Australian Government
Geoscience Australia

CO2-EOR+ in Australia: Achieving low-emissions oil and unlocking residual oil resources

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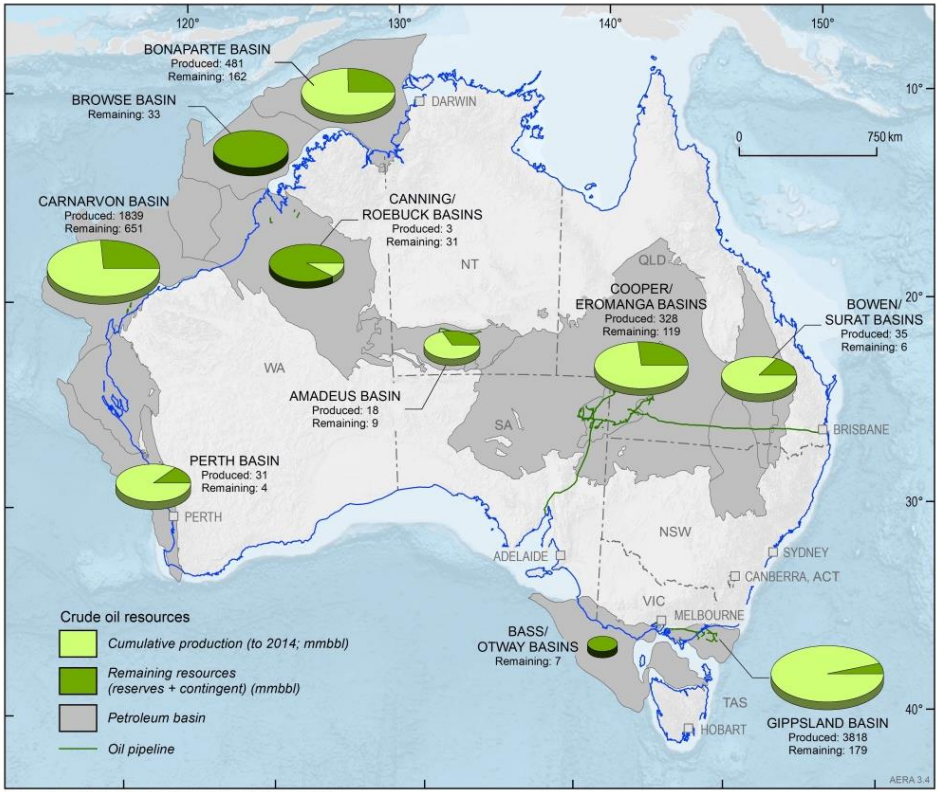
Oil resources in Australia

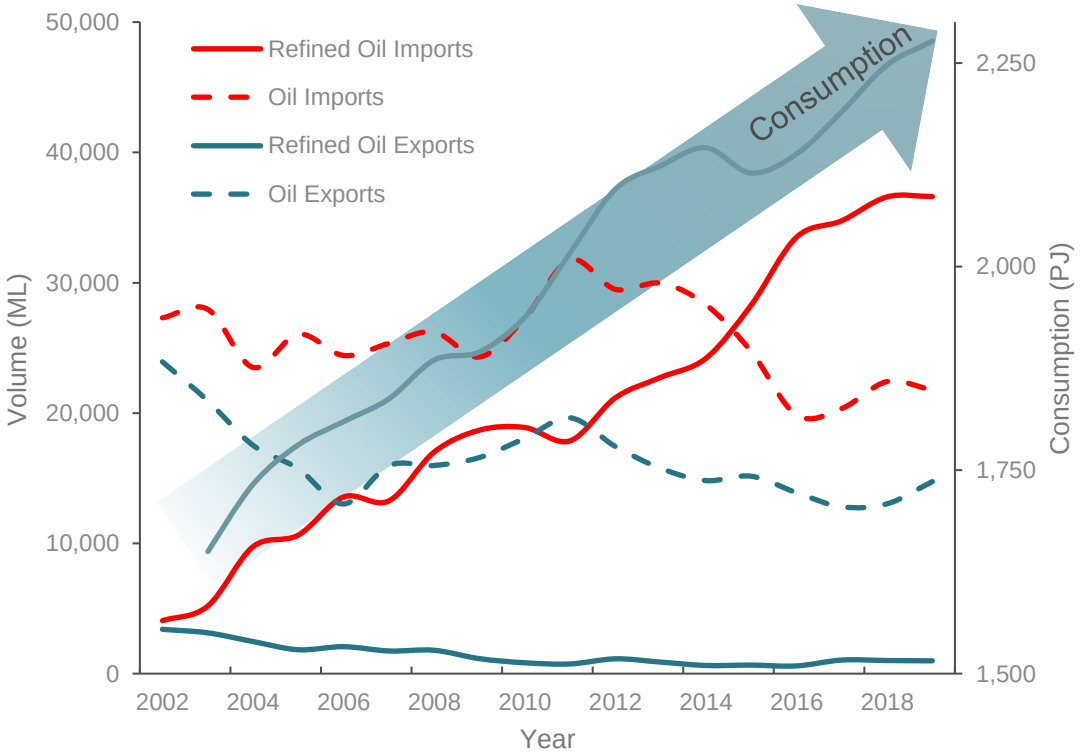
- Many basins contain significant oil
- Conventional production only produces ~40% of OOIP
- CO2-EOR can unlock remaining oil resources and at the same time store CO_2 permanently
- 10-20% additional or incremental oil production possible through CO2-EOR



Source: Geoscience Australia, Encom GPinfo, a Datamine Australia Pty Ltd.
Whilst all care is taken in the compilation of the petroleum pipelines by Datamine, no warranty is provided re the accuracy or completeness of the information, and it is the responsibility of the Customer to ensure, by independent means, that those parts of the information used by it are correct before any reliance is placed on them. Accurate at August 2017.

Import / Export Statistics

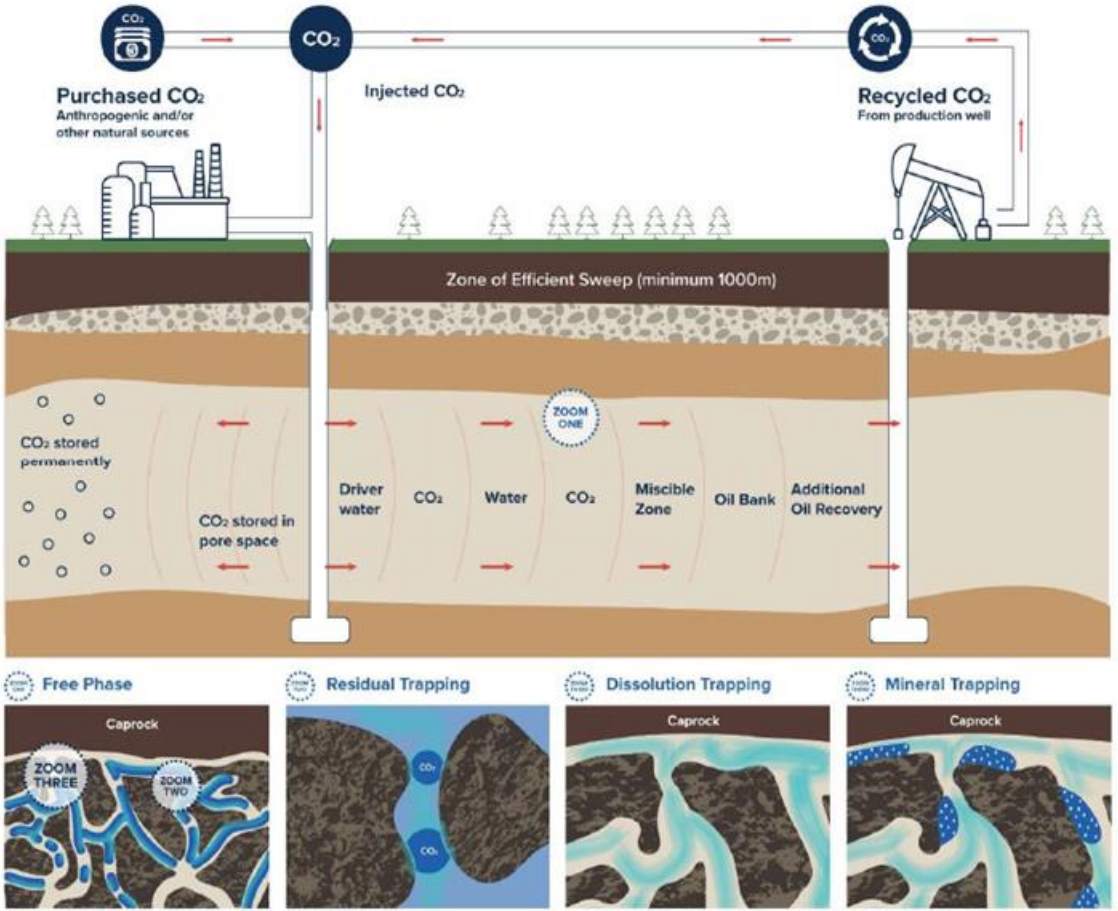
- Main driving force behind exploring EOR
- Since ~2002, imports and exports of raw oil product have been level
- Big change is in import of **refined** liquid products
- Refined product imports have gone up sharply in response to increasing consumption



Australian Government (2020) Australian Energy Statistics. Department of Industry, Science, Energy and Resources.

What is CO2-EOR+?

- Optimising CO_2 storage rather than recycling CO_2
- CO2-EOR can offset some of the costs related to storage
- According to IEA, EOR+ is greater than 0.3 tons CO_2 permanently stored per barrel produced.
- Storage of greater than 0.6 tons CO_2 per barrel is considered net negative in terms of emissions



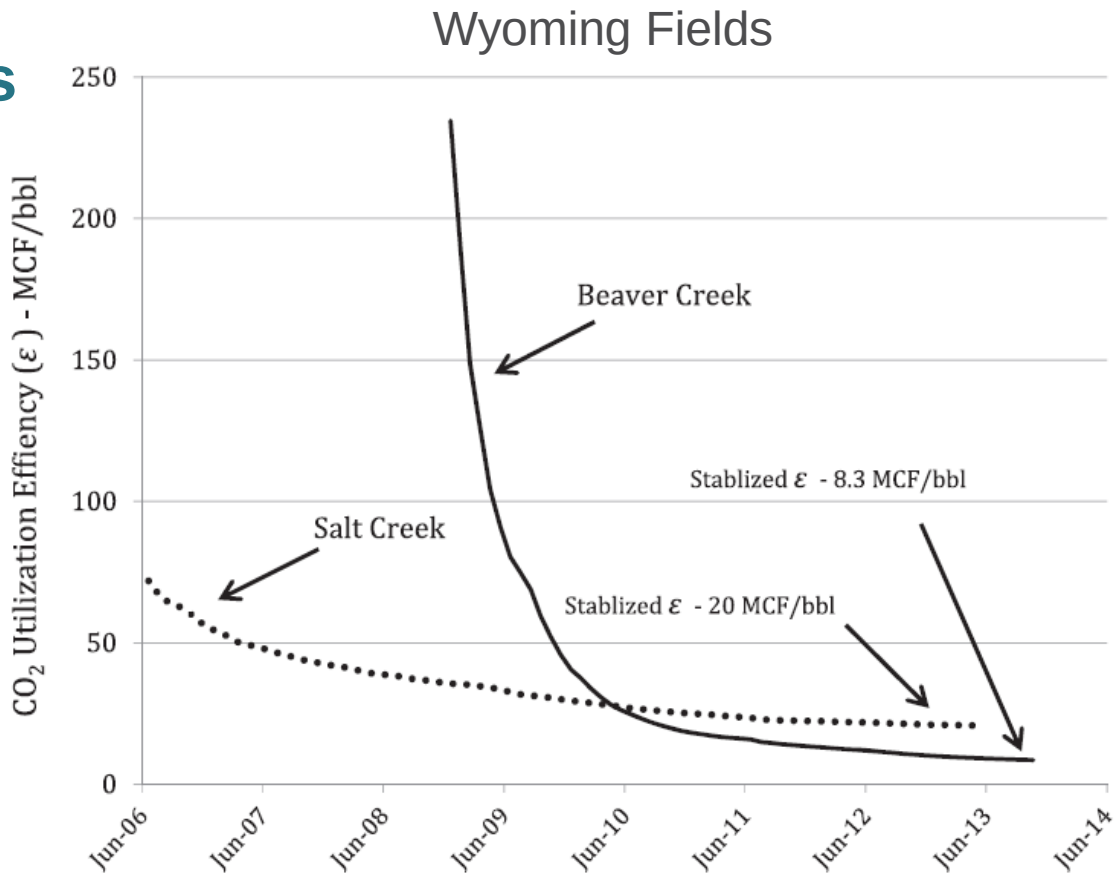
Global CCS Institute, 2019

EOR+ success cases

- CO_2 utilisation is variable over life of project
- Utilisation highest early and flattens over time
- Currently only a small part of CO_2 for EOR is from anthropogenic sources

Notable examples

- Wyoming oil fields
- Weyburn-Midale Project
- Niagaran Reefs, Michigan

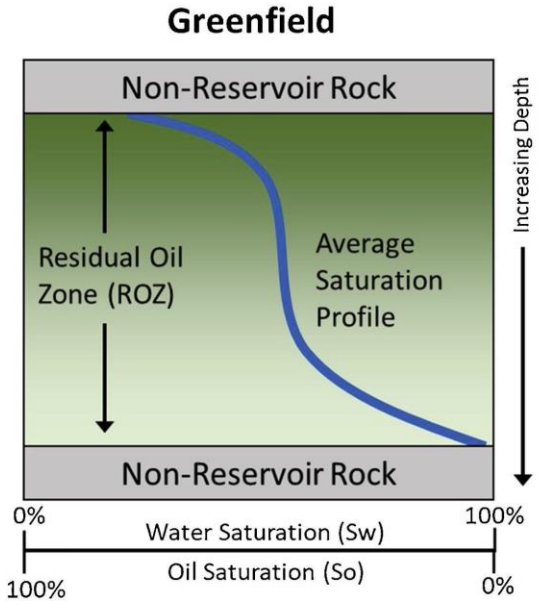


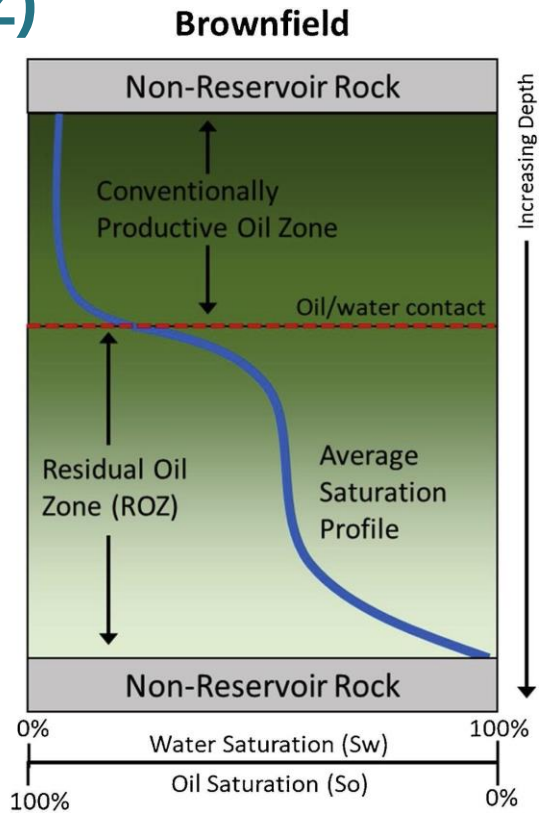
Hornafius and Hornafius, 2015

The Potential of Residual Oil Zones (ROZ)

- Australia's Exploring for the Future (EFTF) Program
- $125 million over 4 years
- ROZ module within *Australia's Future Energy Resources* Project

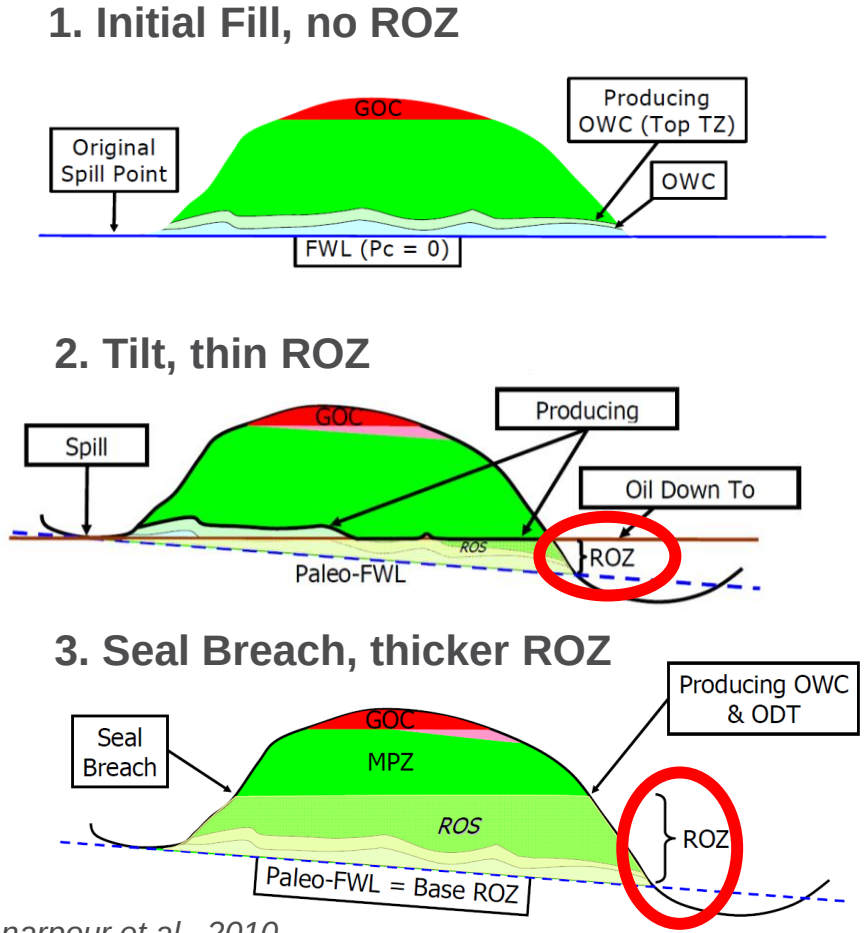
- ROZ: Oil zones which have undergone a natural waterflood
  - Brownfield
  - Greenfield





Sanguinito et al., 2020

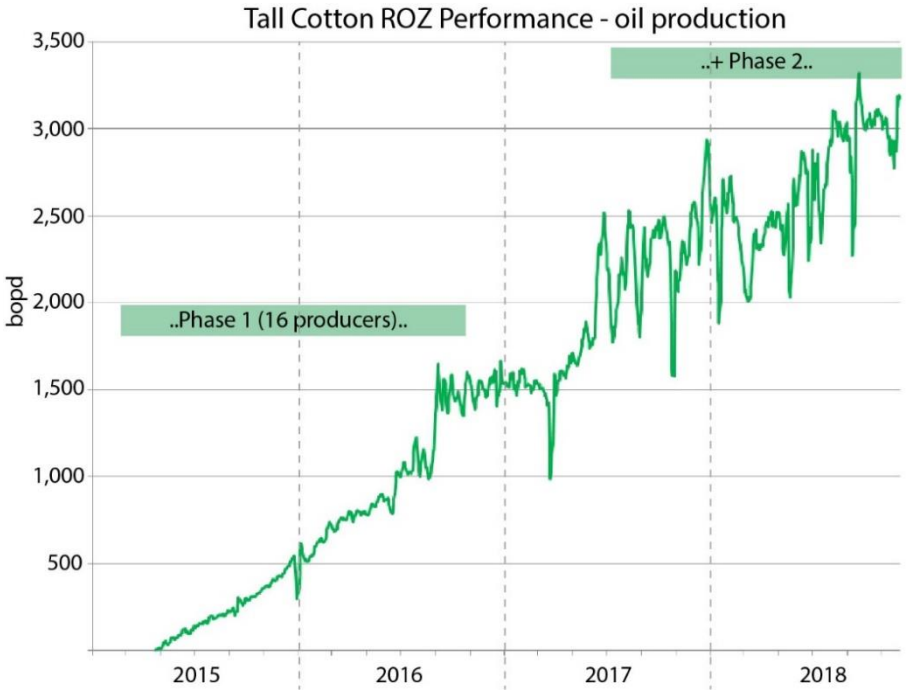
Brownfield ROZ: Seminole Field, Permian Basin, USA



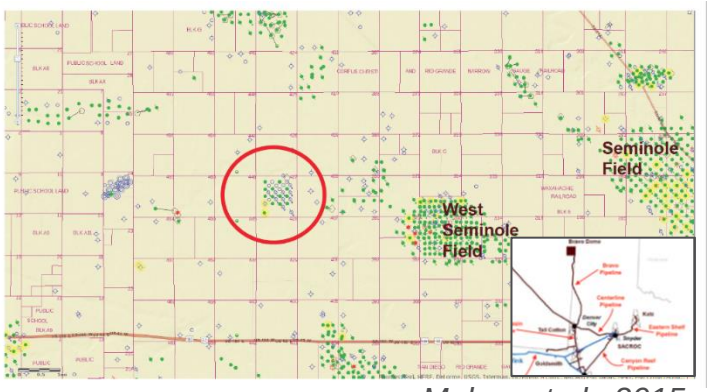
Honarpour et al., 2010

- Field discovered in 1936
- 4 stages of production - primary, waterflood, CO_2 in main pay, ROZ
- Main pay zone: 126 ft (38 m) thick, 9 md, S_o 84%
- ROZ: 213 ft (65 m) thick, 12 md, S_o 32%
- ROZ pilots 1996 & 2004; production from 2007
- Estimated extra 225 MMbbl from ROZ

Greenfield ROZ: Tall Cotton Field, Permian Basin, USA



After Kinder Morgan, 2018

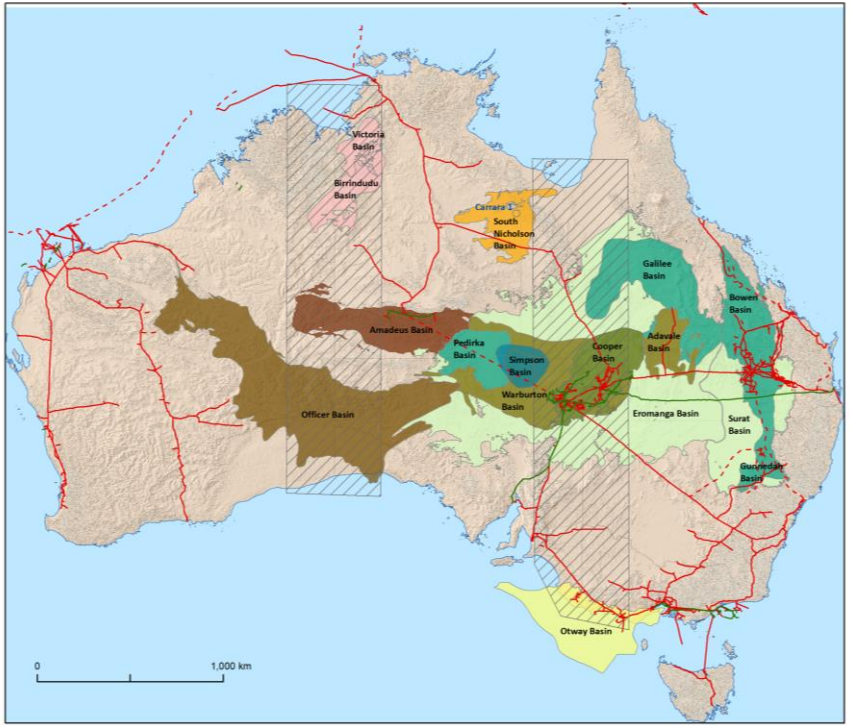


Melzer et al., 2015

- No main pay zone
- First CO_2 injection in November 2014
- By 2018, producing > 3,000 bopd from ~300 foot (91 m) thick reservoir interval with S_o < 30%
- Forecast to be 50% of Kinder Morgan oil production by 2027

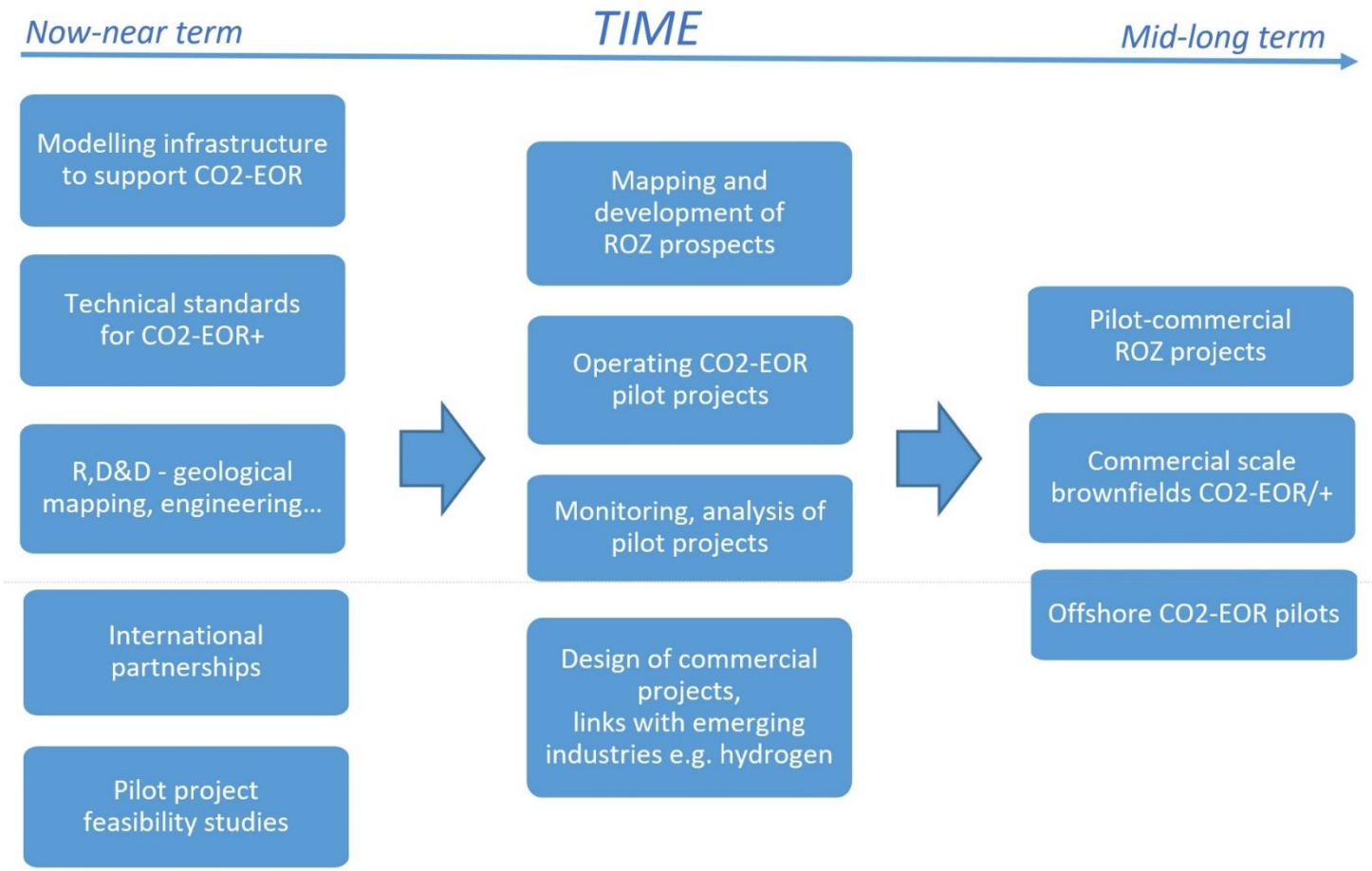
CO2-EOR, CO2-EOR+ and ROZ in Australia

- CO2-EOR and EOR+
  - Surat and Cooper Basins; other basins also look promising
- Residual oil zones
  - Potentially significant oil resources
  - Potentially significant CO_2 storage
- Barriers & incentives
  - Limited oil resources, especially onshore, where CO2-EOR is more feasible
  - Infrastructure in remote regions
  - Availability of CO_2
  - Main incentive is incremental oil production



Exploring for the Future Focus Areas

A pathway for CO2-EOR+ & ROZ?



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For more on this topic

- Visit our team at the Geoscience Australia booth, #34
- Read our paper Tenthorey, E., Taggart, I., Kalinowski, A., McKenna, J. 2021. CO2-EOR+ in Australia: Achieving low-emissions oil and unlocking residual oil resources *(this conference)*.
- Contact us Eric.Tenthorey@ga.gov.au, Aleks.Kalinowski@ga.gov.au
- Read about EFTF https://www.ga.gov.au/eftf/projects/australias-future-energy-resources

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