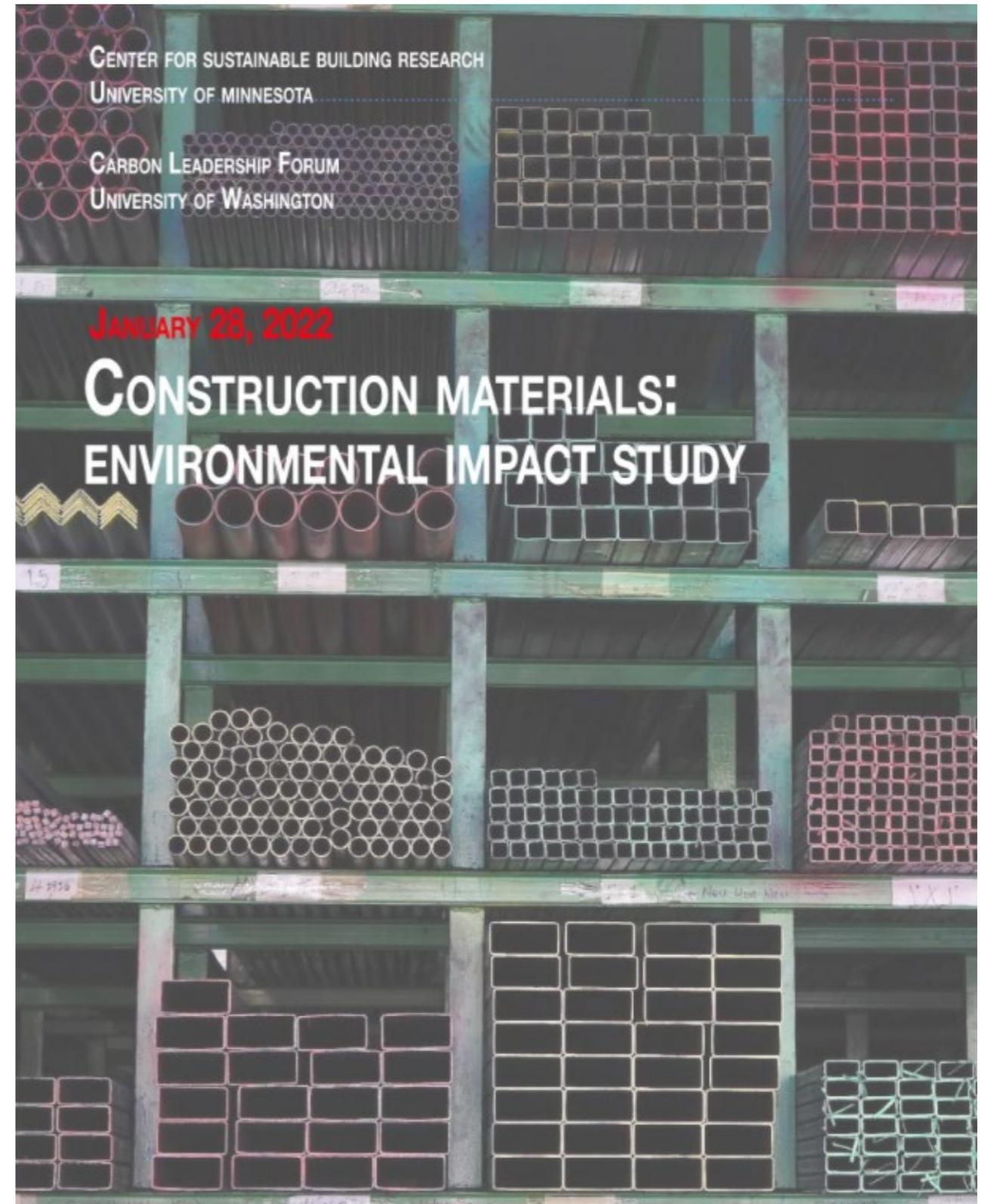


Environmentally Preferable Materials Research

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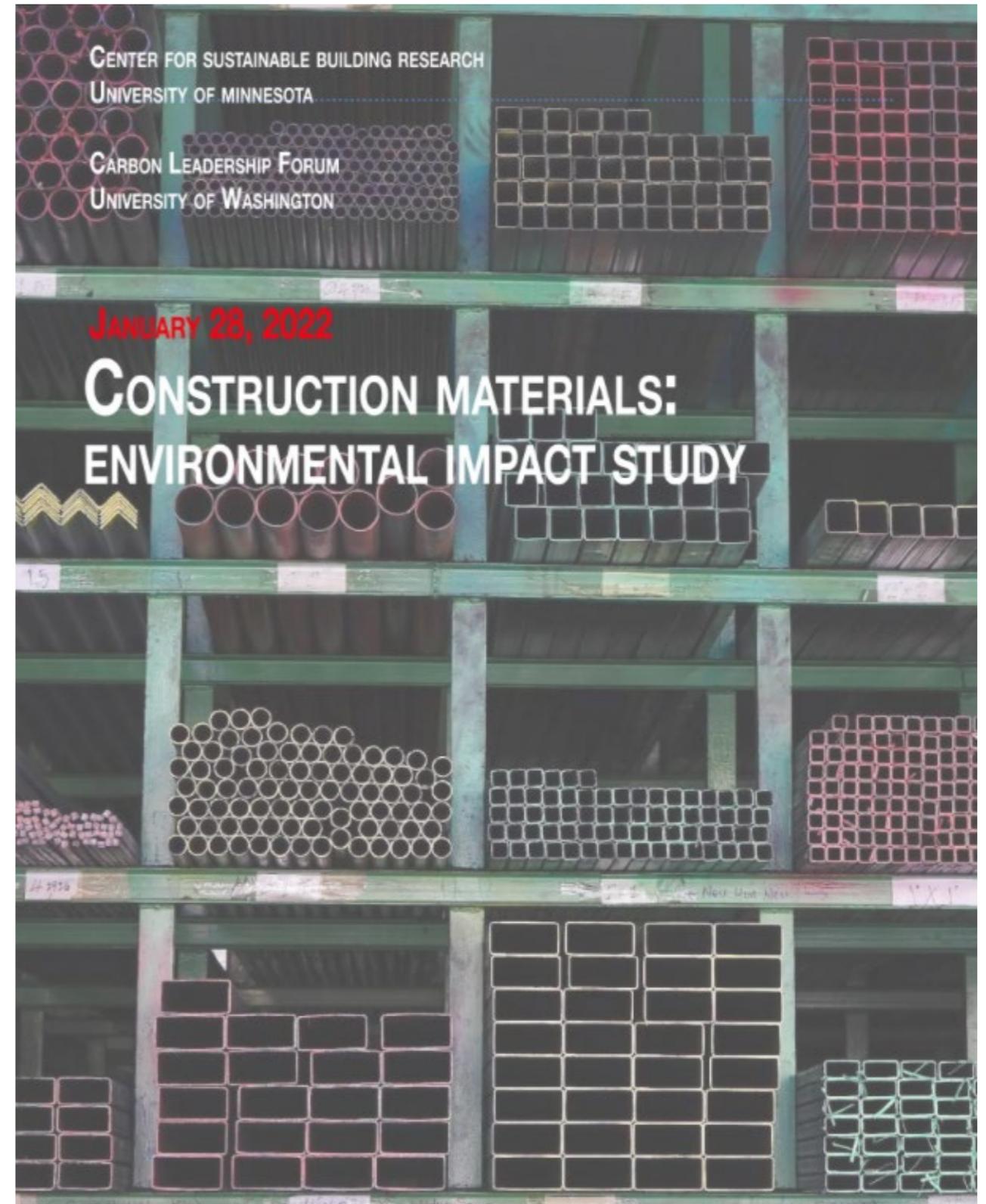
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Environmentally Preferable Materials Research

Scope:

This report provides an overview of low environmental impact material policies, focusing on the use of environmental product declarations (EPDs).

1. Review of Type III environmental product declarations. (Concrete, masonry, metal and wood)
2. Review and summary of programs in other states and countries. (In the Report)
3. Feasibility, economic costs, and environmental benefits.
4. Policy recommendations



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Embodied Carbon

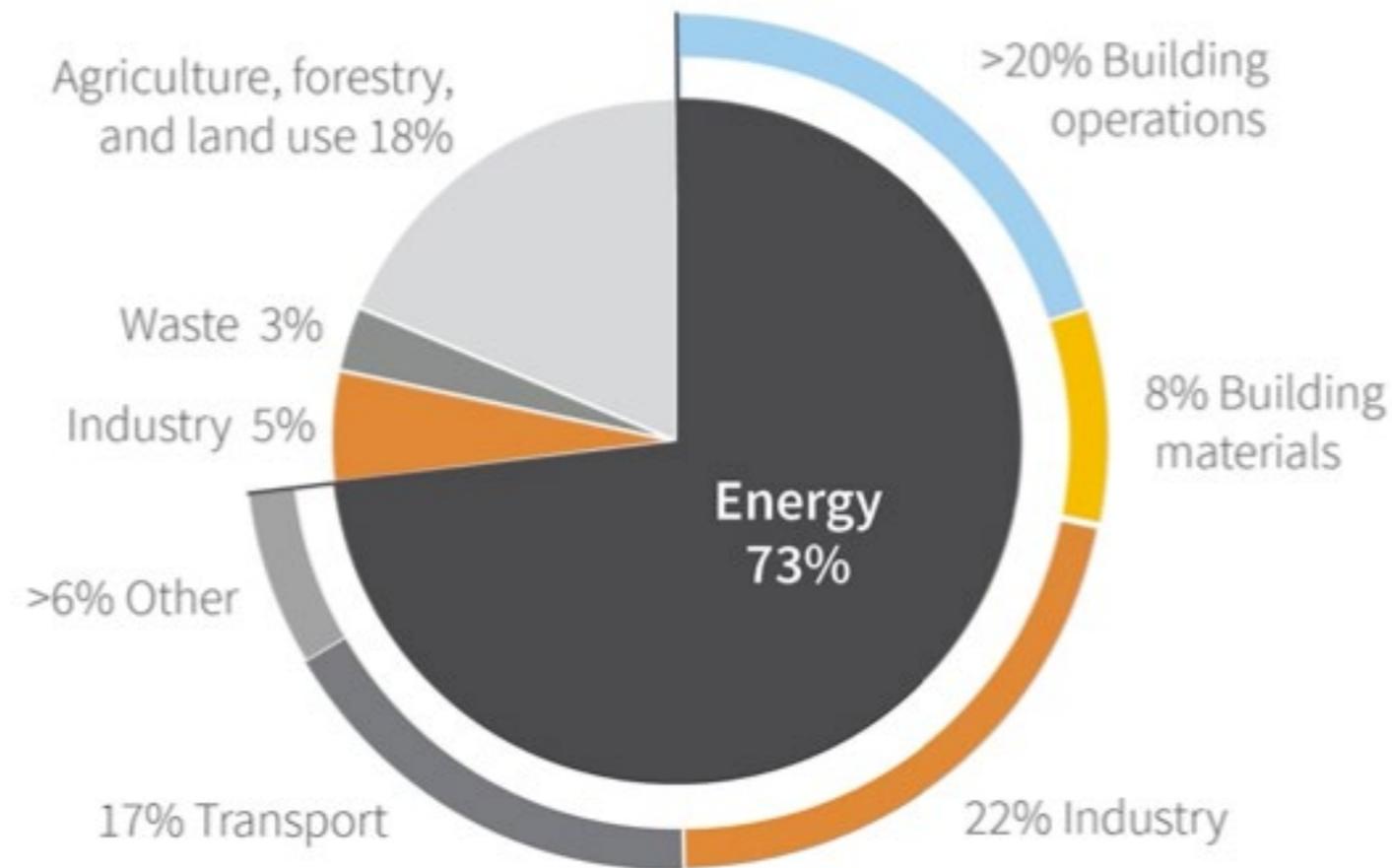


Figure 3. Global CO₂ emissions by sector. Adapted from the [UNEP 2019 Global Status Report](#) and [OurWorldInData.org](#) based on data from Climate Watch, the World Resources Institute. Building material emissions also occur in the Industry and Energy > Industry sectors.

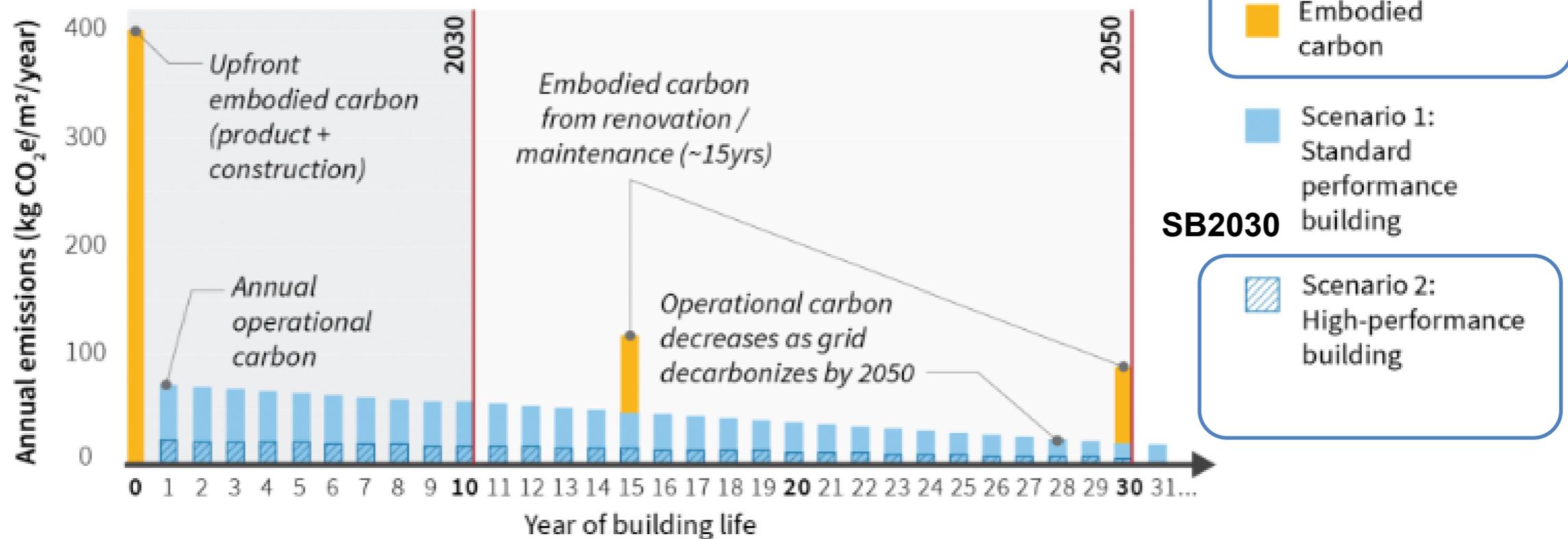
Embodied Carbon



Figure 1. Embodied carbon (yellow) and operational carbon (blue) across the key life cycle stages of a building.

Embodied Carbon

Figure 2. Relative impact of embodied and operational carbon of a new building from 2020-2050. Data sources: *Embodied Carbon Benchmark Study* and *Commercial Buildings Energy Consumption Survey (CBECS)*, assuming a medium-sized commercial office building. Assumes gradual grid decarbonization to zero by 2050.



Bonded Projects (B3) +
Other Projects?

Include in Policy?

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Embodied Carbon

Whole Building
Life Cycle Assessment
(Included in B3 guidelines)



Procurement Policy "Buy Clean"

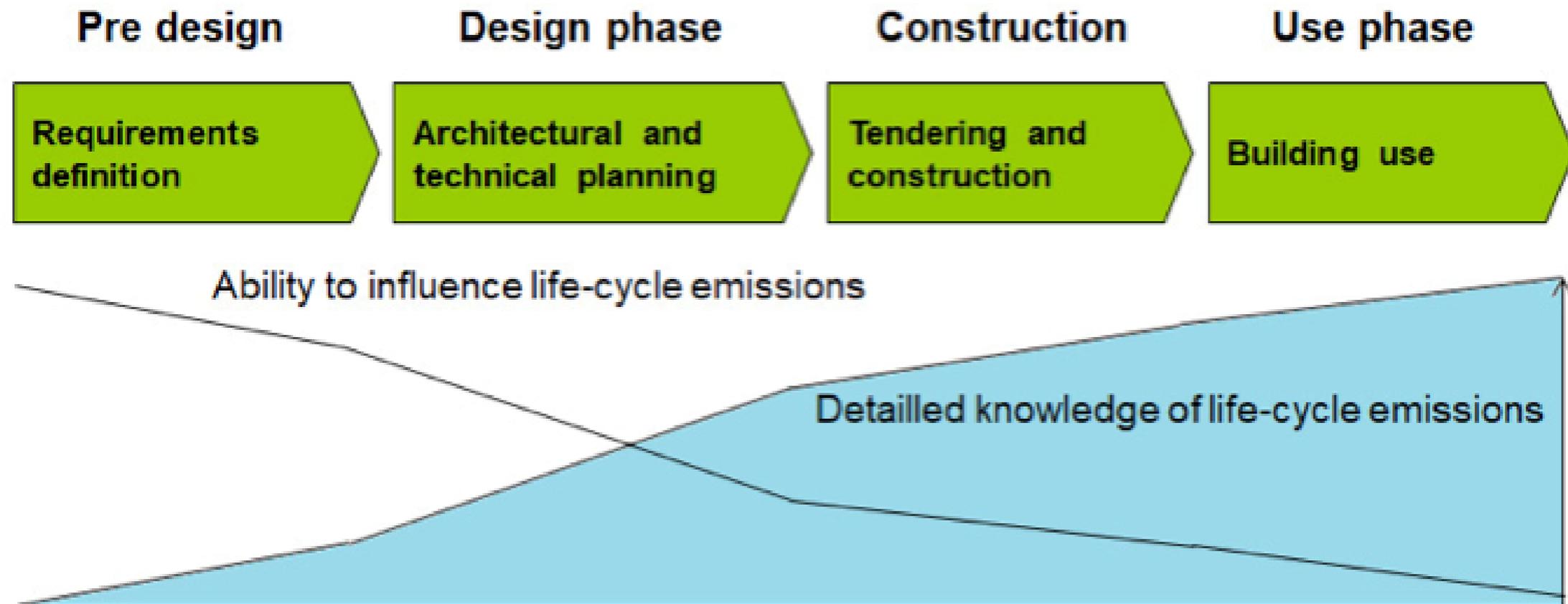


Figure 4. Ability to influence the emissions in different stages of decision making process [28]

Environmental Product Declarations

Environmental Product Declarations (EPDs) are third party–verified documents written in conformance with international standards that report the environmental impacts of a product, including its global warming potential, based on life cycle assessment (LCA) models.

International Standards Organization (ISO) standards identify three types of environmental claims for products:

Type III declarations are preferred for embodied carbon policy because they are third party–verified and contain the greatest amount of “quantified environmental information on the life cycle of a product,” which helps “enable comparisons between products fulfilling the same function” (ISO 14025: 2006).



Environmental Product Declarations

Figure 2. Heatmap of the number of product-specific EPDs by material subcategory and state, showing the top 6 states, and Minnesota at the far right (blue box) for comparison. Darker blue shades correspond to larger numbers of EPDs. Based on data exported from EC3 on October 24, 2021.

Material category	Material subcategory	Grand Total	State/province						MN
			CA	NJ	WA	OR	NY	CO	
Grand Total		55,528	33,872	13,885	2,314	2,297	1,954	981	225
Concrete	Total	55,381	33,780	13,882	2,294	2,282	1,951	968	224
	Ready-mix	51,820	30,832	13,773	2,115	2,062	1,931	904	203
	Flowable fill	1,539	1,329	24	57	66	7	35	21
	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	1
	Rebar-steel	25	7	3	8	3	3	1	
	Cold-formed steel	5	3		2				
	Hot-rolled	1							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			

Feasibility, Costs and Benefits

Feasibility

- Increasing use of EPDs by States and Municipalities
- Clear submission process required for rigor
- Data is improving but uneven for some materials

Costs

- State: Reporting database and staffing
- Material suppliers: Consultant costs for EPDs
- Design/Construction Industry: Time for submissions

Feasibility, Costs and Benefits

Economic Benefits

- Competitive advantage for suppliers and design firms.
- Energy efficiency and process improvements in manufacturing

Environmental Benefits

- State construction could save 295,000 metric tonnes of CO₂e in construction materials
- State construction reductions could affect all construction

Policy Recommendations

Policy Components

- Scope
- Data disclosure
- Compliance
- Standards and Incentives (Optional)

Strategies

- Start simply with short list of high impact materials
- Engage stakeholders
- Align with existing frameworks and tools
- State construction reductions could affect all construction

Next Steps

Establish Goals

- Scope - State funded and renovations
- Other

Stakeholder Process

- Communication and education
- Reduces costs and improves compliance

Policy Design

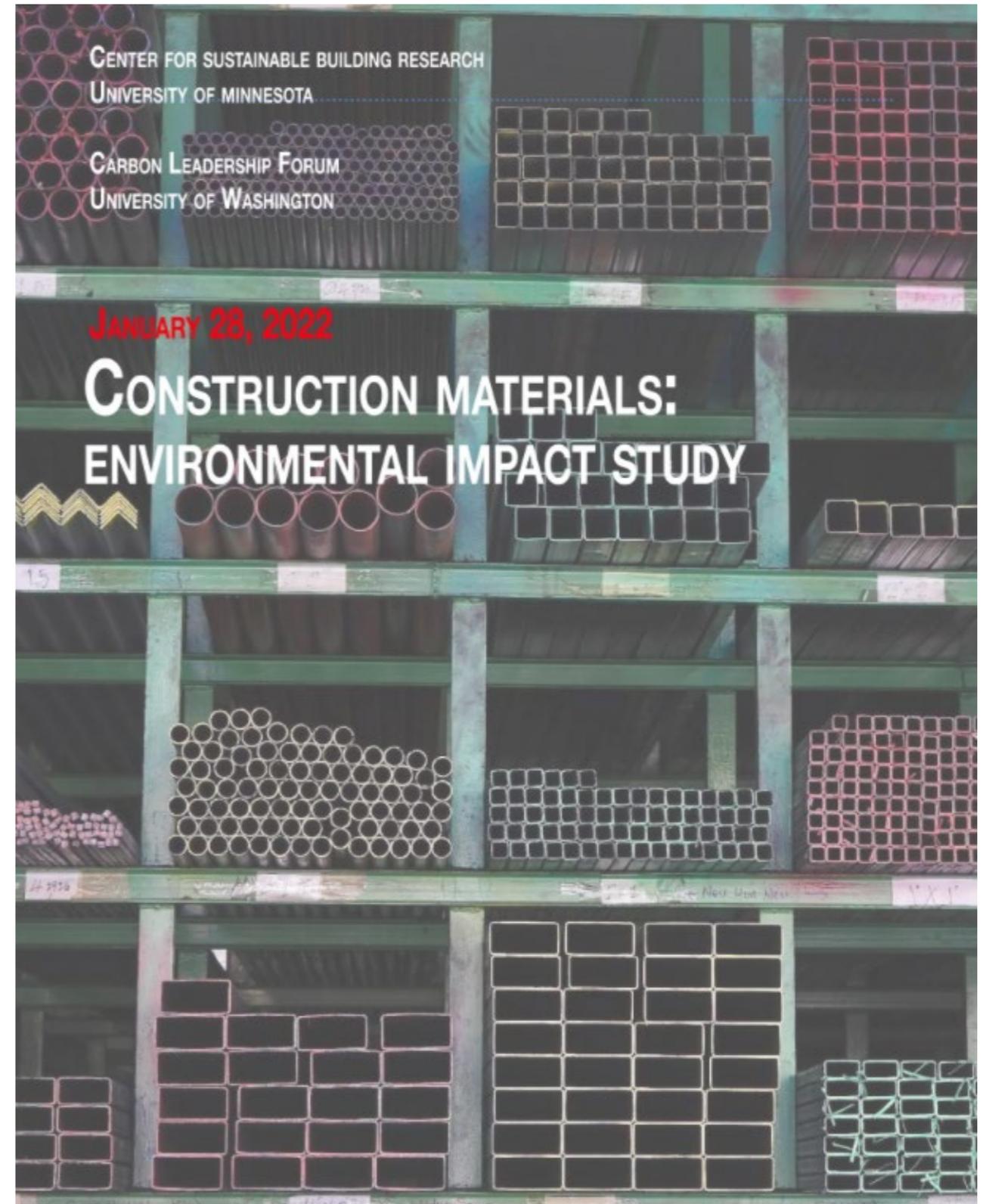
- Scope
- Staffing
- Timeline
- Limits
- Database
- Compliance approach

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