Appendix - Embodied Carbon Study Comments Log

Date	Name	Title	Affiliation/ Organization/ Company	Industry	Comments on Embodied Carbon Study
11/17/2024	Theodore (Ted) L. Clifton				See Embodied Carbon Study Appendix Page 1 - 4
11/17/2024	David Walsh		Dave Walsh Consulting		See Embodied Carbon Study Appendix Page 5 -13
11/27/2024	Will Layden	Vice President, Government Affairs	American Wood Council (AWC)	Represents structural wood products manufacturers in the building materials industry	See Embodied Carbon Study Appendix Page 14 - 18
11/27/2024	Matthew Hinck	Vice President, State Government Affairs	Glacier NW Inc.		See Embodied Carbon Study Appendix Page 19 - 33
11/27/2024	Cory LeeAnn Shaw	Executive Director	WA Aggregates & Concrete Association		See Embodied Carbon Study Appendix Page 34 - 35
11/27/2024	Patrick Hanks	Policy and Research Manager	Building Industry Association of Washington	Represents 8,000 member companies within the residential construction industry	See Embodied Carbon Study Appendix Page 36 - 48
11/27/2024			American Institute of Architects (AIA) Washington Council		See Embodied Carbon Study Appendix Page 49 - 50
11/27/2024 - 11/30/2024	Rachel Wrublik				See Embodied Carbon Study Appendix Page 51 - 55
11/30/2024	Kinley Deller		King County		See Embodied Carbon Study Appendix Page 56 - 59
11/30/2024	Elizabeth Torske (Alyn Spector)	Building Codes Specialist	Cascade Natural Gas Corporation		See Embodied Carbon Study Appendix Page 60 - 61
12/1/2024	Joseph Mayo				See Embodied Carbon Study Appendix Page 62
12/1/2024	Dan Kirschner	Chief Executive Officer	Northwest Gas Association (NWGA)		See Embodied Carbon Study Appendix Page 63 - 65
12/1/2024	Theodore L. Clifton				See Embodied Carbon Study Appendix Page 66 - 70
12/2/2024	Jessie Templeton	Embodied Carbon Service Lead	BRIGHTWORKS SUSTAINABILITY		See Embodied Carbon Study Appendix Page 71 - 72

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Sunday, November 17, 2024 11:20:01 AM

External Email

Submitted on November 17, 2024 - 11:18am

Name
Theodore (Ted) L. Clifton

Email
[redacted]

Phone
[redacted]

Question/Comment
I have attached hereto a copy of my initial comments on the proposed Report on Carbon Codes, given orally on Friday, 11/15/2024. I added to that report a brief biography, supporting my expretise in these matters.

Attachment

- comments-on-sbcc-carbon-study-with-resume-11-15-24.pdf53.17 KB

Comments on SBCC Carbon Study 11/15/2024

The following is a copy of my spoken comments from the November 15th SBCC meeting. I expect to be making additional written comments as I complete my research into the matter. I have preceded my comments with a brief resume, indicating my experience and knowledge of the subject matter:

In March of 2023, I was selected by the NAHB (National Association of Home Builders) to be their representative to the first ever ICC (International Code Council) Committee on Carbon Codes. At their one and only meeting on May 25th, 2023, I pointed out some of the inconsistencies with the way carbon was being measured and accounted for, especially when it came to timber resources. Within a few months, I started to see articles in the New York Times, and elsewhere, bringing up the exact same points I had made.

In 2023 I was vice chair of the NAHB Climate Risk Committee, of which I became the chair in 2024. One of our major achievements (together with the Codes Committee and the Environmental Issues Committee) was to craft a new policy for NAHB on Green House Gas emissions with regard to housing.

I was selected for these assignments because of my long involvement in the energy efficient home building business. I designed and built our company's first third-party verified zero-energy home in 2006, after designing and building a few very nearly zero-energy homes in 2004 and 2005. At the request of other builders, in January of 2008 I started making my zero-energy home plans available through my new company, Zero-Energy Plans LLC, on the website www.zero-energyplans.com . In addition, I defined the Twelve Steps to Designing and Building Zero-Energy Homes (a short video of which can be seen on the zero-energyplans website) and created a four-hour class on the subject. I later expanded the class to eight hours, and have presented it to hundreds of builders across the nation. In January of 2014 I compressed it down to a 1 ½ hour course, which I presented that year at the International Builders Show in Las Vegas, and have since presented to other groups.

Between 2008 and 2011 my design company designed, and my construction company (CVH Inc., dba Clifton View Homes) built numerous third-party-verified zero-energy homes, earning at least one Energy Value Housing Award from the US DOE each year. We were the first and only company ever to earn more than one EVHA award in the same year, when we received three such awards in 2011. One of those was for a National Park Service ranger cabin that earned the US GSA's top award for Government Buildings in 2012. In addition, our companies have earned three National Green Building Awards for Concept and Research, in 2008, 2009, and 2011.

We have continued our winning legacy with the US DOE's Housing Innovation Awards, having earned at least one such award, either as the designer, or the builder, each year since the inception of those awards. In addition to our own awards, at least five builders

have received an HIA award using our plans. Several builders I have trained have also earned numerous National Awards, including HIA awards from the US DOE.
In 2023 the Zero-Energy Home Coalition published their list of third-party verified zero energy homes, and Zero-Energy Plans LLC was listed as the designer of the second largest number of Zero-Energy Dwelling units, after a company out of Colorado with 18 employees. Zero-Energy Plans LLC has no employees, which leaves me as the leading designer of third-party -verified zero-energy homes in North America.

Now for my comments:

I viewed the Study Presentation at the SBCC Meeting on October 18th, 2024, and then reviewed the underlying document a few weeks later. I came up with a list about 3 pages long documenting the reasons why this document was not yet ready to be presented to the State Legislature, other than as a work in progress. The only appropriate action for the Legislature to take is to send this back to the authors, and tell them to get it right. Below are a few of the most concerning issues:

1. Section 3.4 concludes with the sentence **"Applying a whole-life perspective to building would make the realization of high-performance buildings with low-embodied carbon possible".** This should be the guts of the whole thing, but it seems to be buried in this one obscure section. One important fact that was still ignored in the rest of the document is that there are ways you can use a bit more embodied carbon in a building to save more operational carbon over the lifecycle of the building. A concrete thermal-mass slab is an example, which can save about 22% of the combined heating and cooling cost of the building in Western Washington, and even more in Eastern WA, if combined with the appropriate HVAC options. **The 2022 WSEC, on the other hand, does just the opposite with insulation requirements that waste more embodied carbon that can be recovered over the life of the structure.**

2. Most of the proposed Carbon Code would just lead to massive amounts of additional pencil-pushing, without any realization or improvement of the carbon situation, acknowledged by section 5.2.2.2 **"However, reporting itself will not result in the reduction of embodied carbon"!**

3. 5.2.2.3 mentions updating the code over time, to include more and more areas of scrutiny, and tightening restrictions on the total amount of embodied carbon permissible, leaving an open-ended mandate to increase the boondoggle. I will support my use of the term “boondoggle” below.

4. Many of the examples given of other similar State and local programs allow up to double the amount of embodied carbon as the standard reference design as an initial starting point, which would only increase the amount of embodied carbon allowed for many new designs, and push the potential "recovery" farther into the future.

5. The Study proposed using 60 years as the standard lifecycle of a building (Study period), by which the value of embodied carbon vs. operational carbon would be

measured. Our whole problem with carbon in the atmosphere stems from the fact that we are repeatedly rebuilding homes and buildings, instead of building them to be more durable in the first place. If it won't last 100 years or more, we should not be building it!

6. On Page 57 of the report, **"Biogenetic Carbon and carbon sequestration shall be reported separately from fossil fuel GWP". EXACTLY**, but the current way the world is calculating the "biogenetic carbon" (this refers to what I simply call "organic carbon") is exactly the same as the calculation for all other embodied carbon, giving lumber credit for the carbon it has already sequestered over the last hundred years or so of its growing cycle. Once the tree is cut, that process has stopped, and only the return of that carbon to the atmosphere remains, throughout the lifecycle of the building for maintenance and replacement of wood siding and trim, for example, and finally during demolition and disposal of the building at the end of its lifecycle. **THIS FAILURE TO PROPERLY IDENTIFY AND ACCOUNT FOR THE TIMEFRAME OF THE CAPTURE AND RELEASE OF CARBON FROM "BIOGENETIC SOURCES" IS THE REASON THIS (AND ALL CURRENT PROPOSALS WORLDWIDE) WILL FAIL TO REAP THE INTENDED RETURNS IN THE REDUCTION OF CARBON IN THE ATMOSPHERE OVER THE NEXT 60 YEARS.**

The bottom line on “Biogenitic Carbon”, if that is the term we are going to use, is that AT BEST, (if left in the wild) timber (and other sources of biogenetic carbon) is carbon neutral; but as soon as you start applying the harvesting, transportation, manufacturing, and assembly costs, it is a net producer of GHGs, even when you give credit for the next crop being planted and nurtured over it’s lifespan. **THIS LEAVES NOTHING LEFT TO SELL AS “CARBON CREDITS” TO OTHER INDUSTRIES! THIS WHOLE CARBON CREDITS BUSINESS IS WHERE THE BOONDOGGLE COMES IN!**

I have a lot more points I could make, but these are the most critical, and reason enough to send this proposal back to the drawing board.

Theodore (Ted) L. Clifton
[redacted]

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Sunday, November 17, 2024 7:54:47 PM

External Email

Submitted on November 17, 2024 - 07:51pm

Name
David Walsh

Email
[redacted]

Question/Comment
Thank you for the opportunity to comment on the Recommendations for Washington State Embodied Carbon Code Language, dated November 2024. My comments and suggestions are as follows:
• Table 2-1, Transportation: Actual transit distances for some products from the manufacturer to the job site are sometimes unavailable for inputting into the As-built WBLCA model. Some data is straightforward to calculate; other materials have complex and opaque supply chains. I recommend always allowing estimates or using default values in the As-built WBLCA.
• Table 2-1, Construction: Tracking and obtaining actual fuel, water, and electricity use from construction activity is possible, however, it is not business as usual (BAU) and may result in additional project costs compared to the BAU scenario. Potentially there may be additional costs for labor to track fuel usage of the general contractor and all subcontractors and potentially additional submetering of major uses during construction (i.e. cranes, site lighting, temporary heat, water, etc.).
• 2.2.1.3 WBLCA Tools: Is the materials database in the Athena Impact Estimator for Buildings comprehensive enough to satisfy the WBLCA compliance path for a building covered that would be covered under the code proposals (i.e. a relatively large building with multiple covered products)?
• Table 3-1, Code Officials and Enforcement: Code officials' familiarity with embodied carbon varies. I agree that attestations, stamped by the registered design professional and/or attestations by the general contractor are a good method to reduce the review burden on code officials. The attestations shall be to the best of the designer's or contractor's knowledge.
• 3.4, Location in the Code: It's a bit of a stretch to put embodied carbon code language into the Energy Code unless the Energy Code gets renamed the Energy and Carbon Emissions Code and its scope is formally expanded. I recommend that the embodied carbon code language goes into a new chapter, Chapter 36.
• 4.1.1, Allow a Weighted Average: Any code requirement for material carbon caps for concrete should allow for weighted averaging of all mixes in the project as a pathway to achieve the required reductions; this is the case with CalGreen. There will be situations where a specific mix is required and may exceed the GWP limit that mix's strength class, however, other mixes in the project which are under the GWP will offset in equal measure.
• 5.2.1.1, Lessons-learn from Portland: Before drafting code proposals, contact the City of

Portland, the Oregon Concrete and Aggregate Producers Association, and the Northwest Cement Council for lessons learned and feedback regarding the implementation of and compliance with the Portland Low Carbon Concrete Initiative.
• 5.2.2.1, Type of Required EPD: Encourage, but do not require supply-chain-specific EPDs; the requirement for the Material Carbon Cap pathway should be product and facility-specific EPDs.
• 5.2.2, Option 2, Material-Neutral Policy: In addition to the material-neutral precedents cited in the report, consider another material-neutral approach that compares the building's baseline case A1 to A3 emissions with the as-specified/as-installed A1 to A3 emissions for covered products considered in aggregate. In the final calculations, both the baseline case and the as-designed case use identical quantities of products, which are updated at the end of construction. The project's baseline case A1 to A3 emissions are the sum the quantity of each covered product multiplied by the corresponding embodied emissions intensity factor (global warming potential) found in the most recently published industry-average environmental product declaration. The as-specified/as-installed A1 to A3 emissions are equal to the sum of the quantity of each covered product as specified in the contract documents and as-installed multiplied by the corresponding embodied emissions intensity factor (global warming potential) as reported in that specific product's Type III environmental product declaration. A reduction requirement could be expressed as a percent reduction from the baseline case to the as-specified/as-installed case.
• 5.2.2.2, Recalibrating GWP Limits: The proposed GWP limits for concrete parallel the Pacific Northwest regional data from the NRMCA. If the NRMCA publishes more granular data, either at the state- or metro-level, the required GWP limits should be revisited and potentially adjusted with the input of concrete suppliers providing mixes in the affected region.
• 5.2.2.3, Initial Target: In New York and California, the initial GWP limit was set above the industry average. While many projects, but not all, can currently meet targets below the industry average, I recommend setting the requirement initially at 10% above the industry average to aid successful adoption, particularly among suppliers unfamiliar with embodied carbon and/or still in progress with producing product-specific EPDs. Given the urgency of embodied carbon reductions, reasonable and implementable step-downs of the GWP material limits could also occur in between the typical three-year code revision cycles.
• 5.2.2.4, Keep Focus on EC: The other environmental attributes mentioned in this section (recycled, regional, bio-based materials, etc.) are important, however, the focus of this code should be solely on embodied carbon; that topic is complicated enough without adding additional topics.
• 5.2.3, Legitimate Exceptions: When considering compliance, there should be limited exceptions in cases of a state of emergency or verifiable, unforeseen, and unavoidable disruptions in supply-chain or manufacturing ability.
• 5.3.1, Combined WBLCA Approach: I agree that this combined approach has merit, but more research is needed to set a building-level EC limit that is appropriate for all covered buildings in Washington State. The 400 kg CO2e/m2 limit for Vancouver, BC was based on research of their building stock. Research of Washington State's building stock is recommended to validate the most appropriate building limit state-wide. As more data is available, consider different building-level limits for different building use types (just as Energy Use Intensity (EUI) targets vary with the use type of a building).
• 5.3.3.2, WBLCA Reporting: I strongly agree that how WBLCA is reported for code compliance should be harmonized with the reporting standards of the ECHO Schema project.
• Table 5-11, Lower Carbon Products: For a Washington State context should the most local EPD, be changed from "BC, Canada, North America" to "WA, USA, North America?"

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• 5.3.4, WBLCA Model Language, Building Elements: For the sake of clarity, I would recommend explicitly adding insulation to the list of building elements.
• 5.5.2, Enforcement at Inspection Phase: I recommend revising the last sentence in the first paragraph to "…for obtaining a Final Certificate of Occupancy." This would allow for the issuance of a Temporary Certificate of Occupancy, while still maintaining the rigor of this requirement since a Final CO is mandatory to close out a project.
• 5.6.3, Credit-based Systems: This is an interesting approach and one that is understood by many in the design community since it is used in the Washington Commercial Energy Code and by some jurisdictions in their Land Use and or Incentive Programs. Perhaps projects exceeding the required threshold of Embodied Carbon points could reap other benefits such as additional height or floor area; some "carrots" for exemplary projects.
• 6.2.1.4, Assumptions of EC Percentage: Is the estimate that 11% of all GHG emissions are embodied carbon emissions accurate for Washington State given our cleaner than the global average fuel mix for electricity and that Washington's rate of new construction is likely less than China or many places in the Global South?
• 6.2.2.2, LCA Scope Used for Modeling: Since only A1-A3 data was used in the modeling and the potential benefits from carbon uptake during the use phase were not considered, does excluding that significantly change the results?
• 6.3.2 Cost Analysis: One component of cost not mentioned in the report is the potential construction schedule impact of using some lower carbon materials. In the case of concrete, the impact on the critical path schedule can range from no impact to a significant extension. Lower-carbon mixes tend to have less cement per cubic meter and often reach initial strength more slowly. In some applications where reaching initial strength is critical such as post-tensioned concrete, the use of lower carbon mixes may extend the project's critical path. The longer the critical path, the longer the construction duration and a potential increase in construction costs.
• 6.3.2, Cost Premiums: The report mentions that a cost premium of just 1% can potentially result in embodied carbon savings of 19% to 46%. Is that 1%, 1% of that material's cost or is it 1% of the project's construction budget? Even though 1% may seem like an insignificant amount, on a large project, 1% of the construction cost can be a very large dollar amount, especially to owners.
• Table 6-5 Costs of Material Caps: In addition to the EPD costs for the manufacturers mentioned in the report, the general contractor will also incur labor costs (beyond BAU) associated with the forecasting, tracking, and reporting of concrete emissions when using the weighted-average method.
• 6.4.1 Training and Outreach: Beyond training and outreach to architects and structural engineers, training specific to general contractors and manufacturers of covered products is needed. I'd recommend outreach to the Associated General Contractors and the state or national trade associations.
Sincerely,
David Walsh, AIA, LEED BD+C
Dave Walsh Consulting

Attachment

comments-embodied-carbon-code-language_dwc.pdf127.14 KB

Dave Walsh Consulting
Sustainable Construction &
Green Building Consulting

November 17, 2024

Dear Members of the Washington State Building Code Council,

Thank you for the opportunity to comment on the Recommendations for Washington State Embodied Carbon Code Language, dated November 2024. My comments and suggestions are as follows:

- Table 2-1, Transportation: Actual transit distances for some products from the manufacturer to the job site are sometimes unavailable for inputting into the As-built WBLCA model. Some data is straightforward to calculate; other materials have complex and opaque supply chains. I recommend always allowing estimates or using default values in the As-built WBLCA.
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[redacted]

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Sincerely,

David E. Walsh

David E. Walsh, AIA, LEED BD+C
Dave Walsh Consulting

[redacted]

From: Sophie Morin
To: Curb, Dustin (DES); DES SBCC
Cc: Housekeeper, Brandon; Will Layden
Subject: Embodied Carbon Study - Comments from AWC
Date: Wednesday, November 27, 2024 7:38:59 AM
Attachments: Outlook-A picture .png
Embodied Carbon Codes Study_AWC Comments_December 2024.pdf

External Email

Hello Dustin,

Please find attached comments on behalf of the American Wood Council (AWC) regarding the embodied carbon study. Let me know if you need them in a different format and I would be happy to accommodate. If you could also please confirm receipt of this email/the comments, that would be much appreciated.

AWC represents structural wood products manufacturers in the building materials industry — one of the key demographics the study is looking to solicit comments from and place in the appendix. You can use my or Will's (the signee at the end of AWC's comments) name and title in the appendix per the instructions on the embodied carbon study webpage.

If you have any questions, please feel free to reach out to me. My contact information is in the signature block below.

Thank you very much for the opportunity to comment on this study. Have a lovely Thanksgiving!

Best,

Sophie

AMERICAN WOOD COUNCIL
SOPHIE MORIN
Manager, Government Affairs
[redacted]

December 1, 2024

State Building Code Council
Washington State Department of Enterprise Services
Olympia, WA 98501

RE: Public comment on the embodied carbon study required by the 2024 supplemental operating budget, *"Recommendations for Washington State Embodied Carbon Code Language"*

Dear Washington State Building Code Council:

The American Wood Council (AWC) is the leading voice for wood products manufacturing, an industry that provides over 450,000 men and women in the United States with family-wage jobs. AWC represents 87 percent of the structural wood products industry, and our members make products that are essential to everyday life that are derived from a renewable resource that absorbs and sequesters carbon for many decades. Our staff experts develop state-of-the-art engineering data, technology, and standards for wood products to ensure their safe and efficient design, as well as provide information on wood design, green building, and environmental regulations.

AWC commends the State of Washington's continued consideration of the built environment as a significant source of embodied carbon emissions and strategies to reduce these emissions. With buildings contributing to approximately 39 percent of the United States' annual carbon dioxide emissions[1], it is imperative that steps be taken to reduce the negative effects that the built environment has on the planet. Structural wood products produced in North America are a right now solution to do this. For example, mass timber products offer significant embodied carbon reductions in high-rise buildings as they can substitute for more carbon-intensive materials, all while providing multiple other construction benefits, like faster installation, less noise, and the opportunity to use fewer finish materials, saving costs and further reducing embodied carbon emissions. We appreciate the opportunity to provide comments on this study and look forward to continued engagement regarding this topic, as embodied carbon work will continue to be of the utmost importance in addressing the climate crisis.

AWC appreciates the study's consideration of various embodied carbon emissions reduction pathways for adoption in Washington's building code. We are supportive of a multi-pronged compliance approach which provides flexibility in compliance for project teams by allowing them to choose the pathway that best fits their project needs – as mentioned in Section 5.4. The compliance pathways this study considers – building reuse (Section 5.1), material carbon caps (Section 5.2), and whole building life cycle

[1] Environmental and Energy Study Institute, "Buildings & Built Infrastructure," https://www.eesi.org/topics/built-infrastructure/description

American Wood Council
601 Thirteenth Street NW, Suite 1000 N
Washington, DC 20005
O: 202 463 2766

awc.org

assessments (Section 5.3) – align well with what has been adopted or is being considered by other states and jurisdictions, such as in California's Green Building Standards Code. As mentioned in the study, there is no one-size fits all strategy to reducing embodied carbon emissions. Thus, consideration of flexibility around compliance and examining which scenarios may work best in Washington is commendable.

We also commend and support the inclusion of a whole building life cycle assessment (WBLCA) compliance pathway in any proposed code or policy moving forward. As the study notes, a WBLCA approach allows carbon to be strategically designed out during the building design phase, empowering architects, building owners, and designers to construct buildings in a manner that best meets the project goals. The result is a building that has a lower embodied carbon footprint compared to a baseline building and an architect and building community that retains the freedom and flexibility to choose the best materials and systems for their own projects. The study also shows that this pathway, as it was modeled, demonstrates the highest embodied carbon emissions reductions for the State. We commend the study authors for recommending a phased reduction strategy for the State overtime; implementation of a 3-pronged compliance pathway in the near term and shifting to more reliance on WBLCAs in the longer term.

AWC appreciates that the definition of baseline design WBLCAs in Section 7.1 – "Model Language" refers to ASTM E2921-22 in identifying a functionally equivalent reference building. This standard is the most current guidance on conducting comparative WBLCA and is referenced in other standards that direct teams to conduct WBCLAs, such as ASHRAE 189.1 and the U.S. General Services Administration's P100 standard. Any policy including WBLCA strategies should make sure to reference ASTM E2921-22 to give projects teams consistent guidance on conducting comparative WBLCAs.

In Section 5.4 and the model language in Section 7.1, the authors also recommend offering a secondary, parallel pathway to a percent reduction WBLCA in the form of an absolute "building carbon budget" that the proposed design WBLCA would need to demonstrate has an "embodied carbon intensity" lower than the budget. We appreciate the additional flexibility this grants projects teams, however, AWC recommends policy makers and code developers critically evaluate any specific values for a building carbon budget pathway to make sure the values considered are workable for the state and the building typologies they correspond to. The study outlines that the City of Vancouver is considering adopting this approach, but the values they are considering setting are based off several years of data collection, which started in 2017. A higher limit, or one with a range of uncertainty, may be more appropriate for Washington in the near-term as the State continues to build out a robust sample of embodied carbon data.

Another pathway where reconsideration of embodied carbon limits is warranted is in the material carbon caps pathway. The Global Warming Potential (GWP) limits in the model language in Section 7.1 (Table 430.1) may not be appropriate or workable for Washington projects as currently set. This is because embodied carbon data is rapidly

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evolving and becoming more robust as this work has become more important in recent years. It's likely that as even more data becomes available over the next few years, GWP values in environmental product declarations (EPDs) may change. Thus, it's important to consider uncertainty or a higher limit for product categories in the near term and adjust over time as data improves.[2]

The structural wood products GWP limits, for example, appear to be based on GWP values in industry-wide EPDs that were published in 2020 and will expire in mid-2025, as all EPDs need to be updated every 5 years as per internationally agreed upon ISO standards. With capacity increases in AWC's life cycle assessment survey, which collects data from wood products manufacturers to inform industry-wide EPDs, the data has become more robust over time. This broader data sampling, combined with the design community's desire for more granularity, has allowed AWC to begin publishing regional EPDs for certain products, such as softwood lumber/wood framing. There are currently three regional EPDs published for softwood lumber, compared to the one, North American industry-wide EPD from 2020, with plans to publish a fourth in 2025. The three new regional EPDs have a weighted average GWP of 83.54 $kgCO_2e/m^3$, and the fourth region's data will add further consideration for this weighted average. As such, this weighted average is higher than the limit wood framing would need to comply with, 56.81 $kgCO_2e/m^3$, given that a 10% reduction in GWP compared to the baseline in the table would need to be met. This evolving landscape of background data is something to consider when setting any GWP limits to ensure the regulation is workable and doesn't disincentivize using an already low embodied carbon material. The Colorado Office of the State Architect is one body that recognizes this challenge and how they may have to raise GWP limits in some cases as data continues to become more robust.[3] Additionally, there is on-going work at the federal level at the EPA on determining industry averages and thus embodied carbon limits for materials. Referencing these limits may help to avoid the confusion that may occur if states continue to set their own limits.

Additional Considerations when Drafting Embodied Carbon Code Language

If the State considers adopting embodied carbon policy in code, specific standards should be referenced in the body of the code instead of in the definitions themselves. Generally, definitions in code remain at a high-level and any specific standard references would be addressed in the enforceable sections of the code. For example, in the model language in Section 7.1, the reference to ASTM E2921-22 in the "baseline design WBLCA" definition would be better situated where "baseline design WBLCA" is written in

[2] Additionally, these GWP limit baselines appear to be referenced in other sections of the study. Table 5-10 (page 52) documents the baseline material assumptions to be considered in a WBLCA. It should be noted that there appears to be a typo for the baselines used for wood product comparisons. Again, the baselines referenced are those from the CLF 2023 Baselines report, which as stated may need updating overtime to better reflect the evolving embodied carbon data landscape.

[3] Colorado Division of State Property, "Buy Clean Colorado Act: Maximum Acceptable Global Warming Potential (GWP) Limits," (January 2024), https://osa.colorado.gov/sites/osa/files/documents/EE-5.1%20%281%29.pdf

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the body of the code. Working with code officials and other stakeholders to ensure language is appropriate for code adoption will be vital to this on-going work. We appreciate that the study highlights the role of education and training in this space, given how relatively new embodied carbon considerations in code are.

Additionally, we recommend that standards referenced in code, such as in the model language in Section 7.1, are those agreed upon through consensus-based standards development processes that interested parties in the U.S. can participate in. For example, the International Organization for Standardization's standards (ISO standards) or the ASTM standards are open to participation from entities in the U.S. The standards with "EN" are European standards and U.S. participation is not allowed in their development. As such, finding the comparable ISO or ASTM standard for these EN standards is necessary.

Lastly, biogenic carbon is briefly mentioned in this study and in the model code language of Section 7.1, indicating that "biogenic carbon and carbon sequestration shall be reported separately from fossil GWP." AWC appreciates that the study's inclusion of biogenic carbon reporting is consistent with the treatment of biogenic carbon in current ISO standards governing how this carbon flow should be discussed in an EPD.

Again, we appreciate the opportunity to comment on this study, which serves as critical groundwork in considering embodied carbon reduction strategies in Washington. Beginning with a multi-pronged compliance approach to start and then transitioning to a greater reliance on the WLBCA pathway overtime, will yield significant embodied carbon reductions while allowing the necessary time for impacted entities to learn more about these pathways and the embodied carbon landscape of Washington.

AWC is here to serve as a resource as the State of Washington considers strategies to reduce its embodied carbon emissions moving forward. We look forward to on-going opportunities to provide unique insight from the wood products sector in embodied carbon policy considerations.

Sincerely,

W Layden

Will Layden

Vice President, Government Affairs
American Wood Council
[redacted]

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From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Wednesday, November 27, 2024 10:58:27 AM

External Email

Submitted on November 27, 2024 - 10:58am

Name
Matthew Hinck

Email
[redacted]

Phone
[redacted]

Question/Comment
Please find attached Glacier NW Inc.'s comments on the CLF RMI NBI Low Embodied Carbon Report.

Thank you

Attachment

- glacier-comments-on-clf-study-november-2024-final.pdf1.46 MB

Washington State Building Code Council
Department of Enterprise Services
Submitted Electronically

November 26, 2024

SBCC Members -

Glacier Northwest, a CalPortland Company (Glacier) appreciates the opportunity to provide comments on the CLF NBI RMI UW-Recommendations for Washington State Embodied Carbon Code Language report dated November 2024 (the Report).

Glacier is a construction materials business established in 1895 in Washington State producing construction aggregates from our mining operations near Steilacoom, Washington. Our company has grown from the small mining operation to a diversified regional construction materials company. Glacier produces world class aggregates from sources throughout western Washington and operates a cement importation and distribution business as well as a ready-mix concrete division servicing the greater Puget sound region and I-5 corridor. Glacier is deeply committed to providing sustainable materials to the construction industry. As an example of our company commitment to sustainability, we have received EPA's Energy Star Sustainable Partner of the year for 20 consecutive years. The longest of any industrial company.

Glacier believes that the best way to bring low carbon materials to the marketplace is to work in conjunction with builders, architects, sustainability professionals, governmental officials and NGO's. Just such a scenario has been established under 2024 HB 1282 which will utilize diverse working groups to determine how the State of Washington should implement low carbon building standards into State construction projects. Glacier worked on HB 1282 for years and supported the final version which passed in 2024. We re-iterate that the best way to move forward with the maximum result outcome is to work together.

High Level Comments:

Process - The Washington State legislature passed Engrossed Senate Bill 5950 (the state budget) in the spring of 2024. Section 150 item 15a authorized the State Building Code Council (SBCC) with $250,000 to study the potential for building code amendments for low carbon materials through the development of a report. Item 15c specifically states that the report should include comments from the design, building and construction industries.

The SBCC commissioned the report by issuing a contract to the Carbon Leadership Foundation (CLF) who partnered with the Rocky Mountain Institute (RMI), New Buildings Institute (NBI) and the University of Washington College of the Built Environments. This contract was issued in the fall of 2024 and the draft report was published on November 10, 2024. All the groups that worked on the report are either academic or Non-Governmental Organizations. At no time during the development of this report, was a single person from material supply/construction industry consulted regarding the content. The report was written without input from the materials supply industry, and then the industry was given just 20 days to review and comments with a due date for those comments occurring over the long Thanksgiving weekend.

We support the SBCC's decision to include all comments in an appendix to the report when submitted to the legislature. However, the failure to consult with industry in the development of the plan as directed in the legislature's proviso is unfortunate and the report overlooks some serious issues and the report is misleading due to these deficiencies. We are concerned that this report will be used as a reference by those advocating for legislative and code changes and that our comments relegated to the appendices will be overlook and discounted

Material Availability -

- **Cement:** Washington only has one cement plant that provides roughly 1/3rd of the local market demand for cement. The rest of the cement needed for concrete must be imported from Canada or Asia. There is little to no chance a new cement plant will be sited in our region. The product category rules for concrete, which dictate how Global Warming Potential (GWP) values are determined, include the transportation emissions involved in bringing these products to market. These transportation emissions can account for 15% or more of the total GWP. Producers cannot reduce these transportation related emissions. The proposal creates an unfair ability for those with access to local cement (lowest carbon source material), to produce concrete that could meet the proposed code limitations while all others will be at a significant disadvantage. This raises serious questions about the ability of the region to meet the requirements in this report.

- **Supplemental Cementitious materials (SCM's):** The ability to produce low carbon construction materials, such as concrete, is a direct result of having low carbon ingredients available in the marketplace. The report makes incorrect assumptions about the marketplace for low carbon materials and the global supply and demand for materials such as fly ash and slag cements. Principally, the report assumes that these SCM's are abundantly available and at a stable low cost. These SCM's are used by concrete producers to lower the carbon footprint of concrete.

    - Fly ash is produced from coal fired power plants. As the United States, and specifically Washington State, move away from coal fired power plants the availability of fly ash decreases. At the present time fly ash is imported into the market, and all the fly ash available to the market is being consumed.

    - Slag Cement is an alternate to fly ash in concrete and is produced as a by-product of steel production. The majority of the global supply of slag is fully allocated and sourcing this material is subject to the normal supply and demand constraints of a

healthy marketplace. The report attached as an appendix to these comments provides further information on slag.

The bottom line is that availability of both slag and fly ash are limited due to supply constraints, and the report fails to recognize or consider these constraints. The limited supply of these materials limits the ability of concrete producers to deliver low carbon construction materials. These market realities are not discussed in the report and the report assumes that SCM's will be widely accessible in the marketplace which is simply not accurate.

Data - The report does not make a reference to the information used to derive the proposed global warming potential (GHP) values for concrete in Table X01. It could be assumed these are numbers taken from the NRMCA regional average but clarification is needed. The code, if enacted, would cover the entire state of Washington. It is unclear if a statewide standard is possible due to the following:

- The GHG targets for concrete will be extremely difficult to hit in SW and Eastern Washington where the aggregates are not of the same quality as in the Puget Sound Region and fly ash is not available along with a short supply of slag.
    - Aggregate quality (i.e. strength) is a key driver in determining the ultimate strength of concrete. In concrete, lower quality aggregates require more cement material to achieve the same final strengths as concrete made with higher quality aggregates. The report gives no consideration to the very real impact that quality of available aggregates has on concrete strength in different areas.
    - Aggregates in Puget Sound region are significantly stronger than aggregates in the rest of Washington State. Therefore, concrete produced in the Puget Sound region demands less cement to achieve target strengths. This is a geological fact of the State.
    - Aggregates are extremely heavy and cannot be realistically moved by truck over long distances without significant consumption of vehicle fuel and thus additional emissions. Concrete producers must use their local source of aggregates.
- Large warehouse projects and many multifamily housing projects use polished concrete slabs which limit the use of SCM to 15% due to the polishing operations. Many mixes will need SCM's much higher than 15% to meet the GHG limitations.
- The proposed numbers are too broad in scope i.e. 2500-3999 PSI. There will be a different cementitious values between different 2500, 3000 and 3500 PSI mixes and each mix will all have its own respective GWP value. It is simply inaccurate to lump all mixes within a 1500 PSI range into one GWP.
- The NRMCA average (if that is what was used – see first bullet point above) is a result of the NRMCA member who participate in the study. From our experience, the members who participate (since it takes time, personnel expertise and man hours) primarily represent the larger producer companies that produce concrete, often focused in larger metropolitan areas. As a result, the average is heavily weighted to the metropolitan areas like Seattle and generally does not include small producers and rural producers in the State do not have EPD's for their concrete and are not NRMCA members. Therefore, the averages represent only one segment of the concrete industry.

- These proposed GWP limits also do not consider any structural or architect specific specifications such as low w/c ratio, exposure limits, high durability areas etc., where higher cement contents will be needed for these special applications.

Flawed Economic Analysis - The "economic analysis" in the report relies almost entirely on case studies of just three buildings reviewed in another study. The report assumes the strategies employed in these case studies could be applied at scale to the entire construction building market.

The report fails to acknowledge the limitations plainly stated in the study that it relies upon:

> "*The data and the assertions made in this study are based on the scenarios that RMI and Skanska studied. However, they cannot be generalized to all building typologies, or across every building project, because they were not drawn from a statistically significant sample, nor are these construction use types perfectly representative of their respective construction types.*"

However, the SBCC study does exactly what the other study warns against doing.

> "*It is anticipated that the economic impact of the proposed embodied carbon code provisions will be insignificant.*"

> "*A focus on materials selection and procurement can realize significant embodied carbon reductions at little to no additional up-front cost. Case studies in the Pacific Northwest have shown an embodied carbon savings potential of 19%–46% at cost premiums of less than 1%, simply through specifying and substituting lower-carbon alternatives for certain materials during the design and specification process*."

The report fails to acknowledge that nearly 70% of these savings are from ready-mix concrete design strategies specific to an individual project. These savings were derived by using supplementary cementitious materials (SCMs) such as fly ash and slag. SCM materials – derived from burning coal and smelting ore – that are available in limited and increasingly dwindling quantities. As with any product, the laws of supply and demand apply. Requiring all projects over a certain size threshold to meet lower-carbon goals will have an impact on the market price of these materials. The study glosses over this consideration and just assumes that because the price was roughly the same for one project that this would apply to all projects.

The flaws of these assumptions are rampant throughout the study. For instance, the study states:

> "*Embodied carbon code measures can result in additional cost savings in the future through supporting scaling of low embodied carbon materials. For products where a low carbon premium does exist, increased demand for lower carbon materials may help scale production and lower the long-term costs of these products.*"

The report seems to be implying that increased demand for these SCM materials will result in the production of more fly ash. The reality is that's not the case. The closure of the Transalta Coal power plant in 2025 will eliminate a major local supply of fly ash. We do not foresee an increase

in the uptake of burning coal in any scenario. The study provides no insights into the existing market for these materials or how they would be scaled in the future.

Self-Ratcheting Code Mechanism - The proposed code in the report is a self-ratcheting mechanism driving the limit to meet the WBLCA or direct approach perpetually downward.

In the direct approach, the user must meet 90% of the background GHG average for concrete. This sets up a scenario over time whereby all producers attempt to meet the 90% of the average limit, the average itself decreases, thus the compliance limit also decreases. This is a regulatory mechanism more commonly found in environmental regulations at EPA or Ecology and it not a normal way to implement code. Code officials set limits which the public must meet. Periodically this code is reviewed and if warranted, the limits are adjusted. The report proposal creates an automatic self-ratcheting mechanism which is unsustainable because embodied carbon values can only be reduced when the technology and supply of low-carbon materials are available to produce them.

Report – Page # specific comments

Page 1 – Authors - As stated the previous section, the authors of this report include no representatives from the construction or building industry. This completely disregards the intent of the Washington State Legislature's direction under SB 5950 section 150 (15(b)).

Page 4 – Paragraph 3 - "Code-based policies hold critical potential to address embodied emissions, as they most directly impact decisions in design and construction of new buildings where these materials are being used." -

This statement is the opinion of the authors and Glacier disagrees with the assertion that code revisions are the appropriate place for making progress toward the 2050 target. Glacier assets that the most appropriate place is through voluntary actions by producers in combination with legislative actions such as HB 1282.

Page 4 Implementation Considerations - The report authors assert that the administrative burden of complying with this code will be less for larger buildings. While there are certainly fewer larger buildings constructed in the State, the assertion that complying with this code will be less in a larger building is not a true statement. The burden to comply with this code will be significant since larger buildings are more complex, utilize larger amounts of materials and have more complex systems all which must be complied with under this code. The fact that larger projects often have more associated support/administrative staffing, does not make compliance any simpler or less burdensome.

Page 5 – 2nd Paragraph - Relying on the social cost of carbon is a flawed economic analysis. The "social cost of carbon" (SCC) is often criticized for several reasons. Firstly, the models used to calculate the SCC, such as the DICE, FUND, and PAGE models, rely on numerous assumptions about climate sensitivity, economic impacts, and discount rates, which can significantly alter the results. These assumptions can be highly uncertain and subjective, leading to a wide range of estimates. Additionally, Unless the economic study also includes the social

benefits of having material such as concrete available to build infrastructure and housing be considered, these numbers don't mean much.

Page 5 – 3rd Paragraph - The report suggests that the State will be successful in implementing this code if there are training sessions conducted. While training is a useful tool, training will only be successful if the State adopts a comprehensive strategy that the design, building and construction industry participated in developing and the materials needed to implement a low carbon strategy are available.

Page 5 – Conclusions - "*The incorporation of embodied carbon into building codes via the use of a multiple compliance pathway as outlined in this report pairs real market transformation across the value chain with flexibility and capacity-building in the short term*"

This statement is simply not reflective of the material market reality of Washington State. Low carbon concrete is produced by using low carbon ingredients. Low carbon ingredients are in short supply with great delivery uncertainty. The code policy does not account for this important issue and will not be successful without consideration for the realities of supply and demand. It is not true that creating a demand for fly ash will make more fly ash be produced. Fly ash is produced from coal fired power plants and their use in Washington State, the United States and globally is diminishing.

Page 6 Section 1.1 item (c) - The SBCC and report authors did not comply with this provision as has already been discussed.

Page 6 Section 1.2 - The report authors had several months to prepare this report. The industry was given 20 days to comment including 3 weekends and the Thanksgiving holiday. The short time frame to respond is not sufficient and limited the opportunity for stakeholders to comments in a meaningful way.

Page 9 Paragraph 2 – The following broadly written statement is not warranted "Building materials also have a direct local impact on ecological and human health. Communities adjacent to manufacturing facilities can be unjustly burdened by industrial pollution, and workers can bear dangerous working conditions or unfair labor practices."

Manufacturing facilities are heavily regulated in Washington State and held to high standards of health and environmental based compliance limits. Making any assertion that building materials or industry is somehow unjustly burdening society is a subjective and unsupported opinion. Industrial producers make the materials needed by society in compliance with the relevant health, environmental and safety laws which are set by the State.

Page 10 Paragraph 1 - The manufacturing of Cement in the United States accounts for less than 2% of the US CO2 equivalent emissions.

Page 10 – Graphic Image - The report has presented a graphic that has done everything possible to portray industry as a hazardous, unhealthy and polluting place of business. As stated above, industries are held to the highest standards for health, worker safety and environmental

compliance to limits established by the State of Washington and through inspections by State, County and City inspectors. This graphic unfairly portrays industry. Clearly, the inclusion of a graphic image of this nature amplifies the fact that the construction and materials suppliers were not included in the report development.

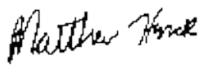
Page 20 Table 3-1 item #2 - The code proposal set forth in this report will create an unfair and uncompetitive landscape benefitting entities that have access to low carbon cements and SCMs. The access to those materials, especially locally produced cement, is uneven across the industry. The impact of these changes on the local market warrants serious consideration that is not acknowledged in this report.

Page 20 Table 3-1 item #3 - As discussed in the main points under flawed economic analysis, the assertion that the proposed code changes will not have an economic impact on the State are completely unsupported by information provided in the report and contrary to industry experience. At a time, when the high cost of all construction is very much a focus of policy makers and jeopardizing important infrastructure and maintenance and repair projects, pushing a policy such as these code changes will only increase the cost of all construction.

Page 44 Table X01.1 - There is no source information provided on where the data in table X01.1 was sourced and how this information was evaluated to determine the values.

Glacier is committed to helping the State move toward a lower carbon intensive built environment by working together with all the interested parties. Unfortunately, due to the limited time to prepare these comments, Glacier did not have enough time to fully vet all the different scenarios which were modeled in the report. As such, our comments are incomplete. We appreciate the opportunity to submit comments and we look forward to further dialogue with the SBCC and the legislature on this report.

Best regards,



Matthew Hinck
Vice President State Government Affairs

Appendix 1 – Global Fly ash Outlook – Follows

IStructE

CLIMATE GROUP CONCRETE ZERO

mpa The Concrete Centre

UK LCCG

The efficient use of GGBS in reducing global emissions

An appraisal of the global availability of ground granulated blast furnace slag

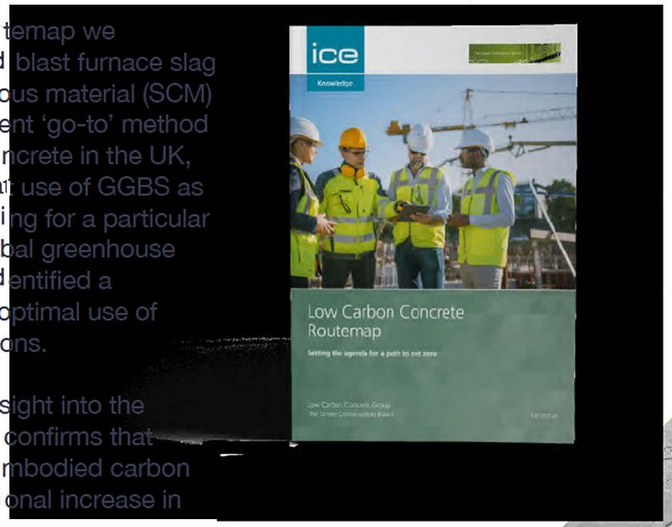
September 2023

“In the Low Carbon Concrete Roadmap we identified that using ground granulated blast furnace slag (GGBS) as a supplementary cementitious material (SCM) to replace Portland cement is the current ‘go-to’ method for reducing the carbon intensity of concrete in the UK, that GGBS is a finite resource, and that use of GGBS as an SCM may result in a low carbon rating for a particular concrete but an overall increase in global greenhouse gas emissions (GHG) emissions. We identified a requirement for industry guidance on optimal use of GGBS to minimise global GHG emissions.

This guidance note provides further insight into the global availability and use of GGBS. It confirms that inefficient use of GGBS (to lower the embodied carbon of one project) can lead to an unintentional increase in global GHG emissions.

We encourage use of the simple three step process that the note describes to ensure appropriate use of GGBS. We strongly support the recommendation for a further technical study to investigate whether there should be a limit on the use of GGBS in concrete for the sole purpose of reducing carbon intensity.”

The Low Carbon Concrete Group



Executive Summary

Ground granulated blast furnace slag (GGBS) is a co-product of the iron and steel industry, formed in the blast furnaces that create iron out of iron ore. It has been used as a supplementary cementitious material in concrete around the world since the end of the nineteenth century due to its technical properties (such as improving the concrete’s durability).

However, as the concrete industry increasingly considers its role in the climate crisis and looks at ways of decarbonising its operations and products, the idea that GGBS can be used as a substitute for carbon intensive Portland cement clinker (referred to as ‘clinker’ in this paper) in concrete to reduce emissions has gained traction.

To help to determine whether this idea has merit, a group of experts drawn from across the concrete and cement industry, construction, academia and civil society undertook a literature review to better understand global production and utilisation of GGBS and clinker, and how this balance could change in the near-future.

The review indicates that global clinker production is currently 8x to 12x higher than global GGBS production and will remain at this order of magnitude to 2030 and beyond. It is found that around 90% of all iron slag is already processed into GGBS each year. No references were found to demonstrate significant usable GGBS stockpiles.

This review demonstrates that GGBS is a limited and constrained resource that is almost fully utilised globally. Any increase in its use in one location is highly likely to result in a reduction in use elsewhere, balancing each other out overall.

This paper concludes that whilst global supplies of GGBS must continue to be fully utilised to reduce overall clinker demand, any local increase in the amount of clinker substituted with imported GGBS is unlikely to decrease global emissions.

GGBS should continue to be used where required technically. Beyond this, it may still be specified where well-established supply chains exist, but it should not be used in high proportions in the hope of reducing global greenhouse gas emissions. It should also be noted that very high proportion mixes can lead to a need to increase total binder content if not managed through the project programme

Alternative options exist for reducing clinker usage and thus reducing global emissions, and designers should work with the supply chain to identify the best way to do this on each project. Concrete buyers and specifiers should recognise these issues and decide how best to align their ambitions to reduce emissions both on-site and globally.

Key messages

1. **GGBS is an excellent supplementary cementitious material that helps displace clinker demand globally.**
2. **However, GGBS is a limited and constrained resource that is almost fully utilised globally.**
3. **Therefore whilst global supplies must continue to be fully utilised, locally increasing GGBS use is unlikely to decrease global emissions.**
4. **Alternative options exist for reducing emissions when using concrete.**
5. **GGBS should still be used where required technically.**
6. **If GGBS is to be used beyond technical requirements, it should come from well-established supply chains, and be used in proportions cognisant of global constraints.**

Introduction

Ground granulated blast furnace slag (GGBS) is a co-product of the iron and steel industry obtained by water-cooling and grinding blast furnace slag. It is used as a supplementary cementitious material (SCM) in concrete due to its cementitious properties, which enhance the long-term strength and durability.

The technical benefits of including GGBS in concrete are now well understood and documented, but in recent years GGBS has also been a subject of discussion among concrete producers for its ability to partially replace Portland cement clinker (referred to as 'clinker' in this paper) and thus reduce the emissions of an individual concrete.

This briefing paper provides:

(1) An objective view of global GGBS availability, both present and future, through market and industry research.

(2) An appraisal of how global greenhouse gas (GHG) emissions can be affected by concrete mix designs.

(3) Recommendations towards the efficient use of GGBS, in reducing global GHG emissions.

This paper has been written in response to a need identified by both the Low Carbon Concrete Group routemap, and ConcreteZero, to better understand the availability of GGBS as an SCM. The paper has been prepared by volunteers, mostly from the UK. Whilst the data reviewed is global, it should be noted that the authors' most direct experience is based on the UK market.

This paper focusses on the issues around GGBS use and the embodied carbon of concrete. The authors wish to stress that embodied carbon is only one aspect of sustainability, and that sustainable concrete must account for other aspects such as resource depletion, social equity, biodiversity, etc.

The paper is relevant to all those who work with concrete that may contain GGBS, including novel technologies such as alkaline activated cementitious materials. Clients, designers, contractors and suppliers should use this paper to understand the three points listed to the left, to determine how they wish to use GGBS going forwards, in the light of the need to reduce global greenhouse gas emissions.

The paper uses terminology from BS EN 197-1:2001, *Cement – Composition, specifications and conformity criteria for common cements*, and equivalent standards as far as possible.[1]

1. Portland cement clinker: The dark grey nodular material produced by heating a mixture of limestone, clay, and other materials in a kiln at high temperature, which is the main component of Portland cement (CEM I).

Portland cement (CEM I): Portland cement is a type of hydraulic cement made by grinding Portland cement clinker, with a small amount of gypsum added as a setting regulator.

Cement (binder): A finely ground inorganic material or combination of materials that when mixed with water forms a paste that sets hard and can be used to bind aggregate together to form concrete or mortar.

Ternary cement: The type of cement (binder) that contains three main constituents: Portland cement clinker, and two other supplementary cementitious materials such as limestone fines, fly ash, GGBS, or pozzolana.

GGBS: Ground Granulated Blast furnace Slag, which is made by rapid cooling of slag melt of suitable composition, as obtained by smelting iron ore in a blast furnace, and containing at least two-thirds of glassy slag. Possesses hydraulic properties when suitably activated. The acronym GGBFS can also be used.

GBS: granulated blast furnace slag – GGBS before being ground. The acronym GBFS can also be used.

1. Global availability of GGBS

The research group conducted a review of existing literature to ascertain how much GGBS is typically produced each year, how much of this is used, and whether there is any spare. Here we summarise the findings from a selection of papers and reports.

1.1 Global production of GGBS

The following references give a range of global GGBS production levels from **330 to 407 Mt per year**.

Reference	GGBS global production (annual)	Year
Harder[2]	332 Mt	2021
CRU[3]	406.5 Mt	2021
	396 Mt	2022
US Geological Survey[4]	Estimated between 330 and 390 Mt (calculated as a % of iron production)	2022

1.2 Global production of clinker

Similarly, the following references give a range of global cement and clinker production levels. Where only cement was given, clinker has been calculated based on a clinker to cement ratio of 0.8 (as a conservative estimate led by the ratio shown by the US Geological Survey[4] reference). These numbers are shown in the table in *grey italics*.

The references give global clinker production levels to be in the range of **3340 to 3840 Mt per year**.

Reference	Cement global production	Clinker global production	Year
Cembureau[5]	4170 Mt	*3340 Mt*	2020
Van de Wegen[6]	4800 Mt	*3840 Mt*	2020
US Geological Survey[4]	4400 Mt	3700 Mt	2021
	4100 Mt	3800 Mt	2022

2. Harder J, Dec 2022, GBFS Focus 2030: Looking Beyond Europe, Global Cement Magazine
3. CRU Sustainability and Emissions Service, 2021
4. U.S. Geological Survey, 2023, Mineral commodity summaries 2023: U.S. Geological Survey, 210 p., https://pubs.usgs.gov/periodicals/mcs2023/mcs2023.pdf.
5. https://cembureau.eu/media/03cgodyp/2021-activity-report.pdf
6. Developments in main components of binders for concrete, Gert van der Wegen, SGS INTRON

1.3 Global GGBS utilisation

The following references all indicate that around 90% of all iron slag produced globally is already granulated by water quenching.

Reference	Statements on GGBS utilisation	Year
CRU[3]	Of total blast furnace slag produced, 90% was granulated.	2020 to 2022
Harder[2]	Granulation rate for blast furnace slag is currently 86.5%	2021
Nippon Slag Association[7]	Water-granulated slag makes up 86% of total slag production	2020 and 2021
China Iron and Steel Association[8]	The rate of blast furnace slag was 99.3% in 2022	2022

1.4 Future production predictions

The following references predict an increase in the production of both GGBS and the use of clinker. However, the ratio of GGBS production to clinker production is not predicted to change significantly by 2030.

It has been anecdotally suggested that there may be a reduction in clinker demand in East Asia (particularly in China) in the next decade, however it has not been possible to find any robust forecasts to confirm this.

Reference	GGBS production – predicted change this decade
Harder[2]	GGBS production predicted to increase to 381Mt by 2025 (+15%) and 416Mt by 2030 (+25%) Note this is partly due to a predicted increase in granulation rate from 86.5% (2021) to 93.4% (2030), and partly due to growth in BOF steelmaking across the world.

Reference	Clinker production - predicted change this decade
GCCA[9]	18% predicted increase in concrete use by 2030 when compared to 2020 levels. Clinker use could be expected to increase at the same rate without any intervention.

7. https://www.slg.jp/e/statistics/index.html
8. China Metallurgical News post on Weixin
9. https://gccassociation.org/concretefuture/wp-content/uploads/2022/10/GCCA-Concrete-Future-Roadmap-Document-AW-2022.pdf

1.5 Blast furnace slag stockpile data

The references to the right indicate that while there is some blast furnace slag stockpiled around the world, quantities are either small or unknown.

It has not been possible to quantify what proportion of stockpiled slag has been granulated versus air-cooled. Where stockpiled slag has been air-cooled, these stockpiles are unlikely to be suitable for use as an SCM, regardless of quantity.

In the event that slag has been quenched, ground, and stored as GGBS, we note that the material loses reactivity over time if it comes into contact with moisture. As such, any stored GGBS may not be suitable, nor have the required performance, for use in concrete.

Reference	Stockpile levels, location, usability
UK Department for Business, Energy and Industrial Strategy[10]	"It is known that there are rather small (less than 1 Mt in total) stockpiles of GBFS [GGBS], mainly at the Redcar plant."
US Geological Survey[4]	"[…] many sites have large slag stockpiles, which can allow for processing to continue for several years after the furnaces are closed or idled […]" The document does not provide any quantitative data or the method of cooling, therefore it is not known whether slag is suitable to replace cement.

10. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/660888/fly-ash-blast-furnace-slag-cement-manufacturing.pdf

1.6 Summary

Based on these references, we conclude that global clinker production is 8x to 12x higher than global GGBS production.

This ratio could fall slightly by 2030, if the future production predictions shown above are correct and a further ~10% of blast furnace slag were able to be converted into GGBS in the future, but would remain at the same order of magnitude (i.e., 7x to 10x).

We find no references demonstrating significant usable granulated blast furnace slag stockpiles. Moreover, even if stockpiles of blast furnace slags were to be identified, they may not be suitable, nor have the required performance, for use in concrete.

As such, we conclude that there is little opportunity for global GGBS production to increase significantly with respect to clinker use.

2. An approach to reducing global GHG emissions

2.1 Limited and abundant resources

Where a resource is globally limited, and is already highly utilised, then this resource offers limited opportunity to further decrease global emissions. To be clear: this is because the overall global level of resource use cannot increase. As such, any local increase in use is highly likely to result in a reduction in use elsewhere, balancing each other out overall.

Furthermore, if a limited resource is being used disproportionately as an SCM in regions where the production of clinker is lower-carbon than the global average, then the production of higher-carbon clinker must increase in the remaining regions, which is likely to increase overall global emissions.

Note that on the other hand, a local increase in the use of a resource that **does** have significant spare capacity within the global system (i.e., a resource which is globally abundant) is likely to decrease global emissions – as local usage can be increased without requiring a reduction in use elsewhere. However, we reiterate that this study does not indicate this being the case for GGBS.

2.2 GGBS as a limited resource

Section 1.6 highlights the limited capacity for significant increase in GGBS production in this decade, with around 90% of all iron slag already being converted into GGBS.

We therefore assume that the total amount of GGBS consumed globally will remain approximately constant in the short-term: GGBS being a limited resource.

This means that any local increase in the amount of clinker substituted with GGBS is unlikely to decrease global emissions. If overall global consumption of GGBS remains approximately constant, then increasing GGBS consumption in one region must reduce consumption elsewhere, and any effect on global GHG emissions is balanced out.

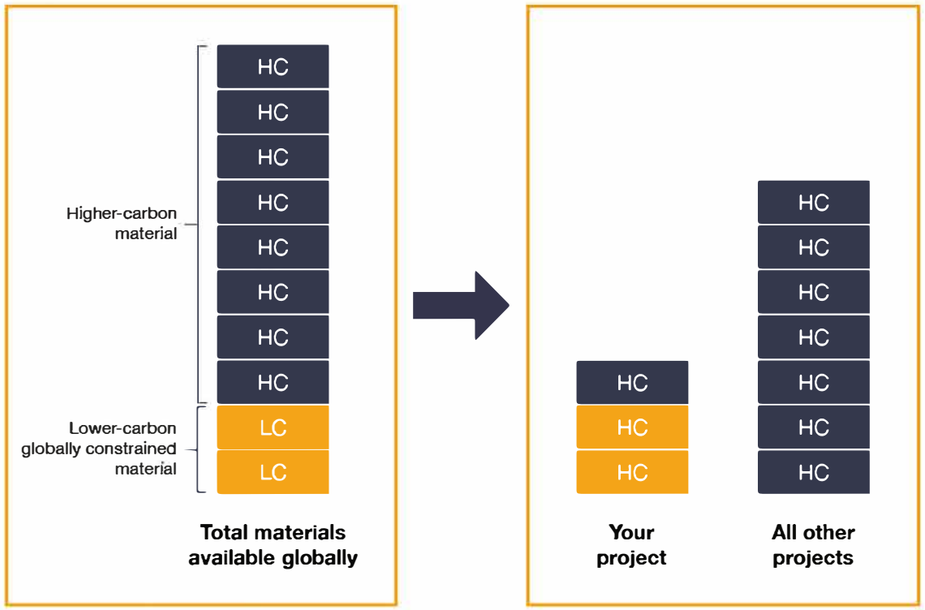


FIGURE 1: Procuring higher than average proportions of a limited lower carbon supply has little to no overall benefit to global emissions.

2.3 Reducing global emissions

This does not mean that GGBS should cease to be used altogether. Such a move would increase global emissions as more clinker would need to be produced to compensate. While increasing GGBS use locally above current levels is likely to be ineffective in tackling global emissions, it is important that GGBS – where available – continues to be utilised.

GGBS should therefore continue to be specified and used where it is required technically, such as for durability or for temperature and crack control. It is recognised that, at present, there is some capacity for GGBS to be used and that many suppliers offer this within their concretes. If GGBS is to be used beyond technical requirements, it should come from well-established supply chains, and be used in proportions cognisant of the global constraints outlined in this paper.

It should also be noted that very high proportions of GGBS in a concrete can actually lead to increased total binder content and therefore increased clinker content to meet early-age strength requirements, thus negating any assumed reduction in GHG emissions. This should be tackled through appropriate coordination of concrete mix design and construction programme.

There are also many other ways to decrease emissions when using concrete without relying on GGBS. For example, other low carbon SCMs can be specified – and where these are proven and in local abundance, this will result in a decrease in global emissions when utilised as part of a low carbon mix design. Similarly, global emissions can be reduced through local clinker and concrete efficiency measures, as outlined in Section 3 of this paper.

2.4 Alkaline activated cementitious material (AACM) and geopolymer technologies

AACM and geopolymer concrete technologies are in development around the world. Many of these utilise GGBS in very high proportions. Research and Development into the next generation of replacement materials is key and GGBS is currently viewed as a necessary step in that development by AACM and geopolymer researchers.

The data presented in this paper, and the recommendations that follow, are the same regardless of whether GGBS is being considered for use in an AACM, a geopolymer, or a regular concrete.

3. Efficient use of GGBS in tackling global emissions

We recommend that three questions are asked early in the design process to optimise GGBS use, to be discussed with the contractor and supply chain to gain a better understanding of the project opportunities.

Question 1: Do we need GGBS for technical reasons?

GGBS brings enormous benefits to concrete being used in chloride-rich environments (such as marine structures, or infrastructure exposed to de-icing salts), and for temperature and crack control. Extensive guidance has been published on the use of GGBS, refer corresponding references throughout this document, and section 5, Further Resources. If there is a technical reason to specify GGBS on your project, then it should be used accordingly.

Note that there are other SCMs that can have similar technical benefits to GGBS, such as fly ash and other pozzolans. These should also be considered for use where technically feasible and where well-established supply chains exist.

Note also that it is unknown what overall proportion of concrete has such technical requirements. It is expected that this is less than the total amount of SCMs available, as in recent decades some clinker has been substituted for SCMs even when not specified in the concrete mix design.

Question 2: Is there a well-established GGBS supply chain for our project?

GGBS is stocked by many ready mixed concrete plants and precast manufacturers. Both the precast and ready-mix industry have the ability to vary the GGBS proportion to optimise the technical properties of the concrete, depending upon the requirements for any structure and the specification constraints.

If GGBS is being used beyond technical requirements, it should come from well-established supply chains, and be used in proportions cognisant of the global constraints set out in this paper. You should work with the local supply chain to agree a GGBS proportion in the context of these constraints.

Question 3: How else can we reduce concrete emissions?[11]

If neither question 1 nor 2 are answered with a "yes", then GGBS should not be used in high proportions just in the hope of reducing global greenhouse gas emissions.

If other, more abundant, clinker substitutes are available locally then they should be investigated for suitability in your mix design. The British Standard for concrete, BS 8500:2015+A2:2019, *Concrete - Complementary British Standard to BS EN 206*, has been revised (publication due late 2023) and this update will considerably increase the range of lower carbon concretes permitted by allowing new ternary cements to be specified, providing a route for more optimised use of GGBS within concrete. Other alternatives such as calcined clays are likely to offer more promise still in the near future.

Clinker efficiency measures will reduce total global clinker usage and thus reduce global emissions. Such measures include (but are not limited to) setting maximum clinker limits, better aggregate grading, more relaxed requirements for early strength gain, use of admixtures or performance enhancers.

Clinker efficiency measures should not be specified by the designers, but instead should be encouraged through specifications which limit carbon but allow flexibility in how the supplier meets them. This could include setting upper limits for the carbon emissions of the concrete – noting that very tight limits may currently be difficult to meet without adding high proportions of GGBS to the concrete.

Concrete quantity reductions should always be considered regardless of the concrete material specification. Structurally efficient concepts, arrangements and design all reduce the amount of concrete (and thus clinker) used, reducing global emissions.

11. https://www.ice.org.uk/media/200i0yqd/2022-04-26-low-carbon-concrete-routemap-final_rev.pdf

4. Conclusions

This paper concludes that any local increase in the amount of clinker substituted with GGBS is unlikely to decrease global GHG emissions.

GGBS should continue to be used where required technically. Whilst global supplies of GGBS must continue to be fully utilised to reduce overall clinker demand, any local increase in the amount of clinker substituted with imported GGBS is unlikely to decrease global emissions. As such, if GGBS is to be used beyond technical requirements, it should come from well-established supply chains, and be used in proportions cognisant of global constraints - it should not be specified in high proportions in an attempt to reduce global GHG emissions.

It should also be noted that very high proportions of GGBS in a concrete can actually lead to increased total binder content and therefore increased clinker content to meet early-age strength requirements, thus negating any assumed reduction in GHG emissions.

Alternative options exist for reducing clinker usage and thus reducing global emissions, and designers should work with the supply chain to identify the best way to do this on each project.

This aligns with the philosophy behind the updated PAS 2080:2023, Carbon management in buildings and infrastructure, which calls for thinking at a systems level, not just an asset level, and highlights the need to collaborate along the whole supply chain to reduce GHG emissions.

Given that the information provided in this paper points to global constraints in GGBS availability, we suggest that the relevant organisations conduct a technical study to investigate whether there should be a limit on the use of GGBS in concrete for the sole purpose of reducing carbon intensity, and how this could be practically implemented.

The information in this paper also highlights the disconnect between accepted life-cycle assessment methodologies (which focus on emissions within a project's boundary) and the issues presented by the use of globally limited resources, which should be considered further by the relevant standards committees.

This paper highlights that whilst GGBS is an excellent material and has helped displace clinker production historically, and should continue to be used, it cannot further reduce global emissions. Therefore an urgent acceleration in the development and scaling of other technologies is necessary to meet GHG reduction goals and the authors urge the industry to support new approaches and technologies wherever possible.

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From: Cory Shaw
To: Curb, Dustin (DES); DES SBCC
Subject: Washington Aggregates & Concrete Association - Comments - RE CLF Study & NBI Code Proposal
Date: Wednesday, November 27, 2024 11:40:11 AM
Attachments: FINAL- 11.27.2024 WACA Comments to SBCC - CLF study.pdf
FINAL - 11.27.2024 WACA Comments NBI Proposal.pdf

External Email

Dustin, Et al.

Please find attached the comments as mentioned during my public testimony for each issue:

1. **CLF Study**
2. **NBI Code Proposal**

We as an industry have not had ample time to provide full commentary, but we hope that these comments are helpful in getting these two issues on the proper track moving forward.

I, and my membership look forward to continued dialogue, and appreciate our comments being attached as addendums to your submittal to the Legislature, and taken into consideration in not moving forward with the NBI Code Proposal(s).

Thank you and have a wonderful Thanksgiving!

Cory Lee Ann Shaw
Executive Director
WA Aggregates & Concrete Association
WA ACI Chapter

[redacted]

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Washington State Building Codes Council
Submitted Electronically
November 27, 2024

WACA Comments to SBCC regarding:

Recommendations for Washington State Embodied Carbon Code Language
A study commissioned by the State of Washington 68th Legislature for potential adoption by code council

SBCC Members & Legislature,

The Washington Aggregates and Concrete Association (WACA) is a non-profit industry trade association representing sand, gravel, quarry rock, cement, ready mix concrete, suppliers, and industry-related businesses in Washington State. We are dedicated to strengthening our industry through agency relations and advocacy at the state, national, and international levels. This objective is achieved through education, training, and industry-related events. One such avenue is our participation in various committees and working groups as well as advocacy. We are thankful for the opportunity to provide comments, as our participation and voice is imperative to the success of this process.

In 2024, The legislature directed the State Building Code Council to engage stakeholders broadly while conducting a study of embodied carbon policies enacted in other states and to evaluate viable options for addressing this policy in the Washington State Building Code. The SBCC contracted the Carbon Leadership Forum (CLF) to generate this study. This study was to be done with broad stakeholder input. Concurrently, the legislature passed 2ESHB 1282 during the 2024 legislative session to examine reporting of EPD's on public buildings over 100,000 square feet. Importantly, the bill set up a technical work group to develop recommendations to the legislature for further action. ESHB 1282 requires the work group to make two sets of recommendations with one due in September 2025 and another in September 2026. We think this report belongs in that working group for further vetting and should not be used as a reference or source for our state legislature for the reasons outlined below.

FLAWS IN THE PROCESS

We want to first address the blatant exclusion of Suppliers, Producers and Operators (Industry) and other Key Stakeholders, as was set forth in the budget proviso that funded this study. Industry was not involved IN the process and have been relegated to providing comment AFTER the report has been finalized, with less than three weeks to evaluate a 95-page document and the conclusions therein. Additionally, we were unaware this report was forthcoming and had one opportunity to sit in on a hearing with the State Building Codes Council, where we raised the concerns outlined below. These concerns were ignored or deemed not significant enough to delay the process. This is bad practice and outside of procedure and we believe outside the legislative proviso that indicated Industry would be included IN conducting the study.

Industry has more accurate numbers, real world data and can provide better, more relevant and sustainable solutions without the misaligned assumptions this report makes.

MISCONCEPTIONS IN THE ANALYSYS

There has been NO economic analysis or impact analysis on business or industry, etc. This study falsely assumes there is unlimited supply, that materials are a like for like exchange, and one region can mirror another, and that there will be zero cost or financial impact to industry. All of this is incorrect.

Supplementally Cementitious Materials (SCM's) are not equal. Mix designs require intensive study and testing to ensure they meet the standards. It is not simply a plug and play scenario. Industry cannot simply pivot. Changing materials would require new permitting, new or retrofitted plants, and more testing and certification of mix designs. All points that Industry should be able to participate in and communicate. We should have been AT the table.

Here are some basic simple reasons why the report and its conclusions are flawed:

1. These recommendations are premature
    a. Scalability of SCM's is not there yet, as the global market is challenged with meeting current demand.
    b. Project to project we are meeting reduced carbon emission goals. This is working without policy as industry and design are naturally progressing toward this outcome.
    c. Industry has already adopted a zero-carbon initiative, without policy.
2. There are basic and known challenges which are ignored in this study:
    a. SCM's are not like-for-like exchanges, so there are steps in the process that need to be considered.
        i. Permitting is a bottleneck for facilities, retrofits, and sourcing of materials.
        ii. Mix Design changes require extensive testing for strength, resiliency, etc
        iii. Certifications for the testing and installation of mix designs is imperative.
        iv. The Global Supply Chain is already struggling to meet demand.
        v. One-size-fits-all will not work with mix designs regionally as simply changing the type of aggregate impacts the mixture.
    b. New materials require new permitting, plant upgrades or retrofits, or entirely new plants altogether. There will be challenges in operation, retrofitting existing or new construction.
    c. To source globally will not solve a carbon emissions problem. We need to source locally.
3. Industry is the solution:
    a. Let industry drive the solutions and the innovations through the successful design build process that is already in place project to project.
    b. Allow for Research and Development to take a natural progression.

THE STUDY IS FLAWED

Aside from the glaring issue that this report appears to be based on a significant portion of a previous study which examined only THREE buildings, the report similarly makes the same assumptions that were already deemed to be economically futile and insignificant by the previous study we just mentioned which took place in 2022.

Both then and now, Industry, Code officials and the like provided comments and feedback pointing out the errors and like then, neither were at the table when the study took place. This appears to be a pattern.

The current report fails to acknowledge that nearly 70% of these embodied carbon reductions are from ready-mix concrete design strategies specific to an individual project and not the industry. Consequently, these savings are derived by using SCMs such as fly ash and slag on a smaller scale. SCM materials – derived from burning coal and smelting ore – are available in limited and increasingly dwindling quantities and there are few domestic sources in Washington State.

As with any product, the laws of supply and demand apply. Requiring all projects over a certain size threshold to meet lower-carbon goals will have an impact on the market price of these materials. The study glosses over this consideration and makes an erroneous assumption that because SCMS were available for one project, a sufficient supply of SCMS will be available at roughly the same price to all projects. This is incorrect.

As an example, the report seems to be implying that increased demand for these SCM materials will result in the production of more fly ash. The reality is that's not the case. All the fly ash available to the current market is already being consumed, and the closure of the Transalta Coal power plant in 2025 will eliminate a major local supply of fly ash. There is no plausible scenario under which the supply of fly ash is maintained or increases over time while burning of coal is being phased out. We also show that all slag in the market is earmarked for current buyers and the market is incredibly competitive for these SCM materials.

Fly Ash as an SCM is diminishing quickly due to phase out of coal fired power plants, so slag is the go-to SCM that we will have to use to reach lower GHG targets. However, the supply of alternate SCM's is also not unlimited, and this study does not touch on this subject. It is worth pointing out that any State using more slag or any SCM will only mean that someone else can't get it. Limited supply and challenges in scalability will create an incredibly competitive and costly global market.

Where a resource is globally limited, and is already highly utilized, then this resource offers limited opportunity to further decrease global emissions. To be clear: this is because the overall global level of resource use cannot increase. As such, any local increase in use is highly likely to result in a reduction in use elsewhere, balancing each other out overall. Furthermore, if a limited resource is being used disproportionately as an SCM in regions where the production of clinker is lower-carbon than the global average, then the production of higher-carbon clinker must increase in the remaining regions, which is likely to increase overall global emissions.

This study fails to consider the existing market for these materials or how they will be scaled in the future, which is a significant oversight.

IGNORES MARKET CONDITIONS AND MATERIALS SUPPLY

The study pays zero attention to local market conditions with respect to materials, especially concrete and cement. Washington has just one cement manufacturing facility that produces roughly 30% of the total local market. The rest of the cement used in Washington is imported, mostly from Asia and Canada.

The local market supply of cement cannot be increased unless we are miraculously allowed to expand cement production locally. We, in industry, understand that there is a close to zero percent

chance of developing a new cement plant for innumerable reasons. However, on the off chance that a miracle happens, any effort to do so would likely take decades to finance, permit and construct. This also applies to mining, harvesting and or producing alternatives to Cement. The local market is heavily dependent on importing material which impacts the embodied carbon calculations and makes meeting these projected numbers in a sustainable manner impossible.

Given these dynamics, the state should be careful about how it treats sourcing and must ensure that any assumptions on supply availability and transport are accurate. It is also imperative that appropriate adjustments can be made as market conditions change over time, which is why the ratcheting regulatory method outlined in the table is unsustainable.

We are all aware that EPD's require the inclusion of transportation emissions for moving raw materials. We believe these transportation emissions can account for roughly 10-15% of the total GWP of a material. This means, as an example, that locally sourced cement or SCM will have a significantly lower GWP than materials imported from Asia. Again, this will create competitive imbalances in the marketplace where potentially only one supplier could meet the lower-carbon requirements.

The market implications on the concrete market in particular demand a more detailed and robust analysis with industry who are doing business in and importing materials to the state.

Section 5.3.2 proposes an unstainable model and is a deviation from California's approach. The Global Warming Potential of the Proposed Design WBLCA shall not exceed 90% of the total Global Warming Potential of the Baseline Design WBLCA with the automatic ratcheting approach will, over time, become an impossibility with current market trends.

The report does not reference where the proposed GWP numbers are derived from. We assume these are numbers taken from the NRMCA regional average but without clarification we are only guessing. What you must remember about the NRMCA average is these are only NRMCA members reporting values and heavily weighted in the metropolitan areas like Seattle. These averages do not pick up a lot of the small to medium Ready-Mix suppliers that cover the rest of the state that were not part of the study and may not even have EPD's yet. Additionally, these mid to small producers may or may not have access to SCM's.

These recommendations: if enacted, would cover the entire state of Washington and as presented are not attainable. This needs further research and industry input. At minimum exploration of the applicability across the state with consideration of varying materials and technical capabilities along with the market availability of SCM's needs to be understood. As an example, these numbers will be extremely difficult to hit in SW Washington where the aggregates are not of the same quality as in the Puget Sound Region and fly ash is not universally available, combine this with a short supply of slag and again, we have issues. This report excludes research on how the recommendations will affect or impact outlying small rural area development. We do not believe the intention behind this report is to begin shipping 1000's of tons of aggregate from Seattle to Eastern Washington or beyond. But again, variations in aggregates will change the ability to meet these recommendations. This report needs to be vetted for the entire state along with industry and not just what is possible in the Puget sound region.

These proposed GWP limits also do not consider any structural or architects project specific specifications such as low w/c ratio, exposure limits, high durability areas etc., where higher paste contents will be needed or special applications. Large warehouse projects and multifamily housing units utilize polished concrete slabs that will limit the use of SCM to 15% due to the polishing

operations. The proposed numbers are also too broad in scope, as 2500-3999 PSI. There will be a different cementitious value between 2500, 3000 and 3500 PSI and will all have its own different GWP. This is simply inaccurate to lump all mixes within these PSI ranges into one GWP.

The term average will have some mix GWP higher and some lower and the lower ones in that areas simply will not be able to comply with this code as it is written

DISMISSES INPUT FROM BUILDING CODE OFFICIALS AND OTHERS THE LAST TIME THIS POLICY WAS REVIEWED BY THE SBCC.

Section 3.2 and 3.3 are wholly inappropriate for inclusion in this study. These sections read as advocacy and opinion of the authors, rather than consistent with the legislative mandates of the study. The Building Codes are not the place to enforce environmental policy or regulation, as the enforcement of these provisions is nearly impossible. The approach to a project should be materially agnostic and focus on the bigger picture with the project and the GWP goals. Section 3.3 dismisses the legitimate concerns raised by industry, building officials, construction firms, and others who would be directly impacted by inserting this policy in the building code.

Building code officials would have no ability to independently determine if a building was constructed using lower-carbon materials. Former Commissioner Micah Chappell raised these concerns throughout the process during the last time the SBCC considered implementing these policies in the building code. The report dismisses these concerns entirely stating, “The only new requirement for code enforcement officials is to confirm that the design professional of record has signed off that measures are complete.” But what happens if the design professional of record hasn’t signed off? Does the building code official have to deny a certificate of occupancy? What are the available remedies for such a situation?

THE BUILDING CODE IS NOT LIKELY THE RIGHT PLACE TO ENACT POLICY.

Building Codes are intended to address the health and safety of buildings, not to enforce regulatory policy.

Policy consideration around mandating design of buildings using lower-carbon materials is really a procurement issue about which products should or will be used. Throughout the report, the authors repeatedly mention how certain materials would be preferred to others. We maintain that these decisions should be made by engineers, project owners and industry, not by the legislature or the building codes council.

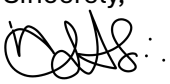
At this point, the legislature has only mandated the reporting of EPD’s, and we have a working group established by HB 1282 that will be exploring EPD’s in depth, with Industry at the table. The building code council or any NGO should not set policy that goes beyond the legislature’s guidance and should not have the ability to determine what products an engineer or supplier should be using when health or safety are not a consideration.

The CLF report’s development process did not include the proper degree of stakeholder input as required and intended by the proviso. Because of this lack of engagement while the report was being developed, it contains numerous flaws and, therefore, should be referred to CLF for the proper level of stakeholder input. At the very least, the report should be submitted to and considered in the ESHB

1282 working group process rather than being adopted without proper input and industry vetting. Neither the NBI proposal nor the CLF report should be adopted or enforced through Building Codes or any legislative avenue at this time. Unlike the process with the CLF report and the NBI proposals, many in the industry have seats at the table with the E2SHB 1282 working group with the Department of Commerce where a wonderful level of stakeholder work will occur resulting in much better and more vetted recommendations. This process at Commerce has just begun and this process will prove valuable in the end.

We thank you for your time and consideration.

Sincerely,



Cory LeeAnn Shaw
Executive Director
WA Aggregates & Concrete Association
WA ACI Chapter

[redacted] | washingtonconcrete.org

WASHINGTON AGGREGATES & CONCRETE ASSOCIATION

22223 7th Avenue South, Des Moines WA 98198
Office: 206.878.1622 | washingtonconcrete.org

Washington State Building Codes Council
Submitted Electronically
November 27, 2024

WACA – SBCC TAG COMMENTS TO NBI PROPOSAL 24-GP1-118-R1

SBCC Members,

The Washington Aggregates and Concrete Association (WACA) is a non-profit industry trade association representing sand, gravel, quarry rock, cement, ready mix concrete, suppliers, and industry-related businesses in Washington State. We are dedicated to strengthening our industry through agency relations and advocacy at the state, national, and international levels. This objective is achieved through education, training, and industry-related events. One such avenue is our participation in various committees and working groups as well as advocacy. We are thankful for the opportunity to provide comments, as our participation and voice is imperative to the success of this process.

These code recommendations put forth by the New Building Institute (NBI) are problematic at best. They are based on an unvetted study by the Climate Leadership Forum (CLF) which did not include any input from Suppliers, Producers, and Operators (Industry) and to base any recommendations on this study would be detrimental to Washington.

These Code proposals will not work.

1. These Code recommendations are Premature
    a. Scalability of SCM's is not there yet, as the global market is challenged with meeting demand
    b. Project to project we can meet carbon emissions, and it is working without policy as industry and design are naturally progressing toward this goal.
    c. Industry has already adopted a zero-carbon initiative, without policy driving the goal.
2. There are basic and known challenges:
    a. SCM's are not like-for-like exchanges, so there are steps in the process that need to be considered.
        i. Permitting is a bottleneck for facilities, retrofits, and sourcing of materials.
        ii. Mix Design changes require extensive testing for strength, resiliency, etc
        iii. Certifications for the testing and installation of mix designs is imperative.
        iv. The Global Supply Chain is already struggling to meet demand.
        v. One-size-fits-all will not work with mix designs regionally as simply changing the type of aggregate impacts the mixture.
    b. New materials require new permitting, plant upgrades or retrofits, or entirely new plants altogether. There will be challenges in operation, retrofitting existing or new construction.
    c. To source globally will not solve a carbon emissions problem. We need to source locally.
3. Industry is the solution:
    a. Let industry drive the solutions and the innovations through the successful design build process that is already in place project to project.

    b. Allow for Research and Development to take a natural progression.
4. Stop letting NBI change the proposal based on comments received and force the inclusion of industry in this process.
    a. These knee-jerk reactions to comments is only serving to validate our claim that the proposal is not ready, nor is it vetted.

THERE IS ALREADY A PROCESS IN PLACE THAT INCLUDES INDUSTRY

ALLOW COMMERCE TO START AND COMPLETE ITS WORK

In 2024, The legislature directed the State Building Code Council to engage industry and stakeholders broadly while conducting a study of embodied carbon policies enacted in other states and to evaluate viable options for addressing this policy in the Washington State Building Code. The SBCC contracted the Carbon Leadership Forum (CLF) to generate this study with broad stakeholder input and issue a report. Concurrently, the legislature passed 2ESHB 1282 during the 2024 legislative session to examine reporting of EPD's on public buildings over 100,000 square feet. Importantly, the bill set up a technical work group to develop recommendations to eh legislature for further action. 2ESHB 1282 requires the work group to make two sets of recommendations with one due in September 2025 and another in September 2026.

The CLF report's development process did not include the proper degree of stakeholder input as required and intended by the proviso. Because of this lack of engagement while the report was being developed, it contains numerous flaws and, therefore, should be referred to CLF for the proper level of stakeholder input. At the very least, the report should be referred to and considered by the ESHB 1282 working group process rather than being adopted without proper input independently by the SBCC. Neither the NBI proposal nor the CLF report should be adopted or enforced through Building Codes. Unlike the process with the CLF report and the NBI proposals, many in the industry have seats at the table with the E2SHB 1282 working group with the Department of Commerce where a wonderful level of stakeholder work will occur resulting in much better and more vetted recommendations. This process at Commerce has just begun and these efforts by the SBCC and the NBI may prove valuable to the group.

NBI's DESCRIPTION OF THEIR PROPOSAL IS NOT CONSISTENT WITH REALITIES FACING MATERIAL MANUFACTURERS AND SUPPLIERS

<u>Problem and Opportunity</u>

We agree that the percentage of building related emission attributable to embodied carbon is increasing as operational efficiency improves and the GHG emissions attributable to building operations decreases.

We do not agree that building code-based policies hold critical potential to address bulk emissions. The reason we disagree is that we regularly receive requests to provide low carbon concrete for a variety of projects including building projects. Our biggest challenge in fulfilling these orders is being able to maintain an inventory of components needed to supply low carbon construction materials. The supply of SCMs like fly ash and slag growing more limited all the time, especially for domestic supplies. The industry is investing diligently to increase the supply of SCMs like pozzolan, calcined clay and Portland limestone cement, but the supply of these materials cannot be increased without

obtaining the necessary permits required to mine materials and/or retrofit existing manufacturing plants. A regulatory process that takes years to complete.

Our lived experience tells us that the critical path for reducing embodied carbon is increasing the supply of low carbon materials to meet the already growing demand, and that greatest opportunity to reduce embodied carbon is to streamline the pathway for manufacturing and obtaining low carbon materials.

The NBI points to the fact that other states like California have passed similar code changes. This is useful information, but it is also important to recognize that the opportunities and challenges are not the same across the country. For example, Washington has one operating cement plant located in Seattle capable of producing approximately one third of the cement consumed in the State. In 2015 California had ten cement manufacturing plants. Now it has seven and is the second largest producer of cement in the US after Texas. Most cement plants in the US are aged and many are approaching the end of life either due to obsolescence or because their supply of limestone or other raw materials are nearing depletion. There is only one source of fly ash in Washington State, the TransAlta coal-fired power plant in Centralia. That plant is slated to close in 2025.

Washington is competing for cement, fly ash and other building materials with other states and globally. We depend on complex relationships and long supply chains to get these materials. It is a mistake to overlook the challenge of maintaining a reliable supply of these materials in Washington State.

Methodology and Reasoning

"We believe allowing three pathways to compliance creates needed flexibility, but it still shouldn't be done through the building code."

Pathway Option 1: The potential benefits of building reuse is clear, and providing incentives for reusing portions of a building seems prudent. Washington concrete and aggregate producers have long advocated for incorporating incentives by encouraging the use of recycled concrete aggregates into project plans and policies. The benefits of using recycled concrete aggregates; where appropriate, provides the advantage of helping to conserve our limited supply of construction aggregates for the best and highest use. Recycled concrete aggregates also provide the climate benefit of absorbing substantial amounts of carbon dioxide from the atmosphere. In addition to providing incentives for reusing portions of buildings, the climate benefit of incorporating recycled concrete aggregates into projects should be accounted for and incentivized.

Pathways 2 and 3: Achieving a 10% reduction in embodied carbon is easily achievable when the low carbon components like fly ash and slag are readily available and appropriate for the application. The NBI proposal appears to assume that there is unlimited supply of SCMs available for incorporation into projects. This assumption does not hold true, and implementing the proposed code without a solid understanding of the supply of these materials alongside a solid understanding of the impact of their use in various applications is reckless and has the potential to substantially and detrimentally impact construction times and associated costs. The requirement that GWP of covered materials be reduced by 10% would have the effect of ratcheting down allowable GWP values. While initial limits may be relatively easy to achieve, the proposed incremental reduction in average GWP over time could quickly outpace the supply of materials and the development of technology needed to meet the changing requirement over time.

Determination of Compliance

While collecting documentation from design professionals that confirm compliance might be easy and inexpensive, putting it into practice is not. What steps are jurisdictions to take if the documentation is not available or regulatory requirements have not been achieved? Jurisdictions may issue fines or refuse to issue certificates of occupancy but both options have serious financial consequences that could potentially embroil parties associated with the project in litigation without a reasonable and clear remedy. If the proposed code is adopted but not enforced, it becomes an unreasonable burden on material suppliers, builders and owners who endeavor to comply. It will also be an economic advantage for material suppliers, builders and owners who do not. For this reason, establishing a clear path and mechanism for determining compliance and effectively enforcing the code is necessary for equitable and fair application of the code. NBI's description does (not?)describe a clean and effective means of enforcing the code.

Economic Impact

The NBI proposal does not provide sufficient information to support their assertion that the proposed code with have "No" economic impact. To support their assertion, the NBI proposal points to a very limited number of projects and speculates that substantial reductions can be achieved by simply specifying and substituting low carbon materials. The statement that products and solutions are available today that can realize embodied carbon reductions is true. The problem is that these products and solutions are not available at scale to meet demands, and future scalability is likely not attainable unless more sites that produce these products are constructed and permitted. Failure to balance requirements with the access to these products and solutions could adversely impact the construction industry economically and stifle the development of new products and solutions.

Costs to Manufacturers and Suppliers

NBI's evaluation of the costs to manufacturers and suppliers is limited to the impact associated with the production of EPDs. This analysis fails to recognize the number of EPDs does not necessarily reflect the number of products evaluated. There is no causal relationship between the production of EPDs and the volume of product available. Finding ways to make the production of EPDs affordable is important and helps the industry, but the production of an EPD does not produce any low carbon building materials.

CONCLUSION

The industry supports the effort to bring more low carbon construction materials to the market to reduce embodied carbon. The NBI proposal, unfortunately, is built upon assumptions that do not hold true when the approach is applied on a larger scale. We encourage the NBI and their partners to work with industry to gain a common understanding of the obstacles and challenges preventing the construction industry from incorporating more low carbon building materials into projects. That is why we agreed to support E2SHB 1282 and its work group and why we are looking forward to engaging collaboratively to find effective solutions through that process.

The legislatively mandated work group at the Department of Commerce needs to review the report and proposal, complete its stakeholder work that has only just begun, and develop embodied carbon policy recommendations for the legislature as required by E2SHB 1282.

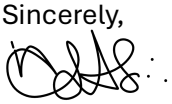
In sum, the SBCC should hit the pause button on making any changes to the building code based on the findings of the CLF report and should not preempt the E2SHB 1282 work group's legislatively directed efforts to work through stakeholder comments develop the proper policy recommendations based upon that work.

We believe the appropriate next step is for the SBCC to not adopt the NBI proposed codes but rather table it until the proper level of stakeholder input has been included. Alternatively, we would recommend that the SBCC also NOT refer to the CLF report given the lack of value at present.

Considering all the above, the SBCC and TAG should not allow the NBI to continue to alter their proposal. This knee jerk reaction to comments is proof that there is clearly a flaw in the process.

We thank you for your time and consideration.

Sincerely,



Cory LeeAnn Shaw
Executive Director
WA Aggregates & Concrete Association
WA ACI Chapter

[redacted] | washingtonconcrete.org

From: Patrick Hanks
To: DES SBCC
Cc: Curb, Dustin (OES)
Subject: Embodied Carbon Study Public Comment
Date: Wednesday, November 27, 2024 2:32:33 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
BIAW - 11-27-24 - Embodied Carbon Study.pdf
Importance: High

External Email

Hello,

Please see the attached document for BIAW's public comment on the embodied carbon study.

Thanks,
Patrick

BIAW
Homes start here.

Patrick Hanks
Policy & Research Manager
[redacted]
BIAW.com

Building Industry Association of Washington
300 Deschutes Way SW, Ste. 300
Tumwater, WA 98501
(360) 352-7800 | BIAW.com

November 27, 2024

Chair Daimon Doyle
State Building Code Council
PO Box 41449
Olympia, WA 98504

Re: SBCC Embodied Carbon Study

Dear Chair Doyle,

The Building Industry Association of Washington (BIAW) represents 8,000 member companies within the residential construction industry. We are major stakeholders of the State Building Code Council (SBCC) and actively participate in all SBCC meetings to advocate for safe building codes that are lawful, provide flexibility in design and materials, and allow for housing construction that is affordable.

We are concerned with the process that this study conducted and presented to the public. The proviso for this study states that "in conducting the study, the council must provide opportunities for comment from design, construction, and building industry stakeholders." We were aware that the SBCC was contracting to have the study performed. However, we expected that, similar to how other agencies operate these kinds of studies, stakeholders would be given opportunities to comment during the study to shape its final outcome. This both encourages stakeholder involvement while also creating better studies with input from those affected. The full contents of this 95-page study were only released to the public a couple of weeks ago with a short period of time before the SBCC was due to submit the study on December 1.

We take issue with the lack of substantial analysis on the economic and cost impacts from the requirements proposed in this study. For example, the increased costs that manufacturers will face are barely addressed, and this is likely a significant portion of the economic impact that may result from these requirements. Had we been able to view the contents of the study while it was being formed, this issue (and others) may have been addressed.

Ultimately, we find that building codes are an improper mechanism to enforce embodied carbon requirements. The point of building codes is to create minimum standards (based on accepted national standards) that relate to direct health and safety, that allow flexibility in design and use of new materials. Embodied carbon does not relate to the direct health and safety of materials, does not allow flexibility in design, and makes it challenging to create and use new building products because they must go through extensive regulatory processes to obtain certification.

Building Industry Association of Washington
300 Deschutes Way SW, Ste. 300
Tumwater, WA 98501
(360) 352-7800 | BIAW.com

Builders, architects, engineers, and their clients can voluntarily use embodied carbon standards in their projects. Doing so voluntarily shows their commitment to addressing climate change while allowing flexibility in our codes and laws for projects across the state, in some cases where it may not make sense to build to embodied carbon standards.

We strongly caution the legislature against adopting the code changes presented in this study and equally caution against directing the SBCC to adopt similar changes. The building codes should only relate to minimum requirements for direct health and safety and the SBCC is ill equipped to handle the consideration of a proposal of this magnitude and the economic impact it will have.

Sincerely,

Patrick Hanks
Policy and Research Manager

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Wednesday, November 27, 2024 3:16:56 PM

External Email

Submitted on November 27, 2024 - 03:16pm

Name
AIA Washington Council

Email
[redacted]

Phone
[redacted]

Question/Comment
Please find our feedback on the attached document.

Attachment

- 241126-ec-proviso-report-feedback.pdf 94.99 KB

AIA Washington Council

27 November 2024

RE: Recommendations for Washington Embodied Carbon Code Language

Dear Members of the State Building Code Council,

Thank you for the opportunity to submit feedback on the Recommendations for Washington Embodied Carbon Code Language report dated November 2024. This report is the product of a 2024 budget proviso requested by AIA Washington Council as a first step in considering how to address embodied carbon in new buildings.

Below is our comprehensive feedback on the report.

The proposed Whole Building Life Cycle Assessment (WBLCA) recommendations demonstrate a thoughtful and comprehensive approach to addressing embodied carbon in architectural design. While the report presents a promising framework, several key areas warrant further consideration to ensure practical and effective implementation.

The methodology's strength lies in its expansive scope, moving beyond traditional carbon accounting to include building enclosure components and specialized systems. This holistic approach represents a significant advancement in environmental assessment. However, the proposed implementation strategy requires careful refinement to balance ambitious environmental goals with the practical realities of architectural practice.

Though not insurmountable, the recommendations would necessitate methodological adjustments, including comprehensive recalibration of project scoping, fee structures, and technical capabilities. We recommend an incremental implementation approach that allows design professionals and manufacturers sufficient time to adapt to new assessment protocols.

In addition, the proposed carbon reduction targets may benefit from a more gradual introduction. An initial threshold slightly above the current industry average would facilitate smoother systemic integration, providing a more realistic pathway for widespread adoption. Additionally, the suggestion for more frequent intervention points between standard code revision cycles is particularly valuable, enabling responsive adjustments to emerging technologies.

The report's approach to material assessment is notably sophisticated. The proposed material-agnostic framework and project-wide weighted average approach for concrete specifications demonstrate a nuanced understanding of the complex interdependencies in building materials. The recommended credit-based incentivization model is especially compelling, offering tangible developmental advantages that could motivate design teams to exceed minimum carbon reduction expectations.

Practical implementation challenges require further examination. The potential temporal implications of low-carbon materials, particularly in complex structural applications, could introduce notable schedule and cost complexities. While the report acknowledges these challenges, more detailed guidance on managing such variations would be beneficial.

We appreciate the comprehensive nature of the recommendations and their potential to drive meaningful change in reducing the architectural sector's carbon footprint. The proposed framework represents a balanced approach that seeks to harmonize environmental stewardship with practical construction realities.

In conclusion, our recommendation is to proceed with the proposed WBLCA methodology with the suggested refinements, focusing on gradual implementation, flexible assessment protocols, and robust support for design professionals during the transition.

The American Institute of Architects
AIA Washington Council
Center for Architecture and Design
1839 Lake Drive
Camano Island, WA 98282

T (206) 957-1925

www.aiawa.org

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Wednesday, November 27, 2024 4:36:36 PM

External Email

Submitted on November 27, 2024 - 04:36pm

Name
Rachel Wrublik

Email
[redacted]

Phone
[redacted]

Question/Comment
Recommend revising section 5.6.1.1.a to say "single stack drainage configuration" rather than "single stack plumbing" for clarity.

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Saturday, November 30, 2024 8:36:47 PM

External Email

Submitted on November 30, 2024 - 08:36pm

Name
Rachel Wrublik

Email
[redacted]

Phone
[redacted]

Question/Comment
Page 7 notes that emissions due to refrigerants were excluded from WA states carbon accounting. Refrigerant emissions can be significant sources of greenhouse gases and pollution. What about proposing a method for tracking total volume of installed refrigerants as well as annual refrigerant leakage and its contribution to overall impacts?

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Saturday, November 30, 2024 8:38:59 PM

External Email

Submitted on November 30, 2024 - 08:38pm

Name
Rachel Wrublik

Email
[redacted]

Phone
[redacted]

Question/Comment
In response to Option 2: Building Carbon Budgets on page 47, we recommend that carbon budgets are created with clearly defined scopes and lifecycle phases. Take a holistic approach where possible, considering whole life carbon implications. This may lead to multiple compliance paths depending on project focus. Perhaps the total budget could scale depending on included scopes.
Cautionary notes: Industry does not yet have robust benchmarking data with well-defined comparable scopes and lifecycle inclusions. Recommend building in flexibility to adjust budgets over time. Also note that there are considerable uncertainties both in background data and assumptions about future phases and their impacts.

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Saturday, November 30, 2024 8:39:50 PM

External Email

Submitted on November 30, 2024 - 08:39pm

Name
Rachel Wrublik

Email
[redacted]

Phone
[redacted]

Question/Comment
Page 59 discusses the allowance of A2L refrigerants which have lower GWP values than refrigerants operating in most existing equipment. It may be helpful to note that while HFO refrigerants have lower GWP values, they are still much stronger greenhouse gases than CO2 and have aquatic pollution concerns. This puts additional pressure for further research on the use of natural refrigerants and alternate materials.

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Saturday, November 30, 2024 8:46:41 PM

External Email

Submitted on November 30, 2024 - 08:46pm

Name
Rachel Wrublik

Email
[redacted]

Phone
[redacted]

Question/Comment
These comments are regarding Section 5.6.3, Table 5-12, on page 63 electrical best practices. We recommend exercising caution with the first 3 bullets without first conducting detailed case studies. It is possible that these do not offer long term embodied carbon savings.
Bullet 1 "Use of wireless controls to reduce wiring":
While this strategy reduces wiring, it reduces small gauge control wires. It does not eliminate the need for infrastructure and often requires additional equipment powered by batteries. Batteries require regular replacement and can have a significant embodied carbon and environmental footprint. There is also a question of system reliability with an increased risk that the system will be taken out and replaced with a more reliable hard-wired option.
Bullet 2 “Use of power over ethernet (POE) lighting and controls to reduce wiring”:
POE has limited capacity and may increase the total quantity of circuits and wiring compared to standard voltage power. This strategy is likely dependent on the targeted devices. Additionally, IT equipment has a shorter lifespan than copper wiring and system configuration may lead to increased base load power requirements for switches. Once again, detailed case studies are recommended.
Bullet 3 “Use of DC wiring for buildings to reduce costs, wiring and increase integration of renewables”:
DC distribution still requires voltage transformation. PV arrays are often configured for high voltage whereas equipment requires lower, non-standardized voltages. Detailed case studies comparing these two options should be pursued prior to recommending.

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Saturday, November 30, 2024 12:54:32 AM

External Email

Submitted on November 30, 2024 - 12:53am

Name
Kinley Deller

Email
[redacted]

Phone
[redacted]

Question/Comment
Please see comments in attached document. Thank you for your consideration of our suggestions.

Attachment

- embodied-carbon-study---king-county-comments.xlsx20.69 KB

Below are comments prepared by King County to the Washington State Building Code Council on the 2024 Embodied Carbon Study. Please direct any questions to Kathleen Petrie: kpetrie@kingcounty.gov.

Numeral Section within the Study	General Topic (if needed)	Comment
5.2.2.1	EPD Collection	If requiring EPDs, where will these be collected? Will there be a public database? Suppliers have stated that they want access to this type of information.
6.4	AEC and Code Enforcement Capacity	This will take extra time to implement and there is already constraints on code enforcers' capacity. It will also take some time to get enough AEC professionals educated in order to implement these pathways. Suggest more time and consideration is put into the rollout of that side of the implementation.
7	Affordable Housing	Even if there are not added material costs, there are added design costs for implementing low embodied carbon development. Consider an exemption or alternative support for low income or affordable housing.
1.3	Embodied carbon voluntary and regulatory activities in Washington	While these are exciting programs, they are not enough to accelerate action quickly enough to achieve the 2050 target established in RCW 70A.45.020. Please add explicit code interpretation here.
3.4	Options for placement of new embodied carbon provisions in code	Option 3 is the best option. If 3 is absolutely not doable, I'd prefer option 1 with additional provision to include in Chapter 4 language about opportunities to improve buildings' impacts on the climate and related impacts on health and safety.
5.1.1	Description of Building Reuse	The conclusion of this section is important and needs to be highlighted: "Opportunities to address building reuse in the code are limited. It is not within the authority of the building code to mandate building reuse – this is best achieved through other legislative actions and policy programs. However, strategies can be employed in the code to encourage adaptive reuse or, at minimum, make it easier for applicants seeking to reuse rather than rebuild. The prevailing example is found in CALGreen..."
5.1.2	Building Reuse Potential Code Pathways	Is there evidence that exemption from MCC or WBLCA is a sufficient incentive to encourage reuse?
5.2.1.1.		Cite SUBSTITUTE HOUSE BILL 1282 or RCW or Title 39 new sections, GSA requirements, Canada's Standard on Embodied Carbon in Construction with active URLs
5.2.2	Material Carbon Caps Potential Code Pathways	Add note that analysis to forecast how option 1 and option 2 would get WA to achieve the 2050 target established in RCW 70A.45.020 is in Section 6.

5.2.4.2	Code Language Option 2	Is the list of other sections of the Washington State Building code that may incorporate new language on submitting EPDs and meeting GWP caps extensive enough? It's hard to pick option 1 or option 2 without having a sense of which one would get WA to achieve the 2050 target established in RCW 70A.45.020
5.3	Whole building life cycle assessments and building-level requirements	This is hard. Only the green of the greenest certified buildings are going to be able to complete this pathway. Option 3: combined approach with example from City of Vancouver seems most feasible. There are not a lot of consultants with this expertise in the industry
5.3.1.1 Existing policies		I can't find CALGreen WBLCA Pathway to reference
New idea		Wouldn't it be nice to just have regulation that require all concrete, for example, for x purpose sold in WA state to have this GWP?
General		I didn't see analysis of EPD market readiness for compliance. I am unsure the study included interviews with suppliers.
General		I also didn't see analysis of existing training programs in WA to train enforcement professionals and designers and practitioners in general.
New idea	Construction and demolition material management.	Move Appendix Y of the Residential Code and Appendix P of the Building Code into the body of each code as mandatory requirements, not optional appendices.
New idea	Mandatory Deconstruction for Buildings Permitted to be Demolished	Either promote and work with jurisdictions across WA State to adopt optional Appendix Z of the Residential Code, or move it into the body of the code making deconstruction a requirement across WA State.
6.4	Technical support	Since this is a new endeavour, there are bound to be situations that will need support to implement these pathways. There will need to be a way for projects to have technical support from experts and/or a network where project managers can go to ask specific questions. What training will need to be provided to industry professionals and developers to better understand what the new measures mean, the intent and how to design/implement.
5.1.3 (and Table 5-3)		Add clear instructions on how to calculate Total % reuse of required elements. Text in this section clearly details how to calculate the % of retained building but not the final total % reuse.
Table 5-11		Third column for DfD is missing text.

New idea	Non-Building Construction Projects	While this is a great start, it doesn't require anything of other types of projects that don't have a building footprint but might use a lot of materials (i.e. infrastructure projects). Consider adding requirements into permits (i.e. land use and conditional use) that would ensure that other project types will need to reduce their embodied carbon footprint. Because the state does not prepare certain codes such as Land Use and grading Codes, consider creating a Bill requiring local jurisdictions to include certain content in applicatble local codes (such as middle housing requirements) - what would the gamut of these codes be?
Table 5-12	Under "Structural"	Consider adding "Use of engineered wood fabricated with salvaged lumber"
Table 5-12	Under "Waste/materil/other measures"	Consider adding "Conduct deconstruction or move structure for reuse"
General		It should be noted somewhere that designing buildings for adaptability will reduce bldg. lifecycle embodied carbon impact.
Table 5-6		Additions for "Wood": - Source timber for local building salvaged lumber. - Utilize mass timber products that are adhesive free (like dowel laminated timber)

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Saturday, November 30, 2024 11:12:31 PM

External Email

Submitted on November 30, 2024 - 11:12pm

Name
Alyn Spector

Email
[redacted]

Phone
[redacted]

Question/Comment
Please see the attached comments submitted on behalf of Elizabeth Torske, Building Codes Specialist for Cascade Natural Gas regarding the Embodied Carbon Study for inclusion in the appendix. If you have any questions, please direct them to elizabeth.torske@cngc.com.

Attachment

- sbcc-letter-cngc.pdf 19.24 KB

CASCADE NATURAL GAS CORPORATION
A Subsidiary of MDU Resources Group, Inc.

8113 W. GRANDRIDGE BLVD., KENNEWICK, WASHINGTON 99336-7166
TELEPHONE 509-734-4500 FACSIMILE 509-737-7166
www.cngc.com

To: Washington State Building Code Council
Subject: Embodied Carbon Study Public Comment

Members of the State Building Code Council:

Cascade Natural Gas appreciates the opportunity to submit comments regarding the State Building Code Council's Embodied Carbon Study which was commissioned by Washington's 68th Legislature. As a local distribution company that provides service to industrial customers in a range of manufacturing fields including those outlined in the study, Cascade shares the following observations and feedback.

First, Cascade agrees with the concerns of our industrial customers that industry was not involved in the development of the study and was only allowed to provide comments to be submitted into an appendix after the finalization of the report. Opportunities to provide comment following the publication of the report on November 7th were limited to less than 30 days. The limited time provided to analyze and provide substantive feedback on the content of the study and its conclusions is a disservice to the policy development process.

Cascade is also concerned that even before the study's release, the report's authors had already been presenting proposals to the SBCC, including the integration of embodied carbon in code which mirrored the analysis of their study. Code proposal 24-GP1-118 related to embodied carbon was submitted by an author of the Embodied Carbon Study as early as September. Proposal 24-GP1-118 has been discussed by the SBCC's International Building Code Technical Advisory Group (IBC TAG) on November 14th and a revision, 24-GP1-118-R1, was discussed by the same IBC TAG on November 21st. Such engagement is premature and does not acknowledge the impacts these potential policies have to the industries directly examined in this study, nor does the study include the direct knowledge these industries bring that could have otherwise strengthened the report.

Due to the tremendous scope and scale of what is being proposed in the report, Cascade believes that no policies or codes should be based upon the study findings until a thorough multi-stakeholder review of this analysis is conducted. Of greatest concern is whether technologies described in the report's recommendations are currently feasible, widely available on the market, and economically accessible. This is particularly essential in light of the study's assertion that the economic impacts of the proposal will be insignificant. The reality of this claim is difficult to ascertain given the lack of industry analysis or calculations included in this report. More robust review will ensure that such cost impacts to industry are further understood and that sufficient feedback can be gained from all stakeholders.

Code policy should be determined in a transparent and collaborative manner with all stakeholders. Based on the submitted code proposal and recent meetings, it would be concerning if SBCC moved forward with implementing the study's proposed recommendations prior to the end of the public comment period and without legislative direction.

Thank you again for the opportunity to submit comments.

Elizabeth Torske
Building Code Specialist
Cascade Natural Gas Corporation

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Sunday, December 1, 2024 10:34:10 AM

External Email

Submitted on December 1, 2024 - 10:34am

Name
Joseph Mayo

Email
[redacted]

Phone
[redacted]

Question/Comment
Tracking embodied carbon for large commercial projects should be standard practice for AEC firms. Most architecture firms are already doing this work and companies like Autodesk and investing into software that will make this data collection easier. Tracking embodied carbon is an essential component of sustainable design and sustainable buildings.

From: Dan Kirschner
To: DES SBCC
Cc: Scott Peterson [redacted]; Curb, Dustin (DES); Braaksma, Krista (DES)
Subject: NWGA Comments re: Embodied Carbon Report
Date: Sunday, December 1, 2024 3:19:51 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
120124 NWGA SBCC Embed Carbon Letter.pdf

External Email

To whom it may concern,

Please accept and acknowledge the attached comments by the NWGA for the public record regarding the Embodied Carbon report that was directed by the Legislature through ESSB 5950.

Warmly,

NWGA
Northwest Gas Association

Dan Kirschner
Chief Executive Officer
[redacted]

Advocating for the role of the region's natural gas infrastructure in safely delivering a clean, dependable and affordable energy future.

NWGA
Northwest Gas Association

1914 Willamette Falls Drive, Suite 260
West Linn, Oregon 97068
t:503.344.6637 • www.nwga.org

December 1, 2024

Washington State Building Code Council
ATTN: Council Members
1500 Jefferson Street SE
P.O. Box 41449
Olympia WA 98504

Re: Request for a Legal and Ethical "Embodied Carbon Code" Report

DELIVERED via sbcc@des.wa.gov

Dear Council Members,

The Northwest Gas Association (NWGA) respectfully requests that the Council suspend its current work on the "Recommendations for Washington State Embodied Carbon Code Language" and start the process over in a manner compliant with ESSB 5950, common practices to protect impartiality, fairness required for publicly-funded research, and simple commonsense.

We have serious concerns about the Embodied Carbon Code report because process matters and this report fails to satisfy explicit legislative direction regarding stakeholder input. We are also concerned that its recommendations promise to distract from and imperil practical decarbonization. Finally, we are concerned about the ever spiraling costs of new energy policy to building homes and businesses; costs that promise little in the way of material decarbonization.

NWGA members are committed to reducing greenhouse gases, but true decarbonization can only take place if the requisite changes are economically and practically feasible, Gaining a clear understanding of the economics and practicality of code recommendations requires broad stakeholder input, rather than relying on the narrow agenda of activist organizations.

ESSB 5950 directs the Council to conduct this study—a study that has the potential to yield valuable insights into helping Washington reduce greenhouse gas emissions. However, this report failed to meet its legislative mandate, contains serious errors, and is already facing wide-spread opposition.

The Washington State Legislature stipulated *"(c) In conducting the study, the council must provide opportunities for comment from design, construction, and building industry stakeholders.*" This did not happen. There was zero notification that a study was even being performed until the November 15,2024 Council meeting, after the report was complete.

In response to stakeholder outrage expressed during that meeting, Megan Lewis, Program Director at the Carbon Leadership Forum who served as co-author and editor for the report, responded:

> ***So first, we would have obviously really appreciated the opportunity to engage with more stakeholders and weren't able to in the timeline. So, while we unfortunately weren't allowed in this timeline to include [actual industry input], we did the best we could.***

How is it that the authors of this report took months to assemble a 94-page document without once providing the opportunity for public input? Ignoring this legislative requirement is especially troubling

considering that the authors of the report attended, actively participated in and advocated for certain policies during various public meetings of the Council while simultaneously authoring this report.

As self-proclaimed activists, the authors of the report have a conflict of interest that blinds them from identifying solutions void of unintended consequences. In other words, they are not disinterested researchers. In fact, Carbon Leadership Forum's own website reveals their sole goal is advocacy of a single agenda item:

> *Our mission is to eliminate embodied carbon in buildings, materials, and infrastructure to create a just and thriving future. To advance government and corporate policy, tools and resources are required to provide the clarity needed for meaningful action. We develop model embodied carbon policy, act as a technical advisor to inform the development of effective and just policies, provide technical support to agencies implementing embodied carbon policy, and collaborate with NGOs to align and advance embodied carbon policies.*

Industry stakeholders, including NWGA, share the goal of reducing greenhouse gases, while balancing other important factors including operational carbon emissions, constructability, affordability, and public safety. Why was their input not invited and considered?

On September 19, 2024, nearly two months prior to publishing the report, co-author Ariel Brenner with the New Building Institute submitted code change proposal 24-GP1-118 to include embodied carbon as a WA state amendment to the 2024 International Building Code. The report acknowledges and offers defense of the proposal Brenner submitted (Table 3-1). To us, it appears that industry stakeholders were purposefully excluded as their input was not desired.

Furthermore, instead of working with industry stakeholders, the report attempts to preempt known concerns with an entire section dedicated to "*Potential Pushback*" vs "*Considerations for addressing concerns*" (Table 3-1). This table reads like an attempt to discredit or silence any feedback not aligned with the author's preconceived notions.

Finally, ESSB 5950 directs the SBCC to perform a study. However, we find no evidence in the report that any study was actually performed while creating the report. Instead, the report merely references prior studies that lack statical significance due to insignificant sample sizes.

We appreciate the opportunity to submit these comments for the record. We respectfully urge the Council to start over, to encourage and incorporate stakeholder input and to apply commonsense rather than ideology in defense of making tangible progress that doesn't leave people behind.

Please acknowledge your receipt of my request and confirm its disposition. Thank you for your consideration.

Sincerely,

DAN S. KIRSCHNER
Executive Director

Cc: Dustin Curb, State Building Code Manager via dustin.curb@des.wa.gov
Krista Braaksma via krista.braaksma@des,wa.gov

From: SBCC Website
To: DES SBCC
Subject: SBCC website - Contact Us webform submission
Date: Sunday, December 1, 2024 7:27:23 PM

External Email

Submitted on December 1, 2024 - 07:26pm

Name
Theodore L. Clifton

Email
[redacted]

Phone
[redacted]

Question/Comment
I am atacling hereto my comments regarding the Carbon Code Study that will be submitted to the legislature on December 2nd. Please attach these comments, along with my prior comments, to the Code Study for submittal. Thank you!

Attachment

- concerns-expressed-to-state-legislature-regarding-carbon-code-report-12:1:24.pdf77.32 KB

Washington State Legislature and other interested parties,

The following is in addition to the brief comments I provided to the WSBBC on November 15, 2024, and also forwarded as written comments to the Carbon Code Report that will be submitted with these comments to the State Legislature. The deeper I dig, the worse it gets!

All of the information provided below comes either directly from the Rocky Mountain institute (RMI) website, or from their 2023 IRS Form 990:

Concerns with Carbon Code Report, including RMI Form-990

1. The authors were listed as:
   Carbon Leadership Forum
   RMI (Rocky Mountain Institute)
   Nbi (New Buildings Institute)
   And the UW College of Built Environments

   Also listed as contributing was the UC Berkeley Department of Environmental Design

   Who was the lead agency, and who authorized the use of the other "stacked deck" of agencies to get involved? Which entities were being paid by the State of Washington, and which were brought in by the ones being paid? The language at the top of the Executive Summary is unclear.

2. At the top of page 3, there is a "competing interest statement", the link to which seems to have been taken down. The "Carbon Leadership Forum" now seems to be non-existent on the Web!
3. The only listed (and not even by name) individuals who participated in interviews about this work were "*three architects, two structural engineers, three mechanical, electrical, and plumbing engineering firms, one contractor, and one code consultant."* Note that NOT ONE SINGLE CODE ENFORCEMENT OFFICER WAS CONSULTED!
   A. *Of possible interest is that David Baker Architects was the recipient of a grant from RMI in the amount of $215,283! Was he one of the three architects "consulted"?*
4. Most of the Executive Summary is highly speculative, and nothing more than an opinion, without the backing of any real research.
5. Only Three modeled WBLCA scenarios were used to form the basis of this report. Why only those three, and not all 17 of those pathways that had been listed above in the report?
6. Introduction 1.1(c) "*In conducting the study, the council must provide opportunities for comment from design, construction, and building industry stakeholders.* This was clearly NOT DONE!

Interesting tidbits in the Rocky Mountain Institute IRS Form-990 for the tax year 2023 (most recent available):

RMI had $139,396,668 in total Revenue, including $8,804,384 in investment income!

RMI had approximately $8 MM in employee compensation.

Investments in “publicly traded securities” = $27,827,158.

Investments in “other securities” = $12,755,253 which exactly matches the fixed income investment on schedule D, part VII, which basically means bonds, real estate contracts, savings accounts, or certificates of deposit. One can safely assume income of less than 6% on these investments, which would have netted not more than $765,315 in income.

RMI reported $27,946 in total lobbying expenses, $26,411 direct lobbying. How much was spent in WA?

RMI investments in “right of use asset” Schedule D Part IX = $21,397,432 This represents their investments in the “Carbon Offsets trade! Total book value of “other assets” is only $25,521,443! This leaves only $2,300 for non-carbon-related investments, from which they derived a net income of over $8.8 million dollars, closely matching the amount they paid to their staff. They are dependent, therefore, on their income from the Carbon Offset market to keep RMI financially stable. They have an axe to grind! Follow the money!

Schedule F, part 1, RMI spent $35,098,414 in foreign countries.

RMI reported 20 total US Grants and assistance, the following of which likely pertain in some way to the Washington Carbon Code Report:

New Buildings Institute, RMI provided $100K grant to “Support Program”

Regents of UC Berkeley, RMI provided $44,228, to “Support Program”

Buildings Decarbonization Coalition, RMI provided $500,000 to “Support Program”

Passive House Institute, RMI provided $47,865 to “Support Program”

This is in addition to the “*Of possible interest is that David Baker Architects was the recipient of a grant from RMI in the amount of $215,283”* listed on the previous page above.

Schedule O Supplemental Info.: Part III line 2 describes the RMI mission. Underline added:

FORM 990,
PART III, LINE
2
"ENERGY TRANSITION SUPER TEAM BRINGS TOGETHER EXPERTS FROM ACROSS THE INSTITUTE TO DEVELOP INNOVATIVE AND INCLUSIVE FINANCIAL APPROACHES TO THE TRANSITION TO CLEAN ENERGY. THESE APPROACHES CAN MOBILIZE CAPITAL AND ALIGN STAKEHOLDERS FOR A FASTER ENERGY TRANSITION."

The rest of my comments are pertaining to articles posted by RMI, on the RMI website for all to see. The most concerning are those articles that pertain to the topic of why Carbon Credits are not widely accepted as having any validity in the marketplace, and why they will not by themselves contribute substantially to the reduction of carbon in our environment. The following bullet points summarize their (RMI's) own conclusion:

1. The most common Carbon Credits are those related to the growing of forest products. In order to qualify for such a credit, the forestry company (timber company) has to be able to demonstrate that their forest practices will sequester more carbon over time than if that particular stand of timber were left to grow by more natural means. Only the amount of improvement can be sold as a carbon credit. This leaves the credit per acre very small! Furthermore, it is clearly in the best interest of the Forestry Company to grow the trees as large and as fast as they can, so they can maximize their profits. Allowing the forestry company to sell carbon credits only allows them to begin monetizing their crop earlier in the cycle. There is of no net benefit to the World!
2. Forestry related Carbon Credits are typically sold for the period of the growth cycle of the timber, which typically means about 60 years. All number of things can happen to that timber during that time, including forest fires, insect infestations, landslides, etc., that can either totally wipe out or at least significantly reduce the effectiveness of that Carbon Credit.
3. While we know that most buildings CAN last much longer than 60 years, this has become the "preferred lifecycle" of a building, because it aligns with the lifecycle of the underlying Carbon Credits. It is all about the money!
4. The State of California requires each Carbon Credit to have a 10% surplus, that would be "banked" against such calamities in #4 above. In just the first few years of their "exchange", the forest fires completely eliminated the surplus. What will happen during the remaining 55 years of these "credits"? Will they all be lost? What good will they have done?
5. RMI recognizes that "Carbon Credits alone will not provide" a long -term solution to the carbon problem. The only thing that WILL provide a long-term solution is the full electrification of our energy sources, using 100% renewable electricity. This is an issue for the Public Utilities Commission, NOT the State Building Code Council!
6. RMI further acknowledges that there are not enough carbon credits available in the world to provide the credits to offset most of our more carbon-intensive industries.

To institute a "Carbon Code" anywhere in the world, in any industry would have the effect of stressing the Carbon Offset market, causing manufacturers to compete within their respective industries, and across all affected industries, for the Carbon Offsets they need to be allowed to continue operation, driving the cost of these Carbon Credits through the roof, which would directly hurt all consumers. Specifically, in the building sector, a Carbon Code would lead to an exponential increase in housing costs, as everything in the house, including insulation, appliances, windows and doors, etc. was forced to comply with the carbon offset requirements of their respective industry requirements. Look above at the value of the direct investment in Carbon Offsets at RMI: They earned $8,8 million, on an investment of just over $25 Million, for a return of over 34%. Follow the money!

In conclusion, with respect to the Carbon Code Report presented herewith, the building industry should NEVER be subject to such an ill-thought out boondoggle. While a few are lining their pockets, our citizens are going homeless. If you are skeptical, you need go no further than the RMI website and their IRS From 990 to find the truth!

Theodore (Ted) L. Clifton
[redacted]

From: Jessie Templeton
To: DES SBCC
Subject: WA State Embodied Carbon Study Comment
Date: Monday, December 2, 2024 7:24:28 AM

External Email

Hi there,
I wanted to provide some general feedback on the embodied carbon code study. I am a strong proponent of adding embodied carbon provisions into code as those emissions from the built environment are a significant contributor to overall global carbon emissions and need to be addressed immediately to minimize climate change and the associated risks which undermine life safety. While there are challenges in finding the right location in code for the provisions as they are currently written, this is not an insurmountable issue, and code should be pliable enough to flex for changing realities and enhanced understanding or definitions of life safety. I would also argue that embodied emissions are ultimately energy related, as they are tied to the energy emitted during the extraction, manufacture, construction, replacement, and disposal of building materials, and part of the carbon issue energy code is designed to address, therefore would be appropriate to house under energy code.

Through other embodied carbon code processes, I have heard many comments from industry that they are making great strides and don't need the regulations to require them to make reductions to their products and that regulations will be cost prohibitive. Yes, industries such as concrete in steel, especially in Seattle, are advancing their products and should be applauded, but code is a tool to ensure everyone is brought along and not every company will choose to make changes unless required. We can't rely on altruism when life safety is a concern.
Regarding cost, I have worked on a number of projects in Washington where the project saw no increase in the cost for low-carbon concrete and parts of the steel package. Specifically for concrete, cement is the most expensive part of the mix and if we are able to reduce the amount of concrete through alternatives or admixtures such as enhanced hydration admixtures which more effectively bond cement to the water content, less cement can be used, and the cost should not increase for low carbon technology. There are costs associated with R&D, innovation, and Environmental Produce Declaration (EPD) development, and there are funds available from the Inflation Reduction Act to help companies make the necessary transitions.

We recently analyzed a project for a Washington State owned building which was required to run a salvage assessment for a portion of the building being demolished and to assess any embodied carbon savings from salvaged or reused materials. These requirements prompted the team to approach design and construction in a more circular manner and generated excitement about reuse opportunities. In the end, the team was able to salvage large

quantities of bricks, concrete, timbers, steel, aluminum, copper, windows, casework, lighting, plumbing fixtures, furniture, and other materials from the old building and reuse almost all of the structural materials on site. In our assessment of the structural materials only, this salvage and reuse saved 18,237,000 kgCO2e, enough carbon to power 3,800 homes' electricity for one year. Additional significant carbon savings can be assumed from the hundreds of pieces of salvaged furniture, plumbing fixtures, lighting fixtures, and casework that went to a reuse store as well. This project was a great success, and you can imagine the impact if every project was required to provide a salvage assessment and deconstruct versus demolish, explore reuse opportunities, and target low-carbon construction.

Thanks,

Jessie Templeton
EMBODIED CARBON SERVICE LEAD

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