EMBODIED CARBON IN THE BUILT ENVIRONMENT: SESSION 2 – POLICY

June 5, 2019
Network Overview

Communication and knowledge building platform

500 members! from industry, nonprofits, governments, academia
102 members in the Policy Group

Common mission to phase out emissions from buildings and construction materials
ECN Focus Groups

10 Focus Groups

Academic
Buildings
Construction
LCA Data/Tools
Materials
Nodo Hispano
Outreach
Policy
Renewables
Reuse
Series Overview

Research, case studies, strategies to measure and reduce embodied carbon

Six online sessions  Subject matter experts  AIA CE Credits
Webinar Series Disclaimer

This session is provided as part of the Embodied Carbon Network 2019 Webinar Series. We invite guest speakers to share their knowledge and insight on topics related to carbon emissions attributed to building materials. The series aims to introduce topics that lead participants to think and talk about building industry strategies for reducing carbon emissions.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use. Please note the opinions, ideas, or data presented by speakers in this series do not represent members of the Embodied Carbon Network or constitute endorsement by the Network.
Logistics

- 15-minute Q&A session after presentations
- To receive AIA continuing education credit: send your AIA member number to info@embodiedcarbonnetwork.org
- To access past webinar recordings, visit: www.embodiedcarbonnetwork.org/resources
- Save the Date! Upcoming webinar: Session 3 - Renewable Materials – June 21 at 9am PST
Webinar Overview

City Embodied Carbon Policy

Trude Rauken
Deputy Director
Carbon Neutral Cities Alliance (CNCA)

City of Vancouver LCA and Embodied Carbon Policy

Patrick Enright
Green Building Engineer
City of Vancouver

Buy Clean California Updates

Kathryn Phillips
Director
Sierra Club California
Webinar Overview

City of Portland Policies

Jordan Palmeri
Senior Policy Analyst
Oregon Dept. of Envir. Quality

LEED v4.1 WBLCA and CaBGC Zero Carbon

Ryan Zizzo
Founder and Chief Oper. Officer
Mantle
AGENDA

1. Background

2. Meeting Content

3. Next Steps
What is CNCA?

The Carbon Neutral Cities Alliance (CNCA) is a collaboration of leading global cities working to cut greenhouse gas emissions by 80-100% by 2050 or sooner — the most aggressive GHG reduction targets undertaken anywhere by any city. It is possible for cities to achieve their interim carbon reduction targets through incremental improvements to existing systems, but achieving carbon neutrality will require radical, transformative changes to core city systems.

OUR MISSION

CNCA enables leading cities worldwide that are working aggressively toward a zero-carbon future to advance their own transformational efforts, collaborate with each other and key partners to overcome barriers, foster innovative approaches, and share lessons with other cities ready to pursue similar goals.
CNCA Embodied Carbon Work - Background and Timeline

- **September 2018:** CNCA Annual Meeting - EC on the city agendas
- **January 2019:** CNCA Embodied Carbon Working Group
- **March 2019:** Webinar on leading city policies - Oslo and Zürich
- **April 2019:** Webinar on tools and materials
- **April 2019:** Embodied Carbon Meeting at Pocantico, NY
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Meeting Participants

Cities: Boulder, Oslo, Portland, San Francisco, Seattle, Toronto, Vancouver and Zürich

Partners: Embodied Carbon Network, Ecological Building Network, International Living Futures Institute, Architecture 2030, WGBC

Industry: Bionova, Skanska (last minute cancel), Volvo Construction Climate Challenge

Funding Community: Rockefeller Brothers Fund (grantor), Bloomberg Philanthropies, Kresge Foundation
City Needs

- Ideas to address EC earlier in the process
- Technical assistance - tools and calculation
- Materials certification - regulation of these (to be able to reuse)
- Promoting re-use and circularity
- Stakeholder engagement
- Addressing tensions between sustainability office and other departments
- Help with communicating what is achievable
Key Emerging Issues

Policy
That achieves success by 2025
Framework
Roadmap
Zoning

Community/Political Will
Not all need to be involved, but who?
Cost effectiveness

Inventory Accounting
Reliable data
Calculating
MRV

Industry Alignment
PPPs
Policy Outcome Map (Architecture 2030)

OUTCOMES
- Material Reduction
- Waste Reduction
- Emission-Free Construction
- Manufacturing

POLICY OPTIONS (Incentives or Requirements)
- Land Use / Planning
- Deconstruction (Design / Demolition)
- FF-Free Sites / Electrification of Equipment
- Material Bans
- Prescriptive Standards
- System / Material Performance Standards

Whole Building Performance Standards
Breakout Discussions

Session 1
What can we accomplish in the next 2-3 years?
What policy(ies) do we use to get there?
What is the result we want to see in 10 years?

Session 2
Next steps in next 6-24 months to go citywide
Who are the key stakeholders and how do you get them onboard?
What do you need to get this done? (tools, resources, events, folks in the room, etc…)

Vision 2050: One group chose to discuss what it actually would take to get to zero.
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3. Next Steps
Where do the Cities Go from Here?

- Start with picking the low-hanging fruits, immediately
- Learn from current collaboration and connect further with industry
- Look at whole-building targets
- Bi-lateral discussion on targets
- Start working through reference documents
- Connect with cities in their region
- Use other cities’ commitments to push for more ambitious targets
Thank you!

truderauken@carbonneutralcities.org
MATERIALS MATTER
TAKING CARBON OUT OF CONSTRUCTION

CITY OF VANCOUVER | GREENEST CITY

PATRICK ENRIGHT
CITY OF VANCOUVER
WHY DO MATERIALS MATTER?

- WORLD WILL BUILD A NEW NYC, EVERY MONTH, FOR 30 YEARS
- CONSTRUCTION IS 11% OF GLOBAL EMISSIONS
- TIME MATTERS: EMBODIED EMISSIONS HAPPEN TODAY
- WITH ZERO EMISSIONS BUILDINGS, MATERIALS ARE EVERYTHING
OBJECTIVE: LIMIT WARMING TO 1.5°C (-1.2M tonnes)

TECHNICALLY ACHIEVABLE BUT PUSHES THE LIMITS

MIX OF TOOLS AND PARTNERSHIPS
CLIMATE EMERGENCY RESPONSE

6 BIG MOVES

1. WALKABLE CONNECTED COMMUNITIES
2. SAFE AND CONVENIENT ACTIVE TRANSPORTATION + TRANSIT
3. POLLUTION-FREE CARS, TRUCKS + BUSES
4. ZERO EMISSIONS SPACE AND WATER HEATING
5. LOWER CARBON CONSTRUCTION MATERIALS + DESIGNS
6. RESTORED FORESTS + COASTS
LOWER CARBON CONSTRUCTION MATERIALS AND DESIGNS

By 2030, the embodied emissions in new buildings and construction projects will be reduced by 40% compared to a 2018 baseline.
IS 40% POSSIBLE?

- REZONING SUBMISSIONS: ▼ 40% WITH WOOD FRAME
- NRMCA (US) STUDY: ▼ 36% WITH FLY ASH, SLAG
- HIGH-RISE STUDIES: ▼ 25-45% WITH MASS TIMBER
- 2019 HIGH-RISE QUICK STUDY: ▼ 21-47% WITH CONCRETE, DESIGN INNOVATION
OTHER OPPORTUNITIES:

- LOCAL ECONOMY (TIMBER, DESIGN, ETC.)
- MATERIAL RE-USE, CIRCULAR ECONOMY
- AFFORDABILITY OPTIONS IN CONSTRUCTION
- SEISMIC RESILIENCE (REPLACEABLE COMPONENTS)
- HEALTHY MATERIALS & INDOOR ENVIRONMENT
NEXT STEPS:

- STUDY - COSTS AND BARRIERS
- STAKEHOLDER CONSULTATION
- SET TARGET - 2021 REZONING POLICY
- ENABLE TALLER MASS TIMBER IN CODE
Stay informed!
vancouver.ca/
zeroemissions

Let’s talk!
green.buildings
@vancouver.ca
The Buy Clean California Act of 2017

Kathryn Phillips
Director, Sierra Club California
Kathryn.Phillips@sierraclub.org
Buy Clean California Act Basics

- State spends on average $10 billion/year on construction
- Act applies to state agencies
- Implemented by the Department of General Services (DGS)
- Ultimately requires that contractors present environmental product declarations (EPDs) for certain specified products
- Specified products must meet a global warming potential standard set by DGS
- First implementation covers four products; others may be added later
Buy Clean Implementation Dates

- Department of General Services (DGS)
  - AB 262 Implementation Website

- Phase-In Timeline
  - Jan. 1, 2019: awarding authorities to request EPDs for project materials
  - Jan. 1, 2020: awarding authorities to require EPDs for project materials
  - Jan. 1, 2021: DGS to establish Global Warming Potential (GWP) limit
  - July 1, 2021: awarding authorities will require EPDs that are at or below GWP limit
Resources

- Department of General Services (DGS)
  - [AB 262 Implementation Website](#)
- [Buy Clean Website](#)
- [USGBC LA Buy Clean Incentive Page](#)
- [Sierra Club California Buy Clean Page](#)
Embodied Carbon Policies:

BUILT ENVIRONMENT

City of Portland, Oregon

Jordan Palmeri
Oregon Department of Environmental Quality

Embodied Carbon Network
6/5/19
Overview

• Residential Deconstruction Ordinance
• Concrete EPD Purchasing Policy
• Zoning Policy
• Upcoming Policy in Oregon
Residential Deconstruction Ordinance
Deconstruction Policy Timeline

- City Council direction
- Climate Action Plan
- Decon Grants
- Ordinance: Decon Code Language Approved
- Contractor Training
- Decon Ordinance (Requirement) Effective
- Workforce Training

Timeline:
- Feb 2015: City Council direction
- June 2015: Climate Action Plan
- Sep 2015: Decon Grants
- Jul 2016: Ordinance: Decon Code Language Approved
- Oct 2016: Contractor Training
- Mar 2017: Decon Ordinance (Requirement) Effective
- Aug 2017: Workforce Training
Deconstruction Ordinance (July 2016)

Deconstruction required if:

- Detached home or duplex
- The structure was built in 1916 or earlier; or
- The structure is a designated historic resource.

Reliance on Certified Deconstruction Contractors
Demo Permits Pre Ordinance (Year Built)

- 1916 or earlier
- 1917-1926
- 1927-1941
- 1942-1951
- 1952-1978
- 1979-Present

Required to Deconstruct House/Duplex Demolitions:
- Built in 1916 or earlier
- Designated historic

1917-1926: 33%
1927-1941: 22%
1942-1951: 17%
1952-1978: 12%
1979-Present: 2%
Built in 1916 or earlier or Designated historic
Outcomes
Workforce Development
Ordinance-Related Lumber
Research - Salvage lumber in Cross Laminated Timber (CLT)

- Oregon State University
- Salvage lumber from 3 Portland companies
- Strength testing/grading of 2x4s
- Panel assembly with mixes including virgin and MDF
- Panel testing
Deconstruction vs Demolition: Carbon and Energy Evaluation

36 homes in sample

Average age: 112 years old

Average size 1,177 sqft
Average salvage per home

- Dropbox: 73.1% (28,775 pounds)
- Salvage: 26.9% (10,587 pounds)
Average materials salvaged per home

- Softwood lumber: 9,243.1 lbs
- Plywood: 358.0 lbs
- Window (single wood): 119.5 lbs
- Inner door (solid wood): 115.4 lbs
- Steel product: 111.7 lbs
- Hardwood flooring: 109.9 lbs
- Cabinets (lower): 97.3 lbs
- Window (double vinyl): 89.9 lbs
- Outer door (solid wood): 71.7 lbs
- OSB: 71.0 lbs
- Cast iron: 52.8 lbs
- Cabinets (upper long): 36.6 lbs
- Ceramics: 36.1 lbs
- Inner door (hollow wood): 28.0 lbs
- Carpeting: 16.7 lbs
- Light fixture: 14.0 lbs
- Cabinets (upper short): 7.0 lbs
- Fiberglass tub: 3.9 lbs
- Hardwood lumber: 2.9 lbs
- Window (double wood): 1.6 lbs
Average carbon impacts per home

Net Benefit = 1.6 cars off the road for a year for each house
Average carbon impacts per home by activity
Policy impact

Total net carbon savings of policy (~250 homes deconstructed) =

1,900 MT CO2e

offset the construction impacts of a 50,000 sqft commercial building.
Concrete EPD Purchasing Policy
City of Portland Concrete Procurement Policy

- **Jan 1, 2020** - Require concrete EPDs on all City projects
- **April 1, 2021** – City publishes global warming potential threshold
- **Jan 1, 2022** – All EPDs must be below threshold

Policy: https://www.portlandoregon.gov/brfs/article/731696
Response to Comments: https://www.portlandoregon.gov/brfs/article/731698
Why is Portland focusing on concrete purchases?

![Graph showing MT CO2e for building operations, street lighting and traffic signals, vehicle fleet, landfilled waste, and spend analysis.](image)
Impacts of public purchasing

FIGURE 3: TOP 5 NIGP CATEGORIES BY CONTRIBUTION TO SUPPLY CHAIN GHG EMISSIONS

SUSTAINABLE SUPPLY CHAIN ANALYSIS
Executive Summary Report

Prepared by Trucost
OCTOBER 2016
Sustainable Procurement Policy (Dec 2018)

Identifies the use of EPDs as a purchasing tool
Oregon Concrete EPD Program

VOLUNTARY program

http://www.ocapa.net/oregon-concrete-epds
City of Portland Concrete Procurement Policy

- **Jan 1, 2020** - Require EPDs on all City projects
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Policy: https://www.portlandoregon.gov/brfs/article/731696
Response to Comments: https://www.portlandoregon.gov/brfs/article/731698
Zoning Policy
Zoning Code

1. 1,500 SQUARE FEET
   - Typical Older Homes

2. 2,500 SQUARE FEET
   - Proposal Maximum

3. 4,461 SQUARE FEET
   - 2013 Built Maximum

4. 6,750 SQUARE FEET
   - Current Code Maximum

Example: 5,000 square foot lots

City of Portland Residential Infill Project: https://www.portlandoregon.gov/bps/article/657675
Upcoming Policy in Oregon
Oregon Executive Order 17-20

• Signed in November 2017

• Titled – Accelerating Efficiency in Oregon’s Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change

• By 2022 and beyond establish carbon neutral operations of state buildings that considers the embodied carbon of the building materials
We’re hiring soon!

New Position Focus Areas:

• 50% built environment
• 50% reuse / repair / product life extension
• Salary – $60,000 – $86,000
• Location: Portland, OR

Contact Jordan if interested
materials management

conserving resources - protecting the environment - living well

Jordan Palmeri | jordan.palmeri@state.or.us
Embodied Carbon / LCA
In Green Building Standards

Ryan Zizzo
MANTLE

Prepared for: Embodied Carbon Network
Two Key Systems

1) LEED

1) Zero Carbon Building Standard (Canada Green Building Council)
LEED v4

• v4, launched in late 2013 – added a new strategy not seen in previous versions: whole-building life cycle assessment (LCA).

MRc: Building Life-Cycle Impact Reduction

Option 4: Whole-Building Life-Cycle Assessment (3 points)

3 points if at least 10% reduction in embodied carbon (global warming potential) plus two other LCA-based indicators (and no indicator increase above 5%)

+ 1 point if all six indicators are reduced by 10%

+ 1 point for some regional priority zones (in Canada at least)
LEED v4

“How much will this cost?

Will we have to specify different materials?

Are you sure we’ll get the three points?”
**LEED v4.1 (beta)**

- v4.1 beta, launched in December 2018 and added significantly more flexibility.

<table>
<thead>
<tr>
<th>Points Awarded</th>
<th>LEED v4</th>
<th>LEED v4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Invest in performing LCA. Can’t achieve 10% reduction in 3 categories.</td>
<td>N/A</td>
</tr>
<tr>
<td>1</td>
<td>N/A</td>
<td>Invest in performing LCA.</td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
<td>5% reduction in 3 categories</td>
</tr>
<tr>
<td>3</td>
<td>10% reduction in 3 categories.</td>
<td>10% reduction in 3 categories</td>
</tr>
<tr>
<td>4</td>
<td>10% reduction in 6 categories</td>
<td>20% reduction in embodied carbon plus 10% in 2 other categories + incorporate building reuse and/or salvage materials into the project’s structure and enclosure</td>
</tr>
<tr>
<td>5</td>
<td>Regional priority</td>
<td>Regional priority</td>
</tr>
</tbody>
</table>
LEED v4.1 beta

“Let’s try it out!

No matter what the results of the LCA, we can get at least 1 point, and might find some low cost ways to achieve a few more!”
Embodied Carbon in

LEED v4

LEED v4.1 beta
Zero Carbon Building Standard

- Pilot launched in May 2017
- Requires all project teams to calculate and report embodied carbon (prerequisite)
Zero Carbon Building Standard

- Pilot just ended
- New version is currently under development. Planned to launch in fall 2019.
- Major changes to embodied carbon requirement
  - Currently proposed:
    - Embodied carbon must be part of the ‘zero carbon balance’
    - Only new materials need to be included (prioritizes retrofit / reuse)

(pending final approval)
THANK YOU!

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MANTLE
Q&A
Thank you!

Embodied Carbon Network | 2019 Webinar Series

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