

# The potential for rotary peeling veneer in regional Tasmania

A feasibility study by Dr. David Blackburn and Associate Professor Gregory Nolan, University of Tasmania





### Reasons for the study

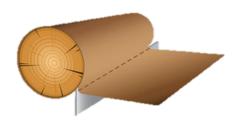
- The success of regional veneer peeling in Asia
- Availability of technology underpinning that success
- Large estates of potential resource in Tasmania
- Key findings from recent studies on that resource







Market opportunities



Technical feasibility

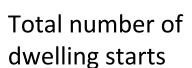


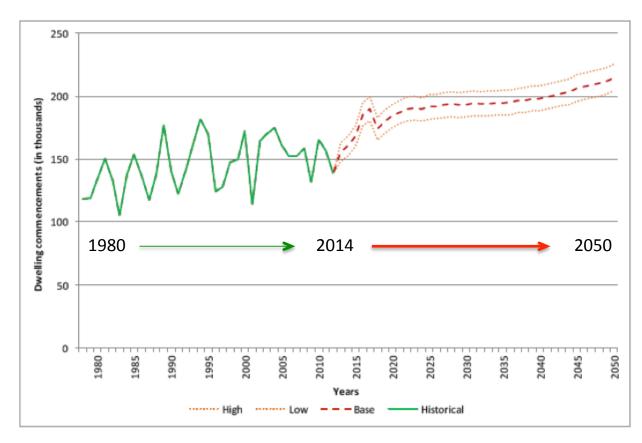
**Economic feasibility** 





#### Market opportunities





Source: ABARES projections, Housing Industry Association datasets.





#### **Potential Products**



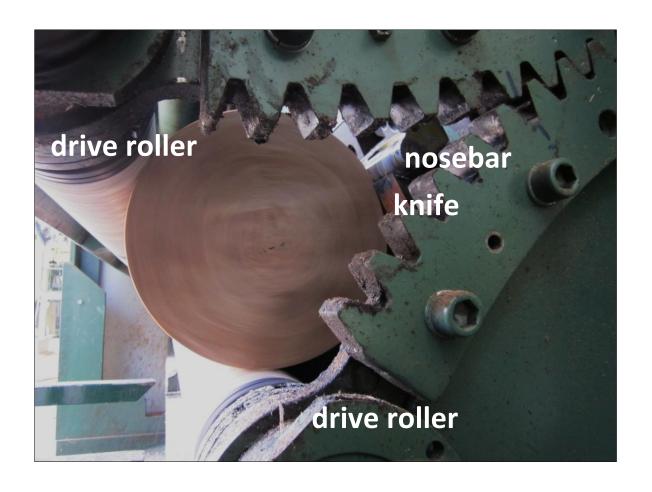








### The spindleless lathe – peeling a log billet







### The spindleless lathe – peeled veneer







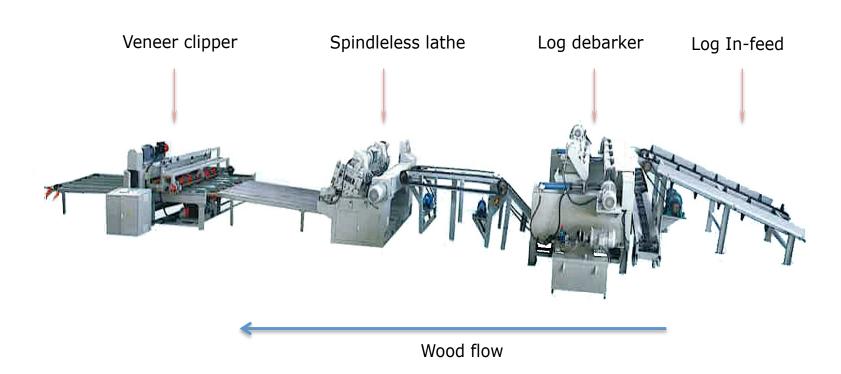
### The spindleless lathe – billet core







### Typical small scale spindleless lathe veneer peeling line

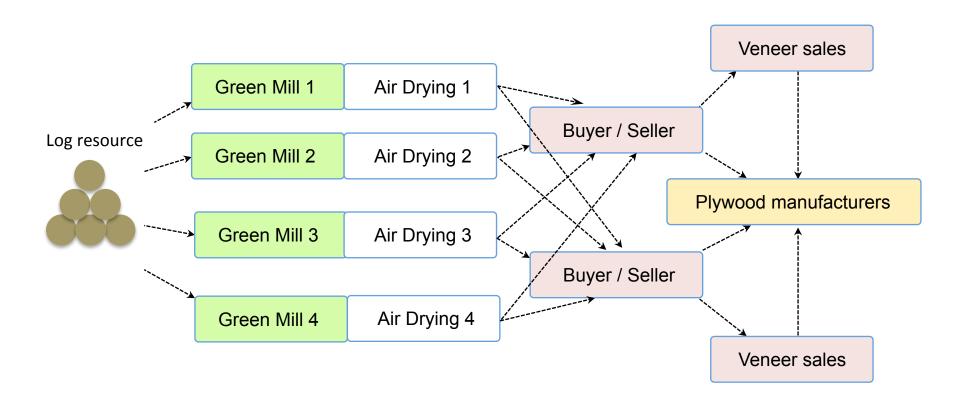








#### Chinese regional veneer value chain







	China	Tasmania
Strengths	<ul> <li>Cheap rural labour in regional areas</li> <li>Availability and low cost of capital equipment</li> <li>Large product demand</li> <li>Favourable government policies</li> </ul>	<ul> <li>Large volume of quality peeler logs are available</li> <li>High quality strength and stiffness veneer</li> <li>Peeler logs should produce some appearance veneer</li> <li>Good transportation infrastructure</li> </ul>
Weaknesses	<ul> <li>Most veneer produced is only suitable as core-ply</li> <li>Limited availability of log resource in future</li> <li>Increasing competition for logs from fibre-board mills</li> </ul>	<ul> <li>No existing domestic market for eucalypt hardwood veneer</li> <li>No locally available equipment and logistic support</li> <li>High labour costs</li> <li>Highly regulated operational requirements</li> </ul>
Opportunities	<ul> <li>Investment available for larger-scale integrated operations</li> </ul>	<ul> <li>Market research predicts steady long-term growth in housing and construction sector</li> <li>Potential export markets for high strength and/or appearance quality veneer</li> </ul>
Threats	<ul> <li>Slower predicted future growth in the housing and construction sector</li> <li>Increased market competition from import</li> </ul>	<ul> <li>A continuing strong Australian dollar will limit export markets and make imports attractive</li> <li>Increased overseas market competition for exports</li> </ul>



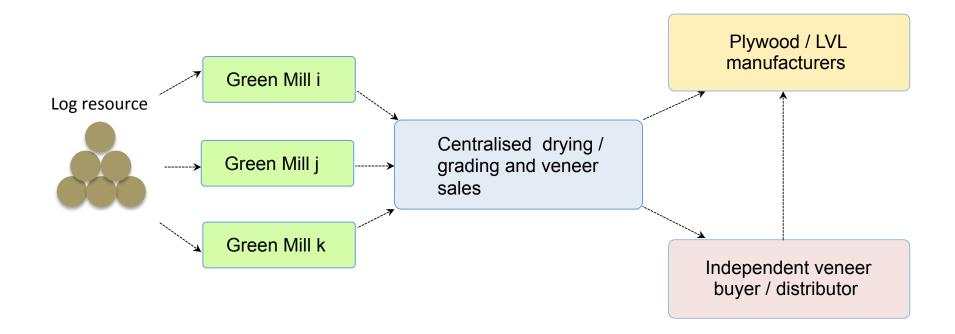








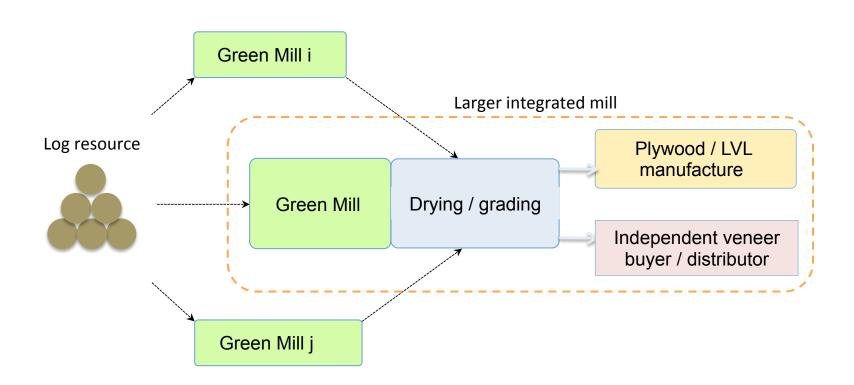
Small-medium scale regional veneer peeling – Structure 1 - operators each peeling < 10,000 m<sup>3</sup> veneer p.a.







Medium-large scale regional veneer peeling – Structure 2 - operators peeling > 25,000 m<sup>3</sup> veneer p.a.







Technical feasibility

**Economic feasibility** 

Resource...?

Size...?

Operating regulations...?

Costs...?

Technical...?

Returns...?

Labour & regulations...?

Assumptions...?



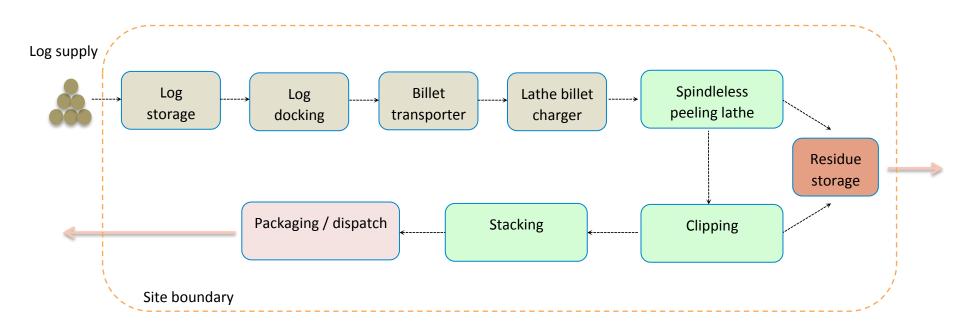


Enterprise Options	Production
Option 1. One low cost spindleless RPV line	Peeling <b>7500 m³</b> of logs to green veneer
operating a single shift.	p.a.
Option 2. Two low cost spindleless RPV lines	Peeling <b>30,000 m</b> <sup>3</sup> of logs to green
operating two shifts.	veneer p.a.
Option 3. Two high quality spindleless RPV line	Peeling <b>50,000 m</b> <sup>3</sup> of logs to green
operating two shifts.	veneer p.a.
Option 4. Three high quality spindleless RPV lines	Peeling <b>100,000 m<sup>3</sup></b> of logs to green
operating three shifts.	veneer p.a.
Option 5. Independent veneer drying and grading	Processing <b>75,000 m</b> <sup>3</sup> of green veneer to
facility with a refurbished heat plant operating three	dry veneer product p.a.
shifts.	
Option 6. Integrated Mill - Three high quality	Processing <b>100,000</b> m <sup>3</sup> of peeler logs to
spindleless RPV lines, and one automated dryer with	dried veneer product p.a.
a scanner/grader, operating three shifts.	





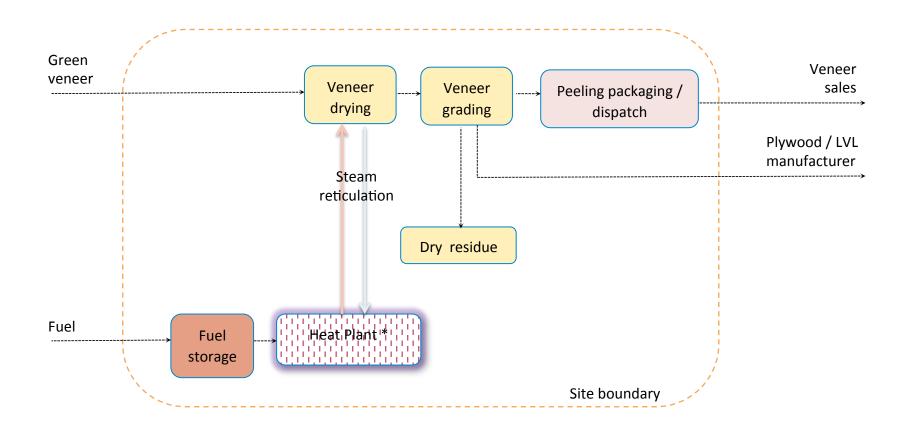
### Green veneer production processing flow







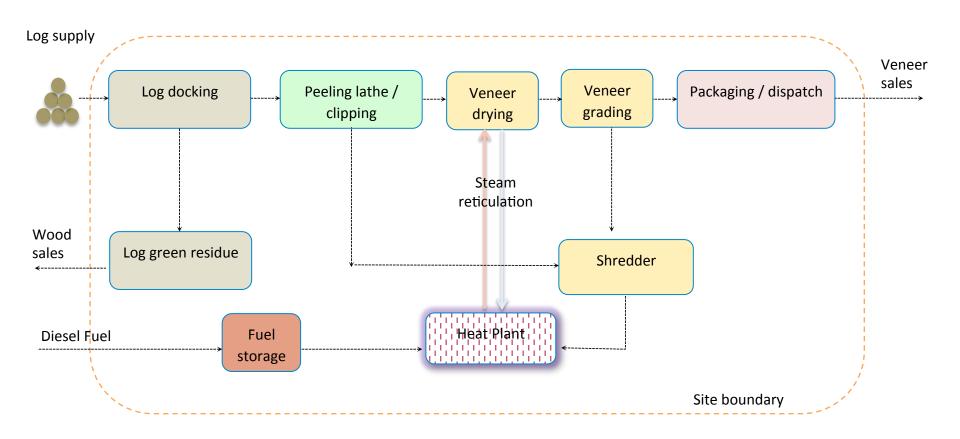
### Independent drying and grading operation







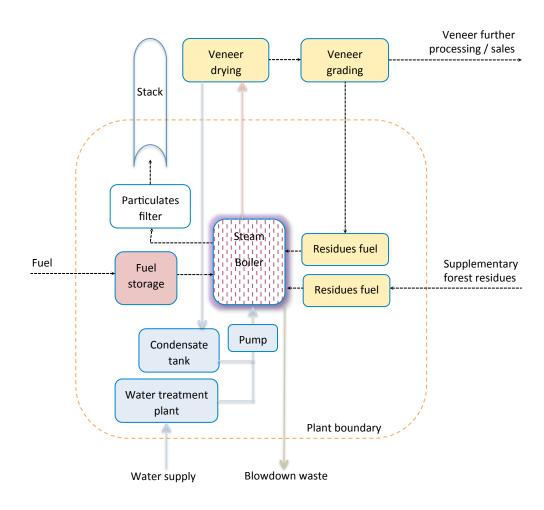
#### Dry veneer processing flow







### Heat plant







CAPITAL COSTS	number	\$cost/unit	Scapital cost	
Log docking station	1	25000	25000	
Billet transporter	1	18000	18000	
Log deck / peeler charger	1			
85V spindleless lathe	1			
Clipper	1			
Veneer conveyors Starker	2			
Stacker Waste conveyor	1			
Waste conveyor Site preparation/building improvemen				
Upgrade to Australian Codes	' '		5000	
Installation and establishment	- 1			
	STota	al capital cost		
		Depreciation	10.00%	
		\$Depreciation	21000	
LEASES p.a.	number	\$cast/week	Sannual Cost	
Front end loader incs fuel/maint	0.3			
Forklift	1			
Ute	0.3			
	\$Tota	al annual cost	79300	
STAFFING p.a. (Single shift)	FTE	\$Base salary	On cost	STotal Cost
Loader operator L4	0.3			
Loader operator L4 Forklift operator L3	0.3			
Los dockins L4	0.3			
Peeling L4	2			
Clipping/stacking line assistants L2	1			4869
Supervisor / leading hand L6	1	40000		5680
Maintenance Staff	0.3		42%	
Sales, Admin & Accounting Staff	0.3	60000	42%	2556
General Manager Staff	0.3			
	6.5		\$Total annual stal	37722
OPERATING COSTS p.a.		\$cost/unit	units p.a.	STotal Cost
Log resource m3		90	7500	67500
Electricity MW.Hours		150		
Equip./maint/hr		2		
Knife Grinding		150		
Rates Premises 30%		0.3		
Premises rental		0.3		
Consumables /m3 Final		1	5625	562 663
		3		
Packaging m3 Freight of residual disposal /m3		12.5		
Freight to veneer dryer /m3		25		
			al operating costs	
Logs - Green Veneer Recovery	75%			
REVENUE o.a.	-			
Green veneer sales m3		222	5625	153000
		272	5625	123100
(cutting Av. 3 m3 /hour/lathe)				
GENERAL EXPENSES p.a.				
GENERAL EXPENSES p.a. Auditing and Legal 0.5%				
GENERAL EXPENSES p.a.  Auditing and Legal 0.5% Insurance				1000
GENERAL EXPENSES p.a.  Auditing and Legal 0.5% Insurance  Water rates / Fees				1000 150
GENERAL EXPENSES p.a. Auditing and Legal 0.5% Insurance Water rates / Fees Office Equipment				1000 150 100 60
GENERAL EXPENSES p.a.  Auditing and Legal 0.5% Insurance			STotal annual gen	1000 150 100 60
GENERAL EXPENSES p.a. Auditing and Legal 0.5% Insurance Water rates / Fees Office Equipment Phone / Coremunications			STotal annual gen	1000 150 100 60 1610
GENERAL EXPENSES p.a. Auditing and Legal 0.5% inturance Water rates / Fees Office Equipment Phone / Communications Training start-up			STotal annual gen	1000 150 100 60 1610
GENERAL EXPENSES p.a. Auditing and Legal 0.5% Insurance Water rates / Fees Office Equipment			STotal annual gen	300 1000 150 100 60 1610 500 150
GENERAL EXPENSES p.a. Auditing and Legal 0.5% inturance Water rates / Fees Office Equipment Phone / Communications Training start-up			STotal annual gen	1000 150 100 60 1610

Lander general de la 1 500 500 500 500 500 500 500 500 500 5		\$cost/unit	number	CAPITAL COSTS
Liste transporter  2 1 1000 3000 3000 3000 3000 3000 3000 3000	75000 75000	75000	1	Log docking station
79	18000 36000	18000		fillet transporter
September   2   1000   2000				og deck / peeler charger
TRANSPORT AND	36000 72000	36000		
STATE OF THE PROPERTY OF THE P	10000 20000	10000		
In the present present of the presen				feneer conveyors
April   Apri	12000 24000	12000		
species to Australian Colles  - 1				
1	9000 18000	9000		roe preparacion/building improve Ingrade to Australian Codes
Section   Sect	50000 50000	50000	1	nstallation and establishment
DeSignation		capital cost	\$Tota	
E-1505 p.a.				
The medit bank received with the company of the com	eciatio 39900	\$Depreciation		
worklit	Fweek Sannual Cost	\$cast/week	number	EASES p.a.
Total formulations   27790   Total annual cost   27790   Total formulations   27790   Total formulati	3500 182000	3500	1	ront end loader incs fuel/maint
Trial Princip   Trial   Sizes with year	250 26000	250	2	Forklift
TAMPROP. p. A (Double of MP)	750 19500	750		Ute
Same groups of large of the control	al cost 227500	annual cost	\$Total	
Section of the control of the contro	salary On cost STotal Cost p.a.	\$Base salary	FTE	STAFFING p.a. (Double shift)
SPEATING COSTS p.a.  SPEATING COSTS p.a.  Speak product for the cost of the co				
owith operators Listy 2 2000 42% 2 3 5000 42	90830 42% 52299 42355 42% 60144			
1	35600 42% 101104	35600	2	Forklift operator L3 day
1	40940 42% 116270	40940	2	Forklift operator L3 aft
In the Content of t	36830 42% 52299			Log docking L4 day
Septiment (1997)   1997				Log docking L4 aft
Commercial Content	36830 42% 209194			Peeling L4 day
Commercial Content	42355 42% 240576 34290 42% 97384	42355		Peeling L4 aft
	94290 42% 97384 40940 42% 116270	40040	- 1	Disping/stacking line assistants L2 Theological tracking line prointents ( )
A	40000 42% 56800	40000		Supposition leading the assistants to Supposit of leading band L6 day
Automation of the Control of the Con		46000	1	Supervisor leading hand L6 aft.
1	55000 42% 78100	55000	1	Maintenance Staff
25 Stroll where with p.A. Stroll where where with p.A. Stroll where whe	60000 42% 85200			iales, Admin & Accounting Staff
SPREATING CODS p.a.   Southwest with p.a.   Steak	85000 42% 120700			Seneral Manager Staff
Inglistration and   90   300	STotal annua 1511803		25	
Microsyn Microsyn   150   760   78	funit units p.a. \$Total Cost p.a.	\$cost/unit		OPERATING COSTS p.a.
Markoty Markonse   150   760   7   150   7	90 30000 2700000	00		
special frames. 2 4 3800  1 50 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5				Santricity MW Hours
Color Growing 150 48  In the Principle 150 58	4 3800 15200			Fouin / maint / hr
Lates Proteins (2004	150 48 7200			Cnife Grinding
1 2200   1 2200   1 2200   1 2200   1 2200   1 2200   1 2 200	0.5 10000 5000	0.5		Rates Premises 50%
Val	0.5 50000 25000			
Avalage of a 2200 1 2200 1 2200 1 20				lonsumables /m3
Frequency (1994) 125 7500 125				
Temple to memor dryne /hd.   20   2250   5	1 22500 22500 12.5 2500 93750			Packaging m3
Situate areas 25 Situate areas 25% STROMOG p.a. Deservoires attends 260 22500 54 DEMONAL PROPOSS p.a. SANDAL STROMOSS p.a. SANDAL STROM				reign of residual disposal /ff/S Froight to various droos /m <sup>2</sup>
STOCKNUT p.a.  Siness vomer sales no.1  Souther, d.s. Sin (Shoundarbel)  Souther sales, free  So	STotal annua 3594110			
EVENUE p.a.   Deen voteer sales m.l.   260   22560   54			75w	nes - Graan Vanaar Barnyee-
Green venneer sales m3 260 22500 58 Cutting Av. In All Privary (Island)  SEGERAL EMPRISES p. a. Nustring and Legal 0.5% Innoverses  Training and Legal 0.5% Innoverses  (Training Company)  (Training Company)			13.00	
(cutting Av. 3 mil /hcur/juthe) GENERAL EUPENSES p. a. Auditing and legal 0.5% Troustrace Water stack   Fees Gifting Engineers	260 22500 5850000			
Auditing and Legal 0.5% reservance Water rates / Fees Office Equipment	260 Z2500 5850000	260		(cutting Av. 3 m3 /hour/lathe)
nsurance Nater rates / Fees Office Equipment				
Nater rates / Fees Office Equipment	7500 20000			Auditing and Legal 0.5%
Office Equipment	20000			
None (demonstration)	1500			
	900			Phone / Communications
\$Total annua	STotal annua 32900			
Fraining start-up Fraining ongoing	12000 2600			
NPV discount rate NPV discount rate	5%			

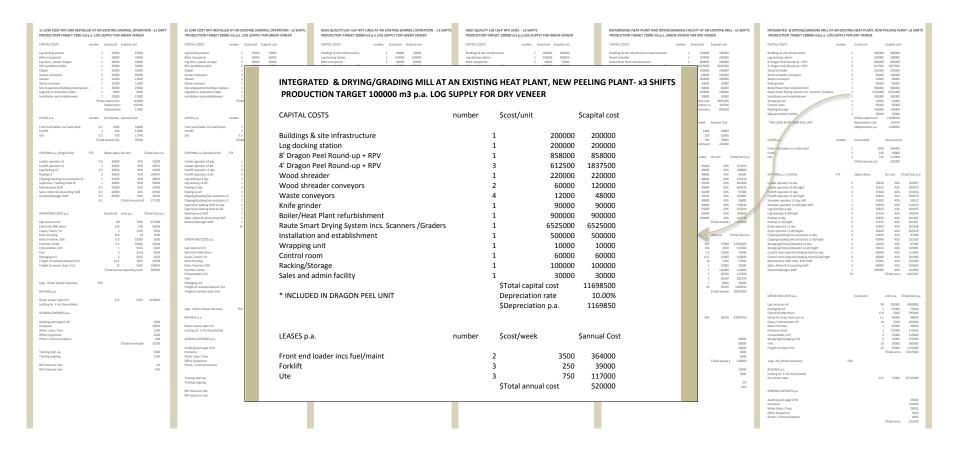
H QUALITY1x8'+1x4' RPV LINE DUCTION TARGET 50000 m3					S	HIGH QUALITY 1x8'+3x4' RPV LINES PRODUCTION TARGET 100000 m3 p			PLY FOR GI	REEN VENEI	ER	
TAL COSTS	number	\$cost/unit	Scapital cost			CAPITAL COSTS	number		Scost/unit	Scapital cost		
Sings & site infrastructure	1	50000	50000			Buildings & site infrastructure		1	100000	100000		
docking station	1					Log docking station		2	200000			
t transporter	2		80000			Billet transporter		4	18000	72000		
ragon Peel Round-up + RPV	1					8" Dragon Peel Round-up + 85"V		1	858000			
agon Peel Round-up + RPV	1					4' Dragon Peel Round-up + RPV Climer*		3	612500			
ser " te conveyors						Waste conveyors		4	12000	48000		
her *						Starker*		0	6000			
grinder		90000	90000			Knife grinder		1	90000	smm		
preparation	- 1					Site preparation		1	25000			
ellation and establishment	1					Installation and establishment		1	80000			
		\$Total capita	1989500							3510500		
CLUDED IN DRAGON PEEL UNIT		Depreciation SDepreciation				* INCLUDED IN DRAGON PEEL UNIT			Depreciation SDepreciation			
iES p.a.	number	Scost/week	Sannual Cost									
t end loader incs fuel/maint		3500	182000			LEASES p.a.	number		Scost/week	Sannual Cost		
lift	1	250	26000			Front end loader incs fuel/maint		2	3500	364000		
	1					Forklift		3	250			
		\$Total annua	247000			Ute		2	750	78000		
FING p.a. (Double shift)	FTE	SBase salary	On cost	STotal Cost p.a.				-	Total annua	481000		
Ser operator L4 day	1					STAFFING p.a. (Double shift)	FTE	9	Stase salary	On cost	STotal Cost p.a.	
ler operator L4 aft	1											
lift operator L3 day	2					Loader operator L4 day		2	36830	42%		
lift operator L3 aft	1					Loader operator L4 aft/night		4	42355 35600	42%	240576 151656	
docking L4 day docking L4 aft						Forklift operator L3 day Forklift operator L3 aft/night		5	35600 40940			
ing L4 day	- 1					Log docking L4 day		2	36830			
int L4 aft	4	42355				Log docking L4 aft/night		4	42355	42%	240576	
oing/stacking line assistants L2 day		34290	42%	97384		Peeling L4 day		5	36830		261493	
ping/stacking line assistants L2 aft	- 1			116270		Peeling L4 aft/night		9	42355			
invisor leading hand L6 day						Clipping/stacking line assistants L2 day		2				
rvisor leading hand L6 aft. stenance Staff	1			65320 78100		Clipping/stacking line assistants L2 aft/nigl Supervisor leading hand L6 day		4	40940 40000			
s, Admin & Accounting Staff	1.5					Supervisor leading hand L6 aft/night.		2				
eral Manager Staff	- 1			127800		Maintenance Staff		2	55000		156200	
	25.5		\$Total annua	1561503		Sales, Admin & Accounting Staff		2	60000	42%	170400	
						General Manager Staff			100000			
RATING COSTS p. a.				\$Total Cost p.a.				48		\$Total annua	2921430	
resource m3		90										
tricity MW.Hours p./ maint / hr		150				OPERATING COSTS p.a.		-	scost/unit	units p.a.	\$Total Cost p.a.	
p./ maint / nr s Premises 50%		1				Log resource m3			90	100000	9000000	
nices rental		- 1				Flortricity MW Hours			150	1200		
sumables /m3		i				Equip / maint / hr			8	5700	45600	
		5	12000			Rates Premises			1	24000		
aging m3		1		37500		Premises rental			1			
tht of residual disposal /m3		12.5				Consumables /m3			1			
tht to dryer /m3		25		937500		Fuel			5			
			\$Total annua	5943950		Packaging m3 Freight of residual disposal /m3			1 12.5	75000 25000		
						Freight to dryer /m3			12.5	25000	1875000	
- Green Veneer Recovery	75%					riegis wayer just					11752100	
ENUE p.a.												
in veneer sales m3		297	37500	8887500		Logs - Green Veneer Recovery	7	5%				
ing Av. 5 m3 /hour/lathe)		-				REVENUE p.a.						
ERAL EXPENSES p.a.						Green veneer sales m3 (cutting Av. 5 m3 /hour/lathe)			234	75000	17550000	
ting and Legal 0.5%				10000								
rance				20000		GENERAL EXPENSES p.a.						
er rates / Fees				6000								
re Equipment ne / Communications				2000		Auditing and Legal 0.5%					14000 30000	
ne / Communications			\$Total annua			Water rates / Fees					9000	
						Office Equipment					2000	
ning start-up				30000		Phone / Communications					2800	
ning angoing				5000						\$Total annua	57800	
discount rate				5% 10%		Training start-up Training ongoing					35000 7000	
				20.0							7000	
						NPV discount rate					5%	
						NPV discount rate					10%	

CAPITAL COSTS	number		\$cost/unit	Scapital cost	
Buildines & site infrastructure improvements		1	100000	100000	
Wood shreader		1	220000		
Boiler/Heat Plant refurbishment		1	900000		
Raute Smart Drying System incs. Scanners /Grade		1			
Delivered waste feed hopper/conveyor to chipper		1	100000		
Wood shreader conveyors		2	60000		
Installation and establishment		1	400000	400000	
Wrapping unit		1	10000		
Control room Racking/Storage		1	100000	60000 100000	
Racking/scorage Sales and admin facility		i			
sales and admin facility			stal capital cost		
			Depreciation ra	10.00%	
			\$Depreciation	856500	
LEASES p.a.	number		Scost/week	Sannual Cost	
Front end loader (small) incs fuel/maint		1			
Forklift		4	250		
Ute		2	750		
			\$Total annual o	223600	
STAFFING p.a. (3 Shifts)	FTF		\$Base salary	On cost	\$Total Cost p.a
Loader/Forklift operator line assistants L3 day Loader/Forklift operator line assistants L3 aft/nigh		3	35600 40940	42% 42%	
Loader/Porkitt operator line assistants L3 aft/right Shreader operator L3 day shift		1	48990	42% 42%	
Shreader operator L3 day shift Shreader operator L3 aft/night shift		2	48000	42%	
Driver operator L3 day		â	35600	42%	
Dryer operator L3 aft/nights		8	40940	42%	465078
Wrappine/Stores/Despatch L2 day		2	34290	42%	
Wrapping/Stores/Despatch L2 aft/night		4	39434	42%	
Control room operator/leading hand L6 day		1	40000		
Control room operator/leading hand L6 aft/night		2	46000	42%	
Maintenance Staff rotat. shift Staff		2 2	55000 65000	42%	
Sales, Admin & Accounting Staff General Manager Staff		1	100000	42%	
General manager scarr		ŝ	100000	STotal annual	
OPERATING COSTS p.a.			Scost/unit	units p.a.	\$Total Cost p.
Green Veneer m3			235	75000	17625000
Electricity MW.Hours			150	4100	
Diesel for Dryer Start-up Ltrs			1.2	12500	
Boiler fuel - residues/ tonne delivered			12.5	12000 5700	150000
Equip /maintenance /hr Bates Promises			10	25000	
Rates Premises Premises rental			1	110000	
Consumables /m3			2	56250	
Wrraping/Packaging /m3			ŝ		
Final			7	8000	
Freight to wharf /m3			25		1406250
				STotal annual	20453000
Green Veneer - Dry Veneer Recovery	75	%			
REVENUE p.a.					
Dry veneer sales			495	56250	27843750
GENERAL EXPENSES p.a.					
Auditing and Legal 0.5% Insurance					20000 80000
Water rates / Fees					20000
Office Equipment					4000
Phone / Communications					2800
				STotal annual	126800
Training start-up					25000
Training orgoing					5000
NPV discount rate					5%
NPV discount rate					10%
					2374

STANTING p. 1   Juhito   PTE	S		INTEGRATED & DRYING/GRADING MILL AT	AN EXIST	ING H	EAT PLANT, NEW F	EELING PL	ANT- x3 SHIFTS	
Marchage   Desiration			PRODUCTION TARGET 100000 m3 p.a. LOG	SUPPLY F	OR D	RY VENEER			
Leg device yesters   1			CAPITAL COSTS	number	5	cost/unit	Scapital cos	it	
Commercial Commercia			Buildings & site infrastructure		1	200000	200000		
## Company and Function on 1970  ## Company and Function on 1970  ## Company and Function Company ## Company and Company ## Company and Company ## Company			Log docking station		1	200000	200000		
Value of invasion   1   2000   2000   1   1   1   1   1   1   1   1   1			8" Dragon Peel Round-up + RPV 6" Dragon Reel Round-up + RPV						
Value company									
1   1000   100						60000			
Baller Vertical France of Indian Control (Vertical France)									
Maria Survicines   Comment   Control			Boiler/Heat Plant refurbishment			900000	900000		
Total process   Total proces			Raute Smart Drying System incs. Scanners / Graders		1	6525000	6525000		
Control Toman									
Standard contents   1,000						60000	60000		
** PRECISION PLONAGON PELL NOTT    Format certain and precision and prec			Racking/Storage						
**ROLLOGO RESPACED FEEL DATE  **Depreciation pa 1:10000  **Servari Cost  **Form entitable recent behaviors  **Form of the part			Sales and admin facility				30000		
March   Marc			* INCLUDED IN DRAGON PEEL UNIT		Ď	epreciation rate			
Treat entitative loss furificante 2 100 10000 Francis Francis State Company 1 1000 Francis State Compan					5	Depreciation p.a.	1169850		
Treat entitative loss furificante 2 100 10000 Francis Francis State Company 1 1000 Francis State Compan									
Treat entitative loss furificante 2 100 10000 Francis Francis State Company 1 1000 Francis State Compan			LEASES p.a.	number	s	cost/week	Sannual Cor	st	
Transit									
15   15   15   15   15   15   15   15			Front end loader incs fuel/maint						
STATING p. A.   China   File   Shees where	à.						117000		
1,000   1,00					\$	Total annual cost	520000		
1,000   1,00									
Lauder reporters La Al Profest 4 4 4155 6 265 3000 1 5			STAFFING p.a. (3 shifts)	FTE	5	Base salary	On cost	STotal Cost p.a.	
Lauder reporters La Al Profest 4 4 4155 6 265 3000 1 5						20020	*700	404503	
Floating Section   1									
Decided registract 12 day with   1   1000   24%   5002   1000			Forklift operator L3 day				42%	151656	
Shower research La Pullege and   2   6400   262   112070			Forklift operator L3 aft/night				42%	290674	
Ling Geologic Lid by  Lid by Water France  Lid by Water Lid by  Lid by Water France  Lid by Water Lid by  Lid by Water France  Lid by Water Lid by  Lid by Wa			Shreader operator L3 day shift Shreader mearator L3 aftilisiate shift						
Persist Californ			Log docking L4 day						
New   1,000			Log docking L4 aft/night						
Department   A   1500   25%   2023			Peeting L4 day Paeline L4 aft/nisht			36830 42355	42%	261493 541297	
a Coppendication for excitorate Judy 2 14000 C24 97314. Writing Judy 2 14000 C24 97314.  DATE OF THE STATE JUDY 2 14000 C24 97314.  D			Dryer operator L3 day				42%	202208	
Cappaign Looking See assessment 2 all higher   4			Dryer operator L3 aft/rights						
Managing Description and Continues   2   1,000   20%   20144									
Committee construction of the control of the contro			Wrapping/Stores/Despatch L2 day			34290	42%	97384	
Commit room operator/basing legislate of shippers 4 64000 CN 251-300 CN 251-3			Wrapping/Stores/Despatch L2 aft/night			39434	42%	223985	
Maintenance Soft Force, 20 to Soft			Control room operator/leading hand to day  Control room operator/leading hand L6 aft/night						
Control Manager Staff   1 20000			Maintenance Staff rotat. Shift Staff						
34 Stade ann. 442947  OREANTING COSTS p			Sales, Admin & Accounting Staff						
10   10   10   10   10   10   10   10			General Munager Scini		74	200000	STotal annu	4427647	
10   10   10   10   10   10   10   10									
10   10   10   10   10   10   10   10									
10   10   10   10   10   10   10   10			007047040 00777					example and	
Paisage of a 1 5000 5000 5000 5000 5000 5000 5000					,				
Desiro (1) Members   150   1500   79000   15							100000	9000000	
Double for oper East-up Citos 12 a 40000 40000 40000 100000 100000 100000 100000 100000 100000 100000 100000 100000 1000			Packaging m3 Electricity MW.Hours					55000 795000	
hair Premise 1 4000 4000 1 1 1 1 1 1 1 1 1 1 1 1 1 1			Diesel for Dryer Start-up Ltrs						
Pomiss entid 1 27000 175			Equip./ maintenance /hr				5700	102600	
Commentation (in 2 50002 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 110000 110000 110000 110000 110000 110000 110000 110000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 1100000 11000000							40000 175000	175000	
Found			Consumables /m3			2	55000	110000	
Freight to what (m) 25 50000 1375000 150000 150000 150000 150000 150000 150000 150000 150000 150000 150000 150000 150000 15000000 1500000 1500000 1500000 15000000 150000000 1500000000			Wrapping/Packaging /m3						
\$1500 215000 100 57 Meet Factory \$500 100 100 100 100 100 100 100 100 100									
							\$Total annu	12155600	
			Load Day Marcas Recovery		SEW.				
(conting-lot, 5 ml / Prospilation) Dry waveer value 413 55000 22715000 GOSEBAL EXPROSES p.a. Auditing and Legal O.SS 3000					J.M				
Dry veiner sales 413 55000 22755000 GDE MA CDPOCSS p.a. Auditing and Legal 0.5% 55000			REVENUE p. a.						
GENERAL EXPENSES p.a.  Auditing and Legal 0.5% 35000			(cutting Av. 5 ms /hour/lathe) Dry veneer sales			419	55000	22715000	
Auditing and Legal 0.5% 35000			,			413			
Auditing and Legal 0.5% 35000			GENERAL PRIENKES n.a.						
Auditing and Legal 0.5% 35000									
			Auditing and Legal 0.5%						
Insurance 150000 Water Rates / Fees 2000			Insurance Winter Enter / See						
Office Equipment 5000			Office Equipment					5000	
Phone / Communications 4000			Phone / Communications						
\$Total annu 223000							> rotal annu	22,9000	
_		7							П









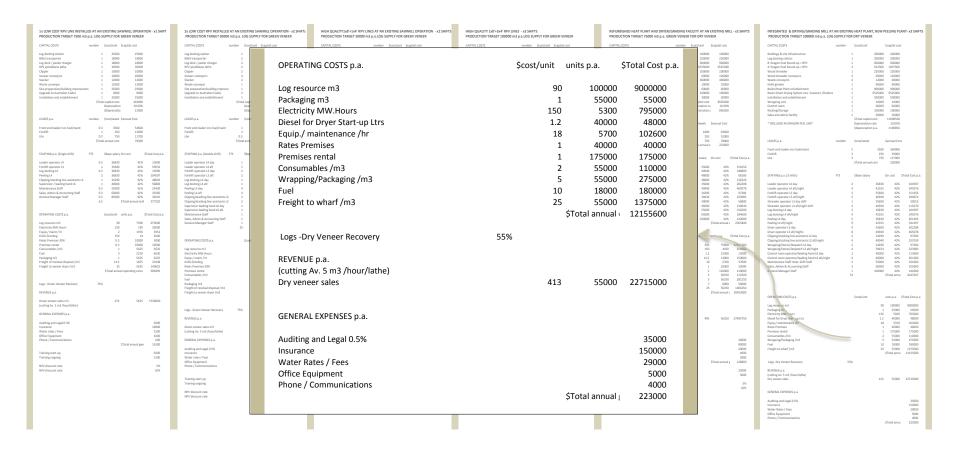


	,	011111011	GREEN VENEER	
CAPITAL COSTS	number	\$cost/unit	Scapital cost	
Log docking station	1	25000		
Billet transporter	1	18000		
Log deck / peeler charger	1			
RPV spindleless lathe	1			
Clipper	1	10000	10000	
Veneer conveyors	2			
Stacker	1		12000	
Waste conveyor	1			
Site preparation/building improvemen	1 1			
Upgrade to Australian Codes Installation and establishment	1			
Installation and establishment				
	\$100	al capital cost Depreciation	210000	
		SDepreciation		
		Spepreciase	21000	
LEASES p.a.	number	\$cast/week	Sannual Cost	
Front end loader incs fuel/maint	0.3	3500	54600	
Forkift	1			
Ute	0.3			
	STota	al annual cost		
STAFFING p.a. (Single shift)	FTE	Stase salary	On cost	STotal Cos
Inader marator I.4	0.3	36830	42%	156
Forklift operator L3	0.3	35600 36830	42% 42%	5055 156
Log docking L4	0.3			
Peeling L4	2			
Clipping/stacking line assistants L2 Supervisor / leading hand L6	1			
Supervisor / reading nano Lo Maintenance Staff	0.3			
Sales, Admin & Accounting Staff	0.3			
General Manager Staff	0.3			
	6.5		STotal annual stal	3772
OPERATING COSTS (L.A.		Southerit	units p.a.	STotal Cos
Log resource m3		90		
Electricity MW.Hours		150		
Equip./maint/hr Knife Grinding		2 150	1976	39
Rates Premises 30% Premises rental		0.3		
Premises rental Consumables /m3		0.5		
Fuel .				
Packaging m3		1		
Freight of residual disposal /m3		12.5		234
Freight to veneer dryer /m3		25		
		\$Total annu	al operating costs	9064
Logs - Green Veneer Recovery	75%			
REVENUE p.a.				
Green veneer sales m3		272	5625	15300
(cutting Av. 3 m3 /hour/lathe)				
GENERAL EXPENSES p.a.				
Auditing and Legal 0.5% Insurance				300
Insurance Water rates / Fees				150
Water rates / Pees Office Equipment				150
Office Equipment Phone / Communications				101
, sammananan			STotal annual gen	
Training start-up				50
				150
Training ongoing				150
NPV discount rate				

PRODUCTION TARGET 30000 m3 p.a. LOG SUF		PRODUCTION TARGET S0000 m3 p.a.LOG SUPPLY FOR GREEN VENEER	PRODUCTION TARGET 100000				TARGET 75000 m3 p.a. GREEN VENEER FOR		
CAPITAL COSTS rumber \$cost/ur	nit Scapital cost	CAPITAL COSTS number Scost/unit Scapital cost	CAPITAL COSTS	number	r Scost/unit Scapital cost	CAPITAL COSTS	number \$co	st/unit \$cap	pital cost
Billet transporter   2   18   Log deck / peeler charger   2   18   RPV spindleless lathe   2   36   Clipper   2   10	5000 75000 8000 36000 8000 36000 5000 72000 0000 20000	Building & site infrastructure         1         50000         50000           Log docking station         1         20000         210000           Bill transporter         2         40000         80000           8 Doggen five filtband-op + RPV         1         818000         858000           4 Doggen five filtband-op + RPV         1         612000         612000	Buildings & site infrastructure Log docking station Billet transporter 8' Dragon Peel Round-up + 85°V 4' Dragon Peel Round-up + 85°V		1 100000 100000 2 200000 400000 4 18000 72000 1 858000 858000 3 612500 1837500	Wood shreader Boiler/Heat Plant Raute Smart Dryir	frastructure improvements 1 refurbishment 1 g System incs. Scanners /Graders 1 seed hopper/conveyor to chipper 1	100000 220000 900000 6525000 100000	100000 220000 900000 6525000 1200000
Veneer conveyors 4 Stacker 2 Waste conveyor 1 Step preparation/building improve 1 Upgrade to Australian Codes 2 Installation and establishment 1 STotal	STAFFIN	G p.a. (3 shifts)	FTE	\$E	Base salary On co	ost	\$Total Cost p.a.		12000 40000 10000 60000 100000 30000 8565000 10.00%
LEASES p.a. number 5	Loader	operator L4 day		2	36830	42%	104597		ual Cost
Front end loader incs fuel/maint 1 Forkillt 2 Use 0.5	Loader o	pperator L4 aft/night		4	42355	42%	240576		93600 52000
\$Total a	Forklift (	operator L3 day		3	35600	42%	151656		78000 223600
STAFFING p.a. (Double shift) FTE S Loader operator L4 day 1	Forklift (	operator L3 aft/night		5	40940	42%	290674		ost \$Total Cost p.a.
Loader operator L4 aft 1 Forkift operator L3 day 2 Forkift operator L3 aft 2	Shreade	r operator L3 day shift		1	35600	42%	50552		42% 151656 42% 348809 42% 68160
Log docking L4 day 1 Log docking L4 aft 1 Peeling L4 day 4	Shreade	r operator L3 aft/night shift		2	40940	42%	116270		42% 136320 42% 202208 42% 465078
Peeling L4 aft 4 Clipping/stacking line assistants L2 2 Clipping/stacking line assistants L2 2	Log docl	king L4 day		2	36830	42%	104597		42% 97384 42% 223985 42% 56800
Supervisor leading hand L6 day 1 Supervisor leading hand L6 alt. 1 Maintenance Staff 1	Log docl	king L4 aft/night		4	42355	42%	240576		42% 130640 42% 156200 42% 184600
Sales, Admin & Accounting Staff 1 General Manager Staff 1	Peeling	L4 day		5	36830	42%	261493		42% 142000 al annual s 2363840
OPERATING COSTS to a	Peeling	L4 aft/night		9	42355	42%	541297		p.a. STotal Cost p.a.
Log resource m3	Dryer op	perator L3 day		4	35600	42%	202208		17625000 4100 615000
Sectricity MW Hours iquip./ maint / hr Inife Grinding	Dryer op	perator L3 aft/nights		8	40940	42%	465078		12500 15000 12000 150000 5700 57000
Rates Premises 50% Premises rental Consumables /m3	Clipping	/stacking line assistants L2 day		2	34290	42%	97384		25000 25000 110000 110000 56250 112500
isel fackaging m3 relight of residual disposal /m3	Clipping	/stacking line assistants L2 aft/night		4	40940	42%	232539		56250 281250 8000 56000 56250 1406250
reight to veneer dryer /m3	Wrappir	ng/Stores/Despatch L2 day		2	34290	42%	97384		al annual c 20453000
ogs - Green Veneer Recovery 75%	Wrappir	ng/Stores/Despatch L2 aft/night		4	39434	42%	223985		
rEVENUE p. a. Green veneer sales m3	Control	room operator/leading hand L6 day		2	40000	42%	113600		56250 27843750
(cutting Av. 3 m3 /hour/lathe) SENERAL EXPENSES p.a.	Control	room operator/leading hand L6 aft/nigl	ht	4	46000	42%	261280		20000
Auditing and Legal 0.5%	Mainten	nance Staff rotat. Shift Staff		3	55000	42%	234300		80000 20000 4000
Mater rates / Fees Office Equipment Phone / Communications	Sales, Ad	dmin & Accounting Staff		3	60000	42%	255600		2800 al annual ș 126800
	General	Manager Staff		1	100000	42%	142000		25000 5000
Training start-up Training ongoing			7	74	\$Tot	al annual :	4427647		5% 10%
NPV discount rate NPV discount rate									
						_			3











### Cash-flow analysis

		GRADING MILL A				•	ING PLANT	- x3 SHIFT:	s															
PRODUCTION 1	TARGET 1	00000 m3 p.a. LO	G SUPP	LY FOR D	RY VENEER																			
		,	YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
EXPENSES																								
CAPITAL COSTS			1	1,698,500																				
WORKING CAPITA	L FOR STAR	T-UP		4,318,212																				
OPERATING COSTS	S				12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600	12,155,600
VEHICLE LEASES					457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600	457,600
GENERAL EXPENSE	ES				223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000	223,000
STAFFING					4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647	4,427,647
TRAINING AND DE	VELOPMEN	T		55,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
SUB-TOTAL EXPEN	ISES (Incs. Ir	nflation p.a. @ 2.5%	6) 1	6,071,712	17,272,847	17,704,668	18,147,284	18,600,967	19,065,991	19,542,641	20,031,207	20,531,987	21,045,286	21,571,419	22,110,704	22,663,472	23,230,058	23,810,810	24,406,080	25,016,232	25,641,638	26,282,679	26,939,746	27,613,239
DEPRECIATION				0	1,169,850	1,169,850	1,169,850	1,169,850	1,169,850	1,169,850	1,169,850	1,169,850	1,169,850	1,169,850	0	0	0	0	0	0	0	0	0	0
			1	6,071,712	18,442,697	18,874,518	19,317,134	19,770,817	20,235,841	20,712,491	21,201,057	21,701,837	22,215,136	22,741,269	22,110,704	22,663,472	23,230,058	23,810,810	24,406,080	25,016,232	25,641,638	26,282,679	26,939,746	27,613,239
REVENUE (Incs. Pr	rice Increase	e p.a. @ 2.5%)																						
Dry veneer \$/m³				0	22,660,000	23,226,500	23,807,163	24,402,342	25,012,400	25,637,710	26,278,653	26,935,619	27,609,010	28,299,235	29,006,716	29,731,884	30,475,181	31,237,060	32,017,987	32,818,436	33,638,897	34,479,870	35,341,867	36,225,413
412		EBIT	-10	6.071.712	4.217.303	4,351,982	4.490.028	4.631.525	4.776.559	4.925.220	5.077.596	5.233.782	5.393.873	5.557.966	6.896.012	7.068.412	7.245.122	7.426.250	7.611.907	7,802,204	7.997.259	8,197,191	8,402,121	8,612,174
m³ p.a.		NET CASH FLOW	-10	6,071,712	5,387,153	5,521,832	5,659,878	5,801,375	5,946,409	6,095,070	6,247,446	6,403,632	6,563,723	6,727,816	6,896,012	7,068,412	7,245,122	7,426,250	7,611,907	7,802,204	7,997,259	8,197,191	8,402,121	8,612,174
55000	CUM	IULATIVE CASH FLO	W -10	6,071,712	-10,684,558	-5,162,726	497,152	6,298,527	12,244,936	18,340,006	24,587,452	30,991,085	37,554,808	44,282,624	51,178,636	58,247,048	65,492,171	72,918,421	80,530,328	88,332,532	96,329,791	104,526,982	112,929,103	121,541,277
DISCOUNT RATE	5%	NPV 5%							3,323,725					21,039,031					40,261,404					57,301,806
DISCOUNT RATE	10%	NPV 10%							861,566					13,119,297					23,664,969					31,073,467
		IRR PAYBACK YEAR	5.0						12%					26%					29%					30%





### Cash-flow analysis

	YEAR	0	1	2	3 4	5	5	6 7		3 9		10	11	12	13	14	15	16	17	18	19	20
PENSES																						
PITAL COSTS		598 500			=0()																7	
	<b>REVENUE</b> (Incs. Pr	ice Ind	crease	p.a. @ 2	.5%)																455 600	42.455.6
PERATING COSTS EHICLE LEASES	Dry veneer								0 22	660,00	0 2	23,226,50	00	23,807,1	63	24,402,	342	25,012,4	100	25,637,710	155,600 457,600	12,155,60 457,60
NERAL EXPENSES	\$/m³																				223,000	223,0
TAFFING	412			EBIT			10	071 71		217 20	2	4 2E1 0	ດາ	4 400 0	20	4 621	E 2 E	4 776 E	· E O	4 025 220	427,647	4,427,6
RAINING AND DEVELOP				EBII			-10	5,071,712	<b>2</b> 4,	217,30	3	4,351,98	82	4,490,0	28	4,631,	525	4,776,5	159	4,925,220	9,000	9,00
IB-TOTAL EXPENSES (Ir	m³ p.a.			NET C	ASH FLOV	V	-16	5,071,712	2 5,	387,15	3	5,521,83	32	5,659,8	78	5,801,	375	5,946,4	109	6,095,070	939,746	27,613,2
EPRECIATION	55000		CUMU	ILATIVE	CASH FLC	W	-16	5,071,712	2 -10	684,55	3 -	-5,162,72	26	497,1	52	6,298,	527	12,244,9	36	18,340,006	0 0	27,013,2
																					939,746	27,613,2
	DISCOUNT RATE	5%		NPV 5	0/													3,323,7	725			
				_																	341,867	36,225,4
\$/m³	DISCOUNT RATE	10%		NPV 1	0%													861,5	66		341,607	30,223,41
412			1	IRR														13	2%		402,121	8,612,17
m³ p.a.				PAYBA	CK YEAR	5.0	0														402,121	8,612,17
55000 L			, , , , , , , , , , , , , , , , , , , ,							,						, , , ,						121,541,2
ISCOUNT RATE 5%	NPV 5%					3.32	3,725				2	21,039,031					40,261,4	104				57,301,80
ISCOUNT RATE 10%	NPV 10%						1,566					13,119,297					23,664,9					31,073,46
	IRR PAYBACK YEAR 5.0						12%					26%					2	9%				30





### **Product prices**

Product	Source	\$AUD per m <sup>3</sup>
Veneer - Non-structural eucalypt RPV	Various Asian suppliers - Alibaba.com	170-300
Plywood - Non-structural eucalypt core birch/poplar faced plywood board	Various Chinese suppliers - Alibaba.com	250-450
Plywood - Non-certified eucalypt core form plywood.	Various Chinese suppliers - Alibaba.com	200-450
Plywood - F14 stress graded form plywood (FORMrite – Carter Holt Harvey)	Australian retailers	1654
Plywood - F11 stress graded concrete form plywood (FORMrite – Carter Holt Harvey)	Australian retailers	1420
LVL Carter Holt Harvey hySPAN F17 graded (200 x 63 mm)	Australian retailers	1650
Plywood - General purpose plywood (most likely imported)	Australian retailers	1160





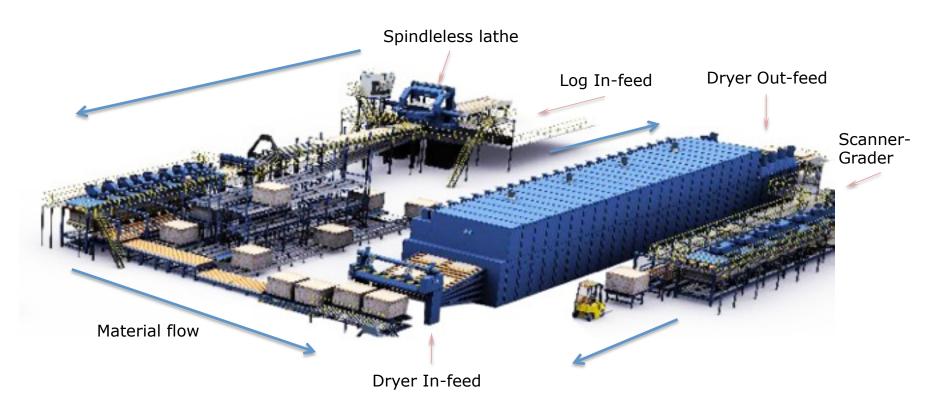
### Sensitivity analysis

Enterprise Option	Product Price	ase Assumption Costs IRR 12% at year 5	New IRR -5% @ 5 years	New IRR +5% @ 5 years	New IRR +10% @ 5 years
<b>Option 1</b> . A single low cost RPV line at an existing sawmill operating a single day shift	Green veneer product price \$/m³	\$271.00	-11%	31%	48%
<b>Option 2</b> . Two low cost spindleless RPVs at an existing sawmill operating two, day shifts.	Green veneer product price \$/m <sup>3</sup>	\$259.00	-16%	36%	55%
<b>Option 3</b> . Two High quality spindleless RPV line operating two, day shifts.	Green veneer product price \$/m <sup>3</sup>	\$235.00	-5%	28%	42%
<b>Option 4</b> . Four high quality spindleless RPV lines operating three shifts.	Green veneer product price \$/m <sup>3</sup>	\$233.00	-7%	29%	44%
<b>Option 5</b> . Independent veneer drying and grading facility. New automated dryer and scanner/grader, operating three shifts.	Dry veneer product price \$/m <sup>3</sup>	\$494.00	-3%	25%	37%
<b>Option 6</b> . Integrated Mill - Four high quality RPV lines, and an automated dryer and scanner/grader operating three shifts	Dry veneer product price \$/m <sup>3</sup>	\$412.00	1%	22%	31%





### Medium-large scale – Integrated dry veneer mill.



Source: Raute (www.raute.cn/).





### Conclusions: Options 1 and 2 - low cost peeling lines

- A high green veneer sale price is needed to achieve an attractive Internal Rate of Return at five years.
- The veneer produced on these types of lathes will have reasonably low quality surface finish and a relatively wide thickness range, meaning it is unlikely to command a high veneer sale price.
- It is therefore unlikely that these options would be financially attractive enough for existing sawmillers to consider joint RPV/sawmill operations in regional Tasmania.





Conclusions: Options 3 and 4 - high quality peeling lines

- Processing efficiency is improved by approximately 20% when compared to the lower cost spindleless lathes. This increased efficiency substantially and reduced the green veneer sales price set to achieve the IRR benchmark.
- The higher quality green veneer is more likely to produce a superior quality dry veneer in terms of surface finish and thickness range, that would command a higher market price.





Conclusions: Option 5 - independent drying and grading operation

- For an independent drying/grading enterprise without onsite peeling, a relatively high dry veneer product price is required to achieve the IRR benchmark. This means that any green veneer supplied for drying and then subsequent sale, would need to be of superior quality and of a consistent thickness.
- The main shortcoming of the stand-alone drying-grading facility is that all the fuel required would need to be supplied from external sources.
- Establishing the drying and grading facility at an existing heat plant, was considered the only possible option that would make this enterprise financially feasible at the chosen 12% IRR benchmark.





### Conclusions: Option 6 – Integrated peeling and drying operation

- Integrating high quality spindleless RPV production lines with an automated drying and grading facility was the most financially attractive option examined.
- The peeling produces a residual that can be processed at minimal cost for use as a fuel source for the heat plant and transportation costs between peeling and drying/grading facilities are eliminated, both factors substantially reducing the dry veneer price to achieve the benchmark 12% IRR benchmark target.
- Handling equipment can be utilised across the whole facility and labour can be multi-skilled to operate anywhere across the plant.





#### Acknowledgements

This work was partially funded by the Commonwealth Department of Industry through a grant to the University of Tasmania as part of the National Centre for Future Forest Industries.

The authors would like to thank Fitzpatrick Woods Consulting Pty Ltd., for providing information gathered during a previous study. Thanks also to Paul Adams and Gordon Pearn of Forestry Tasmania for their assistance during this project. Greatly appreciated was the review by Greg Hickey of Ta Ann Tasmania and Stephen Jarick of Forestry Tasmania. We also wish to give a special thanks to Jukka Siiriäinen, President of Raute Group Asia Pte Ltd., for his expert advice and assistance on line equipment and with productivity estimates.





Thank you for listening

Questions?