Background

Forestry Tasmania, John Holland Development and Investments (JHDI), and National Power (NP) have been examining the feasibility of wood-fired power from forest residues at a range of sites in Tasmania. Some conservation groups have opposed the use of forest residues for bioenergy, particularly residues derived from native forests. There is a need for factual information on the issues relating to energy production from wood that can inform all stakeholders and assist public debate.

To further scientific input, Forestry Tasmania (also acting on behalf of JHDI and NP) contracted CSIRO Forestry and Forest Products to assemble a suitably qualified team and to undertake a review of the science relevant to the sustainable use of residues from wet forest (see Map 1) in Tasmania.

The specific objective of the task was to: 'review the science associated with using native and plantation forest harvesting residues as fuel for electricity production and produce a detailed report on the findings'.

The scope of the review was:

- limited to the economic recovery and use of energy from residues arising from native and plantation forest operations in Tasmania managed in compliance with the Tasmanian Forest Practices Code, relevant District Forest Management Plans, and the Regional Forest Agreement, Tasmania. The review also took account of prescriptions proposed in addition to the Forest Practices Code to mitigate the effects of forest harvesting.

- to include an assessment of the implications for:

    - net greenhouse gas emissions taking into consideration current forest management regimes and potential future management regimes, including conversion of native forest to plantations and the long-term management of those plantations.

    - ecological sustainability as defined in Regulations 7 and 8 of the Renewable Energy (Electricity) Regulations 2001 taking into consideration current forest management regimes and practices including those set out in the Tasmanian Forest Practices Code 2000.

- to document the science currently available that is relevant to the topic

- confined to analysis of Tasmania's wet eucalypt forests (Map 1), and the use of the proposed Southwood project and its associated forest catchment (Map 2) as a case study for quantitative analysis of greenhouse gas (GHG) balance. To facilitate this analysis, Forestry Tasmania provided the consultants with an agreed set of data (Tables 1 a, b and Section 8) on forest biomass, harvest removals, fuel characteristics, and growth rates for native regrowth forests and plantations.

The review team, and their associated expertise, comprised:

Dr John Raison, CSIRO (Project Manager) – soils, forest ecology

Dr Bob McCormack, CSIRO – forest planning and operations

Dr Miko Kirschbaum, CSIRO – greenhouse science

Dr Peter Attiwill, University of Melbourne – nutrient cycling and forest growth, biodiversity of vascular plants

Dr Alastair Richardson, University of Tasmania – zoology, biodiversity of invertebrates and non-vascular plants.

The team was ably assisted by staff from Forestry Tasmania and by Dr Mark Burgmann (University of Melbourne) who commented on aspects of biodiversity conservation relating to coarse woody debris.

The review process consisted of:

- a detailed briefing by senior staff from Forestry Tasmania and the Forest Practices Board.
- a field visit to the proposed Southwood project site and a range of relevant forest operations located nearby. This involved discussions with Forestry Tasmania field staff, and representatives of the proponents of the Southwood bioenergy plant.
- a 2-day workshop to discuss critical issues and draft recommendations.
- incorporation of feedback from the clients on a draft report prepared by the consultants.
- preparation of the final report.

Table 1(a) Commercial and residue components assessed for fuelwood utilisation in coupes in the Southwood Catchment (m3 / ha, green or wet)

Components	Mature	Multi Aged	Regrowth	Source
Standing Non Merchantable Volume (Green)	324	259	174	FI - Sum of branch, stem, stumps, non merchantable timber.
Dead Standing	12	35	42	CFI (1)
Understorey (4)	38	12	16	FI
Downers (Fuel)	256	191	183 (3)	FI, CFI (2), ML less dead standing estimate
Downers (Residual)	94	75(3)	75(3)	FI, CFI (2) ,ML
Merchant Volume Sawlog (5)	80	74	67	W
Merchant Volume Pulpwood (5)	392	376	333	W
Total Biomass	1196	1022	890	

Notes

FI = Fuelwood Inventory 2002 – Report on potential post harvest residue levels following clearfelling in Tasmanian native forests (Forestry Tasmania, unpubl.) (Huon & Derwent, excluding Murchison data)
ML = Biomass assessment by Murray Lawrence
CFI = (1) CFI plot analysis 1999
= (2) CFI plot analysis April 2002
W = Strategic volumes from Woodstock model used for 2002 wood review.

(3) Derived from a combination of sources.
(4) Stems > 10 cm
(5) For 100% clearfall areas only

Table 1(b) Dry weight (tonnes/ha)

Components	Mature	Multi Aged	Regrowth	Source
Standing Non Merchantable Volume (Green)	175	140	94	FI - Sum of branch, stem, stumps, non merchantable timber.
Dead Standing	9	26	31	CFI (1)
Understorey (4)	21	6	9	FI
Downers (Fuel)	138	103	99 (3)	FI, CFI (2), ML less dead standing estimate
Downers (Residual)	51	41(3)	41(3)	FI, CFI (2) ,ML
Merchant Volume Sawlog (5)	43	40	36	W
Merchant Volume Pulpwood (5)	212	203	180	W
Total Biomass	649	559	490	

Conversion Factor tonnes/m3 = 0.54 (Source Farm Forestry Toolbox).
Except Dead Standing Trees = 0.74

Definitions of terms as they are used in this report

Wet eucalypt forest
Wet eucalypt forest is a Tasmanian term used to define forests dominated by species such as *Eucalyptus regnans*, *E. delegatensis* or *E. obliqua*. Wet eucalypt forests are called *mixed* forest where there is a dense understorey of rainforest species, or wet sclerophyll forest where there is an understorey of a variety of broad-leaved shrubs and trees.

Coarse woody debris (CWD)
Coarse woody debris includes all of the larger pieces of wood that have fallen (trees, large branches) or have been created (stumps left from broken trees) through natural processes in a forest. CWD is an ecologically-derived term that draws attention to the processes of death and decay through which habitat is provided for forest plants (lichens, mosses etc) and animals. CWD is therefore an important component of habitat and diversity.

Debris following timber harvesting obviously has not formed from ecological processes. In production forestry, this debris is called residual wood, logging debris, or slash, some of which could be managed so that it becomes CWD.

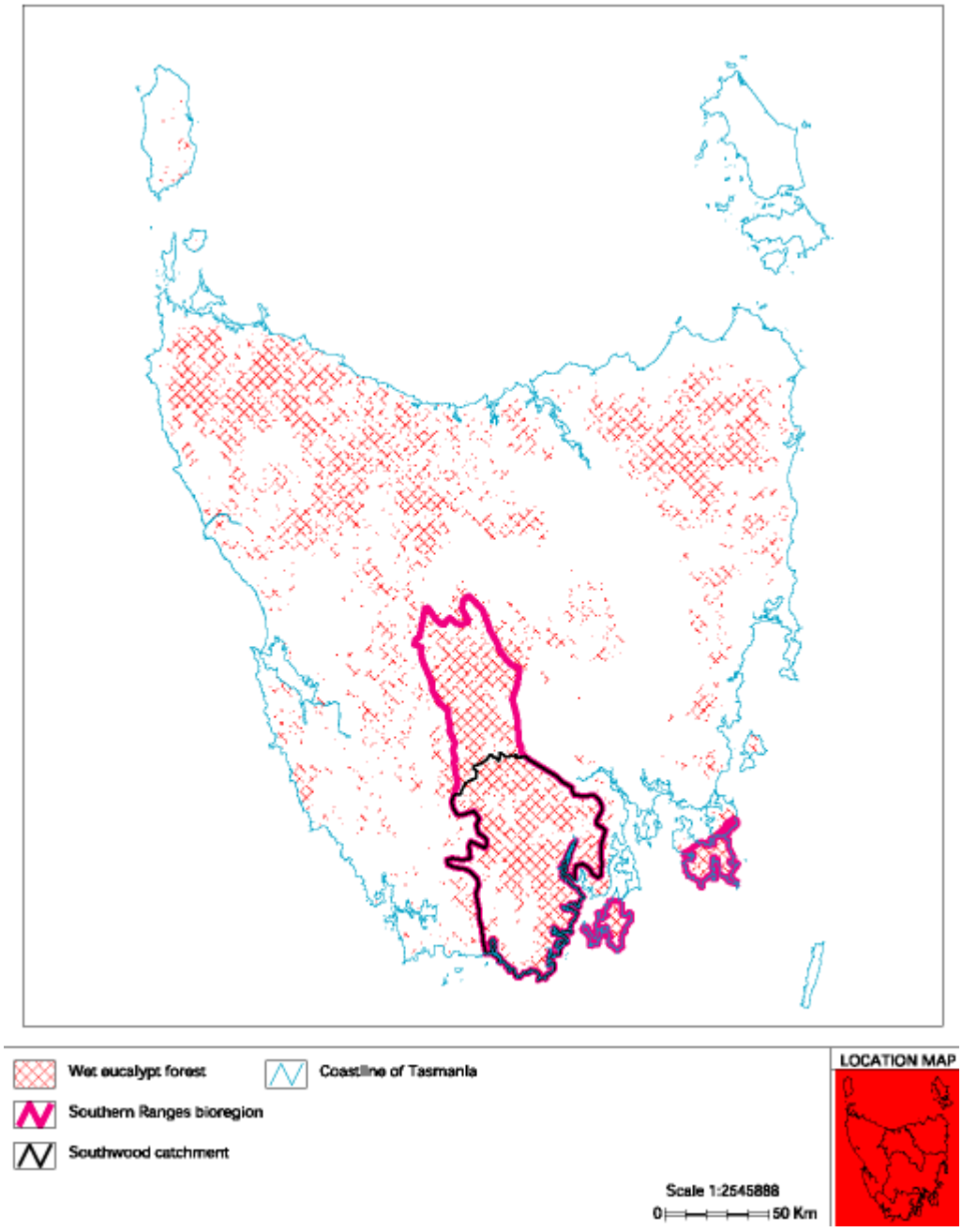
Mature forest
Mature forest is forest dominated by eucalypts that regenerated after a single, major disturbance such as fire more than 110 years ago.

Multi-aged forest
Multi-aged forest is forest dominated by eucalypts that regenerated after a series of 2 or more surface fires that allowed regeneration, thereby resulting in 2 or more age classes.

Regrowth forest
Regrowth forest is forest dominated by eucalypts that regenerated after fire or logging less than 80-100 years ago.

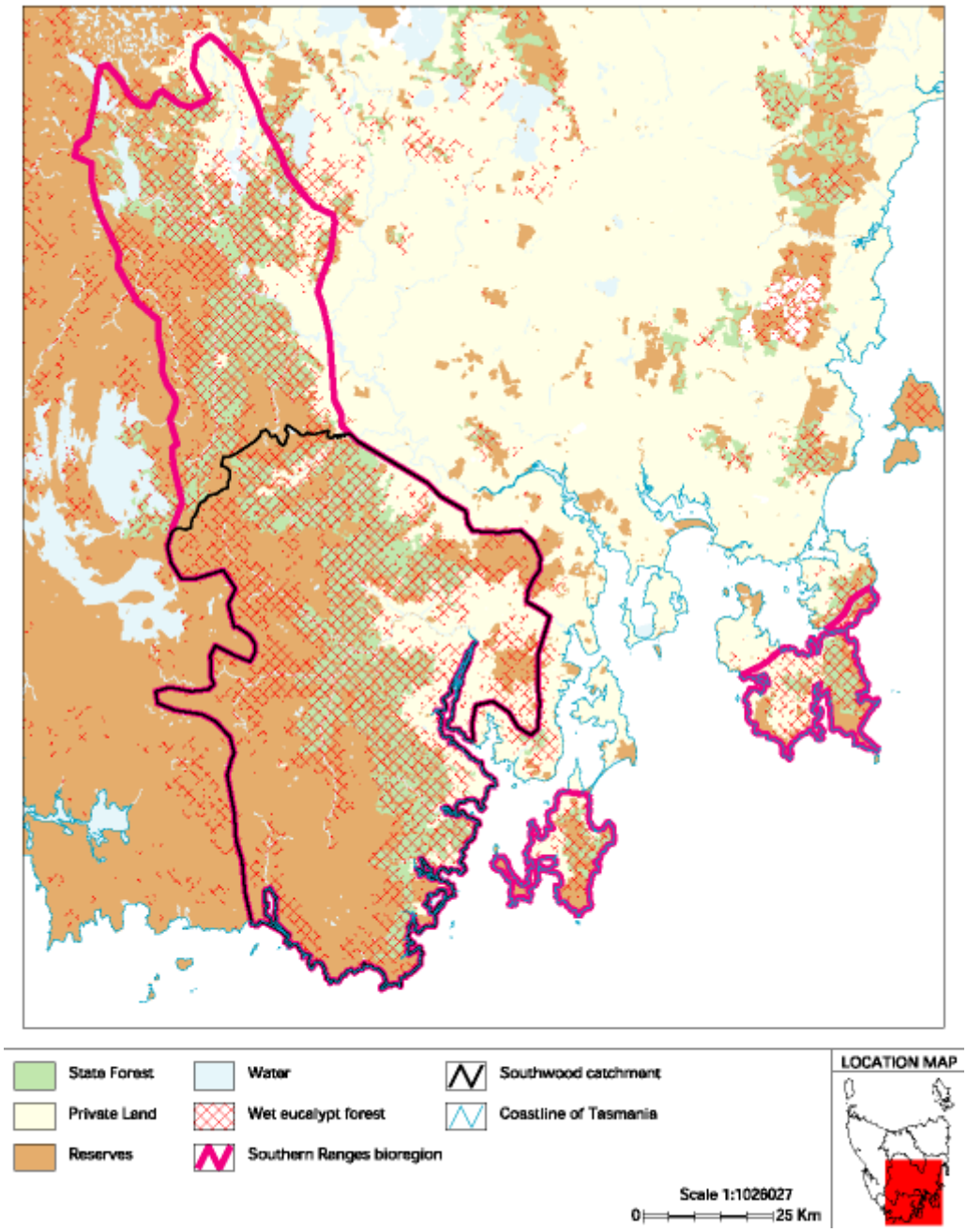
Fuelwood
Fuelwood is wood that is not suitable for sawlogs or pulpwood; energy-wood is therefore residual wood, some of which can be harvested for energy production.

Map 1 - Distribution of wet eucalypt forest in Tasmania



Please note: (1) Bruny Island and the Tasman Peninsula are not part of the proposed Southwood fuelwood supply area. (2) Areas in Reserves are not available for harvesting. (3) This is a colour map - the Bioregion and catchment boundaries will be difficult to distinguish on a black & white version.

Map 2 - Land tenure in the Southern Ranges Bioregion and Southwood catchment



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