SCMs in the Cement Industry

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October 2024

CEMENT AUSTRALIA

Agenda

- The Evolving Industry
- The Impacts of Safeguard Mechanism
- The Current and Future Role of Supplementary Cementitious Materials (SCMs)
- Measure of Value – Alternative SCMs
- Challenges with Dam Ash
- Closing Remarks

The Evolving Industry

Cement Manufacturing in the last 15 years

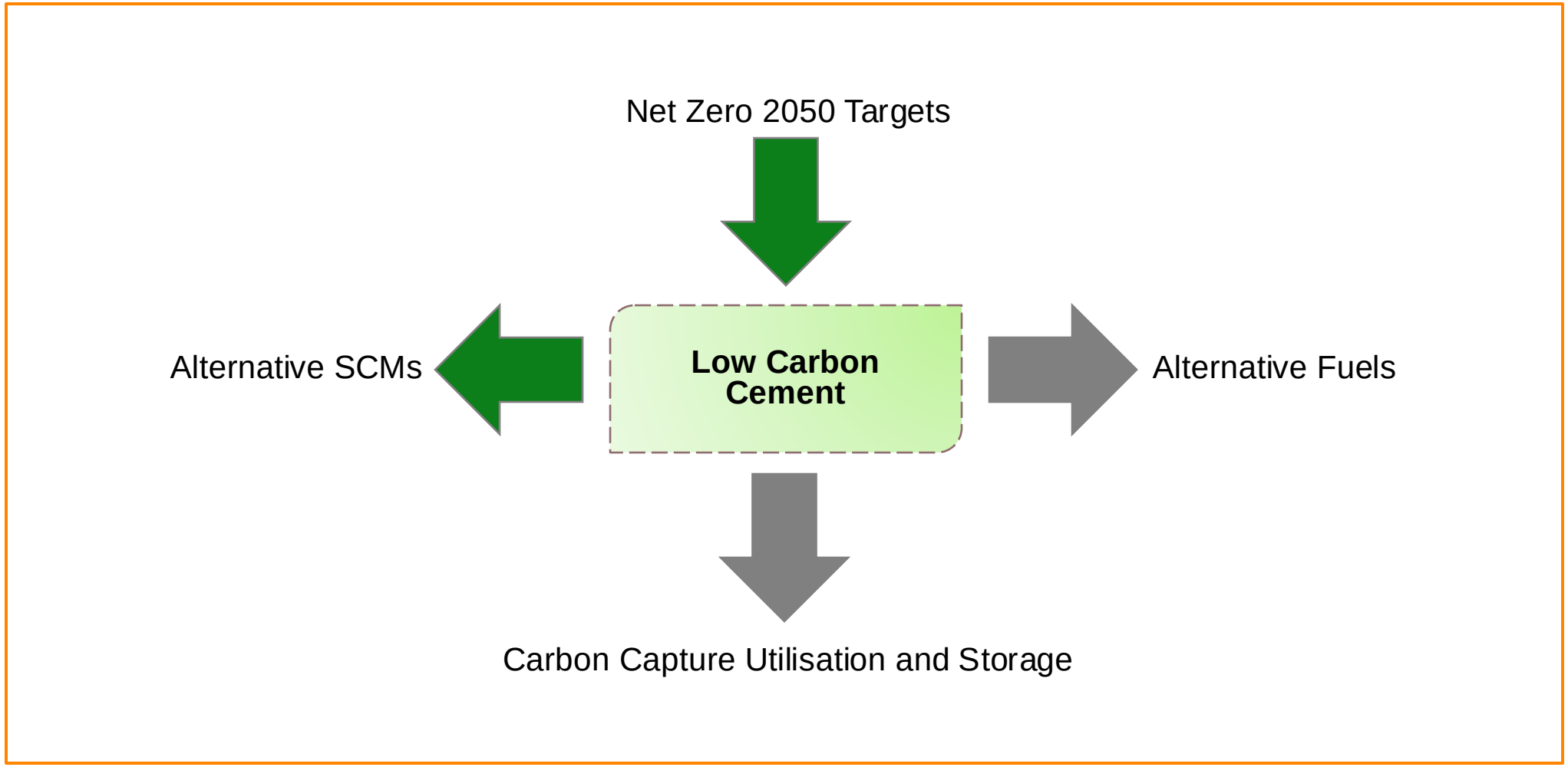
- Inclusion of slag as a SCM in concrete
- Increase in limestone mineral addition from 5% to 7.5%
- Implementation/exploration of additional alternative fuels
- Growth of imported cement
- Exploration in alternative supplementary cementitious materials (SCMs)
- Kiln technology (wet-dry)/ milling technology (VRM – 3rd energy of a BM)
- Efficiency of cement – less in m3 of concrete, finest improvement due to kiln technology

The Evolving Industry

Dam ash – A New Phenomenon?

- Cement Australia has been looking at dam ash for over a decade
- Dam ash investigations range from small scale to production scale trials
- Determining the required processes to future proof cement manufacturing

The Evolving Industry



The Impacts of Safeguard Mechanism

- The Safeguard Mechanism commenced in 2016 and reformed in 2023
- The Federal Government's Safeguard Mechanism is targeting the 219 facilities throughout Australia that emit the highest amounts of CO_2 (> 100kt per ann)
- Aim to reduce targets of ~ 43% below 2005 levels by 2030 and net zero by 2050
- All 4 clinker kilns in Australia (CA, Boral and Adbri) fall under the top 219 facilities
- Both of Cement Australia's plants produce >1 million tonnes of CO_2 per ann
- Biggest return would be to increase SCM
- Currently not impacting companies that import cement
    - This may change due to Carbon Border Adjustment Mechanism (CBAM)
    - *Carbon leakage* is the emissions associated with imported cement
    - CBAM has potential to drive the cost of cement

The Current and Future Role of Supplementary Cementitious Materials (SCMs)

- Conventional SCMs have improved CO_2 emissions in concrete production for years
- Increasing SCMs in concrete will be one of the main initiatives to counter safeguard mechanism
- More initiative to improve and/or concrete performance whilst increase replacement percentages
- Alternative SCMs used to replace conventional SCMs in the future
- SCMs will become harder to attain due to:
  - Freight/logistics
  - Cost of raw materials
  - Closures of power stations
  - Push to utilize local materials

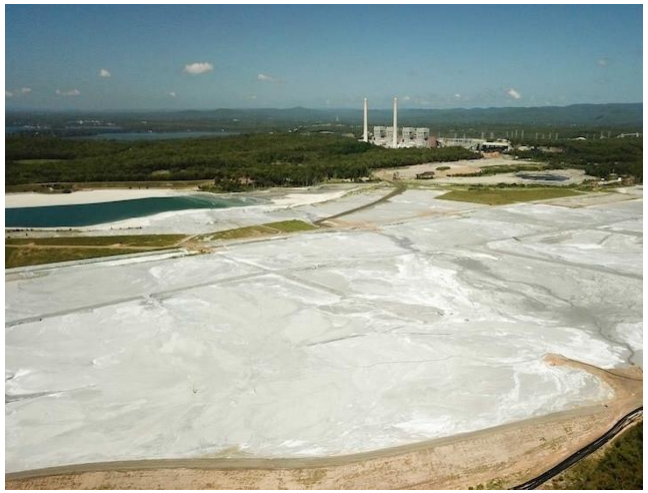
- New alternative binders are needed to lower embodied carbon once conventional SCMs are unavailable

Measure of Value – Alternative SCMs

Viability Assessment Matrix (VAM)

- Quality
- Cost
- Availability
- Embodied Carbon
- Social Responsibility

Fly ash

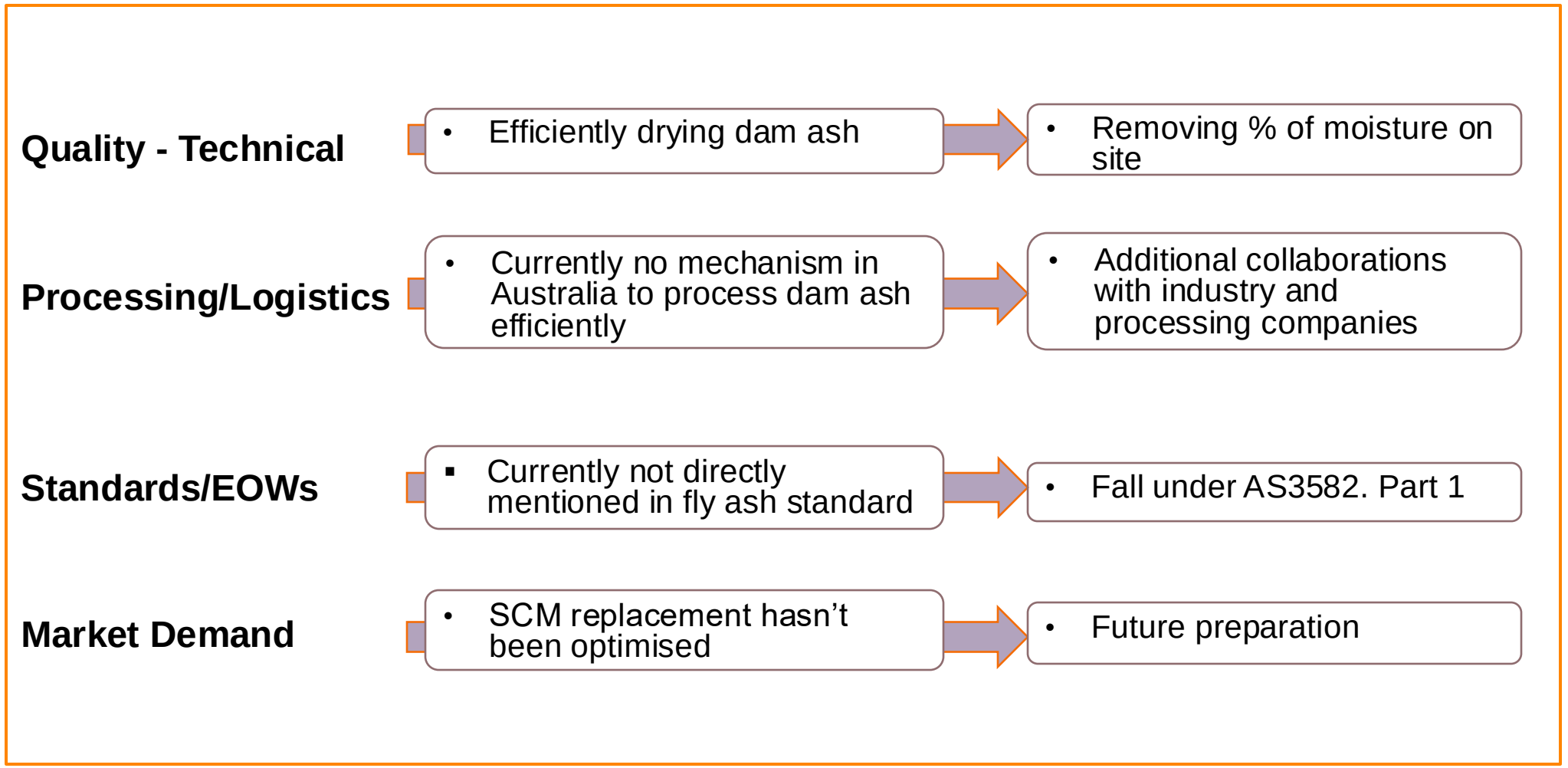


Dam ash

Measure of Value – Alternative SCMs

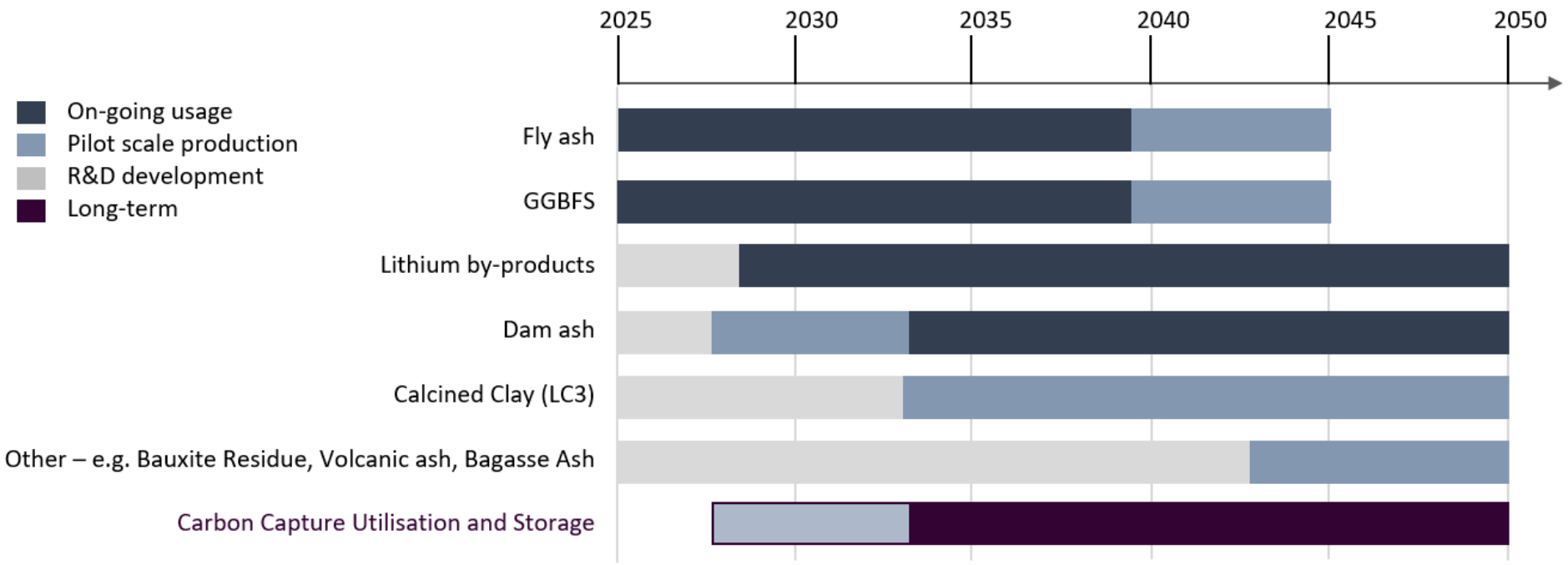
Dam ash – VAM breakdown	
Quality	• Performance in concrete • Impact on plastic properties and interaction with other consituents • Available test methods/standards
Cost	• Processing requirements - CAPEX/OPEX • Logistics and transportation
Availability	• > 10 years of material available • Proximity to markets • Is additional processing required?
Embodied Carbon	• Reduces embodied carbon in concrete • Benefit Safeguard Mechanism
Social Responsibility	• Does the material promote brown mining? • Is the product a waste material?

Challenges with Dam Ash



Challenges with Dam Ash

Cement Australia's Carbon Roadmap



- Conventional SCMs still available and can be optimized
- Alternative SCMs necessary when fly ash and slag are no longer available

Closing Remarks

Summary

- Cement is an integral component in the production of concrete and will continue to be produced
- Cement companies are taking action to reduce the embodied carbon in cement
- Safeguard Mechanism impacting manufacturing industry in Australia
- SCMs paving the way to reduce embodied carbon in cement manufacturing industry
- The industry is changing and evolving for the better