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# New Inquiry – Australian forestry industry

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## Summary

By comparison with many countries with similar or lesser forest resources Australia lags in providing coherent long- term planning and support for a sustainable industry that will provide permanent jobs and other social and economic benefits, energy, carbon sequestration, import replacement, habitat and other environmental benefits.
This has been stated many times since about 1920 by high ranking committees, professional individuals, parliamentarians and members of industry *(see attachment 1).*
Often the countries that we can look to for some useful models have developed a sustainable forestry industry despite having far more silvicultural, economic, environmental or geographic constraints. Examples of countries that fall within this include Sweden, Norway, Austria, Finland.
At the heart of our failure to develop better forestry management across the nation till now has been
a) the retention of forest management by the states, and/or the lack of a coherent cross-state approach
b) the way that forestry harvesting is or has been exploitative and tending to large scale clearfell, rather than sustainably managed with more selective harvesting
c) the unwillingness of the states and federal government to re-invest, and to give enough confidence to industry to re-invest.

## Opportunities for and constraints upon production.

The Opportunities

We could rapidly develop a better national approach to management of privately held native forest to stimulate effective mapping, planning, thinning, habitat valuation, removal of commercial roundwood and biomass. This has been standard practice in many countries over 100 plus years.
As an extension of this there is scope for a more long-term leasing option for management of public native forest within strict guidelines for maintenance of biodiversity, water quality, particular habitat, sustainable yield.
1. We can develop a model of integrated farm forestry that would result in up to 10 million ha of dispersed woodlots being planted across existing farms – mitigating risks of climate change, adding to habitat, adding to farm productivity, and adding to rural economies.
2. We can develop a far more economically viable processing of public and private native forest stands, that at the same times have far better scope for enhancing or retaining environmental benefits.

The Constraints

As always the constraints begin with a lack of adequate planning and policy support. This arises from a lack of a sound understanding by policy makers of the economics of forestry and forest industries, sustainable agriculture, and bioenergy. Too often the economics is based on narrow views that do not adequately reflect the wider economics benefits of import replacement, regional viability, creation of permanent regional jobs, environmental benefits and social benefits. Specific constraints include

1. lack of policy supports for carbon sequestration and GHG offsets in production forest systems
2. lack of R&D into small-scale forestry systems, including into development of improved genetics of a range of more promising hardwood sawlog species, of machinery and equipment for thinning, chipping, handling, biomass to energy at farm or town level, and milling of small diameter logs.

## Opportunities for diversification, value-adding and product innovation

It is not disputed that Australia exports about A$2 billion of low value or un-value-added product (logs, rough sawn timber and chips) and imports about twice this value in value added product (milled appearance grade hardwoods, paper and other wood fibre products, laminated and ply products).
To date forestry management in Australian native forest stands has been for extraction of sawlog and secondarily for extraction of 'reject' material for pulping for export for paper making. In some cases the harvest of low sawlog-yielding native forest for chip has become or tended to become the primary driver for harvest (SE NSW, the Wombat forest and elsewhere in Victoria, areas of Tasmania).
There are 10 clear options for value-adding within the Australian forest and plantation industry -

- production of biomass forms for export - as pellets, torrefied pellets or denser hardwood chip.
- Production of pulp or paper for export and domestic use (replacing imports)
- production of other wood fibre products – card, MDF, oriented strandboard,
- production of ply products – including flooring and panelling
- production of laminated products (glulam structural beams etc)
- production of high-value eucalypt hardwood product with strong design element
- utilisation of presently unutilised biomass to replace fossil fuel energy – heat, electricity and transport fuels
- production of new streams of biomass – from oil mallee and other short rotation coppice woody and energy crops grown on farm land as multi-purpose plantings
- production of non-wood product from native forest and farm and commercial plantations – extractives that have value as pharmaceutical and industrial chemicals
- development of an accessible and remunerative model for carbon credits from production forestry – using a pool arrangement to allow harvesting and re-planting without causing violation of some international concept of 'sequestered carbon is only in living trees' .

## Environmental impacts of forestry

Forests sequester carbon, provide habitat, are important stores of biodiversity, act as water filters (and to a degrees as water storages), cycle deep nutrient to the surface and provide an essential place of natural beauty and retreat from the material world. They can also be senescent and highly inflammable, and in case of wildfire become death traps for vast numbers of resident wildlife. At the same time fire is for many plants an essential part of their life-cycle and without it some cannot reproduce. For some eucalypt species, including the mountain ash, germination is improved by an ash bed.

<u>Impacts of plantations on land and water availability for agriculture</u>
Clearly trees take up water, and young fast growing trees take up more water than mature or senescent trees. However a number of points are too frequently overlooked -

- the water taken up is almost all (over 95%) transpired into the air as water vapour and that soon falls elsewhere as rain, or will be condensed out as dew.

- Trees in a well-designed planting and of appropriate species will have a net effect of reducing water evaporation from sheltered standing water or from pasture or crops downwind of them (the effect is significant for up to ten tree heights). This reduction of water loss from surface evaporation can far exceed the amount of water drawn from the subsoil and transpired by the sheltering trees.
- Where the planting is integrated into a farm layout as a multi-purpose planting ( a wide strip woodlot possibly with some mixture of species) for shelter, habitat, aesthetics, wood, biomass, salinity mitigation, carbon sequestration, etc) the space planted should be more than offset by a lift in overall farm productivity.
- Where planting takes up less than 15% of land area in regions of under 650mm rainfall, and is as dispersed woodlots well sited on the landform there is insignificant impact on runoff and catchment flows – according to CSIRO research data.

<u>The development of win-win outcomes in balancing environmental costs and economic opportunities.</u>
The assumptions behind  the wording of this heading have to be questioned. The two aims are clearly not mutually exclusive, however commonly they are portrayed as being so. In reality the second can help ensure the realization of and pay for the first, and there are clear examples of situations where this is the most cost-effective and beneficial relationship – including in fire-prone native forests around cities and towns. The examples of St Andrews and Marysville in 2009, of northern Perth in 2011, or Canberra, of outer Sydney and Hobart in their instances of loss of houses and lives are all examples of the negative outcomes where this potential for complementarity between environmental and economic benefits is ignored.

While there is an unfortunate oversimplification promoted by some groups that forest timber production and maintenance of environmental values cannot both occur within any area of forest at the same time, this is demonstrably not the case.
It is demonstrably possible to manage forestry so that habitat and water quality and flows are preserved, impacts of fire are minimised, sequestration of carbon in both living trees, forest litter and wooden product is maximised, recreational value is high and accessible, and biodiversity is preserved. And of course that regional economies flourish, timber industry jobs are preserved, carbon-neutral energy is produced and imports of wood product or wood fibre product are reduced or replaced.

Countries that are achieving this across most or all of their forests include Austria, Norway, Finland and Sweden. There are other good examples in parts of Canada, the USA, New Zealand, Germany, and many other countries and regions.
The models for how Finland, Sweden and Norway manage to achieve what in Australia are seen as mutually contradictory aims are readily available. These models are based on thorough mapping, development of detailed plans based on the mapping, a combination of 'stick and carrot' for forest owners to comply, a general adoption of certification (usually under PEFC), and a general concept of stewardship.
In general in most countries with thriving timber industry integrated with sound environmental management the setting aside of vast areas to 'protect the environment' is less common than a forestry practice than is based on 'bottom up' logging (taking out the less good timber first), smaller coupe size of 1-2 hectares or less interspersed with larger areas of undisturbed forest, leaving of about 10% of good form seed trees at final harvest, leaving of habitat trees at any harvest, maintaining a significant buffer strip of intact forest along water courses and drainage lines around swamps etc, and having an adequate revolving funding system that pays a landowner to do all this without loss of income.

For all this to be workable in practice requires a level of local or regional oversight provided by semi-independent bodies that operate under the necessary guidelines and provide a first stage of inspection, monitoring and certification. These are often the forest management associations or grower-managed cooperatives. They have similarities to the grower networks in Australia or possibly the now-unfunded PFDCs. It would be one option to revive the PFDCs, support the networks and /or possibly also equip the CMAs and landcare groups to be able to provide one or two levels of this role.

## Creating a better business environment for forest industries

Investment models for sawlog production
Investment models Australia can draw on include the models developed over the last thirty years in New Zealand, Uruguay, Brazil, Chile and other countries (and there are models within Australia that have good points that may not be well-enough known). These have used a mix of tax concessions, 'soft' loans, grants, targeted regions, and other strategies, to drive establishment of often millions of hectares over a relatively short timeline (*see attachment 2).*

Three areas of sawlog production urgently need attention and policy development in Australia

- sawlog production from integrated multi-purpose farm sawlog woodlots. This has the potential for up to 10 million ha of viable sawlog woodlots by 2040 given proper development. In addition to a range of other products and benefits it could be a sustainable source of up to 30 million m3 of hardwood and soft wood sawlog a year.
- Improved management of private native forest for biodiversity/habitat, carbon sequestration and sawlog production.
- Improved management of public native forest for biodiversity/habitat, fire impact minimisation, water quality, sawlog production, and carbon sequestration.

New business and investment models for plantation production require an intelligent long term policy that includes carbon, environment, other non-wood outcomes, as well as biomass, fuel wood and other roundwood markets identified and catered for in order that there is confidence among investors in the long term revenue, without unintended or counter-productive outcomes.
Superannuation investment in plantations obviously also needs to have the above issues attended to. The use of the crude MIS process for blue-gum plantings was seriously flawed from the start, and the fact that it was instituted indicates how out-of-touch the developers of this approach were. Better models are there for adaptation in many countries and it is a false economy not to be examining and comparing them at this moment. Unfortunately the gathering of this information appears to not be a priority of this or the previous government.

## Social and economic benefits of forestry production

The examples of many countries show the various examples of these benefits. Again Austria, Sweden, Finland, and Norway are among the prime examples. Regions or operations in Portugal, Spain, Brazil, USA, France, Canada and many other countries add to these available models.
In short, it is feasible and achievable to derive social and economic benefits from well managed forest – that sawlog and biomass production can occur in conjunction with recreation, habitat preservation, maintenance of water quality, carbon and of biodiversity, and reduction of fire risks.

## Potential energy production from the forestry sector

Energy production is normally a relatively low value by-product of forestry systems in other countries – though increasingly seen as important for, or even critical to, national energy security, and treated as such in national policy frameworks. In countries such as Finland or Sweden the largest biomass sources are the timber industry residues, including black liquor from pulp making. The secondary (perhaps 15-20%) but relatively faster growing source is forestry thinnings and the more economically attractive area of forestry harvest residues. Other sources that make up the total come from short rotation coppice and agricultural residues.
Biofuels (transport fuels) are increasingly being derived from ligno-cellulosic feedstock as opposed to crop grains or oilseed or other agricultural crops, that compete for land and remove food products from food markets. Denmark is developing straw to ethanol technologies, Canada is developing flash pyrolysis and hydrolysis of woody biomass to produce bio-oil or ethanol, Sweden is developing these technologies mentioned and also gasification. Sweden (pop 9 million) has the stated aim of replacing at least 80% of imported fossil transport fuels with biofuels by 2030. Finland has a similar objective on a similar timeline. New Zealand has a more modest target of up to 30%.

Biomass is a major part of the energy supply of an increasing number of countries. It is the single largest source of energy in Sweden at over 33% - more than either nuclear, hydo or fossil fuels. The target is to reach 39% of primary energy from biomass by 2020, and it is likely that this will be exceeded before the due date. Finland's objectives are similar. These countries are investing in other renewables but biomass is the primary source because it is the most sustainable and cost effective source and because it is linked with carbon sequestration, habitat, industry and regional jobs. National security is a key issue. Bioenergy is baseload and can be indefinitely sustainable, and can result in achieving below-zero emissions in some instances ( where energy from residues as heat and /or electricity is fully used, the trees are replanted, and carbon is stored in value added wood product). Reports done recently in Australia indicate that it is feasible to have up to 20% of current electricity generated from biomass, with heat energy utilisation, and possibly biofuels production and/or biochemical production in complementary industrial processes. It is economically and technically feasible to be producing perhaps 30-40% of our total primary energy from the full range of biomass currently available, using the mature technologies presently used in other OECD countries.

It has to be said that our funding and support and policy directions of our major research and development bodies has been handicapped by confusion over state and federal areas of responsibility, governed by short-term thinking and following of fads. Countries like Finland and Austria that have developed the necessary intelligent and coherent polices and R&D funding processes are up to 20 years ahead of us in this general field.

Biochar is a by-product of slow pyrolysis. This is a process where biomass is heated to moderate levels in the absence of oxygen. In this situation the volatile compounds are driven off to be used for production of energy, leaving perhaps 30% of dry weight as carbon plus the ash - the main nutrients and trace elements. As such in order to get the vast amounts required to be of any real benefit for carbon goesequestration and soil improvement it will be necessary to have an enormous industry (using hundreds of millions of dry tonnes of biomass a year) dedicated to slow pyrolysis – even though it is a relatively inefficient and relatively expensive way of producing energy.
Possibly better in the short term to look instead at using brown coal as a primary ingredient of a basic fertiliser, thus providing employment for mining workforces and transferring carbon from mines to agricultural soils.

Cogeneration is fundamental to realising the potential of bioenergy. Normally it is as electricity and heat energy. The pattern in the Scandinavian countries is to use the heat energy for district heating (and for district cooling in summer). In Brazil and India the heat energy is commonly used by the generating industry, as well as some of the electricity. More and more it is a part of the design that other products are used as much as possible to add to net revenues – the ash, the CO2, the by-products including lignin and molasses from integrated industries such as wood or straw to ethanol.
So in Scandinavian and northern European countries combined heat and power (CHP) plants are both matched to the available fuel volumes and also to the likely demand for saleable heat year-round. They are normally from 20 MW boiler output and thus from 5 MW-electrical output, with the heat selling locally for a similar figure per MWh as the electricity is sold for into the national grid. Plants near big cities or large industry demands may be of 100 MW-e or more. The largest biomass-fuelled CHP plants in the Nordic countries are of 240 MW-e in Finland, 88 MW-e in Sweden and 340 MW-e in Denmark. In Australia it would be feasible to have plants of 10-20 MW-e at Canberra and the larger regional cities, and one or more larger plants of up to 100 MW-e at each of the other capitals. These may be fuelled partly with sorted flammable municipal wastes, partly with urban waste wood and partly with forestry and timber industry residues. Where different fuels are used like this it is common to have a different furnace used for each fuel.

**Carbon sequestration** is part of the growth process of trees and all other plant life. Carbon makes up about 25% of the green weight of a tree or about 50% of the oven-dry weight. When a standing tree is harvested and milled for timber, the sequestered carbon is maintained in the product – whether it is flooring, plywood or house frames. It is also sequestered in the paper and other wood fibre product and in the residues. If the residues are used as a fuel instead of fossil fuels the wood fuel is regarded as carbon neutral as the wood has sequestered its carbon from the atmosphere in the first place and though it releases it on burning this carbon is regarded as not a net increase to the atmospheric carbon levels – When the tree coppices from the live stump or another is planted or grows from seed on the site obviously over time a similar volume of carbon that would have been released if the tree were totally burned is now sequestered again.
Clearly if the forest is actively managed the overall sequestration in standing trees as well as in stored carbon in wood product, plus the displacement of fossil fuels by biomass fuels, is far greater over time (by several orders of magnitude) than the carbon simply held in a mature and eventually senescing forest. In Australia this debate is clouded by ideologies and cynical misuse or selective quoting of dubious research data.

## Land use competition between forestry and the agricultural sectors.

Up to 90 million ha of land has been cleared since 1788 – and mostly since about 1850. Clearing of more marginal lands has continued after World War Two *(see attachment 1).* Some unintended consequences of this have been loss of habitat and of species, spread of dryland salinity, and arguably the reduction of rainfall in marginal rainfall areas and possibly much more widely.
Various aspects need to be considered in looking at issues of 'competition' between forestry and agriculture. Clearly there are various ideologies that some vocal groups cling to that maintain that there is no scope for a complementarity between forestry and agriculture.
However planting of dispersed woodlots on farms integrated into conventional agricultural systems are shown to have only positive benefits for productivity, land values, habitat, salinity mitigation, water quality, and also offset agricultural emissions and potentially provide an alternate income that is not kinked to regular agricultural cycles.