RACE for 2030 BUSINESS

B5: Anaerobic digestion for electricity, transport and gas opportunity assessment

Inception meeting, Tuesday 7 December 2021

Welcome and Introductions

AUSTRALIAN ALLIANCE FOR ENERGY PRODUCTIVITY

Jarrod Leak

Chief Executive Officer

jarrod.leak@a2ep.org.au

We would like to acknowledge the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging.

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Housekeeping

- This meeting is being recorded. If you do not wish to be recorded, you are welcome to leave your camera turned off.
- Your participation is entirely voluntary, and we will seek your consent to participate at the start this meeting. You are free to withdraw from participating at any time prior to report publication without providing a reason. With your consent, we will list participant organisations in reports, without attributing specific statements to members. Please see the link in the **Chat** for the Consent Form in Google Forms.
- This format will keep attendees on mute, so please use the **Chat** as well as the **Q&A.**
- We will be asking questions using **Slido**, they're not mandatory but will greatly help inform our research. Go to https://www.sli.do/ and enter code **#203385**

RACE for 2030

Agenda

Item	Time	Lead
Open & Welcome **RACE & A2EP overview**	3.30pm – 3.45pm	Jarrod Leak – A2EP
Bioenergy Roadmap	3.45pm – 4.00pm	Alex Grant – ARENA
Biomethane ERF Method	4.00pm – 4.10pm	Jet Shoon Chong – Clean Energy Regulator
Opportunity Assessment **Study overview and study team**	4.10 – 4.25pm	Prasad Kaparaju – Griffith University
Focus Group Overview	4.25pm – 4.35pm	Jarrod Leak – A2EP
Feedback Session	4.35pm – 4.55pm	Jarrod Leak – A2EP
Closing	4:55 to 5:00	Jarrod Leak – A2EP

RACE for 2030

RELIABLE
AFFORDABLE
CLEAN
ENERGY

RACE for Business

Presentation to B5 Opportunity Assessment Inception Meeting

Introductions and Industry Partners

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Water Utility

Sydney WATER

Barwon Water

User / Producer

B

agl

LMS ENERGY

VISY

JBS

Jemena bringing energy to life

Industry Association

AMPC

Dairy Australia

AUSTRALIAN Pork

CANEGROWERS

eit Climate-KIC

QFF QUEENSLAND FARMERS FEDERATION

WATER SERVICES ASSOCIATION OF AUSTRALIA

BIOENERGY AUSTRALIA FUEL | GAS | HEAT | POWER

FIAL The Food and Agribusiness Growth Centre

Australian Gas Infrastructure Group

Technology

FINNBIOGAS

ENERGY 360

biogass Energy from Waste

Gaia EnviroTech

Local Government

CITY OF GOLDCOAST

LatrobeCity a new energy

UPPER HUNTER SHIRE COUNCIL

Investment

cefc

Australian Sustainable Finance Institute

ANZ

State Government

AGRICULTURE VICTORIA

VICTORIA State Government | Environment, Land, Water and Planning

EPA VICTORIA

NSW GOVERNMENT | Planning, Industry & Environment

nsw epa

NSW GOVERNMENT | Department of Primary Industries

Queensland Government | State Development, Infrastructure, Local Government and Planning

Queensland Government Department of Environment and Science

Consultant

ndevr environmental

CORPORATE CARBON ...NEW MARKET SOLUTIONS

enea CONSULTING

Federal Government

Australian Government Department of Industry, Science, Energy and Resources

Australian Government Australian Renewable Energy Agency | ARENA

Australian Government Clean Energy Regulator | CLEAN ENERGY REGULATOR

Developer

CLEAN Cowra

HELMONT energy

VEOLIA

Who's here with us today? Type in your organisation!

What industry are you in?

- Developer and owner operator of Bioenergy
- NGO
- Development
- Bio energy
- Consultants - decarbonisation
- Peak body for the water industry
- Bioenergy
- Bioenergy
- Industry association
- Energy
- Energy solutions provider
- Bioenergy
- waste

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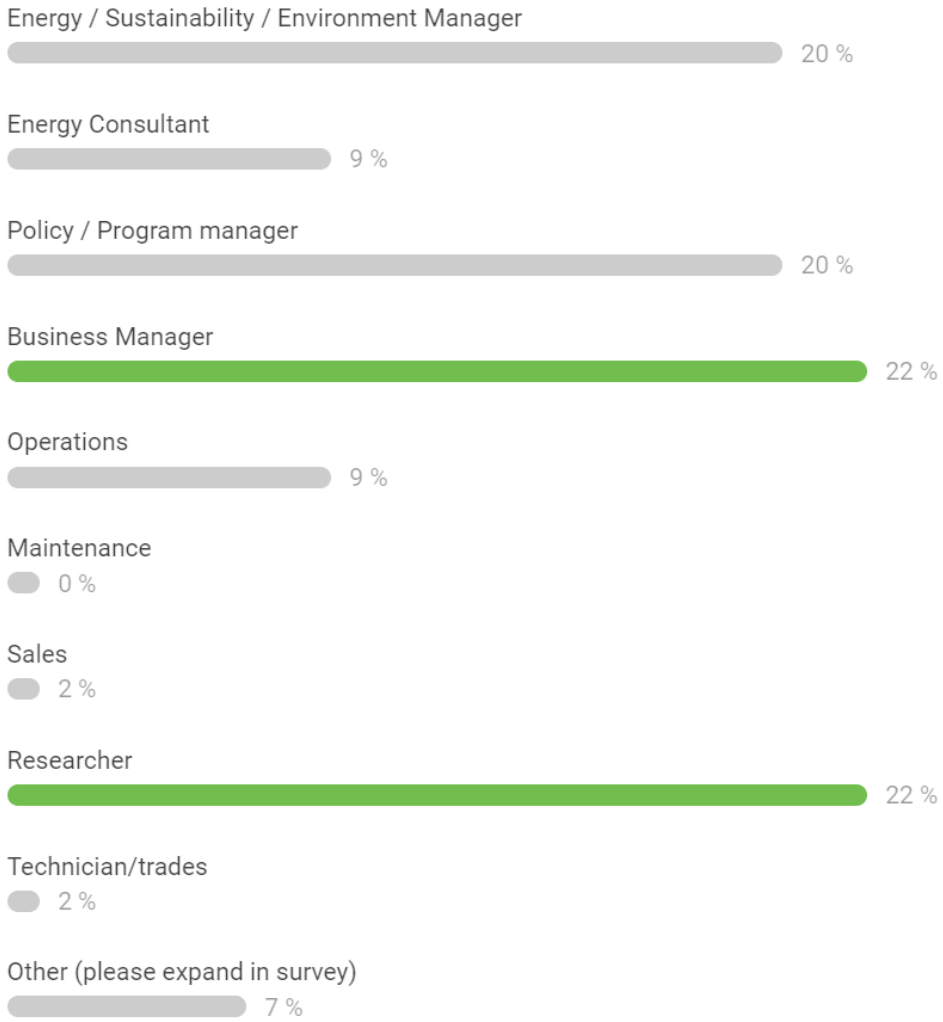
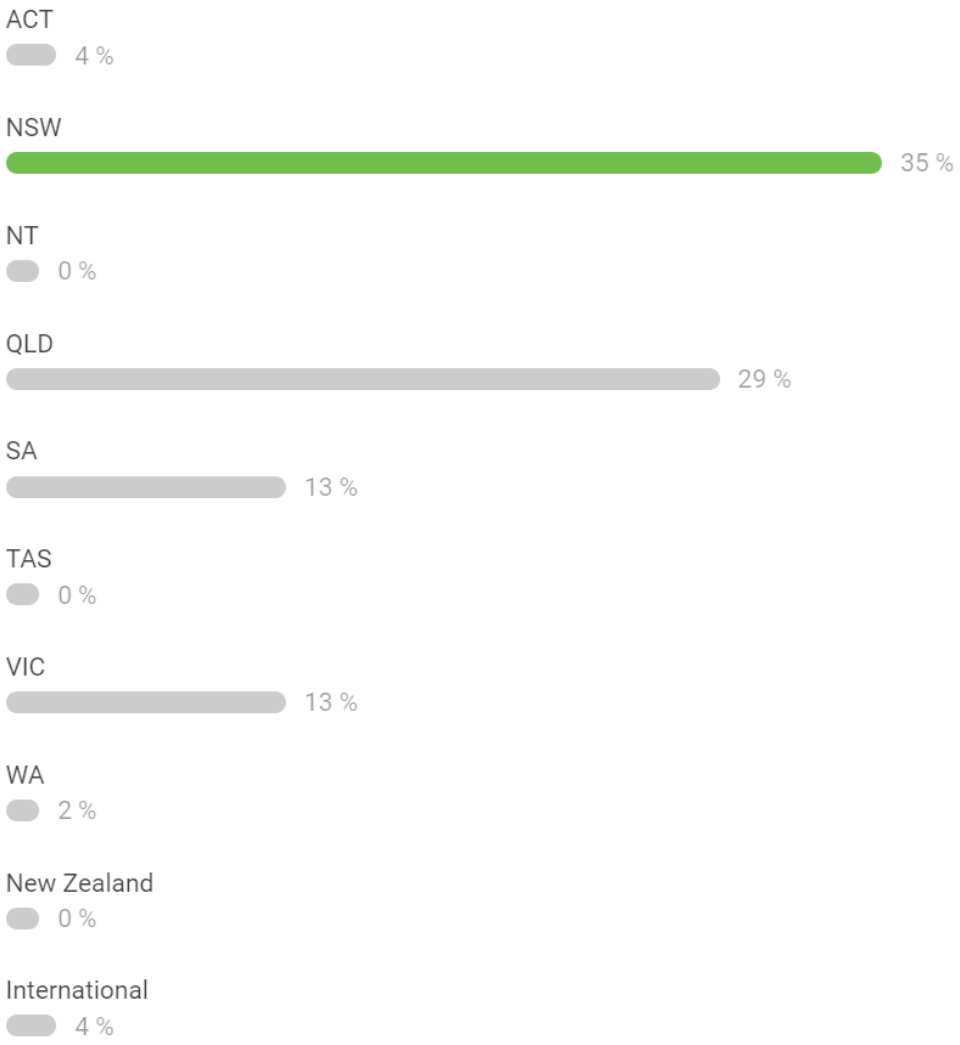
What role are you in?



- knowledge sharing
- Analyst
- Process Engineering
- Biochemical/Process Engineer
- waste consultant

Where are you joining us from?



What is your interest in joining today? (5 words or less)

Green energy (electricity and heat!)	Explore opportunities to participate in CRC	Bioenergy price points	Opportunities for pork producers in bioenergy	Where the industry is at
No crazy policies to surprise us	Understanding biogas options	Understanding new technologies	Direction of industry	Policy framework
Understand stakeholders in Bioenergy	RNG optimisation	Anaerobic Digestion	learning about bioenergy opportunities	Biomethane market
Potential Opportunities	Bioenergy opportunities	Best way to use biogas	gas to energy future	Industry partner on project
Business models	Project updates	Support industry to decarbonise	AD technology for Aus conditions	Green energy
New technologies for biorenewables	Activating renewable gas in Australia	Information on the Biogas Roadmap	scalable, affordable solutions	Learn about the Project
Get projects up, remove barriers	Industry Partner	Enabling feedstock for renewable gas	Understand Race2030	Industry views
Understand industry market	Anaerobic Biodigesters	Understand B5 program	Understand the appetite of industry	Support water industry engagement

The Core Team

Associate Professor Prasad Kaparaju, Griffith University (Project Leader)
A leading international researcher in anaerobic digestion, environmental biotechnology and bioprocess engineering. A/Prof. Kaparaju is an active member of Bioenergy Australia and Member of Taskforce on Waste Management, Circular Economy and Biogas in Australia.

Professor Long Nghiem, University of Technology, Sydney
Prof. Nghiem is an international leader in energy and resource recovery from waste and wastewater. His research to recover energy and nutrients from wastewater and organic waste has been impactful to bioenergy management and industry practice in Australia and overseas.

Assoc. Prof. Andrea Trianni, University of Technology
A mechanical and industrial engineer internationally recognised as leader in industrial energy efficiency, A/Prof. Andrea Trianni has more than 100 publications with particular emphasis on the barriers to and drivers for the adoption of more sustainable solutions by industry.

Dr Rowena Cantley-Smith, University of Technology (Project Manager)
A Senior Lecturer in the Faculty of Law and practicing lawyer with more than 20 years' experience in the Australian and European energy sectors and expertise encompassing energy policy, law, and regulation, climate change law, legal rights and consumer protections.

Jarrod Leak, CEO, Australian Alliance for Energy Productivity (A2EP)
Before A2EP, Jarrod was Managing Director and Cluster President for Swedish engineering company, Alfa Laval's Oceania and south east Asian operations. He has extensive experience with municipal wastewater treatment, agriculture and food processing, and cogeneration systems.

Dr Rebecca Cunningham, UTS-ISF, Sydney
Dr Rebecca Cunningham is a social scientist with research interest and expertise in climate change adaptation, data analytics and visualisation, natural resource governance, the science/policy/community nexus, science communication including the use social network analysis

A/Prof Brent Jacobs, UTS-ISF, Sydney
A/Prof Brent Jacobs is a Research Director in the UTS-Institute for Sustainable Futures working in climate change adaptation, landscapes and ecosystems, and food systems. He has a background in agricultural science and a decade of experience in the natural resource sector in NSW Govt.

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Bioenergy Roadmap

Alex Grant, Australian Renewable Energy Agency (ARENA)
Associate Director | Business Development & Transactions

Contact: knowledge@arena.gov.au

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ERF Biomethane method development

Jet Shoon Chong, Clean Energy Regulator (CER)
Assistant Manager | Emissions Avoidance Methods

Contact: methoddevelopment@cer.gov.au

RACE for 2030

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Introduction to RACE for 2030 & A2EP
B5 Opportunity Assessment Overview
Anaerobic Digestion for Electricity, Transport and Gas

RACE for 2030

Biogas scenario and its potential in Australia

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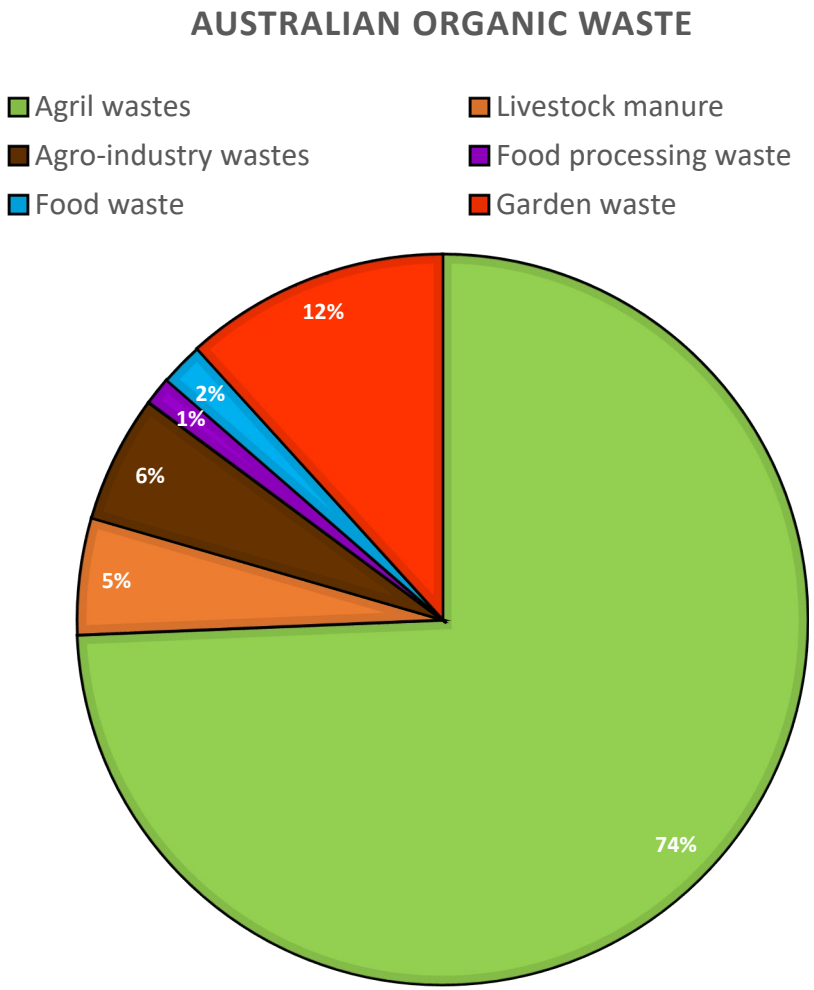
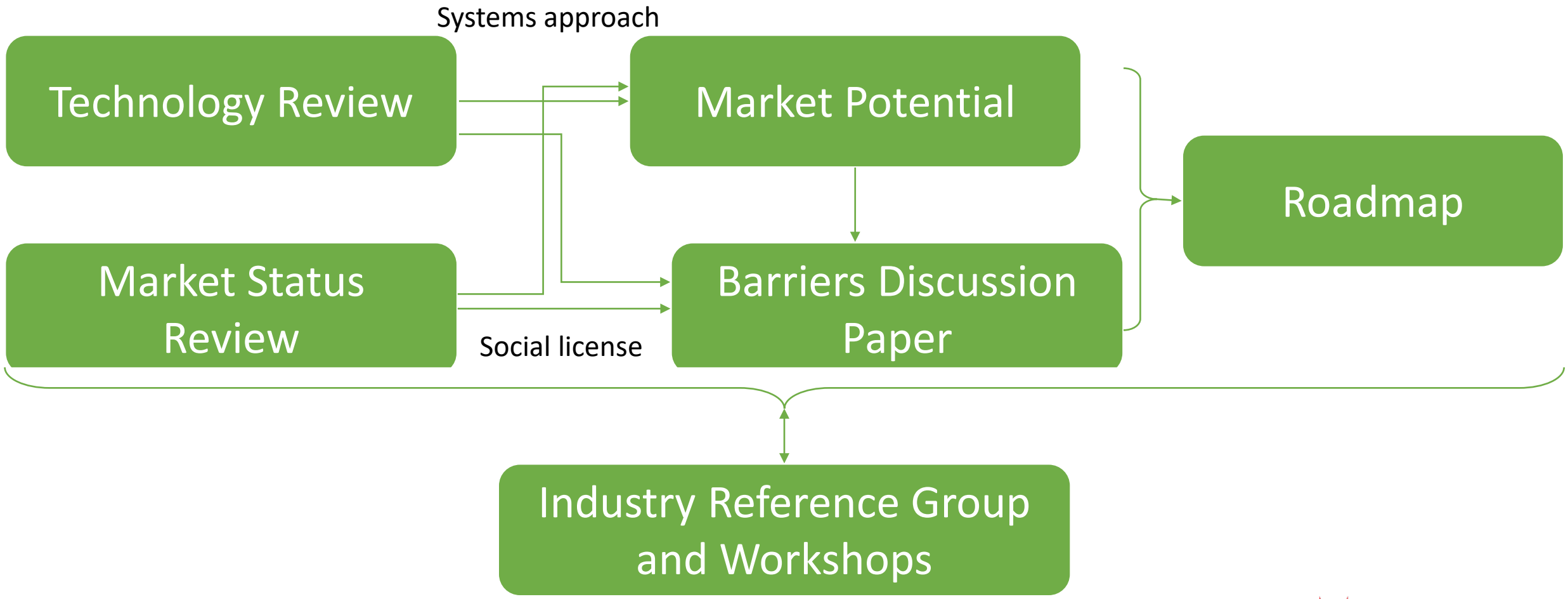
- Australian Biogas industry is growing
  - 242 biogas facilities with 1332 GWh/year electricity generation in 2018-19
  - 0.5% of national electricity
- 122 landfills
  - 50% of them utilise biogas for power generation
- Huge potential especially from agriculture, agro-industries and household
  - 60 million tpa TS



Assoc. Prof. Prasad Kaparaju

Griffith UNIVERSITY
Queensland, Australia

Overview



Assoc. Prof. Prasad Kaparaju

Outreach & engagement plan

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- Industry Reference Group, limited to approx. 10 people to join 4 x 1.5 hours meetings to review and give feedback on the 4 main deliverables
- Focus groups x 2 – approx. 8-10 people to gain deeper insight in to issues. Meat processing + ??
- Barriers and opportunities workshops – approx. 30-40 people to join breakout groups
- Roadmap review workshop open for all

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Discussion

- Market Status Report
- Technology Review

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Which of the followings is the most important driver for the Australian biogas sector in 2030 (you can select multiple answers)?

The need to manage organic waste to prevent land and water degradation.

21 %

The need to manage organic waste to reduce fugitive methane emission.

41 %

Demand for energy.

13 %

Demand for renewable gas.

54 %

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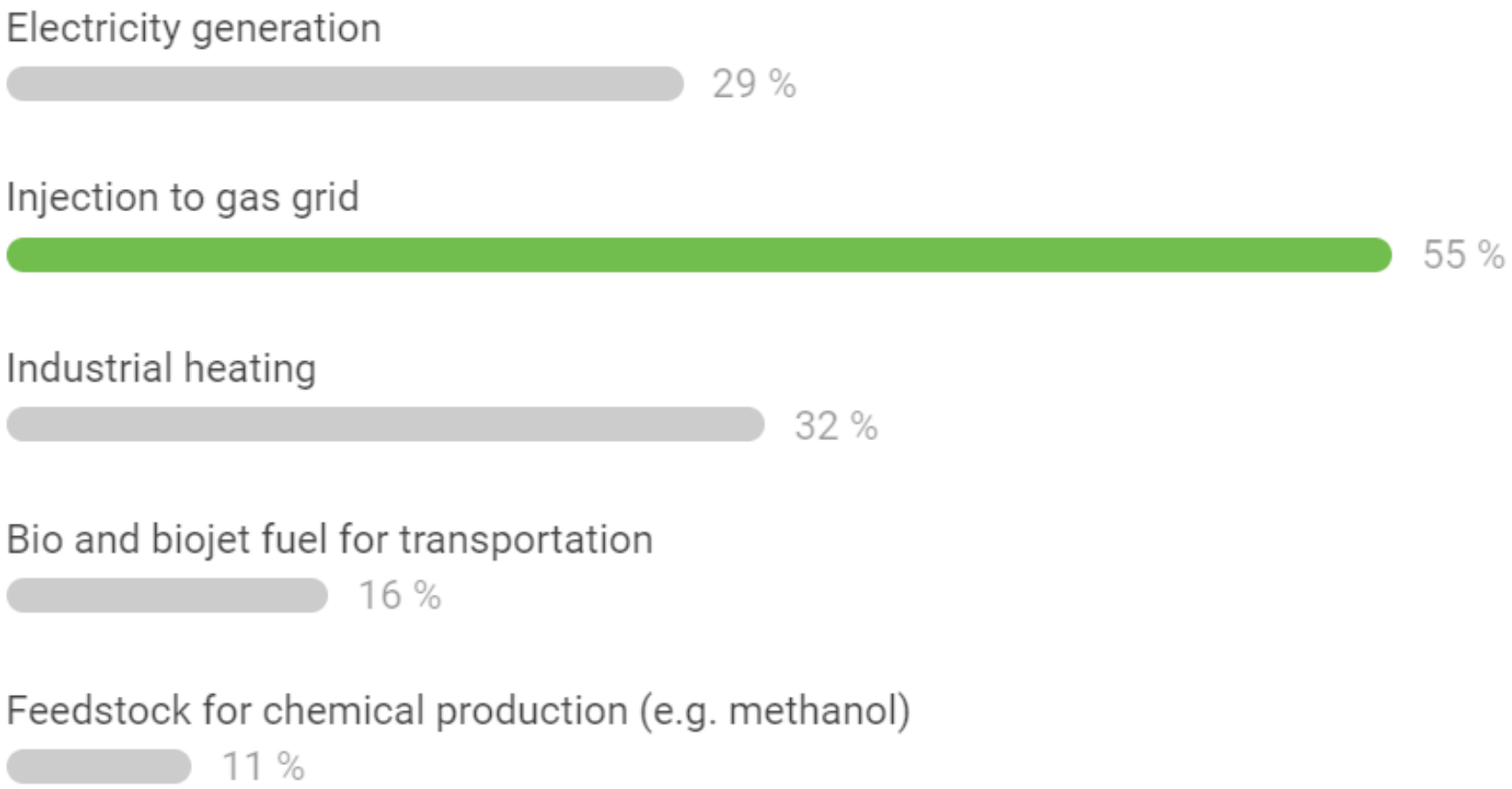
In 2030, more than 25% of the biogas output in Australia will be used for which of the following applications (you can select multiple answers)?



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What is currently the most significant constraint on the Australian biogas sector? Please briefly describe this constraint in one or a few sentences.

Multi sector engagement requiring further support

Economics and scale

Economics Lack of understanding by potential end users

Economic cost and return on investment

Policy and federal regulations

Matching supply and demand - in terms of geography, fuel quality and quantities.

Costs and lack of skills in regional areas to support uptake

Social environment maturity

scalability

lack of gas grid injection ability

Lack of Incentives for carbon abatement achieved

Lack of policy support and regulation

Lack of support to overcome variability of feedstock and develop sufficient scale

Regulatory barriers for use of products

Political commitment

Investment commitment

Scale

Lack of incentives, firm Policy and regulations.

Econmoics

Digestate regulations

No direct support for AD projects

Lack of understanding

Regulatory issues - the framework is not fit for purpose.

Economic viability

Available digester capacity

Renewable gas is not understood by the market

Distance of feedstock to demand

Regulators

Economic viability

Lack of methodologies and regulatory barriers

Scale of operation is too small

Long term offtake of waste to underwrite projects

Feedstock and location to energy demand

Lack of market drivers

What kind of organic waste should be considered as feedstock or co-substrate for anaerobic digestion?

Meat waste can be considered, however ammonia production and sterilisation needs to be considered

All organics

Has to be a mix for consistent supply to processor

All available waste - agricultural, sewage, food etc

Everything

Green waste

Challenge with by-products suitable for animal feed being used as feedstock

Fogo

Waste which cannot be used for any other purpose such as animal feedstock

All

chicken farm - sawdust and manure

Food waste

municiple waste

waste activated sludges

All organic waste

All uncontaminated organic waste

All, end uses will vary

All sorts of waste should be explored without pre assumptions

House organic and industrial food waste

Omsw, fogo

Sewage sludge

All organics - from Ag, from commercial and food processing

Agricultural waste

Agri waste!!!

Agricultural wasted and food waste

Crop residues

Water and straw

FOGO

Ag waste

Agricultural waste

What are the most significant challenges for final users in capturing value from AD adoption in Australia?

Extraction of all potential energy from sludge etc

ability to aggregate

Limitations of ERF SSOW method

Optimisation of distributed resource

Location

Willingness to pay the “premium”

Managing a biodigester is not trivial and is not something most companies would want to take on. Also, consistency in the output gas.

Technical challenges around access by gas producers to electricity or gas grids

Direct use of bio methane in existing equipment

Incentives

Need a gate fee attached to the disposal of the waste

Regulatory constraints green gas certification

Being close to generation

Long term carbon price definition

Development of social acceptance

Regulatory environment

Regulators

Easy access to biogas, versus alternatives.

Efficiency

Green gas certification method

Incentives for biogas use

Recognition for using green gas

Fuel quality - consistency, impurities, reliability

Reliability of cogen

No carbon price

Lack of a target

Recognition of green gas offsets

Where do you see the largest business opportunities (not just in terms of MW installed, but also considering services)?

supply chain issues

Scrubber technology

energy + high value nutirent products + gases - CO2, H2, O2 etc + biochar

New developments for wet and Dry AD, upgrading then conversion to CNG

Hard to abate industries

Diverging the source of feedstock

AD as a bio refinery

Plug and Play systems so that farmers don't need to know the skills to manage biodigesters

Integrated systems....for many biogas opportunities logistics can be a nightmare

Upgrading ag waste to biomethane

Agricultural sector, for example to displace diesel fuel

syndication

Digestate upgrading

What are the main roadblocks along the way hampering a widespread deployment of AD?

Need supportive energy and waste policies

Market not demanding renewable gas

multi participant trust

Moving residuals around

Demand / economics of commercial volumes

Feedstock security

Regulation in digestate

Administration and EPA

Dispersion of feed stock

Scale drives economics

Securing codigested feedstock

Regulations around digestate

Large scale required to be economically viable

Return on Investment

Low energy cost

Access to long term waste streams

transport issues

Digestate being treated as a prescribed waste by VIC

transport and logistics

Lack of technical skills and highly complex administrative and technical requirements for incentive schemes

Feedstock

Security of feedstock

Regulation particularly around land use planning

Digestate regulations and lack of ag waste policy

Lack of certainty of feedstock

Uncertain regulatory and fiscal regime

Politics

What are the most innovative and interesting business models you came across (e.g. also considering experiences and case studies from Europe or US) that would have the greatest potential in terms of success for the diffusion of AD?

collaboration

Net carbon zero plants - circular economy

Local example: Brickworks uses of landfill in western Sydney for cement kilns.

Partnerships

France providing analysis units for injection

New example in Victoria - Barwon Water Renewable Organics Network

Collaborate enterprise models

cooperatives

German and Danish models are the best

Bioelectrochemistry

Thermal hydrolysis

UKs feed in tariffs

What do you see as most disruptive change in the regulatory framework that would drive a substantial boost in the uptake/diffusion of AD technologies and develop its market?

Biomethane recognition by NGERs

mandatory injection of biogas into natural gas pipeine

Biogas to gas grid injection

Unsubsidise Fossil fuels

End user support for baring cost of green solutions

Something to lock in security of feedstock

DA and environmental approvals process

Fix planning

Global methane cut from cop26

Green gas certfication

Carbon tax

Green gas certification

Removal of crediting limits for ACCUs so ongoing abatement can be traded

Bio methane direct to network

Value applied to renewable gas

Higher electricity costs

Allow biomethane to inject in gas grid

Subsidies

What is the general public perception/knowledge of ‘niche’ (compared to solar PV/wind) renewables?

Biogas has been around for thousands of years. Not exciting for people

Very limited and confusing - so many terms the average joe doesn’t get the difference Explain the outcomes to help ppl be inspired

Harder to deliver than a set and forget solar panel

Not as well known especially with hydrogen spruke

Hydrogen has captured the media bad public attention

Lack of awareness

complicated and not in my backyard

Low knowledge

Potentially distrusted/lacking social license

Lack knowledge of industry

Wait for the BANANA army to start

Compared to europe, very poor, also amongst interested businesses

Most relate it to landfill combustion with associated emissions

Some confusion if really low carbon

they do not know what happen to their green bin wastes

even some councils need eduction

Some of them are pretty interested

Growing

Reasonably unknown

Very bad

Not as sexy as solar or wind

Poor

Low knowledge

They have no idea

Who are the key stakeholders in implementing a biogas project?

Authorities

Farmers EPA Utility Gas network Vehicle

Suppliers - have to see benefit / incentive End clients who are already seeking green gas

Regulators - they hold the power to approve or not

FARMERS

Feedstock supplier, project developer and owner, EPA, offtaker

Waste disposal companies and large gas users

Customers - need demand

Planning authorities

EPC provider, locals, councils, EPA, operator, waste providers, local businesses

Farmers (if ag waste)

Energy Safe Victoria

council, waste stream providers, off takers, EPA

investor

Pipeline owners

Fogo producers

Neighbours

Multiple System based approach needed

End users

Energy companies

EPA

Where is the greatest need for innovation in biogas – technology, markets, society?

Buyers of it

Markets

technology to fit process

Use of pure biogas

Markets, simplify incentives

Show ppl that it's a convenient way to maintain current lifestyles and appliances etc

Society- huge opportunity to surpass H2

Regulatory bodies

Regulators

Regulator education

Markets. technology is well sorted

Markets and society

society and markets

Scalability to allow uptake by smaller producers

Markets and regulations

Managing ultimate waste effectively

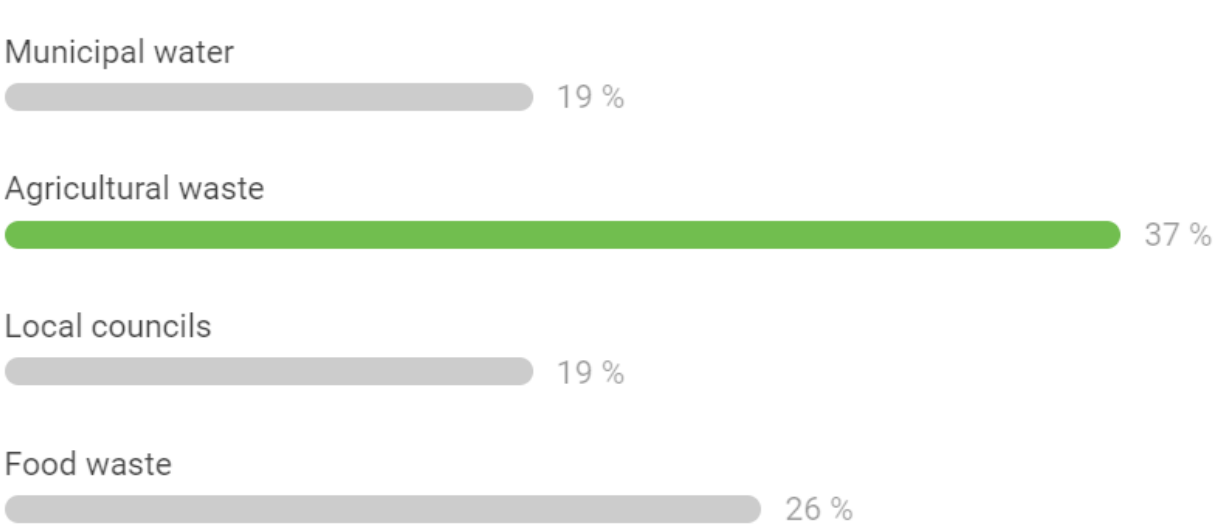
Markets

Low cost biogas upgraders

Public education

Regulations

We will hold a focus group on meat processing. What other area / sector should have it's own focus group?



- Waste disposal companies (Veolia, Suez etc)
- centred around an ag waste producer such as chook farm - and possibly bringing in other wastes to a central hub
- EPC investment requirements
- Potential end users of biogas
- Aquaculture

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Closing

RACE for 2030

Chat

A2EP: Hi Everybody, Katy from A2EP. Welcome to the RACE for 2030: Anaerobic Digestion for Electricity, Transport and Gas – B5: Opportunity Assessment. We would like to acknowledge the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present. If you would like to acknowledge the people or nation from where you are, please do so in the Chat. If you would like to ask our hosts and panelists a questions, please use the Q&A.

Steve Reddington: Wadawurrung

Danielle Francis: Cameraygal lands

Rod Boyd: Drarug

Long D. Nghiem: Gadigal

Kym Cherry: Kaurna

Jet Shoon Chong: Ngunnawal Country

Kirsty Cooper: Hi Everyone, I am Kirsty Cooper from Australian Pork and I am on Cameraygal land today.

cont.

Andrea Trianni: Gadigal

Dylan Gower: Acknowledging Wiradjuri Nation - land of the three rivers

A2EP: Please follow this link to our Consent Form:

https://forms.gle/Ty6iHnvHmyiu5FfHA

A2EP: Go to: https://www.sli.do/ and enter #203 385

A2EP: Thank you all – please remember to follow this to our Consent Form: https://forms.gle/Ty6iHnvHmyiu5FfHA

Rod Boyd: Thanks RACE. Great webinar.

Steve Reddington: Thanks all for a great session!

Greg Appleby: Great session. Thanks Jarrod and other presenters.

Rowena Cantley-Smith: Thank you to all who have so generously contributed time and input today!

Q&A

Q. What will be the process to take part in the initiative if a university is not part of the current core team or CRC?
A. For this specific project, best to contact the project team to see if there is an opportunity to contribute. For other projects, you can contribute your time and expertise as in-kind as part of a project team that includes RACE members, but we cannot fund your time unless you are a member of RACE for 2030.
Q. Thanks David for your reply. Is there a chance to join in as a member of RACE for 2030 at this stage?
A. Yes, of course! Email me (david.roche@racefor2030.com.au) and I'll put you in touch with our partner manager.

Q. Is there a good reference document summarising / detailing the issues / limitations for employing biogas in existing gas networks?
A. The current literature is fragmented. You won't find these answers in a single reference. Our report at the end of the project will hopefully be a one stop shop for all of these questions.

Q. Do you have any sense as to when the regulations for biomethane gas grid injection will be sorted out by?
A. No personal insights, but the timeline and developments are updated here:
https://www.energy.gov.au/government-priorities/energy-ministers/priorities/gas/gas-regulatory-framework-hydrogen-renewable-gases

Q&A

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Q. Is there a waste method developed for agriculture biomass or green waste from horticulture industry?
A. At present there isn't a specific method for agricultural biomass or green waste. There is a potential for some of these wastes to be included in the Animal Effluent Management 2019 method, but the wastes must have been disposed in an anaerobic pond before the project. A key question would be what emissions are occurring from these wastes at the moment, and what is the scope to avoid or reduce emissions by treatment of these wastes an alternative way.
An annual ERF method prioritisation process is run by the Dept. Industry, Energy, Science and Resources (DISER). This is the best platform to provide submissions for future method development. The ag waste R&D work being undertaken by DISER may also assist in determining whether there is scope for a viable method for these waste types.

Q. Thanks for the info Jet, would in-vessel composting be included under any of these methods?
A. Hi, there are some methods that permit composting as a waste treatment activity. Eligibility will depend on the specifics of a project. If you have a potential project idea and would like to know more about whether it would fit under an ERF method, I encourage you to review the guidance on our website (http://www.cleanenergyregulator.gov.au/ERF/Pages/default.aspx). You may also wish to reach out to our ERF Waste & Energy section, who are responsible for administering projects in this space (email: CER-ERFWasteandEnergy@cleanenergyregulator.gov.au).

Q&A

Q. Jet - could a project displacing natural gas usage and currently registered under the IEFE method, but not yet implemented, be transferred to the new biomethane method?
A. Hi, thanks for the question. Without knowing details about the project circumstance, I'm unfortunately not able to provide a definite reply. I'd suggest reaching out to our ERF Waste & Energy assessment team to discuss, as they are the team responsible for administering projects (email: CER-ERFWasteandEnergy@cleanenergyregulator.gov.au). Thanks, Jet.

Q. Hydrogen has taken over the renewable gas narrative in Australia. The average user of natural gas does not understand that renewable gas is available to purchase now.
A. Thanks for your comment. The purpose of this Opportunity Assessment will be to highlight the low-hanging fruit in the short term too!

Q. Challenge is for smaller producers who might not be close to a grid - how is that going to be managed?
A. Something we hope to address in this work - exploring different business models, including collaborative models.

Q. Will the CRC for RACE be leaning on the extensive (but spread out) research done by different industry bodies and the federal government on the opportunities and barriers for biomethane use in Australia?
A. We would expect this OA to engage with existing literature, summarising findings and identifying opportunities, particularly for further research.

Q&A

Q. Will meat processing include intensive farming?
A. Some overlap for example intensive farming will have a certain rate of casualty meaning processing dead animals. Otherwise, these are two separated sectors.

Q. How do I get in touch re the meat processing focus group?
A. Please contact via email (a2ep@a2ep.org.au)