IEA Bioenergy Task 37

Country Report Australia

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29th-30th October 2015, Berlin, Germany

iea Energy Technology Network

BIOENERGY AUSTRALIA

UNIVERSITY OF SOUTHERN QUEENSLAND | NCEA National Centre for Engineering in Agriculture

IEA Bioenergy

Current biogas status

The majority AD plants are associated with municipal waste water treatment plants (WWTP) with most sites employing CHP

Numbers for industry and agricultural plants are difficult to obtain

Survey developed to extract information (http://biogas.nceastg.usq.edu.au/biogas/#/home)

Survey For Australian Biogas Facilities



Survey

To register please complete the form below (We may contact you for further information).

Plant Name

Plant Name

Please provide your full address and postcode

Address

Please provide your e-mail address

E-mail

Please provide a contact telephone number

Telephone Number

Type of Technology and Technology Supplier

Type of Technology and Technology Supplier

Please provide a description of the feedstock(s) being used

Feedstock

Installed Capacity (kW electricity)

Installed Capacity

Biogas production/yr and/or Biomethane production/yr (specify units)

Biogas Production

Commissioning date (month and year)

dd/mm/yyyy

Please add additional information - such as press release - here

Brief Description

Please select one category that best describes your digester feedstock

- ○ Sewage sludge - mono or co-digestion
- ○ Biowaste - co-digestion or mono-digestion of food waste and other types of biowaste
- ○ Agriculture - digestion at farms (mainly manure)
- ○ Industrial - digestion of waste stream from various industries (e.g food and meat processing)
- ○ Landfill - landfill with collection of the landfill gas

Utilisation of Biogas (tick all applicable)

- ☐ Electricity
- ☐ Heat
- ☐ Combined heat and power (CHP)
- ☐ Flare
- ☐ Other

If other please specify

Description of biogas utilisation

Digestate Handling (tick all applicable)

- ☐ N/A
- ☐ Fertiliser
- ☐ Other

If other please specify

Description of digestate handling

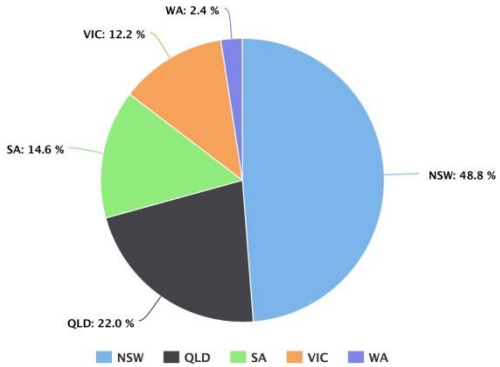
Submit

Survey For Australian Biogas Facilities

Summary

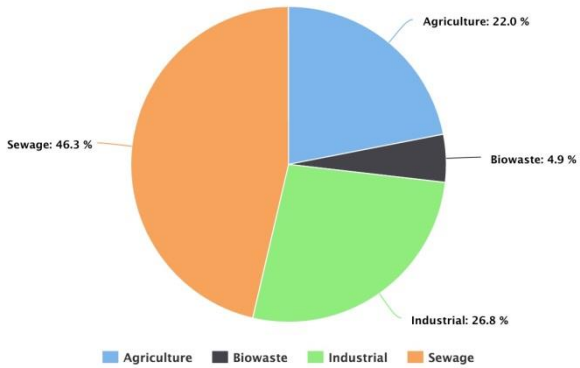
Number of records in regions

Region	No. Records
NSW	20
QLD	9
SA	6
VIC	5
WA	1

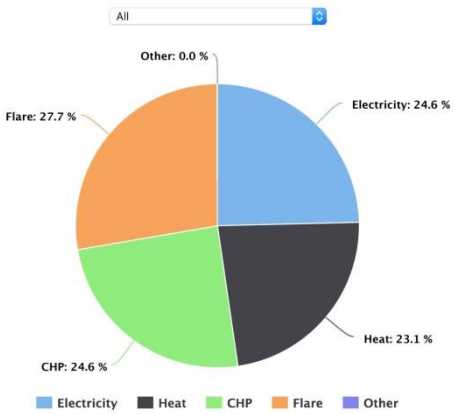


Number of records in feedstock categories

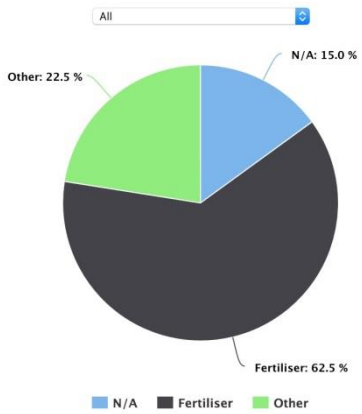
Feedstock Category	No. Records
Agriculture	9
Biowaste	2
Industrial	11
Sewage	19



Utilisation of Biogas



Digestate Handling



Biogas Plant Inventory

Produced raw biogas in Australia, according to biogas survey [a] (last updated 23rd Oct 2015) and additional sources [b]

Substrate/Plant type	Number of plants [a] (+ [b])	Production (Mm^3/yr) [a]	Potential Production (GWh/yr) [a]
Sewage sludge	19 (+30)	92.75	158-233
Biowaste	2 (+2)	6.44	11-16
Agriculture	9 (+9)	11.03	19-28
Industrial	11 (+22)	16.15	28-41
Landfills	-	-	-
Total	41 (+63)	127	216-319

No biogas up-grading plants

Geographic location of biogas plants in Australia

Source https://batchgeo.com/map/2fb1cc9f27a39cb7b37562b95c32bcf4
(does not contain up to date data)

Survey Map will provide an ongoing update of plants

Biogas Trends

Renewable energy provided 13.5% of Australian electricity generation during 2014.

Bioenergy currently makes up 7.9% of total clean energy, or about 1% of Australia's total energy.

Biogas contributes to about 2% of the share of total renewable electricity capacity.

However, electricity generation from AD installations has shown most growth over the past five years.

Goals of 2,413 and 55,815 GWh for bioelectricity were set for 2020 and 2050 respectively, to which on-farm AD and AD using biowaste and industrial organics are key contributors[1]

[1] Clean Energy Council, "Australian Bioenergy Roadmap (2008)

Biogas Trends

Clean Energy Finance Council (CEFC) estimates that current bioenergy capacity for electricity has potential to increase sixfold by 2020 with the right support in place

CEFC projected 2020 target for agricultural biogas production is 791 GWh

Biogas sector holds large potential for the intensive agriculture, meat and food processing industries. Ag and meat processing could abate over two million tonnes of GHG emissions a year for a capital investment of around $300 million

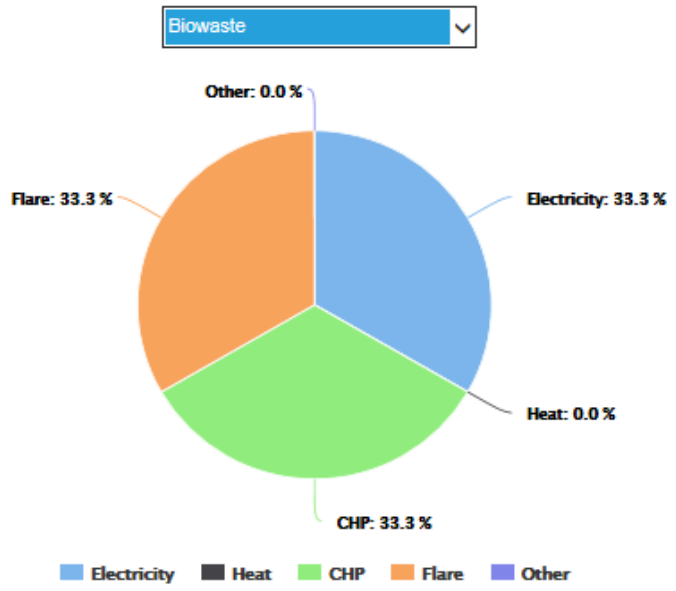
Industries and sectors ideally suited for biogas capture include piggeries, poultry operations, abattoirs, canneries, rendering plants, breweries and any organisations with high-load organic waste

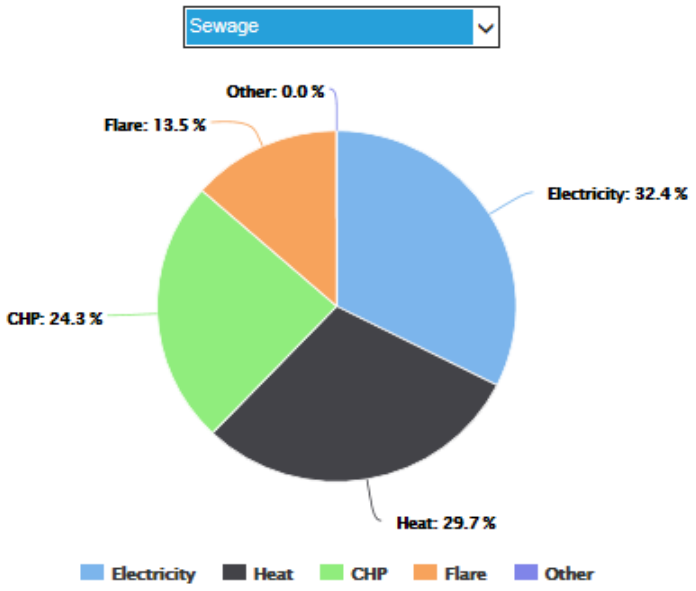
Biogas Utilisation

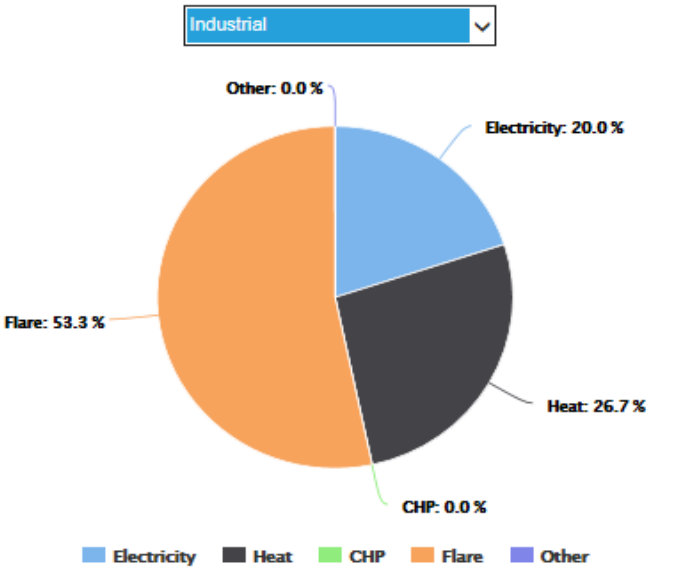
Based on 41 survey respondents

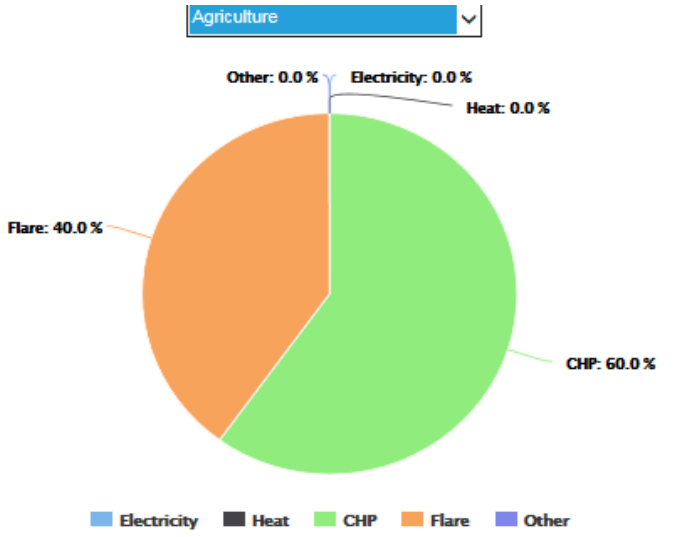
Plant Type	Electricity (%)	Heat (%)	CHP (%)	Flare (%)	kWh
Biowaste	33.3	33.3	-	33.3	6150
Sewage Sludge	32.4	29.7	24.3	13.5	42359
Industrial	20	26.7	-	53.3	3596
Agricultural	60	-	-	40	2290

Biogas Utilisation









Digestate handling

Plant Type	Usage as fertiliser	Usage other
Biowaste	100%	-
Sewage Sludge	63.2%	31.6%
Industrial	20%	30%
Agricultural	100%	-

Digestate trends and existing regulations

Biosolids regulated on a state by state basis

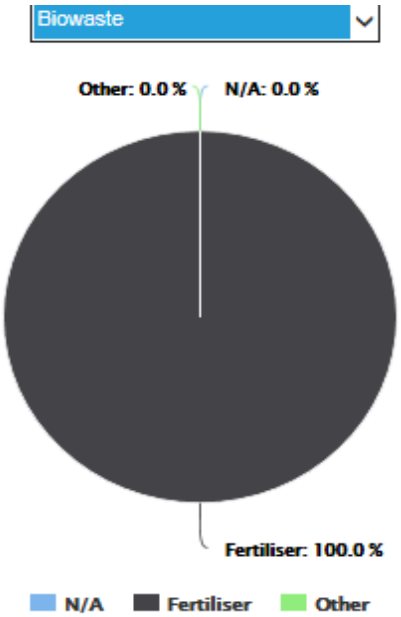
- Promote the reuse of nutrient rich biosolids to land in a manner that protects environment and human health

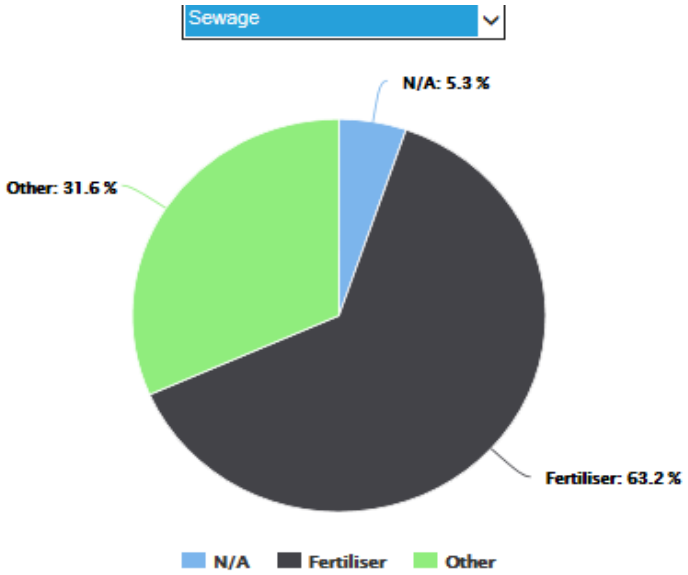
Need for national consistent guidelines across states

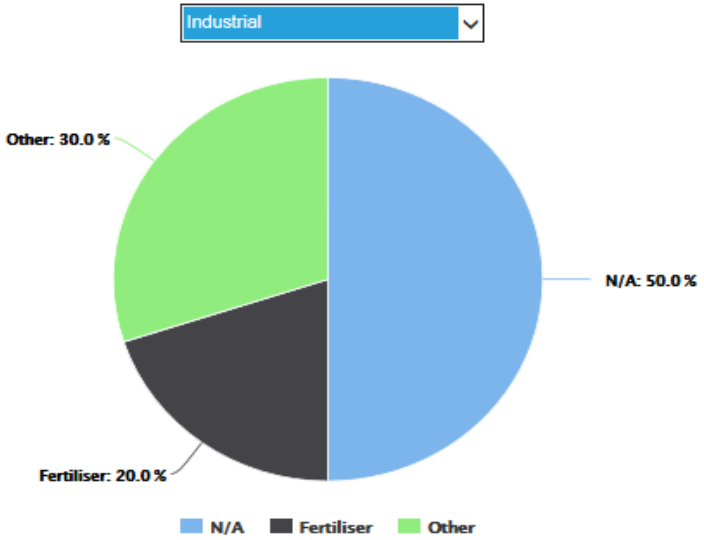
Odour considered a threat to continued land application

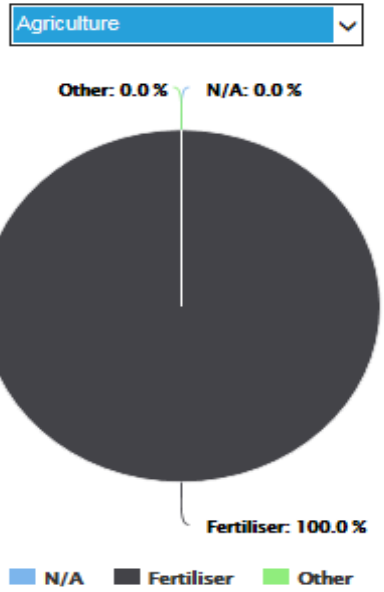
- Vector reduction guidelines need further improvement

Digestate handling









Financial Support Systems for Biogas

Large-scale Generation Certificates (LGCs) only financial incentive nationally (~$70/MWh)

Source: http://greenmarkets.com.au/resources/lgc-market-prices

Financial Support Systems for Biogas

One Feed-in-tariff in Victoria for small plants <100kW capacity (≈ $0.06/kW)

Loan support

- Clean Energy Finance Corporation (CEFEC) loans and financing instruments
- Eg of CEFC Project financing in biogas projects 1 and 2 in this presentation

Investment grants

- Australian Renewable Energy Agency (ARENA) grants
- Smaller state R&D grants

National Strategies

Renewable Energy Target – Previous political uncertainty about the RET has subsided recently – the price has recovered quite significantly

- Scaled back 41,000 GWh target to 33,000GWh early 2015

Clean Energy Act 2011 – repealed – large amounts of ARENA funding removed or deferred replaced by Emission Reduction Fund (ERF) - $(AUD) 1.5 billion over 3 years

- The Emissions Reduction Fund may be an important source of revenue for biogas projects

Bioenergy Roadmap (2008) most significant specific guiding strategy
Australian Energy Assessment 2nd Ed (2014) also provides an outlook of bioenergy resources and market

Carbon farming initiative methodology (Carbon Credits)

- Credits available when replace lagoons with AD reactors or CAL technology

Performance and Economic Data

Performance Data (if available):

- Not available

Economic Data (if available):

- Not available

Obstacles for the Biogas Development

Grid connections (electricity, heat and gas pipeline)

- Typically requires energy partner (wholesaler contract between buyer and seller)
- Gas connection to pipeline??? Unknown if even possible?
- No centralised heat network

The technology supply chain and biogas project ‘ecosystem’ is under-developed in Australia

- there have been very few projects, so there is little experience with importing equipment, installation and operation.

AD plant permitting

- can be difficult/costly to navigate state by state and case by case basis

Obstacles for the Biogas Development

Environmental licenses (air, water, land)

Digestate utilisation

- In Victoria digestate classified as industry waste until proven otherwise
- In NSW and QLD considered under compost guidelines
- Small market for digestate

Poor valorisation of bioenergy

Financing

- Hosts would often like to outsource the whole project and just buy electricity but typically the projects are sub-scale for project finance (CEFC pers comm)

Biogas Projects

Biogas Project 1:

Jandakot Biogas Plant, Western Australia – Commercially-viable biogas from food waste

- 35,000 – 50,000 tonne per annum food waste anaerobic digestion plant at Richgro Garden Products
- Biogas Renewables is the project developer
- Commissioned in March 2015
- Designed to produce over 2MWe capacity – 1.7MWe to the grid
- Sub – 4 year payback on capital (before grants)

Biogas Project 2:

Darling Downs Fresh Eggs, Queensland – Producing biogas from chicken manure

- Converts chicken manure from 290,000 hens and other organic waste (infrastructure is designed for 390,000 to allow for future expansion)
- Developed by Geodynamics (formerly Quantum Power) with RCM International
- Commissioned in 2014
- Produces 100% energy requirements in non-peak periods
- Captures heat from the biogas generator to warm chicken rearing sheds

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