

Submission to Ministry for Cities, Environment, Regions and Transport on Proposed Changes to the New Zealand Emissions Trading Scheme Regulations 2026

July 2026

Introduction

The Aggregate and Quarry Association (AQA) is the industry body representing quarrying companies which produce 45 million tonnes of aggregate and quarried materials consumed in New Zealand each year. The New Zealand Limestone Producers Association (NZLPA) is a sub-group within the AQA, and this submission is on behalf of our members producing limestone products.

Funded by its members, the AQA has a mandate to increase New Zealanders' understanding of the need for aggregate, improve our industry and users' technical knowledge of aggregate and assist in developing a highly skilled workforce within a safe and sustainable work environment.

We welcome the opportunity to provide feedback on a Ministry for Cities, Environment, Regions and Transport (MCERT) consultation document, [“Proposed Changes to the New Zealand Emissions Trading Scheme Regulations 2026”](#).

Submission focus

The consultation scope includes general feedback from submitters on the ETS scheme.

In this submission, we focus on the issue of CO₂ emissions from the calcination of limestone in burnt lime and hydrated lime manufacture, and their subsequent recarbonation during their use in certain industrial processes. This is not recognised as a removal under the Climate Change Response Act 2002 (CCRA) and secondary statutory instruments. The concrete industry faces a related issue, the lack of recognition of carbon uptake in hardened, exposed concrete, a natural process in which atmospheric CO₂ becomes absorbed into concrete and turns into tiny calcite (CaCO₃) particles over time.

We have raised the same issue in the past, however, in a different context, and the solution we proposed was different to the recommendation we make in the present submission. A copy of our submission to the Ministry of Business, Innovation and Employment on “Proposals for a Regulatory Regime for Carbon Capture, Utilisation and Storage (CCUS)” (August 2024) is attached in Appendix 1.

Executive Summary

New Zealand manufacturers of hydrated lime for use in water purification in municipal water supply and certain industrial processes face inaccurate CO₂ emissions liabilities under the New Zealand Emissions Trading Scheme (ETS).

This is because the use of hydrated lime as listed above leads to the precipitation of calcium carbonate (CaCO₃), which removes dissolved CO₂ from water, and sequesters it permanently. This chemical reaction is called recarbonation.

Our calculations show that hydrated lime used in water purification has net emissions of 44% of that of manufacturing burnt lime (CaO), which is then made into hydrated lime (Ca(OH)₂). That amounts to solely the emissions from calcination.

The proposed solution is to insert into regulation a definition of burnt lime (CaO) that excludes CaO that is manufactured into hydrated lime for use in water purification processes and CO₂ absorption processes. This will achieve accuracy in the National Greenhouse Gas Inventory and in the operation of the ETS system, and benefit hydrated lime manufacturers and their customers.

Recommendations

The NZLPA and AQA recommend that MCERT propose that the government:

1. Insert into section 3 of the Climate Change (Stationary Energy and Industrial Processes) Regulations 2009 a definition that says: “burnt lime (CaO) is the product of the calcination of limestone or calcium carbonate (CaCO₃), and excludes CaO used in the manufacture of hydrated lime (Ca(OH)₂) for use in water purification in water treatment, food processing and CO₂ absorption.
2. Engage with the NZLPA and the AQA on developing and implementing the above arising from the industrial use of burnt or hydrated lime, in water treatment and food processing, and in relation to the original emissions from lime calcination.

Emissions from Hydrated Lime manufacture and use

Hydrated lime has the chemical formula Ca(OH)₂ and is used in a variety of industrial processes, e.g. water purification for municipal water supplies, sugar manufacture, and certain other industrial processes.

This material is emissions intensive to produce because it entails heating limestone or calcium carbonate (CaCO₃) in a kiln at close to 1,000 degrees C, to produce burnt lime (CaO). The emissions are caused in two ways:

- Energy emissions from the combustion of coal in the kiln
- Calcination emissions from the splitting of CaCO₃ into CaO + CO₂

To make hydrated lime from burnt lime, water is added. No further CO₂ emissions arise from this part of the manufacturing process.

Use of hydrated lime – carbon sequestration

When hydrated lime is used in water purification, organic contaminants in water react with it to produce CaCO₃, sequestering or recarbonating the same amount of CO₂ that was produced during the calcination of limestone.

This result is attested in international research, for example, a 2023 report commissioned by the European Lime Association (EuLA), titled [LIME-AS-A-NATURAL-CARBON-SINK.pdf](#)

“Studies show that in applications like purifying drinking water, the carbonation rate amounts to 100 %, meaning the full amount of process CO₂ generated during lime production, is captured when this lime is used to produce drinking water. This CO₂ is permanently captured and is not released to the atmosphere as the lime has reverted to limestone – CaCO₃.”

Reference: Grosso M., Biganzoli L., Campo F. P., Pantini S., Tua C. 2020 Literature review on the assessment of the carbonation potential of lime in different markets and beyond. Report prepared by Assessment on Waste and Resources (AWARE) Research Group at Politecnico di Milano (PoliMI), for the European Lime Association (EuLA). Pp. 333.

The Australian Drinking Water Guidelines describe how hydrated lime is used in water purification to produce drinking water, and state: *"The sludge resulting from water softening consists mainly of calcium carbonate, or a mixture of calcium carbonate and magnesium hydroxide. This sludge is generally dense, stable and inert"*.

Issue

Hydrated lime manufacturers are required to account in the ETS system for calcination emissions that are later eliminated via the sequestration process that is inherent in the use of the product.

This failure in the carbon accounting methodology causes inaccuracies in the National Greenhouse Gas Inventory, and over-charging of hydrated lime manufacturers under the ETS.

Proposed Solution

Data from Webster's Hydrated Lime Limited shows that 56% of kiln emissions from lime manufacture are calcination emissions. Refer to Appendix 1. for the detailed calculation.

The policy implication is that lime manufacturers should have to declare only 44% of their kiln-related CO₂ emissions under the ETS - when making hydrated lime, and when this product is used in municipal or industrial water treatment or purification processes for CO₂ absorption.

One way of resolving the issue would be to insert a definition of burnt lime (CaO) into section 3 of the Climate Change (Stationary Energy and Industrial Processes) Regulations 2009. This definition would have an exclusion for CaO used in the manufacture of hydrated lime for water treatment and food processing. In this way, manufacturers of hydrated lime for the above uses would not have to account in the ETS for calcination emissions in the lime kiln, because this CO₂ has been, or will be sequestered in the subsequent use of the product.

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Appendix 1.

Submission to Ministry of Business, Innovation and Employment on Proposals for a Regulatory Regime for

Carbon Capture, Utilisation and Storage (CCUS)

6 August 2024

Introduction

The Aggregate and Quarry Association (AQA) is the industry body representing quarrying companies which produce 45 million tonnes of aggregate and quarried materials consumed in New Zealand each year. The New Zealand Limestone Producers Association (NZLPA) is a sub-group within the AQA, and this submission is on behalf of our members producing limestone products.

Funded by its members, the AQA has a mandate to increase New Zealanders' understanding of the need for aggregate, improve our industry and users' technical knowledge of aggregate and assist in developing a highly skilled workforce within a safe and sustainable work environment.

We welcome the opportunity to provide feedback on a consultation document, [Proposals for a Regulatory Regime for Carbon Capture, Utilisation and Storage \(CCUS\)](#).

Submission focus

This submission concerns the issue of CO₂ emissions from the calcination of limestone in burnt lime and hydrated lime manufacture, and their subsequent recarbonation during their use in certain industrial processes. This is not recognised as a removal under the Climate Change Response Act 2002 (CCRA) and secondary statutory instruments; however, this is what the process is.

The concrete industry faces a related issue, the lack of recognition of carbon uptake in hardened, exposed concrete, a natural process in which atmospheric CO₂ becomes absorbed into concrete and turns into tiny calcite (CaCO₃) particles over time.

Recommendations

The NZLPA recommends MBIE to:

- Classify lime recarbonation as a form of CCUS
- Note the NZLPA's support of the Concrete NZ and Straterra submissions, which address the issue of recarbonation in concrete, a related processes
- Recognise this category of removal by amending the CCRA to no longer require manufacturers to report calcination emissions from lime manufacture, and, therefore, no longer require them to be ETS participants for that purpose, in respect of hydrated lime use in water treatment, food processing and in tanneries
- Investigate in more detail the use of lime in industrial and other downstream economic activities in New Zealand as part of policy development
- Engage with the NZLPA in carrying out the above

Key points

The NZLPA is seeking the following outcomes from this consultation, drawing on listed topics from the consultation document:

- **How CCUS activities should be treated under the Emissions Trading Scheme;**

Add a new category of CCUS – recarbonation of burnt or hydrated lime from its use in industrial processes, specifically in water treatment, food processing, and in tanneries.

In 2022 lime manufacture in New Zealand reported emissions of 101,252 tonnes of CO₂ equivalent (Environmental Protection Authority, Emissions Returns Report 2023). These comprise both calcination emissions, and emissions related to the firing of coal in a kiln to 930°C. See below for calculations of the emissions percentage to be attributed to calcination only.

- **What type of monitoring regime should be imposed for CCUS;**

This is not necessary – overseas research shows that for water treatment, 100% of the calcination emissions from lime manufacture are almost immediately captured and stored as precipitated calcium carbonate on the use of the product. The use of hydrated lime in sugar manufacture and in tanneries has analogous features to its use in water treatment, the common factor being the neutralisation of acidity in water.

Note that the precipitated CaCO₃, which is usually collected as a sludge and disposed of to landfill, has extremely low solubility.

- **How liability for CO₂ storage sites should be managed;**

Given the above, not applicable.

- **How the consenting and permitting regimes should work for CCUS;**

Amend the Climate Change Response Act 2002 to recognise and provide explicitly for the CCUS that arises from the industrial use of lime, in relation to the calcination emissions from the original calcination of limestone.

- **Whether there are any barriers to enabling the utilisation of carbon captured.**

Given the above, not applicable. The process in New Zealand concerns CCUS

Answers to consultation questions

1. Do you agree that the government should establish an enabling regime for CCUS? Please provide any further information to support your answer.

Yes. This regime should recognise the 100% and immediate CCUS arising from the industrial use of burnt or hydrated lime, in water treatment and food processing, and in relation to the original emissions from lime calcination.

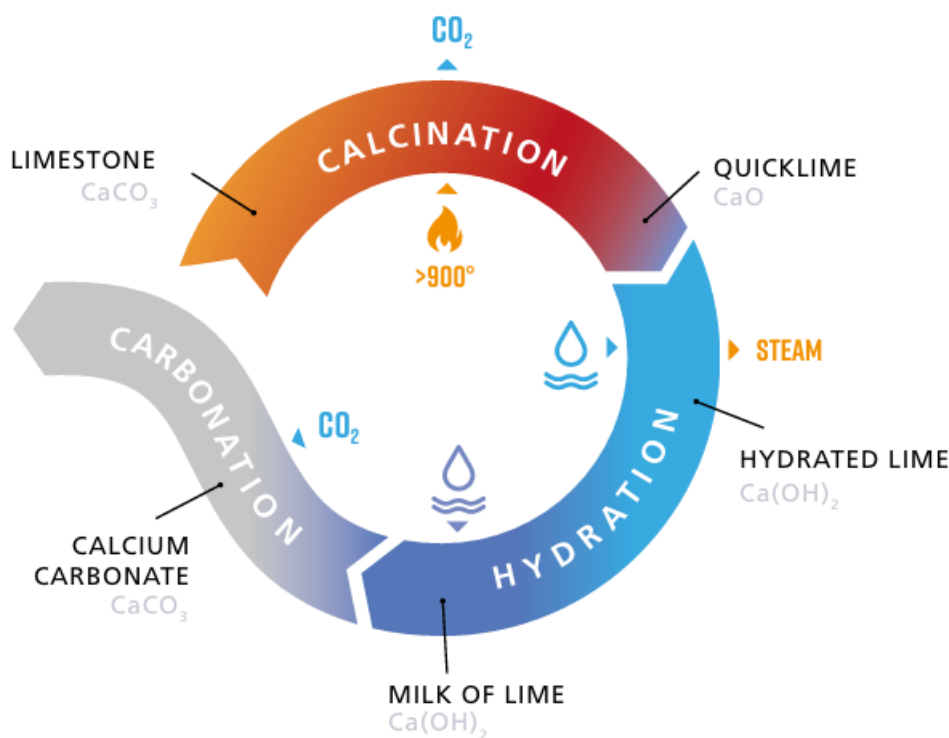
Our reasoning is based on overseas research. In November 2023 the European Lime Association (EuLA) developed a [policy position](#) on carbonation. The use of lime is best described in EuLA's words:

"Lime is one of those usually unseen products that has a profound effect on our daily lives. It is used in numerous industrial processes including steel manufacturing, building/ construction, food industry, agriculture, and many environmental applications to name just a few. It has been used all throughout history, such as when the Romans used lime mortar to build their empire. Today its versatile and unique characteristics help the construction and manufacturing industries optimise their products and it plays an important role in farming, food production and water treatment."

EuLA refers to literature research it commissioned in a paper titled [Lime as a natural carbon sink](#). This says in its introduction of the industrial use of lime products:

*“Studies show that in applications like purifying drinking water, **the carbonation rate amounts to 100 %**, meaning the full amount of process CO₂ generated during lime production, is captured when this lime is used to produce drinking water. This CO₂ is permanently captured and is not released to the atmosphere as the lime has reverted to limestone – CaCO₃.”*

EuLA provides a process diagram for the life cycle of limestone – lime manufacture – and the CCS of calcination emissions during the industrial use of lime.



It is important to note that not all industrial processes deliver 100% recarbonation of calcination emissions.

The literature review carried out by PoLiMi found the following rates of recarbonation in the following industrial processes:

- Aluminium, 12%, over time
- Steelmaking, 5-18%, over 3-6 months
- Mixed air lime mortars, 20%, over the life of a building
- Flue-gas treatment, 32%, immediate
- Hemp lime bricks, 55%, over the life of the building
- Air lime mortars, 80%, over the life of the building
- Pulp and paper, 93%, immediate

Note that processes concerning metals manufacture, and the exposure of hardened lime mortar to air are fundamentally distinct to the processes at issue in New Zealand, i.e. water treatment, and the closely related pH neutralisation processes in water in food processing industries such as sugar manufacture, and in tanneries.

2. Do you agree with our objectives for the enabling regime for CCUS? Please provide any further information to support your answer.

Yes. In particular, the objective of “environmental integrity” which we interpret to mean accurate carbon accounting for lime manufacture and subsequent industrial use, and recarbonation of

the calcination emissions from lime manufacture, in respect of water treatment and in related processes.

3. Should the ETS be modified to account for the emissions reductions achieved using CCUS? If so, how do you think it should be modified?

Yes. A new section in the Climate Change Response Act 2002 is needed to codify:

- CO₂ emissions from the calcination of limestone to produce lime (see calculations provided under the answer to question 8)
- CO₂ capture and storage during the industrial use of lime, in water treatment and related industries, which produce precipitated CaCO₃ as a waste sludge, collected and disposed of to landfill

The legislative or regulatory response should be to require lime manufacturers to account only for the fossil fuel component of the lime kiln operation (which already occurs), provided the product is used in water treatment or related industries.

That would minimise the administrative burden in fully and appropriately accounting for the dynamics of carbon in the limestone – lime – CCUS life cycle.

4. Do you agree that all CCUS activities should be eligible to receive recognition for the emissions captured and stored? If not, why not?

This submission concerns only the current, non-recognised CCS that occurs as an integral part of the industrial use of lime. This source of CO₂ capture and storage should receive recognition, for accurate carbon accounting within the ETS system, as discussed above.

6. In your opinion, which overseas standards for monitoring, verification and reporting of CCUS-related information should New Zealand adopt?

Not necessary in the case of CCUS of calcination emissions from the industrial use of lime because the research referred to shows:

- 100% of CO₂ capture and storage in the form of precipitated CaCO₃ from the industrial use of lime, in water treatment and related industries
- The chemical reaction is almost immediate in its effects

7. Is there any other information that CCUS project operators should be required to verify and report? Please reference the relevant overseas standards where applicable.

In complying with the ETS, the lime manufacturer should report to the regulator, its customers of the product and tonnages, and the use to which the product will be put, i.e. water treatment or related industries. The regulator would respect the confidentiality of this information.

8. What methods should be used to quantify CO₂ removal and storage in CCUS projects?

A stoichiometric approach can be taken because the chemical reactions are well understood and well documented. We provide calculations over the page, based on data from Webster's Hydrated Lime Limited:

0.3 tonnes of coal used per 1t of burnt lime (CaO)

0.6t of coal-related CO₂ emissions per 1t of CaO

1t of limestone or calcium carbonate (CaCO₃) contains 440kg of CO₂

Associated with every 560kg of CaO is 440kg of CO₂, recalculating

1t of CaO has 786kg of calcination emissions, recalculating

56% of kiln emissions from lime manufacture are calcination emissions

The policy implication of the above calculations is that lime manufacturers should have to declare only 44% of their kiln-related CO₂ emissions under the ETS.

For an idea of scale, in 2022 the ETS-relevant emissions from lime manufacture were 101,252tCO₂e, or approximately 0.13% of New Zealand's total gross greenhouse gas emissions.

Lime manufacturing emissions should be recognised in law (using the above figures) as:

- 44% – coal-related emissions, 44,551tCO₂e (reported and eligible for industrial allocation under the ETS)
- 56% – calcination emissions, 56,701tCO₂e (removed from ETS reporting requirements, as a mechanism of recognising CCUS of this component)

Note: further confirmation is required to ensure that all of the above emissions reported for lime manufacture concern the downstream use in water treatment, and related industrial processes.

13. Do you agree the proposed approach on liability for CO₂ storage sites aligns with other comparable countries (like Australia)? If not, why not and how should it be changed?

Not applicable to CCUS from the industrial use of lime. Precipitated CaCO₃ is a waste product that is disposed of to landfill, thereby permanently storing the captured CO₂.

21. Are inconsistencies in existing legislation for consenting and permitting impacting investment?

Potentially. The risk arises of carbon leakage if fair and accurate carbon accounting for lime manufacturers (including the effects of subsequent use) is not introduced, as the level of industrial allocation under the ETS is progressively reduced over time under the CCRA.

22. Should the permit regime for CCUS operations be set out in bespoke legislation or be part of an existing regulatory regime (such as the RMA, EEZ Act, the CMA or the Climate Change Response Act 2002)? Please give reasons for your answer.

We propose targeted amendments to the CCRA to provide the following:

- Recognition of CCUS in the industrial use of lime
- Recognition that 100% of calcination emissions are captured and stored, and that this occurs almost immediately on the use of lime in an industrial process, ie water treatment and food processing, as an integral part of the process
- Require the lime manufacturer to account only for fossil-fuel related kiln emissions in the ETS

In this way, the CCUS that occurs in the limestone – lime manufacture – lime use – recarbonation life cycle is adequately recognised in the ETS system.

Concluding remarks

New Zealand's task of reducing GHG emissions, in playing our part in global climate change action under the Paris Agreement is not an easy one.

Where New Zealand can reduce emissions, we as a country should. That includes improving the accuracy of emissions accounting, and recognising permanent removals where they occur.

Recarbonation of lime is an example of a natural process, inherent in the industrial use of lime products, where the calcination emissions of lime manufacture are subsequently captured and stored, a form of CCUS.

In the case of water treatment, overseas research shows the level of recarbonation of calcination emissions is 100% and almost immediate. Food processing, e.g. sugar manufacture, and tanneries use hydrated lime for an analogous purpose, to neutralise the pH of water used in the industrial processes. Recarbonation into a calcium carbonate sludge is the process by which pH neutralisation of water occurs.

The NZLPA would welcome engagement with MBIE officials to scope how lime recarbonation can be recognised in law and other relevant statutory instruments, to appropriately reduce the exposure of lime manufacturers to the ETS, and to reduce New Zealand's GHG emissions via accurate carbon accounting.

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