

Buy Clean Buy Fair Washington Project Progress Report

*A professional report commissioned by the State of Washington 67th Legislature
through the Operating Budget Proviso and Capital Budget Proviso*

December 27, 2021



About the Carbon Leadership Forum

The Carbon Leadership Forum is a non-profit industry-academic collaborative at the University of Washington. We are architects, engineers, contractors, product suppliers, building owners, and policymakers who work collaboratively, pioneering research, creating resources, and incubating member-led initiatives for greatest collective impact. Our goal is to accelerate transformation of the building sector to radically reduce and ultimately eliminate the embodied carbon in building materials and construction.

Authors

The research team from the Carbon Leadership Forum at the University of Washington College of Built Environments who participated in this project includes:

- Meghan Lewis, Senior Researcher
- Monica Huang, Researcher
- Kate Simonen, Executive Director
- Martin Torres, Technical Consultant

The individuals from the Washington State Department of Commerce, Office of Efficiency and Environmental Performance, Energy Division who participated in this project include:

- Hanna Waterstrat, Director
- Ian Kinder-Pyle, Policy Analyst

Author contributions: M.L. and K.S. led conceptualization; M.L., M.H., and M.T. conducted research and analysis; M.L. and M.H. created the figures; M.L., M.H., and M.T. wrote the report; M.L., M.T., M.H., H.W., I.K.P. and K.S. performed review and editing.

Competing interests statement

The Carbon Leadership Forum receives unrestricted gifts from sponsors, including manufacturers and trade associations, which are listed at this link: <https://carbonleadershipforum.org/our-sponsors/> Kate Simonen is on the board of directors of Building Transparency, a non-profit organization that supports the Embodied Carbon in Construction Calculator (EC3) tool. The EC3 tool includes a database of environmental product declarations referenced in this report.

Acknowledgments

We would like to thank the following individuals for their participation in this project:

- Liz Saylor (State of Washington, Department of Commerce IT)
- Huilin Wang (State of Washington, Department of Commerce IT)
- Ross McKenzie (University of Washington, College of Built Environments IT)
- Eric Gould (University of Washington, College of Built Environments IT)
- Database consultants:
 - Matt Zumwalt
 - Erin Fahy
 - Michelle Hertzfeld
 - Jessica Schilling
 - Maryanne Wachter
- Anthony Hickling (Carbon Leadership Forum)
- Austin Scharff (State of Washington, Department of Commerce)
- Kjell Anderson (LMN Architects)
- Mark Chen (Skanska)
- Phil Northcott (C-Change Labs)
- Brook Waldman (Carbon Leadership Forum)
- Participants in the feedback survey (described in Section 2.2.3), who shall remain anonymous

Table of Contents

About the Carbon Leadership Forum	2
Authors.....	2
Competing interests statement	2
Acknowledgments.....	3
Executive summary.....	5
1. Introduction	8
1.1 About the project.....	8
1.2 Data collection process.....	10
1.3 Carbon reduction potential.....	12
Case Study 1: Projects in King County, WA.....	14
Case Study 2: Office tower in Bellevue, WA	14
Case Study 3: Helen Sommers Building	14
1.4 Availability of EPDs.....	14
1.5 Action on embodied carbon in Washington State.....	16
1.6 Buy Clean policies	17
2. Current project status.....	18
2.1 Project timeline.....	18
2.2 Reporting database.....	19
2.2.1 Initial data collection templates	19
2.2.2 Consulting database experts.....	21
2.2.3 Stakeholder feedback process	21
2.2.4 Feedback results	22
2.3 Pilot projects case study	23
2.4 Quarterly update meetings.....	25
3. Next steps	25
Appendix A: Stakeholder feedback process.....	26
Appendix B: Reporting templates.....	32
Appendix C: Benchmarking material values	39
Appendix D: Case study calculations	44

Executive summary

The Buy Clean Buy Fair (BCBF) Washington Project is a pilot study commissioned by the Washington State Legislature in 2021 after [House Bill \(HB\) 1103 – Improving environmental and social outcomes with the production of construction materials](#) failed to pass the House Committee on Appropriations. This project is funded by two budget provisos that require the University of Washington (UW) College of Built Environments to:

- (1) Develop a reporting database to collect environmental and labor information from state construction projects.
- (2) Conduct a case study using pilot projects.

BCBF requires the collection of environmental and labor data for the following covered products: structural concrete, reinforcing steel, structural steel, and engineered wood. Environmental data will be submitted in the form of Type III environmental product declarations (EPDs), and the EPDs must be supply chain–specific. The contractor is responsible for contacting their suppliers to submit the required information to the reporting database. The database will also collect supplementary information about the projects, such as basic project characteristics and material quantities. Figure 1 below summarizes the data collection requirements and process.

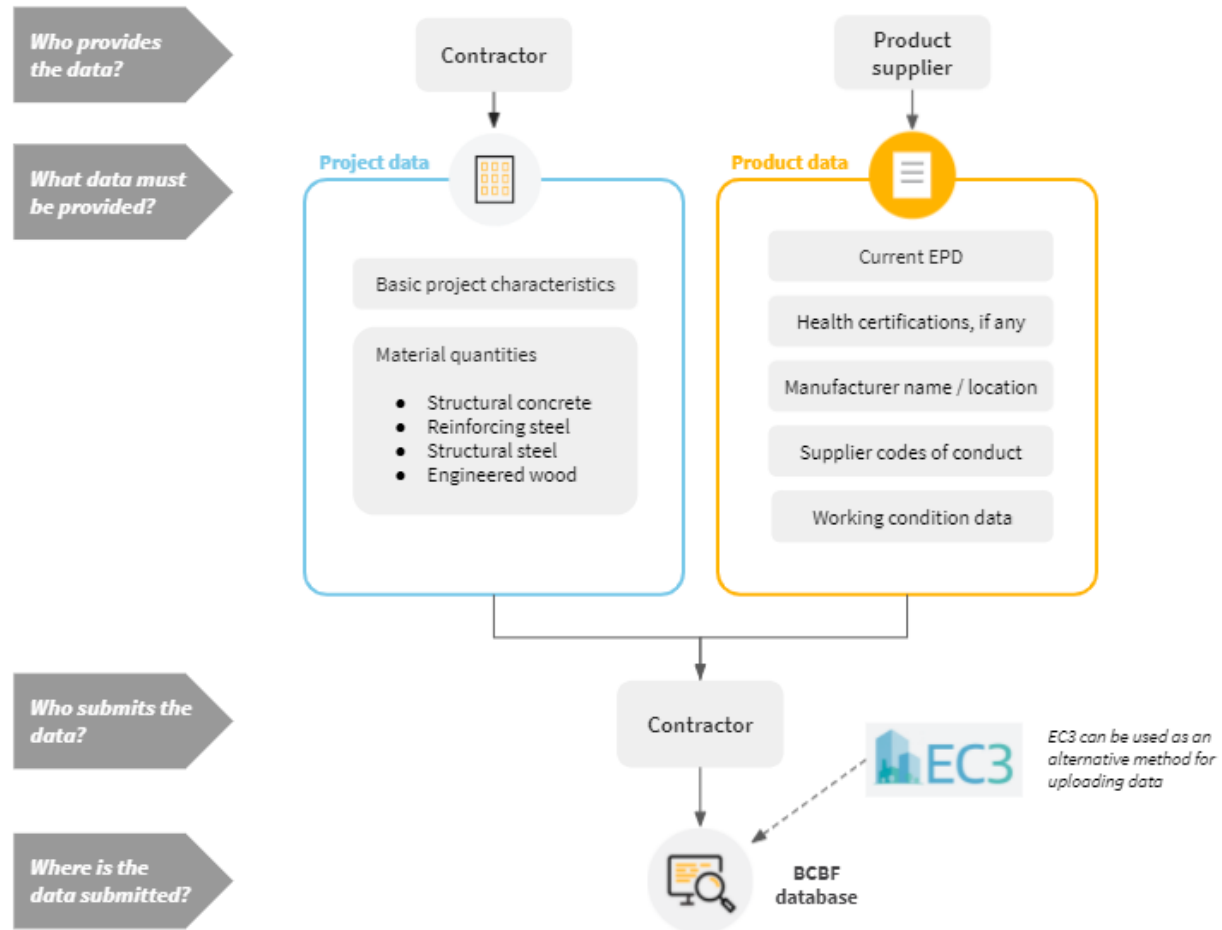


Figure 1. Overview of the data collection process for the Buy Clean Buy Fair (BCBF) Database.

Buy Clean policies, such as the one being piloted in this project, have significant potential to reduce embodied carbon. These types of procurement policies are becoming more popular in the U.S. as more policies are being introduced at the state and federal levels.

This Progress Report summarizes the current status of the BCBF Project, which is one-third of the way to project completion. The project will be complete in November 2022.

For the reporting database, the research team has:

- (1) Developed data structure for the database
- (2) Developed early-draft reporting forms for data collection
- (3) Collected stakeholder feedback on these data collection templates.

Stakeholder feedback will be incorporated into the pilot database, which will begin development in early 2021. The research team will hire a database consultant to assist in the development of the database and a plan for a potential long-term version of the database. The research team has developed an RFP for this database consulting work, which is currently undergoing administrative review.

There are currently four pilot projects enlisted in the BCBF Project:

- UW's Interdisciplinary Engineering Building (IEB) at UW Seattle
- UW's Milgard Hall at UW Tacoma
- WSDOT's Olympic Region Maintenance Administration Facility (ORMAF) - Fuel Island
- WSDOT's Olympic Region Maintenance Administration Facility (ORMAF) - Radio Tower

The research team has engaged with the pilot project teams by having an initial kick-off meeting, providing guidance materials and reporting templates for suppliers, having quarterly check-in meetings, and answering questions as needed. The research team is working to acquire more pilot projects, and is working with the Department of Enterprise Services (DES) to support reporting from three projects in a related proviso for DES.

The next steps for the project:

- Continue supporting pilot projects
- Complete revisions of the data collections forms based on stakeholder feedback
- Hire a database consultant to:
 - Help create the prototype database and interface
 - Develop a plan for long-term database maintenance
- Create the prototype database
- Create an online portal for the prototype database
- Create a plan for long-term management of the database

1. Introduction

In January 2021, members of the Washington State House of Representatives introduced [House Bill \(HB\) 1103 – Improving environmental and social outcomes with the production of construction materials](#). HB 1103, also referred to as the Buy Clean Buy Fair Washington (BCBF) Act, proposes environmental and labor reporting requirements for a list of eligible structural products purchased for public works in Washington. HB 1103 did not pass out of the House Committee on Appropriations. However, an [operating budget](#) proviso and [capital budget](#) proviso allocated \$490,000 of the state budget for the University of Washington College of Built Environments to develop a database to collect the information required by this bill and coordinate with up to 10 pilot projects teams to test the reporting requirements. This project is referred to herein as the “Buy Clean Buy Fair Washington Project.”

1.1 About the project

Two state budget provisos specified the requirements of this project. The first proviso is from the Operating Budget¹, which appropriates \$340,000 of the general fund for the Washington State Department of Commerce to:

... contract with the University of Washington College of Built Environments to create a database and reporting system for promoting transparency on procurement of building materials that make up the primary structure and enclosure used for state-funded construction projects.

The operating budget proviso also requires a case study analysis:

In conducting the analysis, the department and the university must identify up to 10 case studies of publicly funded projects and analyze considerations including but not limited to cost impacts, materials procured, embodied carbon contribution to reducing greenhouse gas emissions, and supply chain considerations.

Finally, the proviso requires the submission of two reports to the legislature:

- (1) a progress report by January 1, 2022, and
- (2) a final report by November 1, 2022, which should report “findings from the case study analysis and recommendations for the reporting system based on lessons learned.”

The second budget proviso is from the State’s Capital Budget², which appropriates \$150,000 from the State Building Construction account to conduct a case study on the following two pilot projects:

¹ 2021 Operating Budget Section 129(68) page 48

² 2021 Capital Budget Section 1050 page 18

- (a) University of Washington College of Engineering Interdisciplinary Education and Research Center (30000492); and
- (b) University of Washington Tacoma Milgard Hall (20102002)

Per the proviso, the purpose of the case study is to “test proposed methods and availability of environmental product declarations and working condition information.”

The proviso requires the following information to be collected for at least 90% of the cost of each covered product used in a project:

- (a) Product quantity;
- (b) Current environmental product declaration;
- (c) Health certifications, if any, completed for the product;
- (d) Manufacturer name and location, including state or province and country;
- (e) Measures taken, if any, to promote the international labor organization's four fundamental principles and rights at work within the manufacturer supply chain;
- (f) Names and locations, including state or province and country, of the actual production facilities; and
- (g) Working condition information for the actual production facilities for all employees

The capital budget proviso defines the following:

- (a) "Actual production facilities" means the final manufacturing facility and the facilities at which production processes occur that contribute to 80% or more of the product's cradle-to-gate global warming potential, as reflected in the environmental product declaration.
- (b) "Awarding authority" means the University of Washington capital planning and portfolio management.
- (c) "Covered product" means structural concrete products, reinforcing steel products, structural steel products, and engineered wood products.
- (d) "Environmental product declaration" means a supply chain-specific type III environmental product declaration as defined by the international organization for standardization standard 14025, or similarly robust life-cycle assessment methods that have uniform standards in data collection consistent with the international organization for standardization standard 14025, industry acceptance, and integrity.
- (e) "Health certification" means a health product declaration, as reported in accordance with the health product declaration open standard, and any product certification that includes health-related criteria.
- (f) "International labor organization's four fundamental principles and rights at work" means: Effective abolition of child labor; elimination of discrimination in respect of employment and occupation; elimination of all forms of forced or compulsory labor; and freedom of association and the effective recognition of the right to collective bargaining.

- (g) "Working condition information" means the:
- (i) Average number of employees by employment type: Full time, part time, and temporary
 - (ii) Average hourly wage, including all nondiscretionary wages and bonuses, by quartiles
 - (iii) Hours worked by weekly hour bands: 1-19 hours, 20-29 hours, 30-39 hours, 40-49 hours, 50-59 hours, and 60 or more hours
 - (iv) Maximum number of hours that an employee can be required to work per week
 - (v) Percent of employees covered by a collective bargaining agreement

The covered products are:

- Structural concrete
- Reinforcing steel
- Structural steel
- Engineered wood

Environmental product declarations (EPDs) must be *supply chain-specific*. Supply chain-specific data refers to the use of primary data, rather than secondary, for upstream manufacturing or production processes. An example of using supply chain-specific data is the use of a cement EPD from the cement plant sourced by a ready mix supplier rather than the use of generic data that represents industry average cement manufacturing in the United States.

1.2 Data collection process

The contractor is responsible for furnishing information about the project, including basic project characteristics and material quantities of the covered products. The contractor is also responsible for reaching out to suppliers for the supplier information. Suppliers for each covered product on the project are expected to furnish EPDs, health certifications (if available), manufacturer names and locations, codes of conduct (if available), and working conditions data to the contractor. Ultimately, the contractor will be responsible for collecting all of this information and submitting the information to the database before substantial completion. The contractor is not responsible for verification of the data collected from the supplier.

Figure 2 describes the expected data collection process for the BCBF Database. The figure shows that the EC3³ tool may be used to submit this data to the BCBF Database. The CLF has contracted with Building Transparency, a non-profit organization based in Seattle that manages the EC3 tool, to develop this new feature beginning in 2022.

³ EC3 (Embodied Carbon in Construction Calculator) is a cloud-based database of digitized EPDs maintained by Building Transparency. Building Transparency is a non-profit organization that was established to continue the management and development of the EC3 tool, as well as provide the resources and education necessary to ensure its adoption. EC3 is a comprehensive database for American EPDs, and also includes a large number of EPDs from around the world. <https://buildingtransparency.org/>

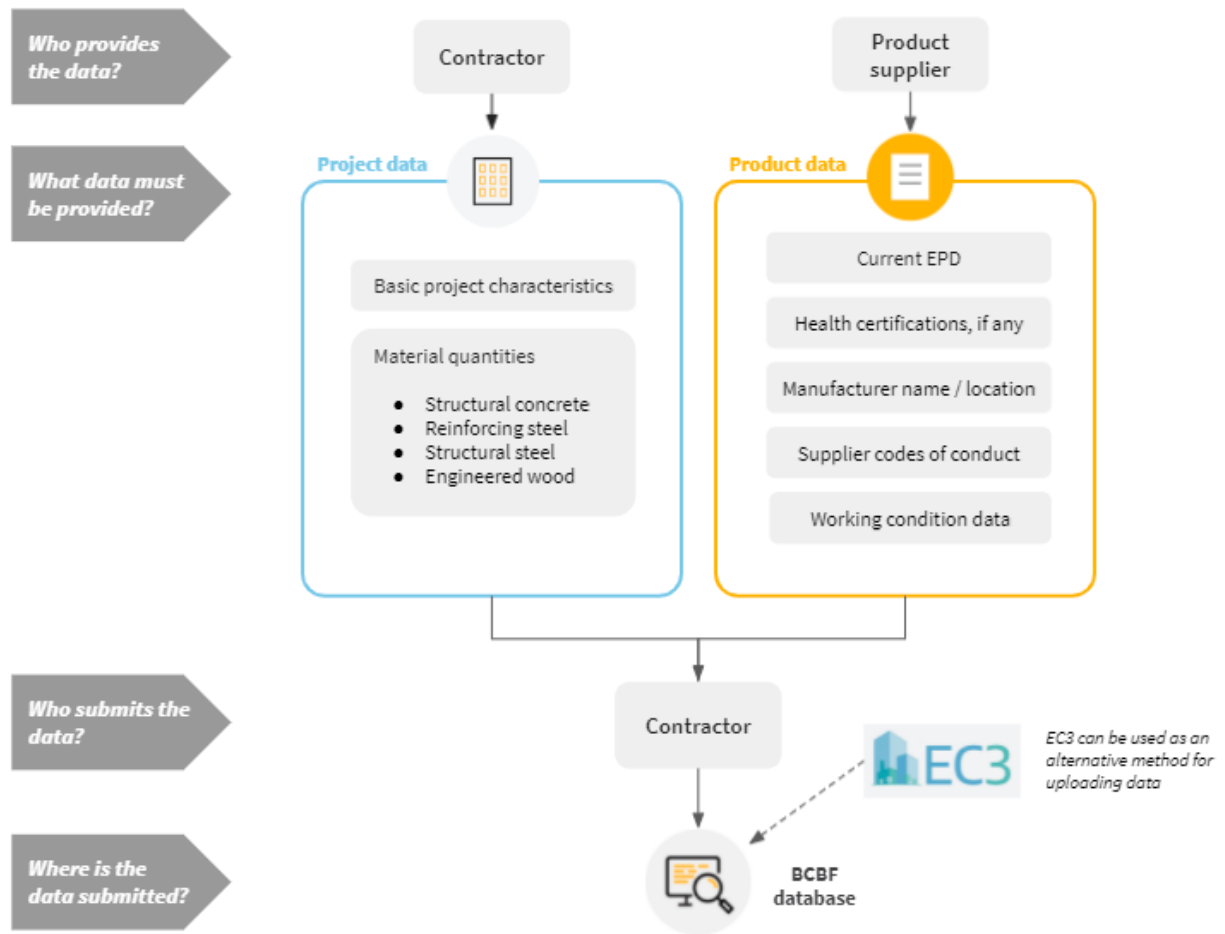


Figure 2. Overview of the data collection process for the BCBF Database.

1.3 Carbon reduction potential

Construction products and projects have significant potential for carbon reductions.

Table 1 shows the approximate carbon reduction potential for eligible products included in the Buy Clean Buy Fair Pilot Project, as estimated using the range in benchmarking values from the CLF 2021 Material Baselines Report.

Table 1. Carbon reduction potential of eligible products. Approximate carbon reduction potential represents the percentage reduction from the typical to the achievable value and from the baseline to achievable value using the CLF 2021 Material Baselines.⁴ See [Appendix C](#), “Benchmarking Material Values,” for additional information and citations. These reduction potentials are based on national benchmark values.

Product Category and Subtype	Approx. Carbon Reduction Potential
READY MIXED CONCRETE	
0-2500 psi (0-17.2 MPa)	30-45%
2501-3000 psi (17.2-20.7 MPa)	30-45%
3001-4000 psi (20.7-27.6 MPa)	25-45%
4001-5000 psi (27.6-34.5 MPa)	20-45%
5001-6000 psi (34.5-41.4 MPa)	25-45%
6001-8000 psi (41.3-55.1 MPa)	25-45%
>8001 psi (>55.1 MPa)	25-40%
STEEL	
Rebar	20-55%
Plate Steel	30-65%
Structural Steel: Hollow Sections	35-50%
Structural Steel: Hot-Rolled Sections	30-55%
Cold Formed Steel: Framing	35-50%
ENGINEERED WOOD	
Composite Lumber - LSL/LVL/PSL	35-45%
Mass Timber - GLT/CLT/DLT/NLT	25-50%

Washington state architects, engineers, and contractors are leading the building industry’s understanding, accounting, and reduction of embodied carbon. The case studies below demonstrate some of the reductions achieved on projects in Washington State, as well some of the local leadership on embodied carbon in Washington state. See Appendix D for full calculations on each case study.

⁴ Carlisle, S., Waldman, B., Lewis, M., and Simonen, K. (2021). *2021 Carbon Leadership Forum Material Baseline Report, (version 2)*. Carbon Leadership Forum, University of Washington. Seattle, WA. July 2021. <http://hdl.handle.net/1773/47141>

Case Study 1: Projects in King County

In 2020 and 2021, Skanska collaborated with clients and design partners to track embodied carbon for concrete, rebar, structural steel, insulation, glass, and carpet on multiple projects in King County. By collecting EPDs from suppliers and tracking their EPDs and reductions in the EC3 tool, the team was able to measure and achieve the following approximate percentage reductions in global warming potential (GWP) from the CLF 2021 baseline:

- 50-60% reduction for ready-mixed concrete
- 70% reduction for rebar
- 35% reduction for structural steel – hot rolled sections
- 20% reduction for board insulation
- 40% reduction for flat glass
- Used carbon negative carpet backing product⁵

Case Study 2: Office tower in Bellevue

In 2019, LMN and MKA collaborated to specify and track embodied carbon for concrete and rebar on an office tower in Bellevue. Through collecting EPDs from suppliers and tracking their EPDs and reductions, the team was able to measure and achieve the following reductions in GWP for no additional cost:

- 10-35% reduction from the 2019 NRMCA Pacific Northwest Regional Benchmarks for ready mix for concrete, averaged across all mixes
- 70% reduction from the CLF 2021 baseline for rebar

Case Study 3: Helen Sommers Building, Olympia

The Helen Sommers Building was completed in 2017. The state of Washington used a procurement approach similar to Buy Clean to lower the carbon footprint of the concrete used on the project. The project's carbon footprint was reduced by 27% compared to the Pacific Northwest average for ready mix concrete, saving approximately 1,300 metric tons of greenhouse gas emissions.⁶ The project required an EPD for nearly every concrete mix. Sellen Construction collaborated with the supplier, engineer, and architect to adapt the concrete mixes and construction schedule to achieve reductions.

1.4 Availability of EPDs

Type III EPDs are third party-verified, standardized documents that report the results of a life cycle assessment for a particular product. EPDs are governed by international standards and product category rules (PCRs). A PCR is a set of rules and guidelines for a particular product or group of products. EPDs are based on product life cycle assessments that cover, at minimum, the impacts of product extraction,

⁵ Interface, Inc. (2021). Environmental Product Declaration – Modular Carpet. UL Environment. Retrieved from [cqd.io/e/ec3e0bu8t0](https://www.interface.com/epd/ec3e0bu8t0).

⁶ <https://www.sellen.com/wp-content/uploads/Measuring-and-Reducing-Embodied-Carbon-Dave-Walsh.pdf>

transportation, and manufacturing. EPDs are therefore well-suited to capture manufacturing and supply chain strategies that prioritize material and energy efficiency and low carbon energy sources.

The current availability of EPDs varies by state and by product type. Figure 3 shows the total number of product-specific EPDs by state, based on data exported from the EC3 tool on October 24, 2021. This map shows that EPD coverage varies greatly by state. Some states have many EPDs (such as California, New Jersey, Washington, Oregon), while most other states in the country have very few or no EPDs. This suggests that the states with more EPDs may have a head start on using EPDs in embodied carbon policy.

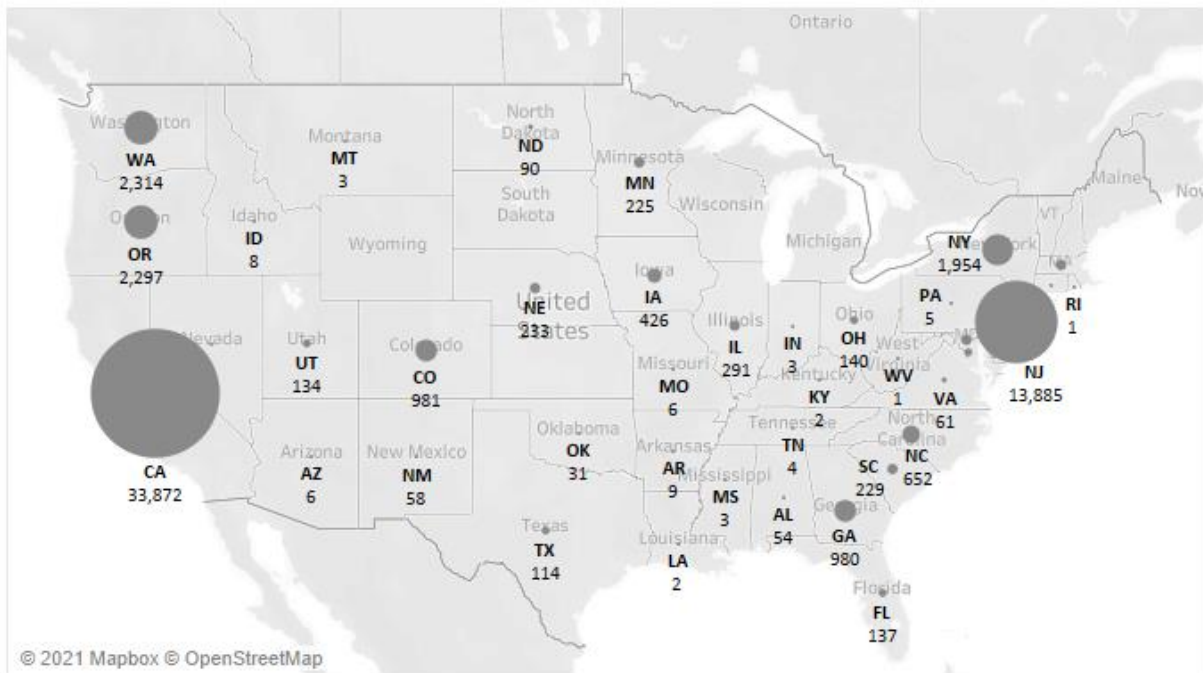


Figure 3. Total number of product-specific EPDs by state. Not shown: Hawaii, which had 0 EPDs, and Alaska, which had one EPD.

Figure 4 presents a heat map of the number of product-specific EPDs by product subcategory and state. The top six states are shown, which are (in descending number of EPDs): 1) California, 2) New Jersey, 3) Washington, 4) Oregon, 5) New York, and 6) Colorado. This figure shows that concrete has the largest number of product-specific EPDs in the country (55,381), followed by masonry (98), steel (32), wood (14), and aluminum (3).

The number of product-specific EPDs for concrete is higher than other product categories due to each concrete mix being an individual product. This means that small changes in mix design are a new product (and therefore new EPD). In comparison, products like structural steel or engineered wood have standard shapes with less variations on a project, and therefore require fewer product-specific EPDs. Tools have been created to simplify the process of creating concrete EPDs, acknowledging the need for rapid output of EPDs to meet the needs of a project with many individual concrete mixes.

Product category	Product subcategory	Grand Total	State					
			CA	NJ	WA	OR	NY	CO
Grand Total		55,528	33,872	13,885	2,314	2,297	1,954	981
Concrete	Total	55,381	33,780	13,882	2,294	2,282	1,951	968
	Ready-mix	51,820	30,832	13,773	2,115	2,062	1,931	904
	Flowable fill	1,539	1,329	24	57	66	7	35
	Shotcrete	1,343	1,154	2	83	83		21
	Cement grout	475	380	20	33	39	1	2
	Concrete paving	195	76	63	6	32	12	6
	Precast concrete	9	9					
Masonry	Total	98	77		9			12
	CMU	98	77		9			12
Aluminum	Total	3	3					
	Alum. extrusions	2	2					
	Alum. suspension assembly	1	1					
Steel	Total	32	11	3	10	3	3	1
	Rebar-steel	25	7	3	8	3	3	1
	Cold-formed steel	5	3		2			
	Hot-rolled	1						
	Misc metal fabrication	1	1					
Wood	Total	14	1		1	12		
	Sheathing panels	4	1			3		
	Wood joists	4				4		
	Mass timber	2			1	1		
	Composite lumber	1				1		
	Non-structural wood	1				1		
	Prefabricated wood	1				1		
	Wood framing	1				1		

Figure 4. Heat map of number of EPDs by product category and state, showing the top six states with the most EPDs.

1.5 Action on embodied carbon in Washington

The following actions have been taken to introduce embodied carbon into Washington’s policies and programs:

- The 2021 [State Energy Strategy](#) identifies reducing embodied carbon in the built environment as a requirement to meet the state's greenhouse gas emission limits.
- Executive Order 20-01 “State Efficiency and Environmental Performance” requires consideration of net embodied carbon on state-owned new facility construction.
- In November 2021, a Low Carbon Construction Task Force was announced at COP26 as part of the Pacific Coast Collaborative, including the states/provinces of California, Oregon, Washington, and British Columbia, and their largest cities.

- In 2018 and 2021, Buy Clean-type policies were introduced in the Washington State Legislature and the Buy Clean Washington⁷ Study was funded in 2018.

Cities and counties in Washington are also introducing policies and programs to reduce embodied carbon, such as the King County Climate Action Plan and the City of Seattle Green Building Incentive Program, which both include requirements related to embodied carbon.

1.6 Buy Clean policies

Buy Clean is a procurement policy approach that addresses embodied carbon in state-funded construction projects by incorporating low-carbon construction requirements into state purchasing, including requirements for the disclosure of EPDs for products used on state projects. The first state-level Buy Clean bill to be passed in the United States was Buy Clean California in 2017.

Buy Clean and similar procurement policies that require EPDs to be procured for eligible products on government projects have increased in popularity and have now been introduced across the United States. At the state level:

- In 2021, state legislators in eight states introduced Buy Clean or similar bills aimed at decarbonizing construction materials through procurement (California, Colorado, Massachusetts, Minnesota, New York, New Jersey, Oregon, and Washington).
- The Buy Clean Colorado Act was signed into law in July 2021.
- New York SB542 targeting low embodied carbon concrete passed both houses of the New York State Legislature in 2021.
- Minnesota's legislature funded the University of Minnesota to perform a study on the opportunity for reducing the environmental impacts of construction materials through state procurement requirements in Minnesota.

At the federal level:

- President Biden signed an executive order on December 8, 2021, directing the federal government to achieve net-zero emissions in federal procurement no later than 2050, including a Buy Clean policy to promote the use of construction materials with lower embodied emissions.
- The House of Representatives introduced the CLEAN Future Act in March 2021, which includes a proposal for a Federal Buy Clean program.
- Administration and for federal pilot programs at the General Services Administration (GSA) Federal Emergency Management Agency (FEMA).

⁷ <https://carbonleadershipforum.org/buy-clean-washington-study/>

HB 1103, the Buy Clean Buy Fair Washington policy introduced in 2021, is unique from other state and federal Buy Clean programs in two key aspects:

1. HB 1103 is a disclosure-only bill, meaning that it requires disclosure of environmental and social impact data but does not require contractors to procure materials below a specific carbon footprint threshold;
2. HB 1103 is the only bill to include “Buy Fair” components, including requirements for reporting on working conditions in facilities where construction products are manufactured.

2. Current project status

This section describes the status of the BCBF Project, including an overall timeline of the project and more information about the current progress of the reporting database and case study on the pilot projects.

2.1 Project timeline

The project is divided into the following tasks:

- Task 1: Develop data reporting structure
- Task 2: Solicit feedback and develop progress report (due January 2022)
- Task 3: Develop pilot database (Q1 2022) and maintenance (Q2-Q4 2022)
- Task 4: Coordinate with pilot projects (June 2021-November 2022)
- Task 5: Final report (due November 15, 2022)

These tasks are laid out in the project timeline diagram shown in Figure 5. The current status is indicated by the red dashed line. More details about progress of the reporting database and the case study analysis is described in the following subsections.

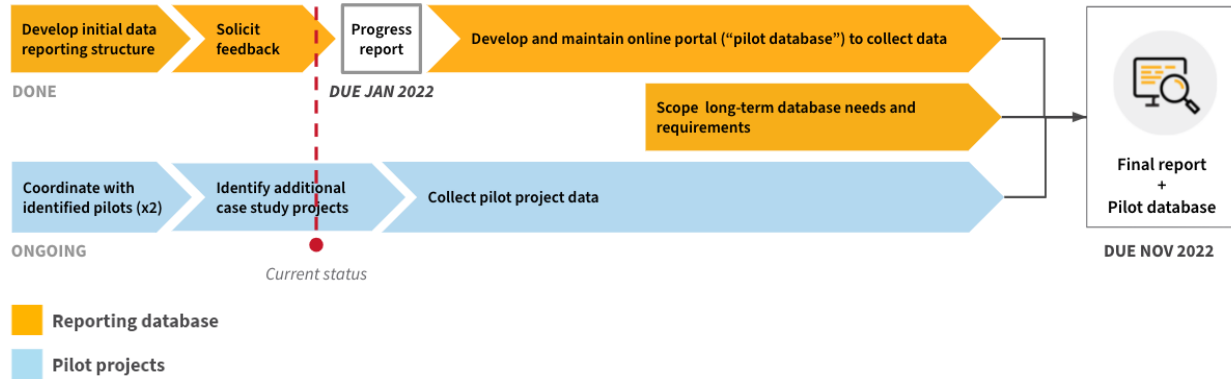


Figure 5. Project timeline. Current status is indicated by the red dashed line.

2.2 Reporting database

Early on in the project, the Department of Commerce and UW team decided that the development of the database would be split into two phases:

- First, the research team will create a prototype database for use by pilot projects during the pilot phase, to be hosted on UW servers.
- Second, the research team will develop a plan for a long-term version of the database, including a scope of work, technical requirements, and cost of creating and maintaining a long-term version of the database. The long-term database could be hosted either on UW or Washington government servers.

This section describes the process of developing the database thus far.

2.2.1 Initial data collection templates

The first task in creating the database was to determine which data fields needed to be in the database. The minimum requirement for the database was that it include the information specified by the Operating Budget proviso (see [Section 1.1](#)).

Additional data fields were included to characterize the projects to increase the utility of the data for researchers and industry stakeholders interested in reducing the embodied carbon of construction products and the building industry at large. Additional fields were selected following an analysis of the data structures from multiple tools and databases that collected environmental data for buildings, listed below:

1. Previous work done by the CLF on whole building life cycle assessment taxonomy⁸
2. Embodied Carbon in Construction Calculator (EC3)⁹
3. SE 2050¹⁰ database
4. deQo¹¹
5. AIA DDx¹²
6. LETI¹³

This further supports harmonization of embodied carbon reporting at the building and product scale, with the goal of reducing the burden on building industry professionals and suppliers to navigate different taxonomies.

The resulting data fields could be divided into two categories:

- (1) Project-related data, to be filled out by the contractor
- (2) Product-related data, to be filled out by suppliers and collected and compiled by the contractor

The contractor is ultimately responsible for making sure that the suppliers submit the data, but they are not responsible for verification of the data sent by suppliers. An Excel file was created for each version (later transitioned to Google Sheets) so they could be easily shared with early pilot projects and stakeholders.

⁸ Taxonomy for Whole Building Life Cycle Assessment can be accessed at <https://carbonleadershipforum.org/lca-practice-guide/>

⁹ <https://buildingtransparency.org/ec3>

¹⁰ [SE2050](#) is a commitment program from the Structural Engineering Institute (SEI) of the American Society of Civil Engineers (ASCE) that has done work on how to characterize a building in a database.

¹¹ [deQo](#) (database of embodied Quantity outputs) is an interactive online tool provided by the MIT Building Technology Program that contains global warming potential and material quantity data of buildings.

¹² [AIA DDx](#) is the American Institute of Architects (AIA) Design Data Exchange (DDx). It is an online database that lets AEC professionals easily benchmark their projects against industry averages and track performance on their journey to a carbon neutral future.

¹³ [LETI](#) (London Energy Transformation Initiative) is a network of over 1,000 built environment professionals working together to put London on the path to a zero carbon future. The voluntary group is made up of developers, engineers, housing associations, architects, planners, academics, sustainability professionals, contractors and facilities managers.

The **Contractor Reporting Template** contained the following pages:

0. Introduction
1. Project info
2. Product data

The **Supplier Reporting Template** contained the following pages:

0. Introduction
1. Contact info and EPD data
2. Fiber sourcing data (if applicable, for engineered wood suppliers)
3. Health certification
4. Code of conduct
5. Production facilities
6. Working conditions

The links to the full reporting templates are provided below. [Appendix B](#) includes images of each page of the reporting template that do *not* include the most recent updates following the feedback collected in November 2021.

- BCBF Contractor Reporting Template: [live Google Sheets version](#), [static PDF version](#)
- BCBF Supplier Reporting Template: [live Google Sheets version](#), [static PDF version](#)

2.2.2 Consulting database experts

In preparation for the development of the prototype database, the research team consulted with several database experts in our network, showed them the initial data collection templates, and gathered feedback. The database experts emphasized the importance of finding someone with expertise in user experience (UX) design to create a user interface that would improve the quality and quantity of data submitted to the database. Their advice informed the Request for Proposal (RFP) that was developed to hire a database consultant. More information about the RFP is found in Section 3: Next Steps.

2.2.3 Stakeholder feedback process

To collect stakeholder feedback on the initial data collection templates, the research team performed the following tasks:

1. **Created two online surveys**, one for each reporting template, with general and targeted questions about the reporting template. Respondents were notified that the research team would not share identifying information. Data is reported in aggregate (such as “Feedback from

[concrete suppliers, contractors, researchers, etc.] included _____.”).

The links to PDF versions of the surveys are provided below:

- a. [BCBF Contractor Reporting Form - Feedback Survey](#)
 - b. [BCBF Supplier Reporting Form - Feedback Survey](#)
2. **Invited stakeholders to provide feedback.** The email sent to the stakeholders (Contractor version) is included in [Appendix A](#). The supplier version of the invitation email is similar. The research team sent the emails on Oct. 25, 2021, and set the Nov. 23, 2021 as the deadline for feedback.
 3. **Held two online presentations to introduce each reporting template and answer questions.** The research team held the Contractor Reporting Template presentation on Oct. 27, 2021 and the Supplier Reporting Template presentation on Oct. 28, 2021. The research team recorded the presentations and emailed the slides and recording to stakeholders after, along with a summary of the Q&A that happened after the presentations. [Appendix A](#) includes a copy of that email. After these presentations, attendees had the opportunity to ask questions individually or set up meetings to give guidance and feedback as they navigate these reporting forms and templates.
 4. **Collected feedback through online surveys and revised the data collection templates based on the feedback.** The research team collected the feedback from online surveys and made some immediate updates, such as improving or further explaining terminology. Additional feedback is summarized in [Section 2.2.4](#).

The target audience (stakeholders) for the feedback process consisted of:

- Contractors
- Manufacturers
- Architects and engineers
- Developers of related databases (AIA DDX, SE2050, EC3)
- Researchers/NGOs interested in outputs and data

For the full list organizations invited to participate in the stakeholder feedback process, see [Appendix A](#).

2.2.4 Feedback results

This section summarizes the stakeholder feedback provided on both reporting templates. Broadly, the research team received two types of feedback.

The first type of feedback provided direction as to how the templates could more clearly communicate the intent and requirements for reporting and using the BCBF reporting database. This type of feedback, summarized below, will be integrated as quickly as possible to improve the user interface for quicker and easier reporting:

- Expand the introduction tabs on both templates to cover definitions and background information, FAQs, motivation for BCBF, its history, and intent for how the data collected will be used.
- Better distinguish the introduction of each spreadsheet to more directly address the supplier and contractor, respectively.
- Reorganize and reformat sections to consolidate instructions.
- Clarify which data is anonymous.
- Update instructions to better address “edge-cases” (that is, unusual or ambiguous scenarios) and clearly outline our intention.
- Make slight wording changes to align more closely with industry-standard terminology.
- Distinguish between industry-average and product-specific EPDs and clarify the type of EPD being asked for in the Supplier Reporting Template.
- Use a different classification system for building type in the Contractor Reporting Template Project Information sheet to allow for more options for “building use type.”

The second type of feedback required more substantial changes to the reporting database interface or reporting requirements. The following items will be reviewed in more depth to confirm that they align with the intentions and requirements of the BCBF project and are possible within the prototype database:

- Update the format of the product data collection sheet in the Contractor Reporting Template to more clearly emphasize that structural products are required, and other products are encouraged but optional.
- Remove the requirement to include the building component (such as stair, column, structural wall)
- Include MasterSpec sections for all products identified.
- Update the wood-fiber sourcing tab to focus on ASTM D7612: Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources.
- Reformat the entire spreadsheet to allow for multiple product inputs on the same spreadsheet rather than requiring different submissions for each entry.
- Include the option for a secondary building use type as applicable on the Project Information sheet of the Contractor Reporting Template.
- Allow those with supply chains entirely in North America to opt out of the Code of Conduct section due to local and national labor laws.

2.3 Pilot projects case study

The goal of conducting a case study analysis is to test the proposed data collection requirements and methods. As the BCBF Project progresses, the research team will:

- (1) Support pilot project teams to help them understand and fulfill the requirements of the BCBF Project

- (2) Collect user feedback on the data collection templates, which will inform the design of the final prototype database.

The capital budget proviso specified the Interdisciplinary Engineering Building (IEB) at UW Seattle and Milgard Hall at UW Tacoma as two required pilot projects. The research team held a kick-off meeting with each of the pilot project teams in late May to discuss the project. At the time of the kick-off meetings, IEB was in very early schematic design and Milgard Hall was in the late stages of design. Construction at Milgard Hall began in summer 2021.

The team also secured two pilot projects from the Washington State Department of Transportation (WSDOT) in early November: A fuel island and radio tower at the new Olympic Region Maintenance Administration Facility. Both of these projects are scheduled to begin construction in early 2022 and be complete by fall 2022.

A summary of the pilot projects is presented in Table 2.

Table 2. Pilot project information.

Project name	Current project stage	Construction schedule	Covered products in project
Interdisciplinary Engineering Building at UW Seattle	Design	May 2021-May 2024 (anticipated)	Concrete, rebar, structural steel
Milgard Hall at UW Tacoma	Construction	Summer 2021-October 2022	Concrete, rebar, structural steel, mass timber
Olympic Region Maintenance Administration Facility - Fuel Island	Design	March 2021-July 2022	Concrete, rebar, structural steel
Olympic Region Maintenance Administration Facility - Radio Tower	Construction	December 2021-January 2022	Concrete, rebar, structural steel

The research team has supported the pilot projects by:

- Having a **kick-off meeting** with each pilot project team. These meetings usually involve two to three people from the construction firm, one or two project managers from UW (if it is a UW project), and sometimes two to three additional people from the architecture firm.
- Having **quarterly check-in meetings** with each pilot project.
- Providing the contractor with a **letter to suppliers** that can then be sent to each of the suppliers. This letter explains the requirements of the BCBF Project.
- Sending them reporting templates and inviting them to stakeholder meetings.

The research team is working to acquire more pilot projects and is continuing to work with the Department of Enterprise Services (DES) to support reporting from the following projects included in a related proviso for DES:

- Western Washington University Sciences Building Addition and Renovation
- Shoreline Community College Allied Health, Science, and Manufacturing Replacement
- Secretary of State Library Archive Building

2.4 Quarterly update meetings

The research team holds quarterly meetings to update general stakeholders about the progress of the BCBF Project. Invitees include Representative Davina Duerr, Representative Sharon Shewmake, Senator Derek Stanford, and representatives from local labor unions and environmental NGOs. To date, the research team has held one quarterly update meeting (Sept. 30, 2021), and sent the presentation slides after the meeting. Thirteen people attended this meeting (including the research team), with representation from environmental and labor NGOs, UW, contractors, and engineers.

3. Next steps

The next steps for the BCBF Project:

- 1. Continue supporting pilot projects.** The research team will continue to support pilot projects by having quarterly meetings with them and will continue to identify new pilot projects.
- 2. Complete revisions of the data collections forms based on stakeholder feedback.**
- 3. Hire a database consultant.** The research team has written the first draft of a request for proposals (RFP) for a database consultant and have circulated this RFP to the Department of Commerce and University of Washington for review. The research team anticipates soliciting proposals using this RFP in January 2022, with the goal of selecting a database consultant to begin work in February 2022. The consultant will help create the prototype database and interface and develop a plan and scope of work for a potential long-term database.
- 4. Create the prototype database.** Initial consultations with the database experts suggest that the database will be straight forward to create, since the data structure is relatively simple. The database will be hosted on UW servers.
- 5. Create an online portal for the prototype database,** which will include the revised data collection forms (see [Section 2.2.1](#) and [Appendix B](#)) as a web form instead of a spreadsheet.
- 6. Create a plan for long-term management of the database.** The research team will rely on the expertise of the database consultant to develop a scope of work and cost estimate for maintaining this database on a yearly basis.

Appendix A: Stakeholder feedback process

Table 3 presents a list of stakeholders invited to the feedback sessions.

Figure 6. Email invitation to stakeholders for feedback process.

Figure 7. Follow-up email to stakeholders (after presentation) for feedback process.

Table 3 (next page). List of stakeholders invited to complete feedback survey and attend feedback sessions.

Type of organization	Organization	Number of invitees to each meeting		
		Meeting 1 - Contractor Template	Meeting 2 - Supplier Template	Both
Architect	EHDD	1		
	KieranTimberlake	2		
	LMN	1		
	Miller Hull	1		
	Perkins + Will	2		
	ZGF	1		
Contractor	Absherco	1		
	AGC of Washington	1		
	Andersen Construction	2		
	BNBuilders	2		
	Hensel Phelps (design builder)	2		
	Hoffman	1		
	Lewis Builds	1		
	McKinstry	1		
	Mortenson	1		
	Sellen	1		
	Skanska	2		
	Tiger Construction	1		
	Turner Construction	1		
	Webcor	1		
Engineer	MKA	1		
Independent consultant	Independent consultant with relevant experience	1	3	1
NGO - building industry	AIA	1		
	SE2050 / LeMessurier	1		
	SE2050 / Meyer Borgman Johnson	1		
NGO - environmental	Blue Green Alliance			1
	National Indian Carbon Coalition		1	

Type of organization	Organization	Number of invitees to each meeting		
		Meeting 1 - Contractor Template	Meeting 2 - Supplier Template	Both
	Washington Environmental Council		1	
	Washington Forest Protection Association		1	
Labor	United Steelworkers District 12		1	
	USW District 338		1	
	Washington Fair Trade		1	
State	University of Washington Project Managers			3
	Washington State Department of Enterprise Services			3
Supplier - concrete	Cadman (a Lehigh Hanson company)		1	
	Cal Portland		2	
	Lehigh Hanson		1	
	Stoneway Concrete		1	
Supplier - glass	Saint-Gobain		2	
Supplier - insulation	BASF Corporation (polystyrene)		1	
	Hunter Panels (polyiso)		1	
Supplier - precast concrete	Clark Pacific		1	
Supplier - steel	Nucor Steel		1	
	Tri States Rebar (Spokane)		1	
Supplier - wood	Weyerhaeuser		2	
Supplier - wood (mass timber)	Structurlam		1	
	Vaagen Timbers		1	
Trade association	American Institute of Steel Construction (AISC)	2		
	American Iron and Steel Institute (AISI)	1		
	American Wood Council (AWC)	1		
	Fenestration and Glazing Industry Alliance	1		

Type of organization	Organization	Number of invitees to each meeting		
		Meeting 1 - Contractor Template	Meeting 2 - Supplier Template	Both
	North American Insulation Manufacturers Association (NAIMA)	1		
	National Glass Association (NGA)	1		
	National Insulation Association (NIA)	1		
	National Ready Mixed Concrete Association (NRMCA)		2	
Grand Total		31	37	8

Invitation email to stakeholders to participate in feedback process (Supplier version)

Hello,

I am reaching out to invite you to participate in the stakeholder feedback process for the Buy Clean Buy Fair (BCBF) Washington Project being led by the Washington State Department of Commerce and University of Washington College of Built Environments. A brief description of the project is attached for your reference.

We are asking you to provide feedback on the Supplier Reporting Template (a separate form collects Contractor reporting information). This reporting template will be used to collect environmental and social impact data for a select list of materials used in state-funded construction projects.

How to submit feedback:

- To provide feedback, please complete the following survey: [Survey on Supplier Reporting Template](#). A link to the template is in this survey. If any of the questions in this form aren't relevant to you, please feel free to skip as you see fit. Emails are only collected for clarification.
- The goal of this survey is to collect user feedback that will help us 1) create a data collection form that is clear, straight-forward, and user-friendly, and 2) create a database of material data that will contain useful environmental information about construction projects. Therefore, please **share this email with the appropriate team member who can provide feedback on the required data collection**.
- We are only accepting written feedback at this time to ensure that we accurately capture feedback from all stakeholders.

Deadline:
The deadline to submit feedback via the survey form above is **November 23, 2021**.

What will we do with this feedback?

- We will include a summary of feedback in our progress report to the Washington Legislature in January 2021, as well as a list of which organizations were invited to participate.

- We will use this feedback to improve the format, user experience, and structure of the reporting templates and database.
- We will not attribute feedback to specific individuals. However, we may attribute feedback anonymously by organization, such as “*Feedback from [concrete suppliers, contractors, researchers, etc.] included _____.*”

Questions?

We are happy to answer questions via email: please reach out to Monica Huang and Meghan Lewis.

There is an optional meeting **Thursday, October 28 at 11am PST** that will be recorded and shared with invited participants following the meeting. This will only provide an overview and an opportunity to answer questions.

Meeting Information: Oct 28, 2021 11:00 AM PST

Join meeting: <https://washington.zoom.us/j/91775941953>

Meeting ID: 917 7594 1953

Find your local number: <https://washington.zoom.us/u/aelxjAc1ig>

Thank you in advance for your participation in this feedback process, and please reach out with any questions!

Sincerely,

Meghan Lewis, Senior Researcher, UW College of the Built Environment

Monica Huang, Researcher, UW College of the Built Environment

Figure 6. Email invitation to stakeholders for feedback process.

Follow-up email to stakeholders to following (Supplier version)

Hello all,

I am writing to follow-up on our invitation to provide feedback on the BCBF WA Reporting Database and to provide a link to the overview meeting last Thursday.

Slides of the meeting are attached, and here is a recording of the call:

https://washington.zoom.us/rec/share/E2CoEZ78rECAMmD75HS7DpNDLRkyKTWIAHLKdCTdiGM4QdsFhBN_IKbg_Vg_8vQNP.8LmntPhDspTOhPAs

A few questions that came up during the call:

- **When are EPDs collected?** The BCBF pilot project and database is testing the requirements of HB 1103. Per that bill, EPDs are not required until project completion and (eventually) at time of install. Neither the legislation nor pilot program require EPDs at time of bid.
- **Which materials are included in the pilot?** Structural and reinforcing steel products, concrete products, and engineered wood products are included in the pilot. However, envelope materials such as glass and insulation are included in the material quantities list and database per the scope of the database set by legislature.

- **What do contractors fill out?** Contractors will be responsible for providing project information and material quantities. Material quantities are linked to a specific product via EPD number (if an EPD is required). See the [contractor reporting form here, for reference](#).
- **Why don't the dropdowns work?** If you would like edit access to the form to be able to use the dropdown functionality shown in the recording, please reach out. We are happy to change it from view access.

As a reminder, here is the [survey for providing feedback](#). We ask that you complete this survey by November 23 at the latest, to ensure we can incorporate feedback in the progress report to WA legislature that is due January 1. Please reach out with any questions, and thank you again for your participation.


Best,
Meghan


Figure 7. Follow-up email to stakeholders (after presentation) for feedback process.


Appendix B: Reporting templates

Figures 8-10 capture the three sheets of the Contractor Reporting Template, and Figures 11-17 capture the six sheets of the Supplier Reporting Template. These images reflect updates made to the templates based on survey feedback. Additional edits may be made in response to feedback in January and February 2022.

Buy Clean Buy Fair Washington
Contractor Reporting Form







Last updated: 10/25/21

Introduction to the Buy Clean Buy Fair Project

The State of Washington Buy Clean Buy Fair (BCBF) Project is a state-led data collection pilot project that incorporates transparency requirements related to carbon emissions and working conditions into the procurement process. The goal of the BCBF Project is to help the State of Washington identify purchasing opportunities aligned with its carbon reduction goals and economic development goals.

To bring increased environmental and social awareness and accountability to the State's construction spending, this project is asking contractors and their suppliers to submit the following information about the materials used in state-funded construction projects:

1. Environmental Product Declarations (EPDs) (required)
2. Health certifications (if available)
3. Supplier Code of Conduct (if available)
4. Names and locations of production facilities (required)
5. Working conditions (required)

About this spreadsheet

This spreadsheet is a reporting form for contractors to provide information about the products they procure for projects in the BCBF program.

Please fill out all tabs in this spreadsheet with the requested information.

See the section below for a description of each sheet in this spreadsheet and the information that you will need to fill out this spreadsheet.

How to fill out this spreadsheet

Sheet name	Description/instructions	Information that you will need to fill out this sheet
0. Introduction	This sheet. Provides background information about the project and spreadsheet form.	-
1. Project info	General information about the project	1. Your contact information 2. Project background information 3. Cover page of architectural/structural drawings (to collect basic design information) 4. General building dimensions
2. Material data	Enter material data from your project	1. Bill of materials, including quantities of structural materials (concrete, steel, engineered wood). 2. EPD declaration number of the products used on project (typically on the second page of an EPD).

Figure 8. Sheet 0: Introduction from the Contractor Reporting Template

2. Material Data

Key
 Autofilled

Instructions/notes

Please fill out the table for as many materials on your project as possible. At a minimum, you must include the following products if they are present on your project:

1. Ready-mix concrete
2. Precast concrete
3. Shotcrete
4. Rebar
5. Post-tensioning (PT) tendons
6. Hot-rolled steel sections
7. Hollow structural steel sections
8. Steel plate
9. Cold-formed steel
10. Composite lumber (LSL, PSL, LVL, etc.)
11. Mass timber (glulam, CLT, NLT, DLT, etc.)

You may add rows as needed

For each material in each building component, repeat Steps 1-5 on each row:

Step 1	Step 2	Step 3	Step 4	Step 5
Material category	Building component	Product type	Product sub-type	Quantity
<small>What type of material is this?</small>	<small>Where in the building is this material used?</small>	<small>What type of product is this?</small>	<small>What is the sub-type of this product?</small>	<small>How much of the material is used in the building?</small>
<small>What is the declaration number on the EPD for this product?</small>				<small>What is the declaration number on the EPD for this product?</small>
Select option from drop-down menu in cells below. * Indicates that this material must be reported if it is present on your project.	Select option from drop-down menu in cells below. * Indicates that this material must be reported if it is present on your project.	Select option from drop-down menu in cells below. * Indicates that this material must be reported if it is present on your project.	Select option from drop-down menu in cells if available. Otherwise, leave blank. Add comment to the right if needed.	Enter material quantity in the given units
			Comments	Enter EPD declaration number
Concrete*	→ Standard foundations	→ Ready-mix* (select sub-type →)	→ 3000 psi (28-day strength)	cubic yards (cy)
Steel*	→ Special foundations	→ Rebar*		metric tonnes
Wood*	→ Standard slabs-on-grade	→ Mass timber* (select sub-type →)	→ Cross-laminated timber (CLT)	cubic meters (m3)
Masonry	→ Structural slabs-on-grade	→ Brick		metric tonnes
Aluminum	→ Slab trenches	→ Billets		metric tonnes
Sheathing	→ Pits and bases	→ Gypsum sheathing		square meters (m2)
Thermal/moisture	→ Floor construction	→ Dampproofing and waterproofing		
Cladding	→ Roof construction	→ Stone cladding		
Openings	→ Stairs	→ Storefront		
	→ Columns			
	→ Structural walls			
	→ Exterior windows			
	→ Exterior doors and grills			
	→ Exterior louvers and vents			
	→ Exterior wall appurtenances			
	→ Roofing			

Figure 10. Sheet 2: Material quantity data from the Contractor Reporting Template

Buy Clean Buy Fair Washington

Supplier Reporting Form



Washington State
Department of
Commerce



CLF Carbon
Leadership
Forum



COLLEGE OF BUILT ENVIRONMENTS
UNIVERSITY of WASHINGTON

Last updated: 10/25/21

Introduction to the Buy Clean Buy Fair Project

The State of Washington Buy Clean Buy Fair (BCBF) Project is a state-led data collection pilot project that incorporates transparency requirements related to carbon emissions and working conditions during the procurement process. The goal of the BCBF Project is to help the State of Washington identify purchasing opportunities aligned with its carbon reduction goals and economic development goals.

To bring increased environmental and social awareness and accountability to the State’s construction spending, this project is asking contractors and their suppliers to submit the following information about the materials used in state-funded construction projects:

1. Contact info and Environmental Product Declarations (EPDs) (required)
2. Fiber sourcing data (if available/applicable)
3. Health certifications (if available)
4. Supplier Code of Conduct (if available)
5. Names and locations of production facilities (required)
6. Working conditions (required)

About this spreadsheet

This spreadsheet is a reporting form for product suppliers to provide the needed information about their products for the BCBF Project.

Please fill out all tabs in this spreadsheet with information about your product, company, and manufacturing facilities. Green cells are required; yellow cells can be left blank if the information is not available.

See the section below for a description of each sheet in this spreadsheet and the information that you will need to fill out this spreadsheet.

How to fill out this spreadsheet

<u>Sheet name</u>	<u>Description/instructions</u>	<u>Information that you will need to fill out this sheet</u>
0. Introduction	This sheet. Provides background information about the project and spreadsheet form.	N/A
1. Contact info and EPD Data	Fill out this sheet with your contact information.	Your contact information
2. Fiber Sourcing Data (if applicable)	If you are an engineered wood supplier, fill out this sheet with additional information about wood sourcing.	<ol style="list-style-type: none"> 1. Wood certifications (if available) 2. The locations wood fiber was sourced from 3. The ownership type of the forest(s) the fiber was sourced from
3. Health certification	Fill out this sheet about health certifications (if any) for your product.	Health certifications (if available)
4. Code of conduct	Fill out this sheet with code-of-conduct information about your company.	<ol style="list-style-type: none"> 1. Links to your company’s code of conduct 2. Your suppliers’ code of conduct (if available)
5. Production facilities	Fill out this sheet with information about your production facility and that of your key suppliers	<ol style="list-style-type: none"> 1. Location of your production facility 2. Location of your key supplier (if applicable)
6. Working conditions	Fill out this sheet with information about employees and working conditions at your facility(ies).	Number of employees, their working hours per week, their hourly wages, and their union status; for your production facility and that of your key suppliers (if applicable).

Figure 11. Sheet 0: Introduction from the Supplier Reporting Template

Key

- Required
- Optional. Can leave blank if not available or applicable

1. Contact Info and EPD Data

Please fill out your contact information below

Contact person - first name	<input type="text"/>
Contact person - last name	<input type="text"/>
Contact person - e-mail address	<input type="text"/>
Company name	<input type="text"/>
Product category (select from dropdown menu)*	Structural Steel ▼
Date (mm/dd/yyyy)	<input type="text"/>

Please fill out the EPD data below

Program operator	<input type="text"/>
Declaration holder	<input type="text"/>
Declaration number	<input type="text"/>
Declared product name	<input type="text"/>

Figure 12. Sheet 1: Contact Info and EPD Data from the Supplier Reporting Template

Key
 Required
 Can leave blank if not available or applicable

2. Wood Fiber Sourcing Data (only applicable for engineered wood suppliers)
 If you are an engineered wood supplier, please provide the following additional information.
 If you are not sure of the exact numbers, please make a rough estimate and leave a comment in the comment box.

(a) Chain-of-custody certification

Enter "x" if your product has this certification

	Sustainable Forestry Initiative (SFI)
	Forest Stewardship Council (FSC)
	Programme for the Endorsement of Forest Certification (PEFC)
	American Tree Farm System (ATFS)
	Other (provide more information in the comments)

Comments (optional)

(b) Percent volume of sourced wood with forest management certification

	%	Sustainable Forestry Initiative (SFI)
	%	Forest Stewardship Council (FSC)
	%	Other (provide more information in the comments)
	%	None

0 % (should add up to 100%)

Comments (optional)

(c) Percent volume of wood by state/province and country

	State/province	Country
	% from	
	% from	
	% from	
	% from	

0 % (should add up to 100%)

Comments (optional)

(d) Percent volume of wood by owner type, e.g., federal, state, private, or other

	%	Federal
	%	State
	%	Private
	%	Other

0 % (should add up to 100%)

Comments (optional)

Figure 13. Sheet 2: Fiber Sourcing Data from the Supplier Reporting Template

Key
 Required
 Can leave blank if not available or applicable

3. Health certifications (if available)
 Please enter information for any health certifications for your product (if available). Examples of health certifications include: health product declaration (HPD), as reported in accordance with the Health Product Declaration Open Standard, and any product certification that includes health-related criteria. Examples of other health certifications in addition to an HPD include the Declare Label, Cradle-to-Cradle, and VOC emission certifications. Feel free to include other work that you're doing in the Comments section, particularly if you do not have any certifications.

Type of health certification URL to health certification document	Select from the dropdown: <input type="text"/>	If other, specify: <input type="text"/>	Comments (optional) <input style="width: 100%; height: 100%;" type="text"/>
Type of health certification URL to health certification document	<input type="text"/>	If other, specify: <input type="text"/>	
Type of health certification URL to health certification document	<input type="text"/>	If other, specify: <input type="text"/>	

Figure 14. Sheet 3: Health Certification from the Supplier Reporting Template

Key
 Required
 Can leave blank if not available or applicable

4. Supplier Code of Conduct (if available)

A Supplier Code of Conduct establishes the minimum expectations for suppliers, subcontractors, and others in a company's supply chain. If your company does not yet have a supplier code of conduct publicly available, please share highlights of the work you've done to promote the ILO's four fundamental principles. The International Labor Organization (ILO) has identified four fundamental principles and rights at work within the manufacturer supply chain: (1) effective abolition of child labor; (2) elimination of discrimination in respect of employment and occupation; (3) elimination of all forms of forced or compulsory labor; and (4) freedom of association and the effective recognition of the right to collective bargaining.

<p>Fabricator URL to supplier code of conduct <input style="width: 100%;" type="text"/></p> <p>Steel mill URL to supplier code of conduct <input style="width: 100%;" type="text"/></p>	<p><i>Describe work to promote ILO's Four Fundamental Principles (if no Supplier Code of Conduct available)</i></p> <div style="background-color: #fff2cc; height: 40px; width: 100%;"></div>
---	---

Figure 15. Sheet 4: Code of Conduct from the Supplier Reporting Template

Key
 Required
 Can leave blank if not available or applicable

5. Names and locations of production facilities (required)

For each applicable facility where the product was produced, provide the following information. If more than one facility manufactured your product, list the primary/biggest facility.

<p>Fabricator Name of company <input style="width: 100%;" type="text"/> Location - city <input style="width: 100%;" type="text"/> Location - state <input style="width: 100%; border-bottom: 1px solid #0070c0;" type="text" value="WA"/></p>	<p>Comments (optional)</p> <div style="background-color: #fff2cc; height: 30px; width: 100%;"></div>
<p>Steel mill Name of company <input style="width: 100%;" type="text"/> Location - city <input style="width: 100%;" type="text"/> Location - state <input style="width: 100%; border-bottom: 1px solid #0070c0;" type="text"/></p>	<p>Comments (optional)</p> <div style="background-color: #fff2cc; height: 30px; width: 100%;"></div>

Figure 16. Sheet 5: Production Facilities from the Supplier Reporting Template

Key
 Required
 Can leave blank if not available or applicable

6. Working conditions (required)

Please fill out the following tables for your facilities.

Fabricator	Number of employees			Number of employees by weekly hour bands						Hourly wage by quartiles (\$/hr)			Percent of employees covered by collective bargaining agreement	Comments (optional)
	Full-time	Part-time	Temp	1-19 hrs	20-29 hrs	30-39 hrs	40-49 hrs	50-59 hrs	60+ hrs	25th percentile	50th percentile	75th percentile		
Type of employee:														
All employees														
Production employees														
Non-supervisory employees														

Steel mill	Number of employees			Number of employees by weekly hour bands						Hourly wage by quartiles (\$/hr)			Percent of employees covered by collective bargaining agreement	Comments (optional)
	Full-time	Part-time	Temp	1-19 hrs	20-29 hrs	30-39 hrs	40-49 hrs	50-59 hrs	60+ hrs	25th percentile	50th percentile	75th percentile		
Type of employee:														
All employees														
Production employees														
Non-supervisory employees														

Definitions

Employee	Any individual who is in an employment relationship with the organization, according to national law or its application.
Non-supervisory employees	Every employee except those whose responsibility it is to supervise, plan, or direct the work of others, including working supervisors and group leaders who may be in charge of a group of employees, but whose supervisory functions are only incidental to their regular work.
Production employees	Every employee with a production occupation, as defined by the standard occupation classification code 51-0000.
Full-time	Employee with an employment contract that is for at least 12 consecutive months and whose working hours per week, month, or year are defined as full-time
Part-time	Employee with an employment contract that is for at least 12 consecutive months and whose working hours are less than required for a full-time employee, as defined in subsection (8) of this section.
Temporary (temp)	Employee who has an employment contract that is for fewer than 12 months or who is terminated by a specific event including, but not limited to, the end of a project or the return of replaced employees.

Figure 17. Sheet 6: Working Conditions from the Supplier Reporting Template

Appendix C: Benchmarking material values

The values listed in Table 4 below relate to national benchmarks. Regional benchmark values are published by the National Ready Mix Concrete Association for ready mix concrete, but not are not included below. While the magnitude of values here would be different if the focus were only on Washington, the approximate reduction potential is the same.

Table 4 (next page). Global warming potential benchmarking values (kg CO₂e per Declared Unit) for eligible materials for the Buy Clean Buy Fair project, extracted from the 2021 CLF Material Baselines report.

Material Category and Subtype	Global warming potential benchmark values: (kg CO ₂ e) per Declared Unit			Declared unit	Data Source
	Achievable (Low)	Typical (Median)	Baseline (High)		
READY MIXED CONCRETE					
0-2500 psi (0-17.2 MPa)	190	266	340	m3	Typical = NRMCA USA benchmark value per strength class (NRMCA, 2020, Table E1); Low = IW-EPD Ready Mixed Concrete (NRMCA, 2019) minimum value per strength class; High = IW-EPD Ready Mixed Concrete (NRMCA, 2019) maximum value per strength class + uncertainty factor to account for cement variation (Building Transparency analysis, citation forthcoming). Note that the NRMCA Industry Average EPD (NRMCA, 2019) provides data for strength ranges (e.g., 3001 – 4000 psi), while the NRMCA Benchmark Report (NRMCA, 2020) provides data for specific strength values (e.g., 4000 psi).
2501-3000 psi (17.2-20.7 MPa)	210	291	380	m3	
3001-4000 psi (20.7-27.6 MPa)	260	343	470	m3	
4001-5000 psi (27.6-34.5 MPa)	320	406	580	m3	
5001-6000 psi (34.5-41.4 MPa)	330	429	610	m3	
6001-8000 psi (41.3-55.1 MPa)	380	498	710	m3	
>8001 psi (>55.1 MPa)	411	535	710	m3	NRMCA does not publish data for concrete mixes over 8000 psi in their IW-EPD or benchmark report. Low = EC3 20th percentile, Feb 2021, drawn from 120 product-specific EPDs. Typical = EC3 average, Feb 2021, drawn from 120 product-specific EPDs. High = default to CLF High Baseline for next-highest strength class value (6001-8000 psi) until more data is available.
STEEL					

Material Category and Subtype	Global warming potential benchmark values: (kg CO ₂ e) per Declared Unit			Declared unit	Data Source
	Achievable (Low)	Typical (Median)	Baseline (High)		
Rebar	0.8	0.98	1.7	kg	Typical = IW-EPD Fabricated Steel Reinforcement (CSRI, 2017); Low = EC3-calculated 20th percentile Jan 2021; High = EC3-calculated 80th percentile Jan 2021 drawn from IW-EPD and 64 product-specific EPDs.
Plate Steel	1.0	1.47	3.0	kg	Typical = IW-EPD Fabricated Steel Plate (AISC, 2016c); Due to low number of EPDs, Low = point between IW-EPD value and estimated global low based on ICE database (Circular Ecology, 2019); High = point between IW-EPD value and estimated global high based on ICE database (Circular Ecology, 2019).
Structural Steel: Hollow Sections	1.5	2.39	3.0	kg	Typical = IW-EPD Fabricated Hollow Structural Sections (AISC, 2016a); Low = CLF beta low value; High = adjusted to reflect similar ranges as other steel products on this list due to shortage of available data.
Structural Steel: Hot-Rolled Sections	0.8	1.16	1.7	kg	Typical = IW-EPD Fabricated Hot Rolled Structural Sections (AISC, 2016b); Low = EC3-calculated 20th percentile Jan 2021; High = EC3-calculated 80th percentile Jan 2021 drawn from IW-EPD and 34 product-specific EPDs.

Material Category and Subtype	Global warming potential benchmark values: (kg CO ₂ e) per Declared Unit			Declared unit	Data Source
	Achievable (Low)	Typical (Median)	Baseline (High)		
Cold Formed Steel: Framing	1.5	2.28	3.0	kg	Typical = IW-EPD Cold-Formed Steel Studs and Track Manufactured in U.S. and Canada (SRI, 2016); Due to low number of EPDs, Low = point between IW-EPD value and estimated global low based on ICE database (Circular Ecology, 2019); High = point between IW-EPD value and estimated global high based on ICE database (Circular Ecology, 2019). These numbers match the 20% and 80% figures in EC3 as of Jan 2021, drawn from IW-EPD and 4 product-specific EPDs.
ENGINEERED WOOD					
Composite Lumber - LSL/LVL/PSL	230	361	400	m3	Category includes multiple product types created by combining wood veneers, strands, or flakes with adhesive. Types differ by manufacturing process and performance qualities. Typical = IW-EPD Laminated Veneer Lumber (AWC/CWC, 2020); Due to low number of EPDs, Low = CLF 2019 beta value = IW-EPD value minus estimated uncertainty factor; High = CLF 2019 beta high value = IW-EPD value plus estimated uncertainty factor.

Material Category and Subtype	Global warming potential benchmark values: (kg CO ₂ e) per Declared Unit			Declared unit	Data Source
	Achievable (Low)	Typical (Median)	Baseline (High)		
Mass Timber - GLT/CLT/DLT/NLT	104	137	200	m3	Category includes multiple product types created by combining individual wood laminations (dimension lumber) with adhesive or fasteners into panels and/or larger-dimension beams and columns. Types differ by manufacturing process and performance qualities. Typical = IW-EPD NA Glue Laminated Timber (AWC/CWC, 2020); Low = EC3-calculated 20th percentile Jan 2021; High = EC3-calculated 80th percentile Jan 2021 drawn from IW-EPD and 7 product-specific EPDs, plus additional 5% factor to approximate manufacturing variability between product types and manufacturers.

Appendix D: Case study calculations

Table 5. Calculations for Case Study 1 and 2, percentage reduction from the CLF 2021 Material Baselines. Carbon intensity values measured as global warming potential per functional unit, for life cycle stages A1-A3.

Product	Baseline Carbon Intensity ¹⁴ (based on 2021 CLF Baselines)	Actualized Carbon Intensity (based on EPD of procured product)	Approx. Reduction
Calculations for Case Study 1 in King County			
Ready-Mixed Concrete, 4000 psi	470 kgCO _{2e} / cubic meter	235 kgCO _{2e} / cubic meter ¹⁵	50%
Ready-Mixed Concrete, 6000 psi	610 kgCO _{2e} / cubic meter	233 kgCO _{2e} / cubic meter ¹⁶	60%
Structural Steel – Hot Rolled Sections	1.7 tCO _{2e} / metric ton	1.12 tCO _{2e} /metric ton ¹⁷	35%
Board Insulation	20 kgCO _{2e} / 1 m ² -R _{si}	12.7 kgCO _{2e} / 1 m ² , R _{si} ¹⁸	20%
Flat Glass	2300 kgCO _{2e} / metric ton	1370 kgCO _{2e} / metric ton ¹⁹	20%
Calculations for Case Study 1 and 2			
Rebar	1.7 tCO _{2e} / metric ton	0.499 tCO _{2e} /metric ton ²⁰	70%

¹⁴ Carlisle, S., Waldman, B., Lewis, M., and Simonen, K. (2021). 2021 Carbon Leadership Forum Material Baseline Report, (version 2). Carbon Leadership Forum, University of Washington. Seattle, WA. July 2021. [University of Washington ResearchWorks Archive](#).

¹⁵ Cadman Materials Inc. (2020). Environmental Product Declaration – Mix MC4C44438, Redmond Plant. ASTM International. Retrieved from [cqd.io/e/ec3n04x4uw](#)

¹⁶ Cadman Materials Inc. (2020). Environmental Product Declaration – Mix MC6RCA41428, Redmond Plant. ASTM International. Retrieved from [cqd.io/e/ec3qchrr3z](#)

¹⁷ Gerdaul Long Steel North America. (2016). Environmental Product Declaration – Structural Steel, Petersburg Steel Mill. SCS Global Services. Retrieved from [cqd.io/e/ec33ex0bda](#)

¹⁸ Owens Corning. (2021). Environmental Product Declaration – Foamular NGX XPS Insulation. UL Environment. Retrieved from [cqd.io/e/ec3hs2mwce](#)

¹⁹ Vitro Architectural Glass. (2017). Environmental Product Declaration – Flat Glass Products. ASTM International. Retrieved from [cqd.io/e/ec302wc3cy](#)

²⁰ Nucor Steel Seattle Inc. (2017). Environmental Product Declaration – Steel Concrete Reinforcing Bar and Merchant Bar Products. UL Environment.

Table 6. Calculations for Case Study 2, percentage reduction from the NRMCA Member National and Regional LCA Benchmark. Carbon intensity values measured as global warming potential per cubic meter of ready-mixed concrete, for life cycle stages A1-A3.

Product	Baseline Carbon Intensity ²¹ (based on Pacific Northwest NRMCA Benchmarks)	Actualized Carbon Intensity (based on EPD of procured product)	Approx. Reduction
Calculations for Case Study 2 in Bellevue			
Ready-Mixed Concrete, 4500 psi	430 kgCO ₂ e / cubic meter	277 kgCO ₂ e / cubic meter ²²	35%
Ready-Mixed Concrete, 6000 psi	455 kgCO ₂ e / cubic meter	350 kgCO ₂ e / cubic meter ²³	20%
Ready-Mixed Concrete, 3000 psi	290 kgCO ₂ e / cubic meter	267 kgCO ₂ e / cubic meter ²⁴	10%
Ready-Mixed Concrete, 5000 psi	430 kgCO ₂ e / cubic meter	303 kgCO ₂ e / cubic meter ²⁵	30%
Ready-Mixed Concrete, 8000 psi	544 kgCO ₂ e / cubic meter	415 kgCO ₂ e / cubic meter ²⁶	20%

²¹ National Ready Mixed Concrete Association (NRMCA). (2020). Appendix D: NRMCA Member National and Regional LCA Benchmark (Industry Average) Report – Version 3. Athena Sustainable Materials Institute. Retrieved from https://www.nrmca.org/wp-content/uploads/2020/10/NRMCA_REGIONAL_BENCHMARK_April2020.pdf

²² Stoneway Concrete Inc. (2019). Environmental Product Declaration – Mix 450174, Black River Plant. ASTM International.

²³ Stoneway Concrete Inc. (2019). Environmental Product Declaration – Mix 665174, Black River Plant. ASTM International.

²⁴ Stoneway Concrete Inc. (2019). Environmental Product Declaration – Mix 350175, Black River Plant. ASTM International.

²⁵ Stoneway Concrete Inc. (2019). Environmental Product Declaration – Mix 458374C, Black River Plant. ASTM International.

²⁶ Stoneway Concrete Inc. (2019). Environmental Product Declaration – Mix 880374C, Black River Plant. ASTM International.