Building for Climate Change:

Building for Climate Change
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SUBMISSION ON 'BUILDING FOR CLIMATE CHANGE: WHOLE-OF-LIFE EMBODIED CARBON EMISSIONS REDUCTION FRAMEWORK'

1. New Zealand Steel Limited and Pacific Steel (NZ) Limited (jointly, *NZ Steel*) welcome the opportunity to provide feedback on Ministry of Business, Innovation and Employment's (*MBIE*) Building for Climate Change Programme (*Programme*).

2. NZ Steel recognises the challenge that climate change presents to New Zealand and the world. NZ Steel (along with its parent company BlueScope) supports the Paris Agreement on climate change, recognising that the global economy must transition to net zero by the middle of this century to limit global increases in temperature. For the steel sector to make a significant contribution, the future of iron and steelmaking will need to be centred around breakthrough steelmaking technology. We see it as crucial that governments and regulators (including MBIE) adopt the right policy tools to support this transition. The building construction sector, including the building materials manufacturing and importing sector, play an important role in a transition to a low emissions economy.

3. NZ Steel is principally interested in the Whole of Life Embodied Carbon Emissions Reduction Framework (*Framework*) which is the focus of this submission. Appendix A to the submission includes NZ Steel's response to the specific consultation questionnaire related to the Framework.

4. By way of context, we must highlight that the Programme is yet another major regulatory hurdle for NZ Steel to manage and comply with, the others being transmission pricing reform, increased obligations under the Emissions Trading Scheme (*ETS*) and the current lack of an enforceable trade remedies regime in NZ. These are regulatory "compliance costs" that most of our offshore competitors are not currently burdened with.

NZ STEEL AND STEEL IN THE CONSTRUCTION SECTOR

5. NZ Steel is New Zealand's only domestic fully integrated producer of flat, rolled steel and long products for the building, construction, manufacturing and agricultural industries. We produce steel to New Zealand's high standards, contribute over 4000

jobs (directly and indirectly) to Auckland and Waikato and strengthen New Zealand's local, regional and national economy.

6. Since 2010 both New Zealand Steel and Pacific Steel have been subject to the ETS. As a result, our steel already incorporates a cost of carbon and we are already heavily incentivised to reduce the emissions intensity of our manufacturing process. We are also required to collect and retain emissions data and file annual emissions returns to the Environment Protection Authority.

7. Steel has, and will continue to have, a critical role in the construction sector. As a building material, in many cases there is no ready substitute for steel – it is crucial for MBIE to factor this point into its Framework policies and decision-making processes. In particular:

    - Steel is extremely ductile meaning it does not buckle, distort, warp or splinter. These properties make it an essential component in earthquake prone areas of New Zealand.[1]

    - When exposed to fire steel has superior structural performance relative to other materials. In the event a fire takes hold of a building, the use of steel is especially important for columns supporting vertical load, internal connections supporting the flooring, and flooring systems/ceilings. The latter provides the separation needed to minimise the spread of fire across the floor of origin. These elements provide a greater chance of structures being able to sustain a fully developed fire attack without collapse. All the impacts of incentivising specific products or practices need to be very carefully considered to ensure New Zealand avoids catastrophic safety risks in future. The Grenfell Tower fire disaster in London is a tragic example of how a combustible material can exacerbate the spread of fire in a building and result in multiple preventable fatalities.

    - The longevity and durability of steel (including its resistance to the impacts of weather) means that buildings constructed with steel tend to have longer useful lives and lower maintenance and replacement requirements. Consequently, the embodied carbon associated with their construction is extended over a longer period with less need for replacement or structural changes.[2]

    - Steel is also infinitely recyclable – this feature is unmatched by other material groups. Unlike most other building materials, steel from demolished buildings can be easily recovered and recycled, resulting in almost zero construction waste. There is a very healthy international steel scrap market, which means that steel as a building material is uniquely positioned to be able to contribute to the circular economy.[3]

    - Finally, steel can easily be prefabricated, which not only contributes to improved construction time and cost efficiencies, but also contributes to reduced construction material waste – which is a major issue for other building material alternatives.[4]

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[1] https://www.pacificsteel.co.nz/products/reinforcing-bar-and-coil/seismic-300e/
[2] https://www.worldsteel.org/en/dam/jcr:5b246502-df29-4d8b-92bb-afb2dc27ed4f/Sustainable-steel-at-the-core-of-a-green-economy.pdf
[3] https://www.worldsteel.org/steel-by-topic/sustainability/materiality-assessment/recycling.html
[4] http://www.prefabnz.com/Downloads/Assets/13422/1/PrefabNZ%20HOW%20TO%20Prefab%20Book%202019.pdf

8. NZ Steel holds a pivotal role in ensuring that our local construction sector has security in the supply of high quality, reliable product that can be promptly delivered. For example:

    - There is a considerable difference in the lead times for imported steel (commonly three months or more) and our domestic steel (five weeks or less). Taking the recent Auckland Harbour Bridge accident as an illustration, the plate steel required for the replacement section of the Bridge was able to be supplied by NZ Steel within a day, in contrast with the far longer lead times that would have occurred if imported steel were used.

    - Domestic steel production also provides resilience for New Zealand in the event of natural disasters, international supply chain disruptions, trade wars, or global commodity shortages.

9. Additionally, steel produced domestically is steel produced in accordance with our strict environmental, employment, social, safety and quality standards. Steel produced by NZ Steel is made for New Zealand conditions, including (and especially) our unique seismic conditions. By comparison, there is limited visibility or assurance as to the environmental, social, employment or safety conditions in which most imported steel is produced.

10. Market conditions are extremely difficult for NZ Steel at present. NZ Steel is currently undergoing a major restructure aimed at ensuring the survival of steelmaking in New Zealand. We are therefore pleased that MBIE has opened the Framework up for consultation at an early stage to enable careful analysis and consideration of the wider implications of such a policy. Were New Zealand to lose its only domestic steel producer, it is unlikely that steel manufacturing would return, and New Zealand's construction sector would be permanently reliant on imported steel products for all applications that require steel.

NZ STEEL'S OVERARACHING COMMENTS ON THE FRAMEWORK

11. NZ Steel's specific comments on the Framework are included in the submission questionnaire attached as Appendix A.

12. Without limiting those specific comments, NZ Steel's key overarching comments on the Framework are that:

    - The Framework needs to be clearly 'material-agnostic' and identify and **avoid unintended consequences.**

    - Evidenced based decision-making will only be achieved if issues related to the **veracity of embodied emissions data** (especially for imported supply chains) are resolved from the outset.

    - The Framework **must provide for a full life cycle approach** to avoid locking in inappropriate material selections that artificially ignore end of life emissions and the reuse or recyclability of materials. This approach must be considered and factored into the Framework from the outset (and certainly before reporting obligations commence).

    - **A decision on an embodied emissions cap is premature.** The embodied carbon data analysis and verification process needs be given time to develop until real system integrity can be achieved.

13. Each of these are considered in greater detail below and in Appendix A.

Need for material-agnostic policies that avoid unintended consequences

14. NZ Steel considers that it is important that the Framework remains strictly agnostic to building material type. Building material selection should be driven by engineers, designers and specifiers and should be chosen on a project-by-project basis. Choosing "winners" from a range of building materials based on a narrow application of carbon intensity would likely lead to a whole range of unintended consequences:

    - Inappropriate overuse of materials driven by emissions calculations without consideration for other impacts including social, environmental, safety and economic;

    - Greater build time and build cost (the minimisation of both being the stated objective of several New Zealand governments now);

    - The unique advantages of specific products including steel could be undermined, ignored or jeopardised;

    - Over-reliance on inappropriate building materials may create issues in the built environment with respect to building longevity, safety, performance or strength (e.g. leaky buildings);

    - Increased barriers to achieving the urban intensification goals of the National Policy Statement on Urban Development 2020 (which requires plans to enable vertical builds of no less than six storeys in many urban areas) resulting in further urban sprawl and impacts on transport emissions; and

    - Fixed policies that could stifle innovation through strict methodologies that do not take into account new technologies or processes.

15. It is also important to ensure that the use of new and relatively untried building materials should only be incentivised where there is sufficient understanding of their long-term performance. The Framework must not create an overwhelming incentive to use such products without appropriate consideration of their long-term performance in New Zealand conditions (which are on average far more seismic and damp than other countries).

16. Without careful consideration of the incentives that the Framework imposes, there is a real risk of the policy having unintended consequences that could have long-term impacts on the sector (such as New Zealand's recent leaky building experience and end of life asbestos remediation issues) or catastrophic safety risks.

Concerns with veracity of embodied emissions data requiring resolution

17. While there is confidence in emissions data related to steel production in New Zealand,[5] there is no single internationally accepted methodology or practice for the accurate recording of embodied GHG emissions in relation to steel. This problem is compounded by the fact that the disclosed emissions data for much of the steel coming into New Zealand is very difficult (or much of the time, impossible) to verify – meaning that MBIE will have little/no assurance as to the actual embodied carbon in such products. We suggest that MBIE considers the following:

[5] New Zealand Steel's emissions data is well documented.

- Imported steel sold into the New Zealand market is commonly made up of a mix of steelmakers – often the last tonnes off the lines. Consequently, they are sourced from multiple suppliers. To accurately report embodied emissions from those products, it is necessary to have information from a range of manufacturers. Application of a global average would be a crude approach unless it could take into account this issue of blending.

- An analogous example of this is the current AS/NZS steel quality standards regime. There have been many public examples of product information certificates for imported steel being questionable and at times outright fraudulent - resulting in integrity issues. There is considerable risk of such issues arising in relation to embodied emissions – particularly where steel is purchased through intermediaries. Similar incentives will be at play, that is, "forced disclosure" in order to meet market demand and commercial incentives.

18. NZ Steel considers that overseas steel production emissions data should not be accepted at face value, MBIE must ensure that any embodied emissions data either:

    - is specific to the relevant manufacturing plant, includes all relevant life cycle stages, follows a standardised methodology and is subject to a robust independently verified calculation process (e.g. EPDs developed under the EN 15804 standard and verified by EPD Australasia[6]); or

    - if unverified or unspecified, then the relevant product should either:

        - not be used in New Zealand buildings; or

        - Should be treated with considerable scrutiny suspicion as to its embodied carbon and be the subject of a material (~20%+ increase above the global generic average).

19. Both of these policy levers will help incentivise "real compliance" and add teeth to the Framework. This will also avoid domestic steel production being disadvantaged due to its required adherence to clear embodied emissions calculations and regulation. Alternatively, MBIE could consider a mechanism that would use a normalised average figure for embodied carbon on all steel products (domestic and imported) – this approach would remove the data verification issues mentioned above. However, the methodology used to arrive at the normalised data point for steel would require careful research and testing – also, the issues around "unintended consequences", "end of life emissions" would still need to be addressed.

Need to consider end of life emissions from the outset

20. While the Framework purports to relate to the "whole of life" of the embodied carbon of buildings, the initial scope specifically excludes the later stages of the building life cycle. NZ Steel considers it is inappropriate to exclude the maintenance, demolition and waste stages of building materials (modules C1-C4), even on an interim basis for the initial scope of the policy. This approach will lead to poor outcomes as products that have no ability to be recycled and which produce GHG emissions during their decomposition stages will effectively receive preferential treatment and be locked in by the initial phase of the Framework.

21. The Framework's exclusion of post construction life cycle stages negates the benefits gained from the use of materials that can be reused or recycled, such as steel. As

[6] http://epd-australasia.com/wp-content/uploads/2018/09/Australasian-Annex-to-GPI_3.0-2018.pdf]

noted above, steel is infinitely recyclable and New Zealand has a globally interconnected and active scrap steel recycling market. Unlike alternative materials, scrap steel does not go to landfills. Consequently, steel in New Zealand buildings should be viewed as part of the circular economy and should be calculated on the basis that steel will be recycled and not go to waste. NZ Steel is concerned that as currently proposed, the Framework supports a linear rather than circular economy.[7]

22. NZ Steel considers that a better approach would be to ensure the Framework calculates embodied emissions over the useful life of the material (lifespan) **and** its ability (and likelihood) of being reused or recycled. This policy approach would be consistent with New Zealand's move to a circular economy. Where relevant, it could be supported through regulatory requirements for the recycling of building materials. Focusing the Programme on lifespan and reuse/recycling potential better reflects MBIE's notion of building owners 'leasing' construction materials and products rather than buying them enabling them to be used in other buildings in the future with appropriate foresight.[8]

Embodied emission cap not justified yet

23. While NZ Steel supports the calculation and reporting of embodied emissions data (subject to addressing concerns with unintended consequences, data veracity and full life cycle emissions) NZ Steel does not support the Framework's proposed imposition of a cap on embodied emissions as currently stated in the Framework.

24. No such cap should be formally considered until the above three issues have been thoroughly considered, tested and resolved (i.e. unintended consequences, data veracity and consideration of full life cycle). NZ Steel suggests that a calculation and reporting obligation alone will encourage transition to low embodied emission alternatives where they exist and where such substitution is appropriate.

25. Alternatively, NZ Steel suggests that MBIE considers imposing a cap on a 'comply or explain' basis. This would provide a strong signal to reduce embodied emissions where possible but would allow a building developer to explain the basis for the use of materials that exceed the cap on embodied emissions.

26. We would be happy to discuss any aspect of this submission with MBIE officials and look forward to sharing our knowledge regarding the issues raised in our submission.

27. We would also like to extend an invitation to relevant officials to come to the Glenbrook steel mill and Pacific Steel's Otahuhu plant to see our businesses in action, meet our people and engage directly with our community.

Yours sincerely,

Gretta Stephens

Chief Executive

[7] We note that other submitters on the Programme refer to the circular economy as the "cradle-to-cradle" approach.

[8] MBIE's Framework page 7.

APPENDIX A

QUESTIONNAIRE - BUILDING FOR CLIMATE CHANGE

1. Contact details (optional)

Name:	Nathan Jones
Company/organisation	New Zealand Steel Limited and Pacific Steel (NZ) Limited (jointly)
Email address:	Nathan.jones@bluescope.com

2. Are you making this submission on behalf of a business or organisation?

☐ No

☒ Yes (please tell us which Company/Organisation you are making this submission on behalf of)

New Zealand Steel Limited and Pacific Steel (NZ) Limited (referred to below jointly as ***NZ Steel***)

3. Would you like to:

Remain anonymous in the published consultation summary report	☒ No	☐ Yes
Receive a copy of your own submission	☒ No	☐ Yes
Receive future updates on Building for Climate Change programme	☐ No	☒ Yes

4. Are you willing to be contacted in relation to your submission if MBIE has questions about your response?

☐ No ☒ Yes

5. The best way to describe your role is:

☐ Architect ☐ Building owner ☐ Geotechnical Engineer

☐ Building Consent Authority/Officer ☐ Electrician ☐ Structural Engineer

☐ Builder ☐ Engineer – other ☐ Plumber/Gasfitter/Drainlayer

☒ Building product/material supplier ☐ Fire Engineer

☐ Other: _____

OVERARCHING APPROACH OF THE BUILDING FOR CLIMATE CHANGE PROGRAMME

6. Do you agree or disagree that the Building and Construction Sector needs to take action to reduce emissions?

☐ Strongly disagree ☐ Disagree ☐ Neither ☒ Agree ☐ Strongly agree

Please tell us why.

NZ Steel agrees that the building and construction sector is a substantial contributor to carbon emissions and that consequently, it is appropriate for it to take action. All sectors of the economy need to play their part in reducing GHG emissions and transitioning to net zero.

However, it is important that any policy to drive such action:

- Takes a robust and holistic approach to embodied carbon that adequately takes into account the full life cycle, waste and recyclability of building products.
- Considers inherent data reliability issues where that data has not been independently verified and cannot be readily audited.
- Takes into account the full costs and benefits of such a policy such as through an assessment of the likely and unintended policy impacts including on building quality and impacts on building material supply chains.
-

7. What support do you think you or your business would need to deliver the changes proposed in the frameworks?

NZ Steel suggests that support in the following areas would assist us, our customers and the wider construction sector:

- A realistic implementation timeframe and process which ensures existing policy tools have been fully assessed prior to progressing to the next step. See response to question 24 which notes NZ Steel's support for policies related to the calculation and reporting of embodied carbon emissions but opposes the imposition of a cap as a blunt instrument. NZ Steel considers that calculation and reporting of embodied carbon data will drive the use of low-emission alternatives where such alternatives exist and their use is appropriate. See paragraphs 23-25 of our submission for more detail.

- Close collaboration between the private sector and central government is needed on the definition of a methodology and on supporting technology that assesses embodied carbon in building products that include all key life cycle stages of the product (including end-of life and reuse/recycling) and a process for third party verification of the assessment. This is necessary to ensure a level playing field with imported steel is achievable.

- To support the appropriate recognition of product transport emissions, NZ Steel suggests that construction products should have clear declaration obligations with respect to the origin of the building materials (including all travel, from source to market). This, when combined with standardised emission factors for typical modes of transport (e.g. sea, road, rail) for the calculation of transport emissions, such as the ones provided by the NZ Ministry of Environment in the 2019 Summary of Emission Factors, will allow for robust transport emission calculations.

- It would also be useful to ensure that MBIE officials have a good understanding of the specific complexity and nuances affecting steel use in the New Zealand construction sector. NZ Steel is happy to work with MBIE to develop this understanding.

- Creating material-agnostic policies that are adaptable so they support rather than discourage innovation. Policies and calculation methodologies need to be able to respond to changes in product manufacturing and manufacturing site-specific processes so embodied carbon calculations are accurate and encourage process innovation.

8. Are there any barriers that are currently preventing (or discouraging) you, or your business, taking action to reduce emissions?

☐ No ☒ Yes

Please identify the main challenges.

Yes. It is important for MBIE to understand that steelmaking is not like other industries – emissions are not readily or easily avoidable. Coal is not combusted in the production of steel as a heat source. Rather, coal combustion is a necessary ingredient to the production of steel (it acts as a reductant that removes oxygen from iron) and there is currently no commercially viable substitute technology to produce virgin steel without coal/carbon.

Notwithstanding the above, NZ Steel is always exploring the various potential decarbonising technologies to understand the scale of emissions reductions that they are likely to deliver, the potential costs and timeframes for implementation and suitable enablers to implementation. NZ Steel's operations at Glenbrook and in Otahuhu are already heavily incentivised by the current ETS to reduce the emissions intensity of our manufacturing process. The market price of NZUs in the ETS provides a tangible cost on each tonne of CO2e that is emitted, and therefore each tonne reduced is of clear value to the business.

Consequently, reducing our emissions intensity is an ongoing endeavour and we are continuously looking to improve process and emissions efficiency both in steelmaking and our wider operations. By way of illustration:

- NZ Steel has heavily invested in a co-generation plant at Glenbrook producing 580,000 MWhs of electricity per annum from off gases and waste heat;
- NZ Steel is targeting year on year emissions reductions to achieve a 12% reduction in greenhouse gas (*GHG*) emissions intensity from steelmaking operations by 2030; and
- NZ Steel has recently realised a waste savings initiative by using slag (a by-product of steelmaking) to reduce limestone and coal consumption – this new method reduces Glenbrook's GHG emissions by circa 20 000 tCO2 pa.

The above measures are aimed at reducing the GHG emissions from the portion of our direct or indirect emissions that are able to be reduced, or in other words, are 'compressible'. However, the majority of our GHG emissions are related to the steelmaking process and are unavoidable and largely 'incompressible' given current technology.

Technology therefore acts as a current barrier to further emissions reductions in the short-term. There are considerable international efforts aimed at developing zero carbon steelmaking processes (including green hydrogen steel). Through our position as part of the BlueScope Group and as members of key international organisations at the forefront of low emissions steel research (including World Steel, the Sustainable Steel Council and the Net Zero Steel Pathway Methodology Project), we have an advantage of being able to maintain oversight and involvement in such studies. However, the development of such technologies **at a commercially scalable level** takes time and it is important that policies such as Building for Climate Change are realistic with respect to the pace of technological advancement as well as the need for, and lack of ready alternative to, steel products.

9. Do you think the Building for Climate Change work programme should include the following building classifications?

	No	Yes

Housing	☐	☒
Communal Residential	☐	☒
Communal Non-Residential	☐	☒
Commercial	☐	☒
Industrial	☐	☒

If you have indicated that you believe one, or more, building classifications **should not** be included, please tell us why

NZ Steel agrees that it is logical to address all building types in policies that involve awareness and capacity building.

However, with respect to any proposed caps on embodied carbon, broad building categories would ignore the clear fact that different buildings require different building materials and therefore have different embodied carbon requirements. For example, steel has superior spanning capabilities that may make it the only material that is appropriate for certain industrial and commercial buildings.

Consequently, NZ Steel considers that it is essential to not only address a range of building classifications but also to ensure that the policy takes into account the realistic demands and requirements of such a wide range of relevant building types and classes.

FRAMEWORK: WHOLE OF LIFE EMBODIED CARBON EMISSIONS REDUCTION

24. Do you agree or disagree that the Building for Climate Change work programme should include initiatives to reduce whole-of-life embodied carbon in New Zealand buildings?

Strongly disagree	Disagree	Neither	Agree	Strongly agree
☐	☐	☐	☒	☐

Please tell us why.

NZ Steel agrees that it is appropriate for the Building for Climate Change programme to include initiatives to reduce whole of life embodied carbon.

However, the nature of those initiatives requires careful consideration:

NZ Steel **supports** initiatives that require **calculation and reporting** of embodied carbon, provided:

- **Embodied emissions data is reliable and universally robust**: The veracity of data of the embodied emissions for imported products must be ensured. Imported building products should be held to the same standard as New Zealand manufacturers. Domestic manufacturers' Environment Product Declarations (EPDs) are more readily auditable and, in the case of domestic steel manufacturing, are verifiable through statutory obliged emissions returns which are required to be filed annually with regulatory authorities pursuant to the Emissions Trading Scheme. Local products must comply with NZ laws and regulations and by extension can be easily audited at any time.

  Imported products must be held to a similar verified and auditable methodology. NZ Steel is aware of numerous issues with reported global average emissions factors for

steel products. By way of example, the main generic embodied carbon figures used by World Steel do not account for NZ's comparatively favourable hydro-electricity emissions profile (that component is instead normalised across all countries).[9] Countries elsewhere have identified the issues with relying upon Life Cycle Analysis (*LCA*) data for comparative carbon performance. For example:

- "The Life Cycle Analysis system and PCR and PED processes in place today in the US, do not yet give statistically compatible data for directly comparing the embodied carbon footprint of one material against another, and claims made today to the contrary should be very critically evaluated before believing them to be true".[10]

- "Far more transparency, consistency and rigour in LCA data and methodologies are needed to render material comparison meaningful, especially for policy development".[11]

Consequently, there is a real risk that the use of international emission factors for steel products may underestimate the embodied emissions in imported products and disadvantage local suppliers.[12]

It is important that a hierarchy for data quality is defined in early stages of the process and that it ensures the right incentives are in place for suppliers to generate product-specific data. It needs to be acknowledged that manufacturers that know their products do not perform better than the average in terms of embodied carbon and will have no incentive to produce product-specific data, which can lead to embodied emissions being underestimated for certain products. Without certainty regarding specific robust data, such products either:

- should not be able to be used in New Zealand buildings subject to a cap; or
- should be subject to an embodied carbon calculation that is set at a level higher than the global average (e.g. with a +20% contingency) for embodied carbon. This would encourage specific verification and specific calculations/

See paragraphs 17 to 19 for NZ Steel's policy solution to this issue.

- **Waste and full life cycle considerations are included from the outset**: The Framework's proposed initial scope also excludes the reuse, recovery and recycling potential of materials at their end-of-life (module D). This exclusion negates the benefits from the use of materials that can be reused or recycled, such as steel, thus supporting a linear (rather than circular) economy. The exclusion of the end of life of products can change the overall conclusions of an embodied carbon assessment and potentially bias product selection. This approach will lead to poor outcomes as products that have no ability to be recycled and which produce GHG emissions during their decomposition stages will effectively receive preferential treatment. NZ Steel suggests that a better approach would be to ensure the Framework calculates

[9] International Standard (ISO14404-1) – Calculation method of carbon dioxide emission intensity from iron and steel production.

[10] (Davies D., Johnson L., Doepker B., Hedlund M. (2018) Quantifying Environmental Impacts of Structural Material Choices Using Life Cycle Assessment: A Case Study. In: Pomponi F., De Wolf C., Moncaster A. (eds) Embodied Carbon in Buildings. Springer, Cham. https://doi.org/10.1007/978-3-319-72796-7_6.)

[11] (Stiebert, S; Echeverria, D; Gass, P; and Kitson, L. (2019) Emission Omissions: Carbon Accounting Gaps in the Built Environment. International Institute for Sustainable Development Report, 63pp.)

embodied emissions on an intensity basis taking into account the useful life of the material (lifespan) and its ability (and likelihood) of being reused or recycled.

To meet our emission reduction goals, a key objective of the framework is to increase building material efficiency, and reduce construction waste.

25. What measures, if any, do you think should be put in place to increase building material efficiency? (Select all that apply)

☐ Update regulatory performance requirements to ensure they are appropriate

☒ Incentivise 'lean design'

☒ Remove barriers to the reuse of construction materials

☒ Other (please specify)

NZ Steel considers that the following measures should be considered:

- Removal of barriers to reusing construction materials (either generated in the construction or demolition process), where those materials can be reused without compromising their integrity. This should also include requirements for the recycling of construction materials that cannot be reused or where recycling is more efficient than reuse.

- Efficient methods, tools and data that enable the rapid iteration and optimisation of designs at concept stage e.g. parametric design methodology that compares embodied carbon of different designs and materials at concept stage. This is being enabled through platforms (like Giraffe.build) and could help improve structural and material efficiency.

- Encourage advanced use of Building Information Modelling and associated technologies to improve design. A focus on design is important to minimise the whole of life impact of any construction project. It is important that structures and the materials used in them are designed for long life, resilience and flexibility to accommodate multiple future reuse options without reinvestment in structural alteration and refurbishment. Steel is uniquely placed to assist with this improved design given its strength, durability, and longevity. NZ Steel manufactures a range of standard and high strength steel grades in plate and coil form. High strength steel grades enhance the strength to weight performance in structural steel applications when the design is governed by strength. By maximising the strength grade, a reduced volume of steel can be required in these applications, e.g. columns and primary members. This in turn can result in embodied carbon savings relative to a reference building design that utilises standard steel grades.

- Develop new standard construction contracts and financing mechanisms that encourage early contractor involvement and prefabricated construction to minimise waste and ensure construction efficiencies.

- Steel is a relatively high-impact material on a mass basis. Therefore, it is important that structures are designed for long life, resilience and flexibility to accommodate multiple future reuse options without reinvestment in structural alteration and

refurbishment. A focus on design is important to minimise the whole of life impact of any construction project. NZ Steel manufactures a range of standard and high strength steel grades in plate and coil form. High strength steel grades enhance the strength to weight performance in structural steel applications when the design is governed by strength. By maximising the strength grade, a reduced volume of steel would be required in these applications (e.g. columns and primary members). This in turn can result in embodied carbon savings relative to a reference building design that utilises standard steel grades.

26. What measures, if any, do you think should be put in place to reduce construction waste?

It is important to note that the yield loss (the amount of waste product generated) is very low with steel. By comparison, wood construction materials have much higher creation of waste within both upstream manufacturing and the construction process itself. Regardless, NZ Steel supports any measures that reduce construction waste.

NZ Steel suggests that MBIE takes into account the following:

- Mandatory waste sorting on site should be investigated and mandated by central or local government. Separate bins must be used to separate waste types at source. This will enable recycling and reuse and encourage the reduction of waste to avoid sorting cost and time.

- Policies that encourage prefabrication of construction materials. Prefabrication ensures waste is minimised and is retained at the source of the fabrication where it is more likely to be easily and readily reused (or at the least reduced more efficiently). So long as quality issues are well managed, support for prefabrication could be realised through the development of new contracts and financing innovation as noted above.

27. Using low carbon construction materials and products is identified as another option to reduce whole-of-life embodied carbon emissions.

How could we encourage the use of low carbon construction materials?

The starting position must be that the principal basis for material selection should be the product's suitability for the buildings expected durability/lifespan, safety requirements and intended use. Embodied carbon is an important additional consideration, but must be a secondary consideration.

The most efficient method of encouraging the use of low carbon construction materials is through market-based mechanisms that are material-agnostic. Market methods encourage innovation and enable flexibility for market participants to make their own decisions within a regulatory environment that ensures built environment safety and effectiveness.

Since 2010, both New Zealand Steel and Pacific Steel have been subject to the ETS and this ensures that all domestically produced building materials include a cost of carbon.

However, the ETS (or an equivalent emissions regulation) does not apply to all imported products – and for those that it does apply to, practical enforcement is highly questionable. As a result, imported steel products, that bear no effective carbon cost or regulation will face less

regulatory pressure to reduce their embodied carbon and will be competing with domestic products that already have a cost of carbon and considerable pressure to reduce embodied carbon emissions.

The Programme could assist with encouraging low carbon footprint steel by ensuring that the embodied carbon in imported steel products is robustly assessed and its use regulated. This would ensure that imported emissions-intensive products that have not otherwise faced regulation (or real enforcement) for their embodied carbon are regulated, without adversely affecting New Zealand-made products that are subject to the ETS.

The Framework proposes introducing reporting requirements for whole-of-life embodied carbon in buildings, followed by a cap on whole-of-life embodied carbon for new building projects.

28. Would you support a cap on whole-of-life embodied carbon for new building projects?

☐ Yes ☒ No

Please tell us why.

See response to question 24 and paragraphs 23-25 of our submission. While NZ Steel conditionally supports initiatives that require calculation and reporting of embodied carbon, it does not support initiatives that impose a cap on emissions at the current time.

A cap is a blunt tool and would require considerable differentiation based on a range of factors to be workable. There is a real risk that a blunt cap that does not consider all the factors that result in particular building material selection could result in over-reliance on sub-optimal building materials. Such unintended consequences could create issues in the built environment with respect to building longevity, safety, performance and strength. The New Zealand construction sector's experience with leaky buildings and the very real safety issues experienced at the Grenfell Tower cladding disaster in London suggest that all the impacts of incentivising particular products or practices need to be very carefully considered.

Consequently, NZ Steel suggests that a calculation and reporting obligation alone is likely to be sufficient to encourage transition to low embodied emission alternatives, where such alternatives exist and where such substitution is appropriate.

Alternatively, if MBIE considers that a cap is necessary to drive behaviour, NZ Steel suggests that any such cap should be imposed on a 'comply or explain' basis. This would provide a strong signal to reduce embodied emissions where possible/practicable but would allow a building developer to explain the basis for the use of materials that exceed the cap on embodied emissions. Building regulators would then be able to consider the explanation when assessing the building consent application but would not be obliged to reject the application where such explanation was reasonable and appropriate.

For example, a legitimate explanation for exceedance of a cap could be that steel is necessary to construct a building of a height required by the district plan zoning or with the seismic strength required by the particular site. In respect of the former, NZ Steel notes that the National Policy Statement on Urban Development 2020 specifically requires that urban centres intensify, including through plan provisions that enable vertical builds of at least six storeys. Urban intensification is essential to ensure that New Zealand's transport emissions are reduced. Consequently, were the Programme to result in restrictions on the use of building materials necessary for vertical building projects or increases to the cost/complexity/time

associated with vertical building projects, it could have unintended adverse effects on New Zealand's overall emissions reduction ambitions and policies.

29. Do you think a data repository of embodied carbon from buildings should be established?

☒ Yes ☐ No

Please tell us why.

Subject to resolving the concerns identified in this submission, NZ Steel supports the calculation and reporting of embodied carbon in building and, in principle supports the establishment of a data repository of embodied carbon.

As noted above, NZ Steel considers the following issues require resolution prior to the creation and a calculation methodology and therefore prior to the establishment of a data repository:

- Accurate calculation of embodied emissions that ensures that imported products are subject to the same reporting, verification and auditing standards as New Zealand product manufacturers (see response to question 24);
- Appropriate calculation of full life cycle emissions including those associated with maintenance, demolition and waste (see response to questions 24 and 35);
- Confirmation of the imposition of international emission factors at levels that do not provide imported products with advantages over New Zealand products (see response to question 27);
- Material-agnostic calculation methodologies that are sufficiently adaptable so as to support rather than discourage innovation (see response to question 27).

30. If a data repository was established, do you think this information should be able to be accessed by the public?

☒ Yes ☐ No

Please tell us why.

Yes, subject to the appropriate handling of the matters referred to in respect of question 29, NZ Steel considers that it is appropriate for the repository to be made available to the public.

The Framework will need to consider how it provides for value engineering, procurement, material substitution. This could have impacts on the repository. For example, the repository will either need to be supplied with data following the commencement or completion of construction or will need to be sufficiently flexible to be updated for post-consenting variations and product substitution.

31. Which, if any, of the following factors would make it difficult for people to report the whole-of-life embodied carbon of new buildings, and why?

☒ Lack of an agreed methodology ☒ Inadequate data quality and availability

☒ Lack of appropriate tools or software ☒ Administrative burden on businesses

☐ Other (please specify)

All of the above are likely to present real issues that impact the reporting of whole of life embodied carbon in new buildings. It is expected that such issues are likely to be more pronounced for small residential construction projects given large commercial builds tend to use Building Information Modelling more extensively.

32. What support, if any, do you think will be needed to make reporting embodied carbon a standard part of the design and construction process for every new building project in New Zealand?

See response to question 7 above. To summarise, NZ Steel suggests that support in the following areas would assist us, our customers and the wider construction sector:

- A realistic implementation timeframe and process which ensures existing policy tools have been fully assessed prior to progressing to the next step. Specifically, policy decisions to impose any caps should only be considered following, amongst other things, an assessment of the efficacy of the Framework's calculation and reporting policies and in light of the anticipated changes to the ETS and its increased carbon price signal.

- Collaboration between the private sector and central government is needed on the definition of a methodology and supporting technology to calculate the embodied carbon of products that includes all key life cycle stages of the product (including end-of life and reuse/recycling) and a process for third party verification. This is necessary to ensure a level playing field with imported products is achievable. As a matter of timing, this collaboration process needs to be completed well before any disclosure requirements are implemented.

- Policies must be material-agnostic and adaptable so they support rather than discourage innovation. Policies and calculation methodologies need to be able to respond to changes in product manufacturing and manufacturing site-specific processes so embodied carbon calculations are accurate and encourage process innovation. Without flexibility, policies could reinforce the use of existing products that have existing calculation methodologies.

The framework proposes that reporting of whole-of-life embodied carbon for buildings would be carried out as part of the building consent application process.

33. What impact do you think this proposal will have on the Building and Construction sector?

In addition to the anticipated compliance costs and delays likely to be associated with the proposal, NZ Steel considers there is a material risk of a wide range of unintended or unanticipated consequences.

The performance aspects of the current Building Code are synergistic and do not exist in isolation. For example, there are interdependencies where the selection of one building material can affect the choice of other building materials. The Building Act and Code have achieved a finely balanced calibrated system that counterbalances product cost, safety, performance, efficiency and planning considerations. The imposition of any top down artificial driver (carbon related or otherwise) has the potential to distort that sensitive system and have

unintended consequences. Given New Zealand has a chequered record with respect to the built environment quality, considerable care must be taken to ensure that any changes to the Building Code are not at the expense of the quality of the built environment. There will always be a compromise between embodied carbon and (for example) building longevity and earthquake resistance – MBIE needs to undertake a careful prioritisation exercise (we can see no policy reason why a New Zealand building should have lower embodied carbon if it is at the expense of reducing the life expectancy of that same building and/or (even worse) heightening the earthquake safety risk). In this regard, a careful cost benefit regulatory impact assessment will need to be undertaken that considers:

- whether the emission savings achieved by the Framework justify the costs to the construction sector and wider economy (as well as wider costs including social, health, safety, regional development, employment opportunities and non-climate related environmental costs);

- whether there are any ready alternatives to emissions-intensive products for particular types of buildings (for many applications of steel products there is no ready alternative) and/or whether any incentives to use alternatives would have impacts on safety, performance, and confidence in the construction sector;

- all the market drivers and legitimate reasons that construction projects may rely on emissions-intensive building materials, including how the Framework affects the achievement of those drivers and reasons;

- impacts on the building materials markets resulting from the policy including the ability of construction material supply chains to respond to changes in demand;

- impacts on construction project build time and build cost (the minimisation of both being the stated objective of several NZ governments now); and

- impacts on the ability to achieve the urban intensification goals of the National Policy Statement on Urban Development 2020 (which requires plans to enable vertical builds) and on the risks of adverse effects on urban sprawl with resulting impacts on transport emissions; and

- impacts on the competitiveness of the construction supply chain if there are any constraints on builders being able to change materials (or brands) post-consenting.

Consequently, NZ Steel suggests that MBIE undertakes a detailed regulatory impact assessment of the Framework. This should cover an assessment of the likely benefits and costs (in the broader sense including social, economic, health and safety and environmental) which includes assessment of unintended impacts. NZ Steel considers that it is essential that such assessment is undertaken before the anticipated risks and impacts of this policy start to influence and be priced into the cost of construction. Crucially, NZ Steel considers that such assessment needs to be conducted in tandem with any pilot projects and before the general roll-out of the Programme to public building construction projects – even if it is just the initial disclosure phase.

34. What additional tools or support would be needed to implement this requirement?

MBIE should consider partnering with existing providers to provide standard, “easy to use” calculators that are widely available and accepted. It will also be necessary to provide

support/coaching for building material manufacturers on how to develop and express (EPDs) and how to undertake Life Cycle Assessments of developments.

To avoid delays and frustrations associated with inconsistent approaches, provision of coaching and training on the use of new software and design methods to comply with the policy will be necessary. Such training will be necessary not only for developers but also for building regulators who will be assessing compliance with any such policy.

35. Do you think that requirements for embodied carbon calculations should only include the initial building life cycle stages (product and construction stage)?

☒ No ☐ Yes

Please tell us why.

NZ Steel is strongly opposed to this aspect of the Framework. NZ Steel considers that it is inappropriate for only the initial building lifecycle stages (production and construction) to be included, while artificially ignoring the maintenance, demolition and waste stages. That result is particularly perverse for steel which is infinitely recyclable and where there is an active and robust scrap market that could be supported through further policies (see below).

We do not agree with MBIE's position on page 3 of the Framework that "most significant emissions happen before the building is used" – at least not with respect to steel. That is because buildings constructed with steel have longer lifespans than those constructed with less durable materials and even at the end of that building's lifespan the steel is recyclable. It is therefore appropriate for embodied emissions to be calculated taking into account lifespan and the fact that some materials (including steel will be recycled and will not go to waste). This recycling could be supported further through the mandating of steel recycling to ensure that assumptions regarding a circular steel economy are robust.

NZ Steel considers that it is inappropriate and inefficient for the maintenance, demolition and waste lifecycle phases to be ignored until some future point in policy development. The Framework needs to ensure that the full lifecycle of embodied emissions is addressed from the outset. An artificial view of embodied emissions will lead to poor outcomes as products that have no ability to be recycled and which produce GHG emissions during their decomposition stages will effectively receive preferential treatment and support a linear rather than circular economy. That preferential treatment will have real impacts on manufacturers of recyclable products.

Furthermore, one of the referenced standards (EN 15804) that provides technical guidance on the calculation of embodied carbon indicates that "All construction products and materials shall declare modules A1-A3, modules C1-C4 and module D", the only exception being products that cannot be physically separated from other materials at end of life, are no longer identifiable at end of life as a result of a physical or chemical transformation process, and do not contain biogenic carbon. The exclusion of module D can change the overall conclusions of an embodied carbon assessment and adversely bias product selection.

NZS considers that a better approach would be to ensure the Framework requires calculation of embodied emissions on an intensity basis taking into account the useful life of the material (lifespan) and its ability (and likelihood) of being reused or recycled. Where relevant/necessary, this policy could be supported through regulatory requirements for the recycling of building materials. This policy approach would be consistent with New Zealand's move to a circular economy.

The Framework should also address and encompass emissions associated with maintenance resulting from the failure of cheap, lower quality building materials that are not fit for purpose and require premature replacement. Where low quality materials or materials that are not fit for purpose are used and require premature replacement, the building's actual overall embodied emissions will exceed the level identified in the original building consent. The current proposed exclusion of maintenance emissions and recognition of lifespan in the Framework artificially ignores the reality of building material usage and would enforce short term thinking. The longevity and durability of building materials must be recognised within the Programme to avoid these risks.

To avoid this impact, MBIE should consider ensuring the Framework includes provisions that:

- remove any incentives to compromise building integrity through the replacement of proven building materials (for example through improved building code standards), and/or

- ensure that there is a post consenting verification method that ensures that embodied emissions associated with all building materials, including any non-recyclable materials that are sent to waste, are calculated and regulated.

Alternatively, should MBIE consider other measures that enables weighting of embodied emissions based on intended construction lifespan. This would enable the benefit of quality design and construction materials leading to durability and longer lifetimes to be assessed at the time of calculation. Such a method could potentially also take into account the ability for the materials and/or building to be reused or renovated for a range of purposes in the future.

Finally, we do acknowledge that certain aspects of the demolition and waste stages (i.e. end-of-life) can be complex. In this regard, we would recommend that MBIE allocate some more time to its current sequenced plan to consider this crucial phase of a buildings life – and, in any event, for such consideration to be done well before public buildings are required to report embodied carbon emissions.

36. The Framework proposes limiting the type of building components that would be included in an embodied carbon assessment, excluding components with lower emissions (such as internal fittings).

Do you agree with this proposal?

☒ No ☐ Yes

Please tell us why.

NZ Steel is concerned to ensure that the framework avoids adverse product bias. The exclusion of some materials internal fittings but the inclusion of others would potentially limit innovation and creativity in terms of designing better buildings in the future (for all sorts of reasons including lower carbon footprint).

37. Do you think that reporting on, and ultimately capping, embodied carbon should apply to new building projects only, not refurbishment or demolition projects?

☒ No ☐ Yes

Please tell us why.

NZ Steel agrees that the reporting and capping of embodied emissions should not apply to refurbishment of existing buildings. Imposition of the policy to refurbishment projects could create additional costs that could remove incentives to refurbish existing building stock. Refurbishment rather than replacement represents a substantial benefit from an embodied carbon perspective, particularly when demolition waste is accounted for. The programme should avoid any unintended impacts that would undermine refurbishment proposals that avoid reconstruction.

However, NZ Steel considers that demolition projects should be included in the programme. This could have two major benefits: (a) inclusion of demolition may incentivise renovation rather than replacement of building stock; and (b) inclusion of demolition would provide an opportunity to ensure recycling and the reuse of building materials is incentivised. NZ Steel recognises that many demolition activities do not currently require building consent but suggests that the requirement of a consent which focuses on the consideration of reuse and recycling of building materials would support a circular economy for the construction sector.

38. The Framework proposes that a simplified embodied carbon calculation tool could be used for small buildings but more detailed calculations would need to be provided for large buildings*.

(* Large and small buildings as defined in the framework scope section)

Do you agree with this proposal?

☐ No ☒ Yes

Please tell us why.

NZ Steel agrees with use of a simplified embodied carbon calculation tool for small buildings and more detailed calculation for large buildings.

However, without limiting NZ Steel's wider opposition to blunt embodied emissions caps (see response to questions 24 and 28), NZ Steel considers that it would be inappropriate to impose caps on embodied emissions based only on these two building types. Such classification would be too simplistic to be applied to caps on embodied emissions. In relation to embodied emission caps a more nuanced approach is necessary that takes into account:

- Buildings that have specific stability or longevity requirements that can only be met through products like steel;
- Buildings in locations that face stability issues that require particular building materials (e.g. stability issues, coastal, geotech issues, wind exposure); and
- Buildings with particular importance categories.

Such buildings are likely to have higher and unavoidable demand for products like steel. The Framework needs to ensure that any embodied emissions caps take into account the practical requirements of the type of building, the purpose to which it will be put or is designed to enable, and any sensitivities of the receiving environment.

39. Any other comments on the proposed frameworks?

In the event that the Framework does eventually impose emission caps, NZ Steel considers that it should also include methodologies that enable offsetting of embodied emissions to provide for compliance with the cap. MBIE's stated concerns with respect to offsetting emissions associated with operational emissions do not apply to embodied emissions. Embodied emissions are a single verified volume, it is entirely feasible for carbon offsetting to ensure compliance with any cap. There are numerous examples of robust carbon neutral and offsetting regimes which could be used to ensure the net impact of embodied emissions comply with a given cap.

Offsetting would provide building developers greater flexibility in their potential selection of products and ensure that there was no short or long term net increase in emissions. Offsetting is particularly important in the case of steel where offsetting may enable a bridge between current unavoidable embodied emissions and a future where steel manufacturing innovation/technologies are able to reduce embodied emissions. The imposition of any cap without an appropriate offsetting regime is likely to discourage innovation which may occur over timeframes that are not consistent with the imposition of a cap.