Helmont Energy Pty Ltd
ABN 53 640 683 727
Phone: +61 403 738 674
Email: mark@helmontenergy.com

Submission to the ARENA Bioenergy Roadmap

June 2020

1 Introduction

Helmont Energy is pleased to make this submission to the Australian Renewable Energy Agency ('ARENA') with regards to the Bioenergy Roadmap ('the Roadmap'). Helmont Energy supports the *Report of the Expert Panel examining additional sources of low cost abatement* ('the King Review'),[1] particularly the recommendations on improving the Emissions Reduction Fund ('ERF') and maximising investment from the private sector. The Roadmap will provide an overall framework for sector growth including achieving the key policy objectives in the King Review.

Helmont Energy's directors have over 50 years' experience in domestic and international energy markets and are confident that investment in bioenergy will occur with appropriate policy, an increase in the supply of secure feedstock, and greater access to markets. Experience in mature overseas markets has allowed Helmont Energy to identify the shortcomings of the Australian industry, and these markets will provide lessons to assist in policy development for Australia's bioenergy industry.

This submission is broken in two parts. The first part sets out the high level recommendations for inclusions in the Roadmap, as well as the market potential and benefits of bioenergy. The second part expands on and establishes the context for the recommendations.

[1] Source: https://www.industry.gov.au/data-and-publications/examining-additional-sources-of-low-cost-abatement-expert-panel-report.

2 High Level Recommendations, Market Potential and Benefits of Bioenergy

2.1 Recommendations

Helmont Energy recently completed feasibility studies to enter the bioenergy market, which identified three clear objectives that would support investment in bioenergy. These align with the direction of Bioenergy Australia and the industry in general.

2.1.1 Objective 1: Commoditise biomethane to maximise market demand

Implement:

1. A specific action plan to create a tradeable commodity market for bioenergy through:
    a) Changes to the National Greenhouse and Energy Reporting scheme ('NGERs')
    b) Changes to the ERF and Renewable Energy Target ('RET')
    c) Development of dedicated frameworks, such as mandatory targets for clean gas and transportation fuels
2. A specific action plan to implement a 'gas swap model' (see Figure 1), which will assist in the delivery of biomethane to all gas consumers

2.1.2 Objective 2: Increase the availability of secure feedstocks

Establish a central feedstock plan to be used by all levels of government, which addresses:

1. Education of the community on the opportunities and benefits of bioenergy
2. Incentives for farmers to participate in bioenergy production, including energy cropping, and building farmers' confidence that a long-term market exists for bioenergy
3. Identification and promotion of regional bioenergy hubs
4. Development and implementation of municipal solid waste ('MSW') source separation policies

2.1.3 Objective 3: Export bioenergy to international markets

Establish a Federal Government-led initiative to collaborate with Australia's international trading partners, which addresses:

1. Establishing new methodologies to trade bioenergy within international clean energy markets, including Asia, North America, UK and Europe, where deep and mature markets already exist

2. The use of existing supply chains, such as those for the export of liquified natural gas ('LNG'), to export bioenergy and its benefits (carbon and green credits) to the international market
3. The promotion of a new Australian bioenergy export industry to domestic producers and international buyers

2.2 Market Potential

Bioenergy has significant potential to decarbonise energy supply and achieve fuel security in Australia due to Australia's natural resources. The abundance of sunshine and availability of agricultural resources (land and expertise) and the current reliance on imported fossil fuels, positions bioenergy as the next growth sector. Currently bioenergy is underutilised due to its confinement to isolated regions and markets, lack of sufficient scale, and the absence of policy which would support its growth alongside other clean energy technologies. Further investment in bioenergy will require clear, long-term policy that provides investors with confidence their product will be supported by a stable contractual market for a minimum of 10 years. It will also require a roadmap for growth and to reach market maturity.

More than thirty years ago, bioenergy was emerging in Australia as an important transitional technology that materially contributed to the Mandatory Renewable Electricity Target ('MRET', now the RET), at a time when wind and solar technologies were not commercially viable. However, with policy driving wind and solar technologies, production costs were reduced, thereby powering that market forward at the expense of bioenergy. Fostering the development of a new bioenergy framework will unlock bioenergy's potential as well as building a pathway through which emerging clean fuels such as hydrogen can join with and supplement bioenergy.

2.3 Bioenergy's benefits

The full spectrum of bioenergy's benefits has not yet been valued and supported within the existing policy frameworks, hindering development of new bioelectricity projects within the renewable electricity sector. The current policy assigns equal value to all renewable electricity technologies despite the different characteristics of each technology. Some of the unique benefits of bioenergy include:

- The ability to be cheaply stored and used as reliable renewable electricity (e.g. for grid support using gas generation)
- Diversity of use including for electricity, heat, transport fuel, domestic gas and production of petrochemicals

- Negative carbon emissions. Note that the Low Carbon Fuel Standard ('LCFS') accredits projects that reduce transportation emissions, and bioenergy projects can create 4-5 times more carbon abatement than Electric Vehicles using renewable generation[2]
- Contribution to the circular economy and other benefits derived from its capture and use (e.g. use of digestate (by-product) as fertiliser, reduced odours from decaying material)
- Diversification of income and development for regional and remote Australia
- The ability to improve regional energy security by creating biofuel reserves

Bioenergy can reach its full potential when these benefits are valued.

[2] The list of accredited LCFS projects on their Carbon Intensity (CI) scores can be found at: https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities.

3 Expanding on the Recommended Objectives

Building on the recommendations noted earlier, the below explores in detail the rationale for the inclusion of the recommendations in the roadmap.

3.1 Objective 1: Commoditise biomethane to maximise market demand

The commoditisation of biomethane which has been transported through the natural gas network will increase the market size for biomethane.

3.1.1 Recommendations

1. The inclusion of a three-stage action plan to commoditise bioenergy through changes to the NGERs, ERF and RET, and later through dedicated frameworks (mandatory targets).
2. The inclusion of a specific action plan to implement a 'gas swap model' (see Figure 1) into the domestic gas market.

3.1.2 Background

Australian Carbon Credit Units ('ACCUs') have monetary value, derived from the ERF and the secondary ACCU market. If a project is an eligible offsets project (a project which reduces carbon emissions), participants can register it under an approved ACCU method to create ACCUs and this provides revenue to a project.

The RET allows electricity producers to generate Large-scale Generation Certificates ('LGCs'), which also have monetary value, if they produce electricity from eligible renewable generation.

Some forms of bioenergy fit into these categorisations and thus create LGCs and ACCUs, however, biogas which has been converted into biomethane (offsetting natural gas usage) and transported through a multi-user pipeline to an end-consumer does not, thereby devaluing its potential.[3] Biomethane's addressable market would significantly increase if its environmental properties[4] could be 'delivered' to a consumer that purchases biomethane via a multi-user gas network. This would improve liquidity, increase market participation and allow new

[3] Gas delivered from a multi-user natural gas system includes gas physically delivered or gas swapped within a natural gas system (see Figure 1). Hereafter this type of biomethane will be referred to as pipeline transported biomethane, or 'PTB'.

[4] For the purposes of this submission, environmental properties are those intangible attributes of biomethane which allow it to be reported as a renewable source of energy with zero carbon emissions.

technologies to be developed, such as biomethane to clean fuel technologies and carbon-free manufactured products.

3.1.3 Recommendation 1: Three-stage action plan for the commoditisation of biomethane

Helmont Energy recommend the following three-stage action plan to commoditise biomethane, which will expand its market potential.

Stage 1: Categorise pipeline transported biomethane (PTB) as a zero-emission source of energy

Currently, if consumers were to purchase PTB, they would not be able to report a reduction in their carbon emissions through the use of a zero-emission[5] source of energy. The relevant legislation and policies should be amended to categorise PTB as zero-emission for the purposes of reporting under the NGERs, to increase its value and build the market. It is recommended these changes encompass biomethane that has been refined into other products, such as methanol or biodiesel, which can service the transportation and petrochemical industries.

This change would increase the market potential for biomethane as:

1) Natural gas consumers could replace natural gas with biomethane and reduce emissions.
2) Biomethane could be refined into transportation fuel and this would allow transportation entities to reduce their emissions.
3) Industrial and consumer materials (plastics etc) could also be recognised as carbon-free products where biomethane was utilised in their production.

Stage 2: Use the ERF and RET to monetise PTB's environmental benefits

The ERF and the RET can be used to create value from the environmental properties of PTB by creating ACCUs and/or LGCs. Helmont Energy specifically recommends:

- The creation or amendment of existing methods to create ACCUs from projects that produce and consumers that utilise PTB, including pipeline transport providers who are required to purchase natural gas to offset their unaccounted gas emissions (gas leaks from pipes, valves and flanges).
- That natural gas generators who use PTB to generate electricity be able create LGCs from these facilities. This will allow the use of a combination of intermittent renewable generation and reliable biomethane generation, to provide energy which is 100% renewable, reliable and capable of replacing baseload coal-fired generation.

[5] For the purposes of this section, zero emissions includes near-zero emissions, negative emissions and renewable energy.

Stage 3: Create a mandated target for clean transportation fuels and clean gas

A mandatory target for the production and use of clean transportation fuels and clean gas should be considered as a longer-term policy mechanism to promote the bioenergy industry, alongside other technologies such as hydrogen and electric vehicles. A mandated target would promote biofuel usage for domestic liquid fuel consumers and help decarbonise the natural gas network. A similar mechanism was introduced in the electricity sector with the introduction of the MRET in 2001. This led to the active promotion of new renewable electricity technologies and the development of policy. In turn, this enabled new investments in the sector, which is now producing more than 20% of renewable electricity generation in Australia. As an example of this type of mechanism being used for fuels, the US introduced the Renewable Fuel Standard ('RFS'), which mandates that oil refiners and blenders purchase 32 billion gallons of renewable fuel by 2022. In 2019, producers delivered 19.92 billion gallons of renewable fuel into the US transportation market[6]. Biomethane transported through a gas network and converted into bioLNG and bioCNG is an eligible renewable fuel under the RFS.

3.1.4 Recommendation 2: Implement a Gas Swap Model

As noted in Recommendation 1 - Stage 1, the NGERs does not currently categorise PTB as zero-emissions. The proposed amendments to the NGERs should be supplemented with a gas swap model, as demonstrated in Figure 1, to give all gas consumers the option of purchasing renewable gas, regardless of their location.

The gas swap model would separate the value of biomethane's environmental properties from the value of the gas itself, so that it can be attributed to any consumer on a multi-user natural gas network seeking to reduce carbon emissions and use renewable fuel. By amending the NGERs, and giving the market the opportunity to swap biomethane with natural gas, a tradable environmental credit will be created from PTB. Demand for these credits, via a voluntary market, will increase the market potential, which will support growth in the bioenergy industry. Further, it will allow biomethane producers to connect with a larger market of gas users and encourage remote and regional bioenergy production.

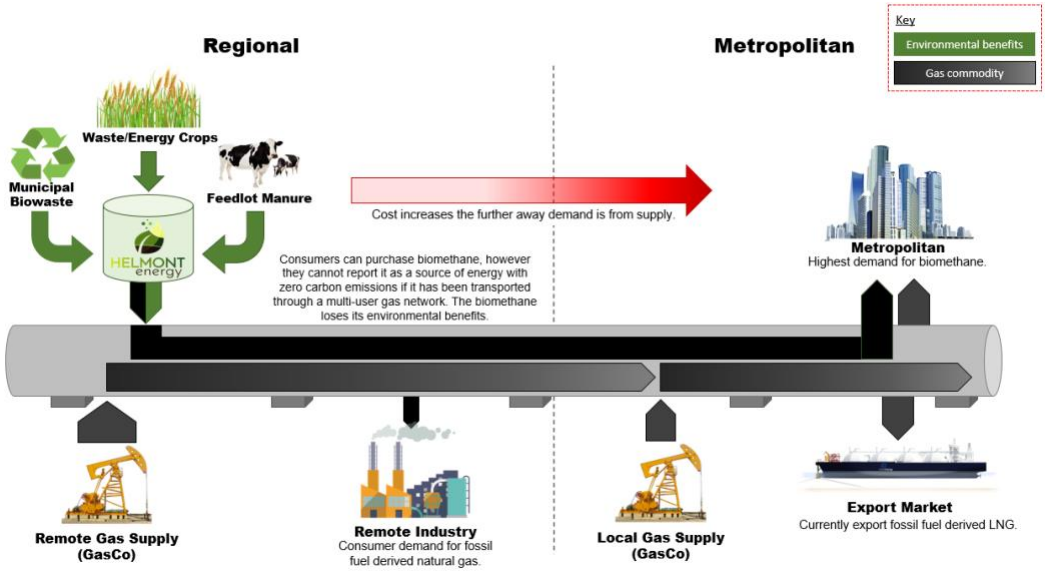
This model has been successful in many overseas markets, highlighting its effectiveness in expanding the market for biomethane and consolidating supply and demand. This can support large-scale production and off-take opportunities. The model is outlined below.

[6] More information on the RFS and the mandated targets can be found at https://www.epa.gov/renewable-fuel-standard-program.

Figure 1 - The gas swap model

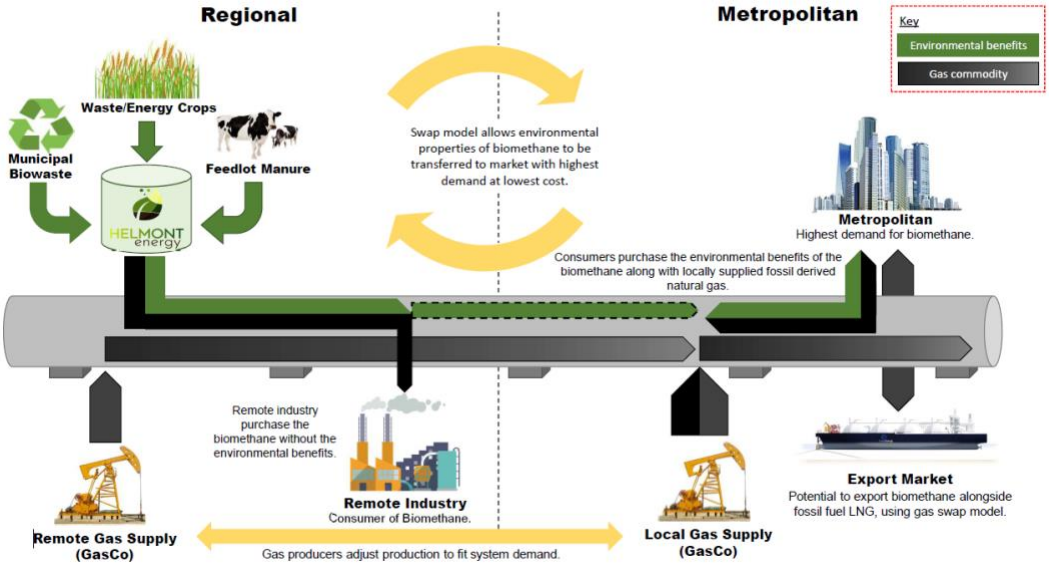
The Problem

Potential biomethane supply is concentrated in remote and regional areas, which are geographically distant from a target market that is largely concentrated in metropolitan locations. Existing pipelines could deliver biomethane from remote regions to target markets, however pipeline transportation costs, which increase with distance, create barriers. While biomethane can be supplied to consumers close to potential production facilities, those consumers do not require zero-emissions gas or renewable fuel. This is limiting the market potential for biomethane.



The Solution

Create a 'gas swap model', separating the value of biomethane's environmental properties from the value of the gas itself, allowing it to be attributed to any consumer on a multi-user natural gas network. Put simply, a user of biomethane agrees to trade the environmental benefits with another user of natural gas.



The Outcome

- The addressable market for biomethane is increased by removing barriers including transportation costs.
- New supply areas in remote and regional areas are utilised, promoting regional development and harnessing Australia's vast productive agricultural lands.
- Access to biomethane for any consumer connected to a gas network is increased.
- Domestic gas supply is increased and diversified.

Helmont Energy, through its directors, has first-hand experience of the successful implementation of the gas swap model in the North America market and believes it provides a simple and effective opportunity for Australia to significantly expand its biomethane market. As at March 2020, there were 114 renewable natural gas (biomethane) facilities operating throughout the US and Canada. The majority of these facilities supply biomethane to LNG and CNG transportation dispensing plants by utilising a gas swap model.[7]

Helmont Energy firmly advocates for the inclusion in the Roadmap of a specific policy and action plan for the implementation of a gas swap model in Australia.

3.2 Objective 2: Increase the availability of secure feedstocks

The utilisation of Australia's vast supply of productive land and agricultural waste residues could de-risk and substantially increase bioenergy feedstock supply.

3.2.1 Recommendation

Helmont Energy recommend that the Roadmap includes a feedstock plan for the increase in supply of secure feedstocks. The plan would cover:

1. The education of the community on the opportunities and benefits of bioenergy
2. Incentives for farmers to participate in energy production, including energy cropping, and building farmers' confidence that a long-term market exists for bioenergy
3. Identification and promotion of regional bioenergy hubs
4. Development and implementation of MSW source separation policies

3.2.2 Background

The existing bioenergy sector in Australia uses a fraction of the available feedstocks, with current bioenergy feedstock being mainly landfills and food processing by-products such as bagasse (a by-product of sugarcane production). Australia's availability of underutilised land

[7] Source: http://www.rngcoalition.com/rng-production-facilities.

and its developed agricultural industry mean that a wide range of underutilised feedstock such as cotton, wheat, sorghum and feedlot manure could be used. Additionally, there is an opportunity in Australia to produce feedstocks specifically for bioenergy production. This will open the market and reduce the risk associated with bioenergy projects.

Increasing feedstock supply via both the creation of dedicated energy crops and the better coordinated use of agricultural waste residues and organic waste diversion will enable growth in regional areas and benefit urban areas. This will reduce landfill and create new jobs and skills, benefiting the agriculture sector through greater diversity of income and the co-benefits associated with bioenergy production. The bioenergy sector also provides a unique opportunity for Indigenous communities, with the potential to develop biomass cropping areas in collaboration with Traditional Owners to create both jobs and income for the communities.

It is recognised that in Europe, bioenergy cropping has generated debate and led to social licence issues, due to limited land supply and concerns that energy cropping will reduce food availability. Australia benefits from a large land mass and the bioenergy industry can make use of both undeveloped and established agricultural regions in concert with food production. Utilising the bioenergy opportunity to enhance the output of undeveloped agricultural regions in areas such as the Northern Territory, will benefit the community by facilitating the necessary infrastructure and skills for food production, and will help to support a growing population.

3.2.3 Feedstock plan

A feedstock plan would enable these benefits by creating a central platform for promoting the increased supply of biomass and organic waste, to be used by all levels of government. The plan should include focussed policy directives on the following four aspects:

1. Education

The plan should provide tools and information to be used by governments to educate communities, stakeholders, farmers and policy-makers on the benefits of bioenergy. It is important that such a plan positions the bioenergy industry as using both existing feedstocks and potentially dedicated bioenergy crops, with the latter needing to be managed within the context of some stakeholder resistance.

An education campaign would highlight bioenergy's environmental and economic benefits including:

- Effective use of waste residues
- Utilisation of land that cannot support food crops for bioenergy crops

- The importance of reliable feedstocks to prove bioenergy's viability and its value in providing energy security
- The broader community benefits of co-locating bioenergy with local industry
- The ability of the sector to drive the circular economy and in particular its benefits to regional and remote areas.

2. Incentives

The feedstock plan should identify and address policies to encourage farmers to supply waste or dedicated biomass crops to the bioenergy industry. As an example, policy instruments could include a framework to establish a market and a floor price on biomass crops to encourage farmers to participate in the supply chain. Similarly, a framework to incentivise farmers to supply waste, which often contributes to methane fugitive emissions, and to utilise digestate (a by-product of biomethane production) could lift the participation rate and maximise co-benefits between the bioenergy industry and agriculture. It is important that these incentives help to build farmers' confidence in a solid and continuing market structure, which will encourage positive changes in custom and practice towards bioenergy.

3. Bioenergy hubs

By working with all levels of government, local communities and Indigenous groups, the industry can identify potential bioenergy hubs that will benefit all stakeholders. The identification of these hubs would factor in the availability of feedstock, suitability of areas for feedstock production, access to key infrastructure and co-benefits available to local industry. The advantage of developing hubs lies in their ability to create economies-of-scale, to reduce costs by allowing for shared resources and to promote investment[8]. Additionally, development of these hubs through the provision of grants and other incentives would further consolidate their development and growth in these areas.

4. Source separation of municipal solid waste

There are a range of existing programs, incentives and technologies for the separation of organic waste from MSW.[9] The utilisation of these programs and the partnership with waste industry groups and local governments could increase supply of feedstock for bioenergy production. Policies for source separation of MSW should be encouraged as they further increase the opportunity to use MSW as a feedstock and minimise waste sent to landfill.

[8] Co-digestion of manure with waste residues can optimise an Anaerobic Digester project. The creation of hubs can bring multiple farms' waste residues into a central location. Source: United States Environmental Protection Agency, 2020, *AgSTAR Project Development Handbook*, 3rd edition.

[9] See IEA Bioenergy's 2013 study on MSW and anaerobic digestion. Source: T. Al Seadi, et al, *Source separation of MSW*, 2013, IEA Bioenergy.

3.3 Objective 3: Export bioenergy to international markets

By separating bioenergy's environmental benefits from the underlying energy commodity, Australia's participation in the international clean energy sector could be revolutionised.

3.3.1 Recommendation

Helmont Energy recommend that the Roadmap includes a plan for the Australian Government to collaborate with its international counterparts to develop and implement methods that allow Australia's bioenergy to be used within new and existing international clean energy frameworks.

3.3.2 Background

Australia has a comparative advantage in the creation of bioenergy, as it is endowed with sufficient land, available sunshine, and advanced technology. Matched with the right policy, Australia can compete on the global stage for supply of bioenergy within international markets, for imports of bioenergy.

The energy markets of Asia, North America and Europe are large and have well established mechanisms to encourage bioenergy production and utilisation. Ensuring that Australia's bioenergy products can be traded into these markets will encourage more investment and increase Australia's positive impact on global emissions. Bioenergy can be turned into green hydrogen and Australia has existing supply chains for natural gas supply into international markets.

3.3.3 Bioenergy export opportunity

Combining Australia's existing international distribution channels, with an increasing supply of biomethane, would allow Australia to export bioenergy into new markets. This could include creating green hydrogen from biomethane across Asia, whereby the biomethane is converted into green hydrogen using conventional steam methane reforming technology. Additionally, an opportunity exists to sell biofuel into California where the LCFS creates carbon credits for participating fuels and has an average carbon price of US$190 per CO2 tonne[10].

The adoption of the gas swap model (or the equivalent for bio-diesel or bio-methanol) could efficiently deliver Australia's bioenergy and its associated environmental benefits into international markets with minimal transaction (transportation) costs.

[10] Source: https://ww3.arb.ca.gov/fuels/lcfs/credit/lrtweeklycreditreports.htm.

To determine if Australia can produce and deliver eligible bioenergy for international markets, a bioenergy export study will need to be developed. Existing supply channels for liquefied natural gas, crude oil, shipping bunkering fuel supply and aviation fuel could be potential pathways to transport and export bioenergy into international markets. To test the feasibility of this opportunity, industry and government will need to consider the use of specialist market, legal and international trade expertise.

4 Conclusion

Helmont Energy's recommendations incorporated into the Bioenergy Roadmap provides the opportunity to substantially increase demand for bioenergy, mitigate supply risk and create a viable bioenergy sector with significant potential for growth in Australia. The recommendations would leverage Australia's comparative advantage (domestically and internationally) by harnessing our natural resources and working alongside our agriculture industry. Australia has the skills and access to proven and new technology that will transition our economy to a low carbon future and diversify our economy. By targeting non-electricity sectors of the economy, bioenergy can realise its full potential as a zero-carbon fuel which has the potential to abate methane emissions and sequester significant amounts of carbon into soils.

Bioenergy can rapidly accelerate the heavy lifting required to decarbonise our transport, natural gas and manufacturing sectors. Working with the agriculture, transport and gas industries will greatly increase supply and demand for bioenergy. The combination of government policy, supporting initial early investment with industry, and the ongoing recognition of bioenergy's environmental benefits, will be essential for this industry to grow. Helmont Energy through its sector experience, are well positioned to partner with government and industry in developing and commercialising emerging bioenergy technology. Through its contributions to the Roadmap, Helmont Energy aim to realise market opportunities to kick-start a viable new industry for Australian regional and remote areas and supply a diverse renewable energy source.