



Contact:
Bioenergy Australia (Forum) Pty Ltd
ABN 14 155 856 821
Renewables Innovation Hub
19/23 Moore street, Turner ACT 2612
Phone: 0439 555 764
Email: [DELETED]

BIOENERGY AUSTRALIA SUBMISSION

Infrastructure SA - 20-Year State Infrastructure Strategy

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The purpose of this submission from Bioenergy Australia is to highlight the role of bioenergy in the transition to a reliable, affordable and decarbonised energy system in South Australia.

About Bioenergy Australia

Bioenergy Australia is the National Industry association, committed to accelerating Australia's bio economy.

Our mission is to foster the bioenergy sector to generate jobs, secure investment, maximise the value of local resources, minimise waste and environmental impact, and develop and promote national bioenergy expertise into international markets.

Bioenergy Australia's objectives are to:

Advocate - With our members, we anticipate and develop leading positions on issues of concern to the advancement and growth of bioenergy in Australia.

Campaign - We raise the profile of the industry within the media and broader community to achieve a greater level of understanding about bioenergy and the vital role it must play to achieve carbon neutrality by 2050.

Inform - We publish reports, webinars and articles to help our members keep ahead of industry trends and opportunities. We also manage the [Biomass Producer](#) website, an AgriFutures Australia resource showcasing Australian bioenergy projects, expertise, and identifying opportunities for primary producers.

Connect - We facilitate knowledge exchange and networking for members through task-specific meetings, our Annual Conference, and Webinars. We link investors with emerging businesses; researchers with technology developers; government with innovators. We also administer Australia's participation in [IEA Bioenergy](#). Our Industry groups bring together specialists in specific fields.

The role of infrastructure in a bio-economy

Around the world, significant steps are being taken to move from today's fossil-based economy to a more sustainable economy based on biomass.

As demonstrated in the international scenario, a key factor in the realization of a successful bio-based economy is the government role in supporting and securing feedstock supply, infrastructure and logistics; promoting access to technology and early-stage investment support; and improving demand.

As an example, infrastructure is critical in the transition to a decarbonisation of the gas network in Australia. As gas production decarbonises, the gas network infrastructure will need to undergo a transition to ensure it can continue to safely transport decarbonised gas from producers to consumers.

According to the recently launched report "[Biogas opportunities for Australia](#)", prepared by ENEA consulting for Bioenergy Australia, biogas represents a reliable and cost-effective solution to replace natural gas in the existing gas network. However, in Australia, there are limited incentives in place to invest in the infrastructure required to produce biogas at scale and inject it into the network. The absence of a broad-based carbon price, or specific policies targeting decarbonisation of the gas sector, limit the injection of biogas. The large-scale renewable energy target (LRET) provides incentives for renewable electricity generation, including electricity from biogas. Although the LRET has increased the overall size of the bioenergy market in Australia, it discourages the injection of biogas into the gas network, even where it may be more efficient than burning locally. This is an unintended consequence of the design of the LRET.

There are some state based schemes which provide support and incentives for infrastructure in the bioenergy space. For instance, the Victorian Waste to Energy Infrastructure Fund provides some investment support to install or upgrade waste to energy facilities in Victoria.

Bioenergy Australia acknowledges that the South Australian Government is currently providing significant support for bioenergy, through the SA Energy Plan. This directly supports the Regional Growth Fund, which has a focus on enhancing regional infrastructure and the Renewable Technology Fund, which aims to catalyse private investment to support further integration of bioenergy technologies.

In addition to the existing mechanisms currently supporting bioenergy technologies in South Australia, we encourage the South Australia's government to introduce a higher level of support for infrastructure in the transport sector. As highlighted in the QUT report "[Biofuels to bioproducts: a growth industry for Australia](#)", the provision of supporting mechanisms, such as education, incentives and infrastructure, is one of the key points necessary to establish a successful bioeconomy in Australia.

This is particularly relevant in the biofuel sector, where it is critical to ensure the establishment of infrastructure required for blending and distribution of biofuels. At the wholesale level, this will require the widespread availability of biofuels-blending infrastructure. At the retail level, the requirement is to ensure that all service stations are equipped with biofuels bowsers and infrastructure necessary to support consumer access to biofuels.

The biofuels infrastructure, from the feedstock supply chain to production, is a critical element for success also because it provides an excellent foundation for expansion of the existing biofuels plants into biochemicals production. In fact, the development of biorefinery systems allows highly efficient and cost-effective processing of biological feedstocks to a range of bio-based products, and successful integration into existing infrastructure.

How will technology change the transport system in South Australia?

A global transition towards low carbon technologies in the transport sector is underway.

In the next several decades, an increase of electric vehicles (EVs) into the global passenger vehicle fleet is expected. However, even with increasing demand, electric vehicles are projected to account for only 30 per cent of the global vehicle fleet by 2040 and a much lower uptake is expected in Australia.

In addition, passenger vehicles account for one part of liquid fuel requirements with Aviation, Shipping and Heavy Haulage (Trucks and Trains) still requiring high energy density liquid fuels. Biofuels are a proven technology and will complement the uptake of EVs as the transport sector moves to reduce emissions.

At a global level, the aviation industry has committed to reducing its greenhouse gas emissions and has set a target of carbon neutral growth from 2020. The use of sustainable aviation fuels will play a critical role towards achieving this target. For instance, technology has been developed for the conversion of first-generation biofuels into jet fuels, and the production route for this has been recently certified for use in commercial aviation. To achieve the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) targets, all sustainable fuels will need to be assessed against a robust and consistent Life-cycle analysis (LCA) framework. In addition, the global aviation industry is seeking to implement a strict set of sustainability criteria to ensure the production of these fuels does not have unintended environmental, social or economic consequences. The international aviation industry will be complying with the global framework and relevant LCA criteria, with many key States having sustainable aviation fuels readily available (e.g. United States and Europe), backed by significant policy mechanisms encouraging the development of this important industry. In the absence of a functioning sustainable alternative fuels industry in Australia, the Australian airlines will be at a significant competitive disadvantage.

Together with the aviation, the merchant shipping sector is one of the mayor players in world trade. More than 80% of all goods are transported via international shipping routes. The sector consumes more than 330 Mt of fuel a year and accounts for 2-3% of the global CO₂, 4-9% of SO_x, and 10-15% of NO_x emissions. Being international in its operation and organization, the maritime sector is regulated by the International Maritime Organization (IMO) under the UN. IMO handles issues regarding safety, security and pollution associated with international shipping. A major issue of pollution from shipping are the particles emitted due to the high levels of sulphur in the fuels. The IMO has put forward strict regulation of the fuel sulphur levels. The low sulphur fuels currently introduced are labelled Very low Sulphur Fuel Oil (VLSFO) having between 0.1 to 0.5% sulphur and Ultralow Sulphur Fuel Oil (ULSFO) having below 0.1% sulphur content. Biofuels have very low sulphur levels and low CO₂ emissions, as such are ideal to meet either the VLSFO or ULSFO requirements.

In addition to these opportunities in the aviation and shipping sectors, biofuels are proven to be a market-ready and a cost-competitive alternative to fossil fuels for heavy haulage. International truck companies are already embracing bioenergy as low-carbon fuel for their vehicles and there is no reason to prevent the same trend in Australia. As an example, Scania, a world leading provider of transport solutions, has demonstrated that it is possible to operate trucks and buses in Sweden on biofuels and reduce environmental impact cost-effectively. Their strategy involves supplying engines running on all commercially available fuel alternatives, including compressed and liquefied biogas and natural gas, biodiesel and ethanol. The company has recently released an alternative fuel engine option for the new truck generation and Euro 6 emissions standard. The new bioethanol engine

delivers 2,150 Nm, equal to that of its diesel counterpart. The fuel consumption is also on a par with a conventional diesel engine.

Biofuels are therefore a viable low-carbon technology for heavy transport, freight, aviation, defence and shipping applications.

Although actions at national level are necessary to drive growth in the biofuel sector, we acknowledge the great opportunity for the South Australia's Government to take the initiative where national leadership is ineffective and to consider biofuels as key player in the decarbonisation of the transport system in South Australia.

How can South Australia take the lead on reducing emissions from transport?

Biofuels derived from biomass and other waste sources can be used in the transport sector as a replacement for conventional fuels, with the opportunity to deliver significant reduction in GHG emissions.

In 2017, biofuels made up 3% of the transport fuel demand worldwide, with 70% of this usage coming from the US (47%) and Brazil (23%). This equates to 140 billion litres globally, which is expected to grow in the future as more sustainable fuel sources are sought by the market.

While the biofuels industry has not experienced the same growth in Australia, production is expected to increase due to mandates for ethanol-blended petrol in both New South Wales and Queensland and a growth in the global demand for biofuels specifically for the aviation and marine sector.

Road

In Australia the vast majority of petrol cars can use ethanol blended fuel — in the same way that virtually all trucks and cars can take biodiesel blended fuel. According to the QUT report "[Biofuels to bioproducts: a growth industry for Australia](#)", biofuels use at up to 10% in petrol and diesel in Australia can reduce GHG emissions by 8.9 million tonnes CO₂ eq. per year, with subsequent health benefits driven in part by the reduction in the use of carcinogenic materials such as alkanes, toluene and benzene.

Aviation

As part of the global decarbonisation process, the international aviation industry has committed to reducing its greenhouse gas emissions. Unlike the land transport sector, airlines have limited options to materially reduce emissions other than through the use of aviation biofuels, therefore bio-based aviation fuels can significantly contribute to a significant decrease in global CO₂ emissions. Worldwide in 2015, 781 million tonnes of CO₂ were produced from flights. Biofuels can decrease the carbon footprint of jet fuel by 80 per cent, based on full life cycle assessment. An overall reduction in CO₂ emissions of 5 per cent can be expected if biofuel replaces 6 per cent of jet fuel by 2020.

Maritime

The maritime industry is facing a similar transformation. LSF2020 refers to the new 'Low Sulphur Fuel' regulations, which will come into effect on 1 January 2020. These regulations are the biggest of a series of steps by the International Maritime Organisation to reduce marine pollution (MARPOL) in response to the threat of climate change. The LSF2020 emission regulations mean ships will have to significantly reduce emissions on the high seas as well as in coastal areas, which is a significant opportunity for the biofuels sector.

Bioenergy Australia would also like to highlight that bioenergy opportunities in the transport sector are not only limited to emissions reduction. The transition from fossil-based fuels to biofuels would also deliver the following benefits:

- Improved energy security

International Energy Agency mandates that countries hold at least 90 days' supply of liquid fuel reserves. However, according to the latest Department of Energy figures, Australia sits well below this, with 22 days' worth of petrol, 17 days of diesel and 27 days of total petroleum products. Biofuels reduce dependence on foreign oil by producing a reliable source of domestic energy securing Australia's energy independence. As an example, the substitution of 10% of Australia's petrol consumption with domestically produced bioethanol would result in a reduction of our reliance on imported fuels by up to 18% and an improvement of Australia's balance of trade by about A\$1 billion annually. In addition, oil discovery is in decline and the world has reached the point at which new drilling has failed to increase the maximum level of extraction. Renewable fuels such as biodiesel can solve many of the concerns that are raised by suggestions of "peak oil", a term used to express when the maximum level of oil can be extracted from the earth.

- Creation of advanced biomanufacturing industries

Australia with its large biomass reserves is well-positioned to benefit from the growth of bio-based fuel and chemical sectors.

- Improvement of vehicle performance

The use of higher octane fuels allows for the use of higher compression engines which are more fuel efficient. When ethanol is added to petrol the octane level increases. Similarly, biodiesel has a higher cetane number (higher ignitability) than diesel fuel and combusts more completely. Biodiesel adds significant lubricity to the fuel and it is also a good solvent and will clean out diesel fuel residue left in the fuel tank and lines.

In Australia biofuels are primarily produced in New South Wales and Queensland and very little if any in South Australia, even though the State is blessed with natural resources which could support the growth of the biofuel industry.

In the light of these opportunities, we invite the South Australian Government to consider making a commitment to a future biofuels and bioproducts industry, similarly to the Advance Queensland Biofutures 10-Year Roadmap and Action Plan. As part of this commitment, we suggest the introduction of a biofuel mandate, similar to the ones currently operating in NSW and QLD.

In addition, we believe that the SA Government should review the availability of biomass in SA and examine the logistics of consolidating this material at a "biofuels" hub for processing. A feasibility study and cost benefit analysis should follow in order to identify viable options.

What options are there to establish a reliable, affordable, decarbonised energy system in South Australia?

According to the International Energy Agency's latest market forecast, modern bioenergy will have the biggest growth in renewable resources between 2018 and 2023, underscoring its critical role in building a robust renewable portfolio and ensuring a more secure and sustainable energy system.

Alongside with the transport sector, the development of a potential bioeconomy offers additional opportunities to establish a reliable, affordable and decarbonised energy system in South Australia.

Gas

While there has been strong investment in recent years in transitioning the electricity supply from fossil fuels to renewable electricity generation, there has been slower progress in transitioning other sources of energy consumption, such as gas used for thermal processes, to lower emissions.

Biogas is a proven technology, which is widely adopted internationally. The recently launched report "[Biogas opportunities for Australia](#)", prepared by ENEA consulting for Bioenergy Australia, examined the potential for the use of biogas energy in Australia and found that biogas represented a multi-billion dollar investment opportunity for Australia, with the potential to offset natural gas use in transport and could be used for heat and/or electricity generation and injection into the existing gas network.

According to the Deloitte report "[Decarbonising Australia's gas distribution networks](#)", biogas is currently the cheapest option for decarbonisation of energy provided by gas networks. Enough biogas potential exists to meet all residential and commercial gas demand on the East Coast. The cheapest form of biogas feedstock (urban waste, livestock residue and food waste), is currently sufficient to meet around 14% of energy used from gas.

In a study conducted by ENEA Consulting and Quantis in 2015, the replacement of natural gas by biomethane in France resulted in the reduction of GHG emissions by 54 gCO₂e for each MJ that was produced, injected into the gas grid and consumed. This amount translates to more than 85% emissions reduction from the consumption of natural gas, which has the emission factor of approximately 63.1 gCO₂e per MJ (LHV) in France.

Several recommendations have emerged from the report "[Biogas opportunities for Australia](#)" for Australian Governments and industry stakeholders to consider, aiming to advance Australia's biogas sector. These are:

- 1. Setting renewable gas target(s)**
- 2. Launching industry stakeholder consultation for policy design**
- 3. Introducing waste management strategies to support feedstock quality and quantity**
- 4. Encouraging plant operators, especially landfill operators, to maximise biogas use**
- 5. Exploring opportunities for the transport sector**
- 6. Providing regulatory clarity for the digestate**
- 7. Simplifying approval processes**
- 8. Informing the community about biogas and its benefits**
- 9. Exploring future work to quantify the industry's economic potential**

Woody biomass: a sustainable energy resource in SA

- Woody biomass accounts for the majority of the world's bioenergy resource, with SA's Limestone Coast region producing a significant volume due to its renewable forest industry.
- Bioenergy from wood waste is renewable and carbon neutral when the source material comes from sustainably managed forests. Because of its vast sustainably managed forest plantations and associated processing facilities, SA is in a very strong position to harness this type of bioenergy.
- Bioenergy from wood waste from processing facilities could fuel electricity or industrial heat production that have traditionally been sourced from fossil fuels. With minimal conversion, some existing fossil-fuelled energy plants could be replaced or co-fuelled by renewable wood waste.
- A number of forest product manufacturers in the South East of SA already use bioenergy to fuel their operations. Industrial heat from biomass is used to fuel sawn timber drying kilns, reducing the call on wholesale power from the grid.
- In addition, interstate forest industry investors are interested in expanding their businesses in the Limestone Coast region for, among other things, the establishment of a bioenergy pellet plant.
- According to the Intergovernmental Panel on Climate Change (IPCC 4th Assessment), a sustainably managed forests industry (with carbon stored in products and residues used for energy) is one of the best ways fight climate change.
- Bioenergy sourced from renewable woody biomass from the Limestone Coast region has the potential of supplying up to 5% of SA's total electricity demand.

Recognition of renewable heat

- National energy/climate change policies should promote renewable energy opportunities for bioenergy, including for renewable electricity, industrial heat and biofuels. Bioenergy and renewable heat could support renewable forest industries and other similar primary industries (e.g. sugar and abattoirs) to convert away from fossil fuels to affordable, secure renewable energy investment, and make a huge contribution to reducing emissions. It would also help sustain Australian manufacturing operations, providing much needed investment and regional jobs.
- Forest product manufacturing are under crippling cost pressures due to rapidly rising gas and energy contract prices. Bioenergy is a unique renewable source that can be used across all three energy sectors (transport, heat and electricity). Bioenergy can be both dispatchable and deliver baseload power 24 hours a day, 7 days a week. Biomass waste and residues can partially substitute for coal in coal fired power station units. Bioenergy is well suited to powering many existing regional manufacturers and communities. Bioenergy assets located in those communities will reduce transmission losses and distribution costs. A major impediment to bioenergy uptake in Australia has been the sole emphasis on renewable electricity rather than energy (including renewable heat) in previous climate change/energy policies. This has constrained bioenergy investment in renewable heat and cogeneration opportunities.

Bioenergy Australia encourages the South Australian Government to incentivise the efficient use of solid biomass resources (e.g. forestry residues, green waste) in heat applications such as in biomass boilers for industrial heat, displacing high-cost natural gas and LPG.

As highlighted in the [Bioenergy State of the Nation report](#), prepared by KPMG for Bioenergy Australia, it is clear that the development of a potential bio-economy could not only provide a significant contribution in the emissions reduction targets, but also deliver a wider range of social and economic benefits at national and state level. These are:

- Regional employment and economic development

The feedstock used for bioenergy often stems from primary industry sector activities and can be associated with existing or new manufacturing processes. Development of bioenergy can provide skilled employment opportunities to these regions and stimulate economic development through the delivery of revenue streams outside of traditional sources.

The Clean Energy Finance Corporation estimates a potential investment opportunity of between \$3.5 billion and \$5 billion in energy from urban waste, agricultural waste and forest residues. With respect to biofuels, increased use of 10% ethanol-blended petrol (E10) in Australia could create more than 8600 jobs and attract \$1.56 billion in investment and generate more than \$1.1 billion in additional revenue in regional areas.

- Energy security

Domestic production of biofuels results in less reliance on imported oil and petroleum products, promoting energy security. As an example, the QUT report "[Biofuels to bioproducts: a growth industry for Australia](#)" indicates that implementation of a nation-wide mandate for 10% ethanol blending in petrol alone could reduce automotive gasoline imports by about 18 per cent annually, and contribute to enhanced domestic fuel security.

- Enhanced resilience of agriculture

Growing non-food energy crops, especially perennial lignocellulosic species strategically integrated into existing agricultural production systems (such as buffers to prevent runoff to streams), can provide income diversification to landholders, enhance agro-biodiversity and reduce environmental impacts of agriculture.

- Utilisation of waste streams

Bioenergy is typically produced from the utilisation of waste materials such as agricultural and animal residues as well as municipal waste. This delivers economic benefit to resources that would generally be considered as end-of-life products, and can contribute towards a reduction in landfill.

The use of waste streams to generate energy rather than disposal to landfill moves away from the linear economy, and promotes a circular economy approach to using the available resources for their highest order use, in accordance with the waste hierarchy.

Bioenergy Australia acknowledges that South Australia is a hub for the circular economy where circular principles are adopted in the areas of recycling and resource recovery; water management; climate change; smart cities; innovation and renewable energy.

As part of this strategy, Bioenergy Australia invites the South Australian Government to consider the development of a bioenergy hub in order to attract industrial projects in renewable energy and make them more competitive, as well as to create job opportunities.

The potential utilization of a broad range of waste streams provides the opportunity to create new industries. For instance, technologies are constantly under development to optimise the conversion

of waste into biofuels. Some examples are the Australian technology developer Licella, Mercurius Australia teamed up with Southern Oil Refining, and Global Ecofuels Solutions (GEFS) in conjunction with Boral Australia.

In addition, new employment opportunities arise from growing and harvesting biomass, transport, handling, and through procurement, construction, operation and maintenance of bioenergy plants.

Bioenergy Australia invites the South Australia's Government to support waste to energy opportunities by incentivising the conversion of residual wastes into energy such as heat, electricity, or liquid transport fuels.

Thank you for the opportunity to provide this submission.

Yours sincerely

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Shahana McKenzie, CEO Bioenergy Australia