

Activities of CO2CRC

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BUILDING A LOW EMISSIONS FUTURE

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Carbon Sequestration Leadership Forum
Technical Group Meeting
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WHO IS CO2CRC

CO2CRC SUPPORTS INDUSTRY TO REDUCE GREENHOUSE GAS EMISSIONS THROUGH CARBON CAPTURE & STORAGE RESEARCH

- ◊ We are the first company in Australia to have undertaken carbon capture and storage end to end
- ◊ Our research demonstrates carbon capture and storage in-field using novel technologies. We test their efficiency, accuracy and cost-effectiveness bringing confidence to industry and regulators
- ◊ We have safely injected, monitored and contained 80,000 tonnes of carbon dioxide for more than a decade
- ◊ We design, project manage and fund carbon capture and storage programs utilising the best international and local talent



For more than a decade CO2CRC has:

- Demonstrated the scientific viability of CCS in Australia
- Worked to ensure CO₂ storage is efficient and cost-effective

External context: Challenging domestic public policy environment but opportunities emerging...

Opportunities:

- **Growing international interest in CO₂ mitigation strategies that include CCS** driven by COP 21 Paris (OGCI initiative, Norwegian CCS hub, IEA commentary)
- **US domestic political and industry factors** driving policy shifts (US 45Q CCS tax credits, Enhanced Oil Recovery)
- **Emerging Australian policy shifts:**
 - Affect of variable renewables on reliability of supply;
 - Attention on CO₂ emissions beyond power generation sector;
 - Emerging hydrogen potential

Strategic focus areas

Optimising Storage

- Expand the utilisation of the Otway Research facility, data, lessons, know-how for CO2CRC and our collaborators to jointly accelerate the global deployment of CCS.
- Develop CO2CRC's capabilities for effective subsurface fluids modelling and monitoring operation solutions.
 - Low cost, low-impact novel monitoring
 - Well integrity and leakage mitigation

Reducing Capture costs

- Develop optimised (fit-for-purpose) gas treatment solutions involving membrane, adsorbent, solvent (and hybrid schemes)
 - Durable membrane/adsorbent materials suitable for high CO₂ content gas
 - Optimise separation under different conditions & deliver compact solutions
 - Materials testing at the Otway Capture Facility

Enhancing CO₂ Utilisation

- Develop expertise to support Australian industry efforts to increase hydrocarbon recovery through CO₂-EOR
- Biorefinery (biomass to fuel, energy & chemicals) – investigate viability in an Australian context
- Carbonate mineralisation (building products) – test possible R&D collaboration with minerals industry

Collaboration & Leadership

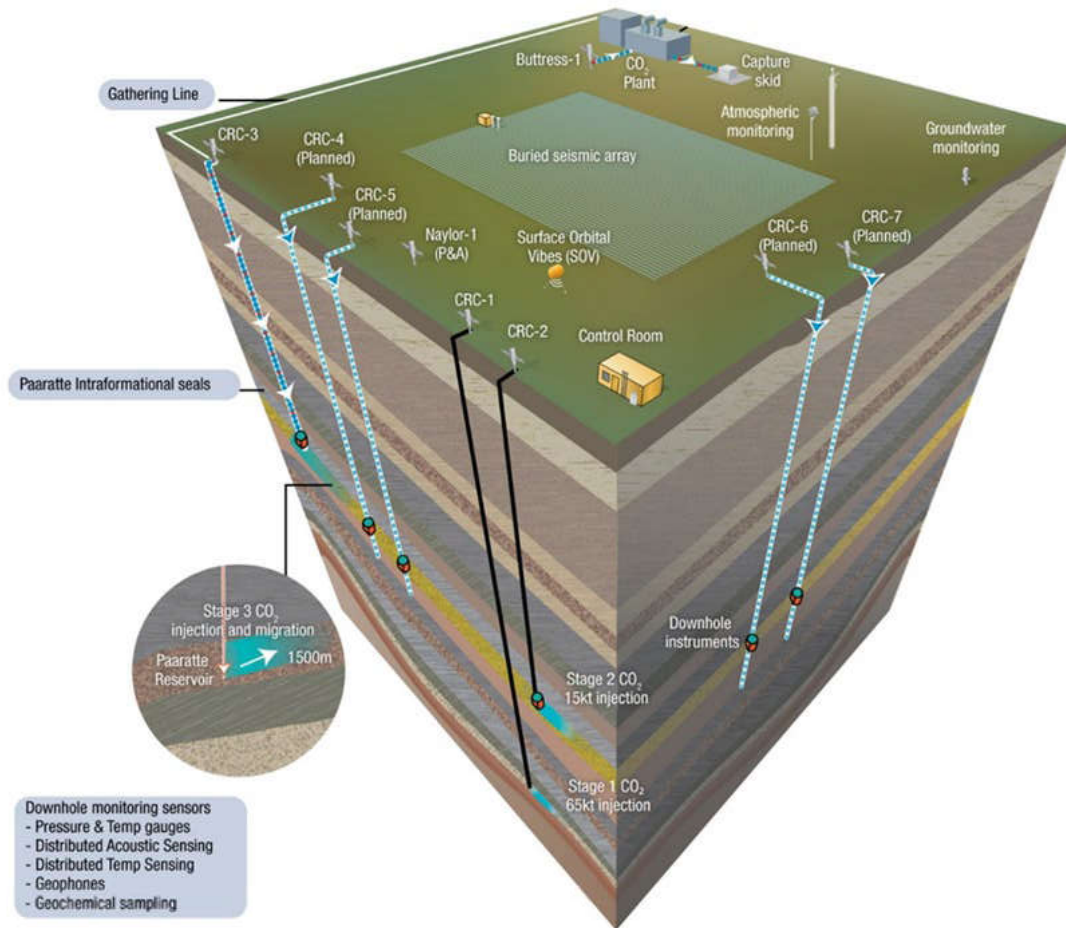
- Provide expert CCUS advice for government industry, and key decision makers, leveraging our technical proficiency and research track record
- Lead technical nexus & forum for the CCUS community in Australia
- Facilitate CCUS demonstrations, aligning government, industry and community



CO2CRC Otway Research Facility

- One of the most comprehensive CO₂ storage demonstration laboratories in the world
- Verification of the fundamental science of CO₂ storage in Australia and further validated the technology globally
- Features an investment of over A\$110 million to demonstrate real-world injection, storage and monitoring techniques
- In-situ access to approximately 400,000 t of CO₂ from the Buttress gas field (79% CO₂ and 19% CH₄), providing the site with a unique storage bank of CO₂ for an array of experiments.
- Ideal for appraising storage and monitoring performance
- Including a state of the art seismic monitoring array
- All regulatory approvals for testing and piloting technology and local community support
- Availability of high quality, comprehensive, datasets, from previous operations (data obtained from three closely spaced wells).

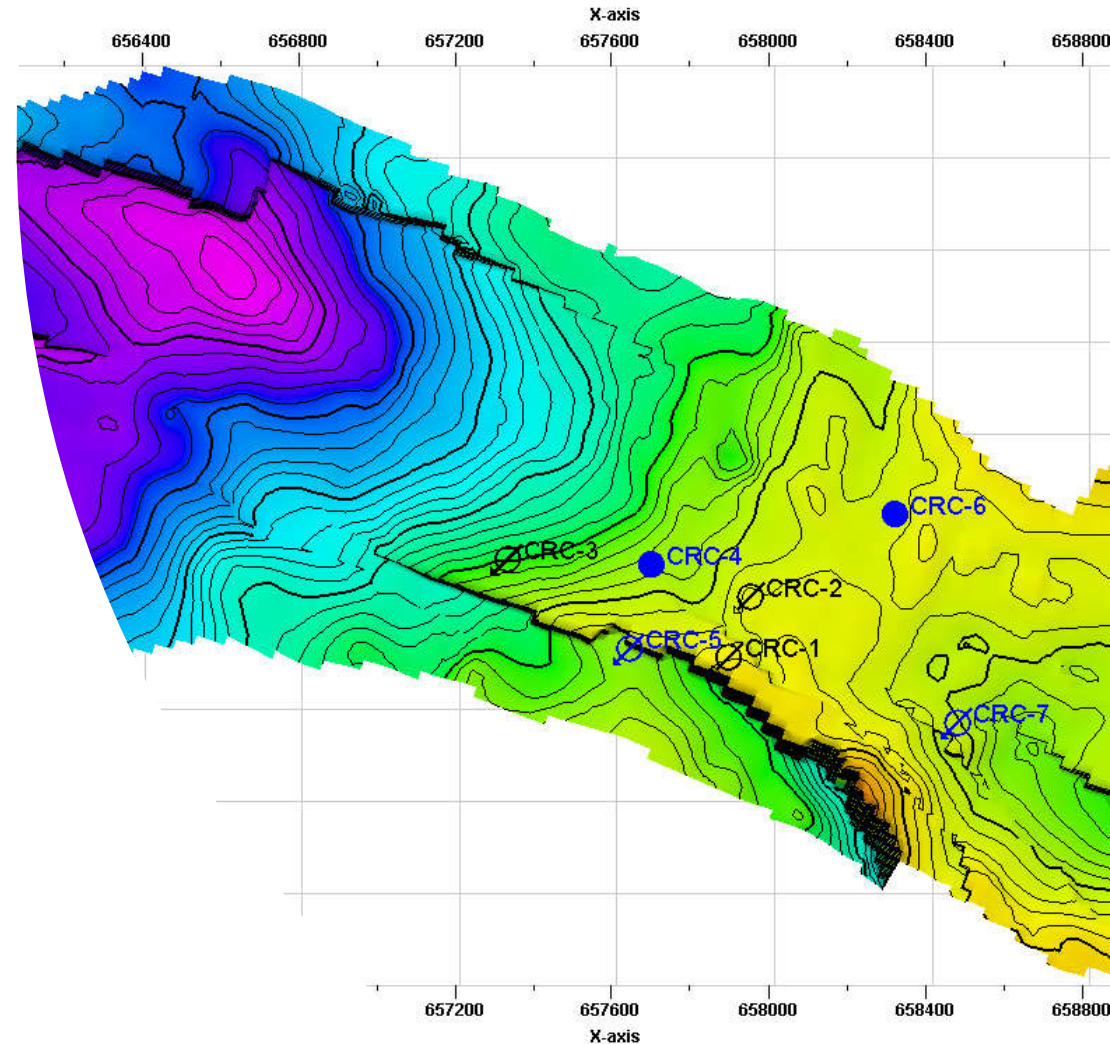
CO2CRC Research Facility- Fifteen years of success



- **Otway Stage 1: 2004 – 2009 (Storage Concept) - Complete**
 - ✓ Demonstrated safe transport, injection and storage of CO₂ into a depleted gas reservoir
- **Otway Stage 2: 2009 – 2019 (End to End Saline Formation Storage) – nearing completion**
 - ✓ Demonstrate safe injection and monitoring into a saline formation
- **Otway Stage 3: 2016 – 2028 (Effective Storage M&V) – Construction 2019**
 - Develop and validate low impact, reliable and cost-effective subsurface monitoring of CO₂
- **Otway Capture Skid: 2016 – 2019 (High CO₂ NG separation) - ongoing**
 - Develop cost-effective, compact natural gas separation technology under high pressure with high CO₂ content.
- **Otway Fault Project: 2016 – 2022 (Monitoring fault flow) – Construction 2019**
 - Trial near surface monitoring of fault controlled CO₂ migration

Otway Stage 3 Subsurface Monitoring & Validation

1. Development of high-resolution, on-demand **monitoring** capability to identify and track CO₂ plume movement in the Subsurface
2. We will employ **non-invasive monitoring** techniques that will be acceptable for community and regulators.
3. The project will evolve these technologies from benchtop application to in-field validation, **aligned with operator need**.
4. The project will provide a suite of technologies and workflows that can be selected to create bespoke solutions which **optimize effectiveness and costs** in commercial monitoring projects.



CO₂-EOR Opportunity

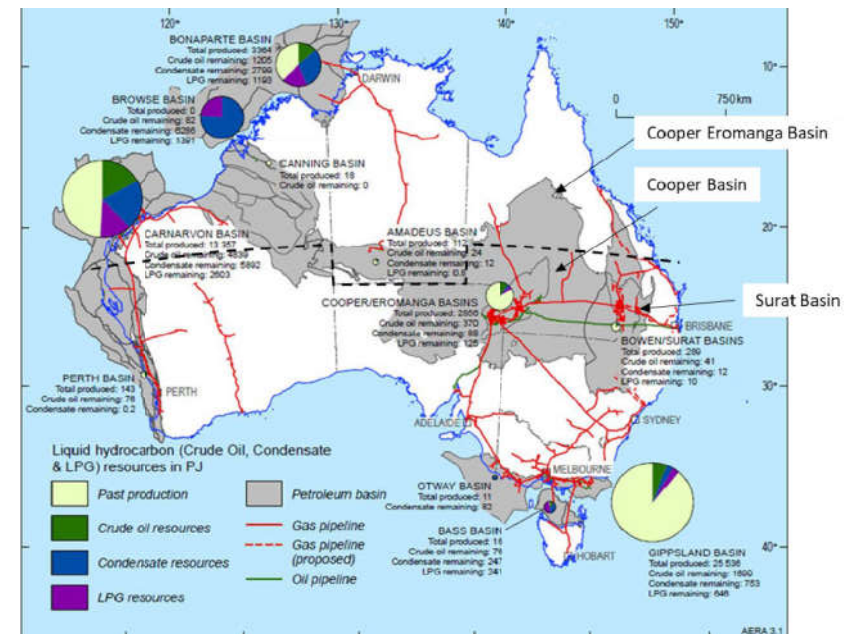
- Production from existing oil fields in Australia is in decline. Companies are expressing interest in developing CO₂-EOR to increase hydrocarbon recovery and extend field life.
- Cooper/Eromanga, Surat, Gippsland, Bonaparte & Carnarvon Basins have been identified as having the potential to benefit from EOR.

Current industry challenge: Development of domestic expertise including the transfer of knowledge from international EOR operations; joint government-industry pilot scale feasibility activities & develop & optimize a fit for purpose pilot plant ('in-situ lab') for CO₂-EOR.

Research topics: The improved recovery factor as a result of CO₂ injection under different circumstances; how to improve the sweep efficiency; what percentage of CO₂ can be permanently stored and how to influence this; how to extract the trapped oil in the Residual Oil Zone (ROZ) with CO₂ injection; address the integrity of legacy wells after exposure to CO₂; cost effective & optimized surveillance & monitoring programs.

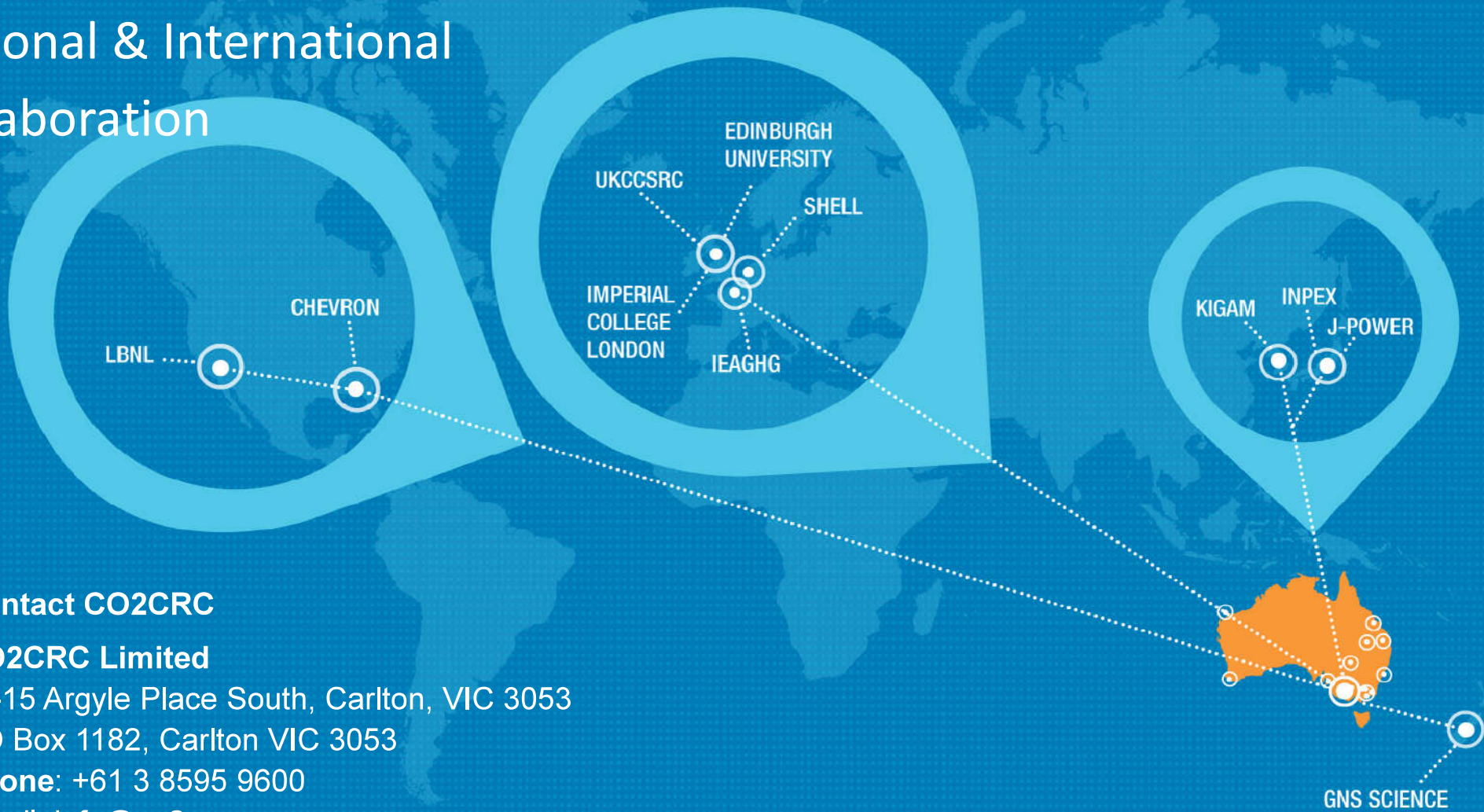
Roles of CO2CRC:

- Centre of Excellence for CO₂-EOR (as a program within CO2CRC to complement current CCS functions).
 - Contribute to the development of a fit-for-purpose pilot plant
 - Coordinate and optimise research activities to maximise contributions to industry.
 - Systematically screen fields across Australia for EOR potential (potentially)



Australian crude oil, condensate & naturally-occurring LPG resources.

National & International Collaboration



Contact CO2CRC

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Government, Industry and Research Partners





Thank you

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