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Project Manager -  
Queensland Biofuel Mandate  
Department of Energy and Water Supply  
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**Emailed** (biofuels@dews.gov.au)

Dear Biofuel Mandate Project Team

### **Submission on the Proposed Queensland Biofuel Mandate**

This submission from Bioenergy Australia is in support of the proposed Queensland biofuel mandate, as a stepping stone towards a broader bioeconomy, with biomass providing a significant proportion of future low emission energy services and bio-products, including liquid biofuels.

**Bioenergy Australia** is a nation-wide government-industry-research alliance of more than fifty-five organisations, established to foster biomass as a source of sustainable energy and for value-added bio-products such as biofuels. 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](http://www.ieabioenergy.com)), an international collaborative RD&D (research, development and demonstration) agreement involving some 23 countries plus the European Commission. The Bioenergy Australia Manager represents Australia on the Executive Committee of IEA Bioenergy, which covers the broad spectrum of bioenergy, including bioelectricity and biofuels. 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.

Please note that this submission does not necessarily reflect the view of individual member organisations.

### **General Comments on the Discussion Paper**

As a preliminary comment the government needs to convey that it will be introducing a legally enforceable mandate, with penalties for non-compliance and that the mandate is much

more than an aspirational target. While, as the discussion paper indicates, there will need to be various exemptions, the government needs to reinforce that this mandate is an essential step towards a low carbon, economically beneficial future for Queensland. It is noted that on page 6 of the discussion paper, that failure to comply “may result in penalties”. It is strongly suggested that failure to comply should be recast as “will result in penalties”.

The discussion paper also notes that stability and confidence are important considerations in deploying biofuels in the Queensland economy. Many of the capital investments that would be required for establishing new biofuels infrastructure would require a 20 to 30 year payback period for such investments. The proposal that the legislation be subject to a 10 year sunset clause may well not support a sufficiently stable investment climate to match the long-term nature of required investments. As such the sunset clause should be seriously reconsidered.

The mandate needs to explicitly exclude ethanol and higher alcohol fuels produced from fossil fuels such as natural gas and coal. The definition of biofuels on page 3 only state that they are derived from organic matter. Coal and natural gas are technically ‘organic’ matter, but the clarification that the feedstock is not of an ancient nature (fossilised) needs to be added.

While the discussion paper notes the possibility of advanced biofuels, most of the consideration is given to conventional ethanol and biodiesel. The advent of advanced biofuels provides huge opportunities for Queensland in developing and adopting a variety of energy crops that would be suitable for producing such new fuels. For example cellulosic ethanol can be produced from a range of woody and herbaceous crops, such as trees, woody weeds and native grasses. Much research has been ongoing in Queensland into developing *Pongamia* as a feedstock for biodiesel and other forms of advanced fuels. Many of the feedstocks suitable for advance processing can be grown in areas of relatively low rainfall and poorer soils. As some of the key markets for biofuels would be inland (for instance at mining sites), this allows the feedstocks to be grown in close proximity to the processing plants, obviating the expense of transporting the fuel over long distances.

As an example of investigating the use of short rotation, eucalyptus mallees as a large-scale energy crop for fuels and power, research by the Future Farm Industries CRC [1] has indentified a large potential for coppiced mallee as a feedstock. 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.

### **Advanced Biofuels**

A variety of processing alternatives exist for converting woody and herbaceous biomass, and a fraction of the urban waste stream, into so-called ‘drop-in’ biofuels. The main routes are thermochemical and biochemical. The former involves gasification, pyrolysis and hydrothermal liquefaction of biomass followed by synthesis of the fuel, while the latter generally uses enzymes and acids for hydrolysis followed by fermentation using tailored microorganisms.

Examples of new technologies for producing biofuels being developed world wide, now being operated or built at commercial scale include:

- Straw and wood to ethanol via fermentation, for example the plant illustrated in Figure 1, operated by Beta Renewables at Crescentino in Italy:



Figure 1: Beta Renewables Ethanol Plant in Crescentino, Italy

- Wood waste to ethanol via gasification, for example the plant illustrated in Figure 2, operated by Ineos Bio in Florida, USA.



Figure 2: Wood Waste to Ethanol via Gasification

- Municipal Solid Waste to ethanol via gasification, for example the plant illustrated in Figure 3, by Enerkem in Alberta, Canada (now operational)



Figure 3: Enerkem MSW to Ethanol Plant in Alberta Canada

Other groups such as Gevo, Byogy and Swedish Biofuels are developing technologies to convert ethanol to hydrocarbons that may be blended seamlessly with petrol, diesel and jet fuel.

These 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). A number of Australian groups have algal fuel projects at the pre-commercial stage, with interesting demonstration plants in WA and Queensland. These algal plants seek to produce biodiesel as well as other, value-added products.

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. The photo below in Figure 4 shows a Volvo DME truck being displayed at a biofuels conference in Stockholm.



(source: S Schuck)

Figure 4: Dimethyl Ether (DME) Truck on Display

### **Biogas as a Transport Fuel**

The biofuels mandate should also consider the use of purified biogas, produced from anaerobic digestion, as a transport fuel. Buses in several European cities are powered by the methane content of biogas and half of Sweden's automotive gas is provided from biogas. Biogas at a large landfill in Los Angeles is purified and liquefied for use as a transportation fuel. The mandate should not just be limited to ethanol and biodiesel, but also allow for a broad range of biofuels.

The key message is that the biofuel mandate needs to make provision for the adoption of new biofuels, using a variety of biomass feedstocks and processing routes.

### **Biomass Feedstocks**

A major cost component of future biofuels is likely to be the cost of the feedstocks. More than half of the cost of the fuel could be ascribed to the cost of the feedstock. As many of these biomass feedstocks are likely to take several years to establish, consideration needs to be given to supporting the development of feedstocks in the medium to longer term. This issue is well recognised in the USA where the US government has established the very substantial Biomass Crop Assistance Program (BCAP). Under this program biomass producers are provided with financial support and subsidies to supply energy crops to biorefineries and bioenergy/biofuels production facilities. Feedstock provision needs to be part of a coherent strategy for advancing biofuels in Queensland.

Another opportunity is to use invasive weeds such as *Mimosa pigra* and *Acacia nilotica*, prevalent in Northern Queensland and the NT, for fuel and feedstocks. Such industries, besides contributing to our future fuel mix and energy security, would stimulate rural economies and provide permanent jobs through the production of the biomass and the supply logistics.

### **Available Expertise**

It should be noted that Bioenergy Australia is an active participant in the International Energy Agency's Bioenergy Program ([www.ieabioenergy.com](http://www.ieabioenergy.com)). It is currently participating in five Tasks including Task 43 *Biomass Feedstocks for Energy Markets*. Prof Mark Brown from the University of the Sunshine Coast is Australia's national team leader for this task and is a world authority on the supply of woody biomass for energy. Bioenergy Australia would be happy to brief the government on some of the latest developments related to biomass feedstocks and advanced biofuel conversion technologies.

### **Aviation and Marine Fuels**

While the discussion paper focuses on land transportation biofuels, it should also be noted that significant opportunities exist for both aviation and marine biofuels. The CSIRO has conducted feasibility studies, largely directed at aviation biofuels, including a case study for the Fitzroy area of Queensland. It is suggested that these studies be revisited with a view to bringing such projects to reality.

### **Value from Biofuels**

While motoring costs are an important consideration, any educational campaign needs to promote the value proposition of biofuels in addressing the local and global environment, sustainability, energy security and local jobs especially in rural and regional areas. The focus should not just be on the cheapest fuel, but the one that best serves society.

**Responses to Selected questions** posed in the discussion paper are addressed as follows (using the numbering of the discussion paper).

3. It is suggested that a 5% ethanol mandate would be a better starting point for the mandate.
4. It is considered that the percentage should increase over time, in annual increments until all regular unleaded petrol is at least E10.
5. A reasonable biodiesel mandate should also start at B5.
7. The mandate needs to cover the economic lives of production plants, closer to 25 years than the 10 year sunset mentioned in the discussion paper.
14. In keeping with an enforceable mandate, as opposed to an aspirational target, exemptions should be limited to account for broad market limitations, such as resulting from droughts and floods, not just due to hardship suffered by an individual liable party.
- 20 & 21. Sustainability principles are important. However, they should be aligned with what is required by others in the agricultural sector, growing different crops on similar land. For instance the requirements on an oil seed producer for bioenergy should be identical to an oil seed producer supplying the food industry. Sustainability criteria should be independent of the target market.
22. Bioenergy Australia represents Australia in the International Energy Agency's Bioenergy program. This provides a wealth of experience and analysis on sustainability issues related to biomass. The government is encouraged to link up with this participation, to stay abreast of latest developments.
26. A substantial and targeted educational campaign is essential to go hand in hand with the mandate. There has been much misinformation about biofuels, which has misrepresented

issues such as 'food versus fuel'. This educational campaign should target fuel users and importantly motor vehicle salesman. There is much international information on ethanol and biodiesel which could be bought to bear in an information campaign.

**31.** The focus should not be solely on fuel price but on the value that biofuels can more broadly provide to society. It is well known that biomass industries can provide permanent jobs in rural economies with broad economic benefits (including mental health). As such sufficient weighting needs to be placed on the job creation potential of biofuels.

**32.** The provision of biofuels feedstocks will provide an alternative income stream for farmers. A stable regulatory framework, hopefully without a sunset clause on the legislation, should be sufficient for farmers to plan which crops they would prefer to plant.

**34.** A government support mechanism is suggested for the establishment of appropriate energy crops during the early years of the mandate. It needs to be recognised that many of the advanced feedstocks (such as tree energy plantations) take several years to establish and become productive. As such support in this area needs to be an early priority of the government.

**35 & 38.** A vibrant Queensland biofuels industry, especially related to advanced biofuels, will be in need of underpinning research and development expertise. This capability should be nurtured through centres of excellence in biological sciences and biofuels processing at Queensland Universities.

## **Conclusion**

Thank you for the opportunity of providing this submission. I would be most pleased to provide follow-up information and assistance to the Project team. This would hopefully lead to biofuels opportunities contributing more substantially to future fuel supplies in Queensland, together with the jobs and sustainable economic development that are unique to this well-established form of renewable energy.

Yours Sincerely



Dr Stephen Schuck  
CEO Bioenergy Australia

## References:

- [1] 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