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CCUS Team
Ministry of Business, Innovation and Employment
By email: gasfuelpolicy@mbie.govt.nz

SUBMISSION TO THE PROPOSED REGULATORY REGIME FOR CARBON CAPTURE, UTILISATION, AND STORAGE (CCUS)

Concrete NZ is the voice of the cement and concrete industry, representing more than 550 members, including more than 200 concrete producers. The industry spans cement manufacture, ready-mixed concrete, masonry, precast components including pipes and culverts, and experts in structural design and construction with concrete.

This document constitutes Concrete NZ's submission on the consultation relating to the Proposed Regulatory Regime for Carbon Capture, Utilisation, and Storage (CCUS).

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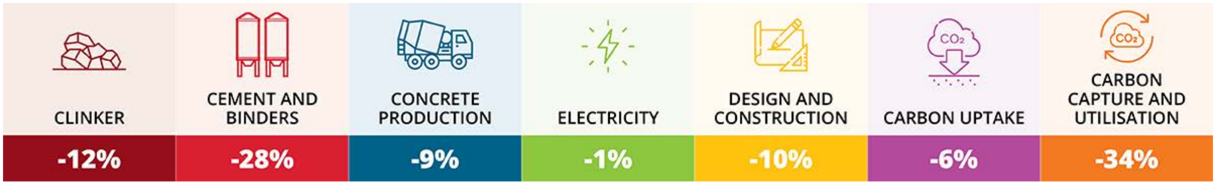
PART A: CEMENT AND CONCRETE INDUSTRY CONTEXT

"[...] the key barriers are not technology, but they have all to do with political economy, with the incentives, with regulations, with the pricing; once you got that right innovation will do its wonderful thing [...]"

Dr. Jan Rosenow, Director of the European Proogrammes
at Regulatory Assistance Project (RAP)[1]

The New Zealand cement and concrete industry has launched and committed itself to a decarbonisation Roadmap, containing two main emissions reduction milestones as per the graphic to the right.

Implementation of the Roadmap is underway. Reporting on progress will take place under Concrete NZ's sustainability reporting as well as regular stocktakes for the industry. The Roadmap lists seven key "levers" for cement and concrete industry decarbonisation (percentages refer to net emissions reductions by 2050 relative to a 2020 baseline):



Concrete plays a significant role in our built environment, for residential and commercial buildings, but also for climate-resilient infrastructure and in the construction of renewable electricity generation.

Within concrete, cement serves as a binder. While some cement may be replaced by so-called supplementary cementitious materials, some proportion of the binder will always remain cement. The production of clinker, the main component of cement, involves a chemical conversion process where limestone ($CaCO_3$) is converted to lime (CaO), inevitably releasing CO_2. In light of these unavoidable CO_2 emissions, it is estimated that approximately one third of the industry's decarbonisation pathway or a total of **about 460,000 tons of CO_2 per annum** will hinge on the utilisation of **CCUS**.

Consequently, cement kilns are often perceived as the most significant and economically feasible application for this process, among other uses such as waste incineration, chemical production, and different lime calcination activities.

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[1] Redefining Energy – TECH Podcast Episode 31

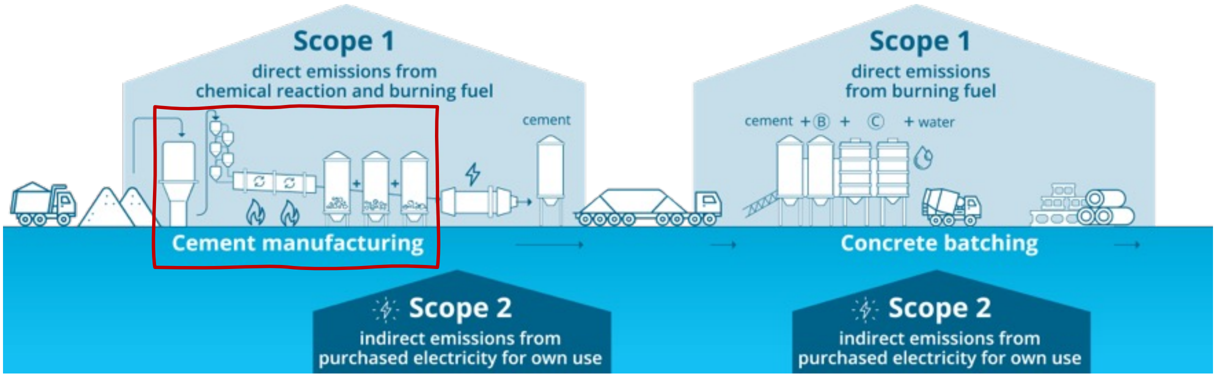

Figure 1: Simplified concrete value chain; in red box: point-source of unavoidable emissions

However, the Regulatory Impact Statement states in section #24: "Typically, the cost of CCUS is highest in industries which have a relatively low concentration of CO_2 in the emissions stream, such as coal-fired power plants, steel production, cement production and some forms of hydrogen production" [emphasis by the author].

It is noteworthy that with an average CO_2 concentration of ~20% in cement kiln flue gas, cement-making is typically not considered a "low concentration" application. This becomes evident when it is compared against flue gas concentrations of coal-fired power plants at ~12% and steelmaking in electric arc furnaces at ~1%.

Also internationally, the decarbonisation of the cement industry is frequently identified as one of the primary beneficiaries of CCUS technology.

- In July 2023, the European climate think tank E3G published a briefing titled "Carbon capture and storage ladder" to evaluate "the climate value of CCS applications in Europe". While such analyses must be localised, certain assumptions remain consistent: The apex of the list is frequently occupied by applications where no alternatives exist such as lime calcination and waste incineration.
- The German Federal Ministry for Economic Affairs and Climate Action's (BMWK) plans for a Carbon Management Strategy were approved by Cabinet in late May 2024, with a specific emphasis on unavoidable emissions originating from e.g. lime calcination.

This is underpinned by numerous international real-world examples where carbon capture technology is in implementation stages in the cement industry:

- Holcim—also present in New Zealand—lists seventeen CCUS flagship projects internationally (commissioning of some projects commencing from 2027).
- Heidelberg Materials, a Germany-based international cement producer, is investing in a number of CCS operations, most notably in Brevik, Norway, as part of the open-source Northern Lights project (commissioning planned for end of 2024), and Slite, Sweden (commissioning planned by 2030).
- Cemex—another large player in the global cement sector—is also implementing a number of CCUS projects as part of its decarbonisation journey.

- The Japanese Ministry of Economy, Trade and Industry (METI) announced financial support for its first seven CCS projects, including for the cement industry.
- The European Commission is set to approve state funding for a CCS project in Greece, sequestering the emissions of two cement plants at the depleted underwater Prinos field.
- In June 2023, China United Cement Group begun construction of the world's largest oxyfuel CCUS project in the cement industry in Qingzhou, Shandong.

PART B: GENERAL COMMENTS

- Concrete NZ welcomes the establishment of a regulatory framework that embeds CCUS activities in a pragmatic way, avoiding overly prescriptive, overlapping, and unnecessary regulatory requirements.
- Concrete NZ underlines the pivotal role of CCUS in the decarbonisation Roadmap of the cement industry.[2] As the primary ingredient in concrete, cement is a crucial building material to meet societal demand for new buildings and infrastructure.
- Concrete NZ members affected by the proposal are either point-source emitters of CO_2 where cement is being produced in New Zealand—feeding into a transport and sequestration and/or utilisation network operated by a third party—, or potential participants of a CCUS-based offsetting market, e.g. where offsets would be generated through a technology like Direct Air Capture (DAC).
- Concrete NZ emphasises that the government has a key responsibility in informing the public about CCUS to maintain the industry's social licence to operate. This is particularly important since CCUS has attracted negative press for applications where better / cheaper alternatives exist, which is not the case in Portland cement production.
- Note that a research project funded by BRANZ (through the Building Research Levy), MBIE's Building Innovation Partnership and Concrete NZ has started work with stakeholders to enable the transformation of the cement and concrete industry towards Net Zero Carbon by 2050, including investigation on how to support CCUS to achieve deep decarbonisation eventually.

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[2] A Net-Zero Carbon Concrete Industry for Aotearoa New Zealand

PART C: DETAILED SUBMISSIONS

Concrete NZ focuses its submission on three key topics:

C1. CCUS on a Level Playing Field with other Carbon Management Strategies

We believe that CCUS should be recognised as a permitted activity in New Zealand, with appropriate legislation to support its implementation. Nevertheless, government policy should remain impartial regarding its support.

A CCUS initiative ought to compete fairly with other emissions management strategies, such as fuel switching or electrification. It is crucial that all emissions reduction options are assessed on an equal footing to ensure a cost-effective transition to a low-carbon economy.

C2. CCUS integration into the NZ ETS

The main components of CCUS include capturing carbon, whether from a point source, such as industrial emissions, or a diffuse source like direct air capture. This is followed by a transport mechanism, which could be by pipeline, road, or ship, and finally, long-term, durable storage.

Given the variety of potential CCUS options, it will be challenging for legislation to comprehensively cover all combinations and anticipate innovative solutions in this rapidly evolving field of emissions management.

We believe that the capture, transportation, and utilisation of CO_2 can be effectively managed through the New Zealand Emissions Trading Scheme (NZ ETS). Essentially, this is a carbon accounting issue, with many aspects, such as custody transfer, being manageable through contractual agreements or emissions reporting processes.

Thus, participants in CCUS activities should either proportionally receive emissions units (NZUs) or proportionally reduce their NZ ETS liability if they are participants in the NZ ETS.

C3. Carbonation of Hydrated Cement—A Source of Permanent Carbon Removal

The current consultation on **New Zealand's Second Emissions Reduction Plan**[3] includes one section (#9) about "Non-forestry removals"[4]. Since there is a significant overlap between the requirements of 'permanent sequestration' as part of a CCUS scheme as well as 'carbon removal' as part of the Emissions Reduction Plan, Concrete NZ suggests close alignment between the teams.

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[3] Consultation on New Zealand's Second Emissions Reduction Plan

[4] Ibid page 84

Exposed surfaces of hardened concrete absorb atmospheric CO_2 in a natural process that the IPCC recognised in its 6th Assessment Report (AR6), published in sections in 2021 and 2022.[5] This report states that carbon uptake or "recarbonation" is significant and includes it as a removal in the overall emission balance.[6]

Furthermore, the Lifecycle Product Category Rules for cement and building lime as per EN 16908:2017+A1:2022 recognise carbonation: "Carbonation contributes to a reduced GWP impact of cement products over their whole life."[7]

This carbon uptake is scientifically robust, additional, and permanent. Therefore, Concrete NZ suggests introducing this additional source of carbon removal into the CCUS proposal by making concrete structures eligible to receive recognition for emissions captured/stored. Since carbonation is integrated in international carbon accounting standards, this could be done within the NZ ETS, as suggested by the Emissions Reduction Plan consultation document and in a similar fashion as outlined above in section "C2. CCUS integration into the NZ ETS".

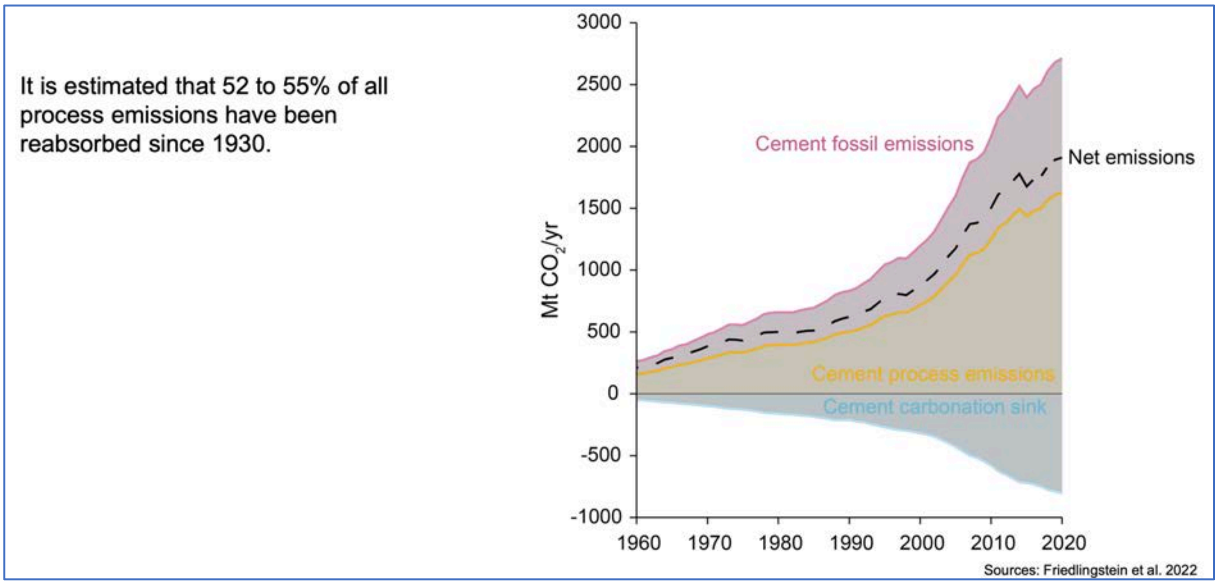

Figure 2: Cement carbonation on a global scale by [Cyril Brunner, ETH Zurich]()

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[5] IPCC 6th Assessment Report

[6] Full IPCC AR6 WGI Report page 688: "The uptake of CO2 in cement infrastructure (carbonation) offsets about one half of the carbonate emissions from current cement production (*Friedlingstein et al., 2020*)."

[7] EN 16908:2017+A1:2022

PART D: CLOSING REMARKS

Concrete NZ thanks you for the opportunity to provide feedback. After all, while the cement and concrete industry is responsible for less than 2 percent of New Zealand's gross greenhouse gas emissions, it plays a significant part to deliver resilient infrastructure for a changing climate, and also in the construction of renewable electricity generation. The industry has demonstrated its commitment towards becoming net zero by investing into technologies and low-carbon supplementary materials supply chains in the past. Now, the roadmap and follow-up research project are aimed to lay the foundation for further emissions reductions. Despite their individual low contribution to New Zealand's emissions reduction journey, every step helps, and should be explicitly recognised in the proposed regulatory regime for Carbon Capture, Utilisation, and Storage (CCUS).

Yours faithfully

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Rob Gaimster

CHIEF EXECUTIVE