

Can Carbon Capture and Storage work for the Latrobe Valley?

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Tania Constable PSM
CEO CO2CRC



About CO2CRC Ltd

- CO2CRC is Australia's leading **CCUS** research organisation, invested A\$100 million in research during past decade.
- We aim to align high-quality R&D with commercial partnerships and insights to assist industries to find **innovative**, **efficient** and **economic** ways to manage their CO₂ emissions.
- Our members recognise the strategic importance of having collaborative R&D centres systematically progressing the science and engineering of **CCS/EOR** to ensure an **efficient** and **safe** deployment of the technology.
- CO2CRC has done multiple **pilot CO₂ injection** projects in the Otway basin and capture tests in the Latrobe Valley
- Our Otway field test facility is one of the largest **CO₂ injection demonstration sites** in the world

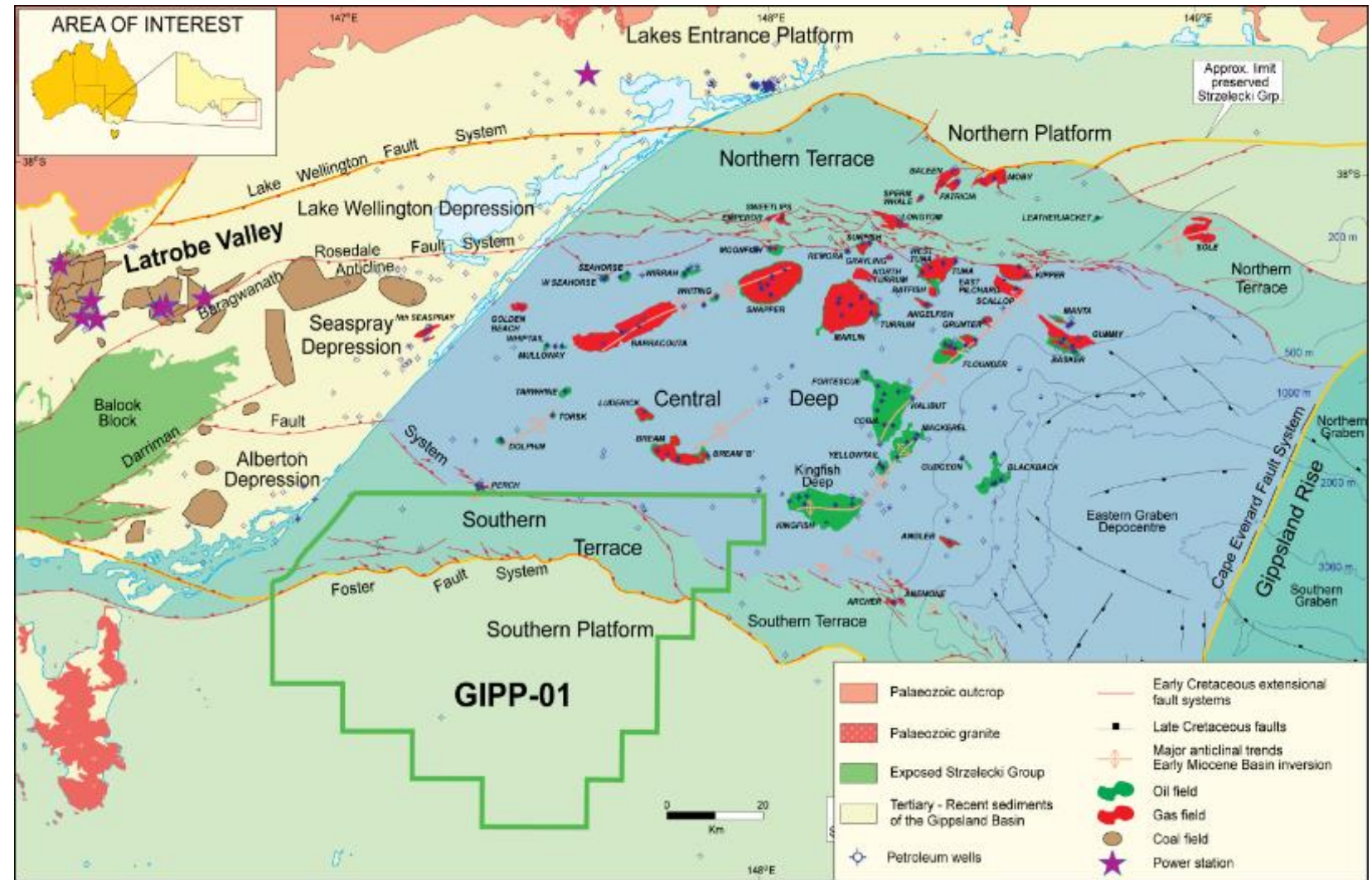


• *CRC-3 drilling operations – April 2017*

Carbon Capture and Storage in Victoria – a sound concept

An impressive numbers game on (energy access, climate and air quality)

- Victorian Hydrogen Economy realistic
- CarbonNet project critical for hydrogen and/or reduction of emissions in power
- 5315 CCS jobs over 12 years (retrofit)
- 334 Mtpa CO₂ emissions in Australia (excludes LULUCF)
- 44 Mtpa CO₂ emissions brown coal in Victoria, 13% direct national GHG emissions, more than 60% of VICs emissions
- If CCS can halve power emissions this equates to 6.5 % national CO₂
- Emissions



POTENTIAL FOR INTEGRATED CARBON CAPTURE AND STORAGE IN AUSTRALIA

WA

- ▶ Large offshore natural gas fields with CO₂, but very close to basins with high storage potential.
- ▶ Well suited to a hub approach including industrial sources of CO₂ emissions

Gorgon
Storage – advanced

South West Hub
Storage hub – feasibility

QLD

- ▶ Close proximity to basins with high storage potential
- ▶ Existing oil and gas pipeline corridors can be used for CO₂ transport

CTSCO
Storage – feasibility

Tarong
Capture – operational

NSW

- ▶ Close proximity to basins with high storage potential
- ▶ Existing oil and gas pipeline corridors can be used for CO₂ transport

Darling Basin
Storage – feasibility

VIC

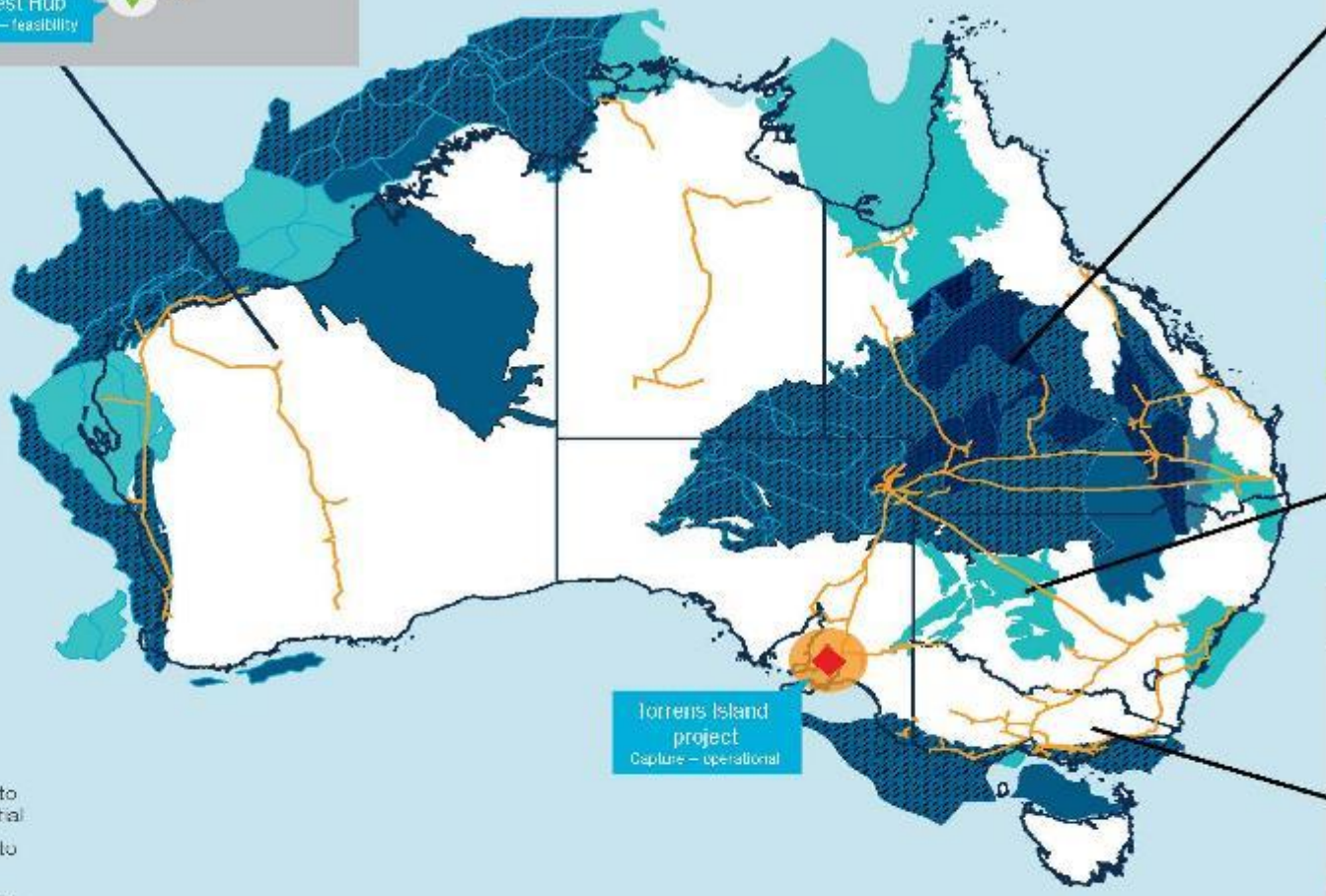
- ▶ Existing oil and gas infrastructure can be converted for CCS application
- ▶ Ideally situated for a hub approach including industrial sources of CO₂ emissions

Otway
Storage – operational

Hazelwood
Capture – operational

Loy Yang
Capture – operational

CarbonNet
Storage hub – feasibility



National major power stations

Oil & gas pipelines

Basins & regions considered to have very high storage potential

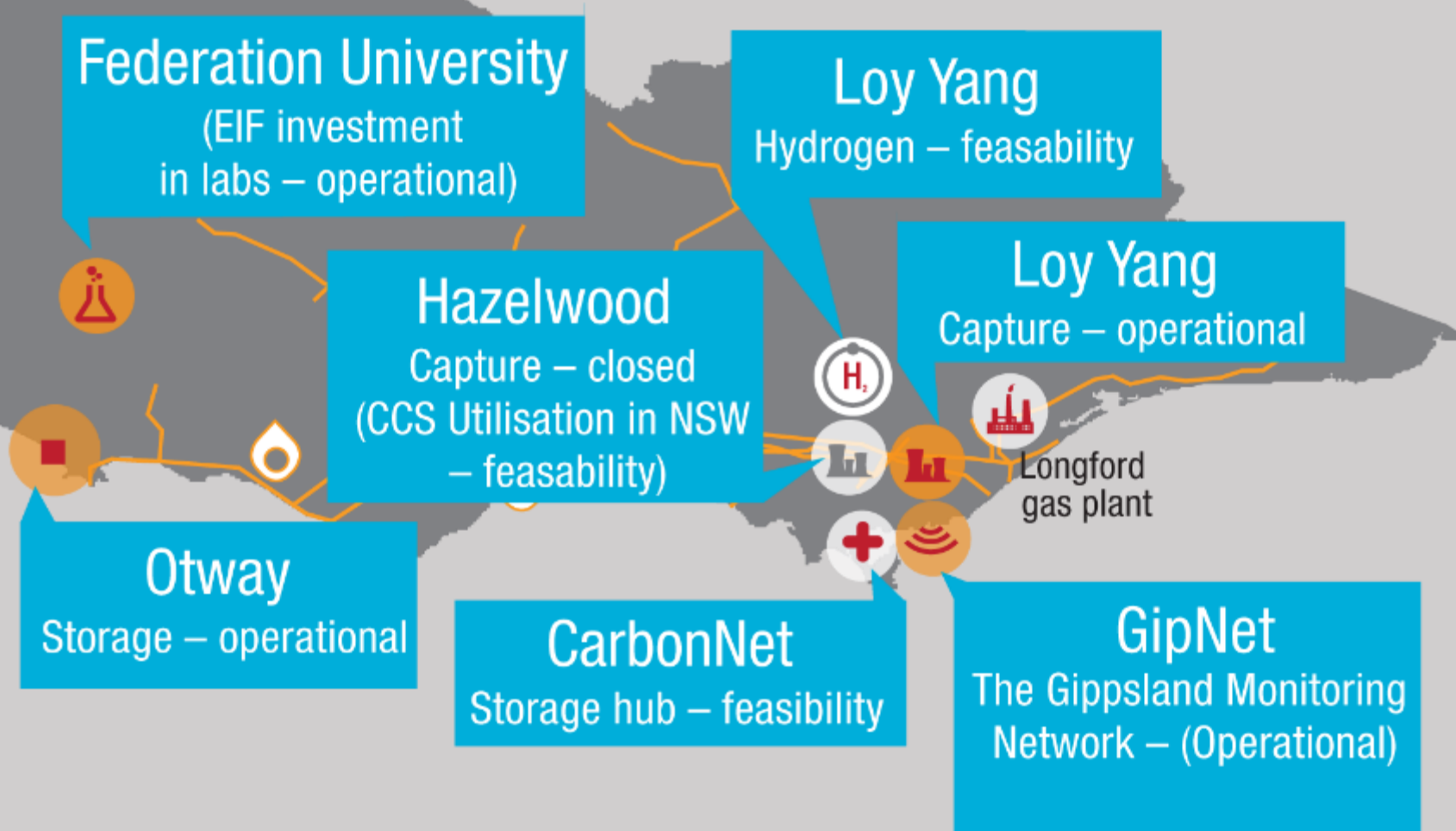
Basins & regions considered to have high storage potential

Basins & regions considered to have storage potential

Sedimentary basins & regions yet to be assessed for storage potential

500 0 500 1000 Km

CCS projects in Victoria



- ▶ Existing oil and gas infrastructure can be converted for CCS application
- ▶ Ideally situated for a hub approach including industrial sources of CO₂ emissions

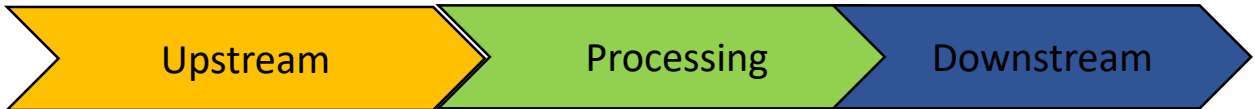
- Potential for Victorian Hydrogen economy driving major projects
- CarbonNet designed to facilitate a storage hub for CO₂
- Loy Yang retrofit study will prove concept design for capture of CO₂
- Otway field test facility further tests viability of tools and techniques to deploy on flagships and other major projects
- Federation University Investment in research labs.
- Capture Facility will be transferred to NSW for further research and development and commercial opportunities

Jobs created from retrofitting CCS to power in the Latrobe Valley

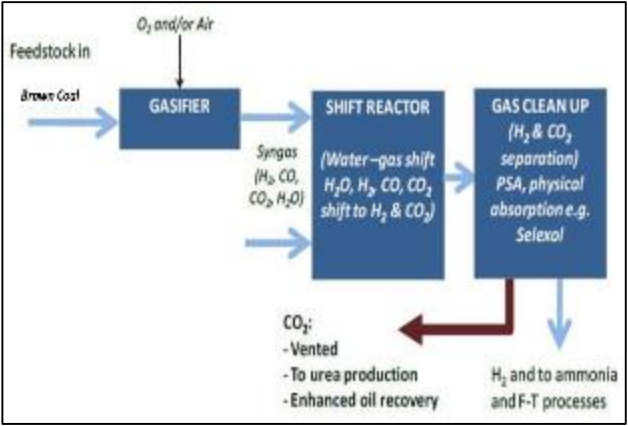
- 5315 new jobs over 12 years
- 4064 annually during operation
- 13% increase in jobs (2011 census data)
- 3% increase in current employment

		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Average
Gippsland	Direct	1117	2601	605	1211	1264	1813	1312	1775	1328	1105	1095	1095	1604
	Indirect	1725	4017	933	1869	1951	2799	2024	2740	2049	1705	1688	1688	2460
	Total													4064
Project	Direct	1786	4165	954	2011	1879	2815	1904	2713	1898	1676	1629	1629	2353
	Indirect	2172	5063	1174	2419	2360	3473	2418	3371	2428	2099	2056	2056	2962
	Total													5315

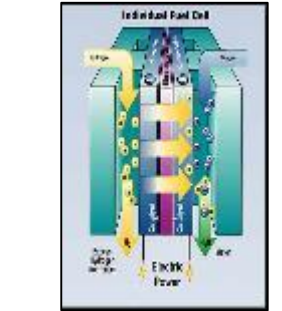
Source: Study conducted by Barry Hooper UNO Technologies for CO2CRC



Hydrogen Energy Supply Chain Project

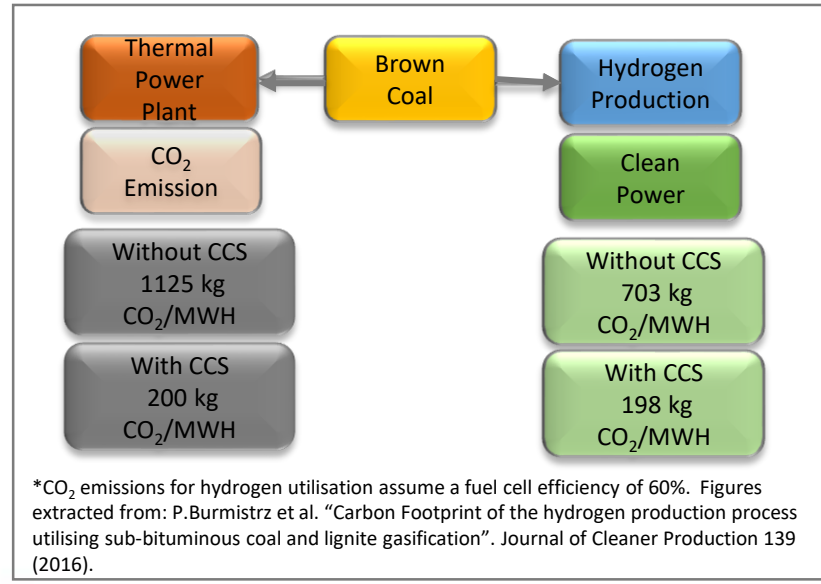


Transportation & Storage



Utilization- Clean Energy

- In partnership with J-Power and Kawasaki Heavy Industry (Japan), CO2CRC is working on more efficient and cleaner ways to produce energy from brown coal.
- A feasibility study is underway to produce 99.999% vol hydrogen from brown coal and includes the construction of a pilot plant in the Latrobe Valley due to be operational by 2021.
- CO2CRC will contribute its expertise in the design and construction of the Gas Clean-up operations where hydrogen is separated from the other gasses to produce a pure hydrogen stream.





CO2CRC – Carbon Capture and Utilisation Project

- Hazelwood Power Station hosted Australia’s first demonstration scale post combustion carbon capture facility.
- Having served the needs of the CCS research community and supported the Hazelwood’s need to reduce the purchase of waste water treatment chemicals, the capture plant will be given a new lease on life and refurbished and relocated to a power station in NSW.
- CO2 generated by the plant (approximately 18,000 tonnes annually) will be sold into the industrial gases market where it will be converted into food grade CO2 (99.999 vol% purity) to fill a gap in the NSW food & beverage market.
- From a social, commercial and policy perspective, operations will add to the depth of understanding of the mechanics of CCUS and the role it can play in not only reducing CO2 emissions from a power plant but also extending the viability of the fossil fuel based power sector.

GipNet – The Gippsland Monitoring Network



GipNet

What is GipNet

GipNet consists of four research projects project managed by CO2CRC and led by the CSIRO, The University of Melbourne and the University of Wollongong. GipNet is designed to test and validate equipment and technologies that help potential future CCS projects monitor and, if necessary, respond to changes in the environment.

GipNet monitoring technologies



Seismology Monitoring Network
– record seismic activity/movements in the subsurface and are used to determine precise locations of earthquakes, as well as identifying areas particularly susceptible to future events.



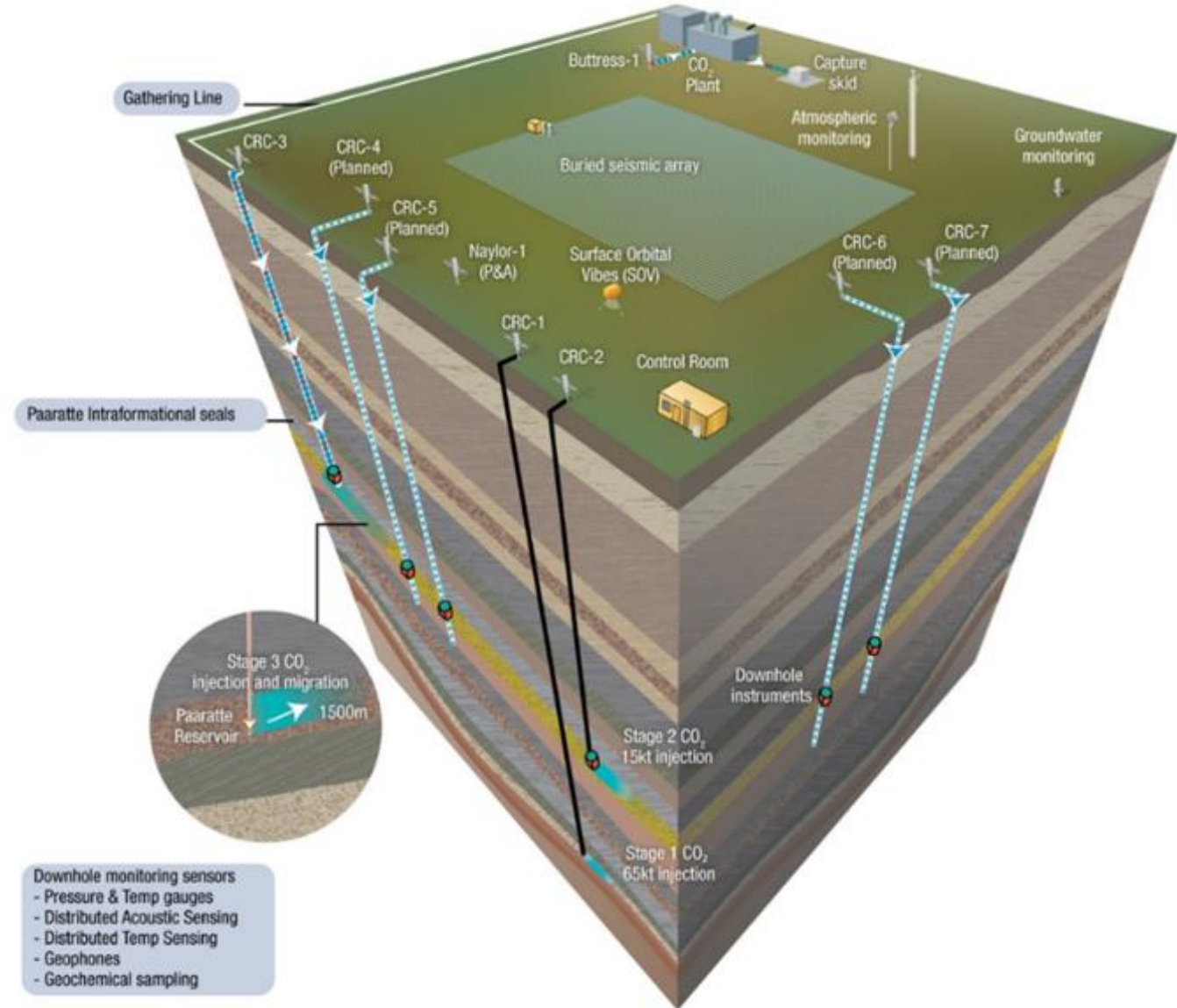
The Atmospheric Monitoring Network – will detect emissions to the atmosphere as well as attributing where they have come from. The system uses an instrument that points invisible and harmless light at a series of reflectors in the Gippsland Basin.



Marine Monitoring Network and Seabed Processes – will allow for validation of monitoring and verification technologies in the marine environment. Marine monitoring research assets will be operated by the CSIRO based on the world-leading marine monitoring expertise of their Oceans and Atmosphere Flagship.

CO2 Otway Storage Projects

- **Otway Stage 1: 2004 – 2009**
 - ✓ Demonstrated safe transport, injection and storage of CO₂ into a depleted gas reservoir
- **Otway Stage 2: 2009 – 2019**
 - ✓ Demonstrate safe injection of CO₂ into a saline formation
 - ✓ Stage 2B – Near well residual & solution trapping characterisation
 - Stage 2C – Minimum detection, 4D M&V & Plume stabilisation
- **Otway Stage 3: 2015 – 2022**
 - Demonstrate safe, reliable and cost-effective subsurface monitoring of CO₂
 - Project outcomes applicable to a number of industries including oil and gas



Otway Stage 3 Project – On the ground

New Facilities requirements



Key

- Proposed new well locations
- Access Roads
- Gathering Line

New Facilities

- 5 new well sites
- 5 access tracks
- New above ground gathering line

Government, Industry and Research Partners



“Support CO2CRC to deliver world leading carbon capture and storage for the Latrobe Valley”

Thank you