Foreword

Presentation prepared by ENEA Consulting based on ENEA's Biogas Opportunities report

Mendo Kundevski
Principal
mendo.kundevski@enea-consulting.com
M +61 419 750 417
360 Elizabeth Street, Melbourne, VIC 3000

Presented by IEA Task 37 Biogas Taskforce

Professor Bernadette McCabe
Leader - Energy and Bioresource Recycling Research Program Team
bernadette.mccabe@usq.edu.au
T +61 7 4631 1623
Centre for Agricultural Engineering
University of Southern Queensland | Toowoomba | Queensland | 4350 | Australia
Independent strategy consultancy

MAXIMISING ENERGY TRANSITION OPPORTUNITIES

Various customers
- Energy companies
- Investors and financiers
- Industries
- Technology firms
- Public institutions
- Start-ups

A diverse, multidisciplinary team
- 60+ experts
- Strategy
- Industry
- Finance
- Technology
- Government

A unique capital of know-how
- New energy solutions
- Energy infrastructure
- Sustainable finance
- Waste and resources
- Energy access

International coverage
- 25+ countries
- 200+ clients
- 1000+ projects

PARIS – HONG KONG – MELBOURNE

ENEA Consulting is also committed to improving energy access through its unique ENEA Access programme, supporting social entrepreneurs in Africa and Asia-Pacific
The report delivers solutions via collaboration and harnessing insights

Lead organisation

![Bioenergy Australia Logo]

Funding partners

- Australian Government
- ARENA
- CEFC
- Energy Networks Australia
- IEA Bioenergy

Extensive stakeholder collaboration

<table>
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<tr>
<th>Peak bodies</th>
<th>Government</th>
<th>Academia</th>
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<td>Technology providers</td>
<td>Project developers</td>
<td>Utilities</td>
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*Biogas opportunities for Australia – International Renewable Energy Conference*
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1. Biogas introduction
A renewable gas offering multiple uses

*Biogas is also flared, when unused.*
2. Global biogas industry

The industry is progressing at different stages across regions

Global production is 1,270 PJ (~1.5% of global renewable energy supply)

2. Global biogas industry

Overseas learnings about aims, targets and actions can inform Australia

<table>
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<tr>
<th>Aims</th>
<th>Reduce GHG emissions</th>
<th>Increase renewable energy</th>
<th>Manage landfill impacts</th>
<th>Support agricultural sector</th>
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<tbody>
<tr>
<td><strong>Targets</strong></td>
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<td>Renewable electricity – Germany: 100% by 2050 (non-binding)</td>
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<td>Renewable gas – France: 10% by 2028, 1000 on-farm units by 2020</td>
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<td>Methane emission reduction – California: 40% by 2030</td>
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<td>Fossil independent transport sector – Sweden by 2045 (non-binding)</td>
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<td><strong>Actions</strong></td>
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<td>Feed-in tariffs, contract-for-difference, renewable energy certificates</td>
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<td>Pilot project funding</td>
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<td>Landfill taxes</td>
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<td>Tax exemption for biomethane vehicle fuels</td>
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Countries investigated:
Germany, France, UK, Sweden, California (US), South Korea

Biogas opportunities for Australia – International Renewable Energy Conference
3. Australian biogas industry
The industry is emerging with 242 sites, half are landfills

Biogas plants by feedstock type in 2017

- Landfill: 129
- Sewage sludge (WWTP): 52
- Industrial: 34
- Agricultural: 22
- Biowaste: 5

No biogas to biomethane upgrading plant in Australia

- Germany: 10,431 plants in 2016
- UK: 987 plants in 2016
- US: 2,200 plants in 2017
3. Australian biogas industry
The Australian industry has significant untapped potential

Electricity generation from biogas in 2016-2017

- ~1,200 GWh (4,320 TJ)
  - Source: Depart of the Environment and Energy
  - ~0.5% of national electricity generation

Annual estimated biogas resource potential

- 103 TWh (371 PJ)
  - Source: Deloitte
  - ~9% of final energy consumption and
  - ~30% of natural gas consumption in 2016-2017
  - Comparable to Germany’s current biogas production

Bioenergy investment potential

- $A3.5 to 5 billion
  - Source: CEFC

CO₂ emission savings potential

- 9 million tonnes per year
  - ~12% of Australia’s carbon abatement task

For new bioenergy and energy from waste projects
  - Source: CEFC
4. Australian biogas opportunities

Biogas offers environmental, social and economic benefits

1. Renewable, continuous energy
   - Supports grid via reliable, dispatchable energy
     - Especially as intermittent renewables increase

2. Emission reductions
   - Replaces fossil fuels
     - Some biogases ~90% less emission intensive
   - Captures methane emissions
     - Mainly landfills and animal waste

3. Waste treatment option
   - E.g. recovers energy from landfill waste
     - 50% organic waste is composted
     - 10% landfill gas is recovered for energy
     - 40% landfill gas is flared

4. Economic
   - Creates investment opportunities and jobs
     - Germany: 45,000; US: 7,000 jobs
   - Supports local economies
     - E.g. new income sources for farmers
4. Australian biogas opportunities
Biomethane unlocks two additional benefits

1. New, sustainable mobility
   - Offers sustainable vehicle fuels
     - Especially heavy vehicles
   - Helps decarbonise the transport sector
     - Sweden: 47 of 62 plants supply biomethane fuel

2. Gas sector decarbonisation
   - Biogas is critical (Gas Vision 2050)
   - Biomethane injection: no infrastructure upgrades
   - Gas grid offers energy storage
5. Australian biogas challenges
Several barriers hinder project development

1. Financial viability
   - High upfront investment
   - Complexity in securing revenue sources
   (Note: Small projects with secured feedstocks can stack up)

2. Policy challenges and gaps
   - No renewable gas targets
   - Financial uncertainties with grid export
   - No taxation exemption for renewable gaseous fuel
   - Unharmonised landfill waste levies

3. Project development
   - Approval process complexity
   - Finding private finance
   - Social license considerations
   - Long distances
6. Recommendations

Advancing Australia’s biogas industry

National target(s) for renewable gas

- Similar to Australia’s Renewable Energy Target
- Non-binding targets can encourage sector development

Policy design via industry consultation

- More consistent national / state policies
- Adapt existing / develop new policies

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<th>Mechanism</th>
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<td>Biomethane</td>
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<td>Grants / loans</td>
<td>Grid injection</td>
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<td>Contract for difference</td>
<td>Green gas retail offers</td>
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<td>Support for projects of all scales</td>
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6. Recommendations

Advancing Australia’s biogas industry

Waste strategies for feedstock quantity and quality
- Harmonised levies
- Organic source separation
- Long-term feedstock supply contracts

Sustainable mobility opportunities
- Promote biomethane use as a low carbon fuel alternative
- Revise excise duty on biomethane vehicle fuels

Simplifying approval processes
- Review current processes, develop guidelines, information packs
Hong Kong
Suite D, 6th floor, Ho Lee commercial building
38-44 d’Aguilar Street, Central, Hong Kong

contact.hongkong@enea-consulting.com

Paris
89 rue Réaumur
75002 Paris, France

+33 1 82 83 83 83
contact.paris@enea-consulting.com

Melbourne
Level 12, 360 Elizabeth Street
Melbourne VIC 3000, Australia

contact.melbourne@enea-consulting.com

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