Net Zero Commission

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CEMENT INDUSTRY FEDERATION

CEMENT INDUSTRY FEDERATION SUBMISSION

Net Zero Commission – Decarbonisation Pathways for NSW
Call for Evidence: June-July 2026

14 August 2026

Introduction

The Cement Industry Federation (CIF) welcomes the opportunity to contribute to the NSW Net Zero Commission's development of decarbonisation pathways for New South Wales.

The CIF supports the Commission's objective of developing practical, evidence-based pathways that improve government decision making, provide greater investment certainty and support an orderly transition to net zero.

The Commission's recognition that different sectors face different technological, economic and policy challenges is particularly important for emissions-intensive manufacturing industries, including cement manufacturing.

The value of this work will depend on the quality of the assumptions underpinning the modelling and we encourage the Commission to ensure those assumptions accurately reflect the technical realities facing Australia's cement industry.

Cement, as the critical ingredient in concrete, is fundamental to the delivery of the net zero transition.

Every major renewable energy project, electricity transmission line, transport corridor, water asset and housing development relies on cement and concrete. As demand for low carbon infrastructure increases, so too will the need for secure domestic supplies of cement.

A successful decarbonisation pathway must therefore reduce emissions while preserving Australia's capacity to manufacture this essential construction material.

Unlike many sectors of the economy, most emissions from cement manufacturing come from the chemical process of calcination rather than from fuel combustion or electricity consumption. These process emissions are inherent to the manufacture of clinker and currently have no commercially available alternative.

Cement kilns cannot currently be fully electrified at commercial scale because clinker production requires continuous temperatures of around 1,450°C, along with tightly controlled heat transfer and material flows.

While ongoing investment in decarbonisation pathways such as energy efficiency, lower clinker cements, alternative fuels and raw materials (AFRs), as well as renewable electricity will continue to reduce emissions, they cannot eliminate emissions generated by the calcination (heating) of limestone.

Long-term decarbonisation of cement manufacturing is therefore expected to depend on technologies such as carbon capture, utilisation and storage (CCUS), which remain at a very early stage of commercial deployment in Australia, with several specific challenges to the feasible deployment for cement manufacturing (e.g., geography/distance, lack of transport and sequestration infrastructure).

For these reasons, the CIF encourages the Commission to adopt modelling assumptions that distinguish between emissions that can be reduced using technologies available today and those that depend upon future technological breakthroughs, major enabling infrastructure and major investment.

Pathways that assume rapid reductions in process emissions before these technologies become commercially available risk overstating what can realistically be achieved and may inadvertently encourage emissions (carbon) and investment leakage through increased reliance on imported clinker and cement.

The Commission's work presents an opportunity to develop pathways that support both emissions reduction and industrial competitiveness. This will require policies that encourage investment in domestic manufacturing, recognise the unique characteristics of ‘impossible-to-abate’ emissions and maintain sovereign capability while supporting the transition to net zero.

This submission contains CIF’s general comments and recommendations as well as specific responses to the questions listed in the Call for Evidence (**Appendix 1**).

About the Cement Industry Federation

The Cement Industry Federation is the peak national body representing Australia's integrated clinker and cement manufacturers. Its members manufacture the cement that underpins Australia's built environment and critical infrastructure, supplying materials that are essential for residential housing, commercial construction, transport infrastructure, renewable energy developments, mining operations and major public works.

Australia's cement manufacturing industry is characterised by high capital investment, long asset lives and exposure to international trade. Integrated cement plants represent investments measured in hundreds of millions of dollars and are designed to operate over many decades.

Investment decisions are therefore highly dependent upon stable policy settings, realistic regulatory expectations and confidence that Australian manufacturing will remain internationally competitive throughout the transition to net zero.

Our industry has a long history of improving its environmental performance. Australian manufacturers have progressively reduced emissions through investments in energy efficiency, increased use of supplementary cementitious materials (SCMs), greater use of AFRs and ongoing process improvements.

These initiatives demonstrate the industry's commitment to continuous emissions reduction while maintaining the performance, durability and safety of Australia's built infrastructure.

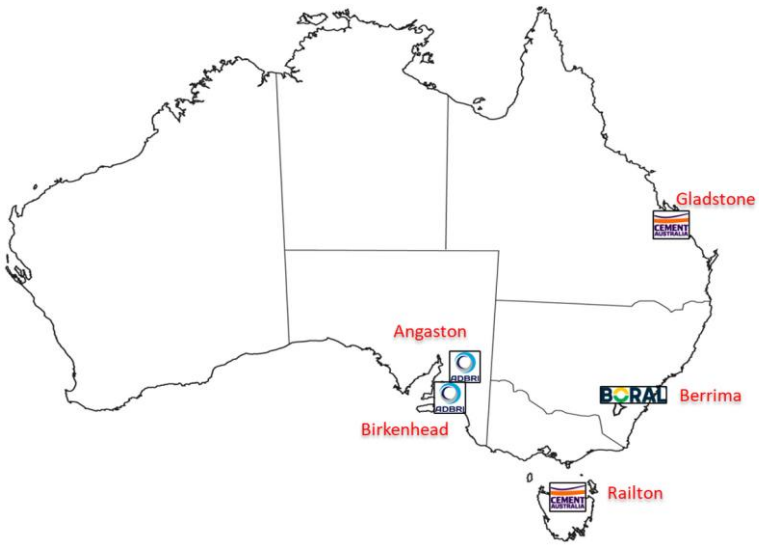
The CIF endorses and refers the Commission to the Cement Concrete & Aggregates Australia (CCAA) submission to this review. The CCAA is the voice of the heavy construction materials industry, and their submission provides additional detailed views and evidence in relation to the broader cement concrete & aggregate industry decarbonisation achievements and challenges.

Integrated Cement Manufacturing Facilities in Australia

There are five remaining integrated cement manufacturing facilities in Australia – where both clinker and cement are produced in a contiguous process at the same facility (**Figure 1**). Boral's Berrima facility is the only integrated facility in NSW.

The majority of our cement facilities are regionally based, delivering over 1,500 direct jobs and supporting over 110,000 people throughout the cement, concrete and aggregates value chain[1].

Figure 1: Integrated Cement Manufacturing Facilities



[1] Oxford Economics Australia 2026, The Economic Contribution of the Cement, Concrete and Aggregates Industry in Australia, report prepared for Cement Concrete & Aggregates Australia, March 2026.

Developing Credible Decarbonisation Pathways

The CIF supports the Commission's intention to develop multiple pathway scenarios reflecting different rates of technology uptake and policy ambition. This approach appropriately recognises that uncertainty remains regarding the pace of technological development and future investment decisions.

However, for the pathways to provide meaningful guidance to government and industry, they must accurately reflect differences in technology maturity between sectors.

For cement manufacturing, this means recognising that not all emissions are technically equivalent. Around 30 per cent of scope 1 emissions arise from the combustion of fuels used to heat the kiln, which can and are being addressed through the increased use of alternative fuels and improvements in energy efficiency.

The remaining 70 per cent of scope 1 emissions arise from the calcination of limestone during clinker production. These process emissions are an unavoidable consequence of the chemical reaction required to produce cement clinker and cannot be eliminated through fuel switching or electrification alone.

This distinction is fundamental to the development of credible emissions pathways. The availability of commercially deployable abatement technologies differs markedly between combustion emissions and process emissions, and the modelling should explicitly recognise these differences rather than applying uniform assumptions across the industrial sector.

For example, the Australian Government's Industry Sector Plan (Sep 2025) notes that CCUS (aka 'carbon management tech') is a potential longer-term abatement option for cement and concrete – broadly by 2050 – rather than as a mature near-term solution[2].

The CIF therefore encourages the Commission to distinguish between technologies that are commercially available today, technologies that are emerging but not yet widely deployed, and technologies that remain dependent upon significant infrastructure, policy support and government investment.

Such an approach would better reflect current industry experience and improve the robustness of the modelling.

Carbon leakage and investment

The Commission's decarbonisation pathways should explicitly consider the risk of carbon leakage in emissions-intensive, trade-exposed sectors such as cement. Professor Frank Jotzo's independent 2025 Carbon Leakage Review found that cement, lime and clinker are among Australia's most trade-exposed industrial products, reflecting the increasing role of imports in meeting domestic demand and the sector's exposure to international competition.

The review identifies cement as one of the industries at greatest risk of production shifting offshore where Australian climate policies impose costs that are not faced by competing imports.

This finding is particularly relevant for NSW. Cement manufacture underpins housing, transport, renewable energy, electricity transmission and other essential infrastructure. Unlike many manufactured products, cement demand is expected to grow as Australia builds the infrastructure required for the energy transition and to meet construction demands.

If domestic production becomes increasingly uncompetitive, additional demand is likely to be met through imported clinker and cement rather than investment in Australian manufacturing capacity. Such an outcome would reduce regional investment and employment, weaken sovereign industrial capability and shift emissions offshore without necessarily reducing global emissions.

The Carbon Leakage Review also reinforces the importance of recognising the unique characteristics of the cement sector (i.e., process emissions referenced earlier). Decarbonisation pathways that do not

[2] Australian Government Department of Industry, Science and Resources 2025, *Industry Sector Plan*, Australian Government, Canberra, September 2025, p.25, https://www.industry.gov.au/sites/default/files/2025-09/disr-industry-sector-plan.pdf

adequately distinguish between process emissions and combustion emissions risk increasing production costs ahead of the availability of viable abatement technologies, further exacerbating carbon leakage risks.

Accordingly, policies designed to accelerate industrial decarbonisation should be accompanied by measures that maintain Australia's competitiveness during the transition.

Technology Readiness and Industrial Decarbonisation

Australian cement manufacturers continue to invest in technologies that can deliver emissions reductions over the near and medium term. Improvements in thermal efficiency, increased substitution of fossil fuels with alternative fuels, optimisation of manufacturing processes and reductions in clinker content all represent practical and proven measures that are already contributing to lower emissions.

Use of alternative fuels in across the Australian industry currently sits at 28 per cent, with CIF members aiming for around 60 per cent fossil fuel substitution, which is the generally accepted technical limit given the current technology.

Continued access to renewable electricity and the development of new supplementary cementitious materials will further support emissions reductions over coming decades.

Beyond these measures, however, the options become significantly more uncertain. While technologies such as hydrogen firing, kiln electrification and carbon capture are being investigated internationally, they are challenging and none can be regarded as commercially deployable across the Australian cement industry.

For example, carbon capture is widely recognised as the most likely long-term pathway for addressing process emissions, yet successful deployment will depend upon the availability of transport and storage infrastructure, supportive regulatory frameworks, commercial business models and significant capital investment. Delivering these elements requires a co-ordinated, concerted, national CCUS strategy led by Governments as has occurred in European countries. This is not in evidence in Australia.

The Commission's modelling should therefore avoid assuming that these technologies become widely available according to predetermined dates. Rather, their deployment should be linked to realistic assumptions regarding technology readiness, infrastructure availability and commercial viability.

Factors influencing investment decisions today include:

- **International competition & carbon leakage risk**: Imported cement/clinker may face different carbon costs. Without border measures coupled with energy security/affordability and procurement support, domestic low-carbon products are disadvantaged.

- **Carbon-price & policy uncertainty**: Long asset lives (20–40 years) versus short-term policy signals, unclear long-run carbon price/credit value prevents underwriting large investments in new and innovative technologies. For example, existing carbon policy is a disincentive to the development of CCU projects as no recognition is provided for the captured carbon subsequently used in a downstream process.

- **No CO_2 transport & storage in place**: Even where capture is technically ready, a viable, permitted, multi-user transport and storage network (pipelines/ships + certified storage) is missing, influencing CCUS investment decisions.

- **Demand-side risk / price-premium recovery**: Margins are typically tight in building and construction; willingness to pay for low-carbon cement/concrete is limited absent procurement mandates. Standards/specifications lag slows adoption of lower carbon cements/LC3/high-SCM concretes in major public works.

- **High, volatile electricity costs & grid constraints**: Electrification, WHR integration, and grinding capacity depend on reliable, competitively priced, firmed renewables and adequate connection capacity.

- **Technology/performance risk**: New capture systems (Electric firing, oxy-fuel kilns, direct separation, calcium looping) and large calcined-clay lines carry scale-up risk.

- **Feedstock constraints & regulatory friction**: Declining fly ash availability, uneven access to slag, nascency of calcined-clay supply chains. AFR scale-up is limited by waste policy inconsistencies, licensing delays, and community acceptance requirements.

- **Permitting & approvals timelines**: Upgrades (AFR, WHR, CCUS tie-ins) often need multi-agency approvals, long sequential processes increase costs and push projects past capital-budget windows.

Demand Reduction and Behaviour Change

For the cement sector, demand reduction should not be interpreted simply as reducing the volume of cement used. Cement and concrete will remain essential to housing, transport, renewable energy, electricity transmission, water infrastructure and climate resilience.

The more relevant objective is to reduce the emissions intensity of each unit of infrastructure delivered through efficient design, lower-clinker cement, greater use of supplementary cementitious materials and specifications that allow the most appropriate material to be used for each application.

A significant existing opportunity is to increase the permitted level of mineral addition in general purpose cement. The current edition of AS 3972 (2010) allows up to 7.5 per cent mineral addition in Type GP cement, an increase from the 5 per cent limit that applied under the preceding standard.

A current Standards Australia revision proposes to increase the allowable mineral addition from 7.5 per cent to 10 per cent. This is a practical and comparatively low-cost measure because it allows a modest proportion of emissions-intensive clinker to be displaced by mineral addition while retaining the established Type GP cement classification and applicable performance requirements.

The proposed change is important because clinker manufacture accounts for most cement production emissions. However, changing the Australian Standard will not automatically result in widespread market adoption. Standards Australia establishes the technical envelope within which compliant cement can be manufactured, but government procurers, road authorities, engineering consultants and asset owners may apply additional specifications that are more restrictive than the national standard.

Unless those specifications are updated, technically compliant lower-clinker cement may continue to be excluded from major infrastructure projects. This is particularly relevant given the historic caution shown by Austroads and road agencies toward higher limestone additions.

The NSW Government can play an important role by ensuring that procuring agencies promptly review their specifications following publication of the revised AS 3972. This review should be undertaken in consultation with cement manufacturers, concrete suppliers, designers and durability specialists.

Delayed or inconsistent adoption across government agencies would weaken the emissions benefit of the standards change, fragment the market and discourage investment in lower-clinker products.

CIF refers the commission to the submission by the CCAA for more details. The CCAA leads industry advocacy and State government engagement on this opportunity.

Economic Impacts

Australia's cement manufacturing facilities collectively have an annual operating turnover of A$2.7 billion and support over 1,500 jobs directly as well as over 5,000 downstream employees and small businesses. A recent CCAA study[3] found that the overall heavy construction materials industry in Australia, including cement manufacturing, supports 112,970 jobs across Australia.

[3] Oxford Economics. (2025). The Australian cement and concrete industries: Their contribution to the Australian economy. Prepared for Cement Concrete & Aggregates Australia (CCAA). https://www.ccaa.com.au/common/Uploaded%20files/CCAA/CCAA_OxfordEconomicsReport_V9.pdf

Australia's growing demand for cement and concrete has increasingly been met through imported clinker and cement rather than investment in new domestic kiln capacity. Around 40 per cent[4] of cement manufactured in Australia already relies on imported clinker, while clinker imports have grown substantially over recent decades. This reflects the significant commercial barriers to constructing a new integrated cement plant, including high upfront capital costs, lengthy planning and approval processes, uncertain energy costs, declining Safeguard Mechanism baselines and exposure to imports that do not face equivalent Australian carbon costs.

This outcome has important economic and emissions implications. Import growth may satisfy short term market demand, but it does not generate the same level of regional investment, skilled employment, supply-chain activity or sovereign manufacturing capability as domestic clinker production.

It can also shift emissions offshore. Future decarbonisation pathways should assess not only changes in NSW or Australian emissions, but also their effects on domestic production, imports, carbon leakage and the capacity to supply the cement required for housing, infrastructure and the energy transition.

A more supportive investment environment is needed if Australia is to retain and modernise its domestic cement manufacturing base. This includes internationally competitive energy, proportionate carbon policy, timely approvals, support for major decarbonisation investments and effective measures to ensure imported products face comparable carbon constraints.

Existing programs such as the Commonwealth Powering the Regions Fund demonstrate that targeted co-investment can unlock decarbonisation projects at emissions-intensive facilities. Continuity of these programs, complemented by NSW co-funding, will be important to sustaining domestic investment.

Without these conditions, additional demand is likely to continue being met through imports rather than new or expanded domestic kiln capacity.

Loss of domestic clinker manufacturing would increase Australia's reliance on imported cement while reducing opportunities to decarbonise local production.

Key areas that the NSW pathways should consider include investment certainty, industrial competitiveness, regional employment, manufacturing capability, infrastructure resilience and sovereign capability.

Evidence for Modelling

The CIF recommends that pathway assumptions distinguish between fuel emissions **(**alternative fuels, renewable electricity, efficiency improvements) and process emissions – which cannot currently be materially reduced without deployment of carbon capture technologies.

The modelling should avoid linear emissions reduction assumptions across all industrial emissions sources.

This distinction also has direct consequences under the Safeguard Mechanism. As facility baselines decline each year towards 2030 and beyond, integrated cement facilities face a growing compliance liability for process emissions that cannot yet be abated, because no commercially available technology exists to reduce them until carbon capture is deployed.

The result is not additional abatement but an escalating obligation to surrender carbon credits for emissions that are, for now, technically unavoidable. Pathway modelling that assumes process emissions decline in line with falling baselines would therefore overstate achievable abatement and understate the carbon leakage risk identified in the Jotzo Review, which found that leakage pressure on cement and clinker intensifies as baselines tighten.

[4] Decarbonisation pathways for the Australian cement and concrete sector (2021), p. 15. https://www.cement.org.au/wp-content/uploads/2021/11/Full_Report_Decarbonisation_Pathways_web_single_page.pdf

The CIF would welcome further engagement with the Commission to support development of appropriate modelling assumptions. We also draw the Commission's attention to the Australian Government's review of the Safeguard Mechanism and consideration of the recommendations in the Jotzo Review.

Cement Industry Observations

The consultation paper identifies significant industrial process changes as a key area for investigation.

The CIF strongly supports this focus and, further, considers that the pathway modelling should recognise the following key points (supported by evidence provided elsewhere in this paper):

- that the chemistry of clinker/cement manufacturing differs fundamentally from other industrial processes
- process emissions currently have no commercially feasible alternative
- there are technical limits after which the amount of alternative fuels start to impact on the process (i.e., ~60%)
- current EPA licence conditions and lengthy approvals processes can act as a barrier to alternative fuel use
- CCUS represents the primary long-term abatement pathway
- deployment will likely occur progressively over several decades and
- continued deployment of existing technologies remains essential while breakthrough technologies mature.

Recommendations

The CIF recommends that the Commission:

1. Distinguish between combustion emissions and unavoidable process emissions in pathway modelling.

2. Base emissions trajectories on demonstrated technology readiness rather than aspirational deployment assumptions.

3. Explicitly model carbon leakage and import substitution risks.

4. Advocate for and support a Commonwealth Border Carbon Adjustment for cement and clinker, consistent with the 2025 Carbon Leakage Review, so that imported products face carbon costs comparable to those applying to domestic manufacturers.

5. Support reforms to planning and environmental approval processes that enable and accelerate alternative fuel projects and industrial decarbonisation investments.

6. Encourage the development of an Australian CCUS roadmap strategy

7. Adopt and promote public procurement policies that increase the uptake of lower-carbon cement and concrete.

8. Recognise lower-clinker cements and increased SCM utilisation as major nearer-term abatement opportunities.

9. Recognise the importance of maintaining domestic clinker manufacturing capability as part of NSW's net zero transition, economic resilience and supporting regional employment and skills.

10. Monitor the Australian Government's review of the Safeguard Mechanism and consideration of the Jotzo Report recommendations and ensure consistency between governments on decarbonisation policies

Conclusion

The CIF supports the development of evidence-based decarbonisation pathways that reflect the differing technical and economic circumstances facing individual sectors.

For cement manufacturing, the transition to net zero will require continued deployment of available emissions reduction technologies alongside long-term investment in breakthrough solutions such as CCUS. The pathway should recognise that a significant proportion of cement emissions arise from an unavoidable chemical process for which there is currently no commercially available alternative.

A successful NSW decarbonisation pathway should therefore seek not only to reduce emissions, but also to retain domestic manufacturing capability, protect regional employment, support investment and avoid emissions leakage through increased reliance on imported cement and clinker.

The CIF looks forward to working with the Commission as pathway development progresses and would welcome the opportunity to provide additional technical information, where available, to support the Commission's modelling assumptions.

Denise Spinks
Chief Executive Officer
Cement Industry Federation

Appendix 1: Response to Consultation Questions

1. What opportunities or barriers could improve the effectiveness of NSW's transition to net zero?

The effectiveness of NSW's transition to net zero will depend on whether pathways are grounded in the practical realities of hard-to-abate manufacturing. Cement is essential to renewable energy, transmission, transport, water, housing and industrial infrastructure, but cement manufacturing also has a unique emissions profile.

For cement manufacturing, this means recognising that not all emissions are technically equivalent.

Around 70 per cent of scope 1 emissions arise from the calcination of limestone during clinker production. These process emissions are an unavoidable consequence of the chemical reaction required to produce cement clinker and cannot be eliminated through fuel switching or electrification alone.

The remaining 30 per cent of scope 1 emissions arise from the combustion of fuels used to heat the kiln, which can and are being addressed through the increased use of alternative fuels and improvements in energy efficiency.

The increased use of supplementary cementitious materials (SCMs – i.e., fly ash, ground granulated blast furnace slag) to reduce the amount of clinker in cement and concrete is another decarbonisation pathway.[5]

These key opportunities to accelerate emissions reductions are technically available now but could benefit from more support, while creating the conditions for longer-term solutions such as CCUS.

Governments should avoid assuming all industrial emissions can decline at the same pace. For cement, the pathway must distinguish between combustion emissions, which can be progressively reduced, and process emissions, which currently have no immediate commercial solution.

[5] See CCAA's submission for more detailed information regarding the increased use of SCMs, lower-carbon cements and binders, recycled materials, improved construction practices and performance-based procurement.

a) What policies or market mechanisms could accelerate emissions reductions in specific sectors or communities? What barriers or opportunities exist for their adoption, including any evidence from businesses, industry and/or comparable jurisdictions?

Near-term emissions reductions could be accelerated by supporting greater use of lower-carbon cements, alternative fuels, supplementary cementitious materials, renewable electricity and more efficient industrial processes.

Specifying public procurement of low carbon concrete in government infrastructure builds is an important lever available to the NSW Government.

Government infrastructure agencies can help create demand for lower-emissions cement and concrete by adopting performance-based specifications, recognising blended cements, and avoiding overly prescriptive material requirements that prevent the use of lower-clinker products. See page 6 above for comments regarding changes to the Cement Standards (AS3972).

Another important policy opportunity is reform of waste and planning settings to support safe use of alternative fuels in cement kilns. Cement kilns can co-process selected waste-derived fuels, reducing reliance on fossil fuels while supporting circular economy outcomes.

However, project approvals, waste classification, licensing and protracted community consultation can slow deployment. A more coordinated approach across climate, waste, planning and infrastructure policy would improve investment confidence.

A major barrier is the lack of enabling infrastructure for deep decarbonisation. For cement, long-term emissions reduction will likely require CCUS, but this cannot be delivered by individual facilities alone. It

requires shared transport and storage infrastructure hubs, regulatory frameworks, long-term liability arrangements and commercially viable funding models.

The development of a formal CCUS strategy should be a key priority for government.

b) How could the NSW Government better stimulate private finance at the scale and pace needed for the net zero transition?

The NSW Government can better stimulate private finance by reducing policy and investment risk. Cement manufacturing involves large, long-lived assets, and investment decisions are highly sensitive to regulatory certainty, energy costs, approvals timeframes and competitiveness against imports.

Private capital will be more likely to flow into industrial decarbonisation where government provides clear policy signals, supports feasibility and front-end engineering studies, de-risks first-of-a-kind projects, and develops appropriate infrastructure for electricity, alternative fuels and carbon management. Government procurement policies specifying low carbon concrete will underwrite demand for lower-carbon products, giving manufacturers confidence to invest.

For cement, finance will not be unlocked simply by increasing emissions obligations. If policy settings impose rising costs without recognising the lack of immediate solutions for process emissions, capital may instead be discouraged or redirected away from domestic manufacturing. Effective finance mobilisation must therefore combine emissions ambition with industry-specific support for hard-to-abate production.

c) What are the drivers and risks to reaching NSW's interim targets in 2030 and 2035, and net zero by 2050?

The main drivers for emissions reduction in cement to 2030 and 2035 are likely to be increased use of SCMs, alternative fuels, energy efficiency, renewable electricity and demand-side measures (e.g., low-carbon procurement). These are practical and available opportunities, provided standards, specifications, approvals and supply chains support their deployment.

A major risk is technology optimism. Pathways should not assume that cement process emissions can be materially reduced in the near term without commercially available CCUS or equivalent breakthrough technologies. Overstating near-term abatement could lead to unrealistic policy expectations and may increase the risk of carbon leakage, where domestic clinker and cement production is displaced by imports rather than genuinely decarbonised.

For 2050, the key driver will be whether Australia develops the infrastructure and policy framework needed for deep industrial decarbonisation, particularly CCUS. Delayed action on enabling infrastructure may leave hard-to-abate manufacturers without a viable pathway while still facing escalating carbon costs.

d) What are the opportunities or barriers for collaboration across sectors to support the transition?

There are significant opportunities for collaboration between cement manufacturing, waste management, construction, infrastructure delivery, energy networks and carbon management sectors. Cement kilns can support circular economy outcomes by using suitable waste-derived fuels. The construction sector can reduce embodied carbon by adopting lower-carbon cement and concrete. Energy and infrastructure agencies can help ensure industrial facilities have access to reliable, affordable low-emissions energy.

There are also opportunities to collaborate on regional industrial hubs, shared carbon transport and storage infrastructure, and coordinated procurement frameworks for low-carbon materials. However, these opportunities require deliberate coordination and investment. Without alignment between climate policy, planning rules, waste regulation, construction specifications and procurement practices, the transition will be slower and more expensive.

NSW's pathway should support emissions reduction while retaining domestic manufacturing capability. A pathway that reduces reported NSW emissions by increasing reliance on imported clinker or cement would not represent a successful transition.

The Commission's modelling should therefore account for technology readiness, carbon leakage, regional employment, sovereign capability and the continuing need for cement in the net zero economy.

2. What are the opportunities and barriers to technology development, deployment for each sector? This may include:

a) What technologies are available or emerging in your sector, and what is their current state of readiness?

Near-term emissions reduction opportunities include energy efficiency, increased use of AFRs, greater use of SCMs, lower-clinker cements, renewable electricity and process optimisation. These technologies are either available now or capable of further deployment with the right policy and market settings.

However, these measures cannot eliminate cement process emissions. The technologies required to do so remain at varying stages of development and should not be assumed to deliver large-scale reductions before they are technically proven, commercially viable and supported by enabling infrastructure.

The Commission's proposed pathways explicitly consider technology availability, costs, trade-offs and dependencies, which provides an appropriate framework for recognising these differences.

b) What constraints exist around technology uptake and deployment?

The main constraints are not limited to technology readiness. Cement manufacturing is capital intensive, operates on long asset lives and competes against imported clinker and cement. Investment in major decarbonisation projects requires long-term policy certainty, internationally competitive energy costs and confidence that domestic production will not be displaced by imports.

Other constraints include planning and environmental approval timeframes, waste classification rules affecting AFR use, availability of high-quality SCMs, conservative standards and specifications, grid constraints, transport logistics and the absence of carbon transport and storage infrastructure.

For process emissions, the constraint is more fundamental. Fuel switching and renewable electricity can reduce combustion-related emissions, but they do not address the chemical emissions from limestone calcination.

Pathways should avoid assuming all industrial emissions can decline at the same pace.

c) What does the evidence say about current and future costs?

Near-term abatement options are generally lower cost than breakthrough technologies, but their deployment is constrained by a range of factors including the finite availability of SCMs, limited supplies of suitable alternative fuels, regulatory and planning barriers, restrictive procurement specifications, long capital replacement cycles for cement kilns, and the technical limits on how far existing technologies can reduce emissions.

Many Australian cement plants have also already implemented substantial alternative fuel and energy efficiency improvements, meaning the remaining low-cost abatement opportunities are progressively diminishing.

By contrast, CCUS is likely to involve materially higher capital and operating costs. It requires capture equipment, compression, transport, storage, monitoring and long-term liability arrangements. While international projects demonstrate technical progress, Australian deployment remains uncertain and would require significant public policy support.

The Commission should therefore model cement decarbonisation using staged cost assumptions, i.e., lower-cost incremental measures in the near term, constrained deployment of commercially available measures to 2030 and 2035, and higher-cost deep abatement options toward 2050 subject to a major government policy shift – followed by infrastructure and commercial readiness.

d) What role could the NSW Government play in strengthening technology development and deployment?

The NSW Government could strengthen technology deployment by focusing on the practical enablers that allow industry to invest. This includes streamlining approvals for AFR projects, supporting access to renewable electricity, coordinating industrial infrastructure planning and working with the Government to develop future carbon management options such as CCUS hubs to enhance commercially viability.

Government procurement is also critical. NSW can support lower-emissions cement and concrete by moving away from overly prescriptive specifications and adopting performance-based approaches that allow safe use of blended cements and supplementary cementitious materials in government funded infrastructure projects.

This would help create demand for lower-carbon products and give manufacturers greater confidence to invest.

The Government should also ensure that industrial decarbonisation pathways are aligned with waste policy, planning policy, environmental approval processes, infrastructure procurement, skills development and regional economic policy. Without this coordination, technically available abatement may remain difficult to deploy.

3. What are the opportunities to foster demand reduction and behaviour change?

The most important demand-side opportunity is to reduce embodied carbon in the built environment without compromising durability, safety or performance. This can be achieved through better design, more efficient use of materials, performance-based specifications, greater acceptance of blended cements and concrete mixes, and procurement policies that value lifecycle emissions.

The NSW Government has a significant role because public infrastructure is a major source of demand for cement and concrete. By setting clear expectations for lower-carbon materials and harmonising specifications across agencies, government can shift market behaviour and accelerate uptake of products that are already technically viable.

Demand reduction should not be interpreted as simply using less cement regardless of outcome. Cement and concrete will remain essential to housing, transport, energy, water and climate-resilient infrastructure. The objective should be the efficient, fit-for-purpose use of materials and lower embodied emissions per unit of infrastructure delivered.

4. What are the likely economic effects on NSW of different emissions pathways to net zero, relative to NSW's current level of ambition?

The economic effects of different emissions pathways will depend on both the speed of emissions reduction and whether the pathway supports investment in domestic manufacturing or shifts production and emissions offshore.

For the cement industry, a well-designed pathway could stimulate investment in lower-emissions production, infrastructure and regional employment.

A poorly designed pathway could increase production costs without providing viable abatement options, weakening the competitiveness of NSW manufacturing and increasing reliance on imported clinker and cement.

A balanced pathway is therefore likely to produce the strongest economic outcome for the cement sector. This would accelerate commercially available measures, including energy efficiency, alternative fuels, renewable electricity, greater use of SCMs and lower-clinker products, while recognising that deep reductions in process emissions depend on technologies and infrastructure that are not yet commercially available.

The modelling should also account for the economic importance of cement to the wider transition. Increasing the cost or reducing the availability of locally manufactured cement could raise the cost of delivering the infrastructure required for NSW to achieve net zero. On the other hand, a strong domestic cement industry can provide secure supply, support regional jobs and enable closer collaboration between manufacturers, construction companies and government procurers to reduce embodied emissions.

The Commission's three proposed scenarios should examine more than the direct cost of emissions reduction. They should assess impacts on capital investment, energy costs, regional employment, domestic production, import dependence, infrastructure delivery costs and global emissions outcomes.

Overall, the CIF considers that the most economically effective pathway is one that combines ambitious but technically realistic emissions reduction with measures to maintain domestic manufacturing competitiveness. NSW should avoid a pathway that achieves lower domestic emissions primarily through deindustrialisation or increased imports. The objective should be to decarbonise NSW industry, not displace it.

a) What are the most significant economic or workforce pressures the pathways should account for in your sector or community?

In short:

- International competitiveness
- scale and timing of investment required for industrial decarbonisation
- energy affordability and reliability
- the availability of SCMs and
- required investment in new technical capabilities while retaining the highly skilled workforce needed to operate existing manufacturing facilities safely and efficiently.

The Commission's pathways should recognise that the industry's economic and workforce pressures differ from many other sectors because emissions reduction is constrained by the fundamental chemistry of cement production and the long operational life of manufacturing assets.

One of the most significant economic pressures is maintaining the international competitiveness of domestic cement manufacturing while transitioning to lower emissions. Australian cement producers

compete directly with imported clinker and cement, often from jurisdictions with lower production costs and less stringent climate policies.

Such ‘carbon leakage’ would undermine regional employment, reduce investment in Australian manufacturing and deliver little benefit to global emissions.

The most effective pathway is one that balances emissions reduction with industrial competitiveness, supports investment in regional manufacturing, recognises the absence of an immediate solution for cement process emissions, and provides the policy certainty needed to encourage long-term private investment in decarbonisation technologies.

5. What are the opportunities and barriers to addressing socio transition, including equitable outcomes for First Nations remote communities?

The cement industry supports the principle of a just transition that delivers emissions reductions while maintaining strong regional economies, secure employment and Australia's sovereign manufacturing capability. For the cement sector, a just transition is about enabling existing manufacturing facilities to progressively decarbonise while continuing to provide long-term economic and social benefits to the communities in which they operate.

Integrated cement plants are significant regional employers, supporting highly skilled direct jobs as well as extensive local supply chains across quarrying, transport, engineering, maintenance and construction. These facilities also underpin investment in regional infrastructure and provide stable employment opportunities in communities where alternative industries may be limited.

Pathways that fail to recognise the competitiveness challenges facing emissions-intensive, trade-exposed industries risk accelerating carbon leakage, reducing domestic production and shifting employment and investment offshore without delivering equivalent reductions in global emissions.

The transition also presents opportunities for regional economic development. Investment in industrial decarbonisation projects, alternative fuel infrastructure, renewable energy connections, carbon capture and storage infrastructure and new supplementary cementitious material supply chains has the potential to create new skilled jobs while extending the life of existing manufacturing assets.

Realising these opportunities will require coordinated investment in infrastructure, workforce development, planning approvals and innovation to ensure regional communities share in the economic benefits of the transition.

The CIF also recognises the importance of meaningful engagement with First Nations peoples in the development of industrial decarbonisation projects. Many cement manufacturing operations and associated limestone quarries are located on or near areas of cultural significance.

Early and genuine engagement with Traditional Owners, together with opportunities for employment, skills development and participation in regional infrastructure projects, can support more inclusive and equitable outcomes while respecting cultural heritage and supporting long-term partnerships.

The Commission's pathways should recognise that a successful just transition for the cement industry depends on maintaining domestic manufacturing, supporting regional employment, investing in new technologies and infrastructure, and ensuring that the economic opportunities arising from industrial decarbonisation are shared across regional communities, including First Nations peoples.

6. What evidence can you provide to inform pathway inputs and assumptions? For example, cost curves, deployment rates, or sector-specific data, include commercially sensitive data where relevant

The CIF supports the Commission's evidence-based approach to pathway development and recognises the importance of using robust sector-specific assumptions when modelling decarbonisation pathways for emissions-intensive manufacturing industries.

Aggregated industry information is available via the CIF website (www.cement.org.au) as well as the *VDZ Decarbonisation Pathways for the Australian Cement and Concrete Sector (2021)* – also available on the CIF website.

As the peak industry association representing Australia's integrated cement manufacturers, the CIF does not hold commercially sensitive operational or financial information relating to individual member companies.

Cost curves, investment plans, project economics and facility-specific deployment assumptions remain commercial-in-confidence and are held by individual businesses. The CIF therefore cannot provide commercially sensitive data on behalf of its members.

The Commission is encouraged to engage directly with individual cement manufacturers should it require confidential information to improve modelling assumptions.

7. Beyond emissions reduction, what outcomes should be considered? For example, impacts on business, jobs, land use, water and biodiversity?

Holistic Approach

The CIF supports a holistic approach to pathway development that considers the broader economic, environmental and social outcomes associated with the transition to net zero.

While emissions reduction is the primary objective, pathways should also assess how different transition scenarios affect industrial competitiveness, regional economies, infrastructure delivery, employment and Australia's long-term manufacturing capability.

For the cement industry, maintaining domestic manufacturing capacity should be recognised as a strategic outcome in its own right. Cement is an essential input into the infrastructure required to achieve net zero, including renewable energy projects, electricity transmission, transport infrastructure, water assets and housing.

A pathway that reduces NSW's reported emissions by replacing domestic production with imported clinker or cement would risk increasing global emissions, reducing sovereign manufacturing capability and weakening supply chain resilience.

Pathway modelling should therefore consider carbon leakage and import substitution alongside domestic emissions to ensure emissions reductions are genuine and sustainable.

The Commission should also consider the economic contribution of regional manufacturing. Integrated cement plants provide long-term, high-skilled employment and support extensive local supply chains, including quarrying, transport, engineering, maintenance and construction services.

The continued operation and decarbonisation of these facilities can help sustain regional communities while creating new opportunities associated with industrial decarbonisation.

Regulatory Requirements

The Commission should also consider the cumulative regulatory burden placed on emissions-intensive industries and the extent to which additional reporting requirements improve environmental outcomes relative to their implementation costs.

Australia's cement industry is already subject to extensive environmental regulation, emissions reporting under the National Greenhouse and Energy Reporting Scheme (NGERS), the Safeguard Mechanism, planning and environmental approval processes, and climate-related disclosure obligations.

While robust environmental oversight is essential, additional reporting, modelling and assessment requirements should be proportionate, evidence-based and coordinated across jurisdictions.

Recent NSW EPA proposals to introduce facility-level climate reporting requirements, together with expanded environmental modelling and assessment requirements, have the potential to create significant additional administrative and compliance costs for industrial facilities.

In many cases, these obligations duplicate or overlap with existing Commonwealth reporting frameworks rather than generating new emissions reductions.

Similarly, CIF has previously raised concerns regarding the NSW EPA's proposed revisions to the Approved Methods for the Modelling and Assessment of Air Pollutants. The proposals would significantly expand modelling, assessment and data requirements and move away from long-established risk-based approaches towards increasingly conservative assumptions.

CIF has argued that changes of this magnitude should be supported by a comprehensive Regulatory Impact Assessment and remain clearly linked to technical feasibility, proportionality and economic sustainability.

Environmental outcomes should similarly be considered in a broader context. The cement industry operates within comprehensive environmental approval frameworks that address biodiversity, water management, rehabilitation, air quality and land stewardship.

Decarbonisation pathways should recognise opportunities to achieve multiple environmental benefits through initiatives such as increased resource recovery, the beneficial use of suitable waste-derived fuels, improved resource efficiency and the development of circular economy solutions.

Where climate policies interact with environmental regulation, governments should seek integrated outcomes that improve overall environmental performance without creating unnecessary duplication or regulatory burden.

The Commission should also recognise the importance of affordability and the timely delivery of infrastructure. Cement and concrete will remain indispensable to achieving NSW's housing, transport, renewable energy and climate resilience objectives.

Pathways that constrain the availability of domestically manufactured cement could increase the cost and complexity of delivering the infrastructure needed to support the State's transition to net zero.

End.