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Progress and future directions in implementing low emissions coal projects in NSW

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Australia-Japan Coal Workshop

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NSW coal industry

- Coal is the state's largest mining sector
- valued at about $19.3 billion in 2008-09.
- single largest export from NSW
  - 103.3 million tonnes
  - $17.1 billion
- direct employment was 16,909.

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AUSTRALIAN ENERGY EXPORTS (2008-09 $ Billions)

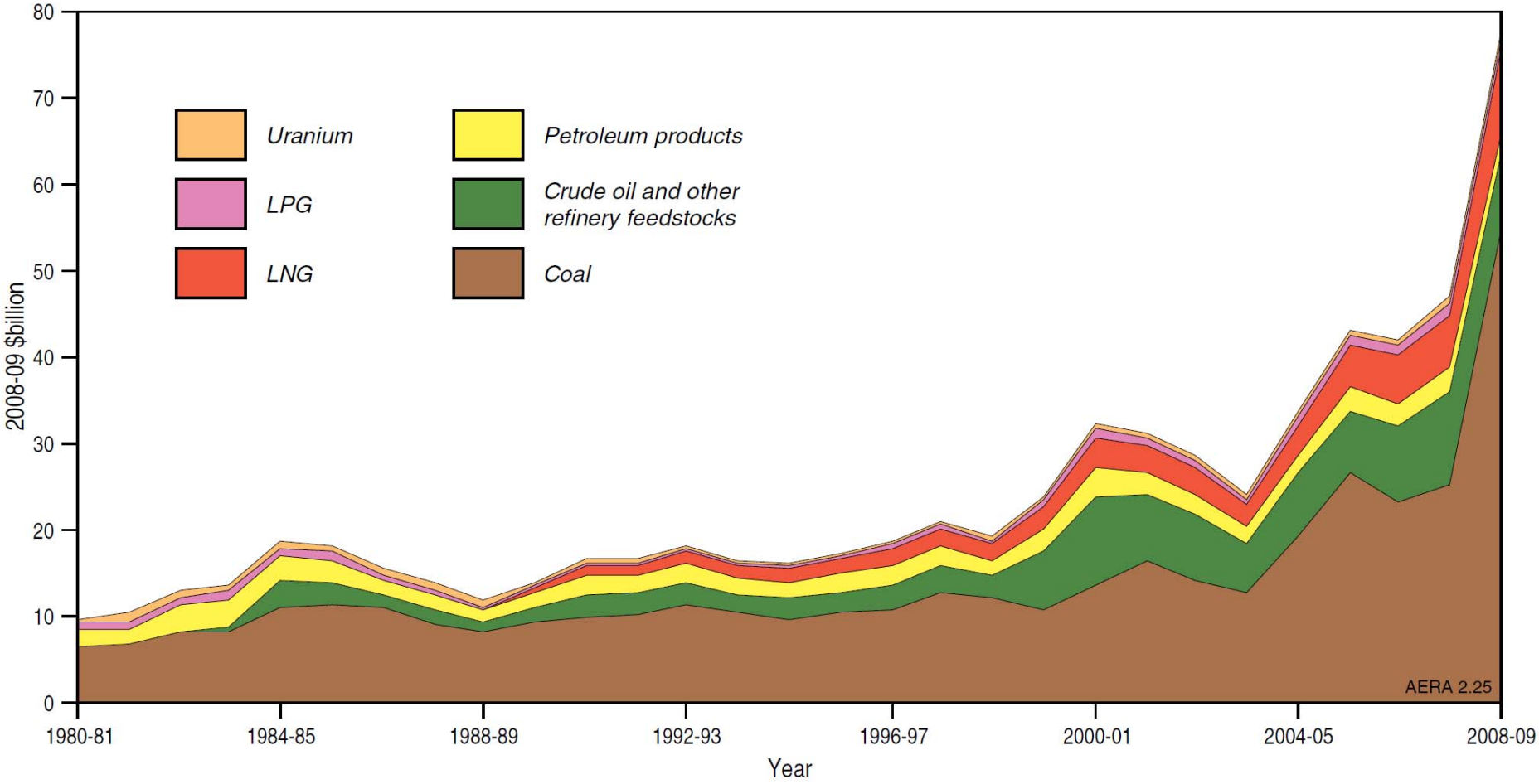

Figure 2.25 Australian energy exports

Source: ABARE 2009d


NSW Power Stations emit almost 60 million Tonnes of CO2 per Year

electricity generation and greenhouse gas emissions

- NSW has around 18,000 megawatts (MW) of installed electricity generation capacity
- 90% produced from coal fired generation
- producing 62 million tonnes CO2 per annum
- emitting 39 % of NSW total emissions
- fugitive emissions – methane; 10% NSW total

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NSW Government policy

- The NSW Government commitment in the NSW Greenhouse Plan and the State Plan.
- It is committed to reducing emissions by 60 per cent of year 2000 levels by 2050.
- It has built on this commitment through the establishment of a $100 million Clean Coal Fund.
- The fund will foster the development and commercialisation of clean coal technologies.

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NSW Government initiatives

The NSW Government is supporting projects :

- Ultra Clean Coal project ($2m)
- pilot capture project of CO2 from Munmorah power station - ($7m)
- The Renewable Energy Development Program provides $40 million over five years to support projects which are expected to lead to large scale greenhouse gas emission savings in NSW.

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NSW CO_2 Storage Assessment Program

- Stratigraphic drilling program to identify potential storage sites in NSW – ($54m)
  - joint initiative Commonwealth, ACALET and I&I NSW
  - Pre competitive data exploration
  - Gunnedah, Darling, and Clarence Moreton Basins

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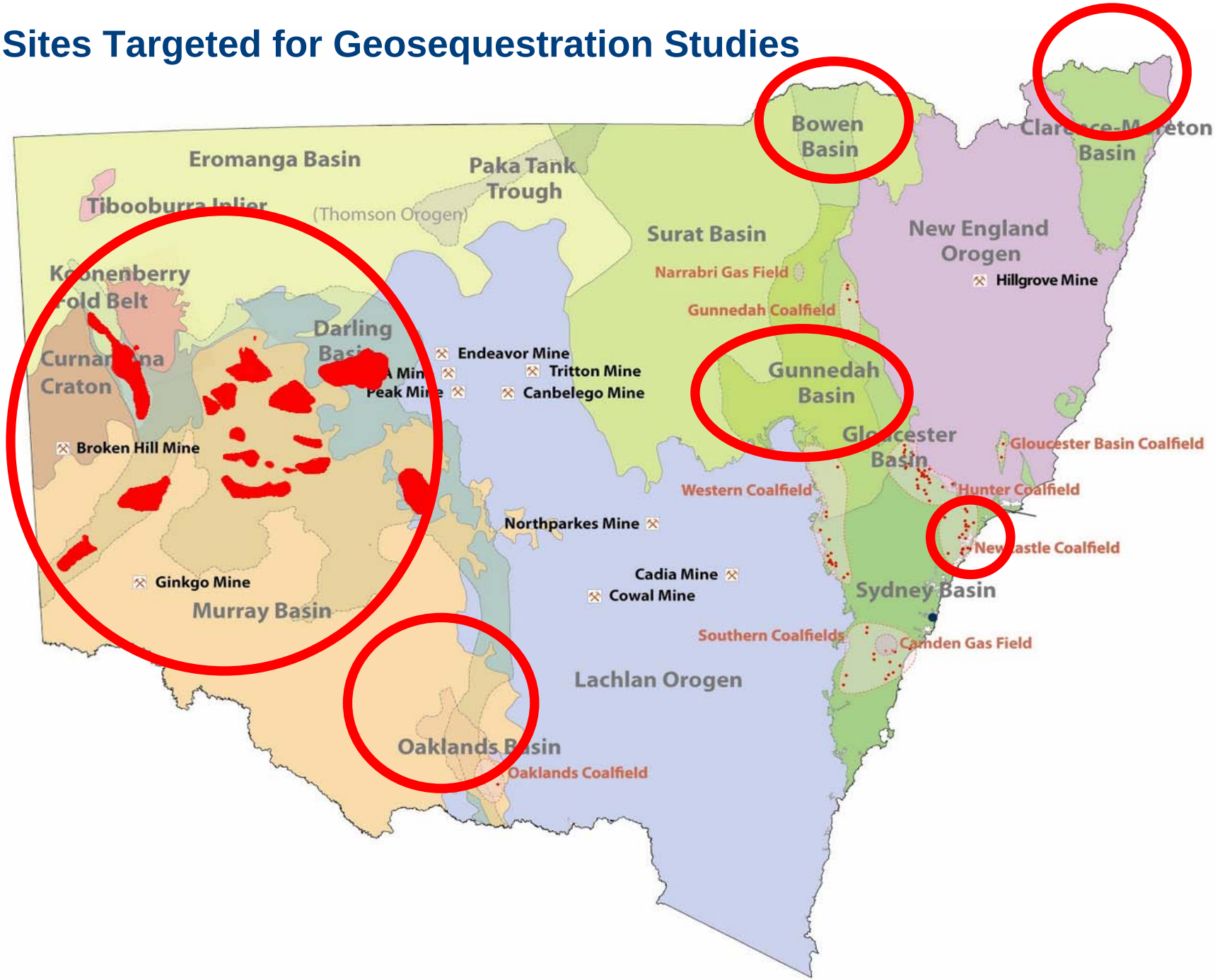
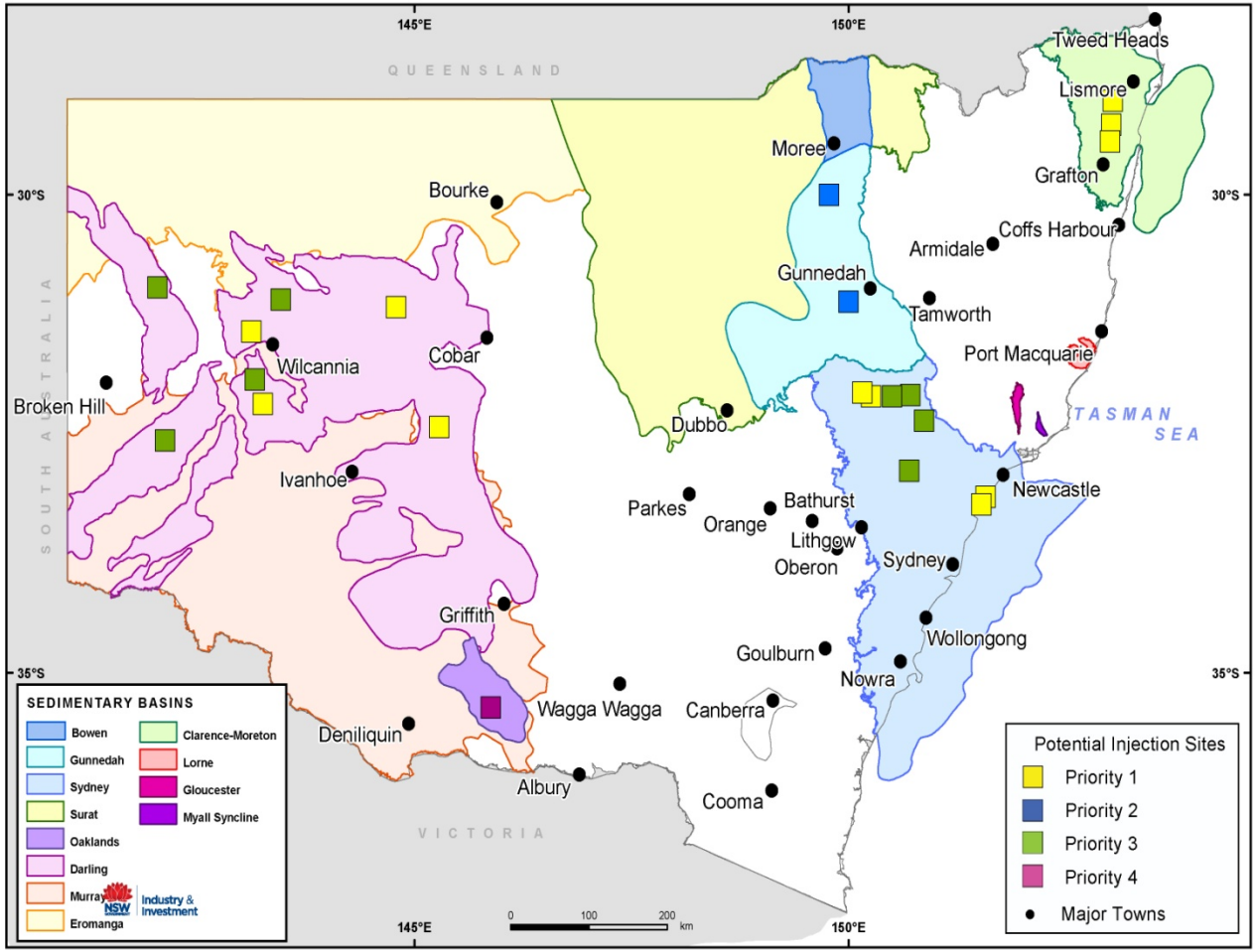
Sites Targeted for Geosequestration Studies



Potential drilling sites



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Work program

Drilling is prioritised in line with the ***'National Carbon Storage Taskforce Report'***

- **Stage 1**: Jan 09 - Jun 13 $35.5 million
  - 4 wells Sydney Gunnedah Basin
  - 4 wells Darling Basin
  - 1 well Clarence – Moreton Basin
- **Stage 2**: Jan 12 - Jun 13 $19 million (depending on stage 1 results)
  - 2 wells Clarence – Moreton Basin
  - 2 wells Gunnedah Basin
- **Stage 3**: $35.5 million (not progressing at this moment)
  - 4 wells Sydney
  - 4 wells Darling Basin
  - 1 well Oaklands Basin

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Delta Carbon Capture and Storage Demonstration Project

- Delta Post Combustion Carbon Capture and Storage Demonstration Project - ($150+m)
  - Stage 1 - $28.3m joint initiative Commonwealth, ACALET and NSW Government
  - Pioneer planning and legal processes in NSW
  - Development of a storage site
  - completed by 2014

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2. Carbon Capture Pilot

- PCC pilot plant based on aqueous ammonia up to 3000 tpa
- Joint Delta/CSIRO project
- Asia Pacific Partnership Funding
- $5 million construct & operate
- Complete experimental program 2009

Delta CCS Demonstration Project

- Stage 2 - construct, commission and demonstrate 100,000 tonne CO2 project 2014 to 2016

- **Why Post Combustion Capture (PCC)?**
  - Retrofit technology
  - Modular design for partial capture
  - Flexibility in operation to accommodate market conditions
  - Processes commercially available

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Clean Coal Fund R&D projects

- Expression of interest round conducted
- 29 applications received
- 9 projects successful, NSW $13m in grants
    - Fugitive emissions
    - Combustion efficiency
    - Capture technologies
    - Alternative storage technologies
    - Raising community awareness

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CLEAN COAL FUND

- Fugitive Emissions (Open Cuts, VAM-RAB)
- Direct Carbon Fuel Cell
- Combined Brayton Rankin Cycle Engine
- Chemical Looping Air Separation
- Aqueous Ammonia PCC
- Mineral Carbonation
- Novel Capture material (Carbon fibre)
- Ultra Clean Coal feed for Diesel Engine
- Public Acceptance of CCS

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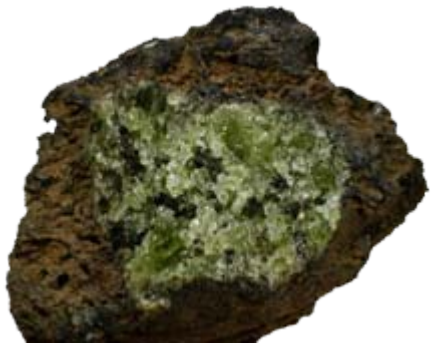
Mineral Carbonation

- More than enough minerals
- High cost could be offset by sale mineral products
- Could use waste materials high in Mg, Fe and Ca - eg bottom ash and fly ash, Asbestos, etc)



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Clean Coal Fund R&D projects

- Fugitive emissions
  - Capture of ventilation air methane ($2.2m)
  - Enhanced drainage of methane ($1.0m)
- Uni of Newcastle and GreenMag, Mineral Carbonation ($3.0m)
- Capture efficiency
  - CSIRO solvents ($1.3m)
  - CSIRO, carbon fibre ($0.6m)

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Clean Coal Fund R&D projects

- Combustion efficiency
  - UCCEnergy ($2.5m)
  - Uni of Newcastle separation of O_2 ($0.9m)
  - Uni of Newcastle, Direct Carbon Fuel cell (0.6m)

- Uni of Newcastle Social Research and public awareness ($0.6m)

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