Introduction to Victoria’s Brown Coal Resources – Policies & Key Projects

Japan Oil, Gas and Metals National Corporation (JOGMEC) Investment Seminar

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Victoria, Australia

Friday 10 May 2019
Overview

- Victoria’s brown coal resources
- Statement on Future Uses of Brown Coal
- Victoria’s comparative advantage for low emissions brown coal projects
- A real example – the Hydrogen Energy Supply Chain Pilot Project
Victoria’s Brown Coal Resources

- **430 billion tonnes** of in situ brown coal
- **65 billion tonnes** of measured coal
- **33 billion tonnes** of potentially economic brown coal
The Latrobe Valley
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Moe/Newborough – Population 16,734
(as at 2016 Census)

Morwell – Population 13,771
(as at 2016 Census)

Traralgon – Population 25,485
(as at 2016 Census)
The Latrobe Valley

- **Moe/Newborough**
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- **Traralgon**
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- **Hazelwood Coal Mine and Power Station (ENGIE)**
  - Ceased operations in March 2017

- **Loy Yang Coal Mine and Power Station (AGL)**
  - Mines 29-30mt/yr

- **Loy Yang B Power Station (Alinta Energy)**
  - Supplied by AGL

Loy Yang Mine
The Latrobe Valley’s Coal Mines

**Hazelwood**
- 1964 to 2017
- 772 million tonnes of coal mined
- Reserves = 250 million tonnes

**Yallourn**
- 1924 to 2032 (estimated)
- 1.071 billion tonnes of coal mined
- Reserves = 340 million tonnes

**Loy Yang**
- 1983 to 2048 (estimated)
- Just under 1 billion tonnes of coal mined to date
- Reserves = 1.4 billion tonnes
## Coal Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
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<tbody>
<tr>
<td>Energy Value (net wet)</td>
<td>5.8 – 11.5 MJ/kg</td>
</tr>
<tr>
<td>Energy Value (gross dry)</td>
<td>25-29 MJ/kg</td>
</tr>
<tr>
<td>Overburden thickness</td>
<td>10 – 20 metres</td>
</tr>
<tr>
<td>Strip ratio (coal:overburden)</td>
<td>0.5 / 5:1</td>
</tr>
<tr>
<td>Water</td>
<td>48 – 70%</td>
</tr>
<tr>
<td>Carbon</td>
<td>65 – 70%</td>
</tr>
<tr>
<td>Oxygen</td>
<td>23 – 30%</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>4 – 5.5%</td>
</tr>
<tr>
<td>Ash</td>
<td>&lt;4%</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>&lt;1%</td>
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<tr>
<td>Sulphur</td>
<td>&lt;1%</td>
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A wealth of brown coal data

- Mining and power generation was state owned in Victoria until privatisation in the late 1990s.

- As a result, the state owns a wealth of data about the region’s abundant brown coal resources, including a three-dimensional coal model.

- Data gathered across more than 9,000 drillholes.
Latrobe Valley coal seams
Coal quality – moisture, ash, sodium, sulphur, etc.
Access to information and data

- 3D model data (SECV maps & sections, coal bore & metadata database, Minescape model, coal model exports)

- GeoVic (online access to Victorian geological data/coal model)

- Access to coal resource
Traditionally, Victoria’s brown coal resources have been used almost exclusively for power generation purposes.

Opportunities exist for brown coal to be used to produce a variety of high value products including:

- Hydrogen
- Carbon fibres and graphenes
- Fertilisers and soil conditioners
- A construction material suitable in replacing CO₂ intensive materials such as concrete and cement.

Low emission opportunities for Victoria’s Brown Coal Resources
Statement on Future Uses of Brown Coal

- Released in July 2017

- The Statement outlines the Victorian Government’s position on new brown coal projects

- Decision making guidelines for new coal projects
**Key elements of the Coal Statement**

**EMISSIONS STANDARD**

0.45 t CO$_2$-e/MWh or 0.3 t CO$_2$-e/tonne of coal to be tested through a Regulatory Impact Statement (RIS)

**ACCESS TO COAL**

Preference given to projects sourcing their coal from existing brown coal mines. New licences only to be granted where proponents have been unable to reach supply agreement with existing miners.

**INDEPENDENT EXPERT PANEL**

Independent Expert Panel with commercial, technical and environmental expertise to support decision making.

**‘OPEN FOR BUSINESS’**

The State will adopt an 'open for business' approach in supporting new investment and research opportunities in projects using coal.
Engaging and informing the community

• Actively engaging the local community and key stakeholder and providing them with information is critical to ensuring the success of any new, low emissions brown coal project
Mine rehabilitation – thinking about the end landform from the start

- Mine rehabilitation is a complex and challenging task, particularly in the Latrobe Valley where decisions made regarding the rehabilitation of one mine may have implications for the rehabilitation of other mines.

- Proponents ought to be thinking about their mine rehabilitation plans from the commencement of mining.
A comparative advantage

• Victoria’s Latrobe Valley has a unique comparative advantage when it comes to the development of new, low emissions coal projects

• No other location in the world boasts a world class coal resource adjacent to world class carbon capture sites
Hydrogen – A real opportunity

• The Coal Statement supports the development of projects that seek to use brown coal in a low emissions context

• Interest in hydrogen both within Australia and internationally is growing, with a number of reports examining the opportunity published in recent months

• Opportunities exist for brown coal in the Latrobe Valley to be converted to a number of alternative products, which when coupled with Carbon Capture and Storage (CCS) is in line with the Victorian Government’s Coal Statement
National Hydrogen Strategy

• The Federal Government is leading the development of a National Hydrogen Strategy through the COAG Energy Council.

• National Hydrogen Strategy is due to be released in 2019

• Aims to build “a clean, innovative and competitive hydrogen industry that benefits all Australians and is a major global player by 2030”
The Hydrogen Energy Supply Chain (HESC) Pilot Project

• An opportunity for Australia to be at the forefront of the rapidly expanding hydrogen industry

• Project to develop and trial a fully integrated supply chain for hydrogen starting with production in the Latrobe Valley and ending with transport of that hydrogen to Japan

• Provides an opportunity for development of a domestic hydrogen market
• The HESC Pilot Project will demonstrate how the seven elements of a supply chain work together.

• Each of the elements includes technologies that are largely proven.

• The Pilot Project is a critical first step in realising a commercialised hydrogen production and export industry.
Latrobe Valley Gasification Plant at AGL Loy Yang

Utilising 160 tonnes of brown coal
Producing up to three tonnes of gaseous hydrogen over the one-year pilot
Hydrogen transportation – Latrobe Valley to Hastings

One trip per month (route to be determined)
Hydrogen liquefaction at Hastings

At the BlueScope Industrial Site
Hydrogen Storage and Loading at Hastings

Artist impression

At the BlueScope Industrial Site
Pilot Storage Ship

116 metres long and 19 metres wide
One trip every three months
No dredging required

Artist impression
Pilot Storage Ship

Artist impression
HESC Pilot Project - Timeline

2017 - 2018
Planning and approvals

• Completion of Front End Engineering and Design Study
• Obtain relevant regulatory approvals
• Commence engagement with community and key stakeholders

2018 - 2020
Plant construction

• Construction of the HESC Pilot Plant due to commence in 2018 and conclude in 2020

2020 - 2021
Pilot operations

• Operation of the HESC Pilot Plant for a one year period to develop and trial the supply chain

2020s
Technical reviews

• Reviews and further work to understand the pathway to commercialisation, with potential planning, commissioning and construction of a commercial plant subject to market demand for hydrogen

Community and stakeholder engagement
Questions

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