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To ARENA
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Bioenergy Roadmap

Key summary points

1. Agriculture is a core component in bioenergy at a range of scales from on-farm energy use through to supply of feedstock to large grid scale operations.
2. The agricultural sector sees strong potential benefit for agriculture in bioenergy as a source of power and heat; as a source of income for farm businesses and in assisting the sector reduce its carbon emissions.
3. Agriculture needs certainty around energy and carbon policy to be able to make long-term investment decisions.
4. The Bioenergy roadmap must recognise and develop strategies for a range of scales of application including:
   - Bioenergy generation on farm for on-farm use;
   - Export of energy generated on-farm to the grid;
   - Large scale bioenergy projects with feedstock supplied in part by agriculture;
   - Bioenergy developments that provide sources of energy for import onto farms (ie biodiesel or biogases)
5. The strategy should recognise the need for incentives or support for projects that could provide working examples for other farmers to see and help to ensure technologies become affordable.
6. Bioenergy strategies for agriculture must combine with other carbon and emissions policies particularly relating to soil carbon. Agricultural engagement in bioenergy should enhance, not detract from, improving soil.
7. The roadmap must address other barriers to participation in bioenergy or renewables, including a consistent approach (policy and regulatory harmonisation) to managing energy from waste by relevant government authorities, network charges and/or regulation that:
   - Makes export of electricity generated on-farm prohibitive;
   - Makes virtual or microgrids impractical, and
   - Reduces regulatory barriers for the potential use of feedstocks.
8. Agricultural businesses will take up bioenergy when it produces a positive commercial benefit for their farming business and when they have seen it working effectively. Demonstrating and communicating successful on-farm operating systems is essential and this should be a part of the strategy.
9. Recognition of agriculture as a key part of any bioenergy strategy must be demonstrated by involving representatives of the sector in key governance and decision processes.
10. Agricultural peak bodies have limited resources and limited expertise and will require resourcing to play a proactive role in the role out of the bioenergy roadmap.

Introduction

The National Irrigators' Council (NIC) is pleased to provide comment on the Bioenergy Roadmap. We recognise the emerging opportunities during this period of transition of the energy market and the technical innovations as well as the policy and regulatory changes enabling these opportunities.

Since 2014, NIC has led a group of peak agriculture bodies *(Ag Energy Taskforce[1])* to draw attention to the impacts of the high cost of energy for Australia's highly efficient and productive agriculture sector. High energy costs have been a significant factor in impeding Australia's transition from a 'mining boom' to a 'dining boom'. The Australian Farm Institute noted in late 2018: *Australian industry – including agriculture – is rapidly becoming uncompetitive against countries with cheaper and more reliable power.* [2]

Australia's agricultural industries play a significant role as economic drivers in local economies, providing flow on benefits to the national economy. Industries include cotton, rice, sugar, wine, almonds, horticulture and dairy. Energy use across the agriculture sector is variable, dependent upon the industry and the intensification of operations at various times. Energy is used for pumping irrigation water, pasteurisation, cool rooms, processing plants and moving products. Operations that require heating, cooling or irrigation have higher levels of electricity use. Some industries have stable electricity consumption year round, while in others there is seasonal variability.

The NIC and Ag Energy Taskforce have long participated in the energy policy space and in energy market design. The rapid adoption of renewable technologies has created an increasingly dynamic system, and we have sought to highlight the needs of agriculture industries, previously challenged to operate in a competitive market in providing food and fibre for Australia and for export.

Australian farmers and agriculture industries are embracing technology to enhance production and operational efficiencies, and increasingly farmers are adopting renewable energy solutions to manage the cost of electricity, off-set unavoidable peak demand charges and working to decarbonise the 'energy mix'.

Despite the impact of prolonged drought and the significant challenges facing some industries, the value of farm production is expected to be $59 billion in 2019-20, supported by high commodity prices in some sectors. [3] Over the past ten years, electricity costs have increasingly become a significant cost input factor in Australia's food and fibre production, impacting the ability of farmers and industries to remain internationally competitive while utilising modern, water-efficient irrigation equipment.

Clean Energy Finance Corporation (CEFC)[4] data shows a progressive commitment among Australian farmers to invest in energy efficiency and renewable energy technologies. In the last three years farmers have taken up loan incentives offered by the CEFC, spending over $100 million on 417 on grid and 20 off grid solar power projects, more than any other single sector. These projects were also on average larger than other sectors, with loans almost seven times the average at over $250,000.

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[1] *Agriculture Energy Taskforce: National Irrigators' Council, NSW Irrigators' Council, NSW Farmers, Cotton Australia, National Farmers' Federation, Bundaberg Regional Irrigators Group, Central Irrigation Trust (SA), CANEGROWERS, Dairy Connect, Queensland Farmers Federation, Australian Grape & Wine, Pioneer Valley Water, Australian Dairy Farmers.*

[2] *Australian Farm Institute: The impacts of energy costs on the agriculture sector, August 2018*

[3] *ABARES Agricultural Overview: March quarter 2020*

[4] *The Clean Energy Finance Corporation (CEFC) is responsible for investing $10 billion in clean energy projects on behalf of the Australian Government to assist lower Australia's carbon emissions by investing in renewable energy, energy efficiency and low emissions technologies.*

Farmers took additional loans with the CEFC to the value of $100 million during this time, to improve the energy efficiency of farm buildings and production systems.

While agriculture industries are taking up the opportunities available to them in the global effort to reduce emissions, it is also important to recognise that farmers and their respective industries will generally invest in these opportunities only if there is an economic imperative with a sound business case, and not solely from an emissions reduction perspective.

Nevertheless, we are seeing enthusiasm for bioenergy as part of the energy solution for agriculture and we believe it is critical that a bioenergy roadmap include agriculture as a fundamental building block of the plan as well as a key end user.

Opportunities for the agriculture sector to be part of a transition to bioenergy/biofuels are twofold; firstly, there is capacity for the agriculture and horticulture sectors to be the major contributors of feedstock. Agriculture already produces substantial potential feedstock. This could feed into a properly established bioenergy/biofuels market with waste or other feedstock supplied into the market for use in the production of off-farm bioenergy. There is also wide potential for bioenergy generation on-farm for use by the business and/or export into the grid.

Agriculture's potential involvement in bioenergy comes both as a source of renewable energy for the rest of society and as energy users.

Agriculture needs to be engaged in the bioenergy journey from the start and with a significant focus. That engagement should recognise that agriculture's potential use of bioenergy will come at a range of scales from small on-farm energy solutions through to supplying large off farm and grid scale bioenergy production.

In making this submission, it is important to note that agricultural peak bodies are limited in their resources and technical expertise to firstly provide the level of engagement needed and secondly to play a role in the implementation of the roadmap and take-up of bioenergy in the sector. **NIC and the Ag Energy Taskforce encourage Government to consider this important point in its next steps and deliberations.**

Pathways for agriculture through technology

Emerging technologies provide opportunities for farmers to both use biomass energy production on farm, and/or sell these by-products. In some cases cost of production can be offset.

With appropriate scale and affordability, bioenergy could become a key part of farmers becoming net zero or even negative emission producers.

In Australia, millions of tonnes of waste biomass are produced yearly. To date there have been few opportunities for commercialisation of waste biomass for conversion into energy. In addition, for use beyond the farm gate, the right interconnected energy systems – eg, feeding surplus energy into the grid – have not yet been established. Nor is there a well-established, accessible, market.

Types of waste include cereal crop straw (stubble), dairy and pork intensive husbandry effluent, plantation residue and grape and tomato vine residue, among others. Many of these have not yet moved to a stage of commercialisation.

Confined animal breeding operations has given rise to waste management systems. This has enabled the expansion of onsite biofuel production. The use of biological and thermochemical technologies in livestock waste to bioenergy treatments can enable livestock operators with value-add renewable energy products.

Crop waste converted

There is significant opportunity for Australian farmers to participate in an established bioenergy industry, with the abundance of biomass from a range of agriculture and horticulture crops. The right policy and regulatory settings will be necessary as an enticement for agriculture and horticulture crop producers to participate in the production of biomass/bioenergy.

The bioenergy market could be led by the industry itself, underpinned by clearly defined pathways for buyer and seller participants. Clear pathways, including consistent, long term, policy and regulatory signals, would be necessary to enable agriculture producers to understand the needs of the market and the different capabilities of the various waste products.

With the varying degree of suitability of certain crop waste, guidelines and specifications will be essential providing participants with the type of information necessary to enable the market to operate successfully, including understanding any barriers. Would there be capacity for the market, for example, to move to futures type contracts, as with other industries?

As NIC has noted in many forums, over regulation and the cost of regulation can be a barrier to industries taking up opportunities. We strongly caution against the imposition of additional costs associated with unwarranted and unnecessary regulation in the development of a bioenergy industry.

The role and impact of new technologies

The energy sector is in the midst of significant energy transformation and technological disruption, both in the physical technologies for the generation, storage and use of power; and in 'soft' technologies that can monitor, manage and secure trade power. The availability of these technologies is increasing rapidly.

New models for grid usage such as virtual net metering, peer to peer trading etc. are being examined, including but not limited to:

- Where a farmer has multiple network connections, they can have renewables connected to the main NMI/account, and credit against consumption at a separate pump connection against the solar generation (with a 'grid transport fee');
- A farm business could generate enough power at one site with a bioenergy plant to cover the consumption at a number of separate (but nearby) sites, by offsetting that consumption against generation at the main site (with a 'grid transport fee).

Challenges for the grid

We recognise the challenges for the electricity grid with the rapid growth of variable renewable energy into the system. The Energy Security Board annual report card released in February 2020 focused discussion on grid capability noting the challenges within current grid design. To ensure security and stability when there is insufficient solar and wind generation coming into the system, given services such as frequency, voltage control and inertia are usually provided by baseload coal power stations.

In a number of previous submissions we have outlined significant concerns with the equity of network pricing. Excessive return built in to pricing for network owners is imposing unsustainable costs on farmers, inequitable pass through costs are punishing agricultural consumers for issues they have no control over; and restrictive rules (albeit sometimes related to network capacity) are even making it hard for farmers to export power generated on site into the grid or via virtual private networks.

Nevertheless, it is recognised that investment will be required to ensure the transmission and distribution networks have the capacity to cope with the injection of renewable energy into the grid, the cost of which will ultimately be passed on to consumers.

The equity of network related charges is directly relevant to a bioenergy strategy, because they act firstly as disincentives to the take up of on farm grid connected generation and secondly the cost of integration and poor integration is passed through producing a very real negative perception for consumers and the broader community.

These factors are being realised when, AEMO (Australian Energy Market Operator), to ensure grid stability, has been required to intervene directing generators to produce or cut output in the past year, mostly in South Australia..

These types of interventions are proving costly to end users. The increased charges are described by AEMO as 'ancillary charges', and are ultimately levied on customers. Central Irrigation Trust (CIT) an irrigation infrastructure operator company in South Australia received notification in early April 2020 of an increase from 1.3842 c/kWh in February 2020 to 2.352 c/kWh, backdated to 1 March 2020. The last month's bill resulted in a 70% increase in ancillary charges, resulting in an overall increase of 25% in irrigators' price of consumption, and in CIT's case, adding a retrospective $60,000 to the monthly bill.

NEM (National Electricity Market) rules allow for these charges to be passed on to the consumer. NIC has received approaches from AEMO following NIC publicly raising this matter. AEMO has committed to look at ways to alleviate the spike in costs in the future. It is important that these issues are flagged and understood as and when they occur. This is particularly pertinent when entities like ARENA are examining the net series of investment and policy decisions in the bioenergy sector in Australia.

We know that AEMO has intervened to force solar farms in the West Murray region – from Ballarat in Victoria to Broken Hill in NSW – to halve generation due to instability in the grid, while other solar and wind farms in that region have been delayed from connecting to the system.

These interventions are causing significant concern for investors in the renewable energy space when one solar farm has been restricted to 50 per cent output and a further farm, delayed from commencing production.

The **Technology Roadmap** discussion paper released in May 2020 notes: a range of energy producing opportunities from waste (EfW) technology solutions, currently adopted widely across Europe, North America and Asia. The paper details existing technologies capable of processing various waste feedstocks including mixed solid waste, process engineered fuel (PEF) and organics (e.g. food waste, biosolids, wood waste). EfW technologies can be used to generate a variety of primary and secondary products including:

- Co-generation systems for producing steam for direct use in industry along with electricity.
- Biogas for use in condensing boilers, conversion into heat and electricity in co-generation systems or further refining into bio-methane as a substitute for natural gas.

- Bio-fuels, biochar and other value-added products.

Potential technologies mentioned in the discussion paper include:

- Anaerobic digestion: Technology typically used to process organic source separated waste streams (including food waste, agricultural waste and biosolids) to produce biogas which can be converted into electricity.
- Combustion (incineration): Technology typically used to process municipal solid waste (MSW) to produce high-pressure steam which can be converted into electricity.
- Gasification: Technology used to process separated waste streams (e.g. wood waste, biosolids) to produce a synthetic gas (syngas) which can be converted into electricity or other value-added products.
- Pyrolysis: Emerging technology used to process separated waste streams to produce a syngas for conversion into electricity along with value-added products such as biochar.

Developing Industry frameworks

In recognition of the opportunities for the agriculture sector, it is expected that the federal government's *Technology Roadmap* will, as well as providing the right settings to support investment in low-emissions technologies, also support jobs and research and development in bioenergy opportunities for agriculture industries.

In the development of an industry led bioenergy market, NIC suggests consideration be given to:

- The frameworks necessary for the management of:
  - technical and regulatory requirements
  - management of risk
  - accountability frameworks
  - labelling and certification standards for bio-based products
  - the quality of the gas end product.
- Establishing supply chain for agriculture waste (buyer and seller)
- Proximity to the market to mitigate transportation costs
- Streamlining specification:
  - Different waste product (wheat stubble, canola, rice) contains different content
  - Understanding what the market requires; the most suitable product to supply to the bioenergy market
- Direct advocacy within the agriculture sector to drive awareness of opportunities, including:
  - Understanding the cost of transportation
  - Capacity for biomass storage
- The right avenues to make it attractive for 3rd parties to participate
- Education for small stakeholder capacity to feed into the electricity grid.

Battery storage

Improvements in the development and cost of battery systems and storage technology are integral to the development of renewable energy systems into the future. Storage capability, particularly adjacent to solar farms, will work in conjunction with market operators to identify and alleviate congestion in the grid.

With the increased take up of renewables, the importance of battery storage technology and cost has become increasingly urgent to support grid stability.

Over time with the transition to a maturing bioenergy market, the development of **Industrial parks** will attract a range of industries, including companion industries. This concept would serve to reduce technical and financial barriers. Establishing links between industrial parks and urban settings, as well as synergies with rural industries and sources of waste will be an advantage. The latter might be established in a major regional town or city.

Affordable storage options are critical to the take up of renewables. Many agricultural electricity uses, such as irrigation pumping do require overnight or quick high capacity response (for example harvesting flood flows). Energy solutions for farms therefore will differ with storage being an important future component.

Bioenergy can play a role in this storage and exploring those options in the roadmap will be useful.

Connection to the grid

While acknowledging the current challenges of feeding renewable energy into the grid, it is expected as these challenges are resolved there will be expanded opportunities for the agriculture sector to provide bioenergy energy to the grid. As discussed, the maturity of battery storage system, integral to the development and capacity of the renewable energy sector, will over time assist in alleviating the challenges of grid instability.

Barriers for smaller players will require consideration, including grid connection and ongoing maintenance of systems.

Stand-alone power systems

Similarly with grid connection, it is also expected there will be opportunities for the bioenergy sector to provide energy to stand-alone power systems.

NIC and the Ag Energy Taskforce provided submissions to the Australian Energy Market Commission (AMEC) in support of the development of stand-alone power systems (SAPS). The falling costs of renewable generation and batteries represents a decrease in the costs of providing off-grid electricity supply, and in some areas off-grid supply may now be less costly than standard supply.

There are potential benefits such as improved reliability for remote customers and reduced carbon footprint. The relatively few customers currently receiving supply from a SAPS can largely be attributed to limitations in the regulatory frameworks and the embryonic nature of the SAPS industry.

There is a move towards a nationally consistent framework to enable distributors to develop off-grid supply arrangements for existing customers or new connections where efficient - as identified in the *Finkel Review into the Future Security of the National Electricity Market* and the ACCC report in 2018 following the *Inquiry into retail electricity pricing.*

We acknowledge that some form of regulation supports assurance to consumers about the quality of the service/product and an assurance about price efficiency of that product. However, as the AEMC examines how to maintain consumer protections and ensure customers receive the same level of services as previously, we strongly caution against the imposition of additional costs associated with unwarranted and unnecessary regulation in the move to stand-alone systems.

The various models of electricity supply for customers will be delivered through:

- the interconnected grid – which the AEMC refers to as “standard supply”

- an embedded network, which in turn is connected to the interconnected grid
- a micro-grid isolated from the interconnected grid
- an individual power system (IPS), which only provides electricity to the customer in question.

Current economic and regulatory impediments to the development of renewable technologies

These impediments are not restricted to the national energy law framework but also include the management of energy from what jurisdictions classify as waste material. As outlined in the attached case studies, such a regulatory impediment was incurred by a pilot investigating whether a gasifier could supplement the energy demand of the cotton lint processing facility, or 'gin'. Now that there is an agreed National Waste Strategy and renewed interest by jurisdictions into energy from waste, it is timely for ARENA to 'join the dots' and negotiate a mutually compatible solution with the relevant government authorities.

There will be a significant role for the COAG Energy Council and the Energy Security Board in facilitating the adoption of decentralised energy generation and greater renewable energy deployment. To enable these new grid usage models to work, associated new rules developed by the AEMC will be necessary.

This will include rule changes that allow virtual metering with the release of the concept of a Technology Roadmap and Bioenergy Roadmap.

Across the grid, considerably higher levels of planning and data collection are required to ensure there is no reoccurrence of historically inaccurate demand predictions. Australia has the highest uptake of solar globally, with more than 21% of homes with rooftop solar PV and as at 31 March 2020 more than 2.37 million rooftop solar power systems have been installed across Australia. It is predicted that there will be 1.1 million battery storage systems in place in conjunction with PV panels by 2035[5].

There is little understanding of the **behind the metre** investment and as such, the contribution these resources make to energy generation is very poorly understood. Smart meters will play an important role in improving the performance and delivery of the National Electricity Objective in the future.

Smart metres at end-user premises, as opposed to simply metering energy use for bulk billing purposes, are required to provide vital information. Smart meters allow both distributor network businesses and electricity end users to have better information on how energy is consumed, and to better control that use, including in the use of end-user generation systems.

According to the Energy Networks Association (ENA) "*As technology and energy markets develop rapidly, smart meters and other devices will benefit individual consumers. Customers should receive practical information and more rewarding tariff structures that match their needs; be able to control their energy use to get better deals and participate in new markets, such as exporting energy to the Grid through solar panels or supporting energy storage options as these develop commercially*"[6].

While rules are now in place that will allow for a very gradual transition of consumers to smart meters i.e. when a meter upgrade is required or following the completion of the solar bonus scheme, we

[5] *Dr Alan Finkel, Independent Review into the Future Security of the National Electricity Market (Preliminary Report)*
[6] *Changing the Face of Energy Management. Electrical Comms Data. Jan/Feb 2015. Vol. 14 No.6. pp. 32-34.*

believe that if future grid needs are to be catered for, it is critical that transition to smart meter solutions should occur much more rapidly.

There are many issues to be resolved to facilitate the roll out of smart meter technology, including:

- issues of smart meter connectivity in regional areas due to telecommunications blackspots
- data privacy and security concerns associated with smart metering arrangements
- education of consumers so they are aware of the shift away from ‘bulk’ electricity pricing on to time of use and load based metering
- the transitional arrangements for historical costs associated with older meter installations as metering responsibilities shift away from the network companies and on to retailers; and
- transparency of metering costs for consumers as retailers take on metering responsibilities.

In many cases, larger agricultural users have been mandated to ‘upgrade’ their meters to smart or interval based meters at their own cost. We believe that the challenges associated with a smart meter roll out must be addressed in order to develop a full understanding of our network capacity and the energy needs for the future NEM.

Broader regulatory reform is required to drive the regulatory change needed within the NEM. The network rules do not allow for localised solutions currently evolving within the existing network. The regulatory process should enable the market to respond quickly to allow for widespread adoption of these technologies that would allow customers to increase the utilisation of electricity networks.

For example, businesses in regional areas would benefit from the ability to ‘net-off’ their generation and use or trade with nearby sites, paying a small fee for the use of the local network (network transportation fee) rather than full network and retail costs. Solutions such as peer-to-peer trading may offer greater local network utilisation and stability, offering new revenue opportunities for DNSPs and result in less sub-optimal options such as ‘do nothing’ or eventual independence from the grid.

Distributed energy generation may represent a cost-effective approach to increasing the reliability of electricity supply above current grid levels. It may also be accompanied by cost measure benefits of ‘local energy trading system’ – where utilities can provide customers with solar and storage and allow their output to be traded in a suburban network. Such approaches require significant changes in the way incumbent utilities (e.g. Ergon, Essential Energy) manage their business models and will require networks to look to a more ‘distributed’ model, while the implications for centralised generation, and for retailers, will also be significant.

The rule changes required to allow this to occur must be initiated urgently to ensure that remaining connected to the electricity network is a viable option for regional businesses, and in fact, the preferred option. We strongly suggest, network rules must promote new solutions not protect existing owners.

We commend these comments to you.

Yours sincerely

Steve Whan
CEO

Attachment A: Existing agricultural bioenergy case studies

There are already a number of operational bioenergy projects in Australian agriculture. These range in scale from on-farm energy sources such as biogas from waste in a piggery to the very large scale, such as Manildra's ethanol plant a Bombaderry.

The examples listed below are those NIC has become aware of via our members or forums such as the Renewables in Agriculture Conference. We do not claim expertise on these projects and the descriptions are to the best of our understanding. In some cases we have highlighted issues being encountered by these projects which lead to some of the challenges outlined in the submission.

Mackay Sugar supports research projects focussed on developing biofuels and other beneficial products. Mackay Sugar is partnering with the Queensland University of Technology's Mackay Renewable Bio commodities Pilot Plant (MRBPP), and University of Queensland and Department of Employment, Economic Development and Innovation's Queensland Sustainable Aviation Fuel Initiative (QSAFI).

The MRBPP, located at Racecourse Mill, is a 38 megawatt cogeneration plant using bagasse from the fibre left from the sugar milling process. This pilot scale collaborative research and development facility for the conversion of cellulosic biomass into biofuels.

QSAFI is also a collaborative research project investigating the feasibility of producing aviation biofuel from various renewable feed stocks, including sugar.

Mackay Sugar's business approach which ensures that nothing is wasted, enables the reuse and recycling of by-products to produce beneficial green products. This cycle, with a carbon positive footprint, provides the right platform for expansion into future business activities and products.

With the increasing demand for renewable energy, Mackay Sugar is working to introduce additional revenue streams into the business by improving the efficiency in the use of bagasse and molasses – both valuable by-products of the sugar milling process.

Bagasse is a biomass which fuels Mackay Sugar's factory boilers, enables sufficient production of renewable energy to be completely energy self-sufficient across operations and excess energy generated from this process, to go to the national electricity grid.

Molasses which is typically used as a supplementary stockfeed, is also a biomass and has increasing value as a feedstock for biofuels.

Mackay Sugar's 20-year Diversification Plan incorporates a number of projects that are expected will add value to the sugar milling products and by-products. These projects include cogeneration, biofuels, yeast, citric acid and amino acid.

Australian Cotton industry A study of Australian cotton undertaken by Sandell et al (2014) found the application of alternative energy sources to be limited, due to high cost associated with some alternatives and limited data available of more promising and less mature technologies. Biofuels and blended fuels at the time of the study were deemed uncompetitive on the basis that users were unable to claim the fuel excise rebate ($0.38/litre) on these fuel types.

Cotton Gin Trash (CGT) is an emerging source of biomass fuel used to generate electrical or thermal energy particularly in-situ for gins. However, the requirements of one state-based regulator proved to be a barrier. A previous gasifier pilot by Namoi Cotton was halted due to the vagaries of NSW EPA requirements over the potential chemicals being present in the trash or released from the trash. This came after considerable financial investment to reach the trial stage, including involvement of university level expertise. (NIC can provide on request further details about this hampered project, including a project contact.)

Cotton industry research (both on farm and at the gin) has also pursued other potential applications of this resource such as the merits of manufacturing biochar from CGT to compliment or substitute synthetic fertiliser use.

Australian pork industry The majority of emissions from conventional piggeries originate from the effluent treatment system on farm and many Australian piggeries are working to reduce their emissions.

By covering a pond with an impermeable membrane, biogas can be captured and destroyed by simply flaring; it can be used for heat to offset farm gas use or for combined heat and power generation on farm. Engineered digesters may be used in place of the covered pond. Covering a pond and destroying or capturing the biogas can reduce on farm emissions by up to 80 per cent.

Piggery operators can also run their farms on biogas where common uses for biogas or LPG replacement are situated on breeder sites where the heat is used to keep the piglets warm.

Producers who capture and utilise biogas are able to register and qualify as an Emissions Reduction Fund (ERF) project which can assist with reducing the payback period of the systems

Blantyre Farms near Young, NSW is the first farm and the first piggery to be certified under the Renewable Energy Target with an accredited biogas electricity generation system sourced from agricultural waste. The effluent from the farm's piggery flows into a covered pond, the biogas is captured and refined into methane which runs the generators to provide electricity for our site. Excess green, renewable electricity is sold back into the national grid.

Combusting the methane turns it into carbon dioxide, which has 1/25th of the impact as a greenhouse gas, a fact acknowledged by the Clean Energy Regulator. This allows for the creation of Large Generation Credits and Carbon Credits.

Since the inception of project, Blantyre Farms have had over 65,000 Carbon Credits awarded, which reflects that our project has reduced methane emissions into the atmosphere by over 65,000 tonnes of CO2 equivalent.

The solid effluent, after the harvest of the biogas, is spread on our paddocks as a complete carbon based fertiliser. This reduces the purchase of synthetic fertiliser, and is used to grow grain which is fed back to the pigs

Generators are controlled by computer which can be accessed remotely. An auto alarm sends text messages signalling any problems with the generator.

Blantyre expects the project will have a 2-3 year payback period, with a significant saving in producing power for the farm's own use, where electricity charges were about 20 cents/kW. A further advantage is the power that is sold to the grid at the rate of around 3.5 cents/kW.

The infrastructure that operates on the Blantyre property is economically feasible for piggeries with greater than 500 sows.

Kia-Ora Piggery (Victoria). Pig Poop and Passion is how Kia-Ora piggery describe its biogas project which supplies gas for heating and enough electricity for all their on-farm use.

Biomassproducer.com.au web site describe the project as: The piggery incorporates a range of waste food by-products into its computerised liquid feed system for the pigs which include rejected or unused packaged or canned products from human consumption and liquid by-products from food manufacturing processes. Utilising these waste products to supplement the pigs' rations results in a huge reduction of organic waste products going to landfill and municipal tip sites.

The effluent treatment and recycling system used at KIA-ORA collects 120,000 tonnes of pig manure annually. It has resulted in an 81 per cent reduction in greenhouse gas emissions at the site, from 16,598 tonnes a year to 3,121 tonnes a year.

The system uses anaerobic digestion in covered effluent ponds to capture biogas. This is used to replace LPG (liquefied petroleum gas) for heating and to cogenerate sufficient electricity to replace all the on-farm electricity usage. It generates more than 15 per cent above the site's needs to be sold into the power grid as a greenhouse gas offset.

Riverlea Australia has agricultural properties in southern New South Wales and Victoria that are focused primarily on the breeding and production of pigs. Company owned pork processing facilities are located in Melbourne and Corowa. As a largely agricultural business, Riverlea's key priorities and business focus is on conserving natural resources, reducing waste and unnecessary costs wherever possible. The objective is to identify innovative solutions to improve efficiencies and implement sustainable environmental management practices in all areas from farming through production, processing and distribution.

Riverlea is reducing its carbon footprint by operating two wastewater methane recovery plants. Methane is both a potent greenhouse gas and a valuable renewable energy source that can displace fossil fuel sourced energy.

Australian Tartaric Products (ATP) (Victoria) is working towards a lower carbon footprint. Grape marc and residuals are collected and delivered to the ATP Mildura site from the ATP winery partners. ATP extracts natural tartaric acid and grape spirit from the wine residuals, using processes originating from the oldest traditional method improved for quality and quantity by the use of modern equipment. Following extraction, grape spirt and tartaric acid are concentrated, purified and packaged for use.

Renewable energy by-product: using the latest furnace technology, grape marc undergoes combustion to generate steam which is used directly in the manufacturing process and to generate electricity to power the site. Due to the nature of the process, by-products are also suitable for agricultural use, where ATP supplies gypsum, marc and march ash back to the agricultural sector to support improved environmental outcomes.