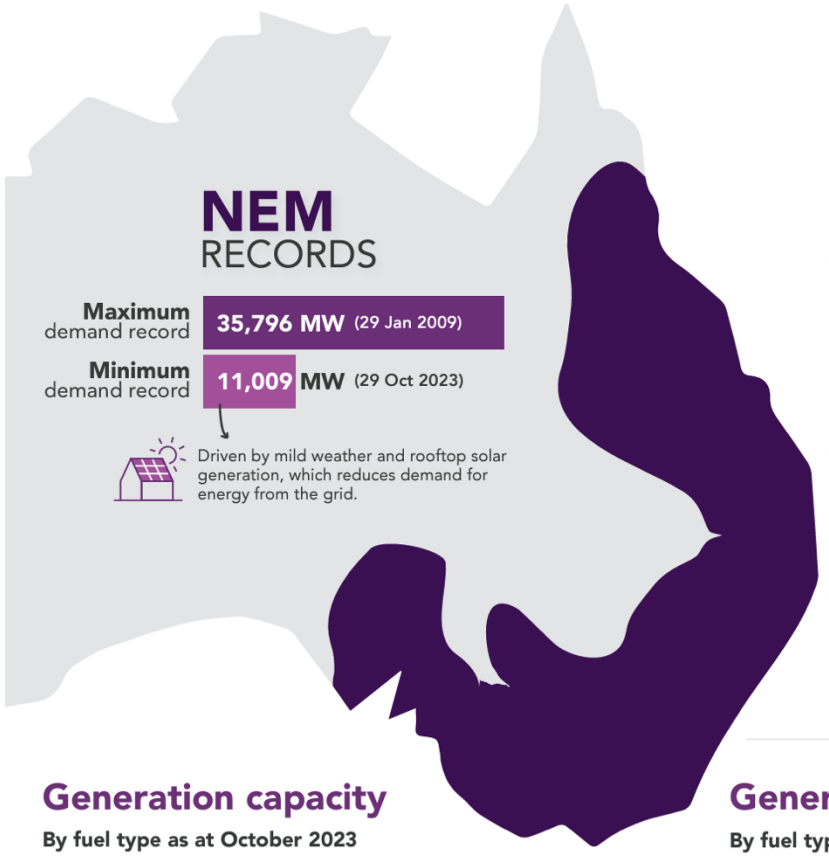
# Innovations, Challenges and Opportunities Coal Combustion Products Harvesting

Craig Heidrich, CEO
Ash Development Association of Australia
International Symposium, 8-9 Oct 2024




## NEM Facts

Commenced as a wholesale electricity market in December 1998.

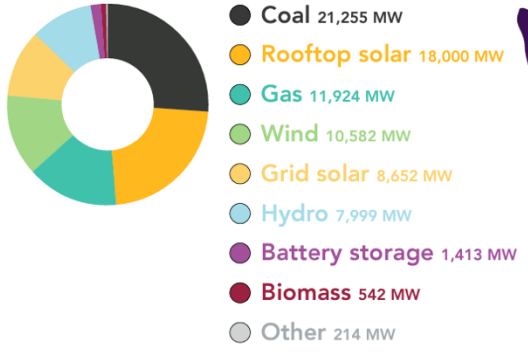
More than 570 registered participants, including generators, transmission and distribution network service providers, and market customers, including retailers.

Approx 175 terawatt hours of electricity supplied to homes and businesses a year.

$25.46 billion traded in FY22-23.

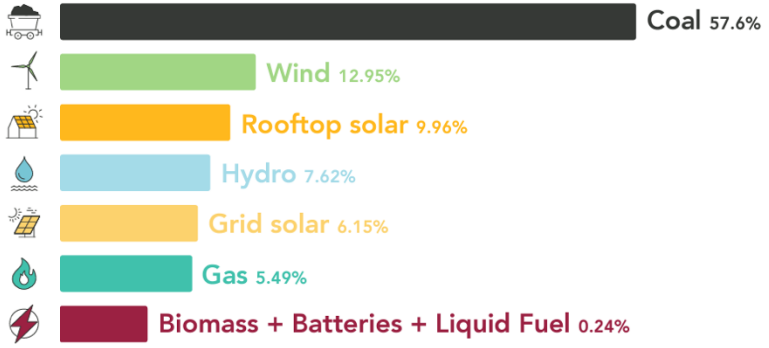
## Generation capacity

**By fuel type as at October 2023**




## Generation supply mix

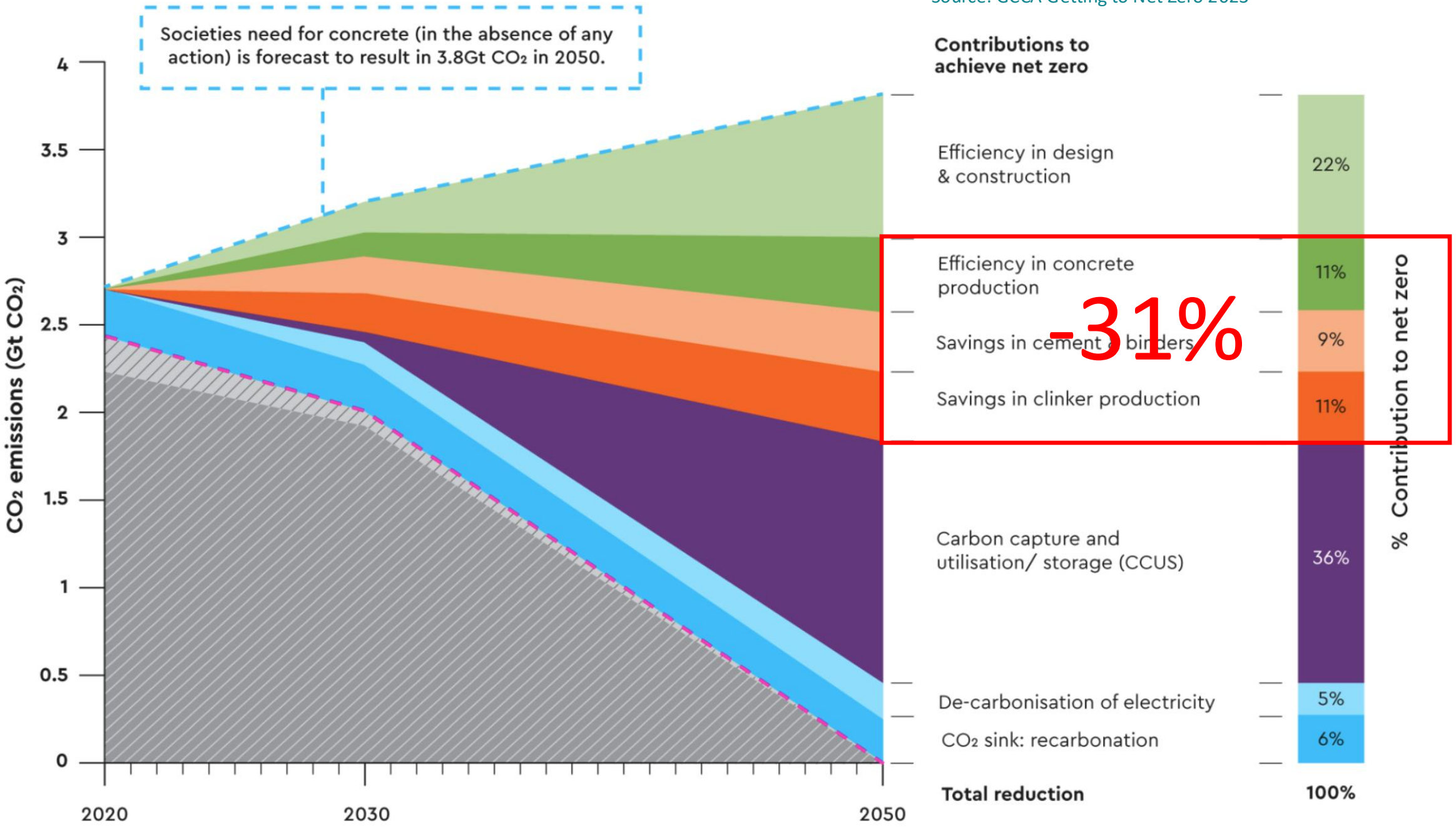
**By fuel type from 1 July 2022 – 30 June 2023**

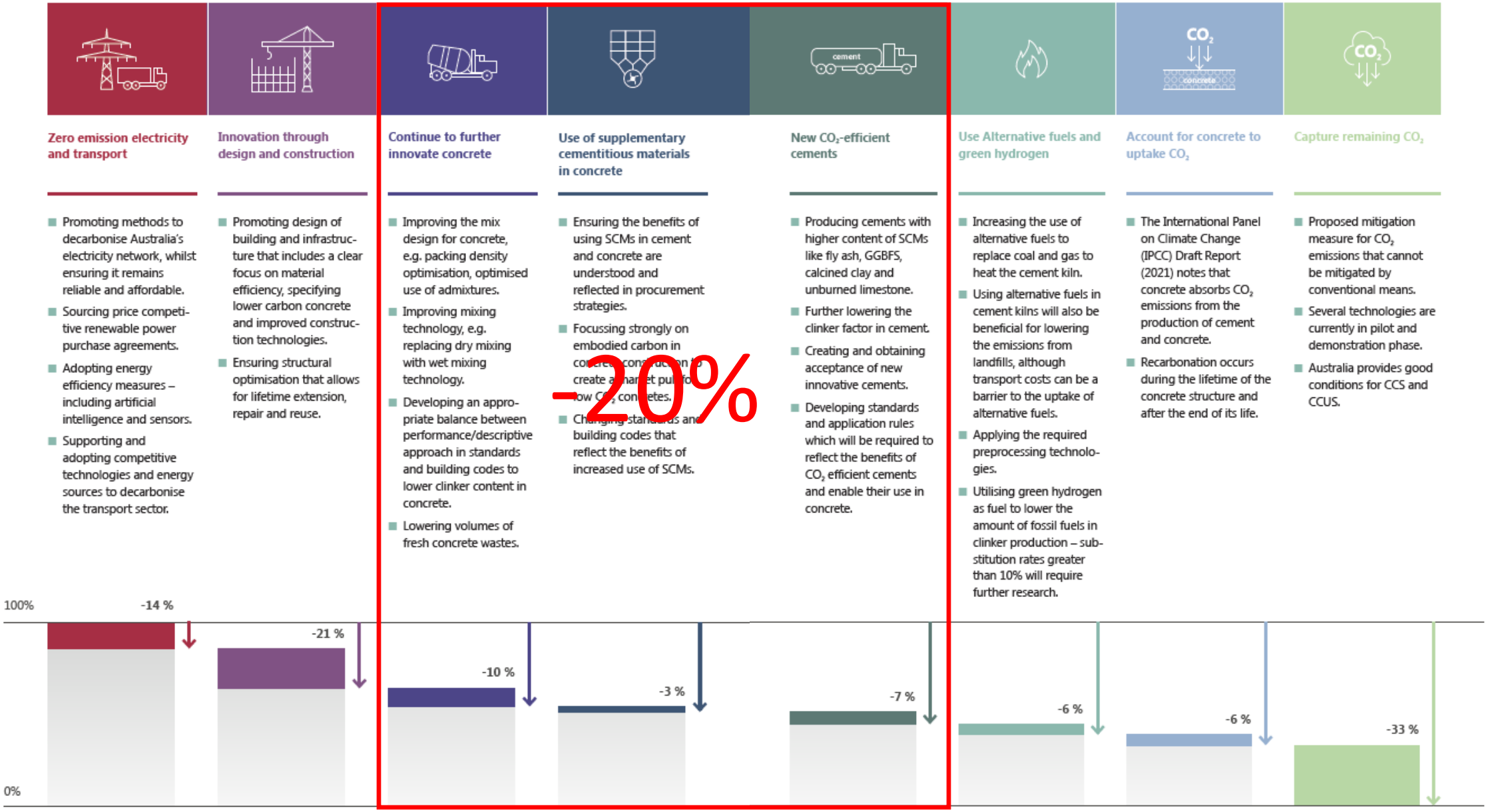



## Quick facts (2024)

- Population ~26 m (humans)
- Population ~50 m (kangaroos)
- Eastern/ South Coastal
- 5 States / 2 Territories
- AUS = 7.8 million sq Km
- USA = 9.8 million sq Km
- Network reliability 99.998%

Source: GCCA Getting to Net Zero 2023

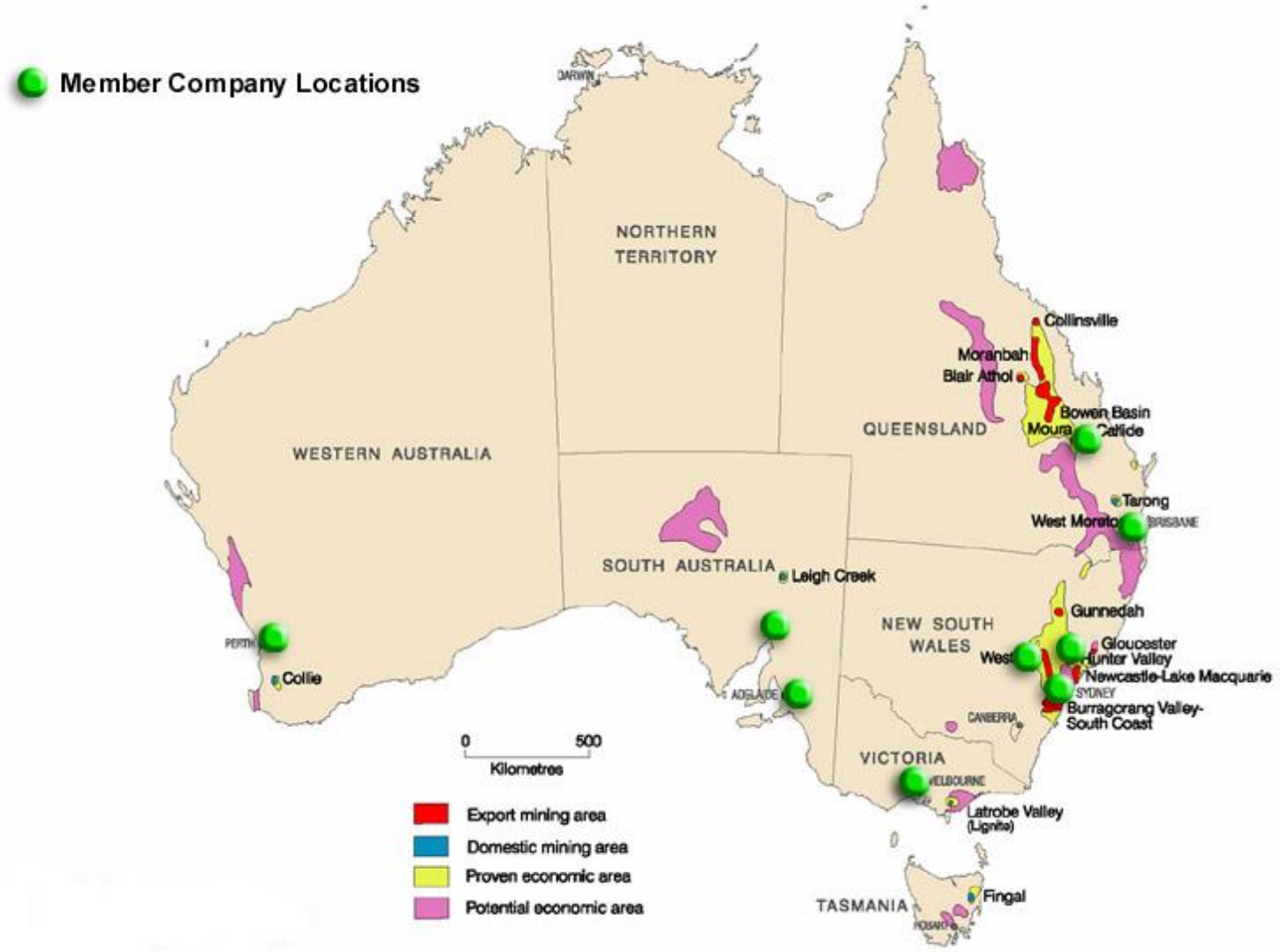


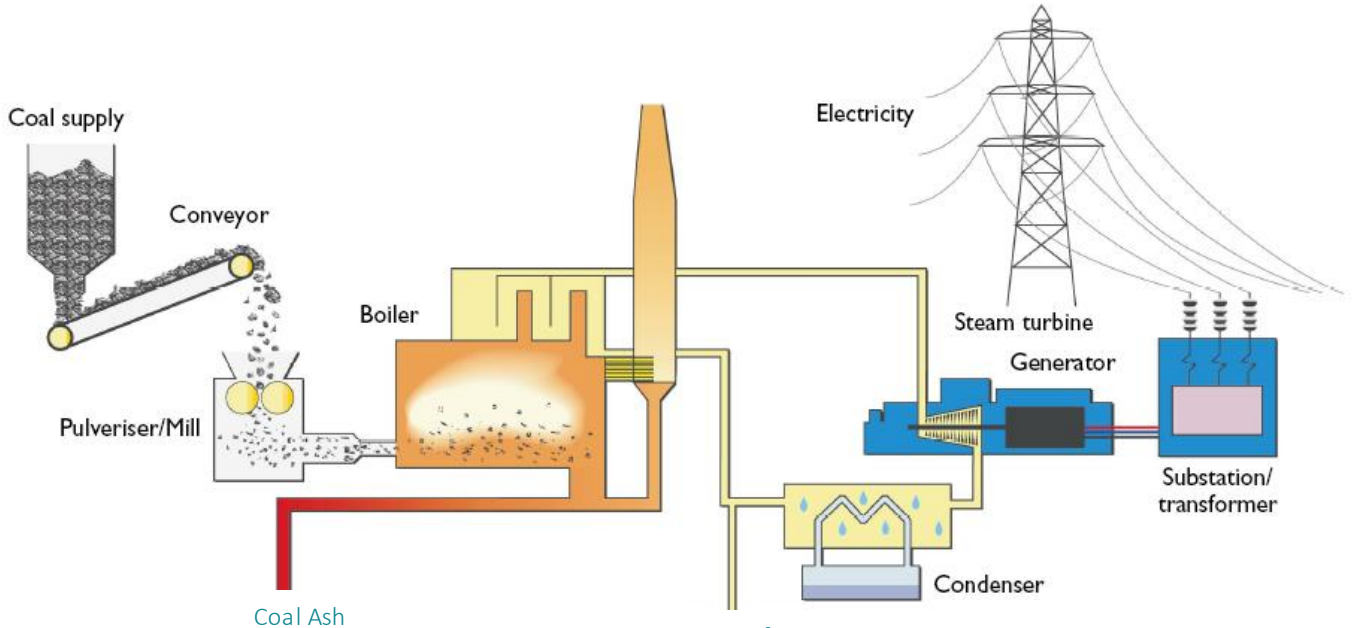



Source: SmartCrete CRC, VDZ report 2020

# Australian context

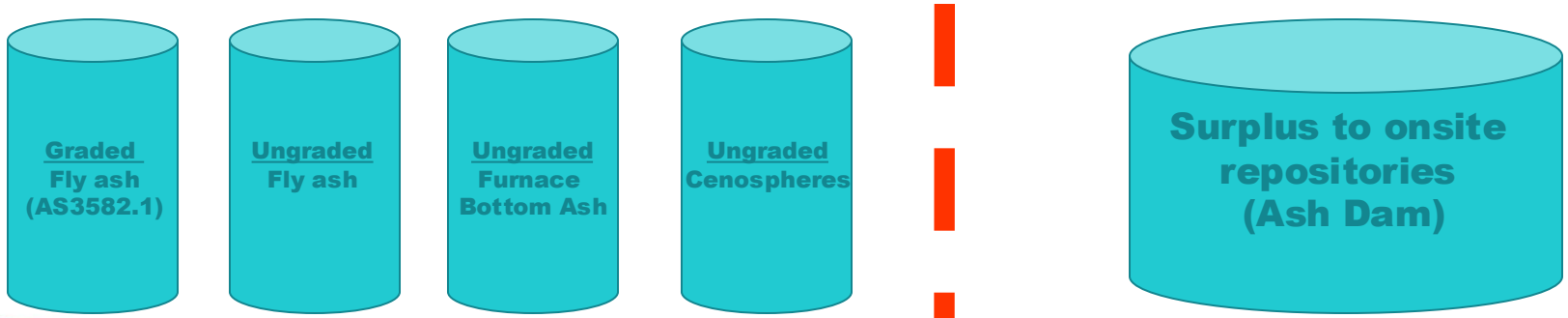
Adbri
AGL Macquarie
BG&E
Boral Quarries & Recycling
Cement Australia
Consulting & Environmental Services
CS Energy
Delta Electricity
Daracon
Energy Australia
Flyash Australia
Gunlake Group
Hallett Concrete
Heeleys Consulting
Tremline (Hills Barker Blower)
Independent Cement & Lime
Independent Fly Ash Brokers
Genuity
Latrobe Magnesium
NRG Gladstone Power Station
Origin Energy Eraring
QTMR (QLD)
TfNSW (NSW)
Stanwell Corporation
UniqueCem
VicRoads (VIC)
Vecor Australia

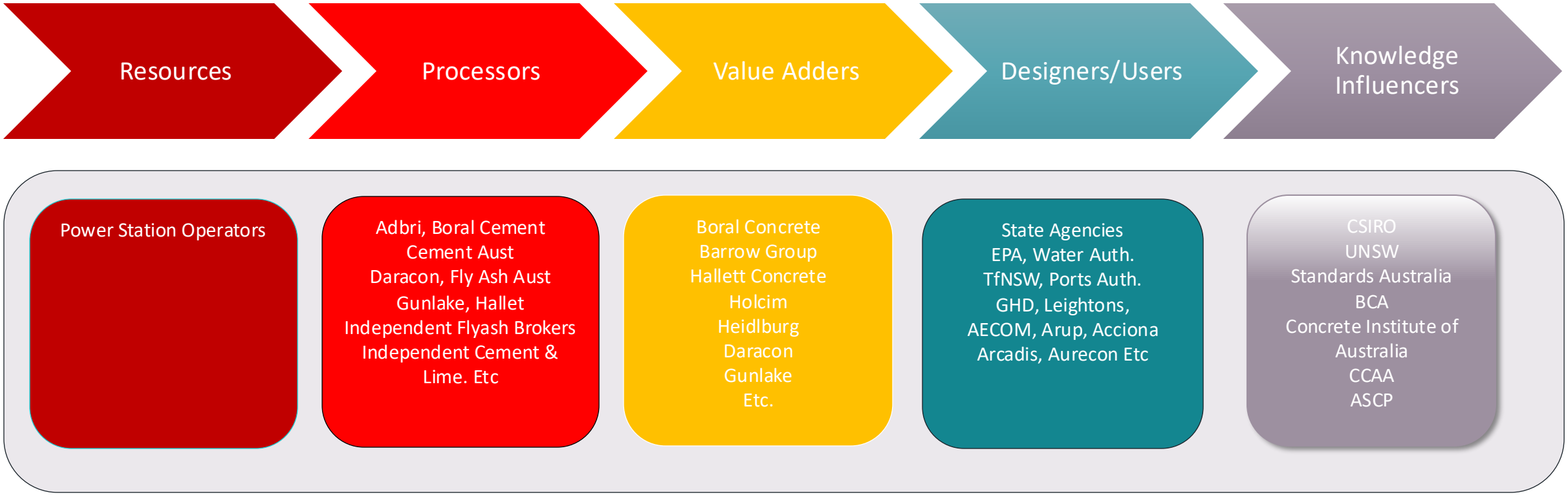


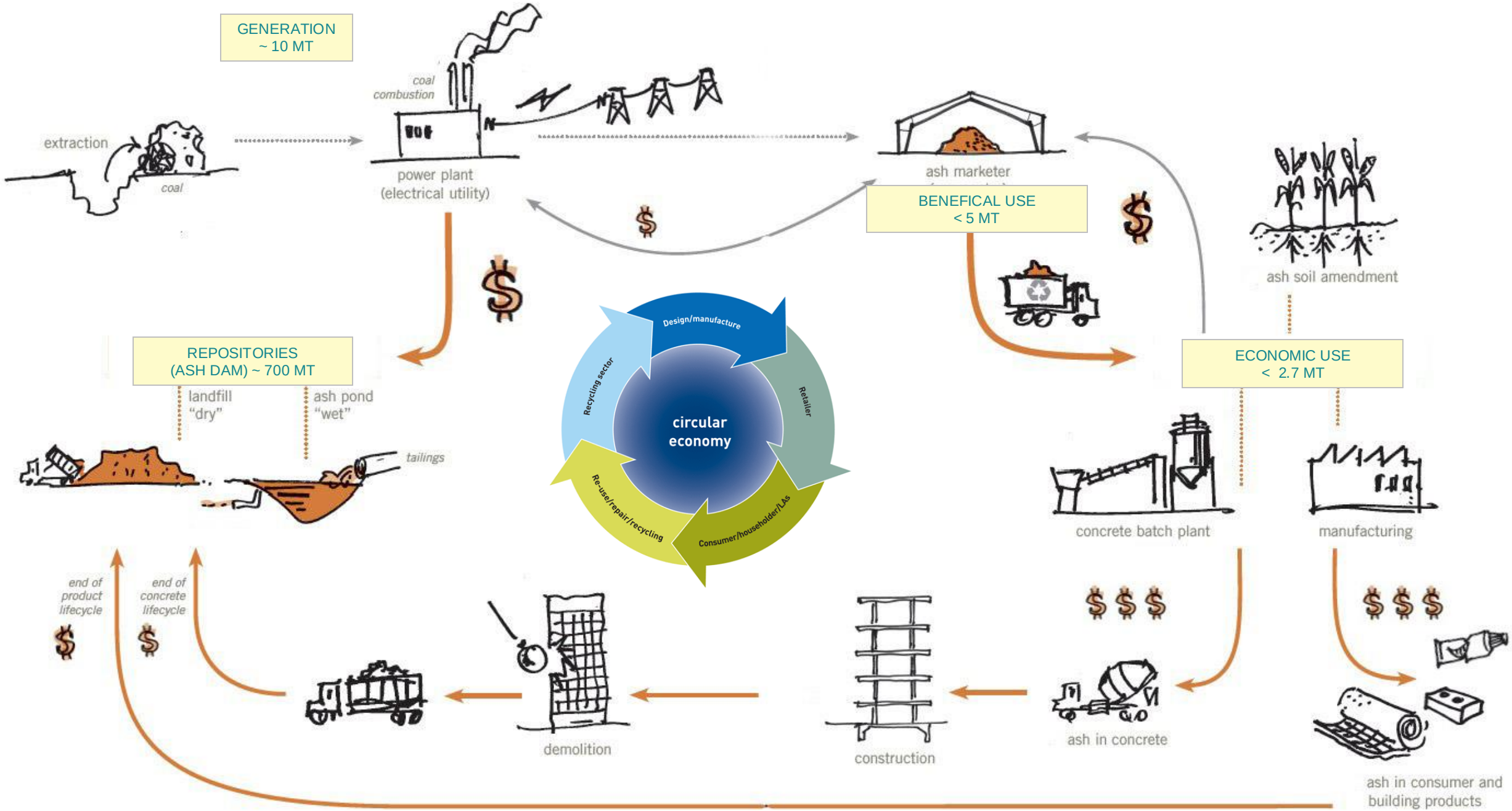



Coal Ash Management Systems

Water Purification




Resources
Processors
Value Adders
Designers/Users
Knowledge Influencers
Power Station Operators
Adbri, Boral Cement
Cement Aust
Daracon, Fly Ash Aust
Gunlake, Hallet
Independent Flyash Brokers
Independent Cement &
Lime. Etc
Boral Concrete
Barrow Group
Hallett Concrete
Holcim
Heidlburg
Daracon
Gunlake
Etc.
State Agencies
EPA, Water Auth.
TfNSW, Ports Auth.
GHD, Leightons,
AECOM, Arup, Acciona
Arcadis, Aurecon Etc
CSIRO
UNSW
Standards Australia
BCA
Concrete Institute of
Australia
CCAA
ASCP

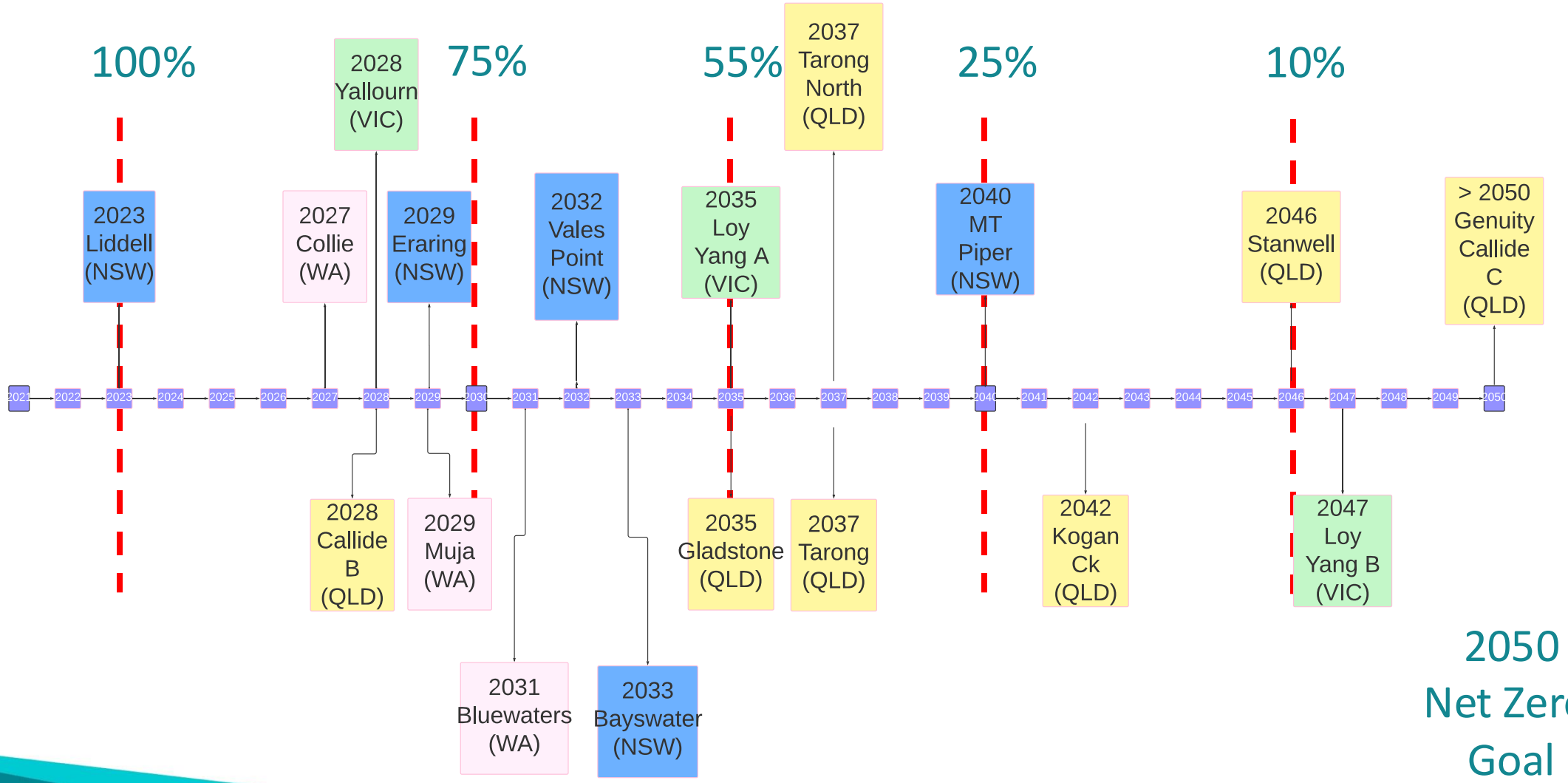

GENERATION
~ 10 MT
extraction
coal
coal combustion
power plant
(electrical utility)
ash marketer
BENEFICAL USE
< 5 MT
ash soil amendment
REPOSITORIES
(ASH DAM) ~ 700 MT
landfill
"dry"
ash pond
"wet"
tailings
circular economy
Design/manufacture
Retailer
Consumer/householder/LAs
Re-use/repair/recycling
Recycling sector
ECONOMIC USE
< 2.7 MT
concrete batch plant
manufacturing
ash in concrete
ash in consumer and building products
construction
demolition
end of product lifecycle
end of concrete lifecycle

# Drivers for change

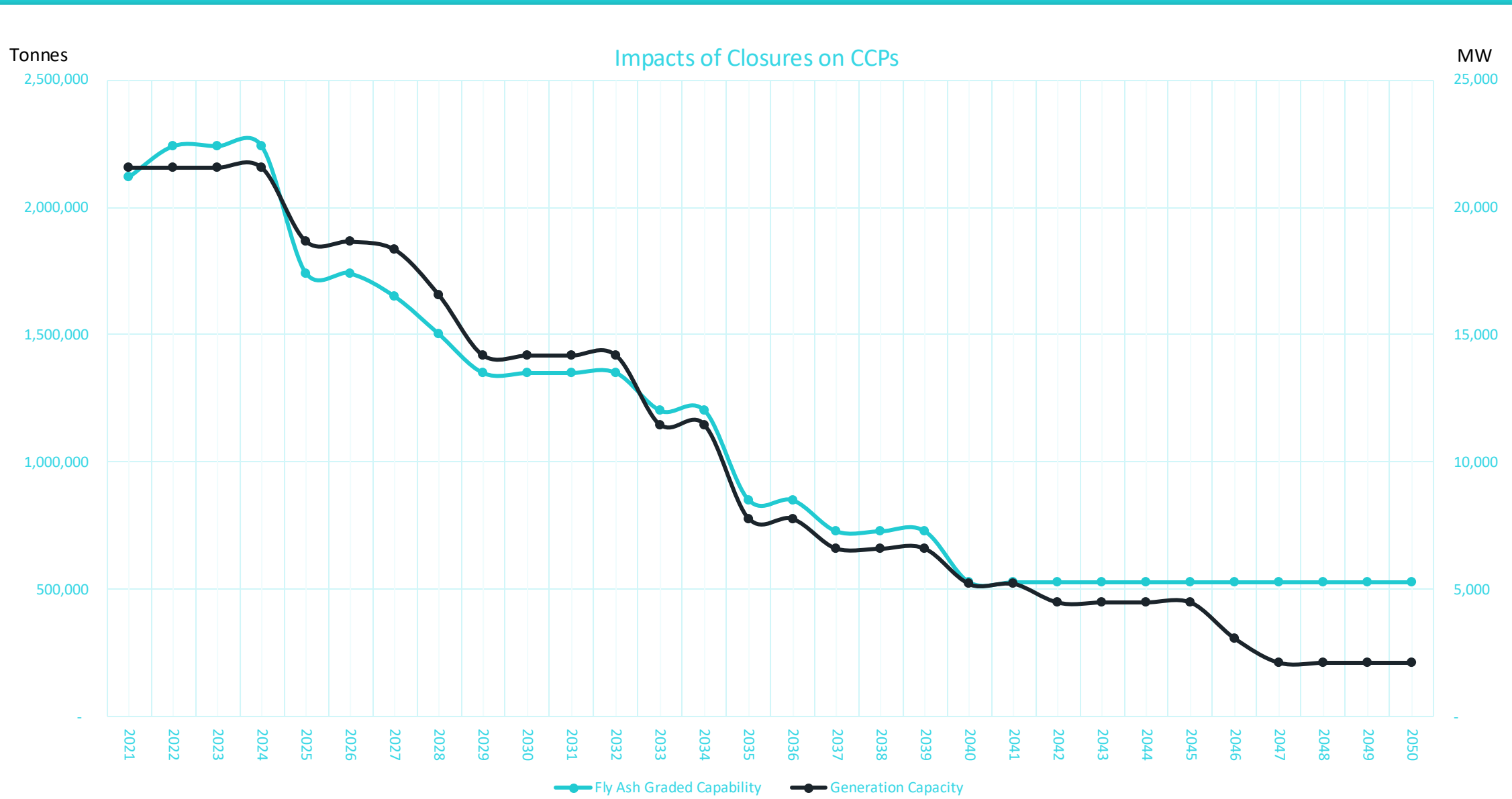
# Energy policy transition underpinned by existing technology…

# Circular economy drivers promoting resources…

# Supply & distribution gap(s) widen with CFPS closures within end uses…




2050
Net Zero
Goal


Tonnes
Impacts of Closures on CCPs
MW
2,500,000
2,000,000
1,500,000
1,000,000
500,000
-
25,000
20,000
15,000
10,000
5,000
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2050
Fly Ash Graded Capability
Generation Capacity

# Hard won markets

# Critical Australian Standards for Concrete

TS199

~$13B

AS3600
BD002

~27 m3

AS1379
BD049

Supps

AS3972
BD010

~15 mtpa

AS3582
BD031

~4.5 mtpa

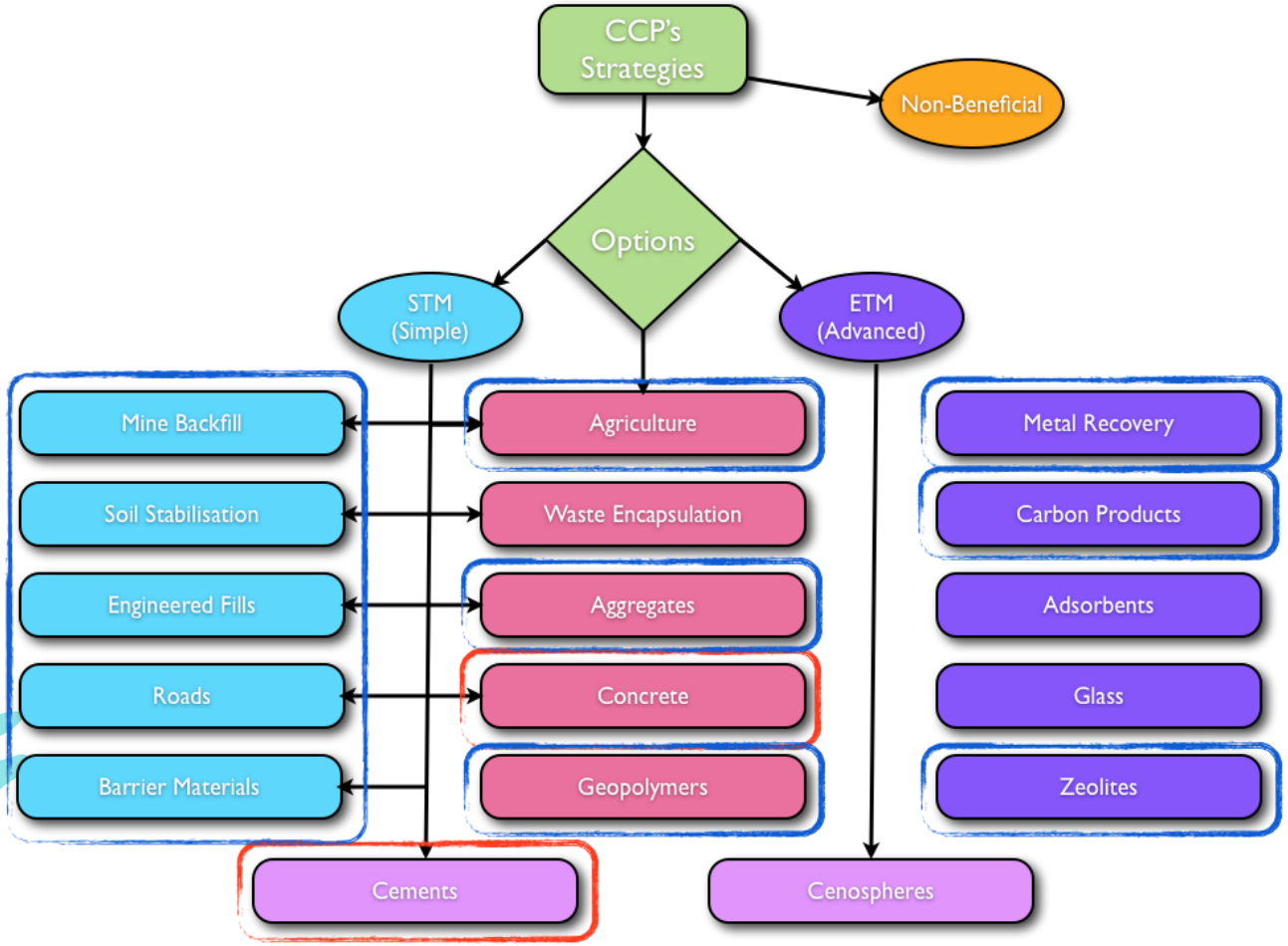
AS2758
CE012

~200 mtpa

Testing

# Application road map… Proven v. Unproven

- STM v. ETM
- Cost of capex [investment]
- Uncertainty factors
- Social attitudes
- Sector attractiveness
- Regulation [legal certainty]



# M1 Motorway: Compaction Of Bottom Ash To 95%

Finished Sub-Grade 95% Compaction Completed Base And Ready For AC-2 Coat Sheet

# Other application/uses…

# Innovations


GP 4000
GOMACO
SEC


HITACHI


STOP
WAGNERS
WAGNERS

# Precast panels using HVFA > 80% Fly Ash creating a low carbon concrete benefits

# ADAA/UTS ARC Grant showed benefits for soil / plants

# Next steps

Heat Map

| | Generator (Producers) | Processor | Marketers (Value adders) | Manufactures | Users (Consumers/Owners) |
|---|---|---|---|---|---|
| **Political**<br>Energy, Carbon policy, Deregulation, Offsets, Transistion | | | | | |
| **Economic**<br>Quality, Fuel switching, Higher value add options, Security of supply, Large volume apps | | | | | |
| **Social**<br>Increased awareness/interest in CCPs | | | | | |
| **Technological**<br>Focus on gas, IGCC, Highly variable CCPs, Beneficiation processes, New markets (GC, Man Agg's, Ag etc) | | | | | |
| **Environmental**<br>Low NoX burners, Harvesting storage dams, Soil condition and education for emerging markets | | | | | |
| **Legal**<br>Environmental regulation, Increased enviro focus/performance pressures, GHG reporting | | | | | |

High Priority  Medium Priority  Low Priority