STRUCTURAL ENGINEERING SOCIETY NEW ZEALAND

Emissions Reduction Plan 2 2024

Submission to the Ministry for the Environment

Manatū Mō Te Taiao

21st August 2024

Executive Summary

As a technical society for structural engineering practitioners, our feedback is focused on reduction of emissions associated with the built environment.

The initiatives that are currently proposed for inclusion in the upcoming Emissions Reduction Plans (ERP2 & ERP3) fall well short of what scientific consensus tells us is necessary to meet the Paris Agreement goal, and are predicted to fall short of meeting our Nationally Determined Contribution (NDC). We urge the government to strengthen the current proposals so that a quantifiable pathway to net zero emissions can be demonstrated, without placing undue burden on the emerging generation to make up for missed opportunities. This pathway needs to rely on proven existing technologies, and focus on the delivery of projects that deliver quantifiable emissions reductions.

Given that the Built Environment is a direct contributor to our national emissions profile, responsible for in the order of 15% national carbon dioxide emissions, there appears to be an obvious gap in the ERP2, with almost no reference to the strategies and potential abatements to be made in this sector. Given that significant emissions reductions will be needed in the building and construction sector by 2050, it is crucial that consistent signals are given to the market to maintain progress and guide investment decisions. It took nearly 3 years to get industry alignment around the approach to regulation of whole-of-life embodied carbon that was signalled in ERP1, which is now in place. It is vital that the building and construction market continues to have the necessary certainty on this long-term goal to reduce embodied carbon and improve operational efficiency, so that the existing industry momentum is maintained.

We strongly support the introduction of regulations that will incrementally introduce a cap on embodied carbon in new buildings. This will play an important role in encouraging adaptive reuse of buildings and building materials, and is likely to result in a significant reduction in demolition waste.

About SESOC

The New Zealand Structural Engineering Society (SESOC) is a collaborating technical society of Engineering New Zealand, with a membership of approximately 3500, most of whom are practising structural engineers. The majority of our members will be directly affected by this proposed reform. We also work collaboratively with other disciplines in associated areas such as Geotechnical and Fire Engineering. SESOC employs a part time Executive Officer and we work closely with Engineering New Zealand who manage many of our operational needs. SESOC otherwise runs on the good will and volunteer efforts of our Management Committee and Membership.

SESOC has close links with overseas Structural Engineering Professional bodies such as IStructE (UK), SEAOC (California) and Engineers Australia.

ENGINEERING NEW ZEALAND TECHNICAL GROUP

SESOC's objectives are:

- To promote the science, art and practice of structural engineering;
- To ensure the advancement and dissemination of knowledge relating to structural engineering; and
- To provide a forum for structural engineering practitioners to communicate amongst themselves and to the public at large

This submission has been prepared by members of the SESOC Management Committee. It is intended to reflect the views of the wider membership of SESOC and member feedback has been sought in relation to our views. SESOC has also encouraged our membership to engage with the framework, and make their own submissions during this consultation period. Our message to our membership reaches over 3000 structural engineers, and we have had good feedback that it not only brought the framework and consultation to their attention, but also fostered discussion in the design offices, and captured some engineers' attention and got them thinking about upskilling in this area.

SESOC Feedback on the draft ERP2

General Consultation Questions

CLIMATE CHANGE STRATEGY

As practitioners in the engineering and construction industry, we applaud parliament's bipartisan commitment to the Climate Change Response (Zero Carbon) Amendment Act. This commitment provides the continuity and confidence that is crucial to the commercial and industrial sectors as they build towards a resilient and sustainable future for New Zealand.

The 5-yearly emissions reduction plans provide scope for the government of the day to adopt specific methodologies and advance specific priorities that reflect the opportunities and constraints of the day, while remaining focussed on a consistent and quantifiable overarching goal.

It is important that the proposed strategies are adequate to meet our emissions reduction goal. We note the IPCC's April 2022 report which says that, to achieve the Paris Agreement goal, we need a reduction of 48% below 2019 levels for net CO_2 and 43% for net overall GHG emissions by 2030. The initiatives that are currently proposed for inclusion in the upcoming Emissions Reduction Plans (ERP2 & ERP3) fall well short of what scientific consensus tells us is necessary. Government projections also indicate that current policies will fall short of meeting our Nationally Determined Contribution (NDC) by approximately 93 million tonnes of CO_2. We urge the government to strengthen the current proposals so that a quantifiable pathway to net zero emissions can be demonstrated, without placing undue burden on the emerging generation to make up for missed opportunities. This pathway needs to rely on proven existing technologies, and focus on the delivery of projects that deliver quantifiable emissions reductions.

The government has indicated particular support for:

- Adopting the most cost-effective approaches to reducing our carbon footprint
- Partnering with industry-led initiatives
- Supporting business confidence
- Making it cheaper and easier to deliver low-carbon buildings and infrastructure.

Our submission identifies a range of opportunities which align with these priorities.

Consultation question 0.3:
What, if any, other sectors or areas do you think have significant opportunities for cost-effective emissions reduction?
Response: Page 104-105 of the ERP2 discussion document lists sector-specific policies being proposed, but the built environment is not directly referred to. There are significant opportunities to make cost-effective

emissions reductions in this sector, and these are outlined in a section dedicated to the Built Environment below.

BUILT ENVIRONMENT

Background

The term 'built environment' refers to the human-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks or green space to neighbourhoods and cities, and is closely related to supporting infrastructure such as water and electricity supply.

The "Pillars of the Government's climate strategy" recognises that "to build resilience, we must invest in our infrastructure and built environment." (page 28). The extreme weather events in early 2023 highlighted the need for **adaptation** projects to improve our resilience to changes in environmental conditions. Since the built environment is a direct contributor to our national emissions profile, representing in the order of 15% of our national carbon dioxide emissions, emissions **abatement** projects will also be necessary in order to address climate risks and meet our net zero targets by 2050.

Given that significant emissions reductions will be needed in the building and construction sector by 2050, it is crucial that consistent signals are given to the market to maintain progress and guide investment decisions.

ERP1 proposed the introduction of mandatory reporting and incremental caps on embodied (and operational) emissions at a building level, given effect through the existing regulatory system (ie Building Code and Building Consent process). This concept received broad support from across the industry, and there is international evidence that it is an impactful first-step towards the overall reductions needed to contribute to the ERP reduction budgets. It took nearly 3 years to get industry alignment around the approach, which is now in place. It is vital that the building and construction market continues to have the necessary certainty on this long-term goal to reduce embodied carbon and improve operational efficiency, so that the existing industry momentum is maintained.

Recommended actions:

In a lot of cases the technology is available to implement lower carbon materials and processes, and the interest in making a change to a lower emissions solution is there, however the business case is preventing large-scale change. In many situations low-carbon solutions are deemed to be approximately cost-neutral, but the business case is influenced by risk factors such as a lack of industry knowledge/experience, or concern about unforeseen regulatory barriers.

To facilitate this shift we see the following drivers of change the Government could take, in order of effectiveness:

1. **Signal intent to regulate**

- We recommend that regulation of embodied carbon and operational efficiency for buildings is included in ERP2. Regulation is commonly used to facilitate change within the building sector, and serves to create demand for change with commercial providers.
- Even if the government decides that regulatory change is not appropriate in the current term of government, signalling an intent to regulate in future will be a significant catalyst for the continuation of industry efforts (e.g. in waste sorting, recycling, supply of low carbon materials, implementation of improved energy efficiency and hygrothermal performance technology).
- It is important that carbon emissions in the building sector are quantified, since you cannot manage what you are not measuring. Reporting of carbon metrics as part of the Building Consent and Code of Compliance Certification process should be made mandatory, providing important information to guide future policy settings (e.g. setting emissions caps). Alongside mandatory, there are other ways that industry-led efforts could be supported in the short term. For example, reporting requirements could be published and a national database could be implemented, making it cheaper and easier for building designers to navigate this process. Incentives could be offered to encourage voluntary carbon reporting (e.g. access to a contestable fund of carbon credits for building owners, tax rebates, or subsidised consenting costs).

2. **Targeted investment**

Worthwhile investments can be made in various sectors of the industry, and should target both plant/capital investment and R&D. Investment should be contestable based on the most cost-effective emissions reduction opportunities available. For example, in the material supply industry:

- **Structural steel** - the Government Investment in Decarbonising Industry (GIDI) Fund was recently used to invest in an electric arc furnace at the Bluescope Steel factory in Glenbrook, which will reduce NZ's carbon emissions by 800,000 tonnes annually. This is a recent example of the type of capital investment that can be made now, which will make it cheaper and easier for the building and construction industry to adopt low-carbon materials and processes in the coming years.
- **Concrete** - the "Roadmap to Net-Zero Carbon for Aotearoa New Zealand's Concrete Industry" was published in 2023 by Concrete NZ. This offers an excellent example of the momentum within the industry towards meeting our emissions reduction goals. Since cement is the most carbon-intensive component of concrete, the roadmap identified the largest potential reductions in carbon emissions as coming from "supplementary cementitious materials" (SCM's), which can partially replace the cement in a concrete mix. Fly ash and blast furnace slag are the most widely known, standardised and used SCM's, but both are obtained from high-temperature, coal burning processes (coal power stations and steel manufacturing respectively). These are generally imported and suffer from intermittent availability, and both are associated with sunset industries from a carbon emissions perspective. Concrete NZ have identified volcanic ash and pumice deposits as potential SCM's that could be obtained locally in New Zealand. This is a known technology internationally, but further research and development is required in order to quantify the performance of these SCM's in the New Zealand context, and to carry out environmental impact assessments to determine the accessibility of this resource. This is an example of a worthwhile R&D investment.
- **Timber** - in the last 5 years New Zealand lost our first supplier of Cross-Laminated Timber (CLT) when the XLam factory moved from Nelson to Australia. Fortunately, Red Stag timber were able to invest in a new CLT manufacturing facility in Rotorua, and have begun supplying the local market. A report by Dr Andy Buchanan for Te Uru Rākau, New Zealand Forest Service, Ministry for Primary Industries (MPI) concluded that it would be feasible to use 1,300,000 cubic metres of logs (producing 650,000m^3 timber at a 50% conversion rate) within the New Zealand buildings industry. This represents only 6% diversion of NZ's timber exports, but would require 10 more Red Stag factories to provide sufficient processing capacity. We support the government's intention to make strategic investments to remove this bottleneck in NZ's timber processing industry, which will also provide wider economic benefit. (Reference: https://www.mpi.govt.nz/dmsdocument/52834-Carbon-footprint-of-New-Zealand-buildings-)

3. **Use procurement to support industry**

- **Buildings** - inconsistent demand is a significant barrier to capital investment in new construction technology in the NZ construction industry. Modular housing is an example of an area where significant productivity gains and emission reductions could be achieved through investment in production facilities. However, this sector of the industry has seen numerous business failures in recent decades, partly due to lack of regulatory support for innovation, and insufficient project pipelines to support cashflow. We recommend that government procurement policies are used to support investment in low-carbon materials and construction processes. Bipartisan agreement on the approach to emissions reductions through procurement is important, to provide sufficient certainty for the industry. The Ministry of Education is a leader in the application of low-carbon design principles on selected projects, and there is an opportunity to replicate this success across other government departments.
- **Infrastructure** - PAS 2080 is a standard for managing carbon in infrastructure (which has recently been expanded to include buildings). It looks at the whole value chain and aims to reduce carbon and cost through intelligent design, construction and use. It relies on contractors to set emissions reduction goals, and monitor their progress to ensure continuous improvement. This standard is increasingly used in the UK, and is now being referenced by transport agencies in Australia. We recommend that the government consider the specification of PAS 2080 for use in significant infrastructure projects (e.g. over $100 million). This would require contractors to be validated for compliance

with the standard, and require a carbon management plan to be prepared for each project. This will support an industry-led approach to emissions reduction.

4. Citation of standards

The transition to net zero emissions requires an accelerated pace of change within the buildings and construction industry. In the past, industry has provided support for standards development, and technical updates have been prepared by volunteers with limited resources. The lack of standards (or slow development and approval of standards) is often a barrier to new technologies, materials and processes being used. For example, the current design standard for timber buildings dates from 1993, despite major advances in technology, materials availability and construction practice over the last 31 years. A long-awaited update has been drafted and published, but has not yet been cited in the NZ Building Code.

A lack of standards (acceptable solutions and verification methods) creates significant barriers to the specification of low carbon materials. These barriers include more complex design processes, less consistency across the industry, triggering of requirements for peer reviews which usually result in longer consent processing times, and making low-carbon products riskier and more expensive for clients. These factors lead to reduced demand for low carbon products and materials across the industry.

To address these issues, we recommend:

- Increasing investment into creating and clarifying compliance pathways. In this case, regulation is likely to improve confidence and efficiency - making it cheaper and easier to build sustainable buildings and infrastructure.
- Reviewing and adopting international best practice. Given the size of our market, it will not always make sense to create NZ-specific standards. In many cases, a brief NZ annex could be published to ensure consistent interpretation of an international standard for use in NZ conditions (e.g. covering local earthquake hazards, material properties, etc), acknowledging that this approach needs to be managed careful so the resulting document is appropriate and accessible to users.
- The process of standards development and maintenance needs to be driven by paid professionals, and given sufficient priority to keep up with the pace of change in the industry. Updating the building regulatory framework to provide timely support for industry adaptation also requires greater focus.

Specific comments on timber standards are provided in the section on "Forestry and wood processing".

5. Support for industry-led initiatives

- **Environmental Product Declarations** - materials suppliers could be assisted with creating environmental product declarations (EPDs) to be used in carbon measurements.
- **Certification schemes** - there may be opportunities for the government to support industry initiatives to promote the adoption of international certification schemes by NZ contractors and suppliers (e.g. PAS 2080 for contractors, Responsible Steel Certification for importers/suppliers).
- **Education and resources** - industry organisations (such as Engineering NZ's technical groups, Steel Construction NZ, Concrete NZ, Timber Unlimited) could be supported with funding for the development and delivery of educational resources to upskill the building and construction sector to deliver low carbon buildings. The Structural Engineering Society (SESOC) has recently partnered with BRANZ to develop top tips for low carbon design (reference: https://www.sesoc.org.nz/wp-content/uploads/2024/05/SESOC-Top-Tips -V1-2024.pdf). We intend to continue to support growth in knowledge and skills in low carbon design for structural engineers - role modelling the direction that we are confident that the industry needs to take. We also have plans for an industry-led embodied carbon database for New Zealand buildings. This is intended as a pilot for a future national database which would form part of the regulatory system, and we would welcome government support for this industry-led initiative.

6. Consider carbon price adjustment for imported materials

As mentioned earlier, decarbonisation of the domestic construction materials industry will require

investment in new plant and processes, and research and development on how to implement available technology in the domestic market. This investment becomes difficult to justify if imported materials such as steel and cement/clinker can be sold in the domestic market without carbon charges (e.g. ETS units). The ETS currently provides industrial free allocations to emissions-intensive and trade-exposed (EITE) industries, but this approach will need to be adapted in future to boost efficiency improvements and innovation, and to encourage substitution of low-emission alternative products.

Border carbon adjustments (BCAs), which add emissions pricing to imported products, would "level the playing field" between domestic and offshore supply, and enable a full emission price signal to be passed to consumers to change behaviour. In the past this option has appeared to be too complex to implement unilaterally, both technically and politically. However, we note that the European Union introduced a Carbon Border Adjustment Mechanism in 2023. We recommend that the government considers future introduction of BCAs, aligning these with international best practice. Initially, BCAs could be limited to key commodities where implementation would be relatively straightforward (e.g. iron and steel, cement, engineered timber, fertiliser, aluminium). Implementation of a regional BCA system could be discussed with close trade partners like Australia and other Pacific nations.

7. **Bolster government capacity**

   The urgency and scale of change required to achieve the climate targets set by the Climate Change Response (Zero Carbon) Act creates an argument for expanding the government's expertise and capability to provide action and leadership in this area over the next 25 years.

Chapter 5: ENERGY

Chapter 5 "Energy" says that "the Government intends to support green building practices in New Zealand, and work to establish a clearer picture of this is underway. We're interested in exploring this topic further as part of ERP2." (page 56).

There are significant opportunities to make cost-effective emissions reductions in this sector, and these are outlined in the section on "Built Environment". These opportunities can be summarised as follows:

- **Introduce regulation** of embodied carbon and operational efficiency requirements for buildings (or at least signal that this remains an important component of our pathway to net zero emissions by 2050, and take interim steps to ensure that we are well prepared for effective implementation).
- **Targeted investment** - making contestable funds available for the most cost-effective emissions reduction initiatives. These could include capital investment in plant, or research and development.
- **Use procurement to support industry -** to generate a pipeline of low-carbon projects with bipartisan support. Reference best practice in NZ and overseas when specifying carbon management and performance requirements.
- **Citation of standards** - including adoption of best practice from other jurisdictions, development of local standards where necessary, and investing in professional support for maintenance and citation of standards within the regulatory framework.
- **Support industry-led initiatives** - including Environmental Product Declarations, certification schemes, and professional development for industry practitioners.
- **Consider carbon price adjustment for imported materials -** aligning a future scheme with international best practice, potentially focussing on key commodities where implementation would be relatively straightforward (e.g. steel, cement, engineered timber, aluminium).
- **Bolster government capacity** - to support the urgency and pace of change in the buildings and construction sector over the next 25 years.

Chapter 8: FORESTRY AND WOOD PROCESSING

The following excerpts from Section 8 "Forestry and Wood Processing" outline the government's strategy for engineered timber products:

- *"Boosting wood processing will result in more long-lived wood products that can store carbon during their lifetime. This will also expand the economy and provide regional jobs and export potential by generating more high-value products. There are significant opportunities for growth in products such as modern engineered timber in construction, which could replace emissions-intensive materials such as steel and concrete, while also storing carbon.*
- *Other government actions outside the forestry portfolio will also boost wood processing. These actions include increasing domestic demand for wood products, liberalising the rules holding back the building and construction sector, and expanding the access of wood products from New Zealand to overseas markets.*
- *Addressing the settings to support building with wood More long-lived wood products such as engineered construction lumber, plywoods and panels can store carbon, offsetting our gross emissions. The Government is committed to addressing any regulatory barriers to enable building with wood. This policy is strongly linked to how the Government is considering the building and construction sector. It is also closely linked to the domestic wood-processing policies outlined above. We are currently receiving advice on what actions we could take."*

Comments on government strategy
We whole-heartedly endorse the intent to expand the economy and provide regional jobs by boosting timber processing capacity in New Zealand, generating more high-value timber products for use in the building industry. We also endorse the government's commitment to addressing regulatory barriers that suppress demand for engineered wood products.

Consultation question 8.3: How large should the role of wood in the built environment in New Zealand's climate response?
Response – Wood products should play a larger role, more than currently, in New Zealand climate response.

However, it is important to note the following clarifications:

- **End-of-life for harvested wood products** - international life-cycle assessment standards (e.g. BS EN 15978) dictate that timber elements are reported as a carbon removal from the atmosphere in the "raw material supply" stage of the building life cycle. However, this stored 'biogenic carbon' has the potential to be released back into the atmosphere at the end-of-life stage. Therefore, building life-cycle assessment will place limited value on carbon sequestration in timber buildings. End-of-life carbon fluxes are significant for timber structures. The climate benefits of timber can therefore be maximised by prolonging the life of structures, reusing timber components or recycling into new materials, all of which keep sequestered carbon out of the atmosphere. It is important that the government develops a strategy for dealing with harvested wood products at the end-of-life stage (e.g. developing design standards for prolonging the life of timber buildings, developing standards for recycling of timber products, and supporting development of industries that convert timber waste into fuel.
- **Prioritising cost-effectiveness** - cost-effective opportunities for emissions reductions exist across a range of construction materials and processes. Emissions reductions should be achieved in the most efficient and cost-effective way possible across all building materials. Given the current NZ strategy to increase the amount of land devoted to forestry to help meet our climate commitments, it makes sense to sustainably manage and utilise that forestry resource for economic and social benefit. Hence, timber construction will have an important role in our future, and rapid upscaling of our domestic production capacity is worthwhile. However, this should not be at the exclusion of decarbonisation efforts involving other materials, which will also have vital ongoing roles in our construction industry.

- **Native forests** – These are an important sequestration tool that must be used in conjunction with exotic forests. They are also considered more resilient in preventing unwanted carbon releases due to fire and disease, and in supporting biodiversity (which provides both economic and ecological benefits. Scientifically evaluating what the right 'mix' between the two is for NZ's future economy, biodiversity, and emissions goals, across NZ's varied landscapes, is however complex (Buswell 2019, https://esr.org.nz/wp-content/uploads/pdf/climate-crisis/carbon-dynamics-in-new-zealands-native-forests-v1.4.pdf)

  We recommend that Scion and BRANZ are supported to lead a science-based workstream to evaluate this topic further, across the multiple possible time-scales that this can be considered for: to then provide to Government and Industry (and the public) for decision making and policy setting on this.

- **Education & Upskilling** – To rapidly grow the capability of NZ's small Building Engineering Sector to deliver on the new form(s) of Engineered Timber Construction for buildings, the sector will need Government support in the development and delivery of educational / training resources to upskill the building design and construction sector in the safe and efficient, and carbon-saving, delivery of these.

Addressing regulatory barriers

Refer to our general comments on citation of standards for the Built Environment. Somewhat counter-intuitively, an increase in utilisation of engineered wood products is being hampered by a ***lack*** of regulation. New Zealand regulations are lagging behind the needs of the industry. This makes it more difficult to demonstrate compliance with the NZ Building Code than it should be, and increases the risk profile for building developers who are considering timber construction.

We would like to draw the government's attention to the following regulatory barriers that hamper demand for engineered wood products:

- There is a lack of clear Verification Method compliance pathways for timber – e.g. CLT design, NZS/AS 1720 remains in draft (not cited), difficulty incorporating European Technical Assessments (ETA's) for proprietary products like fasteners in NZ.
- There is a need for greater nationwide consistency in fire engineering design, including reviews by Territorial Authorities and FENZ.
- There are regulatory barriers to using internationally sourced products.

Chapter 10: WASTE

1. Standards development to facilitate the reuse of materials

There is an opportunity to proactively invest in the development of materials standards and design standards that will control and regulate the way that recycled building materials are used, including quality assurance processes, strength grading for structural materials, and acceptable solutions governing durability.

At the moment, a lack of standards can act as a barrier to the specification of recycled materials in new construction. Appropriate design standards and acceptable solutions need to be developed to govern the use of recycled materials, and rapidly incorporated in the NZ Building Code. This will give building designers, owners and constructors the confidence to specify and use these products, leading to an increase in demand, with resulting financial incentives for the companies who recycle building and construction materials.

2. Develop circular economy database

The availability of quality data is an important initial step in the transition to a circular economy, especially in the construction sector (buildings and infrastructure). For example, building passports can track

the journeys of products, components, and materials in the urban environment. Initiatives by the government to address data infrastructure, similar to the data repository infrastructure being piloted in Europe/UK, are needed sooner rather than later.
As a starting point, all publicly funded projects should have consistent and publicly accessible data sets containing information relevant to the circular economy (e.g. building passport information, asset product and materials composition, and asset condition). This data management system could be connected to the database of embodied carbon (Life-Cycle Assessment) and operational efficiency metrics that are collected as part of the building approval process.

3. Facilitate adaptive re-use of buildings

Most of the buildings that will exist in 2050, when Aotearoa New Zealand is aiming to be net zero, have been built already. Therefore if we only concentrate on reducing emissions of new buildings, it will take a long time to achieve the significant emissions reductions from the building stock as a whole. Improving the utilisation and operational efficiency of our existing building stock is one of the top ways we can reduce emissions attributed to the building sector.
Investments could be made in research and pilot projects to retrofit New Zealand buildings for operational efficiency, especially hygrothermal performance and winter heating.
We strongly support the introduction of regulations that will incrementally introduce a cap on embodied carbon in new buildings. This will play an important role in encouraging adaptive reuse of buildings and building materials, and is likely to result in a significant reduction in demolition waste.
Research also indicates that improving seismic resilience of existing buildings will have a positive effect on life-cycle carbon emissions for our building stock.

We are pleased to provide this submission to The Ministry for the Environment and would be happy to provide further information if required.

In the meantime please feel free to contact the following people in relation to this submission:

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