2018 Asia Pacific Energy Leaders’ Summit
Wellington, New Zealand

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• Australia’s decarbonisation challenge
• Decarbonising Victorian gas consumption
• HyP SA – an innovative power to gas project
• The proposed Australian Hydrogen Centre
About AGIG | A National Business

- 2 million customers
- 3,600km of pipelines
- 34,000km of networks
- 42PJ of gas storage
- $8 billion of assets

Active in every mainland state and the NT, from the well head to the meter
The decarbonisation challenge

Electricity, Transport and Heat – all sectors need to be decarbonised

Energy Consumption for South East Australia

- **Total energy** 100%
- **Transport** 47%
- **Electricity consumption** 27%
- **Gas consumption** 20%
- **Renewable electricity Generation** 6%
Decarbonising Victorian gas consumption

Victorian gas demand peak of 18,000 MW significantly higher than electricity peak of 9,000 MW, with gas consumption concentrated in winter months.

- **Gas consumption**: 18,000 MW peak demand, 36 TWh energy consumption.
- **Electricity consumption**: 9,000 MW peak demand, 45 TWh energy consumption.
- **Energy consumption**: 25,000 MW combined peak demand, 81 TWh energy consumption.
Decarbonising Victorian gas consumption

1. **Full electrification**
   - Replacing all natural gas consumption by electricity generated from renewable sources

2. **Hydrogen conversion**
   - Replace all natural gas with hydrogen produced from renewable generation and electrolysis

- Both pathways assume a Base Case - that the underlying electricity consumption is fully decarbonised
- For the Base Case and the two pathways it is assumed decarbonisation is achieved immediately, with costs of conversion based on projected 2030 costs
- In reality, both pathways will take several decades to complete, so relative costs are important
Decarbonising Victorian gas consumption

The hydrogen conversion pathway is around 40% less than the additional cost of the full electrification pathway.

Due in large part to the flexibility of electrolysis to meet gas demand, with less need for long-term electricity storage and reduced expenditure required to upgrade the electricity network.
Distribution networks offer a great opportunity to kick-start the hydrogen economy

Source: Hydrogen for Australia’s Future, A report prepared for the COAG Energy Council
Gas Vision 2050

Collaborative leadership from industry

• An industry-wide vision to decarbonise the gas sector, released in March 2017

• Highlights the importance of gas to Australia today and into the future

• Established a credible pathway to decarbonise
**Hydrogen Park SA (HyP SA)** | Project overview

**Funded Project**

Hydrogen blended with natural gas injected into SA gas distribution network

**Project Expansion**

Establish Australian Hydrogen Centre

Tube and Trailer Filling Facility

Refuelling station

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Diagram:

- **Potential On Site Solar**
- **Renewable Electricity from Grid**
- **1.25 MW Electrolyser**
- **AGIG Natural Gas Network**
- **(H₂/CH₄ blend)**
- **SA distribution network**

**Funded Project**

- **Renewable Hydrogen**
- **Water**

**Project Expansion**

- **Australian Hydrogen Centre**
  - Subject to ARENA funding
- **Tube and Trailer Filling Facility**
- **Other injection points**
  - **AGIG Network**
  - **Other, Industry/Refuelling/Export**
- **Refuelling Station**
  - Subject to SA Gov funding
HyP SA | Project location

Located at the Tonsley Innovation district, supplying 5% Hydrogen blended gas to 750 households in Mitchell Park.
**HyP SA | Project plan**

FEED finalised, progressing towards detailed design and construction. Commercial operations planned for October 2019

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<tbody>
<tr>
<td>Project set up</td>
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<td>Front end engineering &amp;</td>
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<td>Commencement of site</td>
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<td>Commissioning</td>
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<td>Commercial operation</td>
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# Key Learnings

Significant project learnings across the entire value chain

<table>
<thead>
<tr>
<th>Category</th>
<th>Learnings</th>
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<tbody>
<tr>
<td><strong>Upstream and production</strong></td>
<td>• Electrolyser efficiency and performance</td>
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<tr>
<td></td>
<td>• Integration of intermittent renewable generation</td>
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<td></td>
<td>• Control systems</td>
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<tr>
<td><strong>Distribution</strong></td>
<td>• Network performance – PE pipes, meters, regulators and valves</td>
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<td></td>
<td>• Metering and gas quality</td>
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<tr>
<td><strong>Customers / Stakeholders</strong></td>
<td>• Consumer experience with using blended gas</td>
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<tr>
<td></td>
<td>• Perceptions on using blended gas, moving to 100% hydrogen</td>
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<tr>
<td></td>
<td>• Key concerns and information gaps</td>
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<tr>
<td></td>
<td>• Customer and stakeholder education</td>
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<tr>
<td><strong>Appliances</strong></td>
<td>• Long term performance of domestic appliances</td>
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<td>• Performance of Type B appliances</td>
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<td></td>
<td>• Evaluation of flame characteristics and safety control systems</td>
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<tr>
<td>Update</td>
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<td><strong>Electrolyser purchase</strong></td>
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<td>Procuring from Siemens</td>
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<tr>
<td><strong>FEED</strong></td>
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<tr>
<td>Finalised</td>
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<tr>
<td><strong>Design and Construct</strong></td>
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<tr>
<td>Have gone to market for D&amp;C contractor, and will appoint in January 2019</td>
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<tr>
<td><strong>Tube and Trailer</strong></td>
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<tr>
<td>BOC providing Tube and Trailer and compressor</td>
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<tr>
<td>Finalising pricing and operating regime</td>
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</table>
| Safety Report | Finalised a Safety Report and submitted to OTR  
A detailed Safety Case is required for OTR’s approval |
| Injection options | Finalised Injection Strategy that maximises project learnings and provides platform to scale up (regional towns)  
5% hydrogen blended gas (by volume) will be injected in a sectionalised area |
| Customer and stakeholder engagement | Will undertake extensive customer engagement, communication and appliance survey  
Developing webpage. Essential platform for customer / stakeholder management and marketing and communications |
## Project update

**Gas appliances**
- Will require appliance testing and survey

**Electricity wholesale purchase**
- Working with partners to develop operating and market purchase strategy – run electrolyser at off peak periods, subject to technical and other constraints

**Electricity network tariff and connection**
- Exploring options with Enwave and SAPN

**Onsite solar**
- Keen to explore options – to maximise project learnings
The Australian Hydrogen Centre | Overview

Objectives

Externalise key learnings from HyP SA

Deliver a series of projects and business cases to convert existing natural gas distribution networks to hydrogen networks

Support research, training, stakeholder engagement, policy development and international collaboration to support hydrogen conversion

Key projects

1. HyP SA
   - Externalise learnings from HyP SA

2. Regional Towns
   - 10% hydrogen blending (SA, VIC, ACT)

3. States
   - 10% Blending & full conversion (SA, VIC, ACT)

Strong support

*Government of South Australia*

*Victoria State Government*

*ITM Power*

*ACT Government*

*Australian National University*

*Energy Australia*

*BoC*

*NEOEN*

*CSIRO*

*AusNet*

*Hydrogen Mobility Australia*
The Australian Hydrogen Centre
10% hydrogen blending in SA regional towns

<table>
<thead>
<tr>
<th>Wind farm, Owner, Status</th>
<th>MW</th>
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<tbody>
<tr>
<td>Port Pirie</td>
<td>Hornsdale, HWF, In Service</td>
</tr>
<tr>
<td>Crystal Brook, Neoen, Committed</td>
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<tr>
<td>Gambier</td>
<td>Lake Bonney, LBWP, In Service</td>
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<tr>
<td>Angaston</td>
<td>Keyneton, Pacific Hydro, Com.</td>
</tr>
<tr>
<td>Twin Creek, RES, Proposed</td>
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<tr>
<td>M Bridge / Mt Barker</td>
<td>Palmer, Tilt Renewables, Prop.</td>
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</tbody>
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**Installed Capacity** 1,810
**Committed Capacity** 638
**TOTAL** 2,448
The Australian Hydrogen Centre
10% hydrogen blending in Victorian regional towns

**Installed Capacity**: 1,750 MW
**Committed Capacity**: 1,450 MW
**TOTAL**: 2,448 MW

* Does not fully reflect recent auction

**Wind farm, Owner, Status**
- **Ballarat**: Waubra, Mt Mercer, Stockyard
- **Ararat**: Ararat, Challicum Hills, Bulgana
- **Traralgon**: Toora
- **Wonthaggi**: Baldhills, Wonthaggi wind farm /Inverloch

**Pelican Storage Site**
- 125 MT @ P90

**Gippsland Basin**
- 31 GT of carbon storage