MINNESOTA POLLUTION CONTROL AGENCY

Sustainable Building Material Management

Melissa Wenzel, Built Environment Sustainability Administrator

January 25, 2023

Built Environment Impact

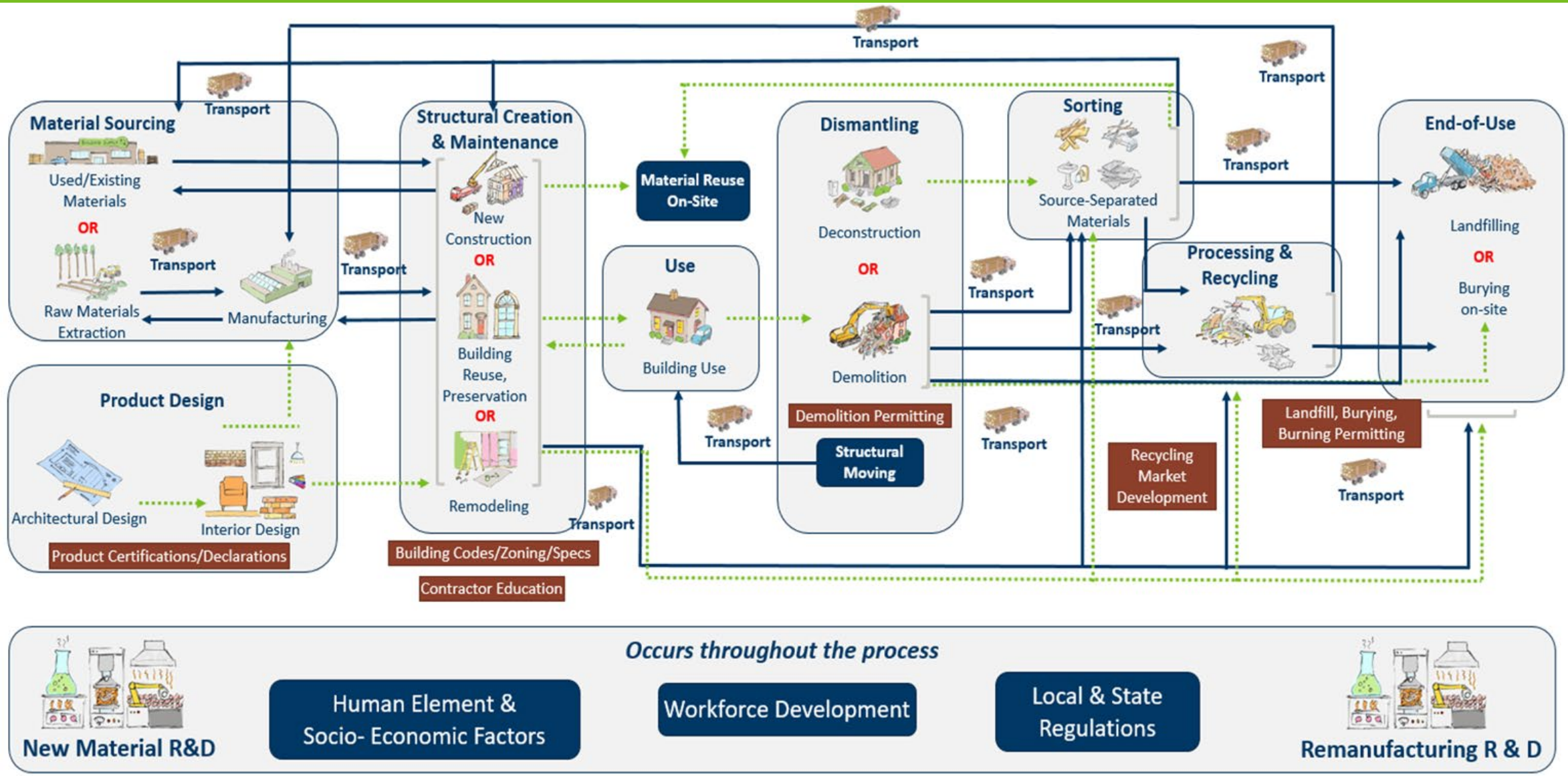
- EPA estimates that 600 million tons of C&D debris were generated in the United States in 2018, which is **more than twice** the amount of generated MSW
- A third of existing buildings will be demolished by 2050. *Architecture 2030*

Why is there so much C&D waste?

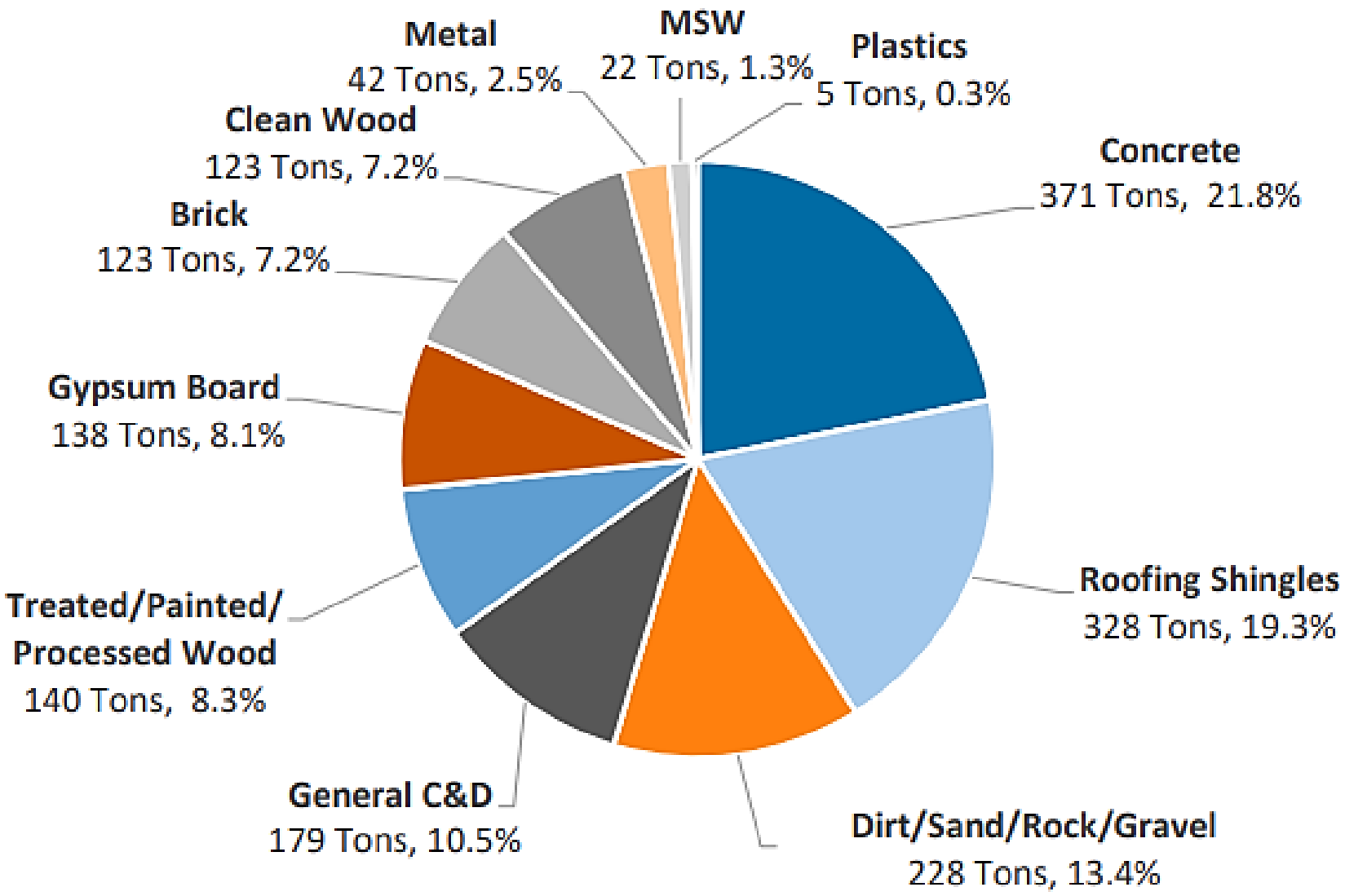
- Redevelopment!
  - Residential and commercial
  - 90% of C&D waste is from demolitions
- C & D waste is big and bulky.
- Some markets for C&D materials are challenging and/or haven't been developed (example: carpet and drywall).

Source: Mpls St. Paul Magazine

Building material management system

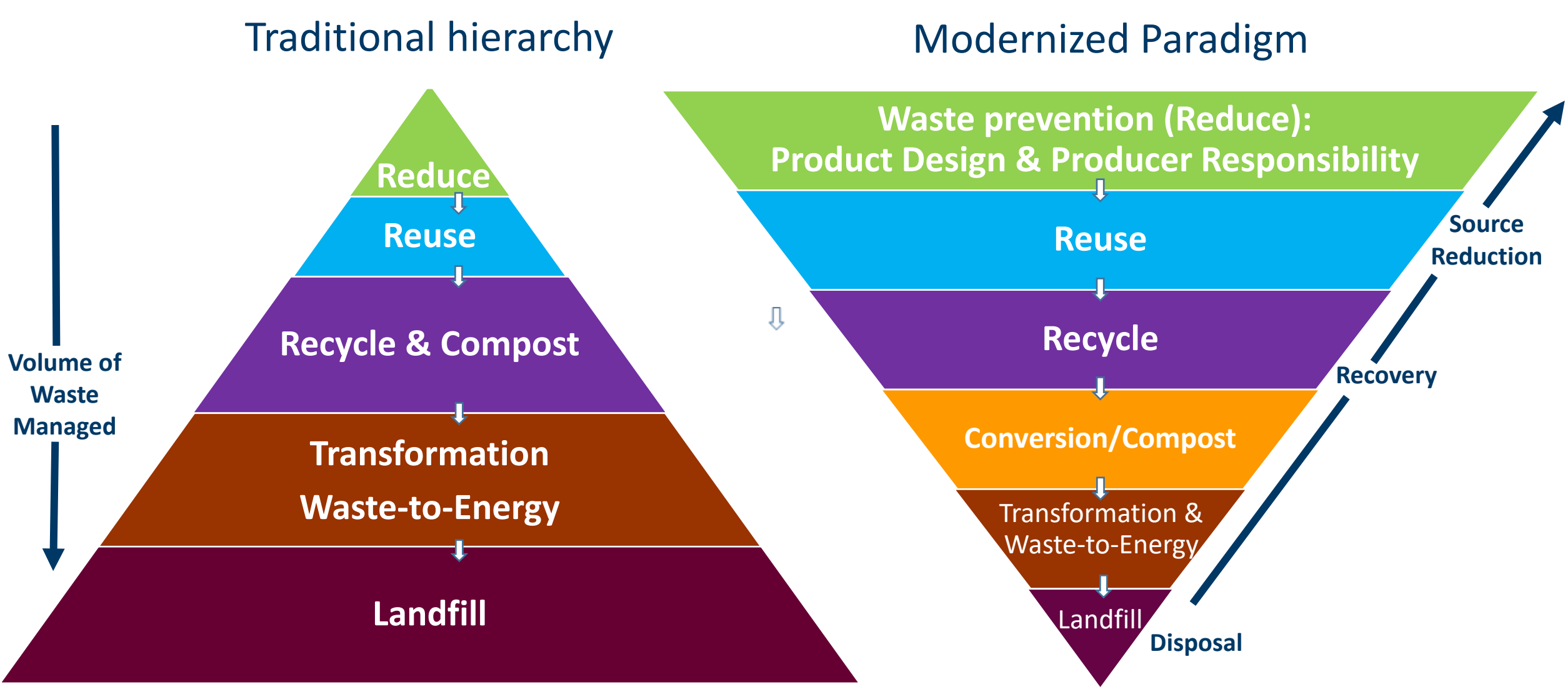


C & D Material Composition Study, 2019



Building Demolition

Material Management Hierarchy



Quick history of deconstruction and reuse

- For all of history we deconstructed.
- Demo became the standard only after WW2.
- Architectural salvage continued for high value materials.
- Reuse languished. Until reuse centers and deconstruction activities restarted in the 90’s.
- Reuse is making a comeback

Historical building materials

Pre-war era buildings (built between 1890 - 1940) tend to have high-value, unique fixtures such as hardwood floors, molding, and built-ins.

Old growth vs. new growth lumber

- Old growth lumber comes from trees grown naturally in virgin forests grown 100+ years.
- Most old growth forest harvesting took place in the U.S. between 1870 - 1940.
- Older trees have more tree rings, which makes wood more durable and less susceptible to rot/damage.

Source: Hull Millwork

Salvage with remodeling & deconstruction

- Also known as salvaging, where high-value materials such as hardwood floors, doors and windows, lighting fixtures, cabinets and other finished materials are selectively reclaimed.
- Focus on historically significant items.
- Great option when full deconstruction may not be feasible.
- Opportunities to donate, sell, or give away materials to local organizations or retailers or incorporate materials back into project.

Deconstruction example

reusehawaii.org/benefits

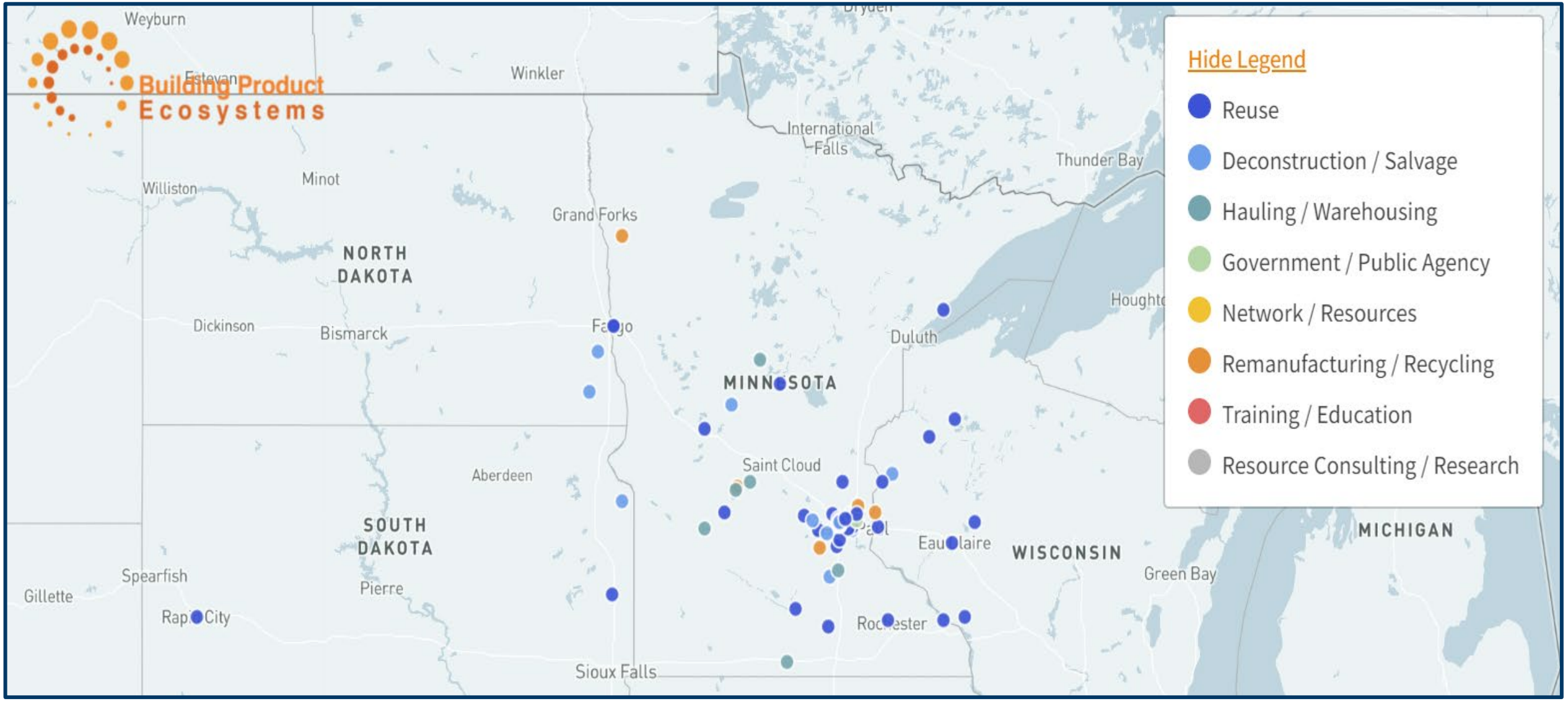
REGIONAL REUSE RESOURCES | MAP + MATRIX


Photo by NYCitySlab


Photo by NYCitySlab

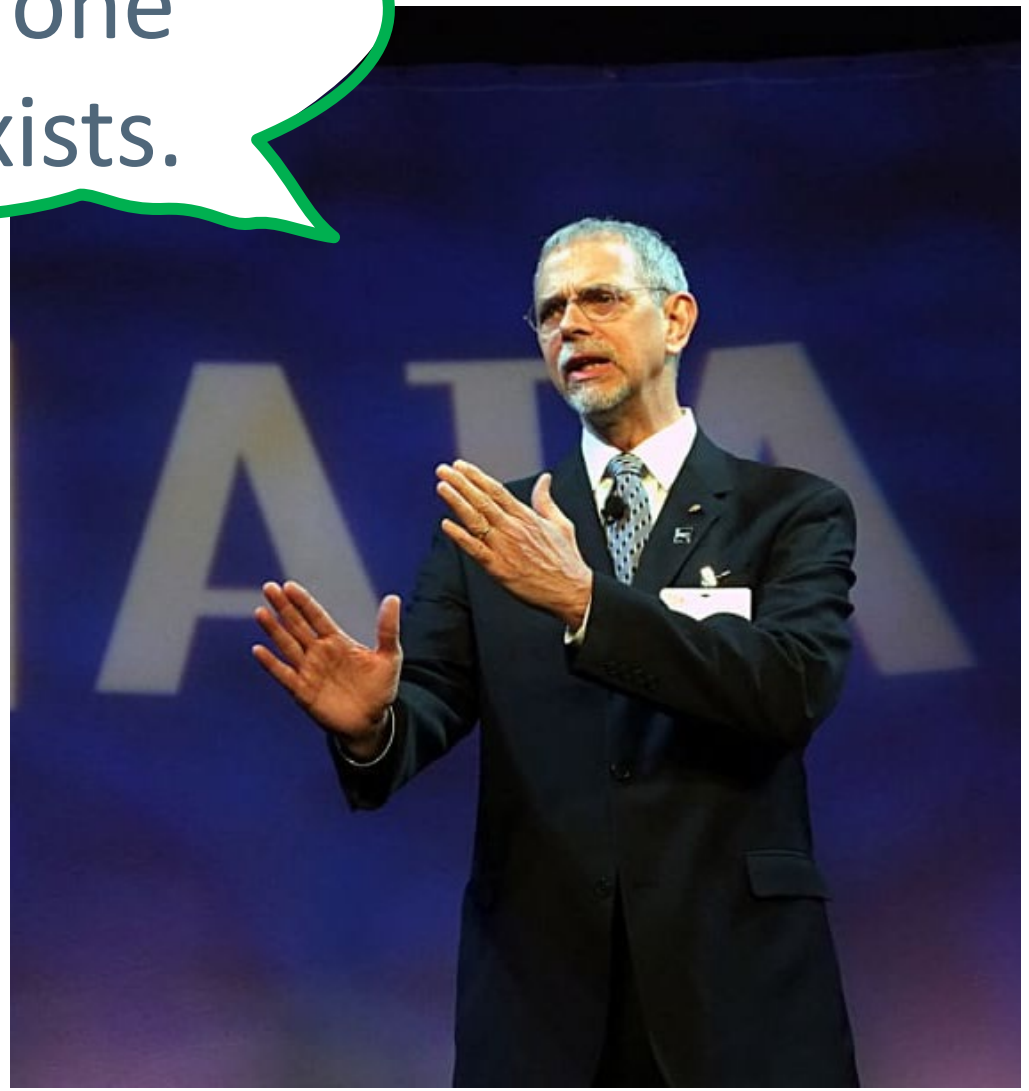

Photo by Perks Deconstruction

Reuse Resources Map



Building preservation, renovation, and reuse

The greenest building is the one that already exists.



Carl Elefante

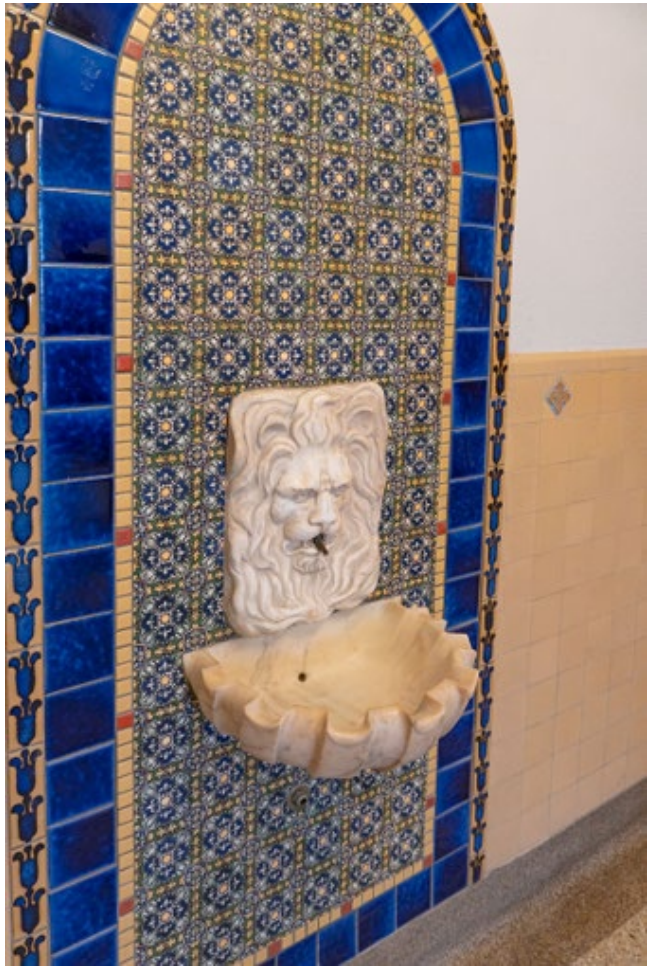
Former president of the American Institute of Architects

Adaptive reuse

South St. Paul bank turned apartment building

Old school, new housing: Carlton Lofts

Central Square Historic Apartments, Winona

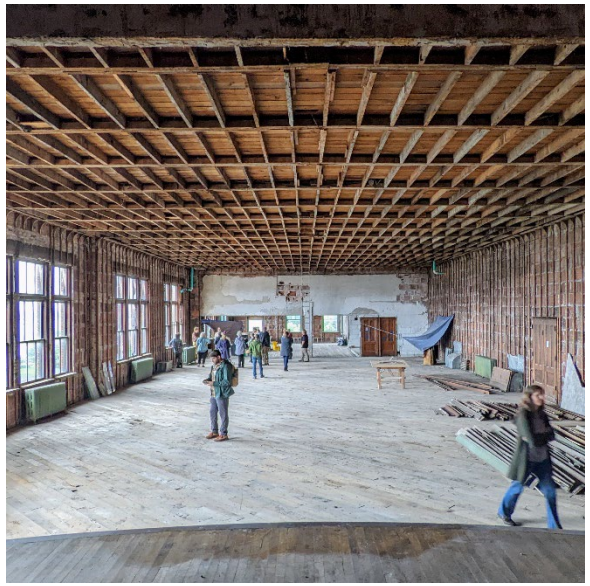


From old bank to new Children's Museum *St. Cloud*

St Louis County Jail, *Duluth*

Duluth Armory

Duluth Armory

The Historic Duluth Armory was built in 1915 and served the military and community of Duluth for decades. The renovated Armory will honor that history and once again serve as a center of the community.

dulutharmory.org

Endion School Apartments, ***Duluth***

By McGhiever - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=73359070

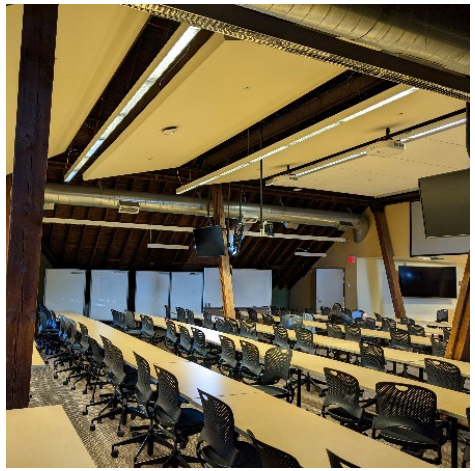
Northrop Hall: A renovation success story

Building material management study

U of MN Ben Pomeroy Student-Alumni Learning Center

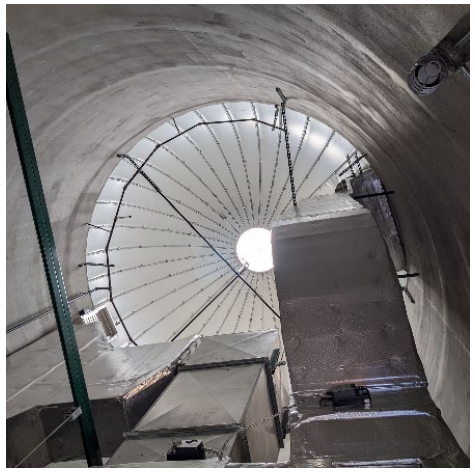
Ben Pomeroy Student-Alumni Learning Center

Renovated entrance



Renovated classroom with original building materials

Old grain silo…

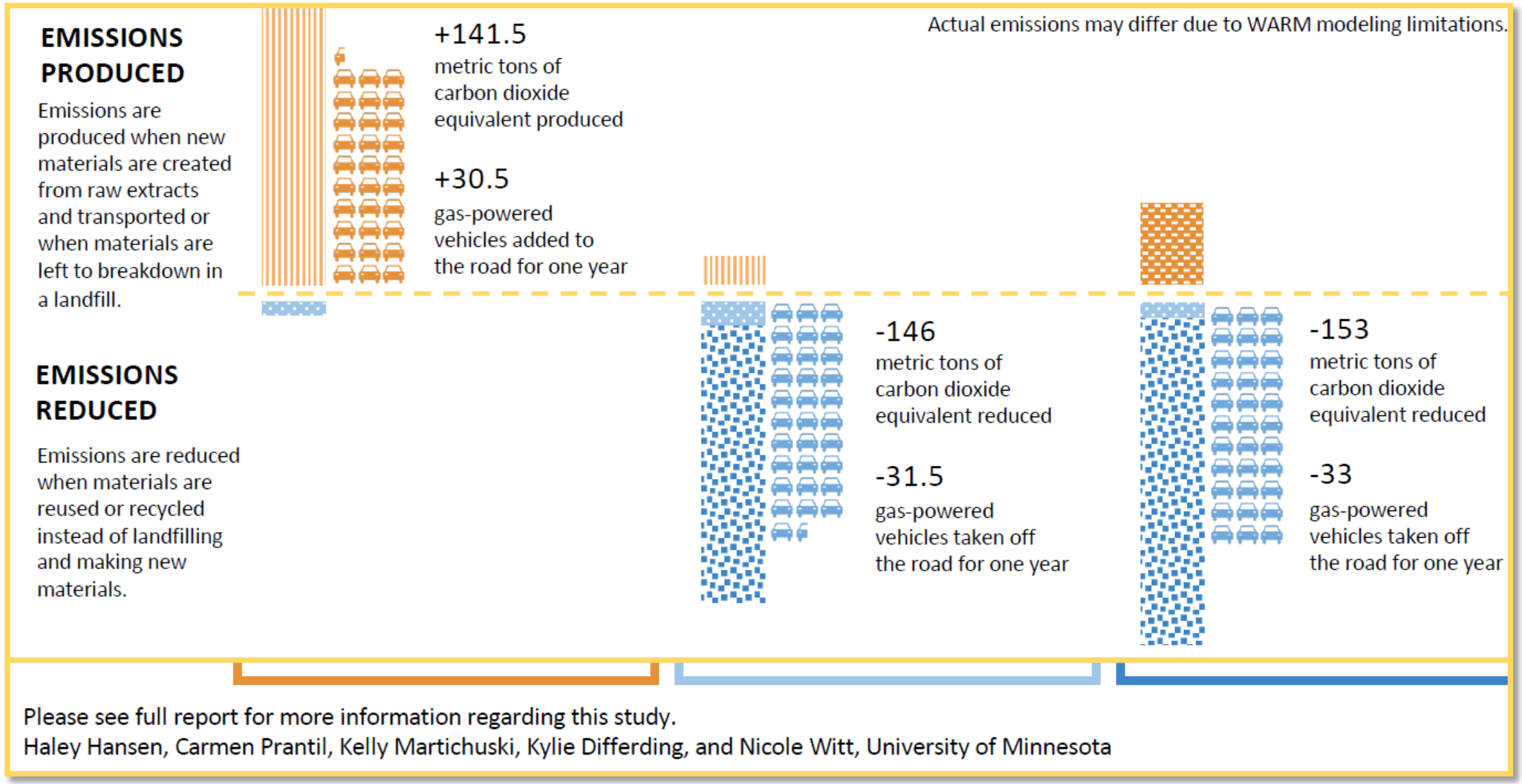


…new HVAC storage room!

2022 Capstone project: results

	Demolition	Deconstruction	Renovation
	Razing a building in such a way that the building components are not intended for reuse *Does not include a new building due to variability of design choices	Disassembling buildings with the goal of maximizing the reuse potential of its components *Does not include a new building due to variability of design choices	Returning a building to an unimpaired or improved state
MATERIAL END USE	 9% of materials diverted from landfill	 74% of materials diverted from landfill	 50% of materials diverted from landfill
	COST **$115,000***	COST **$206,000***	COST **$7,100,000**
	TIME **7.5 weeks***	TIME **15.5 weeks***	TIME **104 weeks**
	Additional costs must be added if the construction of a new building is considered.	Additional costs must be added if the construction of a new building is considered.	The construction of a new building is not needed.
	LEVEL OF SAFETY CONCERN PUBLIC **HIGH** WORKER **HIGH**	LEVEL OF SAFETY CONCERN PUBLIC **HIGH** WORKER **HIGH**	LEVEL OF SAFETY CONCERN PUBLIC **LOW** WORKER **HIGH**

2022 Capstone project: results



A similar study: Cornell University

Cornell study compares demolition vs. deconstruction

Although demolition appears to be the more economical option now, a Cornell professor believes deconstruction might be the better method after practices are fine-tuned and environmental benefits are considered.

Earlier this year, crews removed roofing, flooring and walls in a project that's part of a Cornell University study comparing deconstruction and demolition.

This year's "Built Environment" project

Study holistic costs and impacts between removing old & build new building, or renovate an existing building

Build new, state-of-the-art LEED certified building?

Or renovate existing building to be a state-of-the-art LEED certified building?

Photo credits: BWBR and MOCA Systems

Support: US Green Building Council

Brent Suski

Associate Director

US Green Building Council, Inc. - Minnesota Community

MINNEAPOLIS, Minnesota

LEED GREEN ASSOCIATE

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Brent joined USGBC in October 2016 and serves the Minnesota Community, and West North Central Region as an Associate Director. In this role, he is responsible for advancing LEED, and supporting sustainable, healthy, resilient, and equitable buildings. Additionally, he cultivates members and sponsors, which includes planning and overseeing events and programs, identifying new fundraising strategies, recruiting volunteers, and supporting social and environmental justice projects. After college, Brent served a year as an AmeriCorps Member. He holds a Masters of Architecture degree with concentrations in Urban and Public Design from the University of Minnesota and a Bachelor of Arts from Gustavus Adolphus College. Brent holds a LEED Green Associate and a TRUE Advisor credential.

Support system

Madelyn (Mady) Gulon:

- Graduate Research Assistant, School of Architecture, University of Minnesota
- Master of Architecture
- Master of Science in Research Practices
- Research & Architecture Intern, Perkins&Will

Alex Velsink:

- Masters of Natural Resource Management Student
- Natural Resources Institute University of Manitoba

Kimberly Sandbulte

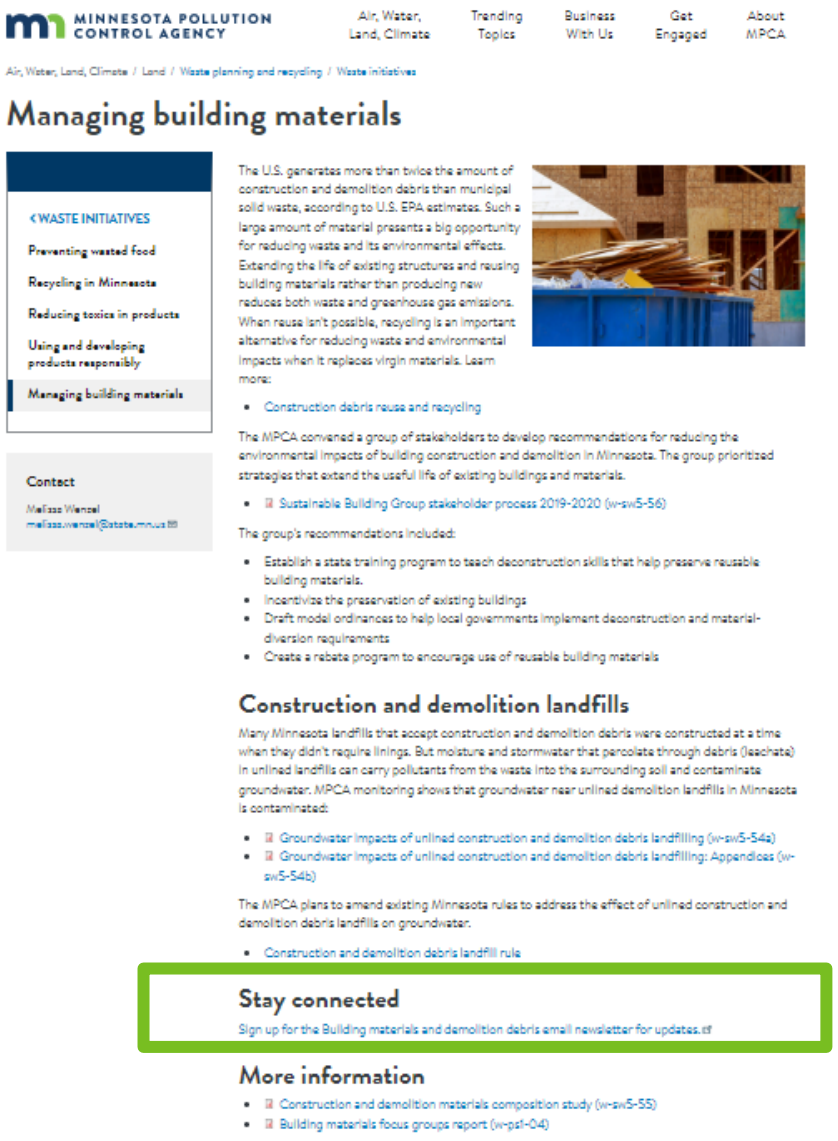
- Director
- Architect

Kimberly Sandbulte

Director

"Building reuse is not only important for heritage preservation but is key to reducing the environment impact of the built industry."

Want to receive updates?



MINNESOTA POLLUTION CONTROL AGENCY

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Air, Water, Land, Climate / Land / Waste planning and recycling / Waste initiatives

Managing building materials

‹ WASTE INITIATIVES

- Preventing wasted food
- Recycling in Minnesota
- Reducing toxics in products
- Using and developing products responsibly
- Managing building materials

Contact

Melissa Wenzel

The U.S. generates more than twice the amount of construction and demolition debris than municipal solid waste, according to U.S. EPA estimates. Such a large amount of material presents a big opportunity for reducing waste and its environmental effects. Extending the life of existing structures and reusing building materials rather than producing new reduces both waste and greenhouse gas emissions. When reuse isn't possible, recycling is an important alternative for reducing waste and environmental impacts when it replaces virgin materials. Learn more:

- Construction debris reuse and recycling

The MPCA convened a group of stakeholders to develop recommendations for reducing the environmental impacts of building construction and demolition in Minnesota. The group prioritized strategies that extend the useful life of existing buildings and materials.

- Sustainable Building Group stakeholder process 2019-2020 (w-sw5-56)

The group's recommendations included:

- Establish a state training program to teach deconstruction skills that help preserve reusable building materials.
- Incentivize the preservation of existing buildings
- Draft model ordinances to help local governments implement deconstruction and material-diversion requirements
- Create a rebate program to encourage use of reusable building materials

Construction and demolition landfills

Many Minnesota landfills that accept construction and demolition debris were constructed at a time when they didn't require linings. But moisture and stormwater that percolate through debris (leachate) in unlined landfills can carry pollutants from the waste into the surrounding soil and contaminate groundwater. MPCA monitoring shows that groundwater near unlined demolition landfills in Minnesota is contaminated:

- Groundwater impacts of unlined construction and demolition debris landfilling (w-sw5-54a)
- Groundwater impacts of unlined construction and demolition debris landfilling: Appendices (w-sw5-54b)

The MPCA plans to amend existing Minnesota rules to address the effect of unlined construction and demolition debris landfills on groundwater.

- Construction and demolition debris landfill rule

Stay connected

Sign up for the Building materials and demolition debris email newsletter for updates.

More information

- Construction and demolition materials composition study (w-sw5-55)
- Building materials focus groups report (w-ps1-04)

www.pca.state.mn.us/air-water-land-climate/managing-building-materials

Stay connected

Sign up for the Building materials and demolition debris email newsletter for updates.

Thank you!

Melissa Wenzel

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