Sustainable Building Material Management

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Built Environment impact

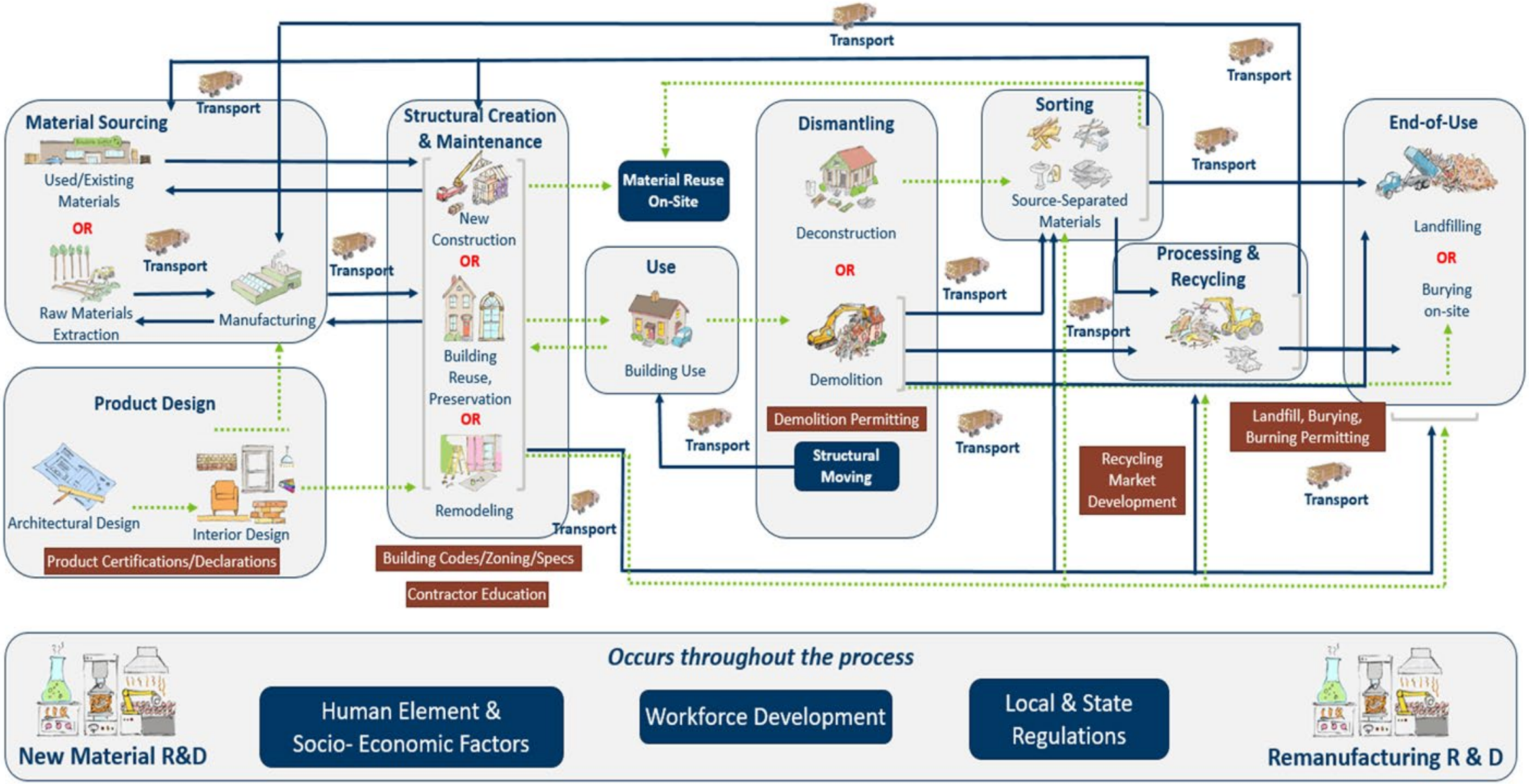
- EPA estimates that 600 million tons of C&D debris were generated in the United States in 2018, which is **more than twice** the amount of generated MSW
- A third of existing buildings will be demolished by 2050. *Architecture 2030*

Why is there so much C&D waste?

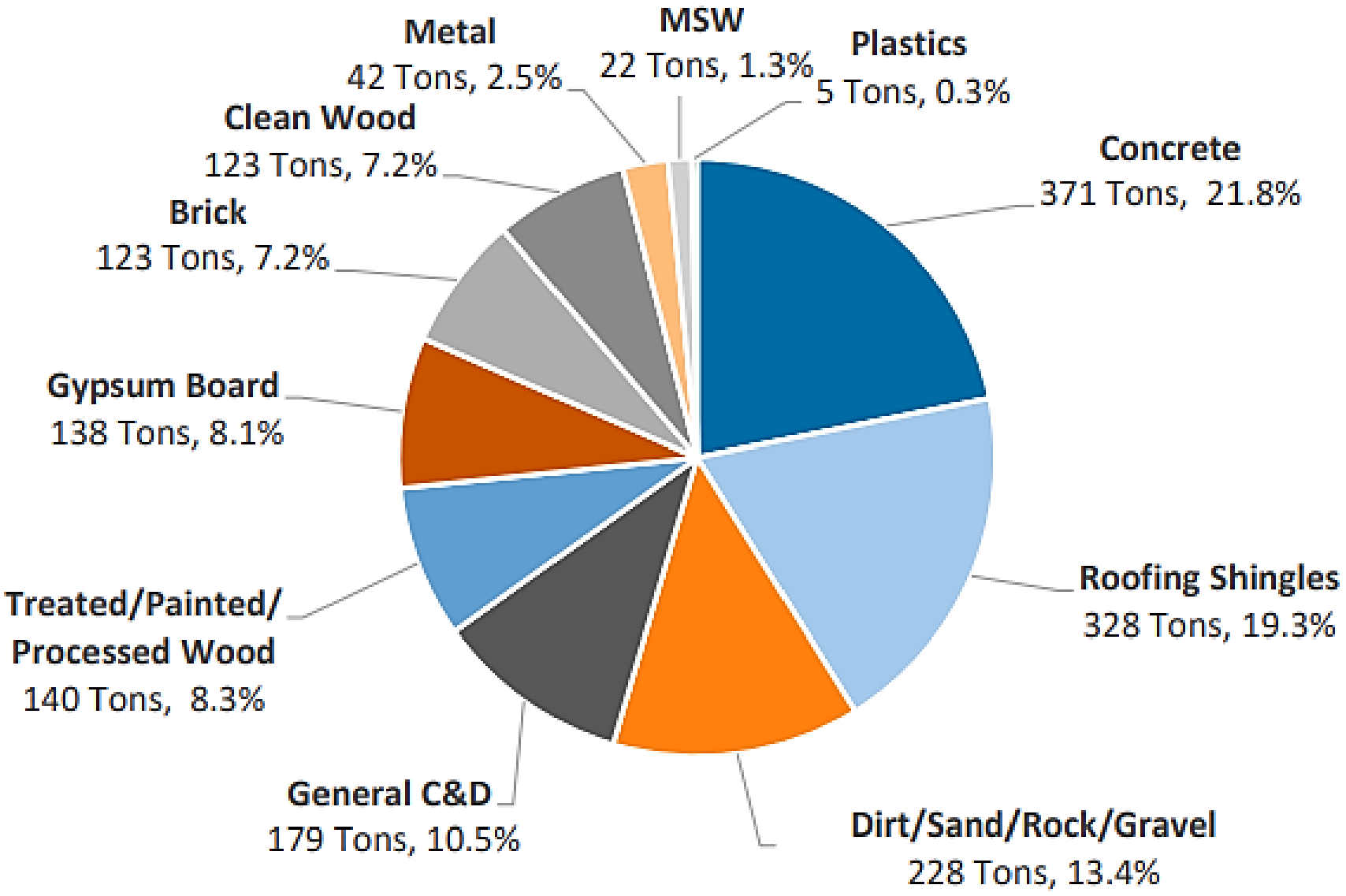
- Redevelopment!
  - Residential and commercial
  - 90% of C&D waste is from demolitions
- C&D waste is big and bulky.
- Some markets for C&D materials are challenging and/or haven't been developed (example: carpet and drywall).

Source: Mpls St. Paul Magazine

Building material management system



2019 C&D landfill material study



Building demolition

MPCA Strategic Plan: Land

Solid waste is managed to conserve materials, resources, and energy

Prevent and reduce risks from unlined construction and demolition landfills

Current plan charts the agency's direction and reflects insight gathered from external stakeholders and thoughtful internal review

Built environment terms

Most environmentally preferred

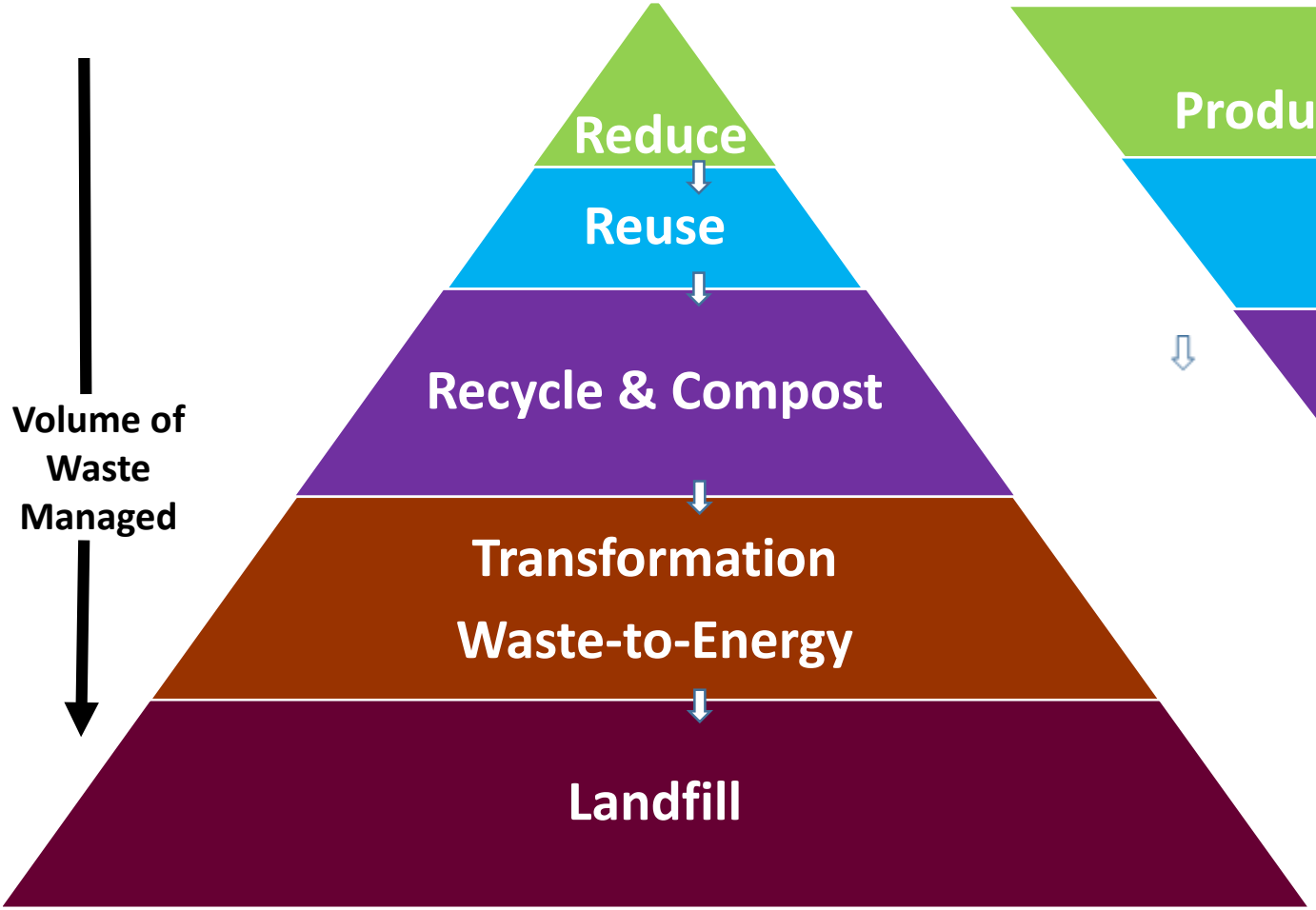
- **Reduce:** preventing waste in the first place is the first and most impactful step to take in managing waste *(example: preserving and rehabilitating an existing home instead of tearing it down to build a new one)*.

- **Reuse:** reuse means finding ways to put existing materials back to their intended use and using things over and over again *(example: removing wood floors during a remodel and installing them for use in a different property).*

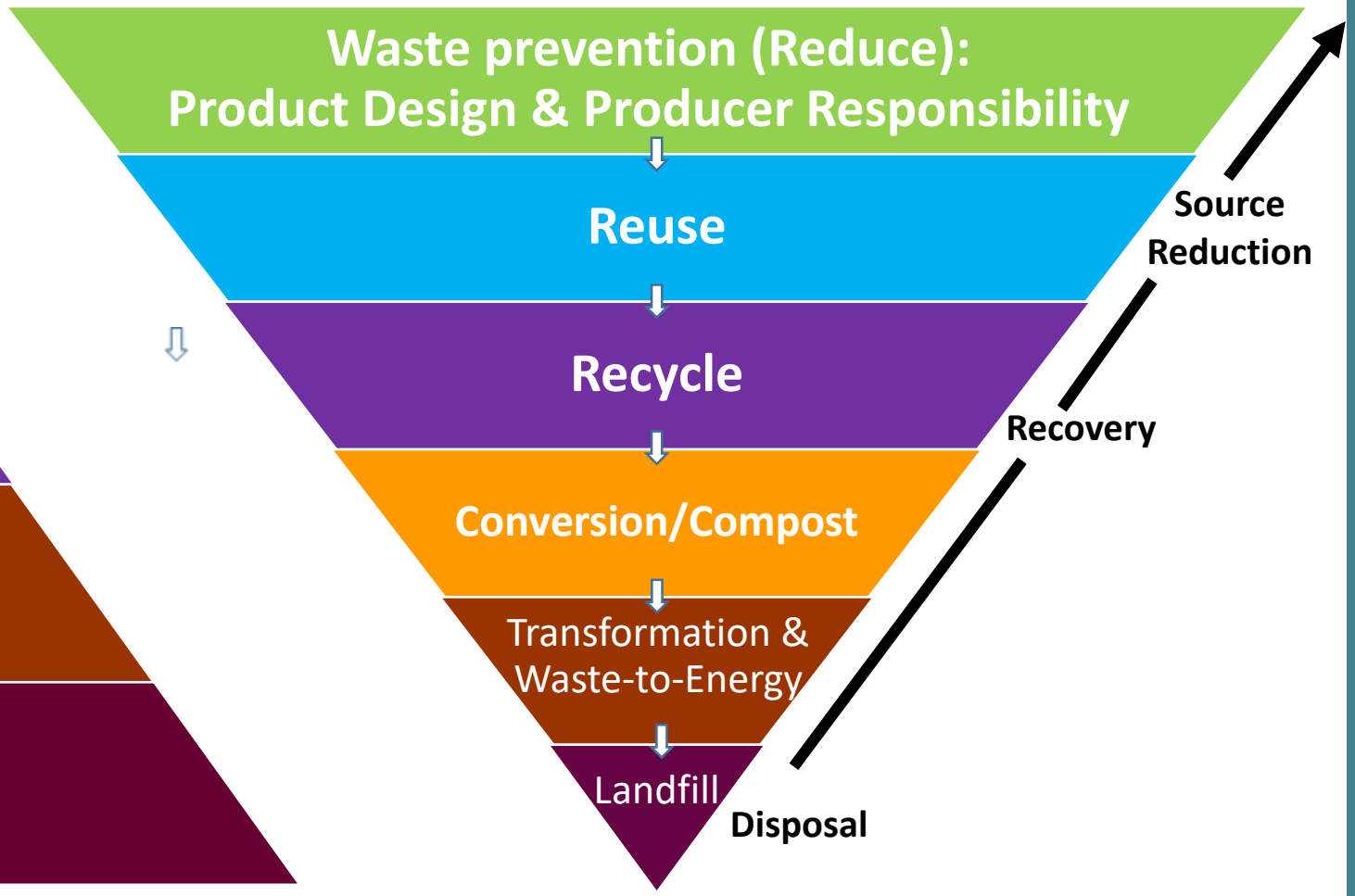
- **Recycling:** refers to systems that collect, separate, process and market materials from the waste stream so they can be manufactured into new products *(example: recycling structural lumber from a demolition project and turning it into wood chips)*.

Material Management Hierarchy

Traditional Waste Hierarchy



New Waste Management Paradigm



Terms continued

- **Embodied emissions:** 
  - Initial emissions from the construction and materials used in a building *(example: energy used to produce metal and concrete to construct a building)*.
  - Locked in place as soon as building is constructed.

- **Operational emissions:** 
  - Emissions from the ongoing use of a building *(example: energy used to heat and light a building)*.
  - Can be reduced over time with building energy efficiency renovations and renewable energy upgrades.

- **Circular economy:** 
  - A circular economy involves designing waste and pollution out of a system and keeping materials in use *(example: designing a building to be deconstructed for future reuse)*.

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 set to be the next wave!

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

Built Environment recommendations

2019-2020 Sustainable Building Group

1. Establish a statewide deconstruction training program
2. Create a statewide grant program for building preservation projects
3. Create three tiers of deconstruction ordinance templates that cities/counties can select from and adopt
4. Implement a statewide diversion requirement for C&D waste for building construction - building removal
5. Create a statewide rebate program for reused building materials in new construction and renovation projects

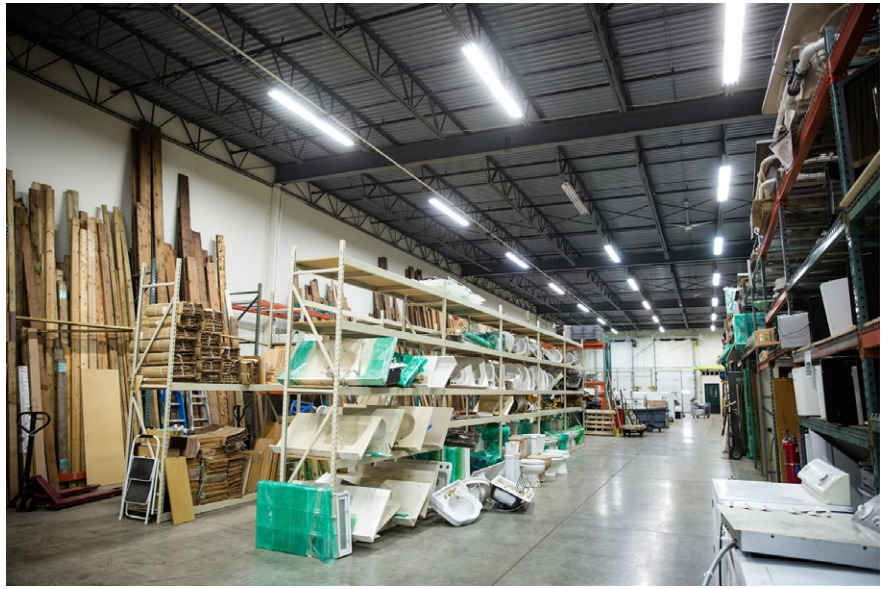
Preservation

Salvage on remodeling projects / partial deconstructions

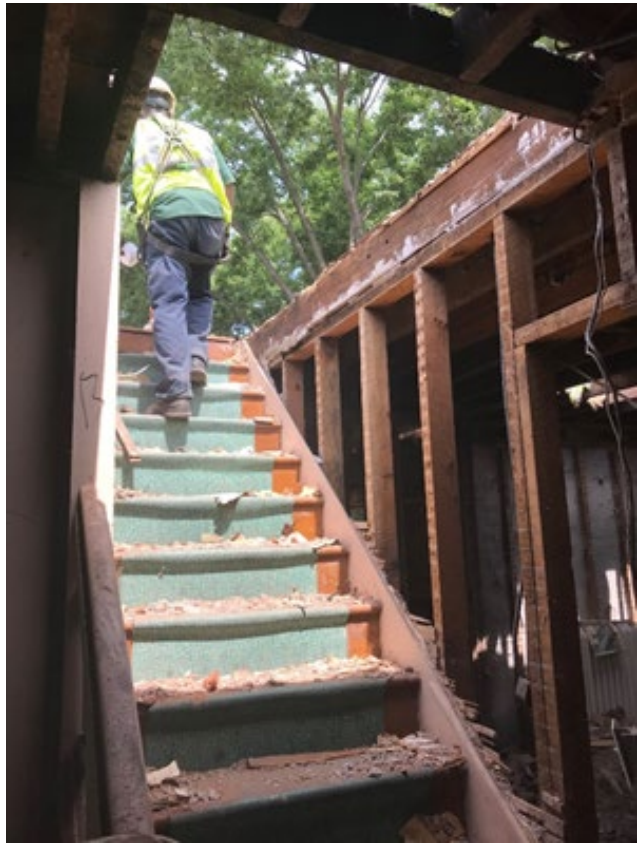
- Also known as salvaging, where high-value materials such as hardwood floors, doors and windows, lighting fixtures, cabinets and other finished materials are selectively reclaimed.
- Focus on historically significant items.
- Great option when full deconstruction may not be feasible.
- Opportunities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

Incorporating used building materials

- Why?
  - Unique, time period pieces to match or add character
  - Affordable fixes for newer items
  - Closes the loop - reduces waste
- Supporting circular economy and local reuse retailers.
- Avoiding embodied emissions.



Full deconstruction project



Duluth Housing Deconstruction Project

Want to see a house deconstructed??

www.reusehawaii.org/benefits

Becker County diversion: a goal in the making

At the transfer station:

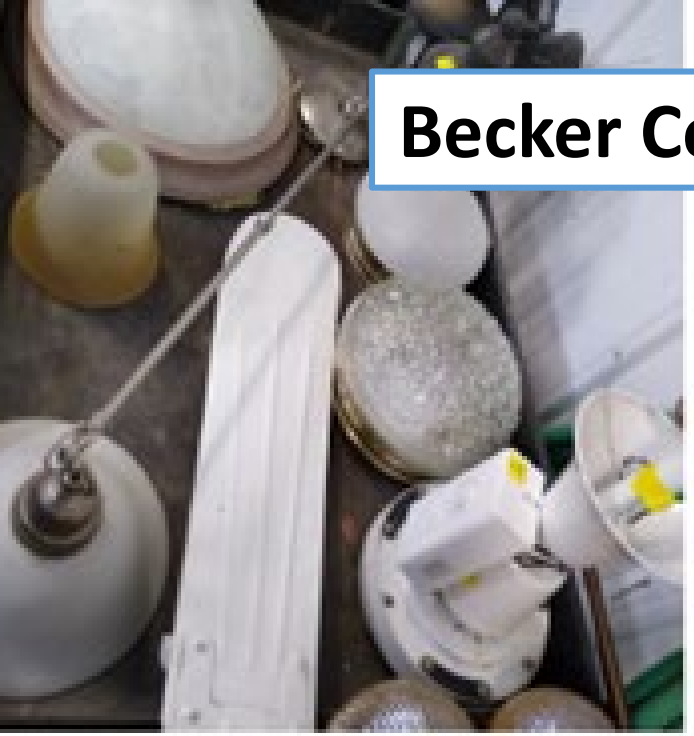
- Encourage staff to see beyond the 'waste' to see the extended life in an item.
- Quantity of waste was unknown.

Community involvement:

- Many residents want to donate!
- Businesses have wanted to partner with us.
- Capacity to take item is vital.
- Positive reinforcement to staff for 'saves' is very importan

#1 goal: diverting waste from demolition waste stream

Becker County C&D Landfill Diversion Pilot Project




CHEVY
TRUCKS
PARKING
ONLY

Scaleable around Minnesota and the US

High demand/cost & low availability for certain products makes this program desirable & scaleable around the state and North America!

Building Product Ecosystems

COLLABORATIVES ECOSYSTEMS WHAT'S HAPPENING JOIN US

- COLLABORATORS
- GLASS IN CONCRETE - MAP
- CLOSED LOOP WALLBOARD - MAP
- REGIONAL REUSE RESOURCES - MAP + MATRIX

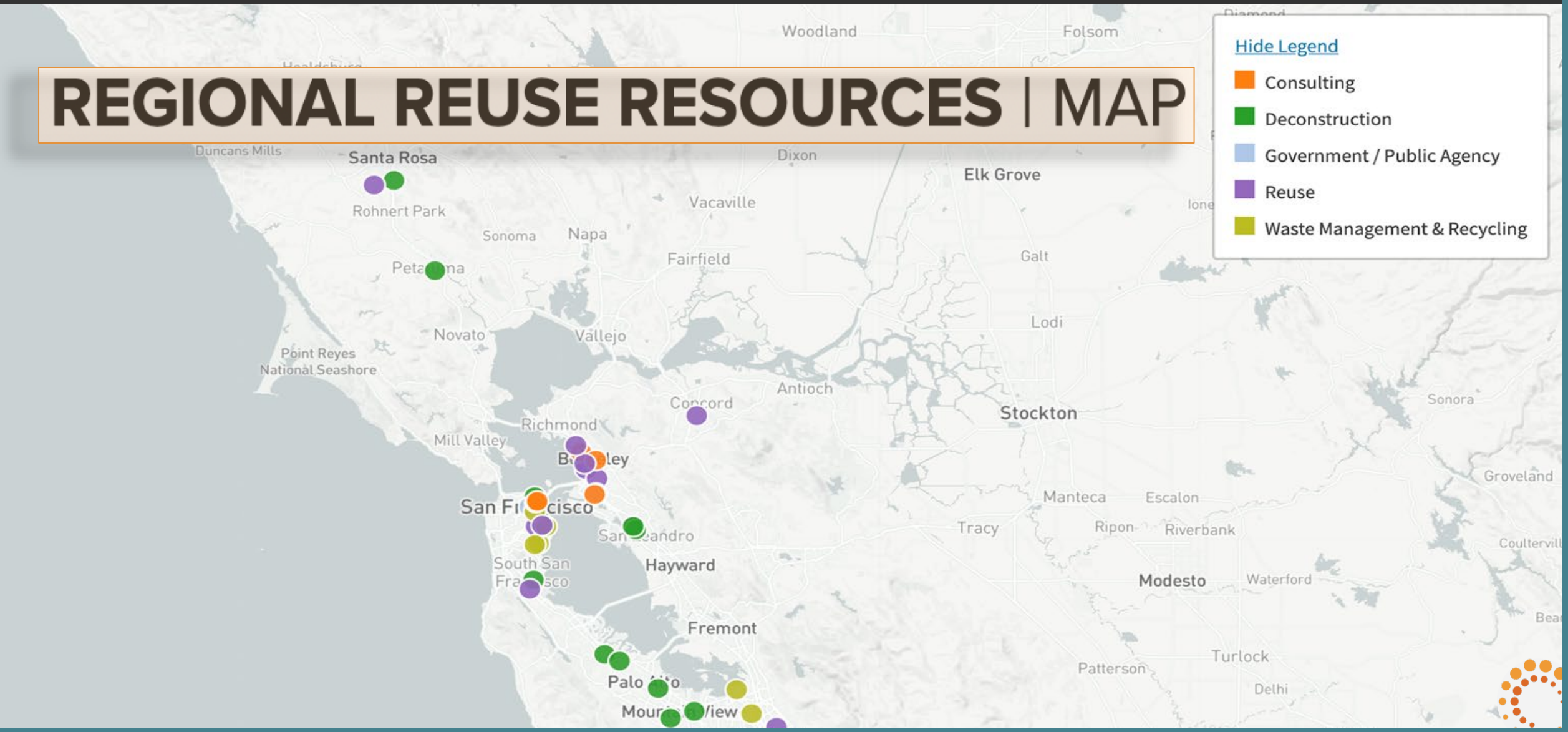
REGIONAL REUSE RESOURCES | MAP + MATRIX

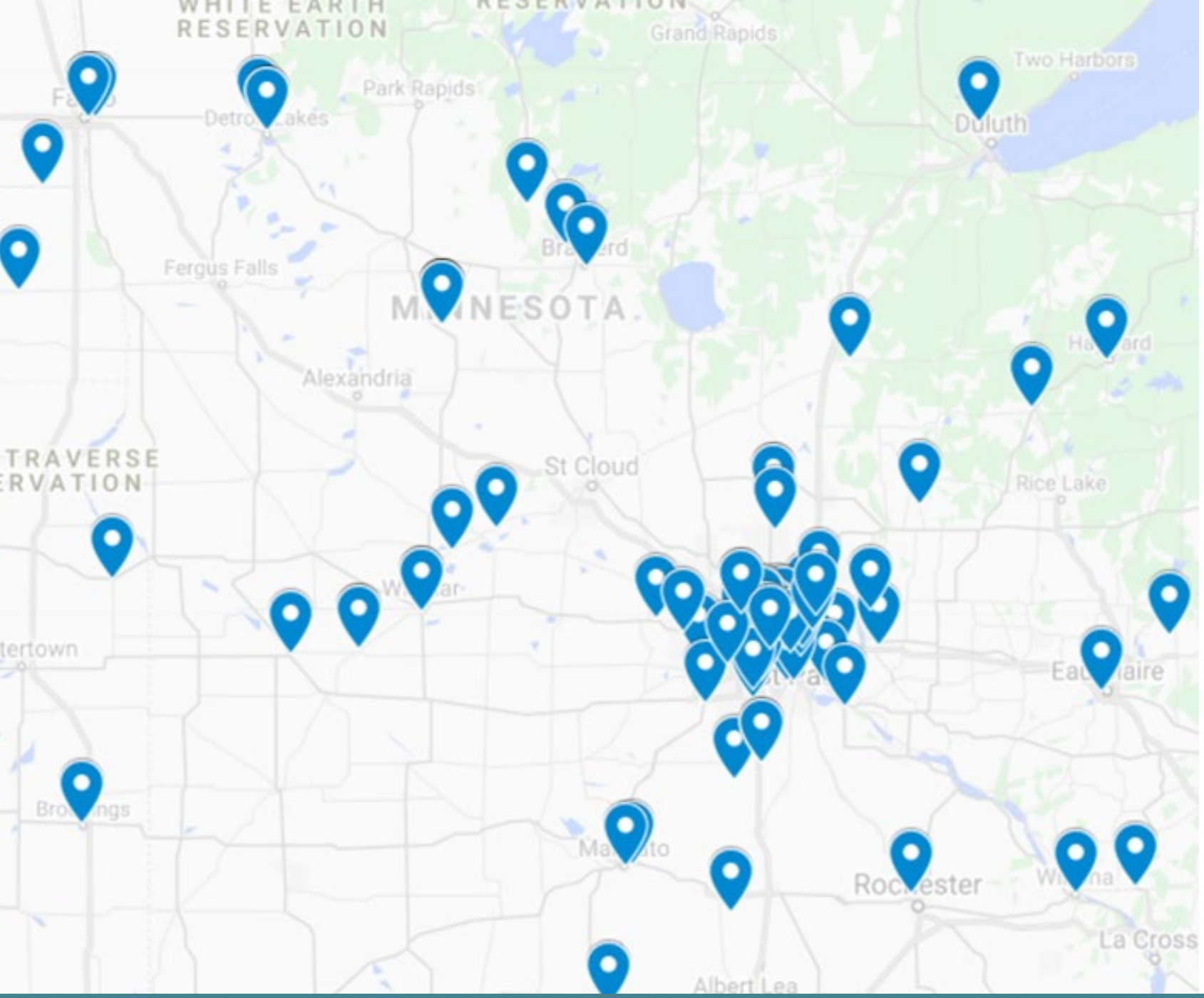

Photo by NYCitySlab


Photo by NYCitySlab


Photo by Perks Deconstruction

REGIONAL REUSE RESOURCES | MAP





MN search terms:

- Habitat for Humanity Restore
- Reuse
- Barnwood
- Reclaim
- Upcycle
- Salvage
  not auto
- Repurpose
- Used
- Thrift
- Movers
  structural or house

Recreating supply chains

Ecosystem players

The Deconstruction Contractor

The Aggregator

The Digital Platform

The Owner

The Loop-Closer

The Refabricator

The Physical Marketplace

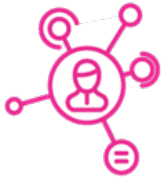
The Architect

The Craftsperson

The Redistributor

The Community Hub

The General Contractor



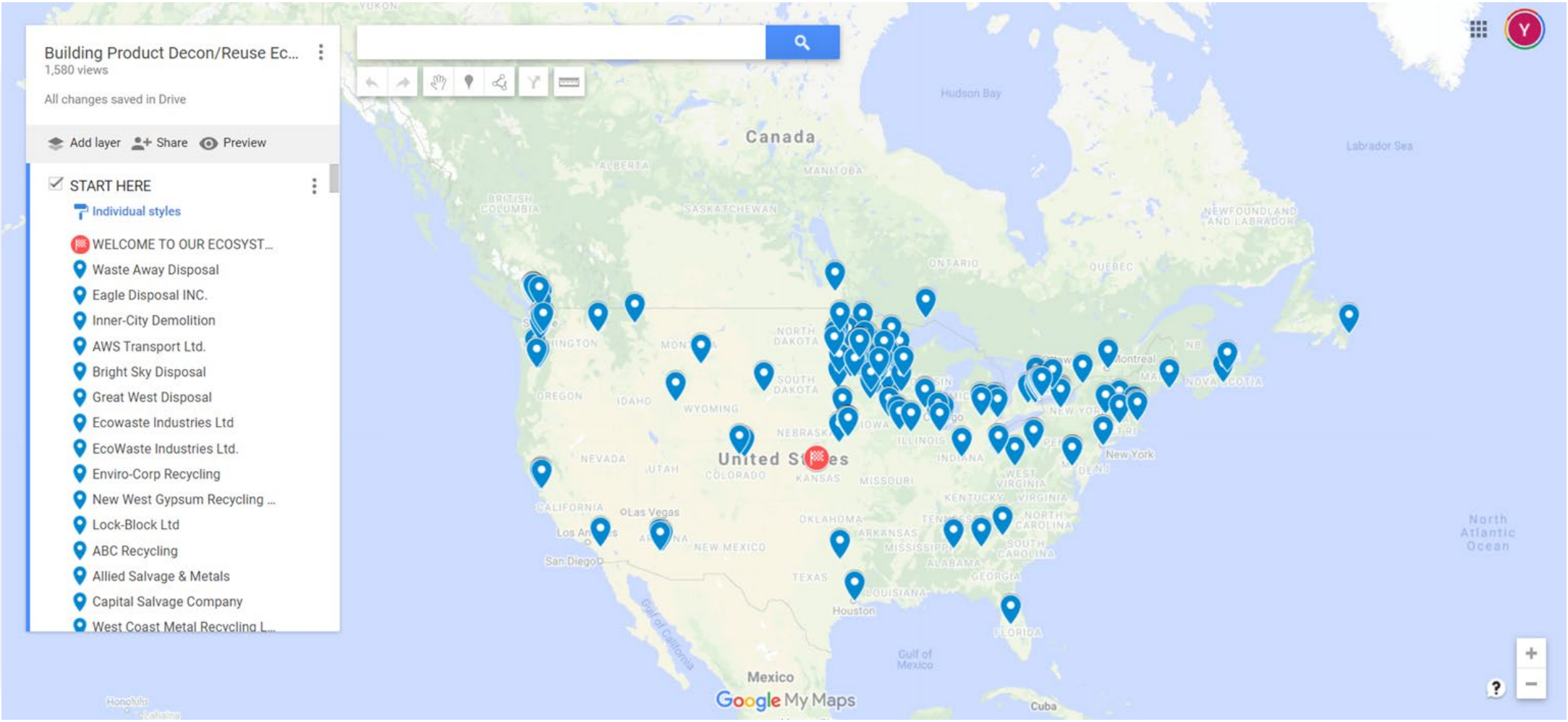
The Material Broker

The Warehouser

The Warranty Service

The Manufacturer

Cultivating circularity



To preserve/deconstruct buildings….or not?

- Save time *avoid needing demo permit*
- Save money *reduce or avoid landfill fees*
- Keep materials in use locally
- Reduce carbon impact *don't have to make same material twice*
- Keep history of building or materials alive
- Increased workforce development *8:1 – 20:1 jobs*
- Waste often goes to a "hole in the ground" (landfills)

If each of the 200,000 - 300,000 homes being demolished in the US each year were DECONSTRUCTED, we would be left with enough reclaimed lumber for approximately 100,000 new homes.

(Zaman 2018)

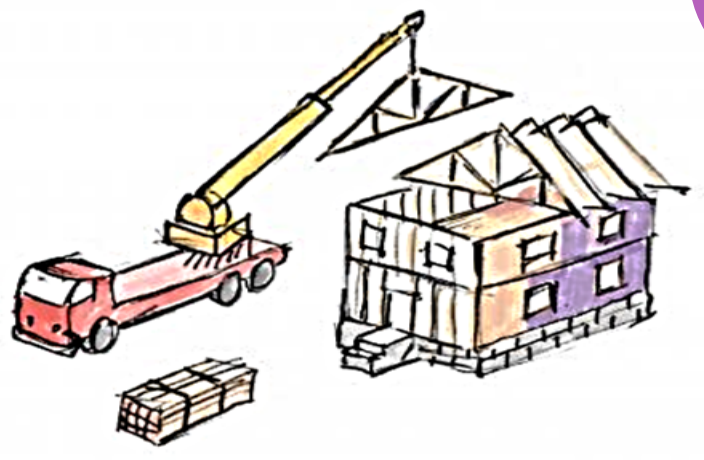
Want to receive updates?

Waste / Managing solid waste / Waste disposal / Construction and demolition / Sustainable building and construction & demolition materials management

Sustainable building group

Members of the Sustainable building group (SBG) and subgroups provided guidance on changing the traditional C&D system focusing on upstream initiatives such as prevention, reuse and recycling and generally finding ways to reduce overall waste.

Questions on the stakeholder group and subgroups? Contact Annika Bergen: **annika.bergen@state.mn.us**



Reports

To identify opportunities for reducing the environmental impacts of the building sector in Minnesota, the Minnesota Pollution Control Agency (MPCA) conducted a study on the generation and composition of construction and demolition (C&D) materials originating in Minnesota and disposed of at permitted solid waste facilities with C&D disposal areas, typically C&D landfills.

Sustainable Building Group stakeholder process 2019-2020 (w-sw5-56)
Report summarizing the Sustainable Building Group stakeholder process and the final five recommendations developed through this community advisory group and proposed for the state of Minnesota. (March 2021)

Sustainable building and construction & demolition materials management

Receive information and updates about the Sustainable Building Group and Rule Advisory Panel, workgroups dedicated to reducing environmental impacts of construction and demolition (C&D) materials and preventing groundwater contamination at C&D landfills.

Email:

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Next

Thank you!

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MINNESOTA POLLUTION CONTROL AGENCY