BUY CLEAN WASHINGTON STUDY: OVERVIEW

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I. ABOUT

In March 2018, the Washington State Legislature authorized the University of Washington's College of Built Environments to conduct a Buy Clean Washington Study in collaboration with Central Washington University and Washington State University. The purpose of the study was to develop potential policy options and recommendations for Washington State. The research team completed the study in four phases and compiled findings into a full report to the state. The report includes five chapters:

- **Chapter 1: Introduction** provides background on state effort to introduce Buy Clean Washington regulation, and summarizes scope and objectives of the Buy Clean Washington Study.
- **Chapter 2: Policy Review** summarizes current embodied carbon initiatives led or adopted by governments around the world, and identifies common themes.
- **Chapter 3: Technical Review** analyzes embodied carbon impacts of eligible construction materials, and provides recommendations to advance EPD development in Washington-based product markets.
- **Chapter 4: Pilot Study** presents the pilot projects used for this study and proposes a method for collecting data to test proposed Buy Clean WA requirements.
- **Chapter 5: Policy Evaluation** provides options and potential investments to support WA State develop and implement policy. This chapter includes analysis of Buy Clean policy components, describes several approaches to develop standards and discusses potential impacts.

This document provides summaries of key information and findings from each chapter.

II. BACKGROUND

'Buy Clean' policy focuses on greenhouse gas (GHG) emissions attributed to construction materials and products. Activities such as mining raw materials, driving trucks, running factories and chemical reactions result in emissions to the air, earth and water. Embodied carbon is the sum impact of all GHG emissions attributed to materials throughout their life cycle. Life Cycle Assessment (LCA) is a standardized method used to calculate environmental impacts including embodied carbon. Environmental product declarations (EPDs) report environmental impact data generated by LCAs. Often compared to 'nutrition labels', EPDs are used by the building industry to report embodied carbon.

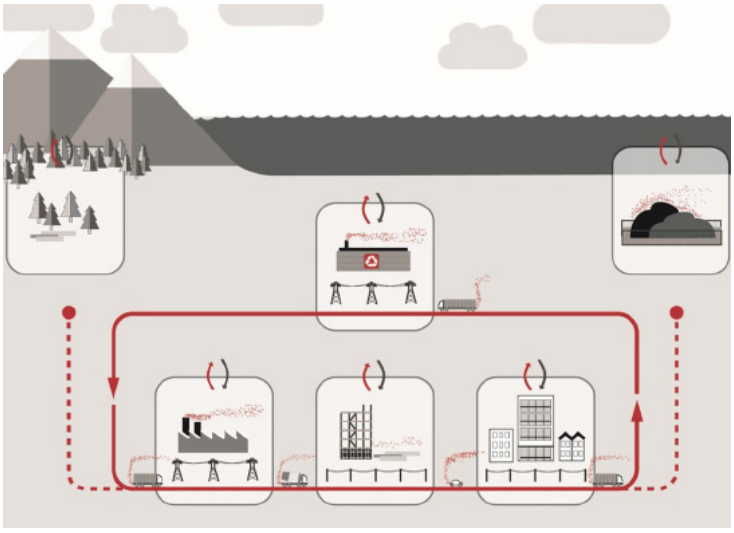

FIGURE 1 - EMBODIED CARBON OCCURS FROM EXTRACTING MATERIALS, MANUFACTURING, CONSTRUCTION, MAINTENANCE, END OF LIFE/DISPOSAL [1]. IMAGE CREDIT: MEGHAN LEWIS.

In 2017, California State introduced 'Buy Clean' policy [2], providing a framework for other governments considering embodied carbon policies. Buy Clean policy aims to compare the carbon footprint of materials within a similar category (e.g. compare types of steel options). It would not compare material options between different categories (e.g. compare steel options with concrete options).

1 INTRODUCTION (CHAPTER 1)

1.1 Embodied Carbon Policy Context

The building sector generates nearly 40% of annual global carbon emissions [3]. Government policies, programs and climate actions plans typically consider emissions that result from building operations, including measures to increase energy efficiency and renewable energy production. However, carbon emissions attributed to construction materials remain a growing issue.

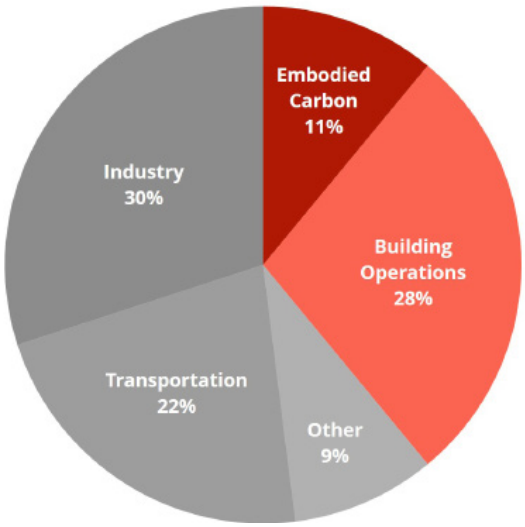

FIGURE 2 - GLOBAL CO2 EMISSIONS BY SECTOR.
DATA SOURCE: UN ENVIRONMENT GLOBAL STATUS REPORT; EIA INTERNATIONAL ENERGY OUTLOOK 2017.

Often termed 'embodied carbon,' these emissions account for 11% of annual global carbon emissions and 28% of building sector emissions [4]. Governments across the European Union (EU) have made progress toward establishing policies to address these emissions. Several countries have implemented national and local programs to require or incentivize industries and product markets to measure, report and reduce environmental impacts over the life cycle of buildings. In nations with established embodied carbon policies, green building associations and industry stakeholder groups worked to develop and standardize LCA methodology, tools and data, and worked closely with governments to align existing industry-led initiatives with new policy.

In the United States (US), government-led embodied carbon policies are less prevalent and established compared to measures adopted by EU counterparts. However, US-based industries, businesses, governments and environmental groups are increasingly becoming more aware of the environmental and health impacts of construction materials. In particular, state and local governments are exploring procurement policies to reduce embodied carbon, which would position government bodies to directly regulate and set thresholds for materials purchased for public works projects.

In October 2017, California passed the Buy Clean California Act, becoming the first state to require facility-specific EPDs and set global warming potential (GWP) thresholds for eligible materials used on public projects. In January 2018, Washington State considered similar Buy Clean legislation [5]. The Buy Clean Washington Study was commissioned based on stakeholder discussions surrounding the proposed legislation.

EXHIBIT 1 - BUY CLEAN CALIFORNIA ACT TIMELINE

The Buy Clean California Act

Incremental timeline to introduce standards

- **Oct. 2017:** Buy Clean California Act signed into law
- **June 2018:** Amendment passed to update timeline, add exemptions
- **Jan. 2019:** CA requests voluntary submission of EPDs
- **Jan. 2020:** CA requires mandatory submission EPDs
- **Jan. 2021:** CA publishes GWP thresholds
- **July 2021:** CA requires eligible materials to meet GWP thresholds

1.2 Buy Clean Washington Study

The Washington State Engrossed Substitute Senate Bill (ESSB) 6095 allocated funding and defined the scope for a Buy Clean Washington assessment in two parts: (1) Sec. 1030 - Buy Clean Washington Pilot for the Department of Enterprise Services (DES), and (2) Sec. 5014 - Buy Clean Washington Study for the University of Washington (UW) College of Built Environments [6].

Sec. 1030 authorized DES to coordinate with five state-funded project teams and the UW College of Built Environments to develop and test methods for meeting proposed Buy Clean Washington requirements. Sec. 1030 established requirements for the pilot phase, instructing awarding authorities to (1) require successful bidders to submit current third-party verified, facility-specific EPDs for eligible materials (if available), and (2) report to DES the structural material quantities and origins, and any EPDs collected during the pilot period.

Sec. 1030 listed **eligible materials** subject to the pilot phase, which include any of the following that function as part of a structural system or structural assembly:

(1) Concrete, including structural cast in place, shotcrete, and precast
(2) Unit masonry
(3) Metal of any type, and
(4) Wood of any type including, but not limited to, wood composites and wood laminated products.

Sec. 5014 authorized the UW College of Built Environments to collaborate with Central Washington University and Washington State University to "analyze existing embodied carbon policy and propose methods to categorize structural materials and report structural material quantities and origins." Overall, the aim of the Buy Clean Washington Study was to assess structural material choices within each eligible material category. The study did not to compare materials between categories (e.g. compare steel products to wood products). The research team completed the study in four phases, which informed policy development options and implementation recommendations for Washington State, shown in Figure 3.

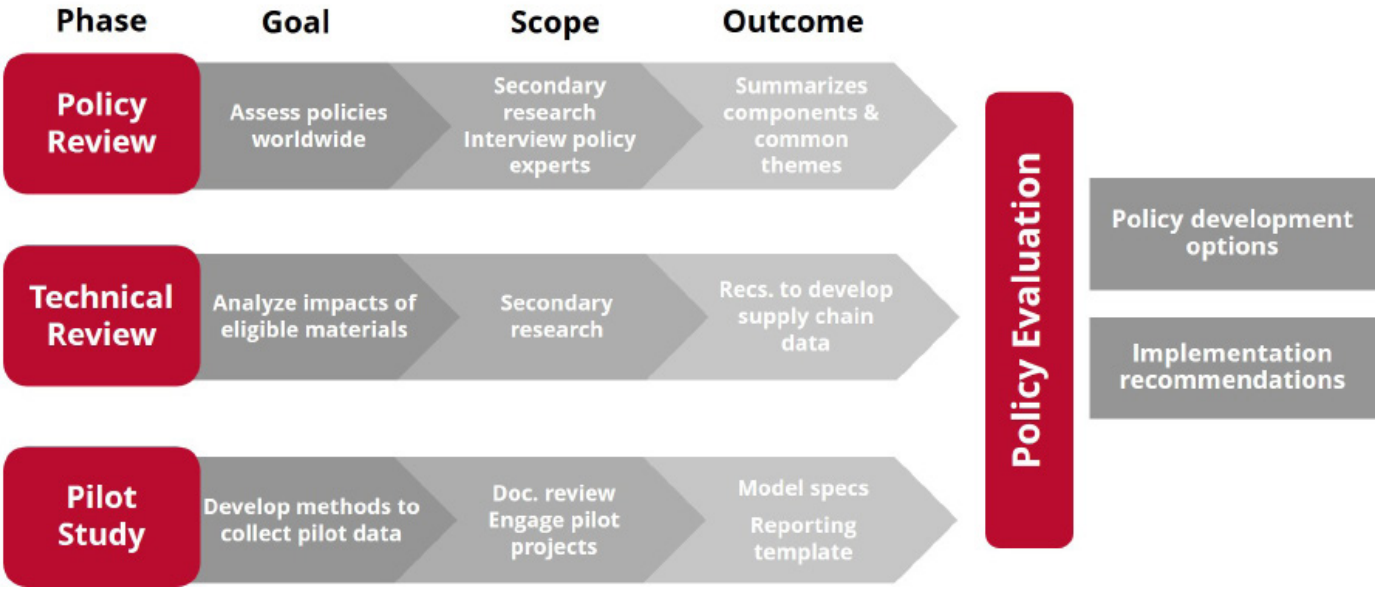

FIGURE 3 - BUY CLEAN WASHINGTON STUDY APPROACH

2 POLICY REVIEW (CHAPTER 2)

2.1 Scope

The policy review considered policies that support building industries to measure, report and/or reduce emissions attributed to construction materials. It focused on recent US-based initiatives and nations with multi-faceted programs that often align multiple embodied carbon standards and support systems. Here, the term 'policy' encapsulates government and non-government mechanisms.

2.2 Key Considerations

- **Technical resources** such as EPD/LCA databases are used to support policy implementation.
- **New policies often align** with existing policies and programs.
- **Incentives** (e.g. financial, technical, construction rights) can support initial implementation.
- **Industry stakeholder engagement** occurs during policy planning, development and delivery.
- **Incremental timelines** are applied to phase in requirements (often with voluntary trial period).
- **Local context** is assessed to develop reasonable, achievable standards.

2.3 Overview of Current Policies

National and subnational governments across Europe have established longstanding policies and programs, commonly shaped in partnership with industry stakeholders. Several nations such as France and Germany apply multi-faceted systems, including national rating programs, databases, standard guidance and open source tools to improve disclosure and performance of materials.

In the US, national certification systems such as LEED are strengthening focus on embodied carbon, establishing disclosure and performance pathways specific to building products. Organizations across sectors are leading national and regional initiatives to identify opportunities to improve data, and measure and reduce embodied carbon. While regulatory policies are sparse across all levels of government, state and local agencies are initiating procurement-based policy and materials management programs. Beginning in 2019, implementation of the Buy Clean California Act may provide a model to inform regulatory efforts by other governments.

The growing focus on embodied carbon arises from increasing recognition of an emissions gap not addressed by 'operational carbon' policies (e.g. energy efficiency measures). While embodied carbon policies can help reduce the total carbon footprint of buildings, recent research [7] on the global 'carbon loophole' highlights a shortcoming in current policy. The 'carbon loophole' assesses policies and national emission levels in an international context, in which it considers the trajectory of embodied carbon through the global economy. The term considers emissions 'offshoring'; as developed countries phase out regional production-based emissions and move toward meeting national emissions targets, they increasingly rely on developing countries to carry out carbon-intensive manufacturing practices. This results in a redistribution of emissions that most policies do not consider, meaning nations can lack holistic view of the carbon footprint of imported materials.

EXHIBIT 2 - EXAMPLE OF NATIONAL PROGRAM: FRANCE'S ENERGIE POSITIVE ET REDUCTION CARBONE

Énergie Positive et Réduction Carbone

France voluntary program to pilot and incentive performance targets

- Performance targets (energy and carbon)
- Incentives include financial support for LCA, construction rights and green product labels
- Evaluates economic and technical feasibility of regulation
- Indicators for emissions occurring during the life cycle of buildings, and emissions attributed to building products and equipment

3 TECHNICAL REVIEW (CHAPTER 3)

3.1 Scope

The technical review assessed embodied carbon impacts of the structural material categories selected for the Buy Clean WA Study: concrete, masonry, steel, and wood. It evaluated options to differentiate products within the same material category and assessed how selected materials are produced, where emissions arise throughout their supply chains, strategies or innovations that can lead to low carbon manufacturing practices, and the current status of environmental data in each

3.2 Quantifying Product Emissions

LCA reports a range of potential environmental impacts, including GHG emissions termed GWP (expressed as kg CO_2e or "embodied carbon"). Environmental data from LCAs underpin EPDs, which can be useful resources to help industry and governments assess emissions, make decisions and guide policies. Some EPDs are industry-wide, which are averaged values, and do not represent the unique characteristics of a specific product. Facility-specific EPDs, which represent the supply-chain and manufacturing impacts of a particular facility or manufacturer, could inform procurement choices if facility-specific data about critical upstream material processes is included.

EPDs are not yet common across the building industry. Many product manufacturers would need to develop new EPDs to comply with pilot Buy Clean WA requirements. Developing EPDs can be simplified through development of regionally-specific LCA calculations for relevant material categories, saving time and money for product manufacturers. Recommendations to spur EPD development in WA include:

- **Quality**: Support initiatives to standardize LCI background data needed to improve EPD accuracy and comparability.
- **Availability**: Incentivize local businesses to create EPDs to increase availability.
- **Usability**: Support tools, training and education for industry to find, sort and use EPDs.
- **Comparability**: Consider known data variability within each material category when setting EPD standards and performance targets.

3.3 Establishing Embodied Carbon Performance Targets

Considerations for establishing performance targets include:

1. Commission material-specific benchmark studies. Studies would consider variability of materials used in WA and provide useful data to help establish reasonable and meaningful performance values.

2. Normalize material impacts to compare to targets. Setting fixed performance targets for generic material categories risks preventing design and construction teams from meeting needed performance requirements at specific applications. Weighted averages over a full building would allow flexibility to address design and construction issues.

3. Set achievable performance targets and establish a roadmap for improvement. Setting a target at industry average could discourage disclosure and result in cost increases if a limited number of suppliers meet the target. Rather, setting a target that is achievable today (e.g. by 80% of market) would likely help incentivize disclosure. A timeline to reduce targets could be developed to align with data-driven opportunity roadmaps specific to each industry.

4 PILOT STUDY (CHAPTER 4)

4.1 Scope

WA State selected five pilot projects to participate in the Buy Clean Washington Study in order to develop and test methods for collecting EPDs, and structural material quantity and origin data. To support the pilot phase, the research team developed a system to categorize eligible structural materials, and methods to report EPDs and structural material data. This includes:

- **Model specifications** project teams can use to outline pilot requirements to contractors.
- **Reporting template** for product suppliers to report structural material quantities and origins.

4.2 Potential Costs

- **Costs to design teams to apply specs**: The cost is estimated to be low. The research team recommends using the proposed specification template as an attachment to standard construction specification processes and documents.
- **Cost to create EPDs:** The cost of EPDs varies depending on material types and state of existing technical infrastructure to calculate data. Costs to generate facility-specific EPDs can range from $5,000 to over $50,000 for materials with complex manufacturing processes. The cost and process of collecting and reporting EPD data can be optimized through datasets and tools. Data collection can be aligned with the stage of construction in which data is easily available to construction teams (as of bidding on/or procurement).
- **Impact on construction costs:** The cost is unknown, but expected to be low. Without mandating EPDs or setting performance targets, no change to costs of materials is expected.

4.3 Pilot Study Next Steps

Pilot project schedules and delivery approaches vary significantly, posing a barrier to developing a uniform approach and timeline to test requirements across selected projects. A timeline extension to the pilot phase would enable comprehensive testing of methods developed by the study and heighten ability to collect information from pilot teams. The research team recommends using a simplified approach that limits disruptions to current project schedules and work streams, especially since several consultants and contractors have been selected for some projects, whereas other projects are not scheduled to advertise contracts in the near-term. No additional resources have been provided to support contractors and product suppliers to collect or generate EPDs. The research team recommends the following steps to assist pilot teams.

Step	Timeframe	Overview
1. Introduction	01/2019	Present study findings to pilot teams
2. Stakeholder discussions	02/2019	Facilitate calls to present draft methods/templates
3. Collect feedback	03/2019	Distribute drafts for pilot team/industry feedback
4. Refine	06/2019	Update/finalize drafts and distribute to pilot teams
5. Report	06/2019	DES provides preliminary report to state fiscal committees
5. Implement	07/2019 -	Pilot teams use methods/templates to meet requirements
6. Evaluate	07/2019 -	DES collects and evaluates reporting templates/feedback

By June 2019, qualitative assessments of the pilot phase would be possible. The pilot phase could expand to include voluntary participation by other public and private projects already collecting EPDs and structural material data.

5 POLICY EVALUATION (CHAPTER 5)

5.1 Scope

The policy evaluation was informed by the policy review, technical review and pilot study. The evaluation aimed to provide pathways to develop Buy Clean WA policy standards. It resulted in proposed options for policy development and recommended investments to support implementation. The evaluation also identified potential impacts. It assessed three phases **Stage 1: Pre-Development/ Planning**, **Stage 2: Policy Development** and **Stage 3: Policy Implementation.**

5.2 Policy Stages

STAGE 1: PRE-DEVELOPMENT/PLANNING

I Understand Issue Policy Aims to Address

Embodied carbon is underpinned by a complex system of overlapping, often inconsistent standards, guidelines, tools, methodologies, and initiatives and research spanning international borders. To start, policymakers can develop baseline knowledge on:

- Sources of embodied carbon emissions along lifecycle stages of materials.
- Product markets/supply chains.
- How embodied carbon is measured. (e.g. EPDs, LCA, GWP).
- Design/construction team roles (e.g. manufacturers, engineers, architects).
- Technical ecosystem (e.g. certification systems, LCA tools and data).

II Assess Policy Context

Policymakers should assess factors unique to local context to understand state and product market 'readiness' to meet potential policy standards. Consider prevalence of:

- Related policies and initiatives targeting the building sector.
- Local market readiness (capability).
- Quality EPDs and LCA data sources.
- Accessible and standardized tools, software, methodologies.
- Government resources to support policy implementation.

III Use Framework to Guide Policy Development

A framework establishes parameters for policymakers, providing a basis to assess options and develop policy standards, methods and guidelines. The study developed a framework with the following key components to guide decision-making:

- Goals - improve reporting practices and/or improve performance.
- Scope - eligible materials, types of standards and compliance guidelines.
- Methods - disclosure, reporting, establishing and assessing performance targets.
- Timeline - schedule to introduce standards and require compliance.
- Implementation - managing, supporting and evaluating policy.

STAGE 2: POLICY DEVELOPMENT

This section outlines proposed steps and options to develop policy.

Step 1 Establish Policy Goal

- **OPTION 1. IMPROVE DISCLOSURE**
  Advance reporting practices that disclose environmental impacts.
- **OPTION 2. IMPROVE PERFORMANCE**
  Improve environmental performance of materials.

Step 2 Establish Policy Scope

2.1 Select eligible materials to meet compliance standards

- **OPTION 1. ADOPT PILOT PROJECT LIST**
  Structural material categories concrete, masonry, steel, and wood.
- **OPTION 2. MODIFY PILOT PROJECT LIST**
  Update selection criteria to consider other material characteristics.
- **OPTION 3. NO DEFINED LIST**
  Apply compliance standards to all construction products.

2.2 Establish policy standards

- **OPTION 1. DISCLOSURE-BASED**
  Require or incentivize eligible materials to report environmental impacts.
- **OPTION 2. PERFORMANCE-BASED**
  Establish values and require/incentivize eligible materials to meet targets.

2.3 Determine compliance guidelines

- **OPTION 1. MANDATORY**
  Product manufacturers must comply with standards to install materials.
- **OPTION 2. VOLUNTARY**
  Standards are optional. State can provide incentives to support compliance.

Step 3 Establish Methods

3.1 Select disclosure method

- **OPTION 1. STANDARD EPDS**
  Market driven development of third-party verified EPDs.
- **OPTION 2. SUPPORTED EPD DEVELOPMENT**
  Support EPD production through tools and incentives.
- **OPTION 3. ALTERNATE METHODS**
  Accept alternative reporting methods.

Step 3 Establish Methods Continued

3.2 Select method to report material quantities

- **OPTION 1. DETAILED REPORTING**
  Report material quantities using a standard template.
- **OPTION 2. SIMPLIFIED REPORTING**
  Report aggregates of material quantities.
- **OPTION 3. NO REPORTING**
  Material quantity and origin data not required.

3.3 Select method to establish performance targets

- **OPTION 1. AVERAGE EPD METHOD**
  Collect available EPDs and calculate benchmarks.
- **OPTION 2. BENCHMARK STUDY METHOD**
  Conduct regionally specific embodied carbon benchmark studies to inform values.

3.4 Select method to assess environmental performance

- **OPTION 1. SINGLE THRESHOLD**
  Establish single GWP threshold and apply binary approach.
- **OPTION 2. TIERED SYSTEM**
  Assess degree of performance relative to GWP benchmarks.

Step 4 Determine Timeline

4.1 Consider industry practices

Assess project delivery timeline (e.g. bid to construction) and amount of time needed to produce EPDs. Provide mechanisms to track and evaluate data.

4.2 Select time to evaluate embodied carbon (if applicable)

- **OPTION 1. AT BID**
  Assess compliance with standards as part of bid decision-making.
- **OPTION 2. AT CONSTRUCTION**
  Require compliance to be demonstrated before installation of products.

4.3 Select method to update embodied carbon targets (if applicable)

- **OPTION 1. AUTOMATIC UPDATES**
  Set and establish timeframes and level of performance updates.
- **OPTION 2. RESPONDING TO MATERIAL UPDATES**
  Use average EPD method to update targets and reflect gradual industry shifts.
- **OPTION 3. MATERIAL SPECIFIC ROADMAPS**
  Engage industry to develop and timeline specific to material categories.

STAGE 3: POLICY IMPLEMENTATION

This section outlines potential investments to support policy implementation.

A DEVELOP STANDARD DELIVERY APPROACH

Introducing policy requires coordination between multiple state agencies. WA personnel should coordinate early and consistently to align effort and establish a consistent delivery approach.

A.1 Identify state funding availability and determine priorities.
A.2 Establish state implementation team to develop standard procedures.
A.3 Provide ongoing communication to stakeholders.

B BUILD INTERNAL CAPABILITY IN STATE GOVERNMENT

Environmental reporting and performance standards involve technical standards, tools and methodologies. The complexity of embodied carbon standards requires government expertise.

B.1 Provide education and training.
B.2 Establish and employ new state staff positions.
B.3 Establish and leverage panel of on-call consultants.

C SUPPORT AND USE TECHNICAL INFRASTRUCTURE

Databases, standard tools and methods can complement and support policy standards. Technical resources help governments collect and manage data, streamline reporting processes and set performance targets. Resources also help industry meet requirements.

C.1 Fund North American LCI database.
C.2 Fund material benchmark studies for WA State.
C.3 Support/apply LCA tools and EPD database(s). Develop standard guidance manual.

D BUILD INDUSTRY CAPABILITY

Knowledge/capability building is needed across product markets to ensure ability to comply.

D.1 Provide education, training and financial incentives.
D.2 Develop online educational resources.
D.3 Conduct ongoing stakeholder engagement.

E EVALUATE

Conduct ongoing evaluation on effectiveness of policy methods/standards. Refine as needed.

E.1 Extend pilot project evaluation and WA study to include industry stakeholder engagement.
E.2 Conduct economic impact analysis.
E.3 Support ongoing data collection on Buy Clean California.

F ESTABLISH PROGRAM TO SUPPORT POLICY

Align technical education, training and financial support to increase impact and reduce risk.

EXHIBIT 3 - OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) MATERIALS MANAGEMENT PROGRAM

Oregon DEQ

Materials Management Program

- Grant funding for research
- Staff with LCA/EPD expertise
- Education, technical support and financial incentives
- Oregon state consumption-based GHG emissions inventory
- Concrete EPD program for local manufacturers

5.4 POTENTIAL OUTCOMES

This section outlines opportunities and barriers and potential outcomes.

Opportunity	Potential Outcomes
Policy builds awareness	• Improved knowledge of embodied carbon reporting and impacts. • Increased use of LCA/EPDs.
WA system for EPD collection	• Improved ability to evaluate data availability and gaps.
Manufacturers create EPDs	• EPDs used to guide firm sustainability investments. • EPDs used for marketing/competitive advantage.
Performance targets	• Improved ability to set reasonable baseline, measure, compare. • Improved performance and uptake of low carbon practices.
Compliance exceptions	• Increased flexibility. • More opportunity to mitigate risk.
Incremental timeline	• Improved capability in state government and industry. • More opportunity to mitigate risk.
Financial/construction incentives	• Increased EPD creation and data availability.
Technical education/training	• Improved capability in state government and industry.

Barrier	Potential Outcomes
Policy without performance targets	• Minimized imperative to improve performance and practices • Reduced opportunity to assess/compare results.
Environmental reporting costs	• Increased burden to small businesses and/or 'unfair' advantage to large firms.
Complexity of developing performance targets feasible, responsive to supply chains	• Decreased effectiveness due to insufficient WA expertise/time. • Broad standards lead to increased disparity across product markets, i.e. standards achievable for some, not all product markets. • Specific standards result in increased burden/complexity to state.
Performance targets need data, verification and tools	• Decreased effectiveness due to insufficient technical systems/ budget. • Decreased effectiveness due to data limitations in some product markets.
Mandatory compliance	• Severe penalties lead to increase in project delays, incurring costs to project teams or deterring manufacturers from doing business with state. • Inconsequential penalties result in increased non-compliance, diminishing policy effectiveness.
Optional compliance	• Reduced participation. • Reduced creation of EPDs. • Reduced imperative to improve performance.

5.5 POTENTIAL COST IMPACTS

This section outlines potential cost impacts for product suppliers and Washington State government.

1 Environmental reporting standards are implemented.

	COST ASSESSMENT	DEPENDENCIES
Suppliers	EPD costs range from $5K to over $50K, depending on complexity of material manufacturing processes and existence of technical infrastructure. Costs may incur from personnel/consultant time, verification and EPD publication.	• Type of EPD and reporting method. • Organization size, past experience/capability. • Time to develop EPD. • State investments to support EPD creation.
WA Gov	Costs would depend on whether WA uses existing resources to implement new policy or if it provides supplemental funding.	• Budget availability/amount. • Current state personnel expertise/capability. • If/degree state adapts procurement systems. • If/what investments to support EPD creation.

COST MITIGATION

1. Promote benefits of using EPDs for revenue growth.
2. Support development of EPD data/industry resources.
3. Use industry assoc. for incentives/resources.
4. Set exemption for small, local businesses.

2 Environmental performance standards are implemented.

	COST ASSESSMENT	DEPENDENCIES
Suppliers	Similar to disclosure, cost of meeting performance targets could incur from staff time, reporting, verification. Standards could require changing or adopting new manufacturing practices.	• Rigor of standards. • Availability of WA funding/incentives. • Organization size, past experience/capability. • Prevalence/sophistication of firm practices.
WA Gov	WA would need to develop standards feasible/responsive to supply chain variances. Costs could incur due to data collection and verification, calculation methods, software.	• WA resources to calculate & implement targets. • Availability of data to calculate measures. • Method to establish targets/assess performance.

COST MITIGATION

1. Set achievable targets. Consider product specific performance criteria to develop targets.
2. Invest in technical resources to develop/maintain targets and support industry.

3 Noncompliance guidelines include penalties.

	COST ASSESSMENT	DEPENDENCIES
Suppliers	State could refuse permit installation of non-compliant materials, require fine or additional recourse procedures.	• Type of compliance penalties. • Exemption criteria.
WA Gov	Noncompliance fees could incur modest revenue. 'Harsh' penalizations could result in project delays and incur construction costs to state and design/construction team.	• Type of compliance penalties/exemption criteria. • Impacts to project schedules. • Competition in product markets.

COST MITIGATION

1. Consider incentivizing compliance over penalizing noncompliance.
2. Establish exemption criteria, e.g. requirements likely to incur significant cost increase/project delays.

4 Implementation timeline and delivery.

	COST ASSESSMENT	DEPENDENCIES
Suppliers	Construction timelines vary/present unknowns. Costs can increase if requirements change after contract is awarded.	• Project delivery model. • Project schedules.
WA Gov	Potential costs can incur to adapt agency procurement processes and guidelines.	• Level of coordination needed between agencies. • Approach to updating procurement processes.

COST MITIGATION

1. Set sufficient timeline to implement/test methods.
2. Agencies engage to establish consistent approach.
3. Use model spec. attachment as standard guideline.
4. Create/maintain EPD database/reporting method.

6 CONCLUSION

The Buy Clean Washington Study was developed to provide information for policy and industry stakeholders interested in embodied carbon reduction strategies. The study report aimed to improve understanding of the background, technical issues and policy options underpinning procurement-based embodied carbon policy. A primary strength of Buy Clean policy is its potential to motivate purchasing decisions that incentivize low carbon material extraction and product manufacturing within supply chains.

The final report of the Buy Clean Washington Study [8] provides detailed summaries and analysis of information highlighted throughout this document. To learn more about the study and access the full report, please visit http://www.carbonleadershipforum.org/resources/buy-clean-washington/.

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Acknowledgments
Please see the primary report document for Buy Clean Washington Study authors and advisors.

Contact
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