Bioenergy Australia (Forum) Pty Ltd
ABN 14 155 856 821
Phone/Fax: 02-9416-9246
Email:ceo@bionergyaustralia.org

Bioenergy Australia 2015
Consultation Response to the Forest Industry Advisory Council (FIAC) Issues Paper 2015

Bioenergy Australia welcomes the opportunity to respond to the Forest Industry Advisory Council (FIAC) Issues Paper. Our response highlights the opportunities presented by forestry residues across Australia in terms of both 'bio' energy opportunities and also the growing interest and development in 'bio' materials/chemicals.

Who is Bioenergy Australia?

Bioenergy Australia[1] is a nation-wide government-industry-research alliance of more than fifty organisations, established to foster biomass as a source of sustainable energy and for value-added bio-products such as biofuels, biomaterials and biochemicals. Its broad objectives are to:

- Promote an awareness and understanding of the economic, social and environmental attributes of sustainable energy from biomass.
- Broaden the market for biomass by enhancing opportunities, and by helping to reduce financial, regulatory, fuel supply, technical and institutional barriers to enable widespread adoption of biomass energy.
- Facilitate the development and deployment of biomass energy business opportunities and projects through information.

Bioenergy Australia is also the vehicle for Australia's participation in the International Energy Agency's Bioenergy program (www.ieabioenergy.com). Bioenergy Australia acts as a forum for general and authoritative information dissemination on bioenergy, including drawing on international best practice experiences through its IEA Bioenergy participation. It is currently participating in five Tasks:

- Task 37 *Energy from Biogas*
- Task 38 *Climate Change Effects of Biomass and Bioenergy Systems*
- Task 39 *Commercialisation of Conventional and Advanced Liquid Biofuels from Biomass*
- Task 42 *Biorefining - Sustainable Processing of Biomass into a Spectrum of Marketable Bio-based Products and Bioenergy*
- Task 43 *Biomass Feedstocks for Energy Markets*.

Please note - this submission does not necessarily reflect the view of individual member organisations; this submission can be made public.

Response

[1] www.bioenergyaustralia.org

Bioenergy Australia considers that the vision for the forests products sector in Australia should be to maximise the value of the 'forest product' in all its forms. The prudent and innovative use of forest biomaterials is a requirement of global forest conservation. Maximising the use of forest-based materials has a role in solving global environmental problems - they are renewable, have low life cycle costs, contribute to carbon sequestration and present a non-fossil pathway to a growing number of modern commodities.

Current research suggests that around 70% of a mature tree is fully utilised in processing. The remaining 30% presents both forest and landowners with an additional opportunity to diversify into energy markets (heat, electricity and liquid fuel) and also into markets for biomaterials and biochemicals. Traditionally, forest materials have been used in wood construction and paper products. Today, new and exciting technologies are transforming those forest resources previously viewed as waste into biodegradable polymers, specialty chemicals and low carbon fuels.

In addition to the traditional forestry products Bioenergy Australia believes that the forestry sector in Australia must take steps now to take advantage of the opportunities to maximise the utilization of biomass often seen as waste, to encourage the use of 'greener' fuel for heat and biofuel and to take steps to position the sector to take advantage of the more lucrative areas of biochemical and biomaterial manufacture. These opportunities are good news for the wider sector and landowners alike as they look to maximise the return from their land.

Diversification will be a key factor in the ability of forestry operations and those working in the sector to ensure a long term and profitable future in the national market but also potentially as participants in international markets. Current operations should look beyond traditional forestry crops to new species and varieties where fast growth is a key feature. From a consumer perspective it's clear that 'sustainability' branding is a positive marketing feature and an operational approach that is the becoming the norm. For Australia there is potential to become a leader where policies and strategies are designed to maximise the value from every fibre grown and where the forestry sector works in partnership with government, the research sector (forestry, biomass, bioenergy and biomaterials), wider industry groups and with potential and existing chemical/materials manufacturers.

A USEPA Study from 2005 entitled, '*Biomass as Feedstock for a Bioenergy and Bioproducts Industry – The Technical Feasibility of a Billion Ton Annual Supply*[2], identified over 10 years ago that the US had sufficient land area to utilise forestry and crop residue to produce both biofuels and supply a biochemical industry. Today, both areas are growing rapidly.

In several other countries the utilisation of biomass as a wood and liquid fuel option has already gained much ground while the emergence of biomaterial and biochemical production companies is an exciting growth area destined for significant economic and sustainable growth. In many cases the success factor has been the ability to deliver these two opportunities (energy and product/material) side by side.

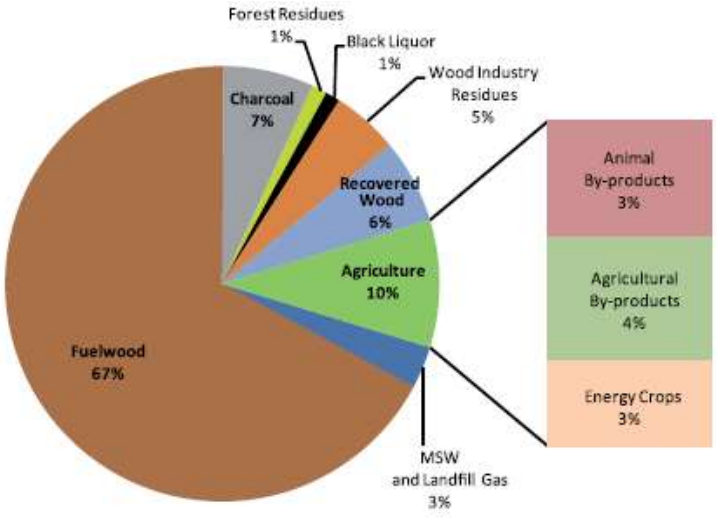
[2] http://www.dtic.mil/dtic/tr/fulltext/u2/a436753.pdf

In Australia, while the potential is here (in terms of both available biomass and knowledge/skills), the development on the ground is less progressed. While electricity and gas prices remain low in many areas, biomass cannot compete in the provision of cost effective heat. However, this is not the case in many other areas – Gippsland is a case in point where several small scale industrial sized heat users are switching to wood fuel using economically and locally sourced forest residues and clean burning high-tech boilers to provide the heat.[3]

In this submission we provide a brief overview of biomass and bioenergy; its contribution to global energy production; Australia's biomass resources; the current Australian contribution of bioenergy by type of biomass and by state/territory; coverage of the various bioenergy technologies for power production; developments in biofuels and the increasing global interest and activity in biomaterials and biochemicals and where Australia sits in this arena. We note also the opportunity for creating jobs from various bio pathways but emphasize the need for favourable conditions to encourage investment.

Biomass and Bioenergy

According to the International Energy Agency's data in 2012, the world relied on renewable sources for around 13.2% of its total primary energy supply, and in 2013 renewables accounted for almost 22% of global electricity generation, a 5% increase from 2012.[4] Of this, some 9.9% points are from renewable combustibles and waste (i.e. biomass). In the OECD countries, renewable combustibles and waste provide 55.7% of the total renewable energy supply. Figure 1 illustrates the makeup of the nearly 10 % of global primary energy provided by biomass[5]. While two-thirds is non-commercial fuel wood, mainly in developing countries, **most of the balance of the biomass used is from the forestry or wood processing sectors in developed countries.**



Source: based on data from IPCC, 2007.

Figure 1: Share of the biomass sources in the primary bioenergy mix.

[3] http://www.hortidaily.com/article/14845/Australia-Gippsland-growers-go-green

[4] http://www.iea.org/aboutus/faqs/renewableenergy/

[5] International Energy Agency's Bioenergy program, *Bioenergy – A Sustainable and Renewable Energy Source – Main Report*, 2009. IEA Bioenergy publication ExCo:2009:06 At www.ieabioenergy.com.

Within Australia, The Clean Energy Council's Bioenergy Roadmap[6] suggests that by 2020 the contribution from biomass for electricity generation could be 10,624 GWh per year or six times the current generation. It further identifies the long-term potential for electricity from biomass in 2050 to be as much as 72,629 GWh/year, which is approximately 40 times the current level.
The Commonwealth Scientific and Industrial Research Organisation (CSIRO) has reported that there is potential for second generation biofuels to replace between 10% and 140% of current petrol only usage over time[7]. At $1 a litre (before excise), replacing the current Australian current Australian transport fuels with renewable would represent sales of some $45 billion per annum.

Figure 2 shows a table of Australian biomass resources, projected to both 2020 and 2050 from the Clean Energy Council's Bioenergy Roadmap[8]. We note the magnitude of the projected increase in generation from forest residues from 2010 to 2020 and again to 2050. This is largely because of the low base in 2010, and the assumption of future supportive policies.

Biomass Source	Quantity	2010 (GWh/y)	2020 (GWh/y)	2050 (GWh/y)
Poultry	94 million	-	297	1055
Cattle – feedlots	870 thousand	-	112	442
Pigs	1.8 million	1	22	205
Dairy cows	1.4 million	-	22	89
Abattoirs	1.3 million tonnes		337	1773
Stubble – grain and cotton crops	24 million tonnes			47000
Bagasse	5 million tonnes	1200	3000	4600
Sugar cane trash, tops and leaves	4 million tonnes	-	165	3200
Oil mallee Eucalypts	-	-	112	484
Camphor laurel			83	20
Forest residues (native forests, plantations, processing residues)	~ 9 million tonnes	79	2442	4554
Black liquor	-	285	365	365
Other pulp and paper wastes	-	74	141	141
Urban food Wastes	2.9 million tonnes	29	267	754
Garden organics	2.3 million tonnes	29	121	461
Urban paper and cardboard	2.3 million tonnes	-	38	1749
Urban wood/timber	1.6 million tonnes	45	295	1366

[6] http://biomassproducer.com.au/wp-content/uploads/2013/11/01AustralianBioenergyRoadmap.pdf
[7] https://**rirdc**.infoservices.com.au/downloads/07-177.pdf
[8] Clean Energy Council, *Bioenergy Roadmap*, CEC, 2008.

wastes				
Landfill gas		772	1880	3420
Sewage gas		57	901	929

Source: Clean Energy Council, 2008

Figure 2: Biomass Resources and Bioenergy Generation Potential

The data presented in Figure 2 took a conservative approach to estimating future biomass resources. None-the-less it illustrates that there is considerable potential for generating stationary energy (heat and power) from both forest based industry wastes and oil mallee energy crops.

Subsequent research by the Future Farm Industries CRC[9] has identified a large potential for coppiced mallee as a feedstock for bioenergy (heat, power, fuels). The FFI CRC studies predict biomass production from woody crops utilising surplus and degraded agricultural land could also provide environmental benefit. At a biomass price of $35/t (green) and a water use efficiency of 1.8 dry g/kg of water, they model that profitable woody crops could produce 39 million tonnes/annum of dry biomass from 1.5% of farmland in a 300-400mm rainfall zone, and 8% of farmland in a 401–600 mm rainfall zone.

Figure 3 shows Australian bioelectricity generation in 2009[10]. Wood waste amounts to 73MW. In percentage terms, little has changed since then.

	Biogas	**Bagasse**	**Wood Waste**	**Other bioenergy**	**Total bioenergy**
New South Wales (incl ACT)	73	81	42	3	199
Victoria	80	0	0	34	114
Queensland	19	377	15	4	415
South Australia	22	0	10	0	32
Western Australia	27	6	6	63	102
Tasmania	4	0	0	0	4
Northern Territory	1	0	0	0	1
Australia	**226**	**464**	73	**104**	**867**
Share of total renewable electricity capacity (%)	**2.2**	**4.4**	0.7	**1.0**	**8.3**

It is generally recognised that the use of biomass for industrial heat provides substantial greenhouse gas mitigation, and this type of opportunity should not be overlooked. While cogeneration (combined heat and power) is generally preferable to stand alone bioelectricity power plants, electricity only plants should not be dismissed. It should also be noted that the Federal Government's Renewable Energy Target (RET) only provides incentives for the electricity, not the heat component of cogeneration.

Figure 3: Australian Bioelectricity Generation (MW) 2009

[9] Scale of biomass production from new woody crops for salinity control in dryland agriculture in Australia, *Int. J. Global Energy Issues, Vol. 27, No. 2, 2007*

[10] Australian Energy Resource Assessment, Geoscience Australia and ABARE, 2010.

Despite having one of the highest areas of forest per capita of the developed nations, Australia lags behind in the use of bioenergy, which represents just 0.7% of energy production. The lack of incentives for the use of forest biomass in energy generation creates a serious imbalance in the renewable energy market, and misses some of the lowest cost opportunities for carbon emissions abatement.

Of course a significant advantage presented by biomass for heat and electricity generation is, relative to the fossil alternatives, its reduced emissions profile and the ability of a biomass solution to minimise waste management costs. One of the ways to "rationalise emissions reductions actions to reduce unnecessary costs" and boost growth in the utilisation of biomass is for Australia to foster biomass cofiring with coal at existing coal fired power stations or to even convert units to run substantially on biomass, such as wood pellets. This low emission technology would obviate the requirement for new green fields power plants, and could extend the lives of existing infrastructure.

To date, the sole emphasis of the RET has been on renewable 'electricity', ignoring opportunities in the area of renewable thermal heat. Recognition of renewable thermal heat as an eligible activity by the RET would be a significant step forward.

Energy policy should also include greater promotion of bioenergy as part of Australia's overall energy mix. Policy development needs to be flexible to support a potentially broad range of bioenergy based opportunities from small co-generation facilities located in small regional areas to large facilities located in regional centres.

Biofuels

The present generation of Australian biofuels are largely based on ethanol and biodiesel, which provide less than one % of current fuel requirements in Australia. In Australia ethanol is currently produced from starch wastes, molasses and sorghum grain, while biodiesel is mainly produced from waste vegetable oil, tallow and some virgin plant oils.

New technologies for producing biofuels are being developed world wide. In addition to drop-in hydrocarbon fuels from fast pyrolysis (mentioned above), technologies now being operated or built at commercial scale include straw and wood to ethanol via fermentation and wood waste to ethanol and diesel like fuels via gasification.

A team of researchers at the US based University of Maryland and Bowie State University, is working on ways to turn poplar trees into high-yield crops for biofuels including ethanol, the renewable biofuel used in gasoline blends and flex-fuel vehicles. The hybrid trees would be grown on plantations and harvested without affecting existing woodlands. The study is funded by a $3.2 million, four-year grant from the National Science Foundation's Plant Genome Research Project, which supports research on plants seen as having economic and agricultural importance. The researchers are focusing on ways to improve the tree's nitrogen processing capability, which will enhance its growth rate and feasibility for use in fuel production.

Many commercial technologies have been developed by international groups with significant engineering capability and the ability to license their technologies into Australia. At the pre-commercial level, exciting and innovative work is underway in Australia on new technologies, such as using hot, compressed water to convert biomass to a bio-crude feed for oil refineries (by Licella in NSW).

While ethanol and hydrocarbon biofuels are well understood and in growing use world wide there is also interest in fuels such as methanol, DME (dimethyl ether) and hydrogen. Volvo in Sweden is developing Dimethyl Ether (DME) as a transport fuel. DME is similarly derived from biomass gasification, having properties not too dissimilar to LPG. Energy crops using tree species could provide the feedstocks for substantial biofuel industries.

Biorefining and high value materials/chemicals

The Parratt and Associates paper commissioned by the Forest & Wood Products Association (FWPA)[11] provides a good summary of biorefinery opportunities linked to forestry and the activities of some of the larger players in the sector on an international scale (e.g., Borregaard in Norway who are chasing the potential of biomaterials and biochemical with forestry products origins).

The development of biorefinery operations in general avoids some of the challenges or risks that affect the viability of petrochemical refineries and manufacturing. While traditional refineries use relatively expensive inputs, the cost of which is directly dependent on currency movements, biorefineries make use of comparatively much cheaper feedstocks available domestically. The advantages of product manufacture from bio-based feedstocks have not escaped some of the large international chemicals companies. Investment by the chemicals industry in commercial scale operations for the 10 to 100,000 tonne per annum (tpa) production of bio-based chemicals has increased significantly in recent years.

In Australia, the recent Deloitte/Corelli Consulting study commissioned by BlueBox Queensland University of Technology (QUT) [12]on the economics of biorefineries in Queensland also confirms the economic potential that biorefineries present and the opportunities for forest processing waste as one of many residue types to feed into such refineries.

Biorefineries in Australia are yet to emerge on a large scale however. While our research sector appears well versed in the opportunities and is focussed on refining some production methodologies, it is also clear from the papers citied above that in many cases, experience shows that closing the gap between research and commercial development is a significant challenge. Experience thus far indicates that in order for biorefineries to achieve commercial scale and create the strong market demand for the domestic consumption of bio-based products they need to be able to attract significant investors and manufacturers on the back of government investment.

[11] http://www.fwpa.com.au/images/resources/FWPA_OptionsPaper_final_0.pdf
[12] http://www.ctcb.qut.edu.au/documents/dae-corelli-biorefinery-report.pdf

As noted in the Deloitte/Corelli Consulting study, it is the nearby availability of feedstocks that influences the viability of biorefineries in Queensland. In many cases in Australia there is potential to tap into this comparative advantage as biobased feedstocks are available nearby and in some cases are considered a waste in themselves.

As an example of the demands for these biobased chemicals and products we note recent research from US researcher Lux Research. In its 2014 report Lux found that the technologies for – and commercialization of – materials and chemicals made from a variety of biobased feedstocks "have reached an inflection point" and are poised to grow significantly over the next four years. Lux says that overall capacity will nearly double, reaching 13.2 metric tons in 2017. Growth rates by segment vary but all are robust, spanning intermediate and specialty chemicals and polymers. The biggest % growth, and largest category of production, will be for intermediates like adipic acid and that old fashioned biobased product, lactic acid. Lux does note that cellulosic feedstocks are likely to continue to grow slowly with corn starch and sugar cane dominating, and oily bio feedstocks and waste gas to also play a role.

These views are confirmed in a recent report from IEA Bioenergy Task 42 - '*Biorefining: Sustainable Processing of Biomass into a Spectrum of Marketable Bio-based Products and Bioenergy*'[13]. The authors note that around the world, significant steps are being taken to move from today's fossil-based economy to a more sustainable economy based on biomass. A key factor in the realization of a successful bio-based economy will be the development of biorefinery systems allowing highly efficient and cost-effective processing of biological feedstocks to a range of bio-based products, and successful integration into existing infrastructure.

This IEA Report highlights all bio-based chemicals with immediate potential as biorefinery 'value added products'. The selected products are either demonstrating strong market growth or have significant industry investment in development and demonstration programs.

The recent climb in oil prices and consumer demand for environmentally friendly products has now opened new windows of opportunity for bio-based chemicals and polymers. Industry is increasingly viewing chemical and polymer production from renewable resources as an attractive area for investment. Within the bio-based economy and the operation of a biorefinery, there are significant opportunities for the development of bio-based building blocks (chemicals and polymers) and materials (fiber products, starch derivatives, etc). In many cases this happens in conjunction with the production of bioenergy or biofuels. The production of bio-based products could generate US$10–15 billion of revenue for the global

[13] http://www.bioenergyaustralia.org/pages/iea-bioenergy-task-42-biorefining-sustainable-processing-of-biomass-into-a-spectrum-of-marketable-bio-based-products-and-bioenergy.html

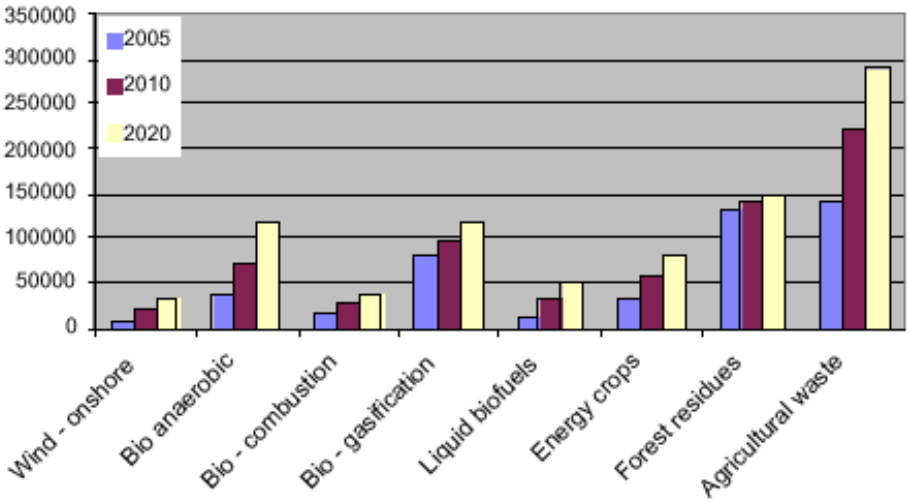
http://www.researchgate.net/profile/Ed_De_Jong2/publication/234073317_Product_developments_in_the_bio-based_chemicals_arena/links/02bfe50f927c980e7e000000.pdf

chemical industry. The economic production of biofuels is often a challenge. The co-production of chemicals, materials food and feed can generate the necessary added value.

A 2014 report from IEA Bioenergy Task 42 entitled simply '*Biorefining*'[14], notes in particular with respect to Australia that as a number of petrochemical refineries are being closed around Australia (NSW and Queensland) with most crude and refined products now coming from offshore. With little prospect of Australia replacing its mineral hydrocarbon liquid fuels from domestic sources, the opportunity for biofuels to replace mineral hydrocarbons is excellent from a macro position. However, unless broad Government policy settings are changed, it is unlikely that Australia will see the development of biorefineries (over and above the 0.3 billion to 0.4 billion litres already produced) to help replace imported liquid mineral hydrocarbons.

Job Creation

Bioenergy is known to have impressive economic multipliers, translating into employment opportunities, especially in rural and regional areas. Figure 4 from a European Union study shows the impressive job creation potential of bioenergy. Of particular relevance is the **forest residue bar in the chart below**.



Projected employment in the EU for biomass technologies. Wind is included for comparison.
Source: EU Altener Report: Impact of RES on Employment, 2000.

Figure 4: Employment from Bioenergy Technologies

In the emerging biomaterials/biochemicals area, international examples give a sense of what can be achieved. In the US, approximately 3,000 companies either manufacture or distribute an estimated 20,000 biobased products and have created around 100,000 new jobs annually[15]. US-based biorefineries that process sustainable biomass are projected to produce 700,000 jobs and US$88.5 billion in economic activity, primarily in rural areas where economic development is greatly needed (US Dept of Agriculture 2010).

[14] http://www.ieabioenergy.com/wp-content/uploads/2014/09/IEA-Bioenergy-Task42-Biorefining-Brochure-SEP2014_LR.pdf

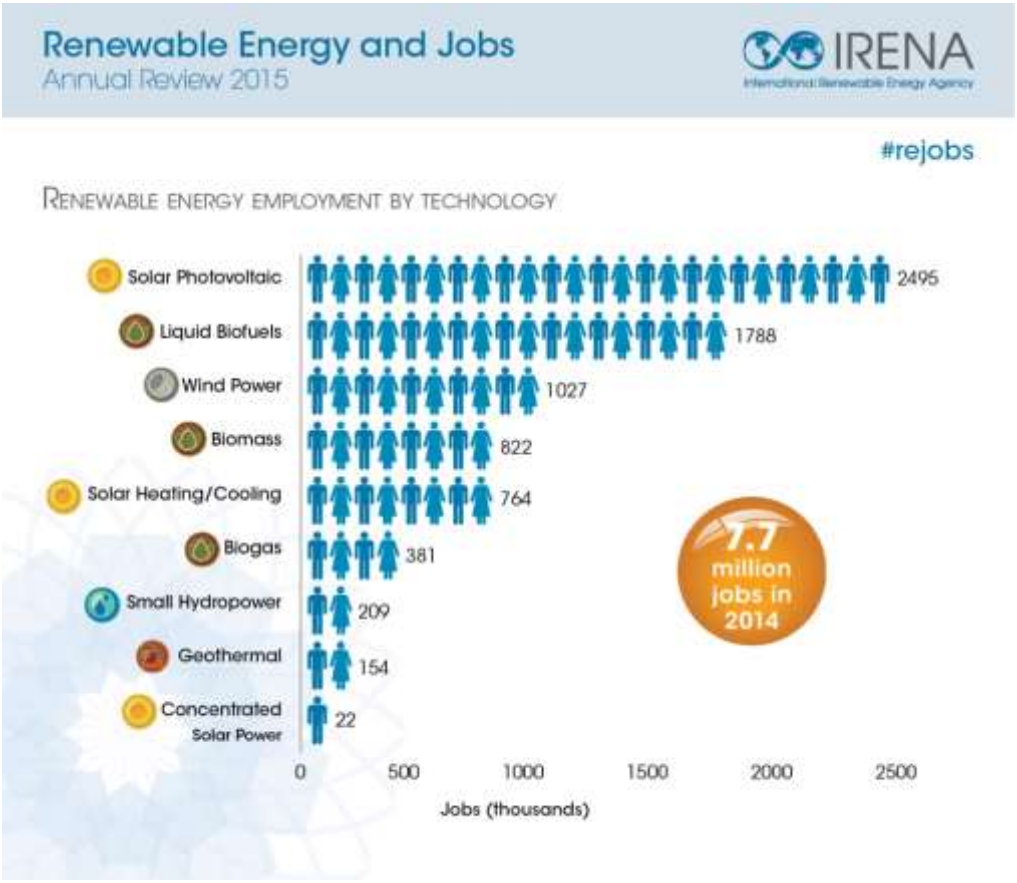
[15] Lerro, C. (2012) "Biobased Jobs, Grown and Made in America. www.biotech-now.org/environmental-industrial/2012/02/biobased-jobs-grown-and-made-in-america#." BIOtech.

Malaysia is home to two major biorefinery precincts, each based on key local feedstocks, designed to attract international chemical and polymer manufacturers. Kertih Biopolymer Park, reportedly Asia's largest biorefinery complex, was launched as a collaboration between Malaysia's national, regional, and state governments. This biorefinery precinct is **planned to initiate a cellulosic feedstock-based chemical manufacturing sector** that could generate US$6.14 billion in income and create 2,500 new jobs by 2020.

The 2015 Renewables and Jobs Report from the International Renewable Energy Agency (IRENA)[16] suggests that 7.7 million people are employed worldwide in renewables. The Report notes that for renewable energy employment to continue to grow, supportive policies are required. Specifically on biomass, the report notes:

> *"**Biofuels (1.8 million)**, **biomass (822,000)** and **biogas (381,000)** are also major employers, with jobs concentrated in the feedstock supply. While **Brazil** and the **United States** continued to dominate, **Southeast Asia** saw growth in biofuel jobs, reflecting measures to support production."*

The infographic in Figure 5 illustrates employment in the bio sector relative to other renewables.



Source: IRENA Annual Review 2015

Figure 5: IRENA 2015 Report on employment by renewable technology.

[16] http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=585

Investment

The legislation and regulations that apply to bioenergy (especially forestry biomass), in Australia are relatively onerous for industry. The Federal Regulations applicable to the Renewable Energy Target essentially impose surrogate sustainability criteria by specifying what biomass sources can be used for compliant energy. Australia is currently a participant via Standards Australia in setting an international Standard for sustainability criteria for bioenergy. It is recommended that when this process is completed, Australia adopts a stand-alone sustainability standard for bioenergy.

Regarding workforce skills, it should be noted that many of the skills in forestry and agriculture are appropriate for biomass supply chains. **As such it is important for Australia to maintain forestry and agricultural skills**, and also transfer such skills to indigenous communities, in support of biomass feedstock and supply chain enhancement. Organisations such as the CSIRO have had a decline in forestry research and such decline should be reversed.

While it is highly desirable to promote and export our technical services and expertise in bioenergy, a fundamental requirement is to have a vibrant local industry underpinned by supportive government policies and programs.

In the recent Deloitte/Corelli Consulting Report on the economic potential for a biorefinery in Queensland, the authors note that the development of a tropical bio-refinery industry could have a significant economic impact on the Queensland economy. The seven modelled projects in the report could alone contribute around $1.8 billion and 6,640 FTEs over the next two decades. Next steps were cited as a due diligence and a full feasibility study of the future potential and viability of these bio-refineries. The authors note that combined with government policy settings that are conducive to investment and 'open for business', a tropical bio-refinery industry could be an important future source of economic growth in Queensland.

Bioenergy Australia notes an initiative led by the Rural Industries R&D Corporation, in conjunction with some state based organisations to develop a national 'biomass for bioenergy atlas'. The development of this atlas would give investors a clear understanding of the location and cost of bio resources.

Conclusion

The biomass (biomass to energy and biomass to materials/products/chemicals) opportunity has yet to be realised in Australia to the same extent as in North America and Europe. Various studies have shown that biomass could provide a substantial proportion of Australia's stationary and liquid fuels needs and could deliver innovative biorefinery manufacturing opportunities (as noted in the recent QUT BlueBox commissioned study in Queensland).

Supportive Government policies and programs are required to stimulate a demand in the bioenergy industry. There is a need for Government to both recognise the potential and develop incentives for renewable bio-energy, including renewable biomass for electricity, renewable thermal and biofuels.

In the longer term this would allow bioenergy to play a more significant role in Australia's energy mix, contributing more than the current 1% for both our electricity and our liquid transportation fuels and in opening up investment opportunities for biomaterials and biochemical production.

International evidence would also suggest that Government support is also essential to kick start a successful bioproducts/biochemicals sector. The Deloitte/Corelli Consulting Report comments on a Government's role as follows:

- *The economic impact analysis assumes that the biorefineries operate without government subsidisation. While production is viable without ongoing subsidies, some government facilitation would assist in industry establishment.*
- *There is a potential role for government in facilitating investment in the sector and ensuring policy settings do not impede private investment, for example through streamlining processes for environmental approvals. In addition, any potential biorefinery investors could make use of the services of Queensland Government agencies (including the Department of Agriculture, Fisheries and Forestry and Trade and Investment Queensland).*
- *International experience shows that governments can make an important contribution to attracting investment, for example through developing technology precincts and facilitating relationships between international companies and domestic industry.*
- *For commercial investors, this analysis supports the case*

While this report has a Queensland focus, these comments apply universally.

The vision for the future of forest products in Australia must aim to maximise 100% of the value from grown trees. Future economic prosperity and indeed survival for many will be influenced by the ability to develop 'high value' and 'value-add products'. Increasingly it's likely that the real 'value' in biomass will be in the biomaterials and biochemical and bioenergy will become an added bonus. Australia is well placed to take advantage of these opportunities with fast growing conditions, land availability, a skilled and experienced workforce. The advantages are many and include fuel security, export potential, employment and international investment. Investment in R&D will be an essential component of a policy to take advantage of the high value manufacturing opportunities associated with biomass, otherwise these opportunities and skills will be lost offshore.

Contact

Bioenergy Australia appreciates the opportunity of providing this submission. We look forward to ongoing opportunities to work collaboratively with the forestry sector in Australia and in doing so ensure the realisation of biomass linked opportunities in energy and fuels and materials and chemicals that will lead to jobs and sustainable economic development.

Yours sincerely

personal contact details
personal contact details
personal contact details
personal contact details
Dr Stephen Schuck
CEO Bioenergy Australia