Embodied Carbon & Deconstruction & Reuse Policies
Overview

This Presentation
1. Reuse & Embodied Carbon
2. Policy Opportunities
3. Case Studies
4. Development Process and Stakeholders

Policy Introductory Series
1. Introduction to the Embodied Carbon Policy Landscape
2. Climate Action Plans
3. Procurement Policy
4. Building Codes
5. City Zoning and Incentive Programs
6. Reuse and Deconstruction

Thanks to the CLF Regional Hub Policy Leads for feedback and review of this series.
Matching Policy Opportunities with Embodied Carbon Reduction Strategies

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**STRATEGIES**
- Build less, reuse more
- Design to reduce embodied carbon and increase material/structural efficiency
- Choose low-carbon systems and assemblies
- Use alternate, low-carbon materials
- Select the lowest carbon version of the selected product
- Clean manufacturing (efficiency, fuel switching)

**TOOLS**
- Early Design Calculators, Rules of Thumb
- Whole Building Life Cycle Assessment (WBLCA)
- Environmental Product Declaration (EPDs) / EC3 Tool

**POLICY MEASURES**
- Reuse & Deconstruction
- Zoning and City Incentive Programs
- Procurement (Buy Clean)
- Building Codes and Regulations
- Climate Action Plans
Reuse & Embodied Carbon
Why Reuse?

Product Stage (A1-A3)  Construction (A4-A5)  Use (B)  End-of-life (C)
Why Reuse?

Fewer New Materials
Why Reuse?

Fewer New Materials + Less Waste
Different Types of Actions

- **Building reuse**: (‘adaptive’ reuse) of an entire building or a portion (structure/envelope)
- **Material/product reuse**: (reuse of individual salvaged/surplus materials)
- **Deconstruction / Salvage**: the systematic dismantling of a structure that prioritizes salvage of materials for reuse, enabling future material reuse (‘buildings as material banks’)
- **Design for disassembly**: design of buildings to facilitate future change and the eventual dismantlement (in part or whole) for recovery of systems, components and materials
- **Government led programs** to support for market development
- **Investment in** existing communities, historic buildings, high priority development areas
- **Links to economic development, local economy**: jobs and businesses, Zero Waste principles

Source: Andrew Ellsworth, All for Reuse
Calculating the Embodied Carbon Benefits of Reuse

Select Tools

- WBLCA tools (Tally, OneClickLCA, etc.) can exclude A1-A3 GWP for reused components
- **C.A.R.E. Tool (in development)** to quantify the trade-offs between retrofit and new build (includes operational energy tradeoffs) [www.znccollaboration.org/care](http://www.znccollaboration.org/care)

Salvage/Deconstruction:

- **Example**: Deconstruction vs. Demolition: An evaluation of carbon and energy impacts from deconstructed homes in the City of Portland (Nunes, Palmeri, and Love 2019)

Source: Carbon Avoided: the Retrofit Calculator (C.A.R.E.)
Deconstruction and Workforce Development

Job Creation

- Increased demand for repair and reuse workers
  - Requires more skilled contractors than demolition
- Jobs in deconstruction and removing materials
- Also in: transportation, storage, refurbishing, and reselling of materials
Deconstruction and Workforce Development

New markets, reuse warehouses, local community hubs

- Connect with others
- Provide training on refurbishing/reuse
- Sales of salvaged materials

Source: Cincinnati Refined, 2022
Policy Opportunities to Influence Reuse
Opportunities for Policy and Government-led Programs

Site Selection & Building Design

- Choosing an existing building to re-use or add on-to, rather than tearing down and building new, sufficiency measures

Related Policy Precedent: Los Angeles Adaptive Reuse Ordinance
Opportunities for Policy and Government-led Programs

**Site Selection & Building Design**
- Choosing an existing building to re-use or add on-to, rather than tearing down and building new, sufficiency measures

**Material Selection and Construction Details**
- Specifying existing/salvaged materials and material longevity
- Using design for disassembly principles

*Related Precedent:* [LEEDv4 BD+C](https://leedbuildings.org) Credits: Building Life-Cycle Impact Reduction (Option 3) or Sourcing of Raw Materials (Option 2) Credits
Opportunities for Policy and Government-led Programs

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Deconstruction & On-site construction waste diversion
- Deconstruction and salvage (rather than demolition)
- Landfill diversion of surplus materials/construction waste

Related Policy: Portland Deconstruction of Buildings Law; Palo Alto Deconstruction Ordinance
Opportunities for Policy and Government-led Programs

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Material Reuse Markets and Storage
- Warehouses for material storage between uses
- Online platforms to enable designers and contractors to identify available materials

Related Precedents: Houston Reuse Warehouse; Rheaply
Tracking the Growing Reuse Policy/Resource Ecosystem

Check out the All for Reuse Ecosystem Map Here: https://www.allforreuse.org/ecosystem-map
Policy Precedents Building Reuse

Case Study: Los Angeles Adaptive Reuse Ordinance

Development incentives for adaptive reuse:

- Mezzanines
- Density bonuses
- Reduction in off-street parking requirements
- Other regulatory exemptions
Policy Precedents **Building Reuse**

Case Study: **City of Vancouver (B.C.) Green Building Rezoning Requirement**
- Requires % reductions from a baseline (as verified by a WBLCA)
- Reuse can contribute to meeting % reduction

Case Study: **City of Vancouver’s (B.C.) Empty Homes Tax**
- Encourages empty and underutilized properties to get back on the rental market
Case Study: Portland Deconstruction of Buildings Law

As of 2020, all single-dwelling structures (houses and duplexes) in all zones must be fully deconstructed as opposed to mechanically demolished if:

- The structure was built in 1940 or earlier; or
- The structure is designated as a historic resource

Projects must use a city-published list of Certified Deconstruction Contractors to perform the deconstruction work.

Figure 5: Quantity of materials salvaged from an average home

Source: Oregon DEQ Materials Management, “Deconstruction and Demolition” Study
Policy Precedents **Deconstruction and Salvage**

**EU Taxonomy Regulation** *(draft criteria)*
Prevents or reduces waste generation
- Including waste from extraction of minerals and construction and demolition of buildings

**EU Construction Products Regulation** *(proposal)*
Create a harmonised framework to assess and communicate environmental and climate performance of construction products
- New product requirements will ensure that the design and manufacture of construction products is based on state of the art to make these more durable, repairable, recyclable, easier to re-manufacture.
- Establish a construction products database and a Digital Products Passport to reduce admin burdens
Policy Precedents **Material Reuse Markets and Storage**

**Case Study: Massachusetts DEEP RecyclingWorks Blog**

Guidance on how to develop a reuse plan, (timeline and budget), taking inventory, and identifying potential reuse outlets.

**Case Study: Houston, TX REuse Warehouse**

City-run warehouse that provides space for excess building materials

- Accepts material from individuals, supply companies, and builders.
- Freely available for reuse by any non-profit organization.

Additional related precedents: [Pennsylvania Recycling Market Center Incubator](#)
Policy Precedents Byproducts into Materials Manufacturing

Case Study: **Colorado Circular Economy Development Center**

Establishes a Center which:

- Works with processors and manufacturers in the state to increase use of recycled content inputs
- Facilitates connections among recyclers, transporters, municipalities, higher education, etc.

Case Study: **Washington Materials Marketplace**

Free online marketplace developed by Department of Ecology

- Connects businesses, organizations, and entrepreneurs to develop and scale reuse and recycling market opportunities
- Supports BIPOC- and women-owned businesses
Development Process and Stakeholders
Before embarking on an ordinance, understand local conditions:

- Public support?
- Local markets to absorb materials?
- Are demolitions publicly funded or privately funded?
- Are property values high or are property values depressed?
- Are there a large number of blighted/condemned properties in your city?
- Can private deconstructions use tax deductions to offset the additional costs?
- Plan to train labor force how to deconstruct?

- Data management
  - What information is already tracked or available to the city agencies?
  - What existing processes are used to gather information or approve projects and act as gates or bottlenecks?
Takeaways

Extending the life of a material or building avoids extraction and manufacturing emissions from creating a new one, saving embodied carbon

Policy instruments:
- Building Reuse
- Deconstruction and Salvage
- Material Reuse Markets and Storage
- Byproducts into Materials Manufacturing

Benefits:
- Environmental
- Economic
- Social
Thank you!
Policy Advantages and Co-benefits

- Avoid carbon emissions from manufacturing new materials for new construction.
- Reduce the environmental damage and community health impacts from landfilling construction materials after demolition.
- Avoid environmental damage from new construction on greenfield (i.e., previously undeveloped) sites by encouraging preservation and increased density in historic portions of cities.
- Preserve cultural resources and heritage, providing economic and social co-benefits.
- Reduce local noise and pollution from demolition activities (depending on the scope of adaptive reuse).
- Provide an opportunity for energy retrofits of outdated, inefficient, and high-emission MEP systems.
Goals

▪ Avoiding embodied carbon from new materials
▪ Reduce local environmental and health impacts from construction waste
▪ Support new markets and jobs related to deconstruction and material reuse
▪ Support circular economy through design for disassembly and adaptability

+ Update policies that unintentionally prevent building/material reuse
Policy Precedents Material Reuse Markets and Storage

Case Study: San Francisco, CA Climate Action Plan

By 2025, create policy framework to expand and cultivate regional building material reuse markets
- Support workforce development
- Small businesses
- Entrepreneurial innovation

Case Study: Oakland Climate Action Plan

Actions to encourage reuse of building materials and establish physical spaces for repair economies.