initiatives should be to focus on those activities that cannot or will not be performed by sector participants themselves, and should seek to ensure that all elements of an effective innovation system—which creates the platform for innovation within communities—are strong and vigorous. The Government should *not* attempt to substitute its own activity for those of companies, but to facilitate the activity of others.

As background, it is important to recognize that government economic policy must address at least three separate fields of activity, and these should be conceived and implemented separately. Confusion among the goals and implementation mechanisms for these three can confound effective performance, on each or all:

Promotion of economic growth. This includes investment attraction and incentives, encouragement of savings, facilitation and regulation of markets, and provision of education and training to meet the normal and routine needs of an expanding economy.

Support for the disadvantaged. Inevitably, those at the bottom of the economic pyramid, especially the unemployed, are the least skilled and least motivated. It is widely accepted that government has a responsibility to assist these members of the community to participate in the economy, and even directly to create employment for them. Here priorities include basic skills acquisition, workforce-participation incentives, counseling, and facilitation of low-skill and low-motivation-demanding jobs.

Productivity enhancement. Over time, the *only* way a community can increase its prosperity sustainably (ie, without mounting debt) is by raising the economic output and value of its combination of economic inputs. Most importantly, it must increase the economic productivity of its citizens' hours worked. Innovation policy addresses *this* task, which the community expects government to perform. Often policy in this field is aimed at the higher-performing and higher-motivated participants in the economy, whose needs can be very different to the others identified above.

These different goals cannot be met with the same policies, and in certain respects they may even come into conflict. Simply stated, if the purpose of innovation policy is to improve productivity, its goal must be:

To enhance competitive capability in the economy's leading sectors.

Surprisingly, most discussion around innovation policy has until recently *not* focused on this aim. Innovation policies have been directed towards one or more quite different goal, most commonly:

- To create new companies, or even entirely new industries, in supposed 'high technology' sectors.
- To gain a financial or other return on government investment in research and education, especially through commercialisation of public-sector research-organisation discoveries.
- To transform the culture of business or even whole communities, to make it more 'creative' and innovative.

In reality, these aims have proven difficult or even impossible for government to deliver. Of perhaps even greater concern, the result has too often been programs that *de facto* substitute the public sector for activities more appropriately performed by the private sector. It is important to reiterate: Innovation policy in Tasmania should *not* aspire to substitute for the private sector. Rather it should aim to provide a supportive

context, within which the risk-taking activities of private companies can be more successful *when necessary infrastructure or capabilities cannot or will not be provided by markets or companies*.[1] Innovation policy in Tasmania should therefore follow several clear principles:

It should have impact on sectors of sufficient weight and potential to matter.

To exercise sufficient impact, an innovation policy must address the needs of relatively large sectors. This implies that an innovation policy cannot restrict itself to 'research-intensive' industries. It is well to recall that so-called high-tech industries (usually defined as industries with R&D/Sales ratios of more than 4 per cent) make up only a small component of manufacturing in any economy, and an even smaller component of GDP.

This is especially true for Tasmania and Australia, but it is also true of all developed economies: in most OECD economies high-tech manufacturing makes up less than 3 per cent of GDP. All OECD economies, including Australia, consist of a combination of large medium-technology and low-technology manufacturing industries (such as food and beverages, or fabricated metal products), and large-scale service activities (of which the largest are education, health, and social services). As we will observe below, this is particularly true in Tasmania.

Nor is it true that 'high-tech' sectors generally account for the greatest proportion of either innovation or growth. The AIRC's Innovation Census of Tasmania revealed that so-called low- and medium-technology industries include significant proportions of innovating firms, that they develop new products, and that they generate significant sales from new and technologically changed products.[2] . Similar results have appeared in other innovation surveys undertaken in Australia and other countries.

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[1] The approach employed here to formulation of an effective innovation strategy has been developed and tested over recent years across several locations in Australia and internationally. It is based on well-established understandings from the field of innovation economics about how, when, and where innovation actually takes place in a modern economy, as described in this report, along with academic papers and studies by the present author and others, combined with a growing body of practical experience. A similar approach has been adopted by other Australian States, most notably NSW. See especially West, *A Strategy to Accelerate Innovation in NSW: Outline for Policy Development,* from which the first section of this report draws.

[2] In the Tasmanian economy, an estimated 70.1 per cent of non-high-tech firms innovated during the years 2004-2006, and the various sectors of the Tasmanian economy innovated at comparable rates, see Smith and O'Brien, 'Innovation in Tasmania: An Innovation Census in an Australian State', Australian Innovation Research Centre, Working Paper, 2008. For the

Indeed, the very distinction between 'high'- and 'low'-technology industries is misleading, resting as it does not on the actual 'knowledge-intensivity' of any industry, but on an inadequate proxy for such a measure: the proportion of the industry's R&D performed internally in individual firms. A more useful classification distinguishes *internal-R&D*-focused industries, in which innovation is driven by formal R&D performed inside companies (producing high R&D/Sales ratios), from *distributed-knowledge* industries, in which innovation is developed externally to individual enterprises, and then optimised internally. Industries can thus be 'knowledge-intensive' without necessarily a high degree of R&D being undertaken by firms themselves.

It should address real needs these sectors face, based on an analytical understanding of the actual innovation process in the Tasmanian economy.

Innovation follows different paths in different sectors. Sectors usually exhibit a typical innovation pattern, but these patterns vary considerably in methods, approaches, and results. These distinctive patterns must be understood in detail if effective policy is to be developed and implemented. The *systems* that provide the platforms within which individual firms or other organisations innovate function quite differently from sector to sector, and even from time to time. What promotes innovation in one sector may be ineffectual or counterproductive in others.

Key dimensions of difference include the relative propensity to new company formation; product-versus-process focus; and internal-versus-external knowledge sourcing. In some industrial arenas, innovation primarily takes the form of new company formation (for example, software and certain fields of electronics); in others, it manifests through the activities of already-existing large companies. In some sectors, such as agriculture, innovation is often developed externally by not-for-profit entities and adopted by individual market participants. Innovation in still other sectors is primarily product-focused; in some (for example, metals and energy production) it is process-focused. It is science-based in some sectors (including pharmaceuticals); in others, marketing-focused.

Australian economy as a whole, and using a different methodology, the Australian Bureau of Statistics estimated that at least 30 per cent of firms typically innovate over any three-year time period. In manufacturing, the most intensively innovating sectors are machinery and equipment and chemicals, each with about 50% of firms innovating. Nevertheless, in such 'traditional' industries as food products, textiles and metal products between 30 and 35 percent of firms are reported by the ABS as 'innovating': see Australian Bureau of Statistics, Innovation in Australian Business 2003, 8158.0, Canberra, 2005, p.7, 10.

It should complement, not attempt to substitute for, and certainly not compete with, the activities of private companies. It should aim to strengthen the market position and capabilities of private firms.

To be effective in supporting innovation, the policy should in the first instance 'do no harm'—that is, it should not distort market incentives by attempting inappropriately to substitute public-sector activity for those of the private sector. It should limit its domain to fields in which infrastructure, capability, and resources are both demonstrably required to support innovation and in which it is not feasible for private companies or markets, in the normal course of affairs, to undertake the specified activity.

In general, there are two broad reasons why economically necessary capabilities might be absent in an economy such as that of Tasmania. One relates to value capture, the other to risk bearing. Markets 'fail' in certain instances. In the creation of physical and knowledge infrastructure, for example, it is sometimes not possible for individual firms to capture sufficient benefit from a particular investment to make the commitment worthwhile, even though such investment might be greatly beneficial to the economy as a whole, or to an industrial, regional, or community sector. Second, individual firms or markets might not be able effectively to diversify and manage the specific form of risk involved in certain types of innovation.

Innovation policy in Tasmania should focus on addressing these needs rather than attempting to create entirely new high-technology industries or provide a direct financial return to government from publicly funded research.

How Innovation Happens in Tasmania: Results of the AIRC Innovation Census

Although it is a small, island community at the periphery of the world economy and based on so-called low-technology industries, Tasmania has a modern, developed capitalist economy. Effective innovation policy for Tasmania must be based on an accurate understanding of the processes through which innovation takes place in its own key industries. Fortunately, a growing body of research is accumulating about these issues, including notably in Tasmania. Research into how, where, and why innovation happens in capitalist economies has recently emerged as a major field within the study of economics, and has now yielded certain well-established results. We know much more today about what promotes, and what retards, innovation than we did 20 years ago. These results can form the basis for effective policy. But several of these insights contravene conventional wisdom, and suggest new directions for innovation policy in Tasmania. Key findings of innovation economics include:

Innovation is diffused across the economy.

Innovation is not confined to a small group of high-technology industries, nor is it driven by a small set of sciences or technologies. Statistical studies of innovation, particularly the AIRC's Innovation Census of Tasmania, but also from Australia and the European Union, reveal that innovation (in the sense of development and sales of new products and services) is distributed broadly across the economy in all developed countries.[3] Low and medium technology sectors are not in absolute decline in most OECD countries; they remain large and persistent as a proportion of both manufacturing output and Gross Domestic Product. Industries that are regarded as 'traditional', 'mature', or 'low tech' often generate substantial sales from technologically new products or processes.

Similarly, and potentially importantly for Tasmania, the service sector is strongly innovative. This finding is especially important since the service sector makes up the largest component of all developed economies, Tasmania included, as will be explored below, although in Tasmania the service sector is a significantly smaller proportion than on the mainland.

[3] Smith and O'Brien, 'Innovation in Tasmania: An Innovation Census in an Australian State', AIRC Working Paper, 2008; Australian Bureau of Statistics, *Innovation in Australian Business* 2005.

The implication of these findings is that government policy to promote innovation should not necessarily aim to develop *de novo* industries whose product is high technology. Creation of an innovation-effective economy should not be reduced to sponsorship of ICT, biotechnology, or nanotechnology industries, nor are R&D/sales ratios necessarily the most important focus of innovation policy in many sectors. Indeed, since business R&D is disproportionately concentrated in 'high technology' sectors (approximately half takes place in these sectors, which, to reiterate, account for less than 3 per cent of GDP), tax credits for R&D can amount to little more than a subsidy to a small proportion of the economy, from the larger—but no less innovative—majority.

Within industries, innovation is concentrated.

While innovation is broadly distributed across the Tasmanian economy, within particular sectors it is concentrated. The Innovation Census found that less than 80 firms in Tasmania account for more than 80 per cent of all innovation sales, and that 1 per cent of firms (specifically, eight firms) account for more than 40 per cent of innovation sales. At the other end of the spectrum, 50 per cent of firms accounted for only 3 per cent of innovation sales.[4] In short, most innovation is led by a few companies, and others follow by copying or imitating.[5]

This finding, too, has important implications for policy. It suggests that government policy should aim to enhance the innovation capabilities of leading firms, rather than hope to raise the average or promote cultural change across entire sectors. Unfortunately, government policy frequently does the reverse: it focuses on supporting failing or at best start-up firms, and regards successful firms as not 'deserving' support.

Of course, this observation does not suggest that government should subsidise leading innovators. Rather, policy should aim to provide infrastructure, education, and knowledge resources that even leading firms cannot undertake alone, to enable pioneer innovators to accelerate growth or strengthen their position.

[4] Smith and O'Brien, 'Innovation in Tasmania: An Innovation Census of an Australian State', Australian Innovation Research Centre Working Paper, 2008, p. 20.

[5] Australian Bureau of Statistics, *Innovation in Australian Business* 2005.

Innovation usually begins with a customer problem, not a technical 'discovery'.

One of the most well-established conclusions of innovation research is that innovation should not be viewed primarily as the commercialisation of scientific discovery. Much innovation policy is based on an implicit assumption that innovation processes are an orderly sequence that begins with R&D. In this view, scientific researchers first discover useful things, engineers then transform these discoveries into manufacturable products, after which marketers sell the results to customers.

In fact, innovation projects more often begin at the end point of the sequence outlined above. Companies usually start by utilising their understanding of particular customer needs to identify a potential new product (this does not imply that they simply 'listen to customers'; often firms understand potential needs better than do customers). After conceiving the potential product, the company initiates an innovation project. Usually, firms endeavour to create new products by utilising their own existing capabilities; this is much the cheapest and safest route. Should they encounter problems beyond their existing expertise, however, they may launch an R&D project, whether entirely internal or partially external.

But note that in this more-common sequence R&D *follows* identification of a customer need, and is launched *after* the project has begun. R&D may well participate in an innovation project, along with such corporate functions as manufacturing, marketing, regulatory approval, and capital allocation, but it is rarely the initiator of the project.

Nor is R&D usually the major financial component of innovation projects. Statistical surveys of innovation in Australian business show that on average only 26.4 per cent of the cost of innovation projects consisted of R&D expenditure (despite tax-based incentives to classify as much expenditure as possible as 'R&D'). Non-R&D expenditures incurred during innovation efforts for items such as training, market research, design, and engineering development were more than twice those for R&D.[6]

In Tasmania, different sectors revealed widely divergent proportions of innovation expenditure committed to various purposes. In the information, media, and telecommunications sector, R&D was indeed the largest component of innovation expenditure, but not a majority (32 per cent), followed by acquisition of advanced machinery, equipment, or software (25 per cent). In the much larger combined agriculture, forestry, and fishing sectors, however, acquisition of advanced machinery,

[6] Australian Bureau of Statistics, *Innovation in Australian Business* 2005.

equipment, or software made up an overwhelming 63 per cent of expenditure, and R&D only 16 per cent.[7]

Yet innovation policy in Australia has until recently consisted overwhelmingly of incentives for R&D, combined with pressure for commercialisation from publicly supported research bodies. Based on the understanding above, these policies are likely to miss the mark or produce undesirable consequences and should not be pursued in Tasmania.

The returns from innovation are disproportionately captured by those who bear and manage its risk.

The defining characteristic of innovation as an economic activity is that its outcomes are much more uncertain, hence more risky, than those of routine activity. This suggests that those who bear this economic risk—particularly by financing it—should be able to capture a significant, perhaps apparently disproportionate, share of its return (given their weight in total GDP). And so it is. Recent studies have shown, for example, that the proportion of total profit in the US economy captured by the finance sector has grown from 14 per cent in 1981 to 39 per cent in 2001.[8]

An important implication of this finding is that while innovation may take place broadly across the economy, the capture of the economic benefits that flow from innovation may be quite concentrated, sectorally and regionally. Even in the industries that predominate in Tasmania, it is investors who capture much of the potential return from innovation, and it is important that as much of that value as possible be retained locally—with the implication that it is important to finance innovation locally. Communities that are effective in building finance institutions capable of managing innovation risk will likely capture more than their 'fair' share of value. Development of a vibrant financial sector should thus be viewed not merely as desirable to support the innovation activities of other firms, but as an end in itself—a means to capture value from innovation taking place elsewhere in the economy. This is important for a small economy such as Tasmania, and not only for the global financial centres of London, New York, or Sydney.

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[7] Smith and O'Brien, 'Innovation in Tasmania: An Innovation Census of an Australian State', Australian Innovation Research Centre Working Paper, 2008, p. 23.

[8] Steve Galbraith, 'Trying to Draw a Pound of Flesh Without a Drop of Blood', Morgan Stanley US and the Americas Investment Research, 8 September 2003; Steve Galbraith, 'Fading Fog', Morgan Stanley US and the Americas Investment Research, 21 September 2003. The Morgan Stanley data are for S&P 500 corporations.

A mismatch between the risk profile of a particular technology and the structure of finance vehicles may, moreover, inhibit the propensity to innovate. Some potential innovations require finance in too large 'lumps', over too long time periods with too skewed a return profile, for private financiers to be able to diversify away sufficient risk. Government is thus sometimes needed to assist in risk diversification for selected technology types. This is an important consideration for Tasmania, which is remote from the financial capitals even of Australia, but which—through its superannuation and insurance funds—actually generates more than sufficient investment capital in aggregate to support its innovation needs. There is evidence, however, that Tasmania lacks suitable investment vehicles to manage the types of risk experienced in its key sectors. Addressing this mismatch should be a priority for Tasmanian policy makers, and some potential options to approach this challenge are included below.

Some essential components of an effective innovation system cannot be developed by private firms alone.

Research to identify characteristics of innovative firms highlights several typical features, each of which appear to relate to enabling factors in innovation:

- **Innovating firms are collaborators.** Knowledge creation takes place through interaction with other enterprises, organisations, and public institutions of the science and technology infrastructure. Indeed, empirical research has shown that innovating firms are almost invariably collaborating companies, that collaboration persists over sustained periods, and that universities and research institutes are important collaboration partners.[9] This finding was confirmed in the Tasmanian Innovation Census, which found that 45.5 per cent of innovating firms were collaborators, and collaborating firms were much more likely to be innovators.[10] They collaborate because at least some necessary capabilities cannot be maintained internally by the firms themselves and must be accessed externally.
- **Innovating firms accumulate capability over time.** Past developments tend to be utilised to determine future pathways of innovation. Cumulative capability acquisition underlies patterns of specialisation in

[9] Basri, E. 'Inter-firm Technological Collaboration in Australia: Implications for Innovation and Public Policy', in OECD *Innovation Networks: Co-operation in National Innovation Systems*, OECD Paris, 2001.

[10] Smith and O'Brien, 'Innovation in Tasmania: An Innovation Census of an Australian State', Australian Innovation Research Centre Working Paper, 2008, p. 28.

economies, and creates differentiation among regional and national economies. Effective policy builds on, rather than ignores or counteracts, such accumulated capability.

- **Innovating firms tend to cluster.** Multiple studies have suggested that successful firms gather together geographically, either 'horizontally'— firms in the same type of business—or 'vertically'— firms connected in related value chains.[11] Firms within such clusters tend to be more successful than those standing alone, perhaps because they tap knowledge bases and related expertise that would not exist separated from the cluster. Clustering appears to help overcome limitations of scale. This finding is an important insight for Tasmania, whose firms are frequently held to suffer from lack-of-scale inefficiencies.
- **Innovating firms in all sectors employ science not developed internally.** Many new products, while not spawned by scientific discovery, draw upon science not possessed by firms. Analyses of patents show that an increasing proportion of patents cite scientific research, and that a substantial proportion of papers cited in industrial patents were produced by public-sector research organizations. This is true as much in 'low tech' industries, demonstrating that while the product of these sectors may appear traditional, they are not 'low knowledge'. In finance, for example, university-based researchers were originally responsible for the three major innovations of the 20th century: venture capital, options pricing, and high-yield bonds.

These findings lend weight to a key proposition from economic theory: that maintenance of a basic research and technology capability should not be left in private hands, since returns from knowledge are difficult to appropriate even in the presence of enforceable intellectual property and patents.[12] The reason is that returns from investments in knowledge often 'spill over' to other sectors, and that unless such returns are incorporated into the economic calculus, investment to build knowledge infrastructure might not be economically justifiable—or justifiable only for an agency such as government or a not-for-profit institution that can appropriate the return over an economy-wide base.

This proposition was strikingly confirmed in Tasmania, where 142 firms (28 per cent of all collaborating firms and 12.7 per cent of innovators) reported that they

[11] Michael Best, *The New Competition*, Harvard University Press, 2006.

[12] Arrow, K., 'Economic Welfare and the Allocation of Resources for Invention,' in National Bureau of Economic Research, *The Rate and Direction of Inventive Activity*, Princeton University Press.

actively collaborated with the University of Tasmania.[13] Collaboration between food-related enterprises and the University was especially important. Ensuring that the University's research remains healthy, and that interaction between the University and Tasmania's firms is facilitated, should be a priority. Proposals on how to improve these relationships are included below.

Formulating an Innovation Policy

If the goal of a Tasmanian innovation strategy is neither to develop new 'high technology' industries nor to ensure a financial return on government's investment in research and education, nor especially to change Tasmania's culture, then the process of developing an innovation policy for Tasmania should proceed quite differently than have some other Australian government jurisdictions in recent times.

Rather than identifying a list of desirable technologies in which the state hopes to build an industry, or a list of alleged commercially valuable intellectual property believed to be 'locked up' in government-sponsored research organizations, or moving immediately to institute programs to promote more 'commercialisation', Tasmanian policy makers should begin with an analysis of the knowledge, research, capability, and resource requirements faced by actual or potential innovators in its high-impact sectors. Only on this basis can a relevant and effective policy to support companies' innovation programs be developed.

From that platform, an understanding can be built of which elements of an effective innovation system are already present, which are likely to be developed by private organisations, and which might require government support. On the basis of such an understanding an effective innovation policy can be constructed.

A constructed advantage approach necessitates co-ordinated policy measures in several directions:

Economy, for example, regionalisation of economic development, integration of knowledge generation and commercialisation, strong local and global business networks.

Governance, for example, strong support for innovators, complementary planning and regulatory regimes, joined up government strategy.

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[13] Smith and O'Brien, 'Innovation in Tasmania: An Innovation Census of an Australian State', Australian Innovation Research Centre Working Paper, 2008, p. 29.

Knowledge Infrastructure, for example, closer engagement with tertiary institutions, mediating agencies, utilisation of tacit and local knowledge, understanding of embedded local assets.

Community, for example, 'liveability' strategies to attract and retain creative workers, health services, and vibrant cultural life.

Our Tasmanian economy and society, and associated institutions, are all potentially sufficiently nimble and connected to undertake the complex co-ordination required to construct competitive advantage. Innovation policy is thus an essential factor in promoting regional productivity and growth.

The analytical underpinning of effective innovation policy should proceed in three steps:

Identifying high-leverage sectors.

The purpose of this phase is to identify sectors with strong potential to support productivity advance. These will be sectors that combine sufficient weight in the economy to be 'important' with existing revealed competitive advantage and a record of innovation.

Tests for such weight and competitive advantage would include that the sector:

- Generated high-wage jobs.
- Created wealth—increased market capitalisation.
- Has grown sales faster than average.
- Exports more than average.
- Manifests substantial productivity growth.
- Introduces new products or processes faster than other comparable sectors.

This phase of policy development requires quantitative analysis, supported by appropriate qualitative and synthetic insight into the processes by which high-impact sectors interact and support one another, creating an overall 'character' for the particular economic unit for which the policy is being developed.

The result will be a target list of economic sectors or industries that offer the particular potential to improve economic performance through innovation-based productivity advance.

Analysing the knowledge infrastructure, business capabilities, and resource-allocation processes that support innovation in these sectors.

As noted above, firms rarely innovate alone. Innovation demands continuous interaction and feedback between perceptions of market opportunities, technological capabilities, and managerial processes within firms. The ability to perceive opportunities and to invest in realising them—that is, the processes of formulating firm strategy and implementing it through a managed portfolio of innovation projects—are among the main characteristics of innovating firms. Many firms lack such capabilities—technical, physical, and managerial—and need access to external infrastructure, capabilities, and resources to make innovation feasible.

Innovating firms rely on three primary forms of support: access to science and technology, access to capital, and access to high-quality information and knowledge infrastructure. The second phase of innovation-policy development should evaluate the extent to which these supports are present in the selected high-potential industries, and in what respects they can be strengthened.

Access to science and technology.

As noted above, innovation-related problems often require firms to import and integrate knowledge and skills obtained from outside the firm and to utilise information infrastructure, usually provided by government. Individual firms frequently find that they cannot justify maintenance of sophisticated science and technology expertise in-house—they simply do not use such capabilities sufficiently frequently to amortise the cost of maintaining them at the cutting edge—but that they do need access to them periodically.

Cooperation and collaboration among innovating firms and suppliers, customers, design or engineering consultants, universities or research institutes are thus frequent characteristics of modern innovation processes. In this context, the role of universities and research institutes should not be seen as to generate innovations, but to provide access to expertise of the highest quality and to help solve problems relevant to innovation efforts by private firms.

Access to financial resources.

Innovation requires sustained investment under conditions of uncertainty. Firms cannot know the future and their strategic innovation choices can be very risky. Nevertheless, they must invest in a wide range of innovation-related assets—human skills, new capital equipment, design capabilities, strategic marketing, engineering

development programmes, and more. Innovation therefore requires access to finance that both permits and encourages such investment, and that can manage the risks involved. An assessment is needed of whether the finance sector has the capability to bear and manage such risk, and possesses the scale required to diversify it.

Access to high-quality information and knowledge infrastructure, especially logistics.

Finally, innovating firms require access to high-quality physical infrastructure, especially logistics and information. In a world in which vital ideas might be sourced from any corner of the earth, rapid movement of information is critical. But industries differ in their demand for such infrastructure, and it is necessary to build an understanding of the specific needs of particular sectors before committing to information infrastructure priorities.

Formulating priority initiatives to enhance knowledge and information infrastructure, reduce risk, and strengthen innovation capability.

Combining these two phases of analysis provides the foundations for an innovation strategy that can exercise sufficient impact on the Tasmanian economy to noticeably enhance productivity. The strategy should focus on increasing innovation capability for specific sectors in specific places and communities. This means it should be particular to the needs of the innovation system for the sector and for the place and community within which the sector is concentrated.

In general, innovation systems can be thought of as composed of the following elements:

People: Skill and expertise.

For human-resource development programs to enhance innovation, they must focus on sectors in which Tasmanian industries are most likely to devote the skills to significant innovation projects. Programs to improve human capital for innovation do not, of course, substitute for efforts in other fields, such as providing the skills any economy needs to undertake and grow its routine activities—they supplement those needs, and should be conceived as a special category.

This is especially so since many innovation-enhancing human-resource programs will need to target an elite: those best equipped to take initiative at the frontier of markets and technologies. Programs designed for people in these categories

might attract envy and criticism from proponents of training directed at lifting citizens at the bottom end out of underperformance.

Infrastructure: Physical, information, and logistics.

The infrastructure required to support innovation may be quite different from that designed to meet other purposes, such as everyday transactions or consumer entertainment. Assessment of infrastructure priorities against the criteria of their impact on innovation will hence likely yield a distinct set of priorities. Very often, vital infrastructure will not be provided by the private sector because it is too difficult for private companies to capture sufficient returns to warrant the investment. In the classic sense, infrastructure is a public good: the returns are captured by those who utilise the systems, rather than those who own them. Government has a potentially irreplaceable role in providing infrastructure, especially since it can take its return in non-profit form: taxes, community well-being, reputation ('brand'), employment growth, and public support.

Problem-solving: Knowledge and science.

As we will see, many of Tasmania's most important industries rely heavily on knowledge and scientific expertise generated and accessed outside individual firms. The industries in which the Tasmanian economy is concentrated commonly exhibit an innovation pattern of external sourcing for knowledge. As a result, maintaining and extending relevant science and other knowledge capability is of even greater importance in Tasmania than in other jurisdictions.

Finance: Capital allocation to innovation.

No successful innovating country today relies on free markets alone to finance innovation. There are good reasons for this. While markets are undoubtedly powerful and effective resource allocators, better than any known alternative for most transactions, they fail in the face of certain types of economic challenge. This is often because they can't manage the form of information involved—in the case of innovation, they can't manage certain types of information asymmetry, moral hazard, and adverse selection.[14] As a result of these weaknesses, markets alone sometimes

[14] *Information asymmetry* occurs when the sellers of risk know more about the degree of jeopardy involved in a particular transaction than do buyers. *Moral hazard* results from the creation of an incentive to undertake more risky behavior, or even to cheat, once the risk of

neither enable innovators to capture sufficient returns nor insure adequately against the consequences of failure. In short, under certain circumstances, neither markets nor private investors alone can adequately manage the forms of risk found in innovation projects, and they avoid commitment.

The size and intensity of risk inherent in any innovation project depends in the first instance on the structure of the technology itself. Innovation risk can be measured along three dimensions: scale, duration, and intensity. *Scale* refers to the minimum necessary investment needed to bring an individual innovation to market. *Duration* refers to the minimum period required before an outcome is known. *Intensity* refers to the likelihood that the product will make it to market. The greater the first two factors, and less the third, the greater the project's overall risk.

The key to financing innovation is to match the scale, duration, and intensity demands of a project under consideration to the risk-management capabilities of particular investment vehicles.[15] While venture capital often receives much attention in discussions of innovation policy, frequently and especially for the innovation needs of most of Tasmania's important industries, it is not suited to the particular financing tasks implicit in the innovation activities under consideration. That is, venture capital is effective for only a relatively narrow range of risk scale, duration, and intensity, and it does not meet the demands of many industries' innovation tasks. This does not imply that these innovation tasks are not likely to be profitable, or do not meet appropriate risk-return criteria. Rather, they are simply not an appropriate investment for the structure of financial vehicles available. Under such circumstances, there can be a role for governments to augment capital markets and private financial institutions, by bearing certain types of risk.

Regulation and planning.

One of the most powerful ways government can influence innovation is by adjusting its regulatory regime to support or discourage it. This lens is rarely employed to evaluate regulation in the Australian economy, which emphasises consumer and investor protection above all other objectives. But in the contemporary economy, most industries exist within a complex web of regulation. As we will see, this is again especially true for industries that matter to Tasmania.

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doing so has been sold to another party. *Adverse selection* occurs when only the riskiest projects are sold to risk managers, creating an unbalanced portfolio.

[15] For more discussion of this issue, see West, J., *Financing Innovation: Markets and the Structure of Risk in Non-Replication Economics*, 2004.

PART 2: ANALYSIS AND OUTLINE OF INITIATIVES

Identifying High Impact Sectors: Key Characteristics of the Tasmanian Economy

The purpose of this section is to identify sectors of the Tasmanian economy with *revealed deep capability*. Our argument is that these are the parts of the economy with greatest likelihood to take the Tasmanian economy up the value hierarchy, by strengthening innovation capacity and generating value-added growth, and thus to drive productivity advance. It is important to stress that in undertaking this analysis we are *not* hoping to divine the future—that is, we are not claiming that because any particular industry was successful in the past it will necessarily be so in future—still less are we intending to 'create' or 'pick' winners by government fiat. Rather the purpose is to understand which parts of the economy have already demonstrated strength and momentum to improve and expand. And as stated, if these sectors are to move productivity in the economy overall, they must be relatively large.

Media coverage of economic issues rarely focuses on capability. It tends to dwell instead on eye-catching stories of managerial blunders or power struggles, mergers, acquisitions, business cycles, currency-exchange and interest rates, taxes, or fluctuations in energy prices. But none of these are fundamental. They can at best be thought of as contributing to *shallow capability*: short-term pricing and cost issues. Shifts in exchange rates, tax levels, and interest rates might buffet companies' business and financial performance, inflating or deflating earnings for a year or two, but they are surface phenomena. Underlying the dramas that surround these topics are the permanent or enduring factors that determine sustainable prosperity.

Unfortunately, because the media focus on the 'shallow' factors, so too often do political leaders, while ignoring the 'deep' factors. *Deep capabilities* develop more gradually, and last longer. Some harness elements of nature; others can be nurtured deliberately by organisations and individuals. Capabilities include accumulations of strategic resources and proprietary knowledge, but these demand for their realisation as pricing- and profit-making power organisational routines and employee commitment, which in turn enable superior problem-solving. Deep capabilities are thus those aspects of the economy that are difficult for others to emulate and that support ongoing gains in competitiveness.

Three characteristics of economic capability are of particular interest in the present exercise:

In their traded sectors, economies tend to specialise. They concentrate in the fields in which they have acquired or built deep capability. Products and services from these sectors in a particular geography can generally out-compete those from others. While all developed economies include large and relatively similar proportions of largely non-trade-exposed sectors—health, education, community services, security, home-building, retail, personal services—in their traded sectors, economies can be remarkably concentrated. And the traded sector is especially important, for two reasons: first, non-traded sectors generally grow only roughly in line with demographics (population and per capita income), whereas traded sectors can generate far greater expansion as they tap distant and overseas markets. Second, in a modern economy, especially a small one, many of the goods and services citizens want can be obtained only from afar; generating the income to pay for these imports depends on what the community can sell to the world. The economic fate of small communities such as Tasmania can thus rest on a surprisingly narrow base of capability in very few fields, and sometimes as few as one. Ensuring the long-term strength of these sectors ought to be a high priority for any community and its government.

Capability is commonly geographically concentrated. Successful industries show a marked tendency to cluster in quite small regions. Such clusters include famous names like Silicon Valley in California or the City of London and Manhattan in finance, but also such less well-known locations as Aalsmeer, 10 miles southwest of Amsterdam, the global cut-flower trading capital (with 60% of global trade),[16] or Surat, in Gujarat, India which cuts 92 per cent of the world's diamonds.[17] Capability concentrates regionally because much of the basis for capability within firms exists and is maintained *outside* firms, in educational and research institutions, finance, local industry and community bodies, support and allied service industries, and community memory. The combination of these elements can be thought of as the local platform for innovation, and the health of these platforms is a vital interest to the future of these communities.

Capability assumes different forms, and is created by different processes, in different sectors. Capability can be thought of as the ability to perform tasks that matter in competition, and what matters in competition varies industry by industry.

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[16] Felix Oberholzer-Gee, Vincent Dessain, Daniela Beyersdorfer, Anders Sjoman, 'Bloemenveiling Aalsmeer', *Harvard Business School Case*, 2006.

[17] Aravind Adiga, 'Uncommon Brilliance', *Time* magazine, April 12, 2004, from Time.com, retrieved 3 November 2008.

The combination of these three observations generates an important implication: to be effective in promoting productivity advance through innovation, government policy ought to focus on sectors in which the economy specialises, and be geographically and sectorally specific. There can thus be no effective one-size-fits-all innovation policy.

Analysis to locate sectors in which the Tasmanian economy specialises is a matter of identifying those parts of the Tasmanian economy that account for a disproportionately large share of Australia's activity (economic output, value-added, employment, and trade) in a given field. Understanding the sources of capability that might underlie such specialisation requires deeper investigation into how physical, human, organisational, and financial factors combine to impart an ability to perform the tasks that matter in that sector.

By 'disproportionate' we mean here those sectors that *account for a substantially greater share of economic activity in a given field than Tasmania's average share of Australia's population or economy*. Since Tasmania accounts for 2.3 per cent of the Australian population and 2.0 per cent of the Australian economy, sectors of particular interest will be those in which Tasmania accounts for a much greater proportion of Australian activity.

It is important to stress two issues in presenting this analysis: first, and rather obviously, the Tasmanian economy is small. It is less than one-tenth the total size of the city of Sydney, indeed it is equivalent to only few suburbs of Sydney and it is by far the smallest Australian state. We should not expect, therefore, to identify a large number of fields in which Tasmania's economy excels. Second, and largely as a result of the first issue, data on industry size in Tasmania are poor—privacy and sampling considerations dictate that data at a granularity that would be available for a larger economy are simply not so for Tasmania.

Nonetheless, the principal features of the Tasmanian economy are clear. Some contradict conventional wisdom, even among Tasmanians. Using employment share as a proxy for share of economic activity, in its traded sector Tasmania enjoys a disproportionate share of only three industry sectors: forestry and associated activities; food, including agriculture; and electricity and mineral processing derived from electricity generation. Summarising this analysis, features of the Tasmanian economy particularly relevant to innovation are:

Tasmania is a significant food producer.

Tasmania enjoys a substantially disproportionate share in several key food categories: aquaculture (20.9%), fruit and vegetable processing (13.3%), dairy farming (8.8%), fishing (8.7%), dairy product manufacturing (5.8%), 'other' food manufacturing (4.6%), bakery products (3.5%), horticulture and fruit growing (3.3%), services to agriculture (3.3%), grain, sheep, and beef (3.2%), agriculture 'not further defined' (3.2%), and farm produce wholesaling (2.4%). In 2005-06, food processing accounted for 25% of jobs in Tasmania's manufacturing sector, the highest proportion for any state, and with a higher Industry Value Added (IVA) than the Australian average (21% versus 18%).[1819] And the sector is growing, not declining; between 1990 and 2008, the ABS category 'Agriculture, Forestry, and Fishing' increased its share of the Tasmanian economy by 3.7 percentage points, and between 1990 and 2000 grew by an annual average 15.2% versus 2.2% for Australia. Between 1990 and 2005, agriculture alone increased its Real Gross Value in Tasmania by 50%.[20]

Some analysts argue that Tasmania's concentration in these food sectors is a weakness. They suggest that these are 'mature', low-technology, and low-productivity sectors, with poor growth or improvement prospects. Hence, it is frequently claimed, Tasmania ought either attempt to transition out of these sectors, or focus on building other, more dynamic industries that are likely to support future productivity and growth.[21]

On closer examination, however, none of the above claims turn out to be supported by data.

Food is not a low-growth or 'mature' sector. Globally, the food sector has grown over the last decade faster than other parts of the economy, and than the economy as a whole. This is because a large proportion of the world's population, especially in China and India, is finally earning sufficient income to enjoy the diet they would like—one with a greater share of protein and high-value foods and less simple carbohydrates. As noted above, the food sector has also grown faster in Tasmania than the State's average. Indeed, in recent years regions strong in agriculture have enjoyed unprecedented prosperity, as rising consumption and limited capacity to increase

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[18] Australian Bureau of Statistics (ABS) 2007, Labour Force, Australia, Detailed, Quarterly, May 2007, Cat. No. 6291.0.55.003.

[19] ABS Manufacturing in Australia 2005-06 Cat. 8221.0DO004.

[20] ABS. Cat. 52220.0

[21] See, for example, Courvisanos J. 1999, 'Region in Transition: Schumpeterian Road to Recovery in Tasmania', *Journal of Economic and Social Policy*, Vol. 4, No. 1, p45–62, and Australian Government Bureau of Infrastructure, Transport and Regional Economics, *A Regional Economy: A Case Study of Tasmania,* Report 116, November 2008.

output have reduced stock-to-use ratios and driven up prices. The Innovation Census of Tasmania found that 70 per cent of food-sector firms increased sales in the period 2004-2006, with an average growth over the two-year period of 65 per cent and median of 37 per cent, and food-sector employment growth averaged 66 per cent with a median of 33 per cent. Importantly, the Census also found that exports out of Australia accounted for 41 per cent of Tasmania's food sector sales and sales to mainland Australia a further 39 per cent. By comparison, for the overall economy sales *within* Tasmania accounted for 64 per cent.

Food is not a low-technology sector. While it is true that the product often appears little changed, the systems used to produce, trade, distribute, and process these products are highly complex and the activities needed to produce and sell them are increasingly knowledge intensive. The sophisticated services needed to construct and maintain these systems make up a major proportion of value creation and employment in and around the food sector. As a result, and this is one piece of evidence for the increasing knowledge intensivity of Tasmania's food and primary sectors, the food sector has been generating a disproportionate share of higher-skill jobs. The two categories of occupation that grew at a faster rate for agriculture in Tasmania than for the average of all Tasmanian industries were 'Professionals', and 'Intermediate Clerical, Sales, Service Workers'. The number of 'professionals' in agriculture grew by 29.8% from 1996 to 2006, but 17.6% for the overall economy; while the number of 'intermediate clerical, sales, and service workers' in agriculture grew by 32.7% from 1996 to 2006, but 21.3% for the overall economy. Over the same period, the number of 'labourers and related workers' increased by only 1.3% for agriculture, forestry and fishing, but by 12.2% for all industries, and within this period—from 2001 to 2006—decreased by 5.5% for agriculture, forestry and fishing, and increased by 8.8% for all industries (the 10-year figure for agriculture was offset by a 7.3% increase in the first five-year period).[22]

The perception that food is 'low tech' is an unfortunate artifact of a commonly employed definition of low-, medium-, or high-tech, which simply measures the ratio of R&D-to-sales in the industry, classifying those with greater than 4% 'high' tech, those between 1% and 4% 'medium' tech, and those with less than 1% 'low' tech. But this taxonomy can be misleading: it fails to recognise either that much innovation (indeed, in most industries, more than two-thirds) does not stem from R&D, or that in many industries, including very often food, R&D is performed not *inside* the firm, but *externally* by not-for-profit researchers, whether government or other, and then adopted by firms, and is therefore not counted in the statistics. The Innovation Census of Tasmania revealed that 71 per cent of innovation expenditure in the food industry was

[22] Australian Bureau of Statistics, Census data, 1996-2006.

non-R&D-related, but that external acquisition of R&D accounted for 31% of R&D expenditure, versus 8 per cent for the overall economy. Indeed, while the food sector accounted for 4.3 per cent of total innovation expenditure in the economy, it made up 16.4 per cent of external acquisition.

And, finally, food is not a productivity improvement laggard. While during the 1990s productivity advance in the Australian economy as a whole averaged 2.7% and during the 1980s 1.5%, the leading productivity-advancing sector was 'communications' on 5.5%; agriculture, far from being a laggard, came in a close second, on 5.4%. This finding was confirmed in the Innovation Census, with 79 per cent of food sector firms reporting that they innovated during the previous year, significantly higher than the average for the overall economy, and that most innovation was productivity-enhancing process related. Tasmanian food firms also reported that they were collaborating to raise productivity with external consultants, commercial laboratories, or private R&D institutes, universities or public-sector research entities at a higher rate than the average for the overall economy (50 per cent versus 35 per cent).

In short, a concentration in food is not a disadvantage for Tasmania, but a potential advantage. Tasmania has accumulated substantial strength over several decades in an industry now characterised by above-average growth, especially globally, considerable knowledge intensivity, and sustained above-average productivity advance.

Forestry and forest products remains a strength.

Forestry remains the sector in which Tasmania has the most disproportionate share of Australian employment. Tasmania accounts for 27.1% of Australian forestry and logging employment, 7.7% of log sawmilling and timber dressing, 6.3% of paper and paper product manufacturing, and 3.1% of 'other' wood product manufacturing.

These numbers make forest products a substantial contributor to the Tasmanian economy, with annual average sales of $1.03 billion or 17.3 per cent of the state's manufacturing sector. Total Tasmanian forest-product-related employment in 2007 was 10,700 (4% of the Tasmanian workforce) and Tasmania accounted for 65% of Australia's hardwood production, 70% of decorative veneer production, 55% of newsprint, 45% of woodchip exports, and 50% of printing and writing paper production.

At the primary-production end, commercial forestry is the single major land use in Tasmania, covering 24 per cent of the State. These forests constitute a substantial and valuable Tasmanian asset. The evident disparity between Tasmania's share of

Australian employment and production in forests and primary forest products and its share of employment and production in higher-value-added products indicates the potential of this sector to expand its value contribution in Tasmania. In addition, since the vast majority of Tasmania's production forests are now regrowth or plantations, and timber is an inherently renewable resource, the industry should be viewed as sustainable, and socially and environmentally desirable. These factors combine to suggest the industry has considerable potential for more-profitable and innovative uses, if community divisions over environmental concerns can be overcome or transcended.

Appendix B proposes an innovation-based approach to one segment of the forest-products industry, the sawn-timber sector, which faces particular challenges in the coming years. This sector provides an example of the benefits potentially available from an Aggregate Project Plan, a tool commonly employed by leading private-sector innovators but adaptable to industry-sector-wide demands.

Tasmania continues to produce a disproportionate share of Australia's electricity.

With only 2.3% of Australia's population, in 2007 Tasmania produced 9800 gigawatt hours (GWh) or 6.2% of Australia's power, almost three times the national per capita average. This output was produced with 5.2% of the Australian electricity-generation workforce, implying that Tasmania's energy supplier enjoyed higher than average productivity.

This capacity far exceeded the needs of Tasmania's home and retail customers, and enabled the State to supply major industrial users. Despite possessing only a little mining in these fields, Tasmania employs 6.3% of Australia's basic non-ferrous metal manufacturing workforce, primarily in aluminium and zinc smelting.

Tasmania has a disproportionate share of Australia's museum activity.

With a 6.4% share of Australia's museum employment in 2007, Tasmania was in early 2009 already a significant centre for these activities. While Tasmania's high proportion of museum employment was attributable in part to the fact that Tasmania possesses by far the greatest share of heritage buildings (more than one-third of all Australian heritage-listed buildings are in Tasmania), the greatest proportion of museum activity was concentrated around Hobart's waterfront, and when combined with the Tasmanian Symphony orchestra, the Playhouse, numerous private art galleries, the Salamanca Arts Centre, the University Art School and Conservatorium of Music, and substantial concentrations of researchers at the CSIRO Marine Science

facility, and—a few blocks away—the new home to the Menzies Research Institute, this area amounted to a *de facto* creative precinct. With the construction of two new art museums in Hobart and the substantial refurbishment of the Tasmanian Museum and Art Gallery, this concentration would increase substantially, and suggests the possibility of developing a major creative precinct in the heart of Hobart.

Tasmania will soon have Australia's most widely available high-speed broadband.

With existing fibre-optic cables across the Bass Strait, combined with the Federal Government's announcement in April 2009 that its 100mbps facility would be introduced first in Tasmania, the 'tyranny of distance' in information access and transmission from which Tasmania has suffered since its foundation looks set to end. The ubiquitous availability of broadband infrastructure would create new opportunities for innovation in both existing and potential new sectors of the Tasmanian economy.

Other sectors with noteworthy Tasmanian disproportions included tourism-related services, with 2.8% of Australia's tourism employment or 2.6% of Australia's gross value added (primarily accommodation, museums, attractions, and related travel services), marine engineering, textile weaving, industrial machinery manufacturing, principally mining equipment, and gambling services. Industries in which Tasmania had a *lower* share than Tasmania's share of the national economy include most types of mining, and property and business services (13% of Australia's Total Factor Income in 2003-06 versus 6% of Tasmania's).[23]

In the following section we outline initiatives to promote innovation in five fields: the food and agribusiness sector, sustainable energy, a creative precinct for Hobart's waterfront, the National Broadband Network, and tourism (which offers the potential to leverage key Tasmanian strengths in food, nature, and heritage, including museums).

[23] ABS Cats. 5220.0 and 5204.0

1. Strengthening Tasmania's Innovation Capability in Food: Seven Initiatives

As a model of the value that effective innovation policy could contribute and what innovation might achieve within the Tasmanian economy, one sector, food and agriculture—which displays especially great potential—has been selected here for closer attention. What follows is an attempt to indicate how great might be the contribution of innovation to the Tasmanian economy, and a proposed coherent set of initiatives the Tasmanian Government could undertake to bring about that contribution. We believe the potential is comparable only to the value provided to Tasmania historically by hydro-industrialisation.

Creating innovation platforms in the Tasmanian food and agricultural industries.

While the analysis above shows clearly that the food and agriculture industries are already substantial contributors to Tasmania's economic well-being—indeed taken together and by several measures they are the largest contributors—they have the potential to generate far more. The two keys to unlocking this potential are facilitating a transition from lower-value land use to higher-value, and the further construction of food-processing and consumer-product development companies. These might be thought about as the 'back end' and the 'front end', or the upstream and downstream of the food chain. Both these are feasible, but they are by no means inevitable if left to their own devices.

Table 1 provides very rough estimates of the feasible potential for a selection of key agricultural products in Tasmania's future:

Table 1: Agriculture and aquaculture potential value increment estimates

Agricultural land use and irrigation scenarios - Tasmania		Sheep	Beef	Dairy	Medium value Hort^	Wine	High Value Hort^	Total
Gross margin per Ha	$/ha	150	225	2,000	5,000	24,000	60,000	
Current irrigation and land use	ha	350,000	350,000	72,000	30,000	1,200	400	803,600
Gross margin	**$**	**52,500,000**	**78,750,000**	**144,000,000**	**150,000,000**	**28,800,000**	**24,000,000**	**478,050,000**
Current irrigation with optimal land use	ha	345,000	345,000	72,000	35,000	5,000	2,000	804,000
Gross margin	**$**	**51,750,000**	**77,625,000**	**144,000,000**	**175,000,000**	**120,000,000**	**120,000,000**	**688,375,000**
Feasible irrigation with optimal land use - Low adoption	ha	280,000	280,000	150,000	40,000	20,000	30,000	800,000
Gross margin	**$**	**42,000,000**	**63,000,000**	**300,000,000**	**200,000,000**	**480,000,000**	**1,800,000,000**	**2,885,000,000**
Feasible irrigation with optimal land use - High adoption	ha	240,000	240,000	200,000	50,000	35,000	50,000	815,000
Gross margin	**$**	**36,000,000**	**54,000,000**	**400,000,000**	**250,000,000**	**840,000,000**	**3,000,000,000**	**4,580,000,000**
^ High value - eg cherries and apricots; Medium value - eg poppies								

Fisheries and Aquaculture scenairo		Other Aqua *	Wild fish	Salmonids				Total
Gross Value Production (GVP) 2006-07	$	23,414,000	180,193,000	271,823,000				**475,430,000**
GVP 2015+	$	150,000,000	180,000,000	530,000,000				**860,000,000**
Gross margin (at 50% of GVP) 2006-07	$							**237,715,000**
Gross margin (at 50% of GVP) 2015+	$							**430,000,000**
* including new species								

These data illustrate three scenarios:

1. Existing land use, with existing irrigation.

2. An 'optimised' land use, with existing irrigation.

3. An 'optimised' land use with feasible additional irrigation, at two levels of land-use transition: high and low.

By 'optimal' land use we mean a shift to higher per-hectare net income generation, where land types, ecologies, and topologies would support it. For the sake of simplicity, and at the risk of obscuring vital differences among good and bad seasons, various sub-sectors, and differentially productive soils and geographies, the tables are based on conservative estimates for 'normal' or 'average' years in income for key land uses in Tasmania: sheep-grazing for wool and fat lambs, beef cattle, dairy, horticulture (itself a very broad category, ranging across fruit and nut trees, specialty crops such as opium poppies and pyrethrum, and vegetable row crops), and wine-grapes.

The comparison is startling. It reveals that were Tasmania to utilise its available quality farm land for anywhere near its optimal value, but with no additional water infrastructure, roughly $0.2 billion in gross value-added could be generated (in this first-cut analysis, we have used gross margin—essentially sales revenue minus input costs not including wages—as a proxy for value added). Since agricultural production in Tasmania is currently worth about $1 billion (or around $0.5 billion in value-added), that represents an additional 40% of potential value. With additional—but technically feasible—irrigation, that additional value could rise to $4 billion, bringing the total value-added of agricultural production in Tasmania to $4.5 billion. With further processing, for example making wine grapes into wine, along with growth in aquaculture contributing another potential $1 billion, it appears feasible to add an additional $5 billion over today's value-added to Tasmania's combined agriculture and food industry, an amount equivalent to $10,000 per Tasmanian. To conceive how great is this contribution, it is worth noting that additional value of this magnitude would roughly double Tasmania's total out-of-state sales and make Tasmania the richest state, per capita, in Australia.

Of course, the reality of how agriculture and food production will evolve is impossible to predict. These would be ambitious targets, and this paper does not suggest either that Tasmania is 'on track' to achieve them or that they would be guaranteed even with substantial investment. The future depends on thousands of individual land-use and investment decisions, made by individuals, families, and companies. All experience indicates that it is impossible for governments to forecast accurately or to direct industry-development patterns with any precision. The choices of these economic actors will undoubtedly surprise policy-makers and move the economy in unpredictable directions, as decision-makers discover unexpected opportunities, make mistakes, and calculate their own willingness to take risk and commit effort and resources. What government *can* do, however, is create conditions that provide incentives and encouragement, and make innovation more feasible and more profitable.

The benefits of creating these innovation platforms and developing the Tasmanian food industry in the directions indicated would be considerable. They extend beyond the directly economic into social, cultural, and community goals, and would create follow-on benefits to other sectors. Key benefits of promoting innovation in Tasmania's food sector would include:

The wealth created would be *geographically* decentralised. All regions of Tasmania would gain from a food-oriented innovation strategy, especially the State's north and north-west which include much of the island's best farmland. Innovation strategies that focus on high-technology, large-scale industry, or professional services

tend to concentrate the returns in a few centres, chiefly one urban metropolis. The strategy suggested here would focus on development of a plurality of industry, deeply embedded in regional communities, with particular communities strengthening their specialisation and capability and hence distinctiveness.

The wealth created would be *socially* decentralised. All economic strata of Tasmania would gain, from the less skilled to professionals, managers, researchers, and investors. The food industry draws upon a wide range of knowledge and expertise and is increasingly sophisticated in the types of skills demanded, as indicated in the previous section's analysis. Nor is the industry exclusively rural or farm-oriented. Much of the value created would be in the development of specialty consumer products, and as indicated in the previous section, approximately one-third of Tasmania's manufacturing sector is already in food processing.

The wealth created would be *economically* decentralised. The economic structure induced by these developments need not follow the common bi-focated pattern, with a handful of distant giant corporations mostly owned out-of-state, and the rest of society wage or salaried employees. Many of the new businesses made feasible by this innovation path would be small and medium-sized, and locally owned. In other words, wealth-generating assets would be distributed more widely among the population, and opportunities for entrepreneurship would abound. To paraphrase Chesterton, more Tasmanians would own at least *some* of the means of production.

The *power and influence* created by such a development pattern would be decentralised. With regional, community, and economic decentralisation would come greater independence and self-reliance. No one group, company, or location would dominate.

The businesses created would be culturally desirable. Tasmanians are justifiably proud of the quality of the food produced on their island and the world increasingly knows Tasmania for the quality of its product. An innovation strategy of the type outlined here would create a dynamic in which the incentive was continually to upgrade, occupying the highest-quality segments of the market. Tasmania's image, and self-image, would benefit. Whatever a Tasmanian's personal view of high-profile resource-based projects, few Tasmanians are likely to brag to their mainland cousin about the state having the largest pulpmill or alumium smelter in the southern hemisphere. They do about having the best cherries, wine, or seafood.

The businesses created would tap and be advantaged by powerful global growth trends. Global growth in demand for premium food far outstrips average economic growth and is likely to accelerate in future. As hundreds of millions of consumers in China, India, and elsewhere in Asia pass the prosperity threshold needed

to upgrade their diets, Tasmania will be ideally situated to meet their needs. In this sector, globalisation would benefit Tasmania as it improves access to premium markets, rather than disadvantage us as it throws our industries into increasingly vicious competition with low-cost alternatives in newly developing economies.

Allied industries would be strengthened. Two key industries for Tasmania are tourism and logistics. Both would gain from an expanded and premium food industry. Gourmet tourism is a growing field, and most tourists report that the quality of the food they experience during their holiday influences their choice. While Tasmania lacks two of the world's major tourism drawcards, 'surf-and-sand' and 'snow-and-ski', it *can* build a unique position in wine and gourmet-experience tourism, to ally with its nature-experience and heritage appeals. Similarly, by demanding more sophisticated, small-batch and information-rich logistics support, a premium food industry offers considerable potential across the state to logistics providers.

The businesses created would be environmentally sustainable, and be seen to be so. With careful planning and natural-resource stewardship, a premium-food innovation strategy would create a dynamic in which it was in Tasmania's interest to reinforce protection of its environment—since a healthy environment would be at the foundation of its most-important industry. Rather than economic-development interests pitting Tasmanian against Tasmanian, and economics against the environment, economic needs would reinforce environmental imperatives.

The businesses created would rest upon difficult- or impossible-to-imitate assets, and the advantage created would be competitively sustainable. Because the foundations to this strategy lie in irreplaceable natural assets—water, arable land, sunshine, latitude, and unique know-how—Tasmania's advantage would not be continually under threat of erosion by new entrants and competitors.

In short, an innovation strategy emphasising upgrade of the agricultural and food industries offers the potential to insert a new 'mainspring' into Tasmania's economic development—let's call it 'hydro-agrarianisation'—one which promises to overcome the divisions that have racked Tasmanian society over the past three decades, offers something to everyone living here, and can build broad-based momentum for years to come. Tasmania can be the Provence or Tuscany of Australia: a great place to live, with a sustainable and thriving economic base for long-term prosperity.

It is possible to paint an appealing vision of the advantages Tasmania could gain by investment in an innovation strategy, and of the society it would create, but is this kind of transition in land management, and value created, really feasible? How might it, and its associated value increase, be facilitated, if at all? It certainly cannot be said

that Tasmania is currently on the path to the future sketched above. Substantial innovation in land use, water use, product specialisation, and skill levels would be required to make this vision real. But it is critical to recognise that the strategy outlined here is not conjured out of thin air. It rests, rather, on existing assets and strengths of the Tasmanian economy, and seeks to augment and connect these to induce substantial innovation.

The vital physical assets are water, land, and sunshine. Tasmania is ideally positioned in all three. Indeed, it has these natural elements in abundance. With 0.9% of Australia's land area and 14% of Australia's water, Tasmania has by far the highest ratio of water to land mass of any state, indeed it might be thought of as the 'Saudi Arabia of water'. Tasmania has an abundance of arable land, with 2.3 per of Australia's population and 6% of Australia's quality farmland. And because Tasmania is the most southerly portion of Australia's land mass, it enjoys the most sunlight during summer and autumn, the key ripening period for important horticultural crops, including wine grapes. To combine with these natural assets Tasmanians have accumulated considerable experience and expertise in food production and are in the early stages of building an umbrella brand to gain recognition for these products.

Case Study – Land use change in the Coal River Valley 1983 to 2013

Prior to construction of the Craigbourne Dam, government analysis had estimated that a new dam on the Coal River could potentially increase the area of irrigated land in the Coal River Valley from 245 ha to 1,100 ha. And indeed, by 1992, six years after the Craigbourne Dam's construction, the quantity of irrigated land grown more than four-fold, to 1,109 ha. Over this time, the total gross margin generated from that irrigated land had increased by only 70 per cent, less than one-fold (in constant dollars). By 2008, however, while the area of irrigated land had grown to only 2814 ha (2.5 times), the *value* produced by that land had jumped by 15 times. Why had that happened, and what can be learned from the experience? The table below provides some important answers.

Land Use Change - Coal River Valley 1983 to 2008	**Area**	**Share of area**	**Avg GM/ha** [5]	**Total GM**
	ha	**%**	**2008 $/ha**	**2008 $**
Pre-irrigation land use (1983) [1] **-** incl land **potentially** irrigated by Craigbourne Dam				
High margin horticulture[4]	125	11.4	15,816	1,977,000
Other agriculture (120 ha irrigated)[6]	975	88.6	381	371,475
	1,100			2,348,475
Pre-Blundstone Study "low margin" irrigated land use (1992)[2]				
High margin horticulture[4]	126	11.4	21,457	2,710,019
Other irrigated agriculture	983	88.6	1,294	1,271,614
	1,109			3,981,633
Post-Blundstone Study "emerging high margin" irrigated land use (1995)				
High margin horticulture[4]	344	19.2	15,241	5,239,860
Other irrigated agriculture	1,442	80.8	1,334	1,923,940
	1,786			
Current "significant high margin" irrigated land use (2008)[3] **-** irrigation supply increased post 1995				
High margin horticulture[4]	1,093	41.3	30,651	33,501,543
Other irrigated agriculture	1,551	58.7	1,284	1,991,484
	2644			35,493,027
Intended irrigated land use (2013)[3]				
High margin horticulture[4]	1,295	25.7	29,033	37,598,000
Other irrigated agriculture	3,741	74.3	1,339	5,010,300
	5,036			42,608,300

1 Land use ha 1983 - SE Tas Irrigation Scheme stages 1&2 Economic Evaluation Tas Dept Ag table 4, 1983

2 Land use ha 1992 - Blundstone Study Vol 1 page 19

3 Land use (ha) - Enhancing Irrigation Water in SE Irrigation District (prelim), Coal River Products Assoc Nov 08

4 High margin horticulture includes stone fruit, grapes, olives, fresh vegetables, walnuts

5 Gross margin (GM) for grapes, stone fruit, dairy, beef, sheep are AIRC est, other refer Crop Gross Margins, DPIW

6 Gross margin for other agriculture in 1983 is overstated as margins are for irrigated (not dryland) agriculture

In 1992, low-gross-margin agriculture—cereals, lupins/beans, lentils, and other crops—accounted for 310ha or 28% of the Coal Valley's irrigated land, while medium gross

margin agriculture—peas, pyrethrum, essential oils, lucerne, seed crops and poppies—made up a further 673ha, or 61%, for a total of 89%. The area of *high*-margin horticulture—fresh vegetables, orchards, and grapes—had remained virtually unchanged.

In other words, the area had not innovated, and relatively little additional value had been created. The continued emphasis on low- and medium-gross-margin agriculture was explained by the 1992 Blundstone Study as resulting from the fact that farmers had not shifted to an optimal land use.

With the Blundstone Study, however, which detailed where and how land-use transition to higher-value uses could take place, a process of change began. Three years after the Blundstone Study, the value of high gross margin agriculture had almost doubled (93%), compared with a 37% increase in the nine years from 1983 to 1992 (in constant dollars).

Between 1992 and 2008, an additional 967 hectares of high-gross-margin agriculture produced $30.8m in additional gross margin, while an extra 738ha of low- and medium-margin agriculture increased gross margin by only $0.9m. By 2008, high-gross-margin agriculture accounted for 94.4% of the total. The average gross margin of each additional hectare of high-margin agriculture ($30,654) was 23 times the average gross margin of each additional hectare of low and medium margin agriculture ($1,284).

In summary, while introducing industrial-scale irrigation to the Coal River Valley was a necessary pre-condition to transforming the area from predominantly low-margin agriculture to much higher gross-margin uses, it was not sufficient. Before the dramatic transformation took place, land owners needed to see that new higher-margin uses for now-irrigated land were possible, or allow new entrants to buy or lease land. Geographic risk (other than water), production risk, financing risk, and market risk had to be identified, assessed, tested, and mitigated. Irrigation *permitted* a new future to emerge, but that did not materialise until these impediments were overcome.

Unlocking potential in other parts of Tasmania

As an example, in 2002, the maximum irrigable area of the South East Region of Tasmania (defined here as Kempton, Elderslie, Brighton-Broadmarsh, Tea Tree-Bagdad, Coal Valley, and Sorell-Orielton) was estimated to be 48,700 hectares, of which only 4000ha, or 8.2 per cent, was irrigated. More importantly, 14,300 ha of the total irrigable area was found to be capable of supporting higher-margin horticulture such as apricots and cherries if irrigation was available (of which 6,900 ha were also suitable for wine grapes). Were a similar process of irrigation and facilitated innovation to take place over this region, the economic impact would be considerable.

And undoubtedly, the *biggest* potential is not in the South East, and certainly not in the Midlands, but in the North-West and North-East.

Maximum Irrigable Area - Hectares

Sub-District	Intensive Horticulture	Additional General Cropping Land *	Additional Pasture Land **	Total
Kempton	1,900	1,200	1,200	4,300
Elderslie	300	1,700	1,000	3,000
Brighton-Broadmarsh	700	2,600	2,600	5,900
Tea Tree-Bagdad	2,300	3,000	2,200	7,500
Upper Coal Valley	2,000	4,200	2,300	8,500
Lower Coal Valley	4,200	3,800	1,600	9,600
Sorell-Orielton	2,900	5,000	2,000	9,900
Total	14,300	21,500	12,900	48,700

* 100 % of Class 4 land (excludes Class 4 land with stone fruit and grape potential)
** 60% of Class 5 (excludes Class 5 land with stone fruit and grape potential)

- Source: Table 4.5 Water Resource Options Development in South East Tasmania, Volume 1, DPIWE 2002

The purpose of the initiatives proposed here is to add to Tasmania's natural food-related assets, accumulated experience, and organisation, to improve the regional platforms through which innovation in this sector can take place. The proposed initiatives below are grouped around the major elements of effective innovation systems, as identified by lessons gained from the study of innovation processes around the world over the past 30 years.

To make this vision feasible, Tasmania needs a comprehensive and coherent strategy comprising the following elements:

1. Upgrade infrastructure: physical, logistics, information, market intelligence.

The starting point for the ambitious innovation strategy outlined above is physical infrastructure, particularly in water, distribution capability, and branding. Initiatives to achieve this could include:

* *Substantially increase commitment to irrigation infrastructure*. Water availability is the key to unlocking Tasmania's food-production potential. The water exists in Tasmania, but only a very small portion is utilised for agriculture. It falls on the western half of the island, but is needed on the eastern. The Tasmanian Government has currently committed a total of $80 million to irrigation infrastructure, to be combined with Federal Government and private capital to support what amounts to a relatively modest program of irrigation construction. Given the apparent potential, and

water availability, it would be sensible for government to increase that commitment considerably, perhaps to as much as $1 billion. While this sum may seem large, in the light of Australia's water challenges and the potential of Tasmania to become the southern food basket of the nation, supplying the bulk of its temperate products, such a sum does not seem unrealistic. The Federal Government should be approached to fund the increase. Of course, the water provided by the schemes will need to be priced so that it creates the maximum benefit to Tasmanians. Since the current Federal Government projects to spend up to $12 billion on Australia's water resources, mostly *taking out* capacity in the Murray Darling—indeed, removing an estimated 40% of Australia's irrigated horticulture capacity—committing $1 billion to *adding in* capacity in Tasmania could appear sensible. The alternative might be for Australia to become a net food importer, potentially from China.

* *Build an institutional structure to plan, assess, construct, and manage these assets.* An irrigation system on the scale warranted would require a coherent and coordinated approach, which considers Tasmania's water assets as a whole, and in their environmental context. Responsibility for water management in Tasmania is currently fragmented across multiple agencies and levels of government, with only *ad hoc* interaction. Much responsibility for water management now rests with Hydro Tasmania, which has expertise in electricity generation, dams, pipelines, and project management, but its mandate is limited to electricity generation. To remedy this, the Tasmanian Government should create and designate a single agency with responsibility for water management as a whole (probably excluding drinking water supply) and give it the mission to construct the irrigation system Tasmania needs. Hydro Tasmania also possesses strong environmental stewardship and planning-approval capability. Tasmanians need to be assured that an ambitious program of irrigation construction would not compromise environmental responsibility in matters such as endangered species, catchment management, and stream-flow.

To meet these needs an independent assessment and approval process would be required. Tasmanians must be convinced that every individual project both meets the highest standards of environmental and economic scrutiny, but also that it be *seen* to do so. We must design and implement a scrutiny process in which all Tasmanians—particularly those whose overriding priority is environmental protection—can have confidence. No project should be allowed, for example, to contribute to soil salinity. In this light, it is important to stress at the outset that while these projects may be considered as part of an overall innovation portfolio, each potential project must be subject to specific and individual assessment to ensure that it is sustainable—economically, environmentally, and socially. A broad innovation strategy and desire to add to productivity and prosperity must not be seen as justifying compromise of the necessity that each project stand on its own merits in these vital respects.

Irrigation is only one element of the set of necessary initiatives. Irrigation alone will not achieve the ambitious goals outlined above. It is important to reiterate that what is proposed in this document is an *innovation* strategy, not an *irrigation* strategy. Although irrigation is vital, so also are other initiatives:

* *Augment small-batch and specialty logistics.* Much of Tasmania's logistics capacity is oriented to high-volume, low-value commodity movement, which is unsuitable for small or medium-value, perishable products. Improvement of this capacity, coupled with superior information traceability would be a priority under this strategy. To prepare for this goal, the government should commission an external study to assess Tasmania's future needs in this light, and recommend how best to meet them and integrate small-batch logistics into an overall infrastructure plan.

* *Make available high-quality information about land-use potential.* Land owners and potential investors, as well as those who scrutinize candidate investment proposals, should have access to a comprehensive, high-accuracy, and publicly available data base that classifies land according to its suitability for various agricultural purposes. Having one's land officially so classified could, for example, enable farmers to seek support from investors for new development projects, and thus facilitate movement up the land-use value hierarchy. Surprisingly, no such comprehensive database currently exists in Tasmania, although key pieces of such information are scattered among various government and not-government entities. The appropriate entity to prepare and maintain such a database is the Tasmanian Institute for Agricultural Research, in collaboration with the Department of Primaries Industries, Parks, Water and Environment.

2. Improve human capital.

The actions described above all rest on the willingness and ability of individuals to tackle and solve problems. This is a particular challenge in Tasmania's agricultural sector, where the average age of farmers is almost 60. To address this need, the State Government should embark on an aggressive, targeted program to augment training and skill levels. The greatest needs are at the levels of highest expertise. The Tasmanian Government could:

* *Create a top-flight farm-management and food-based entrepreneurship tertiary-training institute.* Surprisingly, and in spite of the fact that food and agriculture is arguably Tasmania's most important industry sector, it is not possible for young Tasmanians to study farm-management in the State. It *is* possible to study agricultural or botanical science, and great emphasis is placed on natural resource management, but for farming and food production as a *business* students must leave the State, going

to Marcus Oldham College in Geelong, the University of New England, or Lincoln University in New Zealand. A high-quality degree-level program, contributing as few as 50 bright, young, well-trained and confident farm entrepreneurs each year to Tasmania's food industry, would be invaluable in making possible the land-use transition described above.

* *Create Australia's leading institute for training high-end chefs.* At the other end of the food chain, an important gap exists at the pinnacle of cooking and food-presentation in Australia. Australia currently has no high-end school for training chefs, equivalent to the Culinary Institute of America (known as the CIA) or Cordon Bleu in Paris. Tasmania should seize this opportunity. Training perhaps 50 world-class chefs each year in Tasmania would contribute greatly to Tasmania's reputation as a home of fine food, and training the students with Tasmanian products would increase awareness among the influential elite about what Tasmania has to offer. If only 10 more each year remained in the state, they would over time revolutionise the state's restaurant sector. The benefits to food product development, Tasmania's brand, and the tourism industry go without saying.

3. Reduce the cost to Tasmanian businesses of utilising science and technology.

The Tasmanian Innovation Census found a high level of external sourcing of knowledge in the Tasmanian food and agricultural sectors, along with a high level of collaboration between the University of Tasmania and Tasmanian food businesses. Tasmania possesses valuable food-related research capabilities in the Tasmanian Institute for Agricultural Research (TIAR), Tasmanian Aquaculture and Fisheries Institute (TAFI), and the Cooperative Research Centre for Food Safety, all affiliated with the University of Tasmania. But important obstacles to collaboration between bodies such as these continue to exist, with some exacerbated by government policy.

Most government programs to encourage commercial interaction between publicly funded research institutions and private companies effectively aim to *increase* the price of science and technology to private companies. This result may not be intended, but it creates a serious obstacle to private access to public research.

As governments, especially the Federal Government, have focused on gaining the maximum-possible return from public science and technology investment, and as research agencies strive to demonstrate their value to government, governments in many jurisdictions have created incentives for research institutions to capture as much benefit as possible for *themselves* from their research and expertise, rather than for private industry. They do this by maximizing the price of intellectual property and technology consulting. These incentives have been promulgated under the banner of

'promoting a more commercial-oriented culture', but the effect of raising the price of any good is usually to reduce its demand, and hence its usage.

Rather than pushing public research organizations to raise their prices, government should encourage these institutions to *reduce* their prices as far as is feasible. Of course, if the price is reduced too far, firms may not sufficiently value intellectual property, but certainly if it is increased excessively, its adoption will decline.

To offset this tendency, the Tasmanian Government could:

* *Create incentives for universities to release intellectual property*.

* *Open up its own intellectual property,* by making it freely available to Tasmania-based businesses, with a proviso that an enduring license be granted back to the Government.

* *Support universities to collaborate with businesses for problem-solving*. This could be facilitated by targeted funding for consulting projects to enable the University to free its personnel to work with industry. Rather than provide grants directly to companies, the government could fund problem-solving efforts that collaborate between companies and expertise providers. Such funding would encourage ongoing capability formation and maintenance.

* *Expand the developing cluster of food-related research in Tasmania*. Tasmania is already home to several leading food-related research bodies, and the Tasmanian Government has been instrumental as a partner in building them. In addition to these, Tasmania could potentially be home to further institutes which could strengthen these through collaboration and make available greater expertise to local producers. Particular opportunities include relevant specialty areas such as cool-climate wine and stone fruit production—a major growth opportunity for Tasmania which could build on established work at the Tasmanian Government's Grove Research Station—and high-performance foods for athletes and elite soldiers—building on Tasmania's long-standing research and production effort with the Defence Science and Technology Organisation at Scottsdale. These projects can frequently be funded together with the Federal Government.

4. Encourage capital allocation to innovation.

With more than $4 billion in privately managed investment capital in 2006, including $2 billion in Tasmanian-domiciled superannuation funds, the Tasmanian economy possesses in aggregate more than enough capital to support its innovation

needs. The problem is that too little of this capital is devoted to the activities of innovation. The result has been serious constraints in the development of innovation in the State.[24]

Governments in Tasmania and elsewhere have attempted to redress this difficulty by offering taxpayers' funds to start-up and technology companies, through grant programs targeted at special niches. Most have focused on new companies in high-technology sectors, although in Tasmania a broader range of sectors, including (successfully) agriculture, have been promoted in the past. Alternatively, governments have offered generous tax concessions for R&D expenditure, in an effort to promote business-backed innovation.

Neither of these approaches has been demonstrated to increase the overall rate of innovation in the Tasmanian economy. Worse, both appear to distort capital-allocation processes and entrepreneurial activity in undesirable ways.

In the first instance, these programs, especially tax concessions to R&D, amount to subsidies to high technology, which as we noted above is a tiny proportion of the economy. More seriously, they can induce widespread system-gaming behaviour by firms and dependency on government largesse. Increasingly, firms oriented to these programs fine-tune their activities in ultimately suboptimal ways to remain eligible. Among undesirable consequences of government free-grant programs to support innovation are:

- Selection of senior management on the basis of close relationships with government and skill and experience with grant programs—not necessarily ideal characteristics for entrepreneurial leaders.
- Channeling of firm activity to meet government reporting formats, evaluation measures, and poorly formulated targets.
- Deliberate restriction of firm growth in order to remain below eligibility thresholds.
- Development of a mendicant, government-dependent corporate culture.
- Direction of attention away from real customers, real markets, and real capital providers towards 'free' government money.

[24] 50.3 per cent of businesses surveyed by the ABS reported difficulties gaining finance—which included 'excessive economic risk perceived by business', 'excessive economic risk perceived by financiers', and 'cost or availability of finance'—as important obstacles to innovation. Australian Bureau of Statistics, *Innovation in Australian Business* 2005.

- Curtailment of growth in private risk-capital vehicles, which are required to gain commercial returns on investment and cannot compete with taxpayer-subsidised investment capital.

Yet, as noted above, the issue remains: too little Tasmanian and Australian investment capital is allocated to innovation activities. To develop alternative policies that can address this vital issue, it is necessary to begin with an understanding of why insufficient capital might in general be devoted to innovative economic activity. As we noted above, the underlying reason is that under certain circumstances private investment vehicles cannot manage the associated risks or cannot capture sufficient return to attempt innovation.

As discussed above, capital will not accept innovation risk if it cannot manage the terms of risk in the sector under consideration. These vary from sector to sector. Government can play an important role in remedying these 'market failures', not by substituting itself, but by tilting the playing field in favour of productive investment in innovation projects, and doing so in ways that match the specific demands of the sector in which it aspires to promote innovation. A critical principle to be adhered to in this endeavour is that capital be allocated by private investors, who have the experience to assess and accept risk themselves, rather than by government officials or government-appointed boards. Proposals to achieve this end might include:

* *Avoid free-money grant programs for companies.* Government should at the very least require that all taxpayer-funded grants be matched by private money. Since even this requirement is so readily 'gamed', however, the Tasmanian government should not initiate new grant programs aimed at private companies in its effort to promote innovation. Rather it should increase financial support to innovation in other forms, thereby freeing both substantial capital and time of officials to devote to other programs.

* *Create loans pools for innovative investment*, replenished by repayment on achievement of sustained profitability. In place of grants, the Tasmanian government could create a pool of low-interest loans, repayable on success, which would self-replenish. Such a scheme could be modeled, in amended form, on the successful Higher Education Contributory Scheme (HECS). While such loan pools will not be appropriate or needed in many sectors, which need larger amounts of capital best taken in equity form, where access to relatively small amounts of lesser-risk capital is needed but lacking, such a financial vehicle may be valuable.

Financial pools of this type would be especially suitable for agriculture. Many fields of innovation in agribusiness suffer from time horizons and rates of return that make them difficult investments for other financial institutions. A typical agribusiness

investment will take some years to produce cash flow, but then generate reliable, long-term, inflation-protected returns. Consider a venture to grow wine grapes. Establishment of a vineyard is estimated to cost $40,000 per hectare, but will not generate cash for five to eight years. What bank would lend under these circumstances, even with a mortgage over the vineyard owner's land? Venture capital firms have a different problem with this type of enterprise: while the time horizon and cash-flow schedule might be acceptable, the structure of returns in cash will probably not, nor will the probable equity structure (farmers will be resistant to selling their land to investors as a value-realisation measure).

Government's contribution would be to provide the initial capital, then set a low interest rate, sufficient only to recoup defaults (which themselves should be few given sufficient project scrutiny and due diligence). Such a scheme could partially substitute for existing drought-support programs and be employed to encourage land-use transition rather than reinforce existing, often inappropriate and low value, uses.[25]

* *Reduce innovation risk by co-investing with investment funds.* These funds could be made non-terminating, allowing them to support innovation projects of longer duration than most venture-capital entities, which must wind up and return investors' capital after seven years. Government could effectively increase the risk-adjusted return to investment in innovation by partnering with private capital providers, thus bearing a proportion of total risk in such vehicles, while accepting a below-market rate of return. In such entities, if government 'capped' its return at a relatively low interest rate, private partners could take the return above that level. The result would be a rise in risk-adjusted return, without distortion to the investment decision-making process, making such investments more appealing to private investors.

This approach would potentially provide a means for Tasmania's superannuation funds to invest in the long-term future of Tasmania through innovation.

* *Reduce innovation risk by facilitating limited-term crop insurance to qualified new projects*. A key obstacle faced by innovators is that weather-induced crop failure (for example, frost or hail) will wipe out their capital base in the early years of a project, in the years between planting and initial cash-flow, that is, before earnings have accumulated to a level that will allow the farmer to bear the burden of an occasional crop failure. Fear of such random events prevents many projects proceeding. The government could mitigate this risk by enabling crop-protection insurance for innovators (but *not* others), such that the risk is diversified across the

[25] A similar shift in drought support has been proposed by the National Farmers' Federation. National Farmers' Federation, *Submission to the Productivity Commission Inquiry into Government Drought Support*, 2008.

entire state during this period and not faced by single innovators alone. To avoid moral hazard (see definition above), candidate projects would need to be independently assessed for this insurance to demonstrate that the right crop was planted in suitable areas. Such insurance could be provided by private companies, but supported by government sufficiently to enable effective contracts to be issued.

* *Allow pre-profit businesses to accumulate advantaged tax credits.* This also would serve to increase long-term returns, and hence attractiveness, of investment in innovation risk. This measure was included in the list of proposal coming from the Cutler Commission of Inquiry into Innovation in Australia for the Federal Government, and could be adapted at the State level.

5. Reduce regulatory barriers to innovative Tasmanian companies.

A major problem for innovators in any regulated economy such as Tasmania's is that they are frequently accountable to multiple agencies whose responsibilities and charter do not include sponsoring innovation. These agencies might be charged with ensuring health and safety, preserving the environment, preventing discrimination, or protecting consumers and workers. Any change to the way things are done poses a challenge to such regulators. Since by definition innovation means doing something new, what the innovator proposes is often not covered by the rules and is, in a sense, a threat to the system. Well-meaning regulators then reason that since their charter is other than promoting innovation, their first (and sometimes only) reaction should be negative. Why, they reason, should the innovation be allowed if it puts at risk the agency's primary mission? And in any case, why should the entire set of rules be altered, simply because one small company wants to do something unanticipated? Best just to say no!

To help overcome this problem inherent in modern capitalism, the Tasmanian Government could:

* *Develop a one-stop shop for innovators whose projects will require regulatory approval (which in the food industry would be virtually all)*. Often innovators find that they require approval from many different entities, the existence of some of which they are not even aware at the outset. A single government body—potentially sponsored by the Department of Economic Development Tourism and the Arts—that would work with innovators to develop timelines, facilitate applications, create regulatory checklists, and ease governmental interactions for private entrepreneurs who are often not accustomed to dealing with bureaucracies would increase the probability that innovators would not be taken by surprise, or give up stymied or exhausted.

* *Develop a 'circuit-breaker' to allow potential innovators to test the feasibility of their proposals before permanent or broad regulatory approval is granted*. A major difficulty innovators face in many fields is that they require system-wide, permanent permission to launch their product or change the way a service is provided *before* they are able to test its impact in practice or even whether it works at all. This considerably increases the barriers to innovation. It is as if all new drugs had to be approved for general release to all patients before a clinical trial could be conducted. In the pharmaceutical industry, the institution of clinical trials separates approval to test, under limited circumstances and for a limited time, from approval for general release. The same concept could be extended to multiple arenas of the economy, from food products (for example, raw-milk cheeses) to traffic regulation (permission to run larger or different vehicles on specified routes) to ocean-based farming (permission to raise abalone in sea cages).

This would require an agency whose responsibility was to determine the conditions under which trials limited in scope and time could be conducted, to accumulate data and assess ideas before they were considered for permanent approval. Not all new ideas would be allowed even to be tested, of course, but by limiting the scope such an agency would reduce the regulatory hurdles for innovators to demonstrate their case.

* *Undertake a dedicated audit of Tasmanian regulation to assess its impact on innovation risk and incentive*. While regulations are often assessed for their impact on a wide range of measures, including safety and cost, they are rarely assessed for their impact on propensity to innovate.

* *Remove its ban on GMO crops, at least initially for non-human-food crops*. While some argue that Tasmania gains a marketing advantage from prohibiting genetically modified foods, any such advantage is slight, if it exists at all, and it is difficult to imagine Tasmania becoming a leading innovator in the food sector if it effectively bans the most powerful technology for innovation in this sector ever invented. Scientifically, the ban makes little sense—all foods are 'genetically modified' from their 'natural' form, by the use of certain techniques (such as forced selective breeding) rather than others (deliberate gene insertion). At the very least, Tasmania should lift the prohibition on GM crops not for human food use, such as pharmaceutical plants and animal fodder. As time passes, Tasmania's disadvantage will only escalate if it opts out of this dynamic field of technology.

Furthermore, maintaining a ban on GMOs conflicts with the government's commitment to reduce Tasmania's output of greenhouse gases. Fertiliser and pesticides are both products of fossil fuels, and their use would be substantially reduced by genetic modification techniques in crops.

6. Upgrade and focus Tasmania's image and self-image, its 'brand'.

To support expanded production and a shift to higher value products, Tasmania will need to increase and transform its national and international image. More of Tasmania's food products will sell directly to consumers, and fewer will be commodities. Under these circumstances, brand becomes vital. To enable Tasmania's branding strategy to support its innovation strategy, the first step is to recognise that building and reinforcing its brand is as important as building physical infrastructure, and should not be treated as an after thought or 'poor cousin'.

Until recently, Tasmania's branding effort especially national advertising, has focused overwhelmingly on tourism. But images that might be appropriate for tourism do not necessarily support branding to meet other goals, and might actually undermine them. Images of lonely beaches and remote wilderness, for example, do not necessarily help attract young families or entrepreneurs who are looking for vibrancy and modern facilities.

Tasmania's brand should explicitly be oriented at promoting Tasmania as a source of the highest-quality food and as a place for dynamic young families to settle, and resource allocations to support the brand should be substantially expanded. To re-brand Tasmania as a place of innovation, the state's efforts should beyond advertising and focus on portraying our island as a place where leading-edge ideas are debated and new technologies adopted. Two initiatives to move the state in this direction would be:

* *A nationally prominent festival of ideas.* Such a festival should aim to highlight the state's engagement with frontier thinking globally, and to showcase the best of local ideas and innovation. By partnering with Internet and media providers, an opportunity exists for Tasmania to seize the space as the natural location and leading event of this type in the nation and to speak directly with the world. The festival would also provide an opportunity for the state to showcase its adoption of new technology, demonstrating that it is possible to live here, physically distant from the rest of the world, but no longer mentally or technologically so.

* *State-of-the-art utilisation of information technology at tourist sites.* This should include especially locations where tourists could experience and learn about local foods, but should extend to museums, heritage sites, and tourist shopping areas. The state could relatively cheaply provide lower-bandwidth wireless access at such locations, suitable for the provision of simple information and advertising with a common interface, and direct users to local for-profit providers for higher-bandwidth needs.

* *A global business-plan contest.* Business plan contests promote new ideas and new businesses, but perhaps more importantly, they signal the character and enthusiasm of the institutions that sponsor them. Good ideas are brought to the surface, and interested entrepreneurs and potential investors focus their attention on the sponsors and participants. They are common at Universities, perhaps the most famous being that of the Massachusetts Institute of Technology, and are usually rather small scale, although often vital in spurring on the companies that succeed in them. Tasmania could potentially attract worldwide attention with the world's first state-sponsored business plan competition. It would signal that Tasmania was 'open for business' and entrepreneurship-focused. To be successful in promoting the state's brand, Tasmania's contest would need to combine several features:

- Offer a substantial sum—say, $10 million—to attract worldwide attention.
- Require that private investors match the state's prize money.
- Require that entries be food-related.
- Require that the winning company be substantially Tasmania-based (though not necessarily Tasmanian by origin).

7. Strengthen community strategic and cohesion capability to facilitate entrepreneurship.

None of the above measures will succeed without the enthusiasm and commitment of entrepreneurial and dedicated people. In any innovation process, unexpected obstacles and unforeseen setbacks will be many. Only relentless will and the support of friends and colleagues keeps innovators going.

And innovators never succeed alone. They draw upon resources, expertise, and emotional energy from their community. These communities are almost invariably geographically defined.

The most important support the Government could provide to innovation in Tasmania would be to focus on supporting specific industries in specific places. The measures outlined above should all be implemented regionally and in coherence with one another. Irrigation alone, for example, will not likely create much innovation; capital, know-how, and entrepreneurial spirit will also be vital. These exist in communities and can be strengthened only at the community level.

The same drivers that enable national economies to grow—nimble regulation, trade, innovation, productivity, skills, connectivity—are also now widely recognised to be vital contributors to how well local economies perform. Local and regional

development policies require better co-ordination between these drivers to construct and reconstruct advantage. Local economic development is a strategic activity best delivered through collaborative efforts, which identify long-term economic rationales (as outlined in this paper) and niches, and seeks to build on embedded local knowledge as well as natural and latent competitive advantages. Thus, for example, local councils increasingly play an important role as economic agents in 'place shaping' (Lyons Report UK 2006).

* *Innovation promotion should be combined with community strengthening, and decentralised.* To make innovation of the type described here actually happen, each sector and region will require a specific mix of measures and will likely encounter a unique set of obstacles. This means that a statewide innovation strategy should be built up from a series of regional innovation strategies, in the most decentralised fashion possible. The 'subsidiarity principle' should dominate: no activity should be performed at a higher level if it can be performed at a lower one.

* *Innovation policy should mesh with a Tasmanian population-settlement and livability strategy.* There are now for the first time 500,000 Tasmanians. It is an appropriate time to think about the choices we need to make to shape the future communities we live in. An innovation strategy will provide important guidance for both the skills profiles of Tasmanians in the future and for the places in which they are likely to live. This, in turn, will enable government better to plan the social infrastructure required to attract and retain its future populations, especially those currently at risk of leaving the state, young professionals. A population settlement and liveability strategy would focus on the types of communities that we need, to foster the creativity and networks that underpin innovation. Tasmania should devote concerted effort to understanding where our future regional centres might be, and the types of economic social and environmental infrastructures needed to ensure their sustainability.

The Demographic Change Advisory Council has mapped future populations by local government area (LGA) and on these projections many LGAs face uncertain futures. Some of these LGAs (such as Dorset) are likely to be central to the food component of the innovation strategy. The innovation strategy is therefore likely to provide hope and sustainability to many of our regional communities. But economic opportunity alone is unlikely to attract and retain the skilled workers of the future, a range of livability incentives are required in regional towns such as ready access to the arts and leisure opportunities, the amenities of a city but the feel of a country village, flexible housing options, flexible business ownership and management options, and access to skills development opportunities.

In the context of an innovation strategy the key objective of a population settlement and livability strategy would be to shape the future number, diversity (age/skills), and location of Tasmanians to maximise opportunities for wellbeing, wealth creation and a creative, stable skilled workforce.

* *Promote community enterprises.* Community enterprises are commercial operations with a high level of community ownership. An important goal of the enterprise is to reinvest in the local community to maximise the local value of each dollar. Community enterprises support local communities to increase their knowledge of and engagement with uses of local assets, which are then managed in an ecologically sustainable manner and for the socio-economic benefits of the local community. The exact level of involvement is negotiated within the community and between the community and the appropriate agencies and levels of government and industry. As an example, some communities might wish local governments to negotiate ownership/leasing arrangements of forest assets with Forestry Tasmania, or they might use regional natural-resource-management groups or local community economic development organisations. This does not limit the options; other creative responses will emerge. The three components of community forestry—local involvement, socio-economic development, and ecological sustainability—are subject to negotiation between the parties engaged in the project. Similarly, community enterprises could have access on a place basis to the proposed subsidised loan pools. A place-based approach enhances the capacity of a mix of local players (councils, small and medium enterprises, community agencies) to best understand and extract value from embedded local resources through an 'innovative milieu'.

* *Found a Centre for Entrepreneurship and Local Development.* Strong local institutions are required to support regional approaches to innovation that increase productivity and economic growth. Tasmania needs to build local leadership capacity—civic, economic, social, and environmental. Many of our local councils struggle to attract or develop leaders. The Centre could provide a focal point for the many *ad hoc* leadership programs already in place, and be more strategic in ensuring that regional communities have plans and resources to develop and support social, economic, and environmental entrepreneurs. Importantly, such a centre could also provide the network capacity that in itself fosters creativity and innovation. An important function of such a centre would be to provide knowledge of regional value chains, investment strategies, and financial tools for local economic development.

* *Create 'Small Area Development Plans'.* Many farmers and farming communities now accept that some traditional farming practices and business approaches are no longer sustainable. Communities increasingly seek advice and support about how to transition to new futures. Following the successful example of

the University's demonstration farm in the Coal River Valley, small-area development plans could model, test, and demonstrate how such transitions might best be organised. The strategy would initially target three types of areas:

- Drought-affected areas (for example, Levendale).
- Areas likely to access irrigation in the future (for example, Waterhouse).
- Areas with new irrigation opportunities (for example, Meander).

The plans would focus on both governance (partnerships between governments, businesses, and farming communities) and 'action learning'. Key elements include:

- Cultural change.
- Local land use development plans.
- Skills strategies.
- Access to infrastructure funding.
- Community renewal strategies.

* *The Department of Economic Development, Tourism and the Arts should be decentralised.* The DEDT is the appropriate agency to sponsor and implement a statewide innovation strategy, along with, in the case of food, the Department of Primary Industries, Parks, Water and Environment. But as with education innovation, economic innovation cannot be performed from a single central location in Hobart. The DEDT's officers should work in, live in, and be part of local communities. A small number of specific regions of Tasmania—probably as few as five local-government areas at first—should be selected as models for the region-based innovation strategy envisaged here. Each should then be staffed both with DEDT officers, whose task would be business-development and economic facilitation, and appropriate technical-support personnel, in the food sector most likely from DPIW or the Tasmanian Institute of Agricultural Research. These officers should be based in, and live in, the appropriate local town—and *not* attempt to commute from Hobart. To be effective, they will need to become an integral part of the local community, and yet be capable of seamless interaction with the State bureaucracy.

* *A new data collection and analysis capability should be created to assess progress and identify opportunities and obstacles.* Since the future cannot be known with any certainty, it will be essential to be flexible in implementing these initiatives: we will have to adapt to unexpected developments and opportunities. The basis for such adaptation should be objective data, not anecdotes or hunches. At present, however, data on the performance of the Tasmanian economy are often sketchy at the level required to answer these questions, especially at regional levels. The Australian

Bureau of Statistics is constrained by confidentiality and budgetary requirements, and does not collect information with the degree of granularity required to support or evaluate a capability-improvement strategy. It will be essential to measure what results the strategy is achieving and to identify trends over time in opportunities and obstacles. To do this, a data collection and analysis capability resident in Tasmania will be essential. It should be able to measure innovation directly, in a continuation of the Innovation Census, and identify trends in employment, value-added, and out-of-state exports, especially for identified high-potential sectors.

This should be combined with publicly available analysis of land-use and other potentials, and data on local community strengthening. One step in this direction would be a comprehensive Tasmanian Atlas, to track and record Tasmania's rich record of human activity in its distinctive urban and natural environments. A projected Atlas's starting place is slated to be the cultural precinct at Hobart's waterfront, and from there it could move outwards geographically across Tasmania, and beyond. Such a project would enable and generate specialized, place-based information products to educate, entertain, and engage a wide range of locals and visitors.

* *The strategy should be launched in small number of selected showcase regions*. It is not necessary that these proposals be implemented immediately across the entire state. Indeed, it would be desirable that a select few locations be chosen early as showcases and proofs-of-concept that the system-platform approach to capability improvement proposed here is effective. An ideal way to begin would be to choose at first a handful, perhaps five, high-potential food-producing regions around the state, river valleys in the first instance, to begin implementation. Success in these would encourage others to become involved and provide valuable lessons in the factors that underlie success. In this sense, the 'hydro-agrarianisation' strategy should follow the example of hydro-industrialisation, in which a first example, the Waddamana Power Station, was constructed to demonstrate the strategy's value. With a demonstrated early success, enthusiasm and conviction around the strategy mounted rapidly, providing invaluable public support and understanding. In the present instance, these could be combined with the 'Small Area Development Plans' proposed above.

2. Creating a Sustainable-Power Export Sector

While Tasmania currently enjoys only a slight net surplus of power production over its present industrial, commercial, and household requirements—and in recent drought-stricken years an actual deficit—the State still generates almost three times as much power per person as does the mainland. In addition, the overwhelming majority

of Tasmania's energy is sustainably produced and carbon-free. These two observations, combined with analysis that reveals considerable potential to augment Tasmania's supply of sustainably derived energy, suggest the possibility of both reinforcing and expanding Tasmania's energy-based economic advantage.

Yet many of the parameters and policies within which the Tasmanian energy industry operates today were established in prior eras characterized by very different priorities, constraints, and demands. In particular, they were established before Tasmania was connected to the national energy grid by the Basslink cable and before non-carbon-derived electricity was recognized as especially valuable.

These shifts open the potential to an innovation-based energy sector in Tasmania. Of primary importance is recognition that Tasmania is well placed to expand its available 'surplus' in each of four key sources of sustainable and carbon-free energy: hydro-electricity, wind-power, geothermal, and tidal.[26] Taken together, these constitute the basis of a dynamic and valuable set of industries. This physical context, combined with a set of policies that encouraged innovative investment, could enable Tasmania to become not only a significant producer of sustainable energy, but potentially to build further important businesses exporting energy and energy-intensive products.

As with its food potential, the heart of this opportunity is Tasmania's water surplus. This surplus can potentially be exported in four forms: directly (for example, by pipeline), as food, as energy directly (export of electricity across the Basslink cable), or as energy-intensive products. It is not possible, or even desirable, to specify in this report which of these is most attractive. The choice among them should be a matter for private investors and operators, *subject to the proviso that the Tasmanian community submits all proposals to scrutiny to ensure maximum ancillary value is created and captured across the Tasmanian economy*.

Tasmania is today not close to realizing this potential. Along with its goal to become a substantial high-end food exporter, Tasmania should set itself the goal to increase, potentially *double*, its effective export of energy and energy-intensive products.

How might this goal be achieved? Three measures could move Tasmania towards significant exporter status:

[26] Another option, wood-based biomass, would not be carbon-free but could be sustainable. And it could potentially be a large net contributor. The proposed Tamar pulpmill, for example, is projected to contribute a net 60 Mw, about half the amount that would have been contributed, for comparison purposes, by the Gordon-below-Franklin Dam.

1. Price major power users at market rates.

About two-thirds of Tasmania's power production is absorbed by five large-scale industrial users, with three taking up a majority: the Rio Tinto aluminium smelter at Bell Bay, which employs 550 people directly and about 100 contractors (and consumes 322 Mega Watts, or approximately 25% of Tasmania's electricity capacity); the Tasmanian Electro Metallurgical Company (TEMCO) manganese ferroalloy facility, also at Bell Bay, employing about 250 people and 60% owned by BHP; and the Nyrstar zinc smelter in Hobart, employing about 500 people. In total, these three industrial operations thus employ roughly 1400 people, or 0.6% of the Tasmanian workforce.

While the precise figures are commercial-in-confidence, it is accepted that these three companies enjoy long-term power-supply contracts priced substantially below market levels, and in recent years below even the cost of electricity production (or acquisition) in Tasmania. Hydro Tasmania's Annual Report for 2008 states that "The average cost of generation was significantly higher than the prices received under existing long-term contracts with major industrial customers".[27]

Prior to construction of the Basslink cable, the decision to award long-term very-low-cost contracts to these three industrial operations made good economic sense. Because a Tasmanian Government-owned entity, the Hydro-Electric Commission, could acquire the capital to construct hydro-electric schemes at relatively low rates, in order to attract new industry and create spin-off benefits across the economy, *and lacking any feasible alternative use for the power,* guaranteeing power supply at extremely attractive rates—sufficient only to recover construction and variable production costs in the long term—could be regarded as a sensible economic-development strategy. Indeed, it drove the state's development for 70 years.

With the present potential availability of alternative uses for the power, however, this strategy should be revisited. Two obvious alternative uses are to sell the power to the mainland using the Basslink cable, especially when demand (and thus prices) spike during the summer months, and to offer the power at higher market rates to other potential users in Tasmania.

How much might be gained from exporting this power? This question is open to conjecture, and is of course dependent on the evolution of mainland electricity markets and policies related to greenhouse-gas mitigation, but simple analysis suggests the gains could be large. Were it feasible, for example, to utilize the

[27] Hydro Tasmania, *Annual Report 2008*, p. 13.

Basslink cable as an export vehicle, and were it possible to gain an *average* one-cent per kilowatt hour premium over the price available locally in Tasmania to large industrial consumers, with the capacity to export 500 megawatts per hour of electricity year-round, Tasmania could gain an extra $43.8 million per year; at a five cent per kilowatt hour premium, the gain would be $219 million per year. In a State Government budget of approximately $3 billion per year, this would represent almost 8 per cent of expenditures, a substantial sum indeed. Were this cash flow to be capitalized (borrowed against for infrastructure projects such as hospitals, ports, or educational institutions), at a 6 per cent interest rate this cash flow would enable the Government to borrow an additional $4.4 billion. It should be emphasized, of course, that these calculations are merely illustrative, and constitute neither forecasts nor recommended policies for Government (especially not borrowing an additional $4.4 billion!), but they do serve to indicate the potential financial impact of realizing the full value of Tasmania's power-generating assets.

Alternatively, Tasmania could endeavour to attract new power users, especially those that may be able to gain more value from Tasmania's carbon-free status. An operator of large-scale Internet server farms, for example, might find it commercially attractive to reassure customers that use of their particular search engine implied 100% carbon-free power. Such an energy user might be willing to pay higher energy costs to gain this status.[28]

One potential approach to determine the best allocation of Tasmania's power would be effectively to *auction it*, as these industrial-users' power contracts approached renewal. Tasmania could then determine which users most valued the power, and whether the fully assessed benefits of selling the power within Tasmania outweighed the potential value of having it available for export.

2. Create incentives and remove obstacles for new generators to contribute to grid.

Present energy planning in Tasmania focuses on meeting projected *local* demand. It does not orient to potential export growth opportunities, and it no longer focuses on the potential to expand the economy by expanding electricity availability. But Tasmania has considerable potential to increase its sustainable

[28] It is worth noting that under the scenario implicit in these hypothetical calculations, employment in Tasmania's heavy-energy-use sector would now be effectively substantially subsidized. At a one cent per kilowatt hour foregone opportunity, for example, 500 megawatts for a hypothetical 1000 jobs would imply a $43,800 annual effective subsidy (foregone electricity revenue gain), *per job*.

energy production. Projects underway at the time of writing are forecast to increase Tasmania's wind-energy output by 700 megawatts (adding to a total from all sources 1200 megawatts presently), and it is estimated that Tasmania has the potential to produce up to 1300 megawatts of wind energy cost effectively, within current technology and grid balancing parameters. In addition, highly prospective sources of geothermal energy have been identified in Tasmania, and work is underway to develop and exploit these.[29]

* *The Tasmanian Government should initiate a review of incentives and obstacles to new clean-energy generation in Tasmania*. Current pricing formulas employed by energy regulators are not directed at facilitating this investment. And the Federal Government's planned carbon-pricing schemes will allow no premium for Tasmania's installed base of carbon-free capacity; indeed, Tasmanians will be required under their membership of the National Energy Market (since 2005) to bear a new share of the cost of carbon trading caps in the national grid. That is, as presently designed, the introduction of carbon trading will work to the detriment of Tasmania's energy industry, in spite of the fact that it is overwhelmingly carbon free.

3. Build a second Bass Strait cable.

If Tasmania is to realize its potential as a clean-energy producer and exporter, it will need before long a second cable across the Bass Strait. Such additional capacity is valuable not just as a conduit for further electricity generation—vital at peak times of spiking prices to capture high margins—but also to enable load balancing from additional wind power, the fluctuations in which need to be offset by more stable and predictable flows.

Critical background to these proposals will be the augmentation of capability to source and integrate the variety of energy sources potentially available to Tasmania. *The establishment of a 'Living Laboratory of Sustainable Energy* would potentially offer:

- Educational and training opportunities including tertiary courses and course components relating to renewable energy technologies.
- Economic social and environmental sustainability and technical skill based courses relating to installation

[29] Roger Lewis, *Geothermal Potential in Tasmania*, Presentation to the Royal Society of Tasmania, June 16 2009.

- Maintenance and servicing of renewable energy components.

Opportunities in this field exist for both the development of course components for world wide export as well as in-house delivery.

It should be stressed that these initiatives ought to be undertaken *not* in order to create 'green jobs' *per se,* but because Tasmania has the real opportunity to combine natural advantage with accumulated expertise in this field. Government cannot generate competitive industries out of thin air, in this as in any other area. Indeed, the pursuit of 'green jobs' for their own sake appears to have the potential to mislead governments into investing in schemes that seriously distort market economies, and dissipate public monies. In that sense, they risk falling into the common fate of most government-driven job-creation efforts. A salutary warning is provided, for example, by a careful study by Professor Gabriel Calzada from Juan Carlos University in Madrid of the Spanish Government's much-lauded programs to induce 'green jobs'. Professor Calzada concluded that for every 'green' job created, 2.2 others were destroyed to make way for it. And only 1 in 10 such jobs was sustained for any significant period of time.[30]

3. Founding a 'Creative Precinct' for Hobart's waterfront

With its existing concatenation of *museums*, including the proposed new Museum of Old and New Art (MONA) and a refurbished Tasmanian Museum and Art Gallery; *music* (including the Tasmanian Symphony Orchestra and Conservatorium of Music); *drama* (the Playhouse and Salamanca Theatre); the many *art galleries* in Salamanca and Hunter Streets; *research* at the CSIRO Marine Science facility and Menzies Research Institute; *education* at the University of Tasmania Art School and Conservatorium; and many *entrepreneurial creative companies* in the area, Hobart's Sullivan's Cove district is already a substantial creative precinct.

The Government of Tasmania now has a unique opportunity to build on this foundation and, through an integrated set of relatively low-cash-cost initiatives, catapult Hobart's waterfront to leadership as Australia's foremost creative precinct. Key to achieving this goal would be to encourage the University of Tasmania to return to the area with a substantial presence, and to develop the district as an information-

[30] Calzada *et al., Study of the Effects on Employment of Public Aid to Renewable Energy Sources,* Universidad Rey Juan Carlos, 2009.

technology and broadband-application showcase. The outcome would be to give the city area and waterfront of Hobart the character of a European or US University city, such as Oxford or Cambridge in the UK or Cambridge Massachusetts in the USA, highly conducive to creative activity, and to an extent that is no longer feasible in any other major Australian city. A similar objective could also be feasible in Launceston's Inveresk district.

The key to achieving this goal is to intermingle the University and other life of the Hobart city and waterfront into a 'mosaic', in which the variety of creative activities overlay and mix with one another, rather than are rigidly separated as at present. The community and university should be as *close* to one another as possible, not as distant. The Tasmanian Government could undertake five key steps to achieve these aims:

1. Facilitate the University to re-occupy Domain House, and to develop an expanded presence in the Domain area.

Australia terms its 'Ivy League' equivalent, 'The Sandstones'. The University of Tasmania, as one of Australia's oldest universities, was originally housed in a sandstone building. This building—Domain House—still exists and is presently essentially unoccupied. The building is owned by the State Government, and could relatively easily be made available to the University, on suitable terms, as part of an effort to shift the location of the University into the City area. Images are important. Domain House would serve as an ideal 'icon' for the University, and could anchor a dedicated set of activities in the area.

2. Encourage the University to move its operations to the Sullivan's Cove area, by making available the Railyards site behind Hunter Street.

The Railyards site would make an ideal location for the University's operations, and would offer the opportunity to create a new style of 'open' university—with full public access and interaction—on a spectacular site that no other Australian university could match. The University, and the waterfront area it would shape, would mould the experience and life of the Hobart city, literally placing creativity at the centre of the city's life.

This proposal would offer several benefits to the program to develop an innovative Tasmania:

- It would bring several thousand students and academics into the waterfront area, breathing vigour and energy into the entire district.

- It would create multiple opportunities for the Hobart and Tasmanian communities to interact and utilise the University in ways not now possible.

- It would exert many 'spill-over' effects of intellectual, educational, and cultural life into the surrounding area.

- It would shape the 'feel' of the Sullivan's Cove district, ensuring that the area did not become an alienating 'tourist mall,' as have the waterfront regions of too many other Australian and international cities.

To realise this vision, the Government should make several requirements in exchange for facilitating availability of the site:

- The University buildings should allow, indeed *encourage*, public access and involvement. One possibility would be to make the ground floor of all buildings open to the public and dedicated to exhibitions, museums, and auditoria that could be employed for public purposes when not engaged for University purposes (too many lecture theatres and auditoria are simply idle much of the time when not in official use).

- Students and University staff should be encouraged to mingle in the locale area by, for example, the University *not* providing a refectory—thus promoting the use of local cafes, restaurants, and other food outlets.

- The buildings should be designed to reflect a 21st century, digital learning and research environment, but incorporate an aesthetic that suggests permanence and solidity. The University on this site should be subject to only two government-mandated planning requirements: that no building be taller than or overshadow the Cenotaph, and that the buildings may take any form, but must be constructed of stone (on the principle that it is impossible to build an ugly building in stone).

3. Make Sullivan's Cove a digital-interconnectivity showcase.

As an integral part of the effort to build a creative precinct in Sullivan's Cove, the Government could develop the district as a 'showcase of the possible' in broadband and wireless interconnectivity. The provision of wireless and Bluetooth access to the new 100mbps network, combined with investment in software platforms that would allow the development of multiple applications to demonstrate the unlimited possible uses of such broadband, would highlight the engagement of Tasmania with the frontier of application of 'co-produced' technology.

In particular, the area could showcase state-of-the-art platforms that could enhance the tourist experience of Sullivan's Cove, by far the most tourist-visited site in Tasmania, and at the same time reinforce the perception of Tasmania as a location for technically sophisticated applications of information technology.

4. Facilitate construction of student accommodation above retail in the city.

To support university-city interaction, and to inject new life into the Hobart city area, now somewhat depleted, the Government should encourage the construction of student accommodation in the city, including on the first floor of buildings in which retail occupies the ground floor. Many of these buildings are presently underutilised, or entirely unoccupied above the ground level. Bringing thousands of students, and teachers, into the city would foster a vibrant atmosphere that would make the city attractive to residents, Hobart citizens, and visitors alike.

5. Integrate the State and University Libraries with a Human Interface Laboratory.

By combining the State Library with the University Library, and moving both to a purpose-refurbished site such as City Hall, and then co-locating both with a Human Interface Laboratory, Hobart could acquire a state-of-the-art facility that provided ready access for citizens, students, and scholars, to both printed material and digital material. Such a facility would be a core element of Hobart's 'open University' initiative.

4. Harnessing the National Broadband Network

The economic development of Tasmania over the past 200 years has been driven by a sequence of reductions in the impact of geographic isolation—what historian Geoffrey Blainey termed the 'tyranny of distance.' As Tasmania became increasingly able to integrate with the rest of the world, our economy opened new fields of production, specialised, and built important strengths, and in turn local producers were challenged by an increasing ability to import. In short, the economy became more competitive, in both the sense that its products could compete in the world market and that its market was more open to competition.

Most important among the historic reductions in experienced distance have been improved shipping (first better sail, then steam, and later oil-power), cheap and accessible air travel, and low-cost, instantaneous telecommunications. By further reducing the 'information distance' between Tasmania and the rest of the world, and within Tasmania, high-speed broadband will contribute another important step in this process. It will make vastly easier the movement of the modern world's most valuable commodity—information. Ubiquitous high-speed broadband will thus contribute a significant new overthrow of the 'tyranny of distance'. It will enable Tasmania to integrate more closely with the world, especially with the mainland of Australia.

The most important impact will be to make it more feasible and appealing for individuals who wish to remain engaged with the information-rich contemporary world to reside in and operate from Tasmania—to remain here, or to move here. An increasing proportion of the modern economy is comprised of businesses whose primary product (and input) is information, and these businesses will become more feasible for Tasmanians. This will be especially important for addressing Tasmania's deficit in 'business services,' a vital growth sector of the contemporary economy, which, as noted above, makes up only 6 per cent of Tasmania's total factor income compared to 13 per cent for the Australian economy as a whole.

An increased ability to integrate into the information society and economy will therefore create both opportunities and challenges for Tasmanian businesses, and for consumers. Put simply, *the losers will likely be 'generalists'—those who do a little of many things, servicing a protected local market—and the winners will be 'specialists'—those who excel at one thing, and can meet the needs of a bigger market in a single field.*

While the Federal Government will provide the physical infrastructure, the Tasmanian Government should take several key steps to ensure that Tasmanians are capable of meeting the challenges and taking up the opportunities created. The opportunities and challenges for Tasmania will fall under five headings, and the Government should address each. The National Broadband Network will:

1. **Expand market and capability opportunities for Tasmania's export-focused businesses.**

   Tasmanian businesses with the potential to sell to broader markets will be supported in their capacity to do so by expanded broadband. These will be the *specialists*. They will be found especially in the food sector. But many Tasmanian businesses are presently ill-equipped to seize this opportunity. They lack the skills and orientation to recognise how to utilise the Internet.

   Top priority should be a major program of skills upgrade, and of assistance to identify new opportunities, especially for small businesses. In some cases the appropriate approach would be to present clusters of similar businesses to the world, rather than each operating individually. To address these needs, Tasmania will need substantially increased commitment to appropriate skills along with, in certain instances, the development of common platforms. Specifically, the Government could:

   * *Provide targeted web-utilisation training to priority sectors.* This training should be delivered regionally, in order that it be available to businesses outside the metropolitan areas.

   * *Facilitate Tasmanian businesses to connect to markets and consumers through a targeted, high-content, Web-interface platform*. The ability to market directly to consumers—not necessarily only to *sell* to them, but to provide and gather information about preferences and opportunities—would greatly facilitate Tasmanian businesses, especially those that are food-related, to reach premium markets.

   The Tasmanian Government should facilitate a Web-enabled identity-preservation platform for food producers, in which highly specific information could be made available about bar-coded, RFID, or unique-numbered products, up to and including on an individual-item basis. With such a platform, individual producers could provide stories and information about specific products, with links to web pages providing dates of harvest, information about individual varieties, cooking

and preparation uses, or any form of information desired by consumers or processors. Government facilitation of the platform and associated training of the producers could potentially substantially reduce the difficulty of website construction for individual businesses and improve marketing possibilities for individual users, greatly increasing the potential for value capture from product differentiation.

Similar web 'platforms' could also be developed for other consumer-related industries, in particular the tourism sector.

2. Create platforms for more-effective delivery of public services.

Much of the society-wide productivity-raising benefit of widely available high-speed broadband will come through the more efficient delivery of public services. Tasmania has made some progress in this field, but has far to go. Three approaches could accelerate development of web-based delivery of public-sector services:

- *A comparative study of best practice from around the world, with particular reference to the employment of web-based solutions by governments in smaller and isolated regions.* Many regions around the world have experimented with new approaches to political governance and delivery of public services. Rather than attempting to experiment alone, Tasmania could gain much from systematic study, and adoption, of the best of these.

- *Development of an incremental-innovation improvement program for Government services, based on such quality-improvement programs widely used by large corporations and utilities as General Electric's Six-Sigma.*

- *Develop web platforms available to agencies and government entities with similar needs, such as local councils.*

- *Provide a one-stop shop to enable firms to navigate the thickets of regulation and approvals.* This is perhaps the most valuable activity Government could undertake to promote such business attraction.

Attract new businesses to Tasmania.

Ubiquitously available broadband will offer several opportunities to attract new businesses to Tasmania:

- *Businesses that rely on information but need not be tethered to any particular geography*. These include fields such as funds management, back-office business services, and a wide variety of on-line services, including games. The owners of these businesses may choose to locate in Tasmania for lifestyle reasons, and will no longer be constrained by information-distance.

- *Businesses that wish to test new products, services, and business models*. Tasmania offers a developed market, in most respects representative of larger markets but sufficiently small and geographically contained to be easily evaluated. These businesses may wish to test their concepts in Tasmania, or begin initial roll-out here.

- *Businesses that utilise Tasmania's natural advantages but sell their products over the web or support the web*. An example might be server farms, which provide volume for the Internet but demand large quantities of reliable electricity.

3. Challenge existing Tasmanian businesses that have relied until now on distance as a competitive buffer.

Many existing Tasmanian businesses will be challenged by the availability of broadband, and are far from ready to cope with the new competition it will engender. These are primarily the *generalists*. For decades, a wide variety of Tasmania's businesses, especially its smallest and most local, have survived behind the protection afforded by the 'moat' of Bass Strait, providing a relatively broad range of services to their nearby market.

The availability to consumers of high-speed broadband, coupled with improved, low-cost, and often overnight, inbound logistics, will remove this source of protection, for many. Few Tasmanian businesses are prepared.

Increasingly, access to cheap and fast broadband will make it feasible for Tasmanian consumers to take their business to larger and more agile providers on-line. The first and most obviously affected will be retailers, who comprise a substantial proportion of the Tasmanian business community, and who will find themselves in open battle with larger, better-stocked, more-responsive, better-financed mainland competitors. As retail in Australia follows the global trend and goes on-line—a trend that has until now been substantially retarded in this country

by slower broadband—it will *move out of* Tasmania. This will impact every product category, from newspapers, to clothing, alcohol, food products, books, and entertainment (especially movies and music).

But the same trend will also affect many wholesale businesses, and services, including education, accountancy, and medicine. Thousands of business in Tasmania will for the first time be exposed to competition the likes of which they have not hitherto encountered. Anything that can be sourced on-line, will increasingly *be* sourced on-line, and from the mainland.

To strengthen Tasmanian business in the face of this critical challenge, the Government could:

- *Urgently initiate web-training programs for Tasmanian businesses*. This training will need to go far beyond simply teaching how to access and use the web, but must demonstrate, to small and medium businesses particularly, how business will be conducted over the web. It must provide high-quality advice on how to prepare for the new competition, as well as technical training in web design and usage.

4. Exacerbate social problems from excessive or inappropriate internet usage.

While ubiquitous broadband will bring many benefits and opportunities, it will also likely induce real social problems. One will probably be a rise in 'Internet addiction' and cybercrime.

An ominous example is provided by Korea. In the 1990s and 2000s, Korea blazed a path to some of the fastest and cheapest broadband in the world. The President of the Korean Agency for Digital Opportunity and Promotion (Kado, Youngi Son, however, estimates that as many as 15 per cent of Korea's population, or 7 million people, devote an unhealthy proportion of their lives to the Web.[31] Problems include excessive use of online games, gambling, and pornography. In response, the Korean Government has created the Center for Internet Addiction Prevention and Counselling. The centre helped 72,559 people in 2007, up 40 per cent from the previous year. To cope with demand, the Government has commissioned an additional 90 associated centres throughout the country. Most referrals are teenagers, usually males.

[31] Elizabeth Woyke, 'Wired: How Korea is battling Internet addiction and cybercrime', *Forbes Asia*, April 27, 2009.

To deal with this problem, Government could:

- *Commission a study of best practice from around the world in coping with 'Internet addiction'.*

- *Initiate programs in schools, colleges, and the University to treat the addiction before it becomes deeply entrenched.* This field is one in which being prepared before the problem becomes overwhelming is of great value.

5. Leveraging Tasmania's Advantages in Tourism

The industry that will likely be specially advantaged by several of the key initiatives identified in this report is tourism. While Tasmania's economy is not unusually concentrated in tourism by comparison to comparable Australian tourism-focused regions, and Tasmania's share of Australian tourism employment is only slightly greater than its overall population share, tourism remains an important and growing source of employment for Tasmania. Tourism contributed 4.9% of Gross State Product in 2008, and employed 13,696 or 6.1 per cent of the workforce.[32]

The major initiatives outlined here that will reinforce in particular the tourist sector are:

- **Promoting food and wine innovation.** Restaurants and accommodation make up the largest share of employment attributed to tourism in Tasmania (4136 jobs from a tourism total of 13,696), along with retail trade (3680 jobs). Both these will be strengthened by the focus recommended here on high-quality food, and especially by the proposal to create a top-flight chef-training school.

  More broadly, development of Tasmania's reputation as the 'gourmet state', and in particular of a substantial wine industry, would strongly support tourism in Tasmania, by creating a powerful drawcard for an important sub-group within the overall tourism category. While Tasmania lacks the major tourist drawcards of sun-and-surf, snow-and-ski, or deep-history-and-culture, we *can* appeal to the growing market for food-related tourism. Not only would food-related tourism increase visitation to Tasmania, but it is likely that the tourism

[32] *Fact Sheet on the Tourism Satellite Account for Tasmania 2006-07*, Sustainable Tourism CRC, November 2008.

dimension of the industry would make up a substantial proportion of the overall industry. It is even possible that this dimension would be greater than the core-product segment of the industry itself. It is estimated, for example, that for each dollar of physical produced by a wine district, ten dollars of related tourism are created.[33]

This sector, however, is greatly constrained by Tasmania's regulatory structure, and the consequent *non-availability* of many of the food items for which Tasmania is justly famous. Barely an issue of a national gourmet-food magazine passes without an article on some or other specialty Tasmanian product—from abalone, crayfish, or scallops, through truffles and apricots, to wagyu beef. But try to buy any of these products here as a tourist. These products are somewhat available cooked in restaurants, but rarely otherwise. This is an important gap. It will be difficult to build a gourmet-tourist sector if food-safety and other regulations effectively forbid their sale locally! Tasmania has developed an excellent program to make Tasmanian wine widely available to visitors across the state; similar results need to be achieved for other food products for which the state is becoming recognised. This will require a thorough review of regulation and legislation, with a focus on creation of incentives to make these products widely available.

Finally, food-related tourism will ultimately be the best form of brand development and marketing for Tasmania. As more people visit Tasmania to enjoy the state's special food, more will become ambassadors for our products.

- **Development of a Creative Precinct at Hobart's Waterfront.** Hobart's waterfront area is already the State's most visited tourism asset. By substantially enhancing the range of heritage, artistic, and cultural attractions in the centre of Hobart, the appeal of this area will be dramatically improved.

  Paradoxically, however, to enhance the area's tourist appeal, it is important that it *not* be designated or planned as a tourist precinct. Tourists increasingly want real experiences, enjoyed with local people, not made-up events manufactured for their entertainment. Many, waterfront redevelopments around the world have fallen into the trap of allowing their waterfront districts to jump straight from moribund industrial port to tourist mall. This is not a desirable fate for Hobart's waterfront.

[33] Richard Smart, personal communication.

- **Harnessing the National Broadband Network.** Development of ubiquitous broadband will also advantage tourism. It will enable Tasmania to market itself more cheaply to the world, and will facilitate tourist interaction with the attractions they come to experience. Web-enabled museums, heritage sites, and natural places will—if done well—enhance the enjoyment for visitors and overcome obstacles to understanding and genuine appreciation of these places.

  Ubiquitous broadband also offers the potential to reduce the cost and improve the efficiency of operating a small-scale tourist enterprise. Web-based services can dramatically reduce the back-office costs of operating an enterprise (accounting, personnel, tax and regulatory compliance, and related activities) and can also facilitate the front-end: marketing and bookings. Given the fragmented nature of the tourist sector, this is a field in which government effort to make available industry-wide platforms can be valuable.

Conclusion

An effective strategy should not be seen as a weighty document adorning the shelves of officials and libraries. Rather, it should be a living guide to *action*: a coordinated and continuously evolving set of projects that achieves a desired end. In the present case, the goal is to improve the productivity of Tasmania's citizens and support the lives we choose to live here in our island home. This document aspires to provide a rationale for this goal, and for these actions.

All the proposals suggested here would, of course, require substantial further investigation before adoption. They are not a take-it-or-leave-it blueprint; nor is the analysis here an attempt to provide the kind of careful cost-benefit calculation and detailed investment scrutiny that will be required before any of these proposals can put into practice. But they do illustrate a choice of means by which Tasmania's capability to raise productivity through innovation might be enhanced. They are offered in the hope of providing a basis for discussion of the way forward.

Appendices

Appendix A: Assessing Tasmania's Agricultural Potential

The focus of recent and proposed irrigation schemes has been on increasing surety of supply and making *existing* (often low value) dryland agriculture and dairying more productive by adding more reliable water—rather than transforming land use by introducing higher value agriculture on newly irrigated land.

Empirical evidence from the Coal River Valley and cherry and wine industries confirms that new irrigation can be used to transform land from low to high value forms of agriculture, where soil types and other inputs are appropriate.

This appendix outlines three scenarios of the possible increase in value-added if high value agriculture replaced low value (predominantly dryland) agriculture by introducing or augmenting irrigation. They are not single answers or solutions and they are not mutually exclusive.

The scenarios examine feasible (but uncertain) futures to help the industry and policy makers understand what is possible and where innovations to translate potential into results might be focussed.

Critically, the final decisions will be shaped by the Tasmanian government's attitude to shifting the current focus from making *existing* predominantly *low-value* agriculture more secure and productive to introducing high value agriculture, particularly where irrigation water can be made available.

The scenarios are at a Tasmanian level, not the region or farm level. They use broad based groupings of agricultural products, not detailed individual products. The scenarios are feasible *but uncertain*. The information and specific proposals need to be quantified in more detail and tested.

Land use scenarios

Tasmania lacks sufficient information on the amount of land suitable for high value agriculture if water is made available. In the absence of this information, we define three possible scenarios that provide insight into what might be physically possible.

The scenarios are not intended as 'proof' of potential (the actual figures are unknown at this time) or evidence that the possible futures will be realised. Nor should the selection of examples be taken to imply that these regions offer the most potential or that they should be selected as priorities. They aim to convey a sense of what is possible if the assumptions were confirmed upon further investigation and if subsequent action is taken to change agricultural land use.

The scope to transform low value agriculture to high value agriculture through irrigation outlined in a number of studies of discrete agricultural areas within Tasmania has been used as a reference in generating the scenarios for the State as a whole.

Discrete area studies of high value agriculture in Tasmania

A Poatina Tailrace irrigation feasibility study estimated that 82,000 Ha of predominantly dryland grazing land (Class 4 and 5 land) could be irrigated in the Northern Midlands if the proposed irrigation scheme was introduced. The study identified that high-value agriculture could replace low-value dryland grazing and extensive cropping on some of the irrigable land.

"Class 4 land has proved capable of supporting many irrigated cropping enterprises including but not limited to potatoes, poppies, peas and cereals when carefully managed. There is also increased interest in establishing irrigated dairying enterprises in this region on land with a Class 4 (and possibly some Class 5) land capability classification."
Preliminary Investigation Feasibility Study
Poatina Tailrace – Brumby's Creek Re-regulation Pond Irrigation Scheme

Climate, drainage, slope, aspect and other limiting factors would restrict the capacity of some part of this total area to sustain higher value intensive cropping, horticulture and irrigated dairying on this Class 4 and 5 land. While the number of hectares that could be transformed to high value agriculture was not stated, the available evidence suggests it is material.

A 2002 DPIWE study "Water Resource Options Development in South East Tasmania" estimated that an additional 44,700 Ha of Class 4 and 5 land currently limited to low value dryland agriculture could be used for a mix of high value agriculture including intensive horticulture, general cropping and improved pasture for dairying if water were available.

More importantly, 14,300 ha of the total irrigable area were found to be capable of supporting higher-margin horticulture such as apricots and cherries if irrigation was available (of which 6,900 ha were also suitable for wine grapes).

A study of dairy potential in North East Tasmania conducted for the Dorset Economic Development Group identified a total of 40,000 hectares of irrigable land is suitable for large-scale dairy development in the North East coastal area. The land is predominantly used for dryland grazing at present. The study found that around 50% of the irrigable area (20,000 hectares) is likely to be actually irrigated, due to limitations associated with topography, property shape, roads, power lines, centre-pivot irrigation configuration etc.

Taken together, the studies indicate that it is possible to irrigate a total of 166,000 ha of land across the three areas. A proportion of that irrigable land area is suitable for high value forms of agriculture if reliable water is made available.

The determination of what is ultimately irrigated depends in significant part on the type of products grown on prospective irrigated land. Water schemes are likely to be more viable on land suitable for high margin agriculture.

The studies outlined above illustrate that there is significant scope to increase high value agriculture by changing land use. We therefore construct scenarios of possible changed agricultural land use for Tasmania as a whole, acknowledging that the scenarios are not 'proof' - but rather that deeper investigation is warranted, including more detailed studies of agricultural potential at the Tasmanian and regional level.

Tasmanian agricultural land use scenarios

Four scenarios of agricultural land use in Tasmania have been defined

Current irrigation and land use
Current irrigation with optimal land use
Feasible irrigation with optimal land use – low adoption
Feasible irrigation with optimal land use – high adoption

Gross margins per hectare are applied to each of the four scenarios to derive a value if each of the scenarios were realized.

Scenario 1 - Current irrigation and land use scenario

The 'Current irrigation and land use' scenario is based on existing agricultural land use. The estimates of hectares applied to each agricultural activity have been sourced from the publications in the table below.

Activity	Measure	Source and comments
Area of farms 2007-08 (not all the area is grazed/cropped)	1 541 487 ha	ABS 4618.0 (rel May 2009) Note - down from (previous) 2003-04 estimate of 1,745,000 ha
Pasture/grazing 2007-08	775 119 ha	ABS 4618.0 (rel May 2009) Note - down from (last) 2003-04 estimate of 1 241 000 ha
Dairy farms 2009	72,000 ha	Dairy Tas regional profile 2009 450 farms * 160ha avg farm size
Sheep and beef farming 2007-08	~700,000 ha	50% allocated to each of beef and sheep
Medium value horticulture	32,000 ha	ABS 4618.0 (rel May 2009)
Wine (bearing area) 2006-07	1,196 ha	ABS 7121.0DO03
High value horticulture 2007-08	388 ha	ABS 7121.0DO02 388,000 apricot and cherry trees - at an average density of around 1000 trees per hectare

Scenarios 2, 3 and 4

Scenarios 2, 3 and 4 are not forecasts or projections of what will happen. They are illustrations of what could be possible if water was available on land suitable for high value agricultural uses. Markets, cost of water and a range of complementary innovations including growing, packaging, distribution and financing the introduction of new agricultural products are also factors in realising the possible future.

The scenarios outline three progressively higher levels of magnitude in the possible transformation of land from low to high value agriculture if irrigation water was available.

Scenario 2 - Current irrigation with optimal land use

The current irrigation with optimal land use scenario assumes 11,000 ha of low value irrigated agriculture such as barley, oats and wheat is replaced with higher value agriculture on existing irrigated land.

Scenario 3 - Feasible irrigation with optimal irrigation (low adoption)

The low adoption scenario implies that 136,000 ha or 9.2 per cent of Class 4 and 5 land (1,478,000ha) is transformed into higher value agricultural uses. The scenario assumes that most of the new high value agriculture replaces some of the 700,000 ha of beef/sheep grazing that takes place on predominantly Class 4 and 5 soils.

Scenario 4 - Feasible irrigation with optimal land use (high adoption)

The high adoption case implies that 231,000ha or 15.7 per cent of Class 4 and 5 land is transformed into higher value uses. The scenario assumes that most of the new high value agriculture replaces some of the 700,000 ha of beef/sheep grazing that takes place on predominantly Class 4 and 5 soils.

Gross Margin $/Ha

The estimates of gross margin per hectare for each agricultural product category reflect feedback from agricultural economists and consultants and are common to each scenario.

Gross margins are intended to reflect gross return less inputs and other variable costs of production per hectare for a representative producer in a normal year – and exclude interest, tax, depreciation, farm overheads, and administration.

Actual gross margins for a specific producer in a particular year will likely vary significantly due to changes in prices and variable costs and from differences in agronomic and business management skill available within farming enterprises.

Agricultural land use and irrigation scenarios - Tasmania	Sheep	Beef	Dairy	Medium value^ Horticulture	Wine	High Value^ Horticulture
Gross margin $/per Ha	150	225	2,000	5,000	24,000	60,000

^ High value - eg cherries and apricots; Medium value - eg poppies
# For example a 2002 South East Tasmania Water Options study found that 14,300 ha of Class 4 and 5 land in the Kempton to Orielton area was suitable for cherries and apricots if water was available.

Scenario summary tables

The total gross margin associated with each of the four scenarios is summarised in the following table.

Agricultural land use and irrigation scenarios - Tasmania		Sheep	Beef	Dairy	Medium value Hort^	Wine	High Value Hort^	Total
Gross margin per Ha	$/ha	150	225	2,000	5,000	24,000	60,000	
Current irrigation and land use	ha	350,000	350,000	72,000	30,000	1,200	400	803,600
Gross margin	**$**	**52,500,000**	**78,750,000**	**144,000,000**	**150,000,000**	**28,800,000**	**24,000,000**	**478,050,000**
Current irrigation with optimal land use	ha	345,000	345,000	72,000	35,000	5,000	2,000	804,000
Gross margin	**$**	**51,750,000**	**77,625,000**	**144,000,000**	**175,000,000**	**120,000,000**	**120,000,000**	**688,375,000**
Feasible irrigation with optimal land use - Low adoption	ha	280,000	280,000	150,000	40,000	20,000	30,000	800,000
Gross margin	**$**	**42,000,000**	**63,000,000**	**300,000,000**	**200,000,000**	**480,000,000**	**1,800,000,000**	**2,885,000,000**
Feasible irrigation with optimal land use - High adoption	ha	240,000	240,000	200,000	50,000	35,000	50,000	815,000
Gross margin	**$**	**36,000,000**	**54,000,000**	**400,000,000**	**250,000,000**	**840,000,000**	**3,000,000,000**	**4,580,000,000**

^ High value - eg cherries and apricots; Medium value - eg poppies, vegetables

Fisheries and Aquaculture scenario

The gross value of Salmonids is predicated on industry intentions to double the 2007 value of the industry by 2015. The scenario for other aquaculture assumes that one or more of oyster, abalone, striped trumpeter, rock lobster, and other emerging forms of aquaculture grows significantly in the future.

Fisheries and Aquaculture scenario		Other Aqua *	Wild fish	Salmonids	Total
Gross Value Production (GVP) 2006-07	$	23,414,000	180,193,000	271,823,000	**475,430,000**
GVP 2015+	$	150,000,000	180,000,000	530,000,000	**860,000,000**
Gross margin (at 50% of GVP) 2006-07	$				**237,715,000**
Gross margin (at 50% of GVP) 2015+	$				**430,000,000**

* including new species

Implications for policy

Irrigation makes it possible to replace low value agriculture with high value agriculture on many areas of Class 4 and 5 land.

An innovation policy for the food and agriculture industry needs to focus on what the land *becomes suitable* for if water is available—and not simply making existing low value agriculture more secure and productive.

A note on Tasmanian land capability data

A land capability classification study undertaken by the State Government in 1999 classifies 2.5 million hectares of private land according to its capability to sustain broadscale grazing or cropping.

Of the 1.6 million hectares suitable for some form of agriculture (ie Land Classes 1-5) almost 600,000 Ha or 38 per cent is classified as Class 4 land with low suitability for cropping and high pastoral suitability. Class 5 land accounts for 878,000 Ha or 55 per cent of the area capable of some form of agriculture. Class 5 land has been determined as unsuitable for cropping and has slight to moderate limitations for pastoral use.

A limitation of the land classification data is that areas of well-drained and well-structured soils in low rainfall areas without irrigation were classified Class 4 land (low suitability for cropping). Second, significant areas of class 4 land (and some areas of class 5 land) that are unsuitable for cropping (eg steeper slopes and stony soils), are ideal for many high value perennial horticultural activities such as vineyards and stone fruits, particularly if reliable water is available.

Land Capability Classes on Private Land in Tasmania

Land Class	Ha	%	**Classification description** (limited to broadscale grazing or cropping)
1	3,055	0.1	capable of intensive crops 8-9 years out of 10 in rotation with pasture or equivalent in normal years
2	20,537	0.8	capable of intensive crops 5-8 years out of 10 in rotation with pasture or equivalent in normal years
3	84,139	3.4	capable of intensive crops 3-5 years out of 10 in rotation with pasture or equivalent in normal years
4	599,647	24.0	capable of limited range of crops and only 1-2 years out of 10 in rotation with pasture or equivalent in normal years
5	878,506	35.2	unsuitable for cropping and slight to moderate limitations for pastoral use - limitations can be partially reduced through land management
6	835,980	33.5	marginally suitable for grazing - land should be retained for natural vegetation
7	71,834	2.9	land with very severe or extreme limitations which make it unsuitable for agriculture
Total	**2,493,699**		
Classes 1-5	**1,585,884**	**63.6**	

DPIPWE Land Capability Classification System

Tasmania needs to develop a land classification that indicates the range of agriculture that is possible if *feasible* irrigation were introduced to areas where rainfall and evaporation rates are the key limiting factors at present. The question of whether irrigation is economic is for farmers, potential investors and government to consider.

Appendix B: The Sawn-Timber Industry: Innovation Planning and the Aggregate Project Portfolio

An Example[34]

Over the medium to long term (5-20 years), the Tasmanian hardwood sawn-timber industry will face several interconnected—and escalating—challenges and opportunities. This appendix outlines these challenges, and then considers the feasibility of potential options based on innovation to respond to them.

Challenges

The main challenges are:

1. The available hardwood-sawlog resource will decline in quality but increase in volume.

As a result of pre-existing and inherited forest-management practices, the average quality of the hardwood-sawlog resource available to the Tasmanian sawn-timber industry will decline over the coming two decades, at first gradually and then steeply. This decline will likely occur on both public and private land, although for somewhat different reasons. Concurrently the volume of low-grade logs will increase significantly.

Traditionally, first-grade sawlog (defined as small-end diameter of 30 cm and length 3.6 metres) has been sourced from Category 1 slow-growing hardwood species from mature native forest (predominantly over 110 years old at harvest) and Category 3 regrowth native forest with a harvest range of 80-90 years, or 60-65 years under intensive forest management (eg thinning).

A series of land-use decisions by governments over the past two decades affecting public forested land has significantly reduced the area of native forest available for the production of a mandated minimum 300,000m3 of first grade hardwood sawlog.

The average quality of first-grade hardwood sawlogs from public land has declined as the proportion of Category 8 sawlogs harvested increased significantly in order to maintain the volume of first grade sawlogs.

In the period from around 2012 to 2020, the average quality of first-grade hardwood sawlog on public land will deteriorate sharply, as up to half (150,000m3) of all first grade sawlog is replaced with Class A pruned logs of

[34] This section is drawn from the AIRC report, *The Tasmanian Sawn-hardwood Timber Industry: Capacity for Innovation in the Face of Dynamic Industry and Market Change*, prepared for the Centre for Sustainable Architecture with Wood at the University of Tasmania.

fast-growing species (*E. nitens* and *E. globulus*) grown in hardwood plantations on a 25 year rotation. These plantation sawlogs have physical properties that produce significantly less timber, of lower quality and of less value.

Furthermore, in the 10 years to 2030 virtually all the remaining Category 1 and Category 3 hardwood sawlog from mature and older regrowth forest (150,000m3) will be replaced with Category 8 sawlog from young native forest (particularly young regrowth).

Different drivers will likely also shrink supply of Category 1 and 3 sawlogs from private land. In 2005/06, sawlog sourced from native forest on private land was around 70,000m3 down from 97,000m3 the previous year.

The volume of native-forest hardwood sawlog from private land may also decline significantly depending on the level of future restrictions on private land use, the demand for hardwood pulpwood (which drives sawlog harvesting on private land), and the extent to which plantation hardwood replaces pulpwood from private native forests.

Concurrent with these declines in Category 1 and 3 logs, from 2012, about 300,000 m3 annually of Class B unpruned plantation sawlogs will be available from public plantations for processing. Additional significant volumes may be available from private plantations. While generally not suitable for processing into high quality products, these logs provide a suitable resource for structural commodity products.

Moreover, the distribution of sawlog supply may also change around the State. This can have significant implications for the sawmilling industry in Tasmania. Traditionally sawmills have been located near sources of timber. With the reduction of log supply from native forests and transition to plantation-sourced logs, the balance of log supply between regions may change and some existing sawmills may lose access to a local resource.

This trend is already occurring in the State, with some softwood processors having to ship logs long distances to remain in operation.

In summary, estimates of sawlog sustainable yield over the period 2012 to 2091 indicate that the sawn timber industry is currently locked-in to a regime of an increasing quantity of Category 8 native forests sawlogs and Class A pruned and Class B unpruned plantation hardwood sawlogs in order to offset the dramatic reduction in the volume of Category 1 and 3 sawlog available from mature and older regrowth native forest.

2. Markets for high-quality products have improved in recent years and are likely to continue doing so.

Demand for appearance/decorative hardwood timber products (flooring, furniture, doors, benchtops) and high quality engineered timber (eg laminated beams,) has increased in recent years and broad agreement exists that these markets are likely to continue to grow.

International markets, including in particular the European Union, increasingly value the environmental benefits of wood products and the aesthetic appeal of appearance/decorative and exposed structural timber. The entry into world markets of China as a major buyer and consumer timber will similarly place upward pressure on prices.

3. The Tasmanian industry's product mix will likely shift to lower-quality and lower-value products.

Category 8 regrowth and Class A pruned hardwood plantation sawlogs recover less overall timber (more processing waste and structural degrade), produce a much lower proportion of high-value timber (appearance/decorative products), and are more costly and difficult to process than Category 1 and 3 sawlog from mature/older regrowth native forest.

The inferior properties of timber produced from Category 8 and Class A pruned sawlog include more variation in colour and more feature, and a higher proportion of physical or production induced degradation (discolouration, knots, surface checks, internal checks, spring, bow, etc.).

The current volume of Category 1 and 3 hardwood sawlog is now almost exclusively dedicated to higher-value appearance/decorative uses (joinery, flooring, doors, mouldings etc) as processors severely reduced or ceased the production of lower-value light structural building products (eg house framing, trusses etc).

The industry's first response has been to adapt to the decline in log quality to date. Some in the industry have improved overall and high-value sawn-timber recovery rates from Category 8 native forest sawlogs (with their inferior structural and appearance attributes) by:

- Consolidating to increase scale and in some cases vertically integrating across one or more of growing, processing, distribution/marketing, and retailing.

- Specialising in smaller diameter younger and lower-quality first-grade sawlogs rather than trying to process both Category 1 and 3 from mature native forests as well as Category 8.

- Introducing new cutting/drying/re-sawing and finishing technology and techniques to reduce the loss in overall timber and higher value appearance/decorative product, by minimising physical degradation (internal voids, surface cracks, end split, bow, spring, knots) and using colour and feature matching to increase recovery of high-value appearance grade timber.

Industry has also begun to adapt to process a large supply of Class B unpruned hardwood plantation logs by developing milling capacity and commissioning applicable research.

4. Competition to the Tasmanian industry from both mainland Australian and overseas producers will likely increase.

Tasmanian hardwood-sawn-timber producers face competition from five principle sources: mainland hardwood producers, international hardwood producers, softwood producers, substitute engineered-wood products, and alternative material, such as metal and masonry products. All have gained strength in recent years.

The total consumption of sawn timber in Australia has since the 1970s fluctuated in line with economic cycles between 4 to 5 million m^3 pa. The proportion within this amount of sawn softwoods has increased steadily, however, with an average increase of 3.0% pa in softwood sales over this period. By contrast, apparent consumption of sawn-hardwood timber has declined by an average of 2.7% per annum. In 2003/04, sawn softwood timber accounted for just over three-quarters of total apparent consumption of sawn timber in Australia. These trends reflect the increasing availability of sawn softwood timber due to its low production cost, and its replacement of hardwood in structural timber markets. Softwood timber has a strong presence and competitive position in non-appearance solid board markets (framing, trusses, engineered beams) and general/industrial uses (pallets, fencing, boxes).

Engineered wood products have enjoyed even stronger growth, due to their desirable environmental and performance characteristics, as well as competitive price. These products are especially suitable for the high performance structural markets.

5. In the absence of substantial change, the Tasmanian industry's overall profitability will likely decline further.

In recent years the inferior physical and appearance attributes of timber produced from an increasing proportion of Category 8 native forest logs and higher grade plantation logs has reduced overall average returns to sawn-timber processors as a result of:

- A reduction in total usable timber recovered compared with recovery for Category 1 and 3 of native forest sawlog.

- A reduction in the proportion of high-value timber recovered compared with recovery for Category 1 and 3 native forest sawlog.

- The increased cost and difficulty of processing hardwood sawn timber from a much higher proportion of Category 8 native forest sawlog.

The progressive introduction of Class A pruned plantation sawlogs from 2012 (that will make up half the first-grade sawlog after 2020) will significantly increase the volume of timber with inferior physical and appearance timber attributes. This will increase processing costs and dramatically lower the value of timber product and overall returns to processors, by an amount greater than the impact of the decline in quality of first-grade sawlog to date.

Processors that cannot adjust to the much larger proportion of Class A pruned plantation sawlog will find it increasingly difficult to remain commercially viable.

Processors that seek to convert the increasing volume of Class B unpruned sawlogs will largely be constrained to lower value commodity structural products and will have to compete directly with competitive sawn and engineered softwood products or identify other niche market opportunities for these commodity grade products at considerably reduced margins.

6. Significant change in the Tasmanian industry is impeded by current government policy, including the structure of tax incentives and administered pricing and volume allocation.

The higher risk and greater uncertainty of investing in dedicated longer-rotation hardwood-plantation sawlog species and the tax and other incentives favouring short-rotation hardwood plantations grown for wood-fibre (up to around 15 years) has impeded large-scale private investment in high-quality first-grade hardwood plantation sawlog.

Ninety per cent of hardwood sawlogs supply in Tasmania has been largely controlled by one administrative body. Administered pricing and allocation has inhibited the industry from re-structuring to meet the challenges of a significant decline in the availability of Category 1 and 3 hardwood sawlogs. It has inhibited the price signal, incentives, and rewards that would encourage processors to:

- Invest in larger-scale and/or new/different technology and practices to process a much higher proportion of Category 8 sawlog comprising smaller diameter and younger native forest sawlog (and increasingly Class A pruned plantation sawlog) from 2012.

- Develop and expand markets for end-timber products that are capable of absorbing higher prices of declining volume of the (much scarcer) Category 1 and 3 of hardwood sawlog.

Potential Innovation Options

The challenges listed above are serious. Over the coming decade, the Tasmanian hardwood sawn-timber industry will face a stark choice: innovate, upgrade and diversify, or substantially shrink. Presented below are potential scenarios through which the industry might choose to respond to these challenges. These options are not intended as stand-alone answers or solutions, and they are not mutually exclusive. The purpose here is to examine possible futures and alternatives to help the industry and policy makers determine how innovation might contribute to a way forward for the industry.

Critically, it is apparent that the industry is not likely to innovate substantially or sufficiently to meet these challenges without external assistance. It lacks the financial resources and critical capabilities to respond effectively alone. What type of hardwood sawn-timber industry Tasmania has in 20 years, and even possibly whether there is one, will be shaped by the Government's willingness to commit substantial resources to retain a hardwood sawn-timber industry and the ideas and options from across the scenarios outlined below.

Option 1: Improve technological utilisation of Category 8 and emerging Class A pruned and Class B unpruned plantation sawlog.

This scenario assumes that the quality of first-grade hardwood sawlogs will significantly decline and seeks to grow the industry by boosting existing products and developing new products and markets for first-grade sawlogs comprising young regrowth and Class A pruned and B unpruned plantation sawlog. For the appearance product market, this might be achieved by:

- Expanding recovery of short section appearance timber and reprocessing it into high-value products such as end-jointed flooring, engineered panel flooring, laminated benchtops, etc.
- Improving colour matching and grading technologies to maximise recovery of appearance/decorative products.

This scenario for the structural market could be realized by:

- Re-entering non-appearance solid-hardwood board markets – trusses, framing etc.
- Expanding the use of engineered beams,

- Expanding rotary-peeled veneers and developing other panel products such as Plywood, Laminated Veneer Lumber, Engineered Strand Lumber, etc.

Option 2: Improve the industry's technological capacity to overcome or avoid downgrade and increase recovery of the sawn timber.

This scenario assumes that technical advance can overcome the problems apparent with processing Category 8 and Class A pruned sawlogs. This would focus on:

- Coping with internal check in the E.nitens resource and board distortion in the E.globulus resource; and
- Backsawing plantation and native forest regrowth species without unacceptable degrade.

Option 3: Develop new markets and marketing programs to induce greater end user acceptance of changing hardwood product characteristics.

This scenario focuses on positioning hardwood timber in the consumer market as a preferred material for appearance/decorative and structural/engineered uses. It also aims to align more closely market expectations of appearance/decorative attributes with the changing quality of timber product available, by making feature and variation in colour a positive choice rather than being perceived as inferior.

General market advantages of sawn-hardwood over non-wood alternatives include:

- More C02 friendly than concrete, steel, aluminium.
- Potentially lower price relative to anticipated rapidly increasing prices of concrete, steel, aluminium.
- Feel, look, warmth personality vs 'cold/sterile/featureless/bland' steel and concrete for many decorative and structural appearance uses (exposed beams) etc.
- More versatile: use and in functions it performs.
- Renewable: certified/accredited sustainable by reputable bodies.
- Potentially traceable to source: where, how grown/harvested.

Under this scenario, markets would need to be educated about the value derived from the difference and uniqueness of a natural product that is inherently variable in colour and feature and generates utility from

enjoyment of the feel, look, warmth, charm, and character of wood products in:

- Decorative uses (furniture, mouldings, window frames).

- Structural appearance applications such as exposed beams (in commercial or domestic buildings or exposed panels (eg possible substitute for cork floor look).

The core message would be that what makes wood appealing and 'not just another perfect but sterile finish' is the variation and character translated through timber's physical properties and attributes. The Tasmanian industry would need to find and/or develop markets that value the natural variation of timber.

Option 4: Increase investment to grow more-suitable timber.

This scenario targets the long-term goal of at least restoring (or potentially exceeding) the current level of Category 1, 3 and Class A plantation hardwood sawlogs available to the hardwood sawn-timber industry.

On a no-policy-change basis, over the next 90 years the industry will be locked-in to a first-grade hardwood-sawlog resource, dominated by Category 8 regrowth and Class B plantation sawlog that produces timber with inferior properties to that provided by Category 1 and 3 sawlog—more variation in colour, more feature, (disease, knots, surface cracks etc), and a higher proportion of physical/structural degradation (internal voids, spring, disease, bow, knots) in the end timber product.

Options to improve the quality of first-grade hardwood sawlogs include:

- Improving the physical properties of plantation hardwood species (current 25 year rotation) to recover more high-value timber product through intensive (and expensive) silvicultural management.
- Tree breeding and species/genus selection to deliver higher quality plantation material for appearance products.

The innovation and policy challenge in this option focuses on how to improve the technical feasibility and commercial potential of growing Class A pruned hardwood sawlog by addressing factors that include:

- Species selection.
- Breeding and propagation.
- Site selection.
- Plantation management regimes (pruning, thinning, nutrients etc).

- Barriers to investment in dedicated long-rotation Class A pruned sawlog.

Option 5: Exit or gradually wind down the high-value appearance hardwood industry.

Under this scenario, the industry would simply accommodate a significant decline in the quality of first-grade hardwood-sawlog resource. The overall volume of first-grade hardwood sawlog on public land would be maintained at around 300,000m3, but returns to processors would decline significantly due to the falling aggregate value of timber product (from lower overall recovery and less high-value hardwood timber product) and increased processing costs.

The first-grade sawlog sawn-timber industry would consolidate and specialise around:

- A few appearance-grade processors that produce some non-appearance grades as a by-product.

- A few high-volume non-appearance grade mills that also recover a relatively low proportion of high value appearance/decorative products.

Firms unable to obtain sufficient volume of the declining Category 1 and 3 sawlog resource and/or adjust to the smaller-diameter Category 8 and Class A pruned and Class B unpruned plantation sawlog would be assisted to leave the industry.

Option Feasibility Requirements

Each of these approaches would require a different set of investments and policies to be made feasible.

For each option to be feasible an independent assessment or review of publicly and privately held databases of native forest and plantation condition and projected yield by regions is required. Log estimates by source, region, species and likely diameter class are critical to industry planning and investment in subsequent options.

Summarised below are four key dimensions of feasibility for each option—the required policy structure; the finance quantity and type demanded; technology needs; and training requirements.

Option 1: Improve technological utilisation of Category 8 and emerging Class A pruned and Class B unpruned plantation sawlog.

The starting point of this option would be to re-allocate hardwood sawlog to processors willing and able to invest in processing Class A pruned sawlog, and then to develop or expand markets for those products.

Options to achieve this include:

- Introducing one-off or phased-in time-limited administered allocation and pricing of sawlog, commencing from expiration of the current contracts in 2012, to compensate for adverse legacy aspects of buying existing mills, expanding own mill, or starting new mills.

- Introducing market-based sawlog pricing from 2012 and assistance to compensate for the adverse legacy aspects of buying existing mills, expanding own mill, or starting new mills.

The Government might consider provision of exit assistance to those that sell-up or 'lose' sawlog allocations of an amount less than the difference between the amount they receive from selling (or on losing their allocation) and the amount they might have received from continuing to operate and trade for longer.

Further, given the constrained cash-flow and profitability position of current industry participants, combined with the context of uncertainty in which the industry operates, making this option feasible may require Government to provide specific assistance that contributes to upgrading or introducing new technology and practices that increase volume throughput, overall recovery of timber, and recovery of high-value timber in particular.

This option would also include significantly greater dissemination of existing knowledge and increased investment in gaps in knowledge about processing (cutting/drying/re-sawing/finishing) smaller and younger re-growth and plantation sawlogs to increase throughput, reduce physical defects in the timber (internal checks, spring, bow), and how to reduce appearance/decorative defects such as external splits and checks. Given that individual industry participants would be unlikely to capture and appropriate sufficient individual returns from such investment, this commitment might need to be made by the industry as a whole or by a Government agency on the industry's behalf.

Option 2: Improve the industry's technological capacity to overcome or avoid downgrade and increase recovery of the sawn timber.

Improving the technological capacity of the sawn hardwood timber industry would largely depend on the level of funding for research and development programs targeting timber processing technologies and the ability and willingness of the industry participants to adapt these technological advancements.

Given the current level of cash flow and profitability of processors, Government assistance would be required to establish a comprehensive research program focussing on development of new cutting/drying/re-sawing and finishing technologies required to minimise physical degradation. Further assistance would have to be given to industry participants to enable them to adopt new processing technologies.

Option 3: Develop new marketing programs to induce greater end-user acceptance of changing hardwood product characteristics.

This option would be initiated with a research program investigating market perceptions of the importance of uniformity in colour and low incidence of natural features in appearance/decorative uses of hardwood timber by opinion leaders and other stakeholders, for example designers, architects, builders, purchasing officers and customers.

It would then be necessary to develop and implement a substantial and sustained marketing program for the industry as a whole, to influence the market to value natural variation and features in appearance in appearance/decorative applications.

Central to this option would be introduction or expansion of incentives to increase the effort by individual firms to educate the market for non-timber product about lesser-known or under-estimated benefits of hardwood timber for appearance/decorative or structural/engineered uses—such as the look, feel, warmth, and individuality of natural variation in finishes that include variation in colour and features (disease, knots, discolouring).

Option 4: Increase investment to grow more-suitable timber.

The older-age characteristics inherent in the Category 1 and 3 hardwood sawlog and institutional barriers are impediments to investment in Class A plantation sawlog.

Growing Class A pruned plantation sawlog is a less attractive investment due to the greater uncertainty and risk resulting from a long interval to

first cash flows (well over 25+ years for longer rotation Class A pruned sawlogs).

The uncertainty and risks include:

- Growth rates of preferred native-forest hardwood-sawlog species in plantations were found to be much slower relative to 25-35 years for fast-growing species.

- Future sawlog and product prices, plantation-management costs, market preferences for timber products, etc.

- Physical risk (fire, drought, pest, other damage/potential loss).

- Sovereign risk (access to resource, tax, or other policy changes affecting return).

- The long-term relatively ill-liquid nature of this asset class reduces investors' flexibility to respond to their own needs and changes in circumstances.

The development of secondary markets for long-rotation Class A hardwood sawlog will help overcome the disincentive to invest in a relatively illiquid asset with significant hard-to-quantify risks and a relatively long interval to first cash flow.

The specific exclusion of tax deductibility at the time of expenditure where the plantation is sold early in the rotation works increasingly against the formation of secondary markets, and more so the longer the hardwood rotation.

Removing the tax penalty applying to long-rotation plantations would enable investors better to manage their risk, value the asset as it matures, and deal with investors' own changing circumstances, by permitting a sale of their interest prior to maturity.

The long history of administered pricing and allocation of hardwood sawlogs in Tasmania is another institutional barrier that has impeded plantation investments. It does this by limiting information on market-based sawlog prices that would otherwise contribute to valuing plantation investments.

This may improve over time if administered pricing is removed, but it remains an area of higher uncertainty and risk in the interim.

The Tasmanian government has trialled plantations of the preferred species of native forest for sawn timber. This option would require

substantially increased dissemination of existing knowledge on growing Class A sawlog, and more investment in gaps in research into selecting species, breeding, and growing high-quality hardwood in a plantation regime.

Option 5: Exit or gradually wind down the high-value appearance hardwood.

If this path is not to occur by default, in an unplanned and socially destructive fashion, difficult decisions would need to be taken early, by the combined industry in collaboration with Government, and a clear plan developed to mitigate the impact and maximise the long-term position of remaining industry participants.

This option would combine increased exposure of industry participants to market forces with coordinated measures to reduce consequences for industry exiters. Such consolidation or partial-exit strategies are not unknown in the global industry, but they rarely work as well as they might. Both industry and Government frequently equivocate and seek to avoid recognition of unpleasant realities. The result is commonly half-measures and poor policy.

To make this option viable would require:

- A clear message quantifying the overall hardwood volume to be available and a breakdown showing the significant reduction in the volume of Category 1 and 3 hardwood sawlog and increased volume of Category 8 and Class A pruned and Class B unpruned sawlog over the next 5, 10 and 20 years (ie to 2030).

- A detailed resource audit to inform processors about future changes in the resource distribution around the State.

- Notice of an end to administered pricing and allocation of all sawlogs at least 2 years in advance (earliest opportunity in 2012), so that processors have time to assess their position, seek advice, and look within the industry or to government as last resort to exit or restructure.

- Financial and other assistance to encourage exit of the weakest firms before 2012 and to enable potential entrants or remaining participants to assess and prepare for removal of administered pricing or compensate for the worst legacy aspects of firms that are acquired.

An Aggregate Innovation Project Plan

The options outlined above are not mutually exclusive. Ideally, Tasmania would proceed on several fronts simultaneously. The set of options outlined here necessitates, however, acceptance of different levels of risk, relies upon different time frames, and requires different types of finance. In some options, individual firms could themselves potentially capture and appropriate sufficient returns to justify undertaking the necessary investment; in others the times scale and appropriability regimes demand that industries act together, or that Government act on industry's behalf (individual firms investing in market development, for example, would find it difficult to prevent other firms 'free-riding' on their marketing programs, for example, and hence face difficulty capturing sufficient return to support the substantial and sustained commitment of funds required).

In this context, a valuable planning tool is the Aggregate Project Plan, in which a balanced mix of options is developed, combining different types and durations of risk, along with different instigators. Such an Aggregate Project Plan would also create a framework within which industry could discuss, formulate, and implement its own priorities, and coordinate its action with Government.

In essence, an Aggregate Project Plan simply establishes an agreed set of project categories, arrayed along axes of, for example, risk levels and time durations, then determines a proportion of overall resources to be committed to each category. Individual projects are then developed to 'populate' the Aggregate Plan to make up the balance. Formulation of such plans thus requires four steps:

1. **Determination of key dimensions to be employed.** This might be risk level and duration, as outlined above, or technological and market novelty, or any other agreed dimensions.

2. **Development of a matrix with categories allocated to various combinations of the key dimensions.** This creates a typology of potential projects.

3. **Strategic agreement to commit prioritised proportions of available resources to the various categories.** This discussion enables participants to come to conclusions about the overall level and balance of resource commitment and risk levels to be accepted.

4. **Development of individual projects to leverage available resources, within prioritised categories.** Different types of risk levels and technology or project types will likely require different processes of project initiation and discovery.

Taken together, such a prioritised Aggregate Innovation Project Plan would both formulate and guide implementation of the industry's innovation-based response to the formidable challenges outlined above.

Appendix C: Lessons from the Coal River Experience: How Irrigation Can Contribute to Innovation[35]

Condemned as "hopelessly uneconomic" prior to its construction by the then Federal Minister for Resources and Energy, the Coal River Valley irrigation project has since its construction in 1986 proven a highly successful source of wealth for Tasmania's economy. Today, as the State considers a new wave of commitment to the agri-food sector with the aim of expanding its position as a high-end food producer, the Coal River experience stands as a model of what might be achieved elsewhere in the State.

This study investigates how, why, and where the Coal River irrigation project achieved its success to lay the basis for learning how to repeat and build on this performance. The purpose of this first section of the report is to draw together the lessons of the study and provide insight into how future irrigation and innovation-capability projects should be approached and organised, and to consider what further activities—beyond good water engineering—are needed to ensure such projects realise their full potential. Several important conclusions emerge:

1. **The greatest proportion of the value created by the addition of irrigation to the Coal River Valley came *not* from support to existing industries and land uses, but from new—and often completely unanticipated—businesses.**

   In the period between completion of the Craigbourne Dam (1986), with its associated irrigation piping, and the 'Blundstone Report' (1992), economic output from the Valley had increased by an annual $1.6 million (69%). This amount was probably not sufficient to justify construction of the project. On that basis, a description of 'hopelessly uneconomic' might appear valid.

   Following 1992, however, by 2008, the value of economic output from the Valley increased by $31.7 million, or 9 times (real terms). At that level, the project more than amply returned its cost, and indeed could fairly be described as an economic bonanza. The clear difference between the two periods is that in the first farmers were primarily adding water to existing land uses; in the second they were utilising water as a springboard for land-use transition.

   In short, the project created value mostly not by 'drought-proofing', but by spurring innovation. Critically, it is apparent that the provision of water *alone* was not sufficient to spur this wave of innovation. Water was certainly an essential pre-condition, but for innovation to occur several other factors (identified below and analysed in detail in the body of the report) needed to be present.

[35] Excerpted from *Building Regional Innovation Capability: The Impact of Irrigation in the Coal River Valley*, prepared for the Department of Economic Development and Tourism by Aleksandra Lejda, Susan Nelle, and Jonathan West at the Australian Innovation Research Centre, University of Tasmania.

2. **The conventional form of economic analysis employed to assess the project's feasibility prior to its construction—cost-benefit analysis—entirely failed, through repeated iterations, to judge accurately the project's value.**

   A striking feature of the history of the Coal River region is just how many reports and analyses were conducted prior to commitment to the project, over many years, and how wildly wrong—in the universal direction of underestimation of the benefits—were their conclusions. The project was studied and reported upon serially for more than 40 years prior to an ultimately political decision to proceed. Most reports, including key assessments for Commonwealth agencies, recommended against the project.

   The common underlying failure in these studies is an inability of the methodology to incorporate the results of innovation. These studies commonly employed cost-benefit analysis, a methodology in which costs are estimated in advance and then weighed against time- and inflation-discounted returns, with assessments of whether the project is likely to meet desired-return hurdle rates, payback periods, or Internal Rates of Return.

   A common flaw in such methodologies is that it is extremely difficult to obtain reliable and convincing data about potential future returns from innovative projects. This is as true in the corporate world as that of public policy. The difficulty is that it is impossible to analyse products and markets that don't yet exist. The preparers of such reports typically, therefore, limit themselves to projecting into the future existing trends in existing fields. Returns from entrepreneurial and innovative projects are often dismissed as 'speculative'. Even if incorporated, such information frequently lacks credibility and is granted little credence.

   The upshot is that while the studies are generally reliable about *costs*, they are inherently unrealistically conservative about benefits.

   And this is true in reports attempting to predict in advance the likely future performance of irrigation in the Coal Valley. The reports *assumed* a continuance of existing land use, then estimated the additional value to be gained from provision of a water buffer to production. The result was dramatic underestimation of the project's real value.

3. **A few, in fact a handful, of entrepreneurs exercised a disproportionate impact on value creation, and their experience influenced the decisions of many others.**

   The great impact of a very small number of individuals, both newcomers to the region and some long-term residents, is strikingly apparent. The same names were repeatedly mentioned to this study's researchers not only as disproportionate creators of new value themselves, but also as mentors and sources of inspiration for others.

The impact of these few leaders results from the fact that value creation came primarily in the form of innovation. Since innovation, rather than expansion or reinforcement of existing activities, was the principal source of value creation, the role of entrepreneurs was magnified. Where few lead, many followed.

An important implication of this observation is that a public policy focus on reinforcing the efforts of the few champions of change can outweigh the returns to be gained from efforts to raise the average or transform the broader culture in a given region.

4. **While irrigation was a necessary precondition to the transition to new land uses (innovation), to make that transition happen required in addition the presence of other economic capabilities and activities.**

   For landowners to make a transition to new land uses, that is, to innovate, they needed several additional elements to be present, beyond water:

   - Convincing information about alternative possibilities, including markets.
   - Access to skills and experience working with novel crops.
   - Development of skills and confidence to undertake the broader range of operational, business, and managerial activities often demanded by new business models.
   - Availability of finance, in forms appropriate to the product or business model under consideration.
   - Access to suitable logistics, which often needed to be considerably more sophisticated for the new high-value—commonly highly perishable or brand-dependent—products than those of wool or sheep meat.

5. **Risk is the defining challenge in land-use transition, and perceptions of excessive risk were the main obstacle to overcome in effecting that shift.**

   Greatly higher risk is in general the defining challenge of innovation, and that was shown to be true as well in the Coal Valley experience. Expansion of known activities as a path to value augmentation usually induces less uncertainty than development of new-to-oneself products or services, or even more so those new-to-the-world. This is commonly the most important barrier to innovation.

   The primary contribution of the other elements of an effective 'innovation system' in the Coal River Valley was the reduction of the real or perceived risk of new products and processes. The key dimensions of risk faced by entrepreneurial farmers in the Valley were: *entrepreneurial* or *business-management* risk (could the individual involved manage the new business model implied by a shift to a new line of business); *production* risk (would the potential new crops actually grow in

the region, cost-effectively); and *market* risk (is there a real market for the product, can it be gotten to market cost effectively).
A vital way to assess the propensity to innovate is to consider the dimensions of risk manifest in a given situation, and to assess the effectiveness of external-to-the-firm capabilities to reduce or manage it.

6. Deliberately organised community leadership was vital in supporting entrepreneurs and sharing experience.

In addition to the disproportionate impact of a handful of entrepreneurs, a single community organisation—the Coal River Products Association—played an invaluable role in the transformation, at several key times, and on several dimensions. The Coal River Products Association lobbied effectively for the irrigation project itself, set targets for change, supported entrepreneurs, collaborated with demonstration projects, commissioned the influential 'Blundstone' report, and disseminated its results.

The active part played by the Association meant that key decisions were guided at each stage by local knowledge. Initiatives of government had a higher success rate because they were designed in advance to meet the needs of local entrepreneurs. In essence, deep local knowledge and the support of local actors was an important antidote to innovation risk.

Most importantly, the Coal River Products Association and its members played an irreplaceable role in mitigating *entrepreneurial* risk. Farmers attempting innovation could call on support and advice from other members of the Association at each stage. Several reported that such support, at critical moments, was essential to their ultimate success. An important form of assistance was information about potential markets, which mitigated *market* risk.

7. External research and demonstration (University and Government) was instrumental in overcoming perceived risk.

A further vital contribution to the reduction of perceived risk, in this case *production risk,* was the impact of demonstrations of new products. The University of Tasmania's decision to trial potential new products enabled sceptical farmers to see the products growing. The University farm showcased cherries, apricots, wine grapes, plums, chestnuts, and apples. The results demonstrated not only that the products would grow cost-effectively in the region, but also provided vital knowledge on which varieties were best suited, and know-how on how best to grow them.

8. The availability of high-quality logistics was critical in facilitating the foundation and growth of new businesses.

As the Valley's transition gathered pace, the proximity of the airport emerged as an increasingly important enabling factor. Traditional products from the area had mostly not needed to be exported fresh, or relied on relatively simple refrigeration systems; for the new products freshness, hence speed, was of the essence.

Lessons for future irrigation projects

The Coal River experience suggests several important lessons for future irrigation projects:

The projects should incorporate entrepreneurship and land-use transition as explicit associated elements from the start. That's where the value and returns from irrigation are likely to be created.

Such projects should aim deliberately to reduce the actual and perceived risk confronted by entrepreneurs. It is risk of failure, on several dimensions, that will retard the needed shift. Government and non-government entities can assist where they are able to help manage the risks:

> **Management risk:** Training, and even more importantly mentoring, can help.
>
> **Production risk:** The Coal River experience demonstrates the great value of investment in testing and demonstration projects by non-private entities.
>
> **Market risk:** Information about potential markets is vital, as is the presence of systems to get products to those markets.

Local knowledge of the innovation *system* is essential: The unfolding development of the Coal River region highlights the value of deep understanding of specific determinants of innovation capability, at a regional and sectoral level. Whether and how innovation actually occurs—in this instance, whether and how quickly farmers introduce new crops and business models—is very often dependent on the presence of supporting institutions off-farm. Assessing the adequacy and effectiveness of these dimensions of an innovation *system* is vital for informing policy that works.

BACKGROUND

The Tasmanian Department of Economic Development and Tourism commissioned the Australian Innovation Research Centre (AIRC) to conduct a study of innovation capability within the Coal River Valley.

The Coal River Valley was selected for several reasons:

- Innovators within the region had experimented with diversifying the agricultural base, and had led the drive to introduce irrigated crops in the region;

- An industry group, the Coal River Products Association, played a significant role in encouraging farmers to try new crops, and in building public and political support for an irrigation scheme;
- The Government invested in a major irrigation scheme to provide a reliable source of water to support irrigated agriculture; and
- The combination of climate, soils and an assured water supply attracted entrepreneurs to the region with new investment and expertise in intensive horticulture.

The Coal River Valley case study demonstrates the critical need to better understand agricultural *potential*.

Today, as the State considers a new wave of commitment to the agri-food sector with the aim of expanding its position as a high-end food producer, the Coal River experience stands as a model of what might be achieved elsewhere in the State. This study investigates how, why, and where the Coal River irrigation project achieved its success to lay the basis for learning how to repeat and build on this performance.

Objectives

The purpose of the Innovation Study was to identify and assess the factors that contributed to building innovation capability in the Coal River Valley.
The specific objectives of the Study were to:

- Assess the role and impact of the following factors in building innovation capability in the Coal River Valley including: public policies and regulatory framework, public and private investment, sector innovators, community leadership and culture, collaborative industry groups and R&D providers.
- Apply the findings and conclusions to develop a model for regional innovation in Tasmania.

Methodology

The AIRC used three methods to collect data, analyse the findings and draw conclusions about innovation capability in the Coal River Valley:

- A historical profile of the Coal River Valley was developed based on archival records, media reports and the correspondence of the Coal River Products Association from the 1970's to 2000;
- Regional innovators were interviewed using a structured, but open-ended questionnaire; and
- A system of innovation framework was adapted from a study of innovation in the Australian dairy industry[36] and used to analyse the data and interview results to identify the key factors contributing to innovation in the region.

[36] 'Future Capability Requirements for Pre-Farm Gate Research, Development and Extension in the Australian Dairy Industry, GHD Hassall in association with the Australian Innovation Research Centre, October, 2008.

The 'Innovation System'

An innovation system framework has been used to analyse the dynamics and contribution of the structural elements within the system to its effective functioning. The structural elements of an innovation system include:

- Actors – key players: the innovators, investors, public policy makers and RD&E providers;
- Knowledge – knowledge base of accumulated capabilities (skills and expertise) to develop innovative solutions; and
- Rules – the institutions that shape behaviour: legal and regulatory frameworks and social and cultural norms.

A functional analysis of the 'innovation system' in the Coal River Valley was used to identify the key factors that contributed to building innovation capability in the region:

- Drivers – how innovation opportunities were identified and defined: eg through market signals and customer requirements or through new technological platforms;
- Strategy and investment – how innovation opportunities were shaped and financed and risks were managed (looking at both public and private investment and risk-management strategies);
- Knowledge and capabilities – how new knowledge, skills and technology were accessed and developed to enable innovation;
- Infrastructure impact – how infrastructure requirements (both 'hard' and 'soft') supported or inhibited innovation; and
- Institutional impact – how regulations and/or social norms supported or inhibited innovation.

ANALYSIS AND KEY FINDINGS

The key findings from an analysis of the innovation system and factors contributing to the development of innovation capability in the Coal River Valley are presented below. A detailed historical profile, data and interviews with regional innovators in the Coal River Valley are contained in Appendix 1.

Innovation Drivers

How innovation opportunities were identified and defined

The presence of a reliable source of water made possible by the SEIS, combined with appropriate soil and climate characteristics, created the conditions for the development of higher value agriculture and intensive horticulture in the Coal River Valley from the late 1980s.

The stimulus for change came from innovators in the Coal River Valley led by Bill Casimaty who saw a need to diversify from traditional dry land farming and grazing operations. They identified and experimented with a variety of new crops for which they believed there was a demand (or a demand could be created as in the case of turf).

The Coal River Products Association (CRPA) played a significant role in rallying support from the existing farming community, the public and the several governments of the day to drive the campaign for a comprehensive irrigation scheme in the region. The CRPA also championed diversification into a new range of irrigated crops for existing farmers.

When a reliable source of water was secured, the transformation of the Coal River Valley was driven by market opportunities identified by some existing farmers (Casimaty and Houston), by the seed companies (South Pacific Seeds), and by new entrepreneurs attracted to the region (Qew Orchards, Frogmore Creek and Domaine A/Stoney Vineyard).

The region now has some very sophisticated and capable businesses with a global customer base. The profiles of these innovators demonstrate that long-term relationships with customers based on mutual trust and commitment to delivering results stimulate innovation opportunities.

Strategy and investment

How innovation opportunities were shaped and financed, and risks managed

Innovation is a solution-seeking process encompassing a range of risks: eg market, production and financial risks.

The history of the transition to higher value agricultural and intensive horticulture in the Coal River Valley illustrates the value of reliable and accessible information about potential markets and production requirements of specific crops.

The Blundstone report, commissioned by the CRPA provided a comprehensive assessment of the potential for intensive horticultural ventures. No individual farmer would have been able to develop this information base on his own.

Access to capital is a major requirement for developing an intensive horticultural enterprise. The costs of initial capital investment are particularly high as it takes several years for most crops to reach maturity.

All of the innovators profiled in the Study have relied on their own private capital with the exception of Qew Orchards that also manages an orchard of 100,000 trees as part of a Managed Investment Scheme (MIS).

Two of the case profiles (StrathAyr and Houston's Farm) are examples of existing farmers who made the commitment to develop an intensive agricultural operation on an existing property, and who have prospered after weathering early set-backs.

The remaining professional farmers in the Valley have been more reluctant to invest in the required irrigation infrastructure as some of them are also farming on leased land to reach the commercial scale needed to be competitive in current market conditions. They generally have a mixed farming enterprise in which they include some irrigated crops (eg peas, vegetables for seeds).

The innovators' profiles illustrate that much of the expansion into intensive horticulture has been done by new entrepreneurs attracted to the Valley because of the combination of water, soil and climate characteristics. They brought new expertise and investment to the region.

There is always the ongoing risk of managing fluctuating market prices. Some of the innovators are committed to developing niche or superior products and services.

Some, such as South Pacific Seeds, act as a 'chain captain' effectively linking Coal River Valley growers with global customers. SPS's managers regularly visit their customers and contract with them for seed production at agreed price. The company in turn offers guaranteed price contracts along with assistance and advice to its growers.

Knowledge and Capabilities

How new knowledge, skills and technology were accessed and developed

The ability to access new knowledge, technology and skills is essential to building innovation capability.

The history of innovation in the Coal River Valley demonstrates the importance of accessible sources of science and technology services and the role of effective 'knowledge brokers'.

During the early transition to more intensive agriculture, the State Government, Department of Primary Industries (DPI) and the University of Tasmania played significant roles in identifying and conducting trials of new crops.

The Tasmanian manager of South Pacific Seeds continued to source expertise from the DPI through his personal contacts. The Department has also been instrumental in helping Qew Orchards identify horticultural crops suitable for the area.

Neville Mendham, a lecturer at the School of Agricultural Science at UTAS, provided a direct link between the University and the seed industry in the district through his involvement with the University Farm and by becoming a vegetable seed grower himself. It was through Dr Mendham that a doctoral student from the University,

Cameron Spurr, was contracted by South Pacific Seeds to conduct research on a variety of carrot seed.

Cameron turned out to be a consummate 'knowledge broker' in the field. Not only could he identify the problem, but he could also find the solution and translate it into practical advice for growers. With a background in farming and a PhD in agronomy, he can effectively communicate science-based solutions to growers.

In practical ways, South Pacific Seeds acts a 'knowledge broker' for its growers. As Craig Garland said, '*we use their equipment and our expertise'* to turn sheep farmers into agricultural farmers. SPS uses a hands-on approach to building agricultural skills.

The Coal River Products Association has been acting as a 'knowledge broker' for its members for many years. The Group invites guest speakers to their regular meetings to address issues of interest to its members. By doing so, the CRPA provides an effective forum for 'knowledge vendors' to reach farmers in the region.

The Association has played a vital role in introducing new land management practices to the area by educating its members and effectively disseminating knowledge about sustainable farming.

The innovators also demonstrate the impact of 'accumulated capability.' They are committed to ongoing research. They build on their knowledge base internally through continuous innovation and by encouraging their employees to constantly seek for better solutions, and externally through accessing specialist expertise and research capabilities as needed.

Infrastructure Impact

How infrastructure requirements supported (or inhibited) innovation

The Coal River Valley provides a prime example of the transformational impact that major infrastructure projects can have on a region. There is no doubt that the SEIS (and subsequent irrigation projects) was the pivotal factor in changing the agricultural landscape of the Coal River Valley. Access to a reliable source of water at competitive rates was (*and remains*) the single most important factor in retaining an agricultural future for the region. Dry land farming and sheep grazing are no longer a competitive option.

There are important lessons to be learned from the way the decisions to build the irrigation scheme were made (*and not made*).

Major 'hard' infrastructure projects such as the seven-stage SEIS are long-term projects that require long-term commitment. These projects do not fit short-term electoral cycles and the loss of 'institutional memory' that occurs as personnel (both ministerial and bureaucratic) change.

Furthermore, the feasibility and economic impact assessments were in most part based on projections of *existing land uses*. History shows that those predictions were conservative, and more importantly, failed to take into account *future potential* use of land and the impact of introducing new, intensive horticultural crops.

Table 1 compares actual and projected future land use in the area to be irrigated by the SEIS (columns 3 & 4) and land use in 2008 (column 5). The results do not support the assumptions made by the Rivers and Water Supply Commission that field crops such as lucerne, cereals, poppies and canning peas would consistently occupy 80 to 85 percent of the irrigated area with the remaining 15 to 20 percent being used for intensive horticulture such as cultivation of vegetables, orchards, vineyards and turf. The highest margin forms of intensive horticulture account for 39 per cent of land use in 2008 and close to 50 per cent if poppies and seed crops are included.

Table 1: Pre- and Post-Irrigation Land Use by Area (ha)

Crop	Pre-Irrigation land use in CRV (1980 survey)[1] Ha	Actual land use in area to be irrigated (in 1983)[1] Ha	Projected future land use in area to be irrigated (1983)[1] Ha	Post-Irrigation Land Use in the CRV (2008)[2,5] Ha
Fresh Vegetables	88	105	160	280
Stone Fruit	29	20	80	382
Grapes	-	-	-	300
Olives	-	-	-	95
Walnuts	-	-	-	36
Sub-total: high margin horticulture	***117***	***125***	***240***	***1,093***
Cereals	312	47	200	600
Peas	32[4]	-	110	479
Lucerne	84	28	100	137
Poppies	25	8	110	140
Seed Crops	-	5	70	104
Other	-	-		91
Sheep	4,600	685		-
Fat Lambs	-	-	165	170
Beef	986	132	35	-
Dairying	75	70	70	-
TOTAL	**6,231[3]**	**1,100[3]**	**1,100**	**2,814[5]**

[1]*Source: "Current Land Use in the Coal River Valley", "Estimated Present Land Use in the Area to be Irrigated" and "Future Land Use in Area to be Irrigated" tables* in South East Tasmania Irrigation Scheme. Craigbourne Dam Stages 1 and 2 – An Economic Evaluation
[2] *Source:* Davey & Maynard (2008). *Water Crisis in the Coal River Valley.* Preliminary Business Case.
[3] Land use includes crops under on-farm irrigation and dryland.
[4]Grey peas
[5] Note two irrigation augmentation projects have been implemented since the completion of the Craigborne Dam stages 1&2.

Some interviewees cited the critical role of good transport and logistics infrastructure in getting fresh products to market. The proximity to Hobart International Airport was clearly a facilitating factor for some as well.

The Study also illustrates the positive role played by the Coal River Products Association in garnering farmer and public support for irrigation, and in facilitating the transition to new agricultural practices. The CRPA is a good example of how 'collaborative infrastructure' can provide a structure and process to facilitate change and stimulate effective collective action.

Institutional impact

How regulations and/or social norms supported or inhibited innovation

Although the regulatory barriers were not cited often, many innovators voiced their concern for the future. In particular, they are concerned about the trend to convert agricultural land into housing estates. The Coal River Products Association continues to be vigilant in ensuring that local planning regulations support the continuation of a viable agricultural region in the future.
The continuous existence of the CRPA, the oldest farming group in Australia, is a tribute to the underpinning social values in the region. Formed following the crisis of the bushfires, it continues to provide a place where farmers can learn from and with one another. The Group welcomes newcomers to the area helping them to join the community which also provides existing members with new perspectives and access to new expertise.

Summary

The story of the Coal River Valley illustrates the impact of innovation capability in realising the potential of a region. The key factors that stimulated innovation in the Coal River Valley—a journey that has taken 40 years and is still underway—are:

- **Community leadership** Since the late 1960s, community leaders like Bill Casimaty have built a compelling case for changing the agricultural practices of the region.

They have mobilised community and political support to realise the potential they believed existed for the region.

- **Irrigation infrastructure** The history of irrigation in the Coal River Valley demonstrates the enormous potential impact of major infrastructure projects. The transformation of the region would not have occurred without the **SEIS**. Equally important are the availability of transport and logistics infrastructure to facilitate the development of interstate and global agri-food businesses.
- **Innovators** The region had innovators who led by example through trailing new crops under irrigation on their properties. Once the commitment to the SEIS ensured a reliable source of water, new entrepreneurs were attracted to the area. These entrepreneurs brought capital and expertise to invest in intensive horticultural enterprises. Some of them now act as 'chain captains' in connecting individual growers to global markets. All of them foster a solution-seeking culture in their enterprises.
- **'Knowledge infrastructure'** Knowledge providers have stimulated and continue to support innovation in the region. In particular, the history of agricultural development in the region highlights the critical role played by **'knowledge brokers'** in linking innovators to science and technology-based solution providers.
- **'Collaborative infrastructure'** There is no doubt that the **Coal River Products Association** played a vital role in the transformation of the region. The Group continues to be an effective advocate for agricultural interests of the region. It also provides a place where members (existing farmers and new entrants) can learn from and with one another in an informal and welcoming setting.

All agree that if the region does not have a reliable source of water, *'the Coal River Valley will become another Acton.'*[37]

PUBLIC POLICY IMPLICATIONS

The Coal River Valley experience illustrates the development of innovation capability in a traditional agricultural region. This section summarises public policy implications for the Government and outlines some ways to stimulate regional innovation capability in other regions of Tasmania.

By its very nature innovation entails risk that must be managed to encourage innovative activity. Governments can contribute to creating conditions that reduce risk and stimulate innovation.

Governments can minimise the political risks associated with significant investment decisions such as those required to establish an intensive horticultural enterprise, by

[37] Craig Garland, South Pacific Seeds, Tasmania

providing consistent, long-term direction and bi-partisan support for major infrastructure projects such as the SEIS.

Government as the regulator

The State Government has oversight of the land-use planning framework. Agricultural enterprises in peri-urban areas have particular challenges. Continued development of intensive horticulture can occur along side rural housing development. However, new residents seeking a 'rural lifestyle' often do not understand the nature of professional farming, eg the use of irrigation equipment, gas guns, heavy equipment on the roads, impact of spraying, etc.

The Government could investigate the possibility of creating an 'Active Agriculture Zone' designation. Buyers of land in the areas so designated would have to sign a caveat outlining the implications of living in the region, eg 'I am aware that I am moving into an Active Agricultural Zone and acknowledge that there will be noise and inconveniences due to the conduct of agricultural enterprises.'

Government as an investor in the 'innovation system'

Governments play a significant role in developing the 'innovation system'. In particular, they are direct investors in the development of enabling infrastructure.

Infrastructure projects

The irrigation schemes needed to provide a reliable source of water has been critical to the development of higher value agriculture and intensive horticulture in the Coal River Valley.

As the history of the planning for the SEIS shows, the economic rationale for such major infrastructure projects must be based on the *future potential for new land uses*, rather than projections based on current usage patterns.

Once the feasibility and potential impact of a major infrastructure project is determined, the Government is best placed to ensure the financing of the project through its own funding, alignment with Commonwealth funding, or a public-private partnership. The Government, or an outsourced third party, needs to take on the 'investment broker' or 'syndicate manager' role to structure and oversee funding packages.

Accessible information

If an infrastructure project has potential for stimulating new higher value uses, the Government can also play a role in describing what the range of those uses could be based on soil types, climatic conditions, etc. The Blundstone Rural Development Project Report (commissioned by the Coal River Products Group, paid for by private

and Horticulture Australia funding) is an excellent example of providing 'public' information for use by private investors.

Knowledge infrastructure

Governments also invest in the development and maintenance of an accessible and responsive 'knowledge infrastructure'. The Government can use its investment to ensure that science and technology providers are effectively linked to innovators.

Traditionally in agricultural development, State Governments provided technical services directly through public research and extension offices. The Tasmanian Government has outsourced these services through the creation of the Tasmanian Institute of Agricultural Research (TIAR), a joint venture with the University of Tasmania. TIAR has tremendous potential to create a 'knowledge infrastructure', linking innovators and researchers with regional, national and international networks.

To reach its potential, TIAR must act as a 'knowledge broker' as well as an R&D provider. Through its investment in TIAR, the State retains its capacity to directly influence the delivery of RD&E services in Tasmania.

Increasingly, professional farmers and farming enterprises are using private R&D service providers who have the specific expertise they need. The Government should ensure that such private providers are included in 'knowledge networks.'

Regional groups, such as the Coal River Products Association, can play a significant role as a 'knowledge brokers' and in building regional innovation capability. The Government could support the development of such groups where community leaders exist to provide local direction and leadership.

Government as a provider of new venture funds

The Coal River Valley Study shows that access to capital for new ventures, such as intensive horticulture, has been a limiting factor to many existing farmers in the region. The Government could consider increasing access to capital for investment in new, high value agricultural ventures through a 'revolving loan fund' that it would underwrite.

Regional innovation capability

The Coal River Valley Study tells one story of the development of regional innovation capability. Applying a 'system of innovation' framework has identified the key factors operating in the Coal River Valley to stimulate and support the transformation of the region from traditional dry land farming to intensive higher value horticulture.

The Government can extract the lessons learned from the Coal River Valley experience for application in other regions in Tasmania. It can objectively look at its role in the continued development of the Coal River Valley and other regional areas with the

provision that 'not one size fits all' when it comes to developing regional innovation capability.

Innovation capability is best understood through the sector in which it occurs, and particularly, through the structure and functioning of the value chains that operate within the sector. The Coal River Valley Study shows that opportunities for increasing the value of productive agricultural land can be realised, with local growers linked to global markets.

From the State Government's perspective, there are opportunities for increasing the value of the agri-food sector across Tasmania. The Food Industry Council of Tasmania has identified some issues and opportunities across the sector in his recent Industry Strategy.

These potential opportunities could be realised through a combination of local leadership and new investment.

This Study offers the State Government some insights on developing regional innovation capability for consideration as part of a larger framework for stimulating innovation in Tasmania.

In partnership with regional development groups, conduct an analysis of potential higher value agri-food development in selected regions in Tasmania. Make the findings public to attract new investors to the region.

1 In those regions with significant potential for higher value agri-food enterprises, assess the health of the 'innovation system' in the region.

2 Identify infrastructure requirements (both hard and soft) that would significantly boost the innovation capability within the region.

3 Establish an 'innovation investment broker' function to develop and manage regional infrastructure investment in partnership with the targeted regions.

4 Review planning regulations to support 'Active Agricultural Zones'.

HISTORY OF THE COAL RIVER VALLEY

The historical profile, data and case study interviews with regional innovators in the Coal River Valley outlined here informed the AIRC's findings, conclusions and advice on regional innovation capability prepared for the Tasmanian Government.
The research of historical records and interviews conducted with regional innovators and community leaders are presented in two parts:

A historical profile of the agricultural development of the region including:

- Settlement
- History of irrigation

- Agricultural development
- History of the Coal River Products Group
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Case profiles of six innovators in the region

- StrathAyr Turf Systems
- Houston's Farm
- South Pacific Seeds
- Qew Orchards
- Frogmore Creek Wines
- Domaine A/Stoney Vineyard

HISTORICAL PROFILE OF THE COAL RIVER VALLEY

The Historical Profile provides an overview of the economic and social development of the Coal River Valley from settlement to present day.
It highlights the history of irrigation and contribution of the Coal River Products Group to developing higher value uses of productive agricultural land.

SETTLEMENT

The Coal River Valley was one of the first areas of Van Diemen's Land to be settled by Europeans. When the first European explorers discovered the region in 1803/04, they reported that *"the parkland landscape could be put to the plough"*.

In late October 1803, a government surveyor, James Meehan, arrived at Risdon Cove[38] under the instructions to examine the surrounding area. His role was to investigate soils and natural resources in the region and to identify possible locations for future townships.

The exploration of the Risdon Cove site and the surrounding area in early 1804, led Meehan to Pitt-Water at the southern end of the Coal Valley, where he discovered traces of coal and named the local river – the Coal River.

Prosperous beginnings

James Meehan recognised the agricultural potential of the area. Fertile soils and clear land appeared suitable for crop cultivation. Despite his findings, the agricultural potential of the Coal River Valley was not fully appreciated until the 1840s.

The decision to move the settlement's administrative centre from Risdon to Sullivan's Cove in February 1804 caused major setbacks in further exploration of the Coal River Valley and surrounding areas.

[38] Risdon Cove was at the time the settlement's administrative centre.

With the arrival of new settlers, the need for agricultural land around the Hobart area increased and so did interest in the Coal River Valley's agricultural potential. The relative ease of clearing the native bush, proximity to Hobart and water transport soon started attracting new settlers to the Valley.

The population of the region increased with settlers moving away from Hobart Town in search for land and new transportations of convicts arriving in the area, particularly in the 1830's.

According to the report issued by the Colony Administration Commissioner, John Thomas Bigge, by 1820 there were between 7000 and 8000 sheep in the Valley.

Historical records also reveal a large variety of crops grown in the Valley at the time, such as vines, almonds, walnuts, stone fruit, and hops that became known as "*superior to those imported from England*".[39]

The importance of the Coal River Valley as an agricultural and transit area rapidly increased. On February 23rd 1824, the Township of Richmond was declared and soon became the administrative centre of the region with the building of the Richmond Bridge in 1825, the establishment of Military Officers Quarters, Richmond Court House, a store, hotels, flour mills and impressive private residences.

In the 1840s, the region was proclaimed the "*Bread Basket*" of the colony and by the middle of the century, it had become a major wheat growing area with much of the cereal exported to Sydney.

Years of decline

The prosperity of the Coal River Valley, and Richmond as its administrative centre, was deeply affected by the construction of the causeway across the Derwent River at Bridgewater in 1849. The development removed the city from the main transit route from the south to the north of the colony.

In 1872, the completion of the Pitt Water causeway led to further reduction in transit numbers through Richmond. The situation deteriorated again in 1876 with the construction of the railway from Hobart to Launceston. The railway ran from Hobart, through Bridgewater and Campania, where it turned up north. As a result of these infrastructure developments, Richmond and the Coal River Valley remained a quiet rural area with little change for many years.

Until the 1930s, the land use in the Coal River Valley was dominated by dryland cropping and grazing, with a majority of enterprises specialising in cereals and sheep. Only small parts of foothills and slopes were utilised for production of apricots.

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[39] Margaret Mason-Cox (1994). *Lifeblood of a colony: a history of irrigation in Tasmania*. Hobart

Overgrazing and land cropping resulted in widespread soil erosion in the Valley. Weed infestation and devastation caused by rabbits only added to the worsening condition of land in the region.

Post-war Period

The post-war boom, improved pastures and rabbit control halted the general decline of the area. Wool, fat lambs and beef became the main sources of income. During the late 1950's several modern dairy operations were established in the district. However, by the 1960s, agriculture in the Coal River Valley was once again in a depressed state. The situation deteriorated considerably in February 1967 when 37,800 acres of land were destroyed in the bushfires. The disaster had a devastating impact on the communities in the region with many symbols of early progress lost in the fire. The situation improved in the 1970s when Richmond gained recognition as a heritage area with Georgian Colonial architecture and convict history. The city, with its local art and craft galleries, became a popular tourist destination and once again was an important place, this time on a tourist route.

Years of Drought

October 1978 marked the beginning of one of the worst droughts in the history of Southern Tasmania. The Coal River Valley was officially drought-declared in 1979. The drought of 1979-1983 had a devastating effect on the region. As reported in the *Tasmanian Mail* on 11th January 1979:

> *"The Coal River is only a river in name, being but a chain of pools and water-holes, and in most instances they are either dry or fast drying up."*[40]

The cost of re-sowing pastures was approximately $4.5 million, with the cost of restocking around $3 million. Individual farmer losses in the South East of Tasmania ranged from $75,000 to $200,000.

The severe drought and increasing demand for water for irrigation, domestic use and recreational purposes accentuated the need for an irrigation scheme that would supply water to the drought-prone South East of Tasmania.

When the government's efforts to battle the drought by cloud seeding failed, the need to urgently review water supplies for the region resurfaced.

HISTORY OF IRRIGATION IN THE COAL RIVER VALLEY

The first dams on the Coal River were build some time before the 1880s. Built on a flat river bottom, the dams were susceptible to heavy flooding and many of them were soon destroyed.[41]

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[40] *Tasmanian Mail*, 11-01-1979

One of the earliest attempts to irrigate land in the Coal Valley was during the 1840's, at *Glen Ayr*, Richmond. By 1849, *Glen Ayr* had 29 acres of Virginia tobacco and hops under irrigation. Construction of a large dam on the farm and *"water laid on by pipes"*[42] to the farmhouse were considered a complete novelty in the region. In 1853, a major failure of the irrigation system, followed by a purchase of the farm by Bassett Dickson, caused the dam to fall into disuse.

Another attempt at constructing an irrigation system was made at the Campania Estate during the 1870's, with 150 acres under irrigation.

The first permanent and successful dam on the Coal River was constructed at Richmond during the late 1930's. The project offered jobs to unemployed men during the Great Depression. The dam was initially used for irrigating nearby market gardens.

Although the potential for development of a large-scale irrigation scheme in the Coal River Valley was recognised in the 1880s, it was not until the 1950s that the first serious steps towards the development were undertaken.

An engineer from Victoria, E. P. Kendall, was assigned to examine possible sites for the dam construction between Richmond and Campania. The investigation led Kendall to conclude that *"sufficient water could be made available to fully develop this valley of 5000 acres under irrigation"*[43].

In Kendall's view, the irrigation scheme would not greatly affect the productivity of the district, as, according to his predictions, the majority of landowners would only use irrigation during dry periods to hold their stock. Instead of building a large irrigation scheme, Kendall proposed a construction of a small dam that would boost the flow of the Coal River during dry periods.

After careful investigation, Kendall concluded that for the region to grow and develop its strong agricultural potential, a comprehensive irrigation scheme that would supply water to the South East of Tasmania had to be developed. His proposal was submitted to the Water, Sewerage and Drainage Board in 1951. It was rejected based on the lack of sufficient resources to facilitate a development of such magnitude.

South East Irrigation Scheme (SEIS)

For the next thirty years, the plan to build a comprehensive irrigation scheme in the South East of Tasmania was examined by various government bodies and departments.

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[41] Margaret Mason-Cox (1994). *Lifeblood of a colony: a history of irrigation in Tasmania*. Hobart

[42] Hobart Town Courier, 03-11-1849

[43] Margaret Mason-Cox (1994). *Lifeblood of a colony: a history of irrigation in Tasmania*. Hobart

The Bureau of Agricultural Economics prepared the first assessment of the proposed scheme in 1964. Other studies included the 1971 and 1974 reports by McColl and Associates, with the latter one updated by the Agricultural Economics Section of the Department of Agriculture in 1980 and revised again in 1981.

The push for irrigation in the Coal River Valley gained momentum in the 1970's when Sir Harold Cuthberston, Bill Casimaty and other farmers joined forces in a campaign to secure the future of the region by building an irrigation scheme.

In 1973, an opinion census revealed that 72% of landowners in the area wanted the irrigation scheme proposal to be presented to the Federal Government for funding and approval. Approximately 65% of respondents indicated their intention to irrigate if such scheme became available. Those who opposed to the idea were motivated by the fact that if the development went ahead, parts of their properties would have to be flooded.

Until the early 1980s, the value of the proposed irrigation scheme was mainly considered in relation to the existing traditional agricultural enterprises – fat lambs, vegetables, dairy and cereal. Under this approach, the scheme was considered "not viable" as the irrigation water would only be used to sustain existing enterprises during dry periods. Since the early 1980s, it became apparent that the overall viability of the scheme was highly dependent on the introduction of a range of new crops to the area– essential oils, certified seeds, and stone fruits.

On 22nd May 1981, a meeting of sixty farmers from the district took place at Richmond. After suffering one of the most severe droughts in the history of the area, they agreed that *"the time has come to make a decision on the Coal River project once and for all"*[44]. As a result of the meeting, a motion was passed for the State Minister for Primary Industries, Dr. Julian Amos, to approach the Federal Minister for National Development, Senator Carrick, to grant the necessary funding for the proposed scheme.

Despite the urgency of the development, the construction of the dam was not the highest priority for the State government at the time, with the main focus directed towards the construction of the Warner's Creek Dam, near Deloraine.

The importance of providing irrigation water to farmers in the Coal River Valley diminished over time and the government yet again, abandoned the project.

Stage 1 of the SEIS

The proposal to build the irrigation scheme was reviewed again in May 1982. The site for the dam that would form the first stage of the South East Irrigation Scheme was identified at Craigbourne, near Colebrook. It was the same site that was surveyed in

[44] *Tasmanian Country*, 29-05-1981

1959 by Joe Piscioneri, an engineer for the Rivers and Water Supply Commission, who later designed the Craigbourne Dam.

In 1983, there were approximately 115 properties within the project area, with only 40 of them assessed as supporting full-time farming operations and thus viable for adopting irrigation practices.

In 1983, following the election of the Gray Government, the South East Irrigation Committee was established to carry out an initial study of an irrigation scheme that could supply much needed irrigation water to the drought-prone South East of Tasmania. The Committee included representations of the Treasury Department, the Department of Agriculture, the Rivers and Water Supply Commission and Bill Casimaty from the Coal River Valley Products Association.

The South East Irrigation Committee, responsible for reviewing all possible options of providing water to the area, decided that the most suitable method for irrigating the South East of Tasmania would be by pumping water from the Derwent River due to continuous and reliable water supply. Economic constraints, however, forced the Committee to abandon that idea and pursue an option of using local catchments instead.[45]

Subsequently, the Committee recommended that the scheme should be comprised of seven stages that would provide water to the Jordan and Coal River Valleys, as well as to Iron Creek and its tributaries. The first stage of the scheme would involve the construction of the Craigbourne Dam and cost approximately $6.5 million.

In February 1983, the Federal Minister for National Development and Energy, Senator Sir John Carrick, and the State minister for Water Resources, Mr. John Beswick, announced that the Craigbourne Dam would form a part of the seven-stage South East Irrigation Scheme.

The Australian Labour Party also announced its support for the development of an irrigation scheme in Tasmania. The Opposition Leader, Mr Hawke, declared that irrigation schemes in Tasmania, costing more than $50 million, could be build under the Federal Labour Government.

"The ALP Economic package for Tasmania encompasses such water and irrigation schemes as Warners Creek, Coal River/South-East and Cascades."
"In relation to the Coal River/South-East scheme, the ALP recognises that this scheme has potential far beyond the first stage, that is the Craigbourne Dam" and the "Federal Labour Government will assist with further full investigation of all possible stages."

[45] Casimaty, B.G. (1983). Case Study for the Coal River Irrigation Seminar: "Droughts in Tasmania"

"The ALP recognises the agricultural potential of South-Eastern Tasmania, and if it is shown by these investigations that the further stages are viable, then every consideration will be given to the construction of these stages over the long term."[46]

In 1983, the Federal Government offered to finance the construction of the Craigbourne Dam under a grant from the Commonwealth Bicentennial Water Development Program, with Stage 2 of the SEIS coming under the National Water Resources Program with State and Federal funding. The decision to provide funding for the scheme was made on the basis that much of the planning work had already been done.

The Tasmanian Government failed to secure the deal for the Commonwealth funding for the project due to major setbacks caused by the potential flooding of the Historic Colebrook Park in the Coal River Valley. Subsequently, the Federal Government withdrew from the project.

According to the Minister for Resources and Energy, Senator Peter Walsh, the project was "hopelessly uneconomic", with the cost of irrigation water estimated to be $200 per Megalitre. The Federal Government "refused to fund the scheme on the grounds that it was uneconomic" and it would require "an annual taxpayer subsidy to individual farmers"[47] of around $40,000 a year.

The decision to proceed with the first stage of the proposed seven-stage South East Irrigation Scheme, based upon storages on the Coal River, Jordan River and Iron Creek, was made by the Tasmanian Government Cabinet on 9th August 1983.
In September 1983, the State Government provided initial funding to build the 12,600Ml Craigbourne Dam and expressed its full commitment to its construction, regardless of the availability of Federal funding.

"Irrespective of whether or not there was Federal funding, the State Government would definitely build the Craigbourne dam…"[48]

The total cost of the first five stages of the South East Irrigation Scheme was estimated to be around $22 million with the remaining last two stages expected to cost another $29 million.

In the early 1984, the government appointed international engineering consultants, Gutteridge Haskins and Davey, to design the dam. Later that year, the State Government allocated $5,800,000 towards the construction of Stage 1 of the SEIS.

The works on the construction of the Craigbourne Dam began in April 1985. The construction of the Craigbourne Dam was delayed due to various issues including

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[46] ALP Tasmania News Release, 04-03-1983

[47] The Mercury, 11-10-1985

[48] Craigbourne Certain, *Tasmanian Country*, 16-09-1983

compensation for farmers losing land to the dam and the proposed construction of a levee around the historic *Colebrook Park* homestead[49], later abandoned due to costs.

The Craigbourne Dam was completed on 7th August 1986. The official opening took place on 17 November 1986. The dam had a storage capacity of 10,000 mega-litres and could provide irrigation water to over 3,800 hectares of irrigable land in the Coal River Valley. Following construction of the Craigbourne Dam, irrigation water was made available to 64 properties within Stage 1 of the SEIS District.

At full supply level, the surface area of the lake was around 210 hectares. It was predicted that heavy, unseasonal rainfall within the catchment area of the dam would cause flows sufficient to fill the dam within a few days. Average yearly rainfalls were expected to adequately fill the storage within a given year.[50]

Stage 2 of the SEIS

In 1987, the State Government allocated $800,000 to commence the works on Stage 2 of the SEIS, with another $2 million allocated in the 1988-89 State budget.

The second stage of the scheme would service 4,500 hectares of agricultural land in the Cambridge – Tea Tree area. It was expected that 500 hectares of intensive crops, such as vegetable seeds, stone fruits, fresh vegetables, grapes and essential oils, would be under irrigation each year.[51]

The second stage of the scheme did not increase the available water supply, but allowed for distribution of water from the dam to the lower parts of the Valley via a pipeline and a multi-pump pumping station at the Richmond Weir. Stage 2 was expected to be completed by 1990 at a cost of $4,100,000.[52]

The Rivers and Water Supply Commission was responsible for investigating proposals and implementation of Stage 2 of the scheme. According to the Commission, the majority of farmers in the project area expressed strong support for the scheme. The RWSC in co-operation with the State Department of Agriculture determined the total area of irrigable land for the Stage 2 of the SEIS. A detailed soil survey of the Stage 2 area was scheduled for the 1988-89 financial year.

In 1989-90 the pump station at Richmond and the pipeline were completed. The second stage of the SEIS supplied water to another 56 farms in the Coal River Valley.

In 2000, the scheme had 132 members with water rights of 3,221ML. Since the completion of the scheme, numerous studies have been done on its operations and reliability. There have also been numerous studies investigating other feasible options

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[49] *Tasmanian Country,* 26-10-1984

[50] Rivers and Water Supply Commission, Thirtieth Annual Report for the Year 1987-88.

[51] CRPA Correspondence, 1989

[52] *The Mercury*, 24-09-1987

of supplying water to the area, as the dam has not been able to reliably service areas of Stage 1 and 2 of the SEIS.

Demand for irrigation water in the Coal River Valley has been increasing since the completion of the Craigbourne Dam and the transition from dryland cereal and livestock grazing enterprises to intensive crops under irrigation.

Daisy Bank Dam – Connection to Hobart Water

In order to ensure continuity of water supply to the area covered by Stage 2 of the scheme and improve the reliability of water supply to Stage 1, a new dam was constructed at Daisy Bank during 2000-01. Water to the dam has been supplied during off-peak season through a pipeline from Hobart Water and has increased the allocation of irrigation water to Stage 2 of the SEIS by 1000 megaliters.

Clarence Re-Use Water Scheme

In 1996, the Clarence City Council identified the potential for wastewater re-use within the area serviced by the second stage of the SEIS. The $16 million scheme involved piping treated wastewater from the Rosny Wastewater Treatment Plant for use in the Coal River Valley and was set to boost agriculture in the region.

The strategy focused on providing treated wastewater commencing with an allocation of 420Ml in 2005 and increasing to 3,600 by 2025. The proposed scheme was expected to more than double the existing Stage 2 annual water supply of 1,500ML. When completed, the scheme had a potential to irrigate up to 6500ha.

Works on the wastewater re-use scheme commenced in August 2003. The project was a joint initiative of the Clarence City Council, the Federal Government and landowners in the area. The scheme was expected to provide a guaranteed continuity of irrigation to farmers in the region and enable them to utilise areas they previously had not been able to cultivate. Another advantage was the nutrient content of re-used water that would result in reduced need for fertilizers.[53]

One hundred and thirty five property owners in the district registered to receive water from the scheme as soon as the works on the project started.

Criticism of the SEIS

Since the beginning, the proposal to build an irrigation scheme that would provide much needed irrigation water to the South Eastern Tasmania attracted a great deal of attention and criticism from both members of the public and political parties.

[53] Information Bulletin, 1521-6600,10-05-1996

Criticism of the proposed scheme was mainly directed towards the economic viability of the scheme and the relatively small number of landowners that would benefit from the scheme.[54]

The $7,000,000 cost of the first stage of the SEIS was criticised by the State Opposition, as being too expensive, considering it would benefit only 50 farmers in the area. The Party requested that the construction of the Craigbourne Dam be delayed and a comprehensive economic analysis of the development made and published.

The State Government argued that the economic benefits of the dam would be realised in the long term and the multiplier spin-off effect would enhance the region and the State's economy.[55]

"Schemes such as the South-East Irrigation Scheme will provide a major boost to Tasmania's rural sector in the years ahead. The scheme should not be seen in isolation but as part of the overall rural economy. It will complement the State's other irrigation areas, not compete with them."[56]

Producers from the north of the State were concerned that the development could potentially cause "over-supply problems". According to the Tasmanian Farmers and Graziers Association there was little support for the scheme outside of the Coal River Valley and, in their view, no more irrigation schemes should be constructed around the State.

In response to the questioning of the economic viability of the irrigation scheme, the Coal River Products Association launched a campaign to promote new crops in the area to illustrate its agricultural potential. According to the secretary of the Association, Mr Geoff Crane, *"Trials are being carried out and when water becomes available from the first stage of the scheme, farmers would be ready to proceed 'full steam ahead' with commercial areas of the new crops."* He also pointed out that *"within a three month period… three overseas experts representing American, French and English firms, have expressed interest in growing stone fruits, flowers and seed crops in the area."*[57]

AGRICULTURAL DEVELOPMENT IN THE COAL RIVER VALLEY

Climate

The Coal River Valley is characterised by a relatively warm and dry climate. The average annual rainfall is approximately 500 millimetres compared to potential

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[54] Coal River Irrigation Scheme: Fulfilling its Potential

[55] *The Mercury*, 24-07-1986

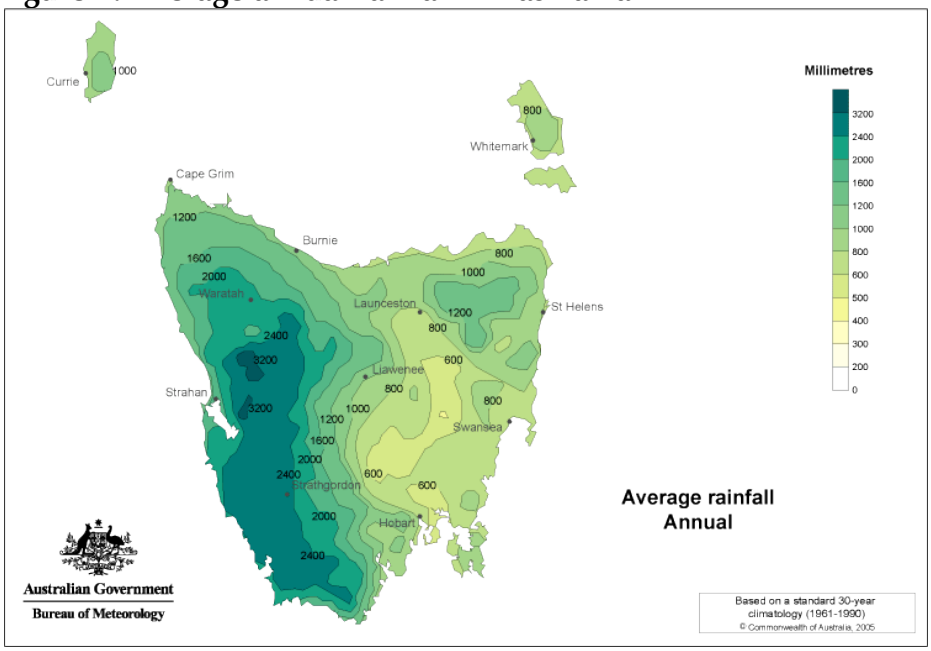
[56] Gray, R. (1985). *The Examiner*, 21-06 -1985

[57] "*South-East dam: a 'subsidy' and 'support' water scheme*", *Tasmanian Country*, 22-03-1985

evaporation levels of 1300 mm per annum.[58] The mean rainfall does not exceed 50 millimetres from January until June. In the following months, rainfall is not greater than 100 millimetres per month.[59] High evaporation rates, which in most months exceed the rainfall[60], make the Coal Valley one of the driest regions in Tasmania.

The dry climate of the region affects river flows. Prior to the construction of the Craigbourne Dam in 1986, the Coal River was ephemeral for its entire length, particularly during summer months (November to April). Historical records show that the river's stream flow has been highly dependent on annual rainfall in the catchment.[61]

Figure 1: Average annual rainfall in Tasmania



Source: www.bom.gov.au/climate/averages/, Retrieved 07-11-2008

January and February are the warmest months with average maximum temperatures of 22^{0}C. Average summer temperatures inland at Richmond and Campania are generally higher than in the southern parts of the Valley that are more influenced by sea breezes.

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[58] Grose, C.J. (2003). *Land Degradation and Salinity Risk Investigations in the Coal River Valley, South East Tasmania*. Department of Primary Industries Water and Environment, Tasmania, Australia.

[59] http://www.bom.gov.au/cgi-bin/climate/cgi_bin_scripts/annual-monthly-rainfall.cgi, Retrieved 07-11-2008

[60] Grose, C.J. (2003). *Land Degradation and Salinity Risk Investigations in the Coal River Valley, South East Tasmania*. Department of Primary Industries Water and Environment, Tasmania, Australia.

[61] Gurung, S. and Dayaratne, S. (2003). *Hydrological Analysis of the Coal River Catchment. A report forming part of the requirements for State of Rivers reporting*. Tasmanian Department of Primary Industries, Water and Environment

This characteristic makes the higher part of the Coal River Valley suitable for some grape varieties that cannot be successfully grown in other parts of the State.
The Coal River Valley is generally frost-free. Frosts, however, can occur during June, July and August. Intensity and frequency of frosts increases from Richmond to Colebrook. July has the lowest mean minimum daily temperature of 3.9^0C at Hobart Airport. Day length in the region varies from 9 to 15.3 hours.
Despite its advantageous warm conditions and long hours of sunshine, the region is windy. The prevailing wind is the north-westerly. During summer months, this wind is counteracted by sea breezes from the south-east and south.[62]

Soils

Soils in the Coal River Valley range from wind blown sands to heavy, cracking clays. A major proportion of the Valley, however, is characterised by duplex or duplex gradational soils with predominantly clayey, poorly structured subsoils. A high level of clay in subsoils increases their susceptibility to structural breakdown if not managed properly. Special management is also required on light sandy soils that are susceptible to wind erosion.

In is not uncommon for different types of soils to be found within the boundaries of one property. Irregularity of soil types dictates irrigation and soil management techniques, choice of crops and the use of fertilisers to suit individual soil type.

Variety of soil types largely determines types of crops that can be grown in the region. Perennial crops, such as fruit trees, vines and very intensive vegetable crops are generally less restricted than annual crops, however their location in the Valley is influenced by access to irrigation water.

Land degradation and salinity issues

According to the Coal River Catchment Management Strategy (1998), "virtually all forms of land degradation can be found within the valley". The most common are wind erosion, tunnel and gully erosion, soil structural decline, and salinity.

Soil salinity was a major concern when the irrigation scheme was constructed due to poor drainage of some soils.

The 2003 Land Degradation and Salinity Risk Investigations in the Coal River Valley Report concluded that the current level of agricultural activities in the region has not resulted in increased ground water levels and has not affected its quality.

The investigation did reveal a significant salinity risk, particularly on upper terrace levels.[63] While salinity is evident in the Coal Valley, salt levels in the root zone remain low and may only affect salt sensitive crops.[64]

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[62] Davey & Maynard, (1992). *The Blundstone Study*

Salinity issues have been managed with the assistance of the Coal River Valley Landcare Group, established in 1991. The organization has been responsible for promoting sound and sustainable agricultural practices amongst farmers in the area with major emphasis on drainage works if required.

An on-going programme to monitor depth and quality of ground water and salinity levels has been required to ensure the sustainable development of the region.

Pre-irrigation land use in the Coal River Valley

Prior to the construction of Stage 1 of the South East Irrigation Scheme, a majority of the land in the region was dominated by sheep enterprises for wool production, prime lambs and beef cattle. There were three dairy units operating within the area to be covered by Stage 1 and 2 of the SEIS. Small vegetable producers for supply to the Hobart markets were also present. Barley and oats were the principal cereal crops, with lesser areas of wheat and triticale also grown. Other field crops of importance were oil poppies, canning pea seeds and grey peas.[65]
Land use in the Coal River Valley based on the 1980 survey of producers is presented in *Table 2*.

[63] Grose, C.J. (2003). *Land Degradation and Salinity Risk Investigations in the Coal River Valley, South East Tasmania*. Department of Primary Industries Water and Environment, Tasmania, Australia.

[64] Grose, C.J. (2003). *Land Degradation and Salinity Risk Investigations in the Coal River Valley, South East Tasmania*. Department of Primary Industries Water and Environment, Tasmania, Australia.

[65] South East Tasmania: Irrigation Scheme. Craigbourne Dam Stages 1 and 2 – An Economic Evaluation

Table 2: Land Use in the Coal River Valley, 1980

Enterprise		Total area (ha)
Sheep	Dryland	4,564
	Irrigated	36
Beef	Dryland	973
	Irrigated	13
Dairying		75
Lucerne	Dryland	44
	Irrigated	40
Barley	Dryland	120
	Irrigated	13
Poppies	Dryland	19
	Irrigated	6
Oats	Dryland	109
	Irrigated	12
Wheat	Dryland	11
Triticale	Dryland	47
Grey Peas	Dryland	32
Vegetables	Irrigated	88
Orchard	Irrigated	29
Total		**6,231**

Source: South East Tasmania Irrigation Scheme. Craigbourne Dam Stages 1 and 2 – An Economic Evaluation

According to the 1983 estimates (see Table 3 below), high value horticultural crops occupied only 11 percent of the 1,100 hectares planned to be irrigated by Stage 1 and 2 of the SEIS. Approximately 975 hectares in the area to be irrigated by the scheme were under cultivation of lower-margin crops, with only 120 hectares under on-farm irrigation.

A range of crops that could be grown in the Coal River Valley under irrigation was determined based on a soil survey conducted by the Tasmanian Department of Agriculture in collaboration with the University of Tasmania. A wide range of other factors was also considered, such as wind, sunlight hours, topography, frost, rainfall, temperature and availability of water.

The variety of crops that could be successfully cultivated in the region under irrigation and sustainable management of soil types was significant. The availability of irrigation water increased the potential for supplying interstate and international markets with high quality essential oils, such as peppermint, boronia, pyrethrum, parsley, caraway and spearmint.

The scheme also opened up new opportunities for production of stone fruits, apples and pears, strawberries, raspberries, blueberries, Chinese Gooseberries, wine grapes,

blackcurrants, fresh vegetables, vegetables for seed production, flowers for bulbs and cut flowers. Many of these crops were already present in the area or under development. The supply of irrigation water allowed for further expansion and intensification of the existing crops and introduction of others.

According to the Rivers and Water Supply Commission, in 1986/87, the following crops were being grown in the area covered by Stage 1 of the SEIS:

Pasture, oats, barley, poppies, canning pea seed, lucerne, wheat, peppermint, maize, chou mollier, fennel, pyrethrum, pink eye potatoes, broad bean seed, chipping potatoes, onion seed, Brussel sprout seed, cabbage and parsnip seed, lettuce, apples and apricots.[66]

Even before the completion of the Craigbourne Dam, expressions of interest from interstate and overseas companies to invest in new crops were being presented to farmers in the region through the Coal River Products Association.

To promote the agricultural potential of the region and attract investment, the Coal River Products Association produced a film detailing the potential of the area in horticulture, viticulture, stone fruit, essential oils and cereal.

The following table illustrates the change in land use in the Coal River Valley from 1983 to 2008 and includes a projection to 2013.

[66] Rivers and Water Supply Commission, 1986/87

Table 3: Actual and projected Land Use Change in the Coal River Valley

Land Use - Coal River Valley	Area Ha	Share of area %	Avg GM/ha [5] 2008 $/Ha	Total GM 2008 $
Projected future land use in the area to be irrigated by Stages 1& 2 SEIS (1983)[1]				
High margin horticulture (all irrigated)[4]	125	11.4	15,816	1,977,000
Other agriculture (120 ha irrigated)[6]	975	88.6	381	371,475
	1,100			**2,348,475**
Pre-Blundstone Study "low margin" irrigated land use (1992)[2]				
High margin horticulture[4]	126	11.4	21,457	2,710,019
Other irrigated agriculture	983	88.6	1,294	1,271,614
	1,109			**3,981,633**
Early Post-Blundstone Study irrigated land use (1995)				
High margin horticulture[4]	344	19.2	15,241	5,239,860
Other irrigated agriculture	1,442	80.8	1,334	1,923,940
	1,786			
Current "high margin" irrigated land use (2008)[3] - note augmented irrigation supply post 1995				
High margin horticulture[4]	1,093	38.8	30,651	33,501,543
Other irrigated agriculture	1,721	61.2	1,284	2,209,764
	2,814			**35,711,307**
Intended irrigated land use (2013) (Coal River Products Association ests)				
High margin horticulture[4]	1,295	24.5	29,033	37,598,000
Other irrigated agriculture	3,996	75.5	1,339	5,010,300
	5,291			**42,608,300**
1 Land use ha 1983 - SE Tas Irrigation Scheme stages 1&2 Economic Evaluation Tas Dept Ag table 4, 1983				
2 Land use ha 1992 - Blundstone Study Vol 1 page 19				
3 Land use ha 2008 - Enhancing Irrigation Water in SE Irrigation District (prelim), Coal River Products Assoc Nov 08				
4 High margin horticulture includes stone fruit, grapes, olives, fresh vegetables, walnuts				
5 Gross margin (GM) for grapes, stone fruit, dairy, beef, sheep are AIRC est, other refer Crop Gross Margins, DPIW				
6 Gross margin for other agriculture in 1983 is overstated as margins are for irrigated (not dryland) agriculture				

Post-Irrigation Land Use

In 1992, land use in the region was dominated by medium margin crops, such as peas, pyrethrum, essential oils, lucerne, seed crops and poppies. These crops accounted for over 60 percent of irrigated land in the region, while low-margin crops, such as cereals, lupins/beans, or lentils accounted for 28 percent of irrigated land. The area of high margin, horticultural crops remained unchanged.

The emphasis on low and medium gross margin agriculture in the early post-irrigation period (up to 1992) could have resulted from a general risk aversion of traditional farmers and high capital cost of investing in on-farm irrigation infrastructure. As suggested in the 1992 Blundstone Rural Development Project Report, the optimal use of the irrigated land was not being exercised.

The Blundstone Rural Development Project Report[67], completed in June 1992, identified the potential for higher value horticultural development in the region. The increase in the area of high margin horticultural crops from 126 hectares in 1992 to

[67] Blundstone Rural Development Project, Davey & Maynard Agricultural Consulting, June 1992.

344 hectares in 1995 can be attributed to farmers capturing the opportunities identified by the study.

Over the period 1992 to 2008, an additional 967 hectares of high margin crops returned $30.8mln in additional value while an extra 738 hectares of low and medium margin crops increased gross margins by only $0.7mln.[68] By 2008, high gross margin agriculture accounted for a massive 94.4 percent of the total gross margin. According to current predictions of the Coal River Products Association, the total area under cultivation will increase to 5,291 hectares by 2013. The area of high margin crops is expected to increase only by around 200 hectares, while still accounting for almost 90 percent of the total gross margins.

Overall, the irrigation scheme facilitated the transition of land in the Coal River Valley but it was not until the Blundstone Report that the real benefits of the scheme started to become realised. Land owners in the region had to perceive the risk of introducing new high margin crops as relatively low or allow new entrants to buy or lease land. Information about potential crops and gross margins provided by the Blundstone Report along with identification of potential markets and successful introduction of horticultural crops by the existing entrepreneurs reduced the overall risk of investment. The most recent increase of horticultural crops area may be attributed to the entrepreneurial spirit of new investors.

Blundstone Study

In 1991, the Coal River Products Association applied for a research grant with the Horticultural Research and Development Corporation to undertake a study of horticultural potential of the region. The Corporation offered its financial support for the studies of the Physical Resources of the Coal River Valley and Horticultural Development of the Coal River Valley.

The Blundstone Study played a vital role in the expansion of higher value agriculture and development of horticultural crops in the region. The report identified crops that could be successfully grown in the area for interstate and overseas markets.

The Blundstone study looked at a range of intensive horticultural crops suitable for introduction to the Coal River Valley. Higher value crops were selected based on their characteristics to suit the soil types, topography and climate of the region.

Fresh Vegetables

The Blundstone Study revealed potential for further development of vegetables for the fresh market. Proximity to Hobart offered a significant advantage in supplying fresh vegetables to the Hobart market. Availability of land and irrigation water as well as suitable climate conditions were also favour for the development of fresh vegetables production in the region.

[68] The number of hectares of low and medium gross margin agriculture on irrigated land in 1992 that was transformed into higher margin agriculture by 2008 is not available.

The Study also identified potential vegetable market niches, such as winter lettuce, washed potatoes and bunched lines (carrots, silver beet, beetroot, leeks and spring onions).

Competition from the existing suppliers in the northern parts of the State, unreliability of irrigation water, high capital requirements and high level of expertise in production and marketing were considered potential obstacles to the development of fresh vegetable sector in the district.

Successful development of a fresh vegetable industry in the Coal River Valley was going to be largely dependent on the ability of producers to introduce advanced management techniques to complement investment in specialised machinery and facilities upgrade. The Study also identified that collective commitment from growers was essential to securing ongoing contracts.

Vegetable Seeds

The potential for development of large-scale seed cropping enterprises in the Coal River Valley had been recognised for some time. The climate of the Coal River Valley offers suitable conditions for growing vegetables for seed production due to dry ripening conditions that ensure that seed crops have maximum germination percentages. The relative isolation of the Valley also makes it a relatively disease- free region.

Successful establishment and operation of seed producing enterprises in the district required major investment not only in sowing machinery, irrigation and harvesting equipment, but also in acquiring new skills and knowledge.

Some farmers in the valley already had some experience in growing crops for seed production with most of their expertise self-taught.

Stone Fruits

The potential of the Coal River Valley to become a major stone fruit producing area was recognised. The advantage of the region is the late harvesting season that enables the produce to be exported to the mainland during their off-season.

This late production season also limits interstate and overseas competition, particularly for apricots, cherries and nectarines. Demonstration orchards of cherries, apricots, wine grapes, plums, chestnuts and apples were planted at the University Farm.

The Coal River Valley region is particularly suitable for apricot orchards as it is generally frost-free and offers preferable dry conditions during the flowering season. As there are only a few other areas in Tasmania suitable for growing apricots, the Study recognised that the region had the potential to become the major supplier of apricots in Australia.

Viticulture

Climate conditions, availability of land and irrigation water, and proximity to Hobart also contribute to the attractiveness of the Valley as a wine region. Furthermore, the attractiveness of the Coal River Valley, and Richmond in particular, as a tourist destination added to the potential development of a wine region in the Valley.

Vineyard expansion was already well under way in the region when the Blundstone Report was released, with a number of estates established with an increasing interest from interstate and overseas investors searching for suitable sites in the region.

The wine industry was identified as an area that would particularly benefit from outside investment. It was recommended that the potential for premium wine production should be strongly promoted interstate and internationally.

In summary, the report encouraged existing farmers in the Coal River Valley to focus on long-term agricultural potential, particularly of higher value horticultural enterprises that would take advantage of the agricultural conditions offered by the valley. Strong co-operation between farmers, especially in relation to sharing equipment and storage facilities due to high cost of financing was also encouraged.

The opportunities identified by the Blundstone Study attracted new investors to the region. In 1995, multi-million dollar investments were made in stone fruit and viticulture. Approximately 160,000 stone fruit trees were planted in the area covering an area of around 100 hectares.[69]

HISTORY OF THE COAL RIVER PRODUCTS ASSOCIATION

The Coal River Products Association was established in 1967, following the bushfires that devastated the area. The objective of the organization was to set a new direction for the region and to provide relief and aid to local farmers.

The role of the group in shaping the development of the region cannot be underestimated. It became an important "knowledge broker" for its members and an effective representative of their interests in public policy debates.

Early history of the association

In 1967, Bill Casimaty went to England on a Nuffield Farming Travelling Scholarship. During the visit, he attended a meeting of the "Grasshopper Club". Inspired by the way the group shared knowledge and experience, Bill thought of setting up a similar organization back in Tasmania.

[69] Letter from Bill Casimaty to Dennis Rogers of the Tasmanian Development Board, 28-02-2000

After returning to Tasmania in October 1967, Bill Casimaty and Jim Burn encouraged farmers in the Coal River Valley to attend an inaugural meeting of the Association. Potential members were drawn from a telephone directory from the section for Richmond and Campania and invited to participate in the meeting. Bill was elected the Chairman and Jim Burn, Secretary of the group.

The structure and organization of the group were based on the British "Grasshopper Club" model and the local Rotary Club, of which Bill was a member.

To attract new members and ensure good attendance, guest speakers were invited to regular meetings of the Association. Formal dress was required during the early meetings to create a business-like atmosphere. An annual membership fee was applied to cover the cost of meals and ensure regular attendance.

Following the bushfires, the main purpose of the group was to share problems and offer emotional support. One of the objectives was to set a new direction for the region. Under the leadership of Bill Casimaty a concept of introducing new crops to the region was born.

Inspired by his overseas trip, Bill Casimaty built two large dams on his StrathAyr farm that allowed him to experiment with new crops. Other farmers in the area followed and soon on-farm irrigation systems were being built and new crops trailed.

During the 1979-1983 drought it became very apparent that in order to further diversify and intensify agricultural production in the Coal River Valley, a comprehensive irrigation scheme had to be build.

In a bid for the irrigation scheme, the CRPA represented interests of farmers in the region. Members of the Association became heavily involved in promoting the need for irrigation in the region and in conducting public awareness campaigns.

"New crops for new markets" was the most popular slogan of the group used in the push for construction of the Craigbourne Dam. Publicity events like the press conference in Geoff Crane's empty dam at Strelley in 1980 were directed at attracting publicity and State Government's attention and support.

The Association has continued to be particularly active during difficult times. The CRPA would seek assistance and support from the State Government and private investors to address water shortages and deal with technical problems.

In 1999, when the Craigbourne Dam was at critically low levels, members of the Association proposed building a pipeline from the Derwent River to supply much needed water to the region. The proposed $30 million scheme would have enabled water to be pumped from Bridgewater all the way to Tea Tree by a pipeline.

The role of CRPA in development of the region

The nature of the Association has changed over the years. Originally it's main purpose was to assist farmers in "getting back on their feet" by sharing equipment and experience.

The group quickly realised that it could use its collective influence to negotiate better contracts for supply of agricultural produce and to improve the services available to local businesses and the community. The bargaining power of the group was demonstrated during successful price increase negotiations for malting barley with the Cascade Brewery.

One of the most important attributes of the Association has been its ability to identify problems and collectively search for solutions.

For example, In order to ensure availability of land suitable for agriculture, CRPA was involved with local government planning schemes, originally with the Richmond Municipality and after 1992, with the City of Clarence and the Municipality of Southern Midlands.

To further explore the potential for expansion and growth in the region, the Coal River Products Association organised a Future Planning Workshop in April 1995 at Orford. The purpose of the conference was to review major changes that had occurred in the industry over the past three decades and set a direction for the future.

A new mission statement for the region was produced as a result of the workshop:

"The Coal River Area produces, promotes and profitably markets high quality agricultural products (for which we have a sustainable competitive advantage) to enrich the long term standards of living of our families and the community."[70]

New goals for the district were set. For example, by 2000 the group aimed to have developed skills and expertise required to have 350 hectares of crops producing over $5,000 gross margin (based on 1995 values). They also aimed to achieve a 100 percent increase in hours of employment; expand infrastructure and marketing networks to grade, pack and export the produce; and gain approval for secure water supply to enable better planning and management of crops.[71]

An action plan was developed, with an emphasis on training and skills promotion, infrastructure, regional development initiatives and irrigation schemes. The ability to recognise changing markets and adapt to change was recognised as vital to the successful implementation of the strategy.

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[70] Coal River Products Association – Proceedings of the Meeting at Eastcoaster Resort (21-22 April, 1995). Tilbury, Steele & Farley Australia, 1995

[71] Coal River Products Association – Proceedings of the Meeting at Eastcoaster Resort (21-22 April, 1995). Tilbury, Steele & Farley Australia, 1995

In 1999, the CRPA jointly with the Tea Tree Valley Irrigation District commissioned a study into potential sources of irrigation water to the area. Results of the study were presented to the members of the Association, State Government and other public bodies.
In 2000, a Coal River Valley Catchment Committee was established to develop a management plan for the area and facilitate further development of intensive agriculture to ensure that economic benefits of the SEIS were being maximised.
The Association was also involved in the Clarence Re-Use Water Scheme to ensure that water from the scheme would be used efficiently.
The CRPA continues to conduct regular surveys in the region to determine levels of investment in irrigation and farm equipment, farm size, employment levels, crops grown and potential developments.

PROFILES OF INNOVATORS

The Coal River Valley once dominated by dry land cropping and livestock enterprises has been replaced by a "garden" of horticultural crops.

The availability of water and land with appropriate soil and climatic conditions for intensive horticulture set the conditions for the transition of agricultural practices in the Valley.

It was, however, a combination of local innovators and new investors who transformed the region.

They all recognised the potential of the region for new enterprises. They developed expertise and sought advice wherever it could be found. They took considerable risks and eventually reaped the rewards. They still believe in the potential of the Valley, but are fearful for its future if secure and reliable sources of water are not available.

These are the stories of six leading innovators.

STRATHAYR TURF SYSTEMS, RICHMOND, TASMANIA

The enterprise

StrathAyr is a world leader in sport field and race track construction techniques. The company specialises in natural turf production and has a network of distributors around the world. StrathAyr Turf System has been installed at sporting venues in Egypt, USA, Singapore, Australia, Malaysia, Hong Kong and New Zealand.[72]

The company was established on the StrathAyr property at Richmond, Coal River Valley, in 1968 by Bill Casimaty following his return from a Nuffield Travelling Scholarship where he visited Britain, Europe and the USA. In 1972, the business

[72] www.strathayr.com.au, Retrieved, 15-11-08

expanded to Victoria and today, StrathAyr operates a turf farm in Victoria and a mixed farm, including turf, in Tasmania.

Along with producing turf for sports grounds, StrathAyr specialises in building racing tracks. The first racing track built by the company was used in 1990 in Hong Kong for the resurfacing of the Sha Tin Racetrack. The Byr Root (soil free) Turf that was used there is now licensed in eight countries around the world.

Why CRV

"Necessity is a mother of invention"[73]

Bill Casimaty has been described as one of the greatest entrepreneurs in the Coal River Valley, and possibly in Tasmania. Always seeking for better solutions, Bill has always encouraged his employees to identify and solve problems.

After the wool boom of 1950's, he realised that dryland farming and sheep grazing were no longer sustainable due to low rainfall and relatively small farm sizes in the Coal River Valley. His entrepreneurial nature drove him to try a range of new crops that had not been grown in the area before.

When he visited the United States to further explore agricultural opportunities and acquire new knowledge, he found that the turf industry was just starting to develop and for Bill it was enough inspiration to start a similar industry back in Tasmania.
On Bill's return to the Coal River Valley, he built two on-farm dams on his StrathAyr property to irrigate his existing crops and create an opportunity to introduce new crop enterprises.

Relying on his on-farm irrigation system, Bill soon started experimenting with new crops such as grape vines, poppies, peas, turf and vegetable seed crops. He had grown mushrooms prior to his scholarship and continued for some years but decided against investing in new sheds as his turf venture in Victoria was expanding rapidly.
During the drought of 1979-83, he was forced to pump water to his property from a weir at Richmond through six kilometres of aluminium pipes to ensure continuous water supply.

Every new contract presents itself with new challenges.

StrathAyr's first specialist turf concept involved the total removal of soil from the turf with a washing process, which made it ideally suitable for the emerging trend towards the sand-based sportsfields and racetracks.

The company's development of its StrathAyr system for sportsfields and racetracks resulted in a major breakthrough with the MCG project. The company also developed concepts to facilitate the establishment of cricket wickets for venues like the MCG so

[73] Bill Casimaty, StrathAyr, Tasmania

that they could be used for cricket, shortly after the annual grand final event. Following three advances in the technology, the company developed its drop-in cricket wicket system, which has since been installed in New Zealand and Australia and is being trialled at Lords in London.

The company has also developed turf repair systems that facilitate high use, multi use sports venues as well as a ModulAyr Turf System, which has been used for several Davis Cup Tennis finals and for the Reliant Stadium in Houston, Texas.

Business strategy and investment

As Bill has always been concerned about the small population in his home State, StrathAyr expanded to Victoria when the national's pioneer turf company, Custom Lawns, closed its operation in 1972.

"Selling turf was similar to selling mushrooms"[74]

Both turf and mushrooms involved entry into virgin markets and Bill used publicity and public relations to create interest in both products. Turf was a new product in Australia, a novelty with no developed market. Bill used figures of the US pioneer in the turf industry to forecast his potential demand.

StrathAyr supplied Custom Lawns' Housing Commission's contract in Victoria by shipping turf to Melbourne. One of StrathAyr's first projects was the redevelopment of the Hobart Showgrounds in 1980 in preparation for the Inter-Dominion Trotting Series.

Capabilities

The Nuffield Farming Travelling Scholarship inspired Bill to form the Coal River Products Association and introduce irrigation to the Coal Valley district.

One of the major challenges Bill faced was to develop weed, insect and pest control techniques when there were no established methodologies. The Tasmanian Department of Agriculture and the University of Tasmania initially provided much needed assistance in dealing with weed problems and advising Bill on the use of chemicals. StrathAyr soon formed an in-house research and development program to deal with a range of agronomic issues.

The company trains its employees to observe the effect of various agronomic techniques. Informal research and development, where staff is encouraged to constantly seek new solutions is an integral part of the company's culture.

Research and development is a vital part of StrathAyr's culture. The company continuously develops improved turf concepts and systems. The company has always worked closely with several universities and believes in "*putting science into practice*".

[74] Bill Casimaty, StrathAyr, Tasmania

Bill was the founding Chairman of the Tasmanian University Farm Committee and a member of the governing body (Council) for many years.

Future challenges

StrathAyr Racetrack and Sportsfield Systems have developed a reputation for providing athlete safety to both equine and human participants. Combined with the reputation for high use and all-weather benefits, the company plans to use these features to expand its international activity.

StrathAyr Turf Systems' future focus is on market expansion and further development of turf systems that resolve problems associated with the use of sportsfields as outdoor entertainment venues. Invariably they have to cater for an ever increasing range of activities while providing world-class, high-quality sports surfaces.

SOUTH PACIFIC SEEDS PTY. LTD., RICHMOND, TASMANIA

The enterprise

South Pacific Seeds is a medium-size company operating on a global scale. The company was established in 1986. SPS now has a reputation of one of the most innovative producers of vegetable seeds in the world.

The company was established by Phil Hancock and ten colleagues who left Yates when it was taken over by another company. Yates was one of the first companies to offer contracts for seed production to farmers in the Coal River Valley following the construction of the irrigation scheme.

SPS Production now operates in Australia (NSW, TAS, VIC and WA), New Zealand, Chile and Argentina. In Tasmania, SPS has contracts with growers in the Coal River Valley, Derwent Valley and in the North of the State.

South Pacific Seeds operates its Tasmanian Production branch in The Coal River Valley. The company in Tasmania specialises in production of hybrid cabbage, hybrid cauliflower, hybrid carrot seeds, onion seeds and spring-sown brassica. The primary focus of the enterprise is on hybrid cabbage and hybrid cauliflower seed production.

Why CRV

> *"Coal River Valley is recognised as one of the best seed production areas in the world for hybrid cauliflower seed".*[75]

The potential for growing vegetables for seed production in the Coal River Valley was recognised soon after the decision to build an irrigation scheme was made. Natural

[75] Craig Garland, SPS, Tasmania

advantages, such as dry summers, long hours of sunlight and relatively frosts free winters combined with a supply of irrigation water created an opportunity for the region to become one of the largest seed producing areas in Australia.

Business strategy and investment

"SPS has aimed to develop sheep farmers into agricultural farmers."[76]

SPS has had a significant impact on farming practices in the Coal River Valley. By providing practical and agronomic knowledge and guaranteed-price contracts, SPS has been encouraging traditional farmers in the region to switch to intensive seed production.

Today, SPS's seed production is pre-sold on contract to global customers. SPS, in turn, contracts with local growers. SPS provides growers with practical, hands-on advice including taking soil samples and providing advice on irrigation techniques and fertiliser use to its growers. Craig Garland, the Tasmanian manager, regularly visits their properties to offer ongoing support and closely monitors their progress.

"You have to be open and honest with your growers and your customers"[77]

SPS' objective is to connect local seed growers to global markets. It has played that role very effectively for over twenty years and continues to do so by developing new markets and building strong relationships based on trust and friendship with customers around the world.

Building trust with growers has been equally important. To maintain effective working relationships with it growers, SPS operates a transparent pricing system and are open about margins along the chain.

The initial investment capital was raised by the 11 founders. SPS reinvests its earnings in the company to finance expansion and ongoing research.

SPS' employees are offered an opportunity to purchase shares after two years with the company.

"Innovation is critical to our success."[78]

South Pacific Seeds has developed an effective problem-solving culture that enables it to constantly innovate its operations. Identifying a problem, finding a solution and translating the solution into practical steps is at the heart of the company's innovation culture.

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[76] Craig Garland, SPS, Tasmania

[77] Craig Garland, SPS, Tasmania

[78] Craig Garland, SPS, Tasmania

SPS has been involved in seed research for over twelve years. The majority of the research is done and funded internally. SPS also receives financial support for its research programs through various R&D grants.

Only ten years ago, most of seed production was handled manually, with a limited use of basic machinery. To address increases in the cost of labour, SPS has introduced advanced machinery to reduce the use of manual labour. The company's innovative culture has enabled it to develop new technologies and adapt machinery acquired overseas to local needs. Today, SPS is a world leader in technological advancements in seed production.

To further reduce input costs and their impact on the natural environment, SPS has introduced recycled cardboard bulk bins to store and transport seeds. The bins are used throughout the entire production cycle, from harvesting and cleaning to shipping to global customers.

Capabilities

SPS has always cultivated links with R&D providers, such as the Tasmanian Department of Primary Industries, where Craig had been an employee.

SPS in Tasmania has well-established links with the University of Tasmania. The relationship developed through Dr Neville Mendham, a lecturer at the School of Agricultural Science at UTAS who moved to the Coal River Valley when the water became available.

The University Farm played a role in the early development of the seed industry in the district by providing research into seed varieties and managing commercial-scale demonstrations.

In 1996, SPS was experiencing serious problems with the quality of carrot seeds in Australia. A PhD candidate from the University of Tasmania, Dr Cameron Spurr, solved the problem which was the beginning of a productive 10 year relationship with SPS.

Future challenges

Future development of horticulture in the Coal River Valley is dependent on the continuity of water supply and availability of land for agricultural purposes. Water is the most critical issue, many growers have invested heavily into irrigation systems and water storage. A guaranteed supply of quality water is imperative to ensure the Valley can continue to expand all of the horticultural activities that are occurring. SPS is also concerned about the trend towards subdivision of rural land for residential purposes and the impact that this has on the ability of farmers to function and carry out their operations without unnecessary restrictions.

The impact of climate change is another challenge for all growers in the Coal River Valley. Intensity and frequency of severe weather patterns are already affecting crops in the area.

SPS has potential to continue to expand their operations in Tasmania based on global demand from their customers. However, that expansion will be limited by the willingness of farmers to commit themselves to contracts for intensive agricultural production.

HOUSTON'S FARM, CAMBRIDGE, TASMANIA

The enterprise

Houston's Farm is a major producer of pre-washed, fresh-cut salads in Australia. The company was established in 1991 by Anthony and Colin Houston. Over the decade from 1995-96 to 2004-05, Houston's Farm became one of six major fresh cuts producers in Australia, supplying seventy five percent of its fresh cut salads to major supermarket chains, Woolworths and Coles.

In 2006-07, the Houston's Farm introduced fourteen new products to its already impressive product range. While eight salad varieties were sold under the Houston's brand in Tasmania, the majority of their produce was sold under the Woolworths and Coles generic brands.

By early 2007, the company was supplying its products to almost 1,400 supermarket stores around Australia. Twenty five percent of their sales were in Tasmania, 40% was sold to Woolworths and 35% to Coles supermarkets nationally.

Why CRV

Anthony Houston grew up to be an egg farmer with a quiet ambition to move into horticulture.

"I was growing eggs. We were in eggs for 30 or so years, from when I was six years old. We didn't go past it. But for 20 years this guy Dennis said, 'Don't keep growing eggs. You have to get into lettuce.' But I said that we needed water to do that."[79]

Twenty years ago, when Anthony and his older brother were running an egg farm in the Coal River Valley, battery hens were receiving a lot of negative publicity. The Houstons were often in the spotlight.

Getting tired of seeing her husband depressed and concerned about the future, Anthony's wife, Pru urged him to *"ring that guy about growing lettuce"*. Anthony rang

[79] Anthony Houston, Chief Executive, Houston's Farm

Dennis and said, *"You always said you'd help us grow lettuce if we had water. Well, we've got water."*
In 1989, with Dennis' help, Anthony started growing iceberg lettuce on his 35-hectare farm. He was later joined by his brother, Colin.

Business strategy and investment

When he first started, Anthony applied his knowledge from egg production to growing lettuce and a range of other vegetables, such as cauliflower, celery and broccoli. He soon realised that lettuce production required more expertise than he previously imagined, and so he began studying it.

Continuity and quality of water supply proved critical to the success of his enterprise. As the original irrigation system failed, Anthony pulled in expertise from the mainland to design an irrigation system that would suit the soil type.

"Eggs never change"[80]

Anthony soon discovered that the difference between egg production and growing lettuce extended beyond that of water requirements. Input costs into egg production were relatively constant and predictable. Early days of lettuce production nearly sent him broke. After investing in a cool storage room, the Houston's Farm was $1 million in debt.

In 1991, Anthony and Colin Houston established a private company, Houston's Farm Pty. Ltd., of which they both became equal shareholders. The combination of skills and entrepreneurial spirit proved to be a key to the success of the enterprise.

The brothers realised very quickly that the quality of their produce was going to be critical to gaining competitive advantage in the market for iceberg lettuce.

In 1993, the Houston's decided to diversify their production into fancy lettuces, such as red coral, green oak and red oak. Production of quality whole lettuces along with separately managed egg production, turned the farm into a stable and successful enterprise.

"…we got plastic bags and we punched holes in them with a screwdriver and we put the lettuces in them and had people out in the shed rolling their arms back and forth to get the water out."[81]

Anthony and Colin started processing their lettuce in response to their customers' demand. Value adding was not originally part of their business plan. To keep their main customer, Wrest Point Casino, happy, the Houstons started experimenting with washing their lettuces using very primitive and inefficient techniques. However, their

[80] Anthony Houston, Chief Executive, Houston's Farm

[81] Anthony Houston, Chief Executive, Houston's Farm

entrepreneurial nature encouraged them to innovate and make the process of washing and packaging their product more efficient.

"We got failure, failure, failure, success."[82]

In 1995, the company introduced lettuce leaf mixes, washed and ready to eat. The product quickly became popular within the food service industry around the State.

The following year, Houston's Farm started supplying bulk salads to supermarkets. In 1997, the company was approached by Woolworths to supply bagged salad to its Tasmanian stores.

In 1997, the market for fresh cut lettuce was almost non-existent. A promotional campaign, and the introduction of perforated air-tight bags that made the product last longer, allowed the Houston's to expand their markets.

In 1998, the company purchased a commercial washer to ensure better quality and efficiency of production. In order to make their product last longer, the Houston's brothers replaced the open trucks with refrigerated ones to transport their lettuce.

Houston's lettuce soon started being recognised as a top quality product, with an increasing number of loyal customers. Their sales were increasing by about 30% a year.

"A market-driven animal"[83]

Driven by the success of Houston's lettuce in Tasmania, Anthony was keen to take up an opportunity to enter the national market. Houston's Farm began selling its products in Victoria through Safeway. However, the sales volumes were very disappointing.

Despite slow response from the Victorian market, the company was experiencing significant growth. A new management style was introduced to manage the expanding business and settle any differences between the Houston brothers in regards to running the business and expansion plans.

Capabilities

When Anthony realised that he had to learn how to run accounts for horticulture to prevent his business from going broke, he approached John Maynard, an agricultural consultant, to help him identify the costs and determine where the losses and profits were.

[82] Anthony Houston, Chief Executive, Houston's Farm

[83] John Maynard, Davey & Maynard Agricultural & Resource Management Consulting

Maynard created a planting schedule for the farm, determining how much of each crop to plant, when and where. With modifications, the schedule is still being used by the company.

Future challenges

"It's all about land and water, as it always is.
The business is as big as land and water."[84]

Houston's Farm continues to be one of the most innovative and fast growing businesses in the Coal River Valley. The growth of the company has been largely driven by the entrepreneurial skills of Anthony and Colin Houston. The only boundaries for future expansion are set by the availability of land and, most importantly, continuity of a secure water supply.

QEW ORCHARDS, CAMPANIA, TASMANIA

The enterprise

Tian-An Pty Ltd/Qew Orchards is a family-owned and operated apricot orchard in the Coal River Valley. Qew Orchards specialises in producing tree-ripened apricots for the fresh fruit market.

Qew Orchards have grown to become one of the major suppliers of ripe apricots to wholesalers around Australia. Three years ago, they also began supplying the fruit to major supermarket chains around the country. Qew Orchards also sell apricots directly to consumers through door-sales and at country markets.

There are thirteen apricot varieties currently grown in the Chongs' orchard, such as the popular Moorpark, Orange Red, Bergeron, and Sundrop. Apricot varieties have been chosen based on quality and volume requirements.

Why CRV

Tasmania has always attracted the Chongs. It was one of their favourite travel destinations when they were living in Singapore. After about ten years of visits to the State and in search for a lifestyle change, they made a decision to move here.

Water supplied by Stage 1 of the South East Irrigation Scheme enabled the Chongs to take advantage of the warm and dry climate of the region. Long hours of sunlight create preferable ripening conditions and produce sweeter fruit. The late harvesting season has enabled Qew Orchards to target interstate and overseas markets for ripe apricots during their off-season.

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[84] Anthony Houston, Chief Executive, Houston's Farm

Apricots require relatively dry climate as even moderate rainfall can damage the fruit and result in bruising. Apricots are location-specific and there are only a few places in Tasmania, such as the Coal River Valley, suitable for growing the fruit.

Business strategy and investment

Setting up a large apricot orchard required a significant capital investment and involved considerable risk. Trees did not produce fruit for the first two to three years, which made the early years of operations particularly difficult for Qew Orchards.

Approximately 20,000 apricot trees were planted on the Chongs' property in 1999. Ten years later, there are around 50,000 trees in the orchard. In 2006, the Chongs agreed to manage a large apricot orchard as part of a Managed Investment Scheme. Almost 100,000 trees were planted in 2006 and 2009 marked their first harvest. Qew Orchards also leased the apricot orchard from the UTAS Farm.

In developing markets for ripe apricots, Qew Orchards used a customer network previously established by their orchard manager. They have also been consulting organisations like Austrade to identify potential markets overseas, and have plans to expand into Europe and the Middle East.

Qew Orchards recently introduced red pears to their orchard to replace an unsuccessful apricot variety. After extensive market research, the red pear was identified as a niche product that could provide high margins. Although it is not easy to grow, the red pear offered an opportunity to explore new market opportunities and utilise processing and storage facilities during the off-season for apricots. The first harvest is expected in 2009.

"You have to keep trying new things."[85]

Necessity has been the major driver of innovation at Qew Orchards. The enterprise developed a problem-solving culture that enables them to constantly seek better ways of managing the business by identifying problems and searching for solutions.

The diversity of soil types found within the boundaries of Qew Orchards requires advanced management techniques, in particular with regards to irrigation. Individual blocks of land have been created within the orchard to allow for application of irrigation techniques most suited to individual soil types and ensure the most efficient resource use.

The team at Qew Orchards constantly seek more efficient ways of using their resources to address issues such as water shortages and high labour costs. Introducing new methods of irrigation, sorting technology and replacing labour-intensive tasks with technology have been key to the success of Qew Orchards.

[85] Heather Chong, Qew Orchards, Tasmania

To reduce running costs during the off-season, Qew Orchards use their processing plant as a storage facility for local businesses, such as wineries.

Capabilities

Before investing in apricots, the Chongs considered various investment options, mainly in aquaculture, tourism and agriculture. After an extensive search and consultation with the Tasmanian Department of Primary Industry, Department of Economic Development and Tourism and local farmers, they decided to grow apricots.

Having no previous experience in horticulture, Heather Chong relied heavily on the knowledge and experience of horticulturalists from the Department of Primary Industry and the orchard manager who acquired his expertise in the field while running his own apricot orchard. Heather has since developed the necessary knowledge and skills over the years of running the business.

Producing fresh and ripe apricots required an advanced technology that would allow for gentle sorting of the fruit to avoid bruising. The required technology was acquired by Mr Chong from the United States and has been adopted by Qew Orchards.

Future challenges

"Agriculture is not sexy"[86]

Continuous and reliable water supply is critical to Qew Orchards. Recent drought and insufficient supply of irrigation water have forced the Chongs to take some trees out of production and implement strict management of irrigation water.

As apricots are seasonal crops and very labour-intensive, the availability and cost of labour has is one of major concerns for Qew Orchards. In comparison to other countries, the cost of seasonal labour in Australia is high. It is also becoming increasingly difficult to find workers who are willing to pick apricots for six to eight weeks during the Tasmanian festive season.

The cost and quality of transport services are also concerns for Qew Orchards. High cost of transport determines their export potential to a large extent. A relatively high standard of transport services is required as apricots are a very delicate product.

FROGMORE CREEK WINES, CAMBRIDGE, TASMANIA

The enterprise

[86] Heather Chong, Qew Orchards, Tasmania

Frogmore Creek is an award-winning producer of a wide range cool climate wines under their Frogmore Creek and 42 Degrees South labels. Current varieties include Pinot Noir, Chardonnay, Riesling, Sauvignon Blanc and Pinot Gris.

Frogmore Creek winery also makes wines on a contract basis for over thirty vineyards around Tasmania.

The estate was established in 1996 in Penna, Coal River Valley. Tony Scherer is a part owner and company director.

Why CRV

Tony Scherer's experience with organic farming began in 1974 in California. After many years of working on farms, Tony became increasingly concerned about the use of chemicals in everyday framing practices. His passion and faith in organic farming grew out of clouds of pesticides and herbicides used on US farms in 1960's.

Tony thought that there had to be a better way of growing fruit and vegetables. He began his search by looking at ways of attracting beneficial insects to his crops. A friend of his at the time, who today is a world specialist in the field, offered him his assistance.

In 1989, Tony arrived in Perth where he continued his research into organic farming. He quickly realised that there was no market or infrastructure for organic farming in Australia at the time. His experience with organic methods of farming, however, did not go unnoticed.

Tony's passion for wine began when he was approached by local vineyards interested in growing their grapes organically. Having been paid in wine, he acquired a taste for the beverage and started looking for a suitable site where he could start his own organic vineyard.

When he began his search, he *"never even heard of Tasmania"*. In 1983 he "*had run out of places to go"* on the mainland, and then he came across Tasmania. In May, he drove around the island for four or five days and thought that this was the only place that would not change during his lifetime and he decided to stay.

Tasmania offered a climate suitable for cool climate viticulture and Tony felt it would be an ideal location for his organic vineyard. For almost two years, Tony and his wife travelled around Tasmania searching for a suitable site. At one point, they even considered going to New Zealand, until they came across the Coal River Valley.

The Coal River Valley not only had suitable climate, soils and irrigation water, but it was also close to the capital city – Hobart. Another benefit of choosing the area was the availability of relatively inexpensive land.

Business strategy and investment

The company purchased a 430 hectares property at Penna in 1996 and planted 12 acres of Pinot Noir, Chardonnay and Riesling. They have continually expanded vineyard and winery operations since.
About a year ago, Frogmore Creek Wines started exporting their wines to the United States, mainly to California. It has always been the company's aim to export wines to the States, where they could use their well-established contacts. Since they started selling wines to the US market, the volume of sales increased from 20 cases a month to 300 cases. They are aiming at doubling this volume over the next 12 months.

The company has enjoyed a considerable growth since they purchased the winery in late 2003. From average processing capacity of 300 to 400 tonnes of grapes a year, they have increased the capacity to 1000 tonnes per annum. This expansion enables the Frogmore Creek Winery to process grapes grown at their own vineyard at Penna and continue to process grapes from 36 other Tasmanian vineyards under their own labels. The company continues to improve their wine making facilities for these customers.

What distinguishes Frogmore Creek Wine from other commercial wine producers is their engagement in the community and with the environment. Tony and the team at Frogmore Creek recognise the importance of preserving the environment. They cooperate with the Endangered Species Group to create a habitat for endangered species on the property at Penna.

Capabilities

Following his vision, the company did not use any chemicals on the vines when he first established the vineyard. In 2006, weed infestation caused by high rainfall, forced the company to introduce herbicides to their practices and wines harvested since then have not been labelled "organically grown".

Since the introduction of herbicides in 2006, there has been a 50% increase in yield from the vineyard. Currently, the company is hoping to go back to organic methods of growing grapes and looking into new, organic ways of dealing with weed and pest issues. Three hectares of the property are currently used for running trials of organic herbicides.

As climate change has become an issue, the team at Frogmore Creek is collaborating with the wines industry to develop measures of reducing their carbon footprints and secure sustainable management of the enterprise in the future.

Future challenges

"Best sites in Tasmania haven't been planted yet…"[87]

Out of 430 hectares of the property, approximately 180 hectares are suitable for planting. However, the area under cultivation has been restricted by the availability of water.
Other factors limiting further investment and expansion of Frogmore Creek Wines have been high capital costs and the local government planning scheme that largely determines land use in the region.

Even though, in his view, there is still a lot of potential in the Coal Valley, he would not like to see the entire area planted with vines. He believes that the variety of crops grown in the region only adds to its natural beauty.

"We are in the position to offer the world an iconic Tasmanian produce."[88]

Tony Scherer strongly believes that Tasmania and the Coal River Valley still have a lot of potential. However, for this potential to be realised, he believes there needs to be a significant change in mindset. As the Tasmanian economy is not big enough to compete on volume, he believes that, *"production should be product and demand, not commodity-driven"*.

Tony strongly believes that Tasmania has a potential to create an iconic brand that is associated with top quality. The company's vision for Frogmore Creek Wines is to be an "ambassador" of Tasmanian produce and be a showcase of what the State has to offer.

DOMAINE A/STONEY VINEYARD, CAMPANIA, TASMANIA

The enterprise

Domain A/Stoney Vineyard was originally established in 1973 by Priscilla and George Park. In 1989, the estate was taken over by Peter and Ruth Althaus.

The 20-hectare property is located on the side of a hill in the Coal River Valley. Sheltered from westerly winds, it enjoys long hours of sunshine and very little rain. The warm climate of the region translates into a long ripening period and essentially creates suitable conditions for production of one of Tasmania's finest wines.

Domaine A/Stoney Vineyard is proud of its Cabernet Sauvignon, Cabernet Franc, Merlot, Petit Verdot, Pinot Noir and Sauvignon Blanc. The exquisite flavour and aroma of Domaine A/Stoney Vineyard wines have been recognised by wine experts around the world.

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[87] Tony Scherer, Frogmore Creek Wines, Tasmania

[88] Tony Scherer, Frogmore Creek Wines, Tasmania

The Domaine A Cabernet Sauvignon was the first Tasmanian red wine to be included in the Langton's Classification of Top 100 wines, a classification that is considered a benchmark of Australian wine and wine investment.

Why CRV

When Peter Althaus first arrived in the Coal River Valley, he was quickly named an "enfant terrible". He was a man with a vision and dedication, a newcomer to an area dominated by sheep grazing and dryland cropping.

"We wouldn't have come here if it wasn't for the water."[89]

Since his arrival in the Coal River Valley, Peter has seen a true transformation of the area. From a dull landscape dominated by sheep grazing properties, the region now enjoys a wide variety of agricultural enterprises taking advantage of its mild warm climate and irrigation water.

Peter developed his extraordinary passion and knowledge of wines in Europe. However, he saw little opportunity on the old continent and wanted to explore other parts of the world suitable for cool climate viticulture.

His exploration of potential sites for his vineyard took him to various places around the Southern Hemisphere. Peter visited southern parts of Argentina and Chile that had potential to become significant wine producers, but with little industry at the time. New Zealand was another possible location, but Peter found that this southern land was more abundant in sheep than grapes or even people.

"We fell in love with the scenery."[90]

From New Zealand, Peter and his wife Ruth travelled to Tasmania. The wine industry on the island was in very early stages of development, but the natural beauty of the island quickly won Peter and Ruth's hearts.

During their visit to Tasmania, Peter discovered a wine he particularly liked. It was a product of Domaine A/Stoney Vineyard.

Peter first visited the Stoney Vineyard in March 1989. Six months later, when the vineyard was put on sale, Peter returned to Tasmania to purchase the estate.

Business strategy and investment

1990 marked the first commercial vintage of Domaine A/Stoney Vineyard under new ownership. Peter identified the soil types found within the boundaries of his property.

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[89] Peter Althaus, Domaine A/Stoney Vineyard, Tasmania

[90] Peter Althaus, Domaine A/Stoney Vineyard, Tasmania

Expertise and knowledge acquired in Europe enabled him to match grape varieties to individual soil types.

As the wine industry in Tasmania was only just starting to develop, and the Australian market for wine was relatively small, Peter's strategy from the very beginning was to export his wine.

Based on this approach and by using his already long-established contacts in Europe, Peter managed to build a worldwide network of consumers. Currently, fifty percent of Domaine A/Stoney Vineyard wines is exported, with a majority sold in China, Singapore, Japan and Europe.

His approach to making wines has always been focused on producing the finest quality product that anyone with some knowledge about wines would recognise for their quality and unique aromas and flavour.

Capabilities

"I have fulfilled my dream." [91]

The key to his hard earned success has been *"dedication and hard work"*. If you want to fulfil your dream, you "*cannot take any shortcuts"*.

Peter Althaus relied entirely on his own expertise when making early business decisions. He brought with him to the Coal River Valley not only knowledge and experience, but also the technology to make cool climate wines.

Future challenges

About two years ago, Peter began working on a succession plan for his enterprise. So far he has found it difficult to find someone with the same level of expertise and passion for the art of winemaking.

[91] Peter Althaus, Domaine A/Stoney Vineyard, Tasmania

Appendix D: Sources and Consultation

(Partial)

Prof David Adams, Professor of Management Australian Innovation Research Centre
Hon. Michael Aird, Treasurer State of Tasmania
Hon. David Bartlett, Premier State of Tasmania
A/Prof Colin Birch, Vegetable Centre Tasmanian Institute for Agricultural Research
Dr Colin Buxton, Director Tasmanian Aquaculture and Fisheries Institute
Bill Cassimaty, Director StrathAyr
Don Challen, Secretary Department of Treasury and Finance
Jock Chudacek, Chief Executive Tasmanian Irrigation Development Board
Lance Davey, Davey and Maynard Consulting
Rhys Edwards, Secretary Department of Premier and Cabinet
A/Prof Jack English, Entrepreneurship Australian Innovation Research Centre
Kim Evans, Secretary Department of Primary Industries Parks Water and Environment
Prof Andrew Fearne, Director Centre for Supply Chain Research, University of Kent
Michael Field, Chairman Tasmanian Innovation Advisory Board
Aidan Flanagan, General Manager Forests and Forest Industries Council
Wes Ford, General Manager Department of Primary Industries Parks Water and Environment
Dr Stephen Giugni, Chief Executive Tasmanian ICT Centre
Bob Gordon, Managing Director Forestry Tasmania
Sir Guy Green, Chairman of Trustees Tasmanian Museum and Art Gallery
Anthony Houston, Houston's Farm
Colin Houston, Houston's Farm
Greg Johannes, Deputy Secretary Department of Premier and Cabinet
Mark Kelleher, Secretary Department of Economic Development Tourism and the Arts
Chas Kelly, Chas Kelly Transport
Chris Lock, Director Economic Policy Department of Treasury and Finance
John Lord, Chairman Tasmanian Irrigation Development Board
Prof Ian Marsh, Professor Australian Innovation Research Centre
John Maynard, Davey and Maynard Consulting
John McCann, Chief Executive Tasmanian Electronic Commerce Centre
Norm McIlfatrick Secretary Department of Infrastructure Energy and Resources
Prof David McNeil, Director Tasmanian Institute of Agricultural Research
Michelle Moseley, Deputy Secretary Department of Primary Industries Parks Water and Environment
Mike Nermut, Chairman The Learning Edge International
Rob Nicholl, Deputy Secretary Department of Treasury and Finance
Martin Rees, Partner KPMG
Denis Rogers, Chairman Tasmanian Development Board
Robert Rockefeller, Director Nekon Pty Ltd
Bob Rutherford, Deputy Secretary Department of Infrastructure Energy and Resources
Mark Ryan, Chief Executive Tassal
Mark Sayer, General Manager Skills Tasmania

Andrew Scobie, Managing Director Tasmanian Chamber of Commerce and Industry
Fritz Shoemaker, Commercial Manager Austal, Margate
Hadley Sides, Chief Executive Sullivans Cove Waterfront Authority
Dr Richard Smart, Director Smart Viticulture
Brett Torossi, Director Tasmanian Development Board
Dr John Volkman, Chief Research Scientist CSIRO Marine and Atmospheric Research
Bradley Watson, Director Little Lion Holdings
Robert Wilson, Director Tasmanian Development Board
Rob Woolley, Chairman Forests and Forest Industries Council