Australian Government
Department of Resources, Energy and Tourism

ENHANCING AUSTRALIA'S ECONOMIC PROSPERITY

ENERGY WHITE PAPER

SUBMISSION COVER PAGE

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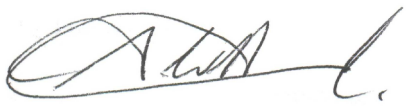
Signature  Date 4 June 2009

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Submission to Department of Resources, Energy and Tourism

on the

Strategic Directions Paper

for

National Energy Policy – Framework 2030

June 2009

RECOMMENDATIONS

1. Regulatory barriers restricting the potential for forest and wood residues to be used for renewable energy production should be addressed to:
   - enhance Australia's energy security;
   - provide access to the financial benefits of the expanded RET and the CPRS;
   - encourage the commercial application of wood-based renewable energy technologies.
2. The definition of "wood waste" in the existing Commonwealth renewable energy regulations should be clarified in the *Expanded National Renewable Energy Target* scheme to align forest and renewable energy policies.
3. The restriction on eligible plantations in the existing renewable energy regulations should not be carried through to the *Expanded National Renewable Energy Target scheme.*

INTRODUCTION

In February 2009, the National Association of Forest Industries (NAFI) recommended to the Department of Climate Change that the regulations for the *Expanded National Renewable Target Scheme* (RET) be amended to include in the scheme energy generation from wood waste[1].

These recommendations were based on the potential of the forest industry to make a significant contribution to Australia's efforts to address climate change through the carbon storing capabilities of forests and wood products, and through the use of wood waste to increase renewable energy production.

[1] NAFI, *Submission to the Department of Climate Change on the Expanded National Renewable Energy Target Scheme – Exposure Draft Legislation*, February 2009

This submission supplements those recommendations by focusing on the role forests and wood products can play in enhancing Australia's energy security while meeting environmental policy objectives.

A NAFI study has shown that at existing rates of timber production, the quantity of woody biomass available is enough to produce, in aggregate, 3000 gigawatt hours (GWh) of electricity a year[2]. This represents about 7 per cent of the 45,000 GWh required to meet the expanded RET of 20 per cent of Australia's electricity production. The Clean Energy Council's Bioenergy Roadmap[3] includes pulp and paper manufacturing in its projections and puts the long term potential at more than 5000GWh.

This can make a significant contribution to energy security because the resource is inherently located in rural Australia and is necessarily distributed where the forests are. It is therefore most suited for application to small power stations feeding small enterprises and communities – that is, those most likely to feel the squeeze in any tightening of supply from baseload electricity generators.

At the same time, woody biomass has potential to contribute to the production of liquid biofuels, such as ethanol and diesel. This is seen as a secondary priority at present but, as Australian petroleum supplies dwindle and the "peak oil" scenario is realised, the current varieties of feedstock for these fuels could be extended into forest and wood wastes to add to Australian supplies as part of the energy security mix.

However, significant policy and regulatory barriers, at both national and State levels, stand in the way of the use of woody biomass resource and its expansion. NAFI again calls on the Federal Government to remove those barriers and include forests and wood waste as suppliers of renewable energy to Australia.

Attention is also required to research and development across the bioenergy industry to address innovations in forestry practices, logistics and applications. R&D could be particularly applied to finding the place in the Australian market of such promising existing technologies as pelletising and gasification.

ENERGY OUTCOMES

Forests and wood products can be the sources of increased electricity supply in the immediate future and, longer term, liquid fuels such as ethanol.

The Carbon Pollution Reduction Scheme (CPRS) is intended to reduce Australia's net greenhouse emissions 25 per cent by 2020 over 2000 levels if international agreement is reached to limit global emissions 450 parts per million. A key mechanism of the CPRS is an increase in the generation of electricity from renewable energy sources to 20 per cent of Australia's total electricity supply.

[2] MBAC Consulting, *Wood Waste for Renewable Energy*, funded by FWPRDC and the Australian Government, 2006.
[3] Clean Energy Council, *Australian Bioenergy Roadmap*, September 2008.

Liquid biofuels, such as ethanol and biodiesel, will continue to be manufactured mainly from non-forest product sources in the foreseeable future but, as Australia's petroleum production continues to decline and as demand for renewables in liquid fuels rises (especially under the influence of government policy), unlocking the potential in forests and products will become increasingly feasible.

- Electricity

Just 0.5 per cent of the fuels generating Australia's electricity supply come from biomass – wood waste and bagasse[4]. Gross electricity generation in Australia is projected to grow at an average 2 per cent a year until 2030[5] and the use of biomass at an average 5.6 per cent to achieve a usage of just more than 1 per cent – doubled but still hardly noticeable.

These ABARE projections were compiled in the absence of the CPRS and the enhanced RET, nor do they include any estimations of the impacts of climate change on the economy. At the least, Australian Government climate change policy will result in a change in the fuel mix used in power generation as the policy forces a shift away from coal. Woody biomass is available as an attractive fuel source option in certain circumstances.

- Liquid biofuels

Australia's transport fuel mix is forecast to change substantially in response to declining domestic petroleum production, rising international oil prices (possibly because of world supply peaking) and Government policy aimed at reducing greenhouse gas emissions. Oil prices associated with a peak in global oil production could result in petrol prices in the range of A$2 to as high as A$8 per litre by 2018, depending on how rapidly alternative fuels and vehicles become available and the share of diminishing global oil supplies Australia can acquire[6].

The Future Fuels Forum report indicates that significant economic quantities of additional liquid biofuels will not be available until after 2020 and greater research and development are needed. The implication for forest and wood products is that their potential will not open up until after that. In terms of this submission, liquid biofuels from forests and wood waste in the energy mix remain a secondary consideration.

ENERGY SECURITY

The intended CPRS-caused rise in the cost of coal-fired electricity generation will open an opportunity for much greater growth in the use of alternative fuels such as biomass than presently projected. In terms of the total electricity supply, biomass will remain a minor fuel and therefore contribute only a small proportion of the nation's energy security.

But for special reasons associated with the nature of the resource itself, this contribution is potentially significant. As the Clean Energy Council notes[7]:

[4] ABARE, *Energy in Australia 2009*, April 2009.
[5] ABARE, *Australian Energy: National and State Projections to 2029-30*, December 2007
[6] CSIRO, *Fuel for thought: the future of transport fuels*, Future Fuels Forum, June 2008
[7] Clean Energy Council, *Australian Bioenergy Roadmap*, September 2008

> Due to the distributed nature of biomass resources, bioenergy generators will tend to be relatively small and located near the communities they serve. This is in contrast to fossil fuel generation plants, which usually have large generation capacities and are located far from their demand.
>
> This characteristic of bioenergy plants has an added value for reliability and security of energy supply as the failure of a single small plant to deliver power has less of a system impact than a forced outage at a large centralised generator.
>
> For rural or regional areas, bioenergy reduces the system risk factor of disrupted electricity supply caused by incidents including accidents, or severe weather conditions such as storms and lightning.
>
> In essence, bioenergy plants add to the diversity of energy supply, contributing to security of supply and strengthening weaker outlying areas of the electricity grid.

The electricity supply-demand balance in the National Electricity Market area (eastern Australia) is growing tighter. The latest 10-year projections[8] from the National Electricity Market Management Company (NEMMCO), based on existing capacity and firm, announced power station projects, show that investment in new generation will be required by 2013-14 to avoid a shortage of reserve capacity in the national grid. This is an overall picture – in Victoria and South Australia the balance has already tipped into the negative.

ABARE projects[9] gross electricity generation in Australia to rise from 257,000 GWh in 2005-06 to 415,000 GWh in 2029-30. This represents an increase of 62 per cent at an average rate of growth of 2 per cent a year.

In 2005-06, 92 per cent of electricity was generated from fossil fuels (coal, oil and gas), and 8 per cent from renewables, including hydro, wind, biomass, biogas and solar. By 2029-30, the share of gas used in electricity generation is projected to grow from 15 per cent to 24 per cent. A corresponding decrease is projected in the share of electricity generated from coal from 76 per cent to 67 per cent. Wind, biogas and biomass energy are projected to account for the majority of the increase in electricity generation from renewable sources, reflecting the impact of government policy.

These projections from both NEMMCO and ABARE do not take account of the impact of the CPRS, nor the expanded RET. Both of these major government policies are widely expected not only to reduce further the share of coal but also to block the construction of new coal-fired baseload generation, possibly close some generators and thus threaten a shortage of baseload power.

Whether the most drastic scenarios play out or not, it is clear that Australia will have a need for extra electricity generation capacity in the medium term. Security of supply is not assured beyond 2013-14. Some of the additional capacity can be based on woody biomass fuel.

WOODY BIOMASS ELECTRICITY GENERATION CAPACITY

Australia produces less than 500GWh a year of electricity from the residues of forestry, sawmilling and other wood processing operations, such as pulp and paper manufacture. The Clean Energy Council estimates[10] there is potential to boost that sixfold by 2020 and 12-fold over the long term from a total resource of 8.8 million tonnes.

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[8] NEMMCO, *Australia's National Electricity Market Statement of Opportunities 2008*, October 2008.
[9] ABARE, *Australian Energy: National and State Projections to 2029-30*, December 2007
[10] Clean Energy Council, *Australian Bioenergy Roadmap – Resource Appraisal*, September 2008

Bioenergy production potential from native forest wood waste should remain relatively constant, depending on continuing access to forests. But if the plantation estate keeps increasing at the rate of recent years (75,000ha a year) through to the year 2050, there will be around 5 million hectares of plantations by 2050. This may be optimistic, given concerns about land availability and investment levels, but the potential exists for enough forestry wood waste to produce an aggregate of more than 3500GWh of electricity deep into the future.

It is notable from the table below the variety of technologies that may be employed to convert the fuel to electricity. These are the result of significant research and development programs across the timber and energy industries and ongoing R&D will be required to ensure the long term sustainability of woody biomass-generated electricity (see Applications and Technology, below)

Wood-related waste electricity generation potential[11]

Biomass resource	Sub-resource	Quantity (million tonnes)	Conversion technologies	Existing capacity (GWh)	Electricity generation potential				
					Extra capacity (MW)	2020 extra (GWh)	Total 2020 capacity (MW)	Total 2020 (GWh	Long term (GWh)
Forestry residues	Native forest (public)	2.2	Anaerobic digestion/reciprocating gas engine Direct combustion/steam turbine Briquetting & pelletising Gasification/gas turbine Co-firing	79	40	300	344	2442	4554
	Native forest (private)								
	Plantation (public)	3.8			180	1348			
	Plantation (private – incl. farm forestry)								
Wood waste	Sawmill and woodchip (wood processing) residues	2.8	Anaerobic digestion/reciprocating gas engine Direct combustion/steam turbine Briquetting & pelletising Gasification/gas turbine Co-firing Charcoal		90	674			
			Pyrolysis		8	41			
Pulp and paper mill	Black liquor		Direct combustion/steam turbine Gasification/gas turbine	285	11	80	49	365	365
	Wood waste		Direct combustion/steam turbine	60	3	25	11	85	85
Recycled paper mill	Wet wastes		Anaerobic digestion/reciprocating gas engine	2	1	6	1	8	8
	Recycling wastes		Direct combustion/steam turbine	12	5	36	6	48	48
Total		8.8		438	335	2510	412	2948	5060

Source: *The potential for wood in a sustainable and competitive Australian renewable energy industry 2004*, MBAC Consulting Group for NAFI; Australian Plantation Products and Paper Industry Council (A3P); *BCSE Renewable Energy Power Plant Register 2007*

NAFI's expanded RET submission said that maximising the use of wood waste resources currently available in Australia has the potential to:[12]

- deliver over $800 million of direct investment in renewable energy facilities;
- create over 2300 new direct jobs; and
- supply renewable electricity to at least 400,000 houses.

[11] ibid

[12] MBAC Consulting, *Wood Waste for Renewable Energy* Project, 2006, funded by FWPRDC and Australian Government

The submission supplemented earlier research, incorporated into the Clean Energy Council table, with a breakdown of the forestry contribution, as follows:

Estimated available forestry wood waste[13]

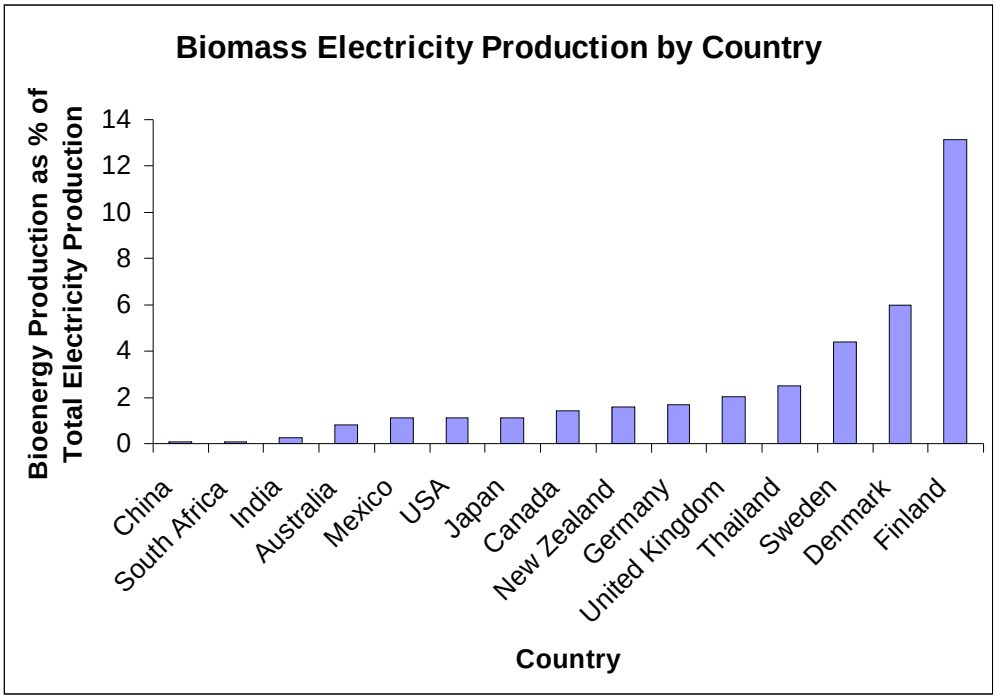
Resource		Potential resource dry wood equivalent (Mt)	Available (green wood equivalent) (Mt)	Available (as supplied) (Mt)	Available (dry wood equivalent) (Mt)
Harvest residues	Native forest	2.2	0.3	-	0.15
	Plantation	2.0	2.0	-	1.00
Wood processing residues		2.8	0.8	-	0.42
Salvaged wood residues		5.3	-	1.0	1.00
TOTAL		12.3	3.1	1.0	2.6

This highlights the gap between currently available forestry wood resources and potential resources, without even considering what the paper industry might supply.

APPLICATIONS AND TECHNOLOGY

Australia lags many other OECD countries in the use of woody biomass in energy production[14].

In the United States, bioenergy generates 40,000GWh of electricity – equivalent to the entire grid-connected electricity demands of Western Australia, South Australia and Tasmania combined. More than 14 per cent of Finland's electricity generation comes from bioenergy. In Sweden, bioenergy makes up 5 per cent of the electricity supply. Even in Austria, more than 4% of electricity supply comes from bioenergy.



[13] ibid
[14] International Energy Agency, 2007.

Much of the technology is in place to facilitate the production of renewable energy from woody residues. For instance[15]:

- Some existing coal-fired power plants can be adapted to co-firing. A number of coal-fired plants in Victoria, Western Australia and New South Wales have already operated in co-firing mode.
- Small-scale power plant technology based on 100 per cent wood feedstock exists overseas.
- Secondary processing pilot technology for bioenergy production using woody cellulosic feedstock exists but is untested in the market place. One example is the integrated wood processing renewable electricity demonstration plant, using mallee tree feedstock at Narrogin, Western Australia. Another is the pelletising of woody wastes in WA and Victoria, now being trialled for export to Europe.

The Narrogin project offers renewable electricity generation and the potential to commercialise charcoaling and carbon activation technology. The demonstration plant showed, *inter alia,* that[16]:

- Renewable electricity can be produced for sale.
- The overall process technology can be scaled up from batch to continuous operation.
- The biomass delivery system can be developed.
- The proposed continuous harvesting system has benefits in terms of quality and cost.

Pelletised woody biomass is a feedstock in Europe for co-firing with coal and increasingly for use alone in dedicated plants[17]. In co-firing there, blending ratios are typically 10 per cent but R&D is being directed at increasing that to 20 per cent. Where pellets are being used alone, they are replacing raw biomass. An important factor is that the pellets are handled using the same infrastructure as coal.

The bringing of plants like these up to commercial operation requires a sustained R&D effort – for example, in making feedstock and existing coal-fired power stations compatible for co-firing. Harvesting and handling the woody waste are other areas in which R&D could be deployed, given that, for example, forest residues are necessarily on the ground, irregular in shape and size and somewhat scattered.

In Victoria in March 2009, an American biofuels company[18] canvassed the potential for using woody waste for producing ethanol through its own digestion technology. As an additive to petrol, ethanol contributed about 0.5 per cent of total petrol consumption in 2007. Since then ethanol production capacity has grown to about 270 million litres (Ml) a year, still representing less than 1 per cent of petrol consumption.

The company promoting its technology claimed it could produce 380Ml from about 1 million tonnes of woody biomass. The current total national supply of such feedstock, including pulp and paper manufacturing residues, is 8.8Mt. Intensive R&D would be required to turn this and other such processes into commercial propositions.

[15] Clean Energy Council, *Australian Bioenergy Roadmap – Resource Appraisal*, September 2008
[16] Verve Energy. http://www.verveenergy.com.au/mainContent/sustainableEnergy/OurPortfolio/iwp.html
[17] Plantation Energy Limited, *Submission to the Senate Select Committee on Fuel and Energy*, December 2008.
[18] Coskata Inc, presentation to industry, Melbourne, March 2009. www.coskata.com

REGULATORY BARRIERS

The costs of wood-based bioenergy plants, compared with coal-fired plants have been a major limitation on investment to date. Dedicated biomass facilities could generate renewable energy at lower cost than either solar or wind facilities – provided investment were forthcoming. The most cost-effective bioenergy option is the co-firing of coal with biomass.

Financial benefits from national policy measures, such as the expanded RET and greenhouse gas emissions trading under the CPRS, will be critical in improving the attractiveness, competitiveness and subsequent investment in bioenergy facilities based on woody biomass.

However, existing regulations covering forestry biomass and not proposed to be amended in the expanded RET, and similar provisions in various State regimes, limit the eligibility of forestry biomass as a renewable energy source – and thereby restrict access to the financial benefits available to renewable energy under the expanded RET and the CPRS that could overcome the cost constraint[19].

In the Commonwealth RET regulations, two key provisions are designed to prevent the harvesting of trees from native forests for renewable energy certificates (REC), rather than for high value products (sawlogs), and to prevent native forest being cleared to grow biomass.

These provisions interfere with the strict regulations under which native forests are logged and managed, especially in regional forest agreement (RFA) areas, and have produced perverse outcomes. These regulations should be amended to clarify eligibility of forestry-sourced biomass for renewable energy and thereby facilitate the maximum use of the resource.

Eligibility criteria should be based on the sustainability of forest management as determined through existing processes and frameworks (such as RFAs). That is: wherever forests are managed under Commonwealth and/or State forest management regulations, the products of any harvesting operation should be eligible to produce renewable energy under the *Expanded National Renewable Energy Target Scheme.* In that way greenhouse, energy and forestry policy would be harmonised.

The application of independent third-party forest certification – such as the Australian Forestry Standard (AFS), Programme for the Endorsement of Forest Certification schemes (PEFC), or Forest Stewardship Council (FSC) – could also be used as an eligibility requirement.

- Key regulations

The Commonwealth's *Renewable Energy (Electricity) Regulations 2001* include two requirements that are crucial restrictions on the use of forest wood waste (Attachment A).

Regulation 8 (2) (b) (i) and 8 (3) – high-value process. These clauses limit the eligibility of forestry wood waste. Biomass from a native forest must be "harvested primarily for a purpose other than biomass for energy production". The primary purpose of a harvesting operation is

[19] Only 2.7% of the renewable energy certificates created by the Mandated Renewable Energy Target scheme since 2005 have been for bioenergy.

taken to be a high-value process "only if the total financial value of the products of the high-value process is higher than the financial value of other products of the harvesting operation" – that is the value of sawlogs must be greater than that of by-products, such as renewable energy biomass.

In practice the high-value test excludes from eligibility those wood wastes derived from harvesting poorer quality native forests where the proportion of high quality logs to low quality material may be small. It is not uncommon for native forest harvesting operations to yield a high proportion of residues or waste products and the utilisation of these products is fundamental to the commercial viability of such operations. The silvicultural practices employed in such situations result in an improved quality of forest for future rotations.

Furthermore, the high-value requirement under the regulations for the high-value process is an unnecessarily confuses and to an extent contradicts existing forest policy which stipulates the utilisation of forest products for their highest value end use. Such policy exists in both RFA non-RFA areas, given that operations are carried out in accordance with relevant Commonwealth, State or Territory planning and approval requirements.

Regulation 9 (1) (c) – native vegetation clearing. To be an energy crop, biomass from a plantation can be taken only "taken from land that was not cleared of native vegetation after 31 December 1989 to establish the plantation".

This clause creates an unwarranted restriction on growers who have established plantations on land where some form of native vegetation clearing was permitted. For example, since 1990 in Tasmania a large proportion of plantations have been legally established on areas that were converted from native forests. In other States, partial clearing involving removal of some native vegetation has been an accepted legal practice.

Denying eligibility for a sub-set of a plantation estate will lead to unnecessary waste of resource from that land in perpetuity as the vegetation clearing that has occurred cannot be reversed in any way.

This regulation also specifically places a condition on plantations that is not applicable to other energy crops or crop wastes. For example, bagasse from sugarcane crops planted on land cleared after 31 December 1989 is an eligible source under the regulations.

CONCLUSION

Australia is underutilising a significant resource of woody biomass contained in the residues of forests and wood processing that could be used in producing renewable energy.

The potential for expanding and maximising the use of the resource is being restricted by regulatory barriers and flawed rationales that exclude forests and wood waste from the financial benefits of the proposed *Expanded National Renewable Energy Target Scheme* and the *Carbon Pollution Reduction Scheme.*

Those benefits would help make woody biomass economically competitive with other fuel sources, especially for electricity generation and possibly for liquid biofuels, that would add to the variety and quantity of energy sources available to Australia.

Electricity generated from woody biomass would strengthen the energy security of Australia, particularly in those rural regions near forest areas and distant from the large baseload, coal-fired generators that power the electricity grid.

Woody biomass is best applied to small generation plants serving discrete industrial operations and communities. These plants provide an independent electricity supply that can replace grid supply if that is tightened by a contraction in coal-fired generation or if it is interrupted in some way.

Australia needs to remove the regulatory barriers to the use of forest and wood residues in renewable energy production to:

- enhance Australia's energy security;
- provide access to the financial benefits of the expanded RET and the CPRS;
- encourage the commercial application of wood-based renewable energy technologies;
- stimulate R&D of not only the renewable energy technologies but also the growing, harvesting and handling of the resource.

FURTHER INFORMATION

Please contact Allan Hansard, CEO, on (02) 6285 3833 or allan.hansard@nafi.com.au, or Noel Bushnell on 0412 569 581 or bushnell@hanbush.com.au.

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ATTACHMENT A

Renewable Energy (Electricity) Regulations 2001

Division 2.2 – Eligible renewable energy sources, sections 8 & 9

8 Meaning of *wood waste*

(1) For section 17 of the Act, ***wood waste*** means:

(a) biomass:

(i) produced from non-native environmental weed species; and

(ii) harvested for the control or eradication of the species, from a harvesting operation that is approved under relevant Commonwealth, State or Territory planning and approval processes; and

(b) a manufactured wood product or a by-product from a manufacturing process; and

(c) waste products from the construction of buildings or furniture, including timber off-cuts and timber from demolished buildings; and

(d) sawmill residue; and

(e) biomass from a native forest that meets all of the requirements in subregulation (2).

Examples for paragraph (b)

Packing case, pallet, recycled timber, engineered wood product (including one manufactured by binding wood strands, wood particles, wood fibres or wood veneers with adhesives to form a composite).

(2) Biomass from a native forest must be:

(a) harvested primarily for a purpose other than biomass for energy production; and

(b) either:

(i) a by-product or waste product of a harvesting operation, approved under relevant Commonwealth, State or Territory planning and approval processes, for which a high-value process is the primary purpose of the harvesting; or

(ii) a by-product (including thinnings and coppicing) of a harvesting operation that is carried out in accordance with ecologically sustainable forest management principles; and

(c) either:

(i) if it is from an area where a regional forest agreement is in force — produced in accordance with any ecologically sustainable forest management principles required by the agreement; or

(ii) if it is from an area where no regional forest agreement is in force — produced from harvesting that is carried out in accordance with ecologically sustainable forest management principles that the Minister is satisfied are consistent with those required by a regional forest agreement.

(3) For subparagraph (2) (b) (i), the primary purpose of a harvesting operation is taken to be a high-value process only if the total financial value of the products of the high value process is higher than the financial value of other products of the harvesting operation.

(4) In this regulation:

ecologically sustainable forest management principles means the following principles that meet the requirements of ecologically sustainable development for forests:

(a) maintenance of the ecological processes within forests, including the formation of soil, energy flows, and the carbon, nutrient and water cycles;

(b) maintenance of the biological diversity of forests;

(c) optimisation of the benefits to the community from all uses of forests within ecological constraints.

high-value process means the production of sawlogs, veneer, poles, piles, girders, wood for carpentry or craft uses, or oil products.

9 Energy crops (Act s 17)

(1) For section 17 of the Act, biomass from a plantation is not an energy crop unless all of the following apply to it:

(a) it must be a product of a harvesting operation (including thinnings and coppicing) approved under relevant Commonwealth, State or Territory planning and approval processes;

(b) it must be biomass from a plantation that is managed in accordance with:

(i) a code of practice approved for a State under regulation 4B of the Export Control (Unprocessed Wood) Regulations; or

(ii) if a code of practice has not been approved for a State as required under subparagraph (i), Australian Standard *AS 4708—2007 — The Australian Forestry Standard*;

(c) it must be taken from land that was not cleared of native vegetation after 31 December 1989 to establish the plantation.

(2) For section 17 of the Act, biomass from a native forest is not an energy crop.