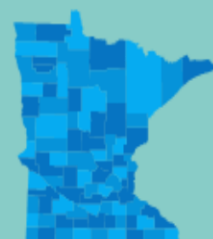


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Sustainable Building Group Stakeholder Process 2019 - 2020

This report summarizes the Sustainable Building Group stakeholder process, and the recommendations developed through this community advisory group.



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Introduction

Background

Construction and Demolition (C&D) landfills in Minnesota have largely been managed in the same way since the late 1980s, when rules for the design, construction, and operation of these landfills were promulgated. The regulations for C&D landfills have remained unchanged since 1988; however, the Minnesota Pollution Control Agency (MPCA) developed the 2005 Demolition Landfill Guidance Document to create more consistency in the siting, design, monitoring, and operation of C&D landfills, including specifications for three classes of landfills depending on the waste accepted. At the time, C&D waste was assumed to be inert, and therefore accepted at Class I and Class II unlined landfills. Only Class III C&D landfills, accepting both C&D and industrial waste, were required to construct a liner and collect leachate. The release of the MPCA's 2005 Demolition Landfill Guidance Document led to the installation of monitoring wells at more C&D landfills to collect groundwater data. With this additional data from the C&D sites, permit hydrologists noted the presence of Arsenic (As), Boron (B), and Manganese (Mn) at unlined C&D landfills across the system, with concentrations exceeding the drinking water health-based values set by the Minnesota Department of Health. These findings raised questions about the previous assumption that C&D materials are inert, and led the agency to revisit the protections and monitoring needed when this waste is managed at end-of-life through land disposal. A complete summary of the data is available in the MPCA Groundwater Impacts of Unlined Construction and Demolition Debris Landfilling report ([Groundwater impacts of unlined construction and demolition debris landfilling | Minnesota Pollution Control Agency \(state.mn.us\)](https://www.mn.gov/groundwater-impacts-of-unlined-construction-and-demolition-debris-landfilling)).

In addition to mitigating the environmental impacts of landfilling, there are clear opportunities for Minnesota to improve sustainability in earlier stages of material design, manufacturing, and reuse, and building design, maintenance/preservation, and removal. The state's low recycling rate for C&D material and its growing number of Metro region home tear-downs resulted in the MPCA's decision to examine the environmental impacts of the entire C&D and building system. The state's building sector contributes significant greenhouse gas emissions, and as a result it was important for the MPCA to consider the broader climate impacts of buildings, not just end-of-life management.

The MPCA uses the Sustainable Materials Management (SMM) framework to consider the full life cycle of structures and typical building materials (i.e. concrete, bricks, wood, lumber, roofing, and drywall). For example, reuse of buildings with an average level of energy performance consistently offers immediate climate change impact reductions compared to more energy efficient new construction. Therefore, research and discussions focus on opportunities for expanding and supporting more building preservation and reuse statewide. This SMM approach also prioritizes following the waste management hierarchy (reduce → reuse → recycle → waste-to-energy → landfilling) for managing building materials and products. Since there are upstream savings of resources associated with prevention and recycling (when virgin materials are displaced by recycled materials), there is an overall avoidance of greenhouse gas emissions.

Figure 1. Greenhouse gas emissions by management method for 100 tons of asphalt concrete

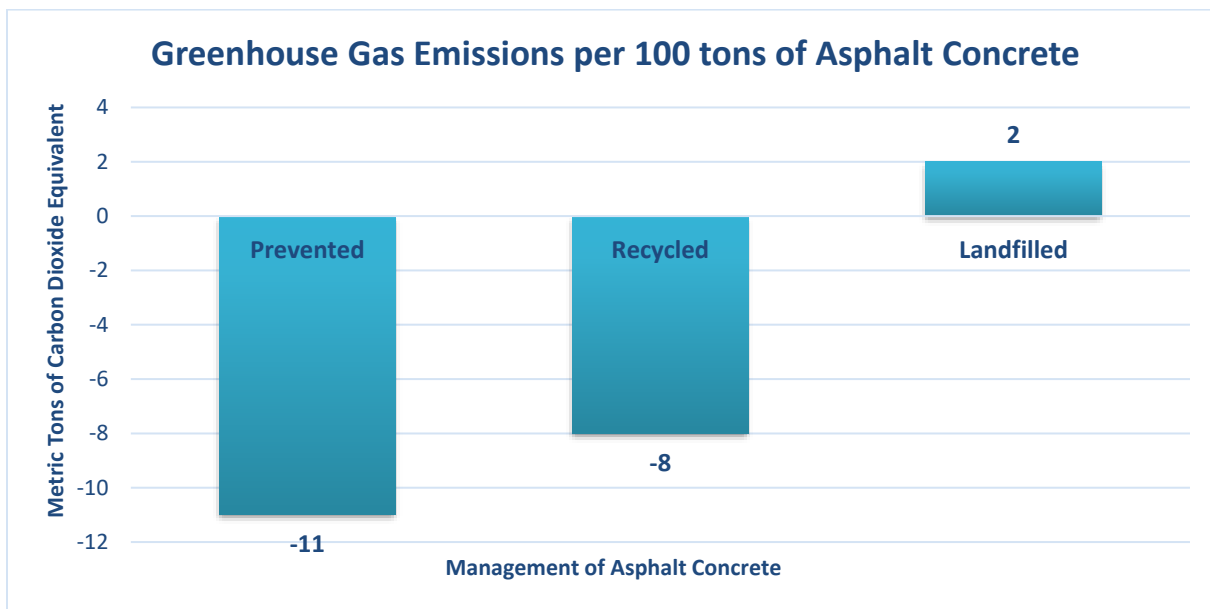


Figure 1 is one material example highlighting the environmental benefits of strategies driven by sustainable materials management, particularly prevention. This graph shows the metric tons of carbon dioxide equivalents (MTCO₂e) for three different ways of managing 100 tons of asphalt concrete (calculated with the Environmental Protection Agency’s Waste Reduction Model, WARM). A negative number in the graph represents a savings of greenhouse gas emissions, and a positive number is a release of greenhouse gases. The first management scenario shows the emissions savings from *not* using the 100 tons of asphalt concrete in a project, avoiding the resource demand and energy inputs of that material throughout the full life cycle; thus avoiding the generation of 11 tons of MTCO₂e. Recycling 100 tons of asphalt concrete avoids the demand for some raw materials upfront, but there would still need to be some remanufacturing to incorporate it into the product; therefore still avoiding some greenhouse gas emissions (8 tons), but not as many as preventing it in the first place. Landfilling asphalt concrete generates greenhouse gas emissions.

In 2018, the MPCA held four stakeholder meetings for organizations and individuals involved in the C&D sector across the state to provide feedback on opportunities and barriers within the current material management system. Approximately 100 stakeholders participated in one or more of four stakeholder sessions in Crookston, Duluth, Mankato, and St. Paul. At each session, participants discussed a set of questions in small, facilitated groups. Question topics included:

- Barriers that prevent recycling, reusing, or reclaiming materials
- Supports for businesses or organizations to capture material
- Government’s role in supporting material reuse
- Oversaturation of organizations or materials
- Workable economics
- Workforce development potential
- Environmental justice considerations
- Ideas for possible approaches and partnerships
- Urban and rural differences in opportunities for material management
- Disposal efficiencies
- Hub-and-spoke model for C&D materials

The MPCA staff documented and coded 750 discrete comments, identifying emerging themes. A complete list of themes from the 2018 stakeholder discussions can be found in Appendix A.

Workgroup overview

As a follow-up to the four initial sessions held in 2018, the MPCA convened two stakeholder groups in the fall of 2019, to gather input on approaches for improving the environmental protections and sustainability of the state's building sector. The Rule Advisory Panel (RAP) efforts focused on end-of-life management, with the ultimate goal of rewriting the statewide Rules for C&D landfills. In contrast, the Sustainable Building Group (SBG) worked to develop recommendations for reducing the environmental impacts of the full building system, prioritizing activities and strategies that aim to extend the useful life of existing buildings and materials.

Sustainable building group and subgroups

The role of the SBG was to identify system gaps and opportunities for improving the sustainability of new construction, building preservation and maintenance/renovation, building removal, and materials management across Minnesota. The stakeholder workgroup represented a wide range of industry players, including local government staff, architects, building preservation specialists, product manufacturers, reuse retailers, material recyclers, deconstruction and demolition managers, and landfill operators. Members represented their organization and similar organizations across the state, acting as a liaison between the workgroup and external parties interested in the recommendation development. Members were selected based on their expertise, commitment to communicating within their sector, geographic representation, and ability to work on a team.

The SBG full workgroup met every 4-6 weeks throughout the year, and five topic-specific subgroups met as needed between the full workgroup times. The subgroup topic areas included:

1. **Upstream building design** - This subgroup recommended strategies to reduce the environmental impacts through building design and material choices.
2. **Material value** - This subgroup recommended strategies for creating market infrastructure and demand for various reused materials.
3. **Regulation for collaboration** - This subgroup recommended new statewide or local regulations, policies, or sample ordinance, that support collaboration practices in material reuse.
4. **Material processing and recycling efficiencies** - This subgroup identified the processing steps necessary to ensure an efficient assessment, deconstruction, and distribution of materials, and provided recommendations to ensure effective storage and movement of reuse, recycling, and waste materials.
5. **New financial system** - The current financial system was not created to incentivize and support the capture of construction and demolition materials for future use (reuse, recycling, etc.). This subgroup met at the start of the year, but decided to not meet separately from the broader workgroup as the recommendations coming from the other subgroups were likely to have a large influence on the financial ideas put forward.

Subgroup charters, outlining focus areas in more detail, are available in Appendix B.

Process and recommendation development

Stakeholder involvement

The year-long stakeholder process involved five main phases:

1. Research and goal-setting

MPCA staff and external presenters provided relevant information and facilitated workgroup discussions about sustainable building and materials management strategies, limitations of the state's building system, and existing frameworks and tools available to support transitioning to lower impact approaches. Workgroup members also identified priorities and goals they hoped to address with the SBG recommendations.

2. Brainstorm subgroup ideas

Using their specific subgroup charters and the overarching workgroup goals as guides, the subgroup teams brainstormed 65 unique concepts that would encourage more sustainable building processes, material selections, and material management methods within Minnesota. This initial list of 65 unique concepts is available in Appendix C.

3. Evaluate subgroup ideas based on goals and key values

In order to narrow the list of 65 unique workgroup concepts, subgroup members evaluated their specific list based on the following criteria:

- Reduces greenhouse gas emissions
- Creates resiliency to climate change
- Reduces toxicity to the ecosystem
- Follows the Waste Management Hierarchy, prioritizing reduction strategies first, then reuse and repair strategies, and finally recycling
- Promotes equitable systems
- Adds sustainable, trained, local jobs
- Applies and is accessible to both the Metro and Greater Minnesota regions
- Touches on all building types (commercial, residential – single family, residential – multi-family, etc.)

Using the scores from the evaluation, subgroups identified their top three to five concepts. This generated a new list of 22 ideas.

4. Vote and narrow to top ideas

The SBG workgroup members individually ranked the 22 ideas produced by the subgroups. The list of 22 ideas and their ranking from the SBG workgroup is available in Appendix D. This final exercise led to the selection of the final five SBG ideas.

5. Refine and finalize recommendations

During the final stage of development, the subgroups dissolved and workgroup members formed new teams for each of the five final ideas. The idea-specific groups added detail and refined the recommendations before presenting them to all workgroup members, MPCA leadership, members of the RAP, and members of the public that chose to attend.

In order to create an inclusive and transparent stakeholder process, all SBG meetings were open to the public and external input was encouraged.

Final recommendations

The SBG workgroup reached consensus on five final ideas. In cases where the idea was more conceptual, additional research and discussion by subgroup members and MPCA staff helped solidify concepts into more specific, tangible actions. SBG workgroup members concluded their involvement in the stakeholder process by advising statewide implementation of five recommendations and supporting activities in order to improve the sustainability of Minnesota’s building sector.

Idea	Final recommendation
Establish a statewide, state-funded deconstruction training program that accompanies deconstruction and demolition licensing	Establish a statewide, state-funded deconstruction training program that accompanies deconstruction and demolition licensing
Create a financial incentive for buildings to be preserved, while still meeting energy efficiency standards	Create a statewide grant program for building preservation projects
Create a deconstruction ordinance template that cities can adopt, establishing consistent standards across the state	Create three tiers of deconstruction ordinance templates that cities/counties can select from and adopt
Create, implement, and enforce a statewide diversion requirement of C&D waste (including reuse and recycling) for new construction, demolition, additions, and/or renovation projects	Implement a statewide diversion requirement for C&D waste for new construction, additions, renovations, and building removal
Create a financial incentive that encourages the use of reused, more repairable, and/or reusable materials in new building construction and renovation projects	Create a statewide rebate program for reused building materials in new building construction and renovation projects

The following summaries offer a high-level overview of the SBG recommendations. Recommendations may require multiple phases of implementation in order to successfully achieve the goals defined by workgroup members.

Each recommendation includes labels to indicate whether it is:

- POLICY** requires legislative action to enact statewide policy
- FINANCE** requires additional funds to implement (either through a legislative appropriation or other funding channels)
- PROGRAM/ACTION** requires research, planning, and support to implement; recommendation development isn’t necessarily restricted by legislative policy or budget requests

1. Deconstruction training program

FINANCE

PROGRAM/ACTION

Establish a statewide, state-funded deconstruction training program that accompanies deconstruction and demolition licensing.

- **Overview**

Minnesota doesn't have the trained deconstruction workforce needed to substantially grow partial and full deconstruction projects statewide. By establishing a training program, Minnesota can help normalize and improve access to skilled deconstruction services for building renovation and removal. Licensing or certifying deconstruction and demolition contractors also helps level the playing field between these two approaches, moving towards more cost-comparative offerings (currently one of the main limitations identified for deconstruction is the additional cost for labor).

- **Goals**

The goals of a statewide, state-funded deconstruction training program are to:

- Reduce statewide environmental impacts through more building and structure deconstruction, extending the useful life of building materials for reuse and recycling.
- Increase the supply of reused building materials, reducing the demand for new production.
- Grow the state's certified deconstruction workforce, providing accessible skills training to new and existing contractors.
- Expand the number and distribution of reuse retailers across Minnesota.

- **Next steps**

- **Curriculum and requirements development**

Training curriculum and materials need to be developed first, defining requirements for deconstruction and demolition certification and licensing.

- The first phases of program implementation will focus on safety and technical skills for deconstruction, with the potential for future phases to expand the training to include project management and business best practices.

- **Partnership building**

Building partnerships with technical colleges and organizations already offering training courses will be important for the success of this program in the short and long-term.

- **Funding request**

Additional funding needs to be secured to support a state-wide, state-funded program (e.g. Legislative appropriation, grant funding, etc.).

- In the event additional funding is not secured to launch a new program, there are other opportunities for moving this recommendation forward through other partnerships in Minnesota or nationally (i.e. technical colleges, existing deconstruction organizations and consultants, etc.).

2. Incentive for building preservation

FINANCE

Create a statewide grant program for building preservation projects.

- **Overview**

Rather than demolish an existing building and construct a new one in its place, preserving, maintaining, and reusing structures can significantly reduce the environmental impacts of Minnesota's built environment. By creating a statewide grant program, Minnesota can help incentivize building preservation projects and keep structures in use longer. A key component of this grant program is funding projects that improve the performance and accessibility of buildings, while still ensuring operational efficiency. Examples of eligible projects include, but aren't limited to, foundation improvements, building use changes (e.g. commercial to multi-use), code improvements, and weatherization.

- **Goals**

The goals of a statewide grant program for building preservation projects are to:

- Stimulate investment in existing buildings (at least the envelope and/or structure) by improving the performance, and ultimately keeping them in use longer, while operating more efficiently.
- Incentivize operational, equipment, and behavior modifications to recover greenhouse gas emissions for a limited financial investment compared to new construction.
- Establish an equitable funding pool and awarding process (sliding scale based on need), where upfront capital is not a requirement.
- Create a simple and accessible grant and application process, including broad promotion and support.
- Reduce climate impacts from the building sector, by reducing the need for new construction and new material use.

- **Next steps**

- **Research and program development**

Additional research is needed to define the eligible project scope, funding sliding scale, and program specifics. This includes identifying a lead organization to run the program and confirming the application evaluation team.

- **Funding request**

An ongoing funding pool needs to be secured for the grant program, which will likely be through a legislative appropriation.

3. Deconstruction ordinance templates PROGRAM/ACTION

Create three tiers of deconstruction ordinance templates that cities/counties can select from and adopt.

- Overview**

Deconstruction and salvage help keep materials at a higher value with the greatest potential for continued use when managed by trained, certified professionals. Traditionally demolition is the primary approach for building removal because it is a faster process and therefore a lower cost for labor; however, demolition is also destructive and less sustainable. Currently deconstruction policies are being implemented at the city or county level through ordinances specifying requirements for deconstruction methods, along with targets for material reuse and recycling. Creating several templates for Minnesota cities and counties to adopt provides the foundation and guidance for greater adoption of more sustainable building removal, material salvage, and reused material markets.

	Tier 1 Ordinance	Tier 2 Ordinance	Tier 3 Ordinance
Deconstruction requirement	X	X	
Diversion requirement	X	X	X
Pre-project assessment/ inspection	X	X	X
Certified deconstruction contractor	X	X	
Applicable project types	<ul style="list-style-type: none"> • Building removal • Renovation 	Building removal	Building removal
Applicable building types	Requirements apply to all: Public Residential Commercial	Requirements apply to 2 (based on applicability): Public Residential Commercial	Requirements apply to at least 1: Public Residential Commercial
Material-specific management targets	X		
Management targets <i>Set as base, but pre-project assessment determines unique, reasonable project targets based on building type, age, condition, available materials, etc.</i>	<ul style="list-style-type: none"> • Recycle at least 80% of all concrete and asphalt • Divert at least 75% of materials, excluding concrete and asphalt, with at least 5% reclaimed for reuse 	Divert at least 85% of materials, with at least 5% reclaimed for reuse	Divert at least 50% of materials
Measurement and reporting	Full material management plan, including material amounts, management method, and specific end markets/contacts	Full material management plan, including material amounts and management methods	Material survey detailing materials that could be deconstructed for reuse and recycling

- **Goals**

The goals of deconstruction ordinance templates are to:

- Reduce the environmental and climate impacts of the state’s building sector by encouraging wide-spread adoption of building removal and material management strategies that maximize the value of existing materials, reducing the demand and need to produce new, replacement items.
- Reduce the amount of building demolition and subsequent generation of wasted building materials (debris) going to disposal at landfills in Minnesota.
- Minimize the adverse health risks caused by building demolition and unsafe removal and management of hazardous materials.
- Create standardized terminology and design a consistent framework, saving cities time and money by not creating new language and requirements with each ordinance implementation.
- Expand deconstruction skills and create jobs across the state through increased demand for deconstruction work.

- **Next steps**

- **Ordinance drafting**

The first step for this recommendation is to draft three tiers of deconstruction ordinance templates, including a guidance document to support local governments determining which tier is best suited for their community.

- **City and county outreach**

Cities and counties statewide should be engaged in discussions early. The guidance documentation will support their decisions on which requirements to include from the template in the official policy, including gradually phasing in the requirements to ensure a successful transition and adoption.

4. Diversion requirement for C&D waste

POLICY

Implement a statewide diversion requirement for C&D waste for new construction, additions, renovations, and building removal.

- **Overview**

While local ordinances present an important opportunity for increasing deconstruction, a statewide diversion rate can act as a strong compliment. Diversion often refers to diverting from landfill disposal, regardless of the alternative management method; however, for this statewide implementation the goal is to specifically increase diversion defined as reuse and recycling of C&D materials. Documentation and detailed reporting is essential to the success of a diversion rate, noting material categories, amounts, and management method or end market. Before pursuing a statewide diversion requirement, local government units and organizations in Minnesota can initially consider adoption of C&D waste management plans to begin this tracking and mapping of material flows. In an ideal scenario, C&D waste management plans should track material categories and amounts for a project, specify management methods for each material, and identify the specific end-market and contact. Longer-term the recommendation is to implement a 50% diversion rate with at least 5% reuse, increasing the goal as markets strengthen to a 75% diversion rate with at least 10% reuse.

- **Goals**

The goals of a statewide diversion requirement for C&D waste are to:

- Reduce the environmental and climate impacts of the state's building sector by encouraging wide-spread adoption of building removal and material management strategies that maximize the value of existing materials, reducing the demand and need to produce new, replacement items.
- Reduce the amount of wasted building materials going to disposal at landfills.
- Increase the supply of reused building materials, reducing the demand for new production.
- Increase C&D material recycling, reducing the need for new raw materials extraction.
- Expand the number and distribution of reuse retailers and recycling processors across Minnesota.

- **Next steps**

- **Waste plan drafting and outreach**

Before pursuing a statewide requirement, a useful first step for this recommendation is creating a waste plan template that cities and counties can modify or adopt directly, connecting with local units of government to support their adoption.

- **Statewide material flows**

With the adoption of waste plans, there will be more data available to track material flows, identify successful material markets, determine best practices for management, and identify areas needing additional support.

- **Policy proposal**

A statewide requirement needs to be submitted to the Legislature for establishing a C&D diversion rate, using lessons learned from waste plans to successfully phase in the requirements.

5. Incentive for reused building materials

FINANCE

Create a statewide rebate program for reused building materials in new building construction and renovation projects.

- **Overview**

There is growing awareness in Minnesota around deconstruction and the benefits of maintaining the value of materials for reuse; however, the system lacks incentives to drive demand for those reused items. Reused materials and products are often more unique, requiring additional skills and labor to incorporate in a project, and can be more difficult or costly to procure. For many project owners, designers, and contractors, the additional effort and cost for that labor isn't worth the environmental benefit of reused materials. There is a supply of reusable building materials, and Minnesota can encourage their use in construction and renovation with a rebate program to help offset the additional cost of preparing reused materials and for the skilled labor to install the reused materials, reimbursing confirmed projects for a portion of the material costs of the reused items. Doing so will ultimately reduce the demand and need to produce new building materials, which require significant energy and resource inputs and generate significant pollution and waste outputs to manufacture.

- **Goals**

The goals of a statewide rebate program for reused building materials are to:

- Reduce the environmental and climate impacts of the state's building sector by increasing the amount of building material reuse, reducing the need to produce new replacement items.
- Reduce the amount wasted building materials going to disposal at landfills.
- Grow building material reuse retail across the state by incentivizing additional sales.
- Support a skilled labor workforce in the building material reuse sector.
- Raise awareness on the climate impacts of the building sector, specifically on the embodied carbon of existing building materials.

- **Next steps**

- **Research and program development**

Additional research is needed to define eligible project scope and program specifics. This includes funding amounts, material requirements, and expected reporting and measurement details.

- **Funding request**

An ongoing funding pool needs to be secured for the rebate program, which will likely be requested as a legislative appropriation.

Recommendation interconnections and dependencies

Each of the five final SBG recommendations aim to improve different aspects of the building system, but they depend strongly on the implementation and success of the other recommendations.

- **Deconstruction training program**
 - **Reuse and recycling markets:** Markets are needed for materials that come from deconstruction.
 - **Partnerships:** Partnerships are needed with existing programs that focus on deconstruction training and skills building.
 - **Deconstruction and demolition certifications:** Certification requirements need to be established for both deconstruction *and* demolition to help level the playing field and move towards a more cost-comparative system.
 - **Deconstruction ordinance:** Passing deconstruction ordinances that require certified teams to perform the services helps incentivize and drive demand for this type of trained work.
- **Building preservation grant**
 - **Reuse markets:** Markets are needed with reused materials to incorporate in preservation projects.
 - **Partnerships:** Partnerships are needed with existing programs that focus on the operational efficiencies of buildings.
 - **Reused material rebate:** Joint promotion with the Reused Material Rebate reinforces the hierarchy, by encouraging use of grant funds first for repair, then replacement with reused materials, then replacement with new materials.
- **Deconstruction ordinance templates**
 - **Reuse and recycling markets:** Markets are needed for materials that come from deconstruction and diversion.
 - **Deconstruction and demolition certifications:** Requiring certifications for demolition and deconstruction contractors in ordinances, ensures consistent and more easily tracked services.
 - **Diversion targets:** The lowest tier option for deconstruction ordinance templates can connect details from the Statewide Diversion Requirement.
- **Diversion requirement for C&D waste**
 - **Recycling markets:** Markets are needed for materials to meet diversion requirements.
 - **Deconstruction and demolition certifications:** Requiring certifications for demolition and deconstruction contractors alongside a statewide diversion requirement ensures consistent and more easily tracked services.
- **Incentive for reused material rebate**
 - **Reuse markets:** Markets are needed with salvaged materials to be sold for reuse.
 - **Deconstruction ordinance:** Passing deconstruction ordinances helps create material supply to support this program.

Interconnections

The goal of establishing a grant program that helps to keep existing buildings in use longer will significantly reduce the emissions associated with building a new structure. It can be difficult to find materials, products, and fixtures that fit aesthetically and functionally in older homes, which can lead to newly manufactured items being the only option for keeping homes in good repair. However, there are two other recommendations that compliment this preservation grant program. A deconstruction ordinance will bring more quality, used building materials to market, many of which will work with an older home. Offering reused material rebates also encourages incorporating more used and repairable products and materials by making it more financially accessible too.

Another example of recommendations that work well together or rely on one another is the deconstruction training and a deconstruction ordinance. If municipalities start passing deconstruction ordinances, it becomes easier to capture materials for reuse and recycling. However, Minnesota doesn't currently have a lot of organizations with teams trained to deconstruct structures. Deconstruction training classes will provide the education and certification processes necessary to increase and stabilize the necessary workforce offering this service. A certification program also helps establish standards for the industry, for both deconstruction and safety.

Dependencies

Two focus areas that are strong dependencies for a more sustainable building system in Minnesota, but weren't uniquely identified in the final five recommendations, are the manufacturing and marketing of materials. This in turn resulted in less emphasis on the market development for used and recycled building materials. However, all five final SBG recommendations rely on strong and stable reuse and/or recycling markets. This dependency will need to be added alongside the SBG recommendations to ensure a holistic, sustainable transition of the state's building sector.

Although the recommendations were not all labeled as financial requests or proposals, most of the recommendations will require some form of financial assistance in order to progress. The SBG stakeholder group initially discussed finances through a subgroup, but a final financial recommendation wasn't put forward at the end of the stakeholder process. The current construction and demolition system appears to be going through a systems changes. Offering incentives to maintain buildings longer and reduce the overall embodied carbon of the state's building sector, deconstructing buildings instead of demolishing them, and normalizing markets for used building materials will require a broad and inclusive discussion about new financial systems. These conversations will take time and will most likely be phased in as programs and processes recommended by the SBG stakeholder workgroup become more established.

Lessons learned and next steps

Lessons learned

- The goal was to have an estimate of the environmental impact of each of the recommendations but, without a life cycle modeling and analysis expert and the subsequent inability to report on the environmental impacts of each of the strategies, the group was unable to use specific numbers as one of the criteria when making final recommendation selection.
- Research was conducted on deconstruction and diversion ordinances that other states/municipalities have worked on or implemented. This was extremely helpful because the SBG could learn what did and didn't work for other organizations. For instance, Wisconsin has implemented two deconstruction ordinances that have not fared well. SBG was able to have conversations about the fact that there needs to be work done establishing programs and carefully selecting requirements for the ordinance. It would be wise to start with a smaller recycling and reuse goal with the earlier projects for multiple reasons. As new deconstruction contractors enter into the sector, they will be new and learning how to deconstruct. There are bound to be some mistakes as the program gets underway and trades are being learned as well as market outlets. The condition of the homes being deconstructed as well as the era, building materials used and capacity for deconstruction should all be considered. This was all good information to learn from others that have already implemented deconstruction ordinances.

Next steps

The MPCA will continue circulating the final recommendations to gather additional and diverse feedback, refining the details in the proposed programs and legislative requests. This follow-up work will focus in large part on defining specific metrics and targets for each of the recommendations, ensuring realistic, yet ambitious goals. The development and implementation of the SBG recommendations will heavily depend on the support and statewide involvement of numerous partners. In some cases, the proposed programs from this stakeholder process will be better initiated and managed by local units of government or industry experts.

The MPCA will continue to develop elements of its work to support sustainable building efforts as part of the agency's Strategic Plan goal to prevent risks associated with construction and demolition materials, and especially the agency's commitment to advancing sustainable materials management and reducing the associated environmental and human health impacts.

Appendix A: 2018 stakeholder emerging themes

	Themes and # of comments	Topics	Example comment
1	Connect the players: 96	<ul style="list-style-type: none"> • education • market demand • permitting • financial alignment • timing • convenient/easy • database • aggregation (Amazon Fulfillment Center) 	<i>Connections are missing between those that deconstruct and end markets & users. We need to reach remodelers.</i>
2	Financial alignment: 87	<ul style="list-style-type: none"> • timing • landfill rates 	<i>More work and time require funding so that they are no longer incentivized to do the job as quickly as possible. [referencing demolition vs. deconstruction]</i>
3	Education: 72	<ul style="list-style-type: none"> • connect players • MPCA lead education • material trend research 	<i>Education is huge. If the consumer demands it, the market will meet the demand.</i>
4	Regulation needed: 71	<ul style="list-style-type: none"> • market demand • policy for use inspections • government needs to specify deconstruction, recycling, reuse, and reclaimed requirements • building codes • material sorting • address temporary trends but don't base regulations on them 	<i>Regulation can play a role here, such as regulating which materials can be sold and used after being reclaimed.</i>
5	Specific material issues: 44	<ul style="list-style-type: none"> • drywall • boron • sorting • prioritization • concrete & rebar • hardwood • connect players • timing • enforce % reclaimed • increase market demand • material value add 	<i>Flooring is labor intensive to reclaim. We don't keep it in stock; if we know there's a need, then we broker it.</i>
6	Increase market demand: 46	<ul style="list-style-type: none"> • urban/rural difference • materials sorting 	<i>We need to affect design and creative reuse of materials.</i>

7	Urban/rural differences: 42	<ul style="list-style-type: none"> • financial alignment and incentives • connect players • regional market differences • market/design drivers • sorting and transportation • regulation • private and public • labor for deconstruction 	<p><i>In rural areas, the economics of scale aren't the same or as beneficial; you need more public & private collaboration to share the risk, and to create ordinances to limit risk</i></p>
8	Financial incentives: 50	<ul style="list-style-type: none"> • connecting partners • total cost and environmental cost • regulation needed • timing • financial alignment • lack of re-stores in rural areas • more reuse center/business • downside of financial incentives • equipment • education • building preservation • deconstruction • private and public • permitting/recovery targets 	<p><i>There are other incentives for reuse but could be more broadly applied through state policy; access to the tools and incentives for building reuse (historic tax credits, etc.) is much harder in greater MN - but there are hundreds of qualifying projects!</i></p>
9	Permitting: 27	<ul style="list-style-type: none"> • waste plans • support range of deconstruction • regulation needed • proper buildings for deconstruction • landfill permits • financial incentives • sorting materials • expedited permits as incentive 	<p><i>There are challenges currently in permitting deconstruction - they must be permitted like demolition which doesn't make sense.</i></p>
10	Timing: 24	<ul style="list-style-type: none"> • work through planning and zoning • financial alignment • connect players • value add • permitting • plan for trends in housing and moving • labor for deconstruction • regulation needed 	<p><i>Timeframe may be a barrier. (e.g., barn wood in rural areas- before they take barns down, they have people come and bid on it first)</i></p>
11	Culture change: 28	<ul style="list-style-type: none"> • education • financial incentive • market/design drivers • increase market demand • set audacious goals • construction practices • regulation needed • manufacturers product/building design 	<p><i>Habits must change; not just capacity increase. He's tired of speaking with architects and feels like nothing motivates them</i></p>

12	Material value add: 27	<ul style="list-style-type: none"> • increase market demand • wood grading • specific material issues • recertify/regrade materials • market/design drivers • preserve MN civic buildings • product stewardship • hazardous materials • manufacturers product design 	<i>I think another thing to think about is making products that are designed to last longer and create incentives for manufacturers to create more durable materials.</i>
13	Licensing: 8	<ul style="list-style-type: none"> • education • licensing revisions: reporting • permitting 	<i>Credentialing could help (follow OSHA training); reputations are important, and deconstruction doesn't have the reputation yet.</i>
14	Find appropriate buildings for deconstruction: 11	<ul style="list-style-type: none"> • hazardous materials 	<i>In terms of reuse, think about the generation, when the building was built - certain eras have more reuse demand.</i>
15	Hub and spoke: 38	<ul style="list-style-type: none"> • facility safety • equipment • siting facilities • reduce disposal costs • financial incentives- who pays? • grinding equipment • transportation cost optimization • facility safety & environmental controls 	<i>It would be more efficient and improve economics & environmental outcomes if we use hub & spoke [model] - to consolidate resources and easier for recycling and landfills.</i>
16	Sort for recycling/C&D contamination: 37	<ul style="list-style-type: none"> • contamination of C&D loads • hazardous materials • how to enforce percent reclaimed? • portable reuse options • sorting materials • enforcement • labor • sorting at landfill • disaster debris recycling considerations 	<i>Landfills receive a lot of recyclable material. Bigger landfills can afford the equipment and manpower to separate recyclable materials.</i>
17	Environmental Justice: 25	<ul style="list-style-type: none"> • unintended consequences • market/design drivers • siting facilities • product stewardship/ hazardous materials • labor for deconstruction • choose better materials in building design • more deconstruction • hazardous materials and worker safety • understand market demand • government needs to specify deconstruction, recycling, reuse and use of reclaimed • evaluate impacts of any requirements 	<i>High end salvage isn't addressing affordable building materials</i>

Appendix B: SBG subgroup charters

Upstream building design charter

Background and problem statement

Have building materials changed much over time? It can be very difficult, time intensive and expensive to develop and bring new materials to the market. When a building is planned and the materials sourced, it works best if all the materials are standard for quality and use.

How many of the building materials we use now could be better for the environment? Concrete is a material that has a large amount of greenhouse gas emissions generated in its manufacturing. Are wallboard or asphalt shingles the right material to continue to use with more frequent flood events and wet weather?

As our weather changes and buildings are being hit by more frequent storms, toxicity of our products becomes a bigger concern and planning for end-of-life of these materials becomes harder. It is a good idea to review the current building materials to see if there are better alternatives.

Purpose/mission and reason for the team's existence

The goal of this subgroup is to recommend strategies to reduce the environmental impacts through building design and material choices, including:

1. Improving design and material decisions
2. Reducing product toxicity
3. Enhancing product stewardship efforts
4. Creating policy recommendations based on where in the life cycle of buildings the greatest environmental benefit can be obtained

Questions to consider

- Who is doing what, and for whom?
- What successful project completion looks like?
- The business justification or expected benefit of the work

Interim and overall objectives that must be attained

- What is to be achieved and by when? Should include timelines, deliverables, check points, tracking and measurement
- Scope

Roles and responsibilities

- Are there additional skills or expertise that we need for project success?
- Are there any other teams or Individuals that need to be represented or consulted?
- Is the team strength enough for the work and the deadlines?
- Is there any training that the team members will need to complete the work successfully?

Operating guidelines

- Code of conduct and safe environment
- Meeting guidelines
- Decision making guidelines
- Conflict resolution process
- Workload distribution
- Internal and external communications
- Team additions/terminations

Material value charter

Background and problem statement

Currently most buildings when they are replaced are demolished. Often this is done because it is one of the least expensive options and requires the least amount of time. However, once materials are commingled in demolition it is very hard to capture most materials for reuse or even recycling. For more materials to be used again (i.e. salvaged to be used in other buildings, deconstructed to be sold and made into something else, find a new market for common materials, etc.) something within the process needs to change to carefully remove materials in a timely and safe manner.

If demolition remains the main solution for removing valuable material from structures, it will continue to be disposed of instead of used again.

Purpose/mission and reason for the team's existence

The goal of this subgroup is to recommend strategies for creating market infrastructure and demand for various reuse materials by establishing or enhancing:

1. Government specifications for purchasing reuse materials in building projects
2. Marketplace or material exchange for timely transactions
3. Material recertification standards and procedures
4. Deconstruction standards
5. Early materials capture standards
6. Onsite sales
7. Workforce development opportunities

Questions to consider

- Who is doing what, and for whom?
- What successful project completion looks like?
- The business justification or expected benefit of the work

Interim and overall objectives that must be attained

- What is to be achieved and by when? Should include timelines, deliverables, check points, tracking and measurement
- Scope

Roles and responsibilities

- Are there additional skills or expertise that we need for project success?
- Are there any other teams or Individuals that need to be represented or consulted?
- Is the team strength enough for the work and the deadlines?
- Is there any training that the team members will need to complete the work successfully?

Operating guidelines

- Code of conduct and safe environment
- Meeting guidelines
- Decision making guidelines
- Conflict resolution process
- Workload distribution
- Internal and external communications
- Team additions/terminations

Regulation for collaboration charter

Background and problem statement

There are regulations or lack of regulations, which currently help incentivize demolition and landfilling of construction and demolition materials. If we were to collaborate at all levels of government to work on promoting alternative approaches to managing building materials for prevention, reuse, and recycling, it will help to restructure the building sector and avoid wasting valuable resources.

Purpose/mission and reason for the team's existence

The goal of this subgroup is to identify and recommend changes, including new statewide regulations, policies, or sample ordinances that will support collaboration practices in material reuse by supporting or changing:

1. Permit timing (improve C&D, reduce contamination)
2. Preservation-building stewardship requirements
3. Certifications for demolition and for deconstruction operators
4. [State rules](#); building codes
5. State agency policies:
 - a. Minnesota Housing and Finance Agency
 - b. Percentage of material collection in state C&D projects and reuse
6. Solid waste ordinances

Questions to consider

- Who is doing what, and for whom?
- What successful project completion looks like?
- The business justification or expected benefit of the work

Interim and overall objectives that must be attained

- What is to be achieved and by when? Should include timelines, deliverables, check points, tracking and measurement
- Scope

Roles and responsibilities

- Are there additional skills or expertise that we need for project success?
- Are there any other teams or Individuals that need to be represented or consulted?
- Is the team strength enough for the work and the deadlines?
- Is there any training that the team members will need to complete the work successfully?

Operating guidelines

- Code of conduct and safe environment
- Meeting guidelines
- Decision making guidelines
- Conflict resolution process
- Workload distribution
- Internal and external communications
- Team additions/termination

Material processing and recycling efficiencies charter

Background and problem statement

Currently there is some processing of construction and demolition materials in the metro area and limited reuse and processing in Greater Minnesota. While there are different processes in place, the standard practice is for C&D material to be mixed together and brought to a central location. Not all facilities have magnets to separate out metals and sorting lines to pick out other commodities that have viable markets such as cardboard and shingles.

When the material is brought into the facility, mixed together and compacted, it can render some of the materials that would have been recycled, incapable of being recycled. If nothing changes with collection at the demolition site, this material will remain unusable.

Purpose/mission and reason for the team's existence

The goal of this subgroup is to review the materials in the C&D waste stream, recycling options for materials, how best to capture materials so the quality of the material remains intact, collection, transportation and distribution of the materials, and discussing new markets for materials.

Recommendations may include but are not limited to policy, data collection, and regulation in the areas of:

1. Enhanced required materials separation
2. Processing for recycling
3. Establishing minimum material grade standards
4. Research and development (R&D) of value-added products and services
 - a. Identify specific material issues (i.e. porcelain, gypsum); establish strategies to optimize reuse
5. Identifying workforce development opportunities
6. A measurement system to capture and track recycling and reuse that is occurring in the industry

Questions to consider

- Who is doing what, and for whom?
- What successful project completion looks like?
- The business justification or expected benefit of the work

Interim and overall objectives that must be attained

- What is to be achieved and by when? Should include timelines, deliverables, check points, tracking and measurement
- Scope

Roles and responsibilities

- Are there additional skills or expertise that we need for project success?
- Are there any other teams or Individuals that need to be represented or consulted?
- Is the team strength enough for the work and the deadlines?
- Is there any training that the team members will need to complete the work successfully?

Operating guidelines

- Code of conduct and safe environment
- Meeting guidelines
- Decision making guidelines
- Conflict resolution process
- Workload distribution
- Internal and external communications
- Team additions/terminations

New financial systems charter

Background and problem statement

Because construction and demolition (C&D) waste was thought to be inert material, until more recently, most C&D landfills were not lined. The solid waste tax for C&D materials is less than municipal solid waste - at only 60 cents per cubic yard. Now that we know there are some environmental impacts with C&D material, the tax structure needs to reflect that reality. Also, if valuable materials can be recovered, should the financial system reflect that as well, because it offsets environmental costs? This group will discuss how to change the financial system for C&D as the other portions of the system transition.

Purpose/mission and reason for the team's existence

The current financial system was not created to incentivize and support the diversion of construction and demolition materials. The goal of this subgroup is to identify and recommend changes in the current financial system that will maximize prevention, reuse, and recycling of C&D materials.

The subgroup is charged with considering changes that:

1. Align the financial system with the waste hierarchy to emphasize prevention and reuse while accounting for those C&D materials that need to be recycled or disposed of
2. Cover system costs through fees and permit costs
3. Create disincentives to disposal, such as tipping fees
4. Incentivize implementation by using grants and loans
5. Include reuse requirements in certain situations, such as bond-funded projects, etc.

Questions to consider

- Who is doing what, and for whom?
- What successful project completion looks like?
- The business justification or expected benefit of the work

Interim and overall objectives that must be attained

- What is to be achieved and by when? Should include timelines, deliverables, check points, tracking and measurement
- Scope

Roles and responsibilities

- Are there additional skills or expertise that we need for project success?
- Are there any other teams or Individuals that need to be represented or consulted during the project?
- Is the team strength enough for the work and the deadlines?
- Is there any training that the team members will need to complete the work successfully?

Operating guidelines

- Code of conduct and safe environment
- Meeting guidelines
- Decision making guidelines
- Conflict resolution process
- Workload distribution
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- Team additions/terminations

Appendix C: Initial 65 concepts from subgroup brainstorm

Subgroup	Action	Initial recommendation idea
Upstream building design	Incentive and pilot	Incentivize architects to use materials that are easily pulled apart from one another, can be moved easily, used in different ways (flexible), are reusable, repairable and recyclable.
	Incentive	Program in which single family homes and commercial buildings are more affordable/free with the agreement of investing in repairs and restoration to extend the life of the building.
	Education and incentive	Create funding/incentives to replace concrete with compressed lumber to reduce the environmental impact of larger structures and reduce fire risks. Focus EPDs on construction needs instead of an individual, specific material.
	Formal research	Initiate research project to identify factors that result in certain buildings being removed faster – commercial vs. residential, specific eras of construction, etc.
	Incentive	Create tax break when building construction uses low carbon materials (life cycle perspective) that are also low toxicity.
	Incentive	Create incentives (tax break or subsidy) for incorporating used materials into new structures.
	Incentive	Create a tax incentive for buildings to be used/preserved (not deconstructed or demolished) but renovated and sustainable (energy efficient, used materials and non-toxic materials).
	Incentive	Set up a program that has funding for manufacturers to create durable products that the manufacturer will want to take back at end-of-life.
	Incentive and pilot	Create tax incentive for building owner to remediate hazardous materials in order to reuse/preserve the building (reqs around maintaining % of structure).
	Pilot	Require manufacturers to include environmental impacts (inc GHG emissions) on products to encourage the use of the more sustainable option. Pilot with adding EPDs as a part of the State contracts.
	Pilot	Update B3 specifications, requiring use of building information modeling in state-owned building.
	Education	Require early phase energy modeling in building projects.
	Best practice - voluntary action	Within LCA calculations (likely starting with state projects), include the deconstruction or demolition of the existing building as well as the construction of the new building (incorporates embodied carbon).
	Regulation (requirement)	Establish a state mandate requiring EPDs on all construction and demolition materials.
	Regulation (requirement)	Implement tax on single family homes or structures exceeding XX sq ft.

	Regulation (requirement)	Increase the amount of multi-family dwellings vs single family homes as a part of city zoning (master plans); focus on urban centers.
	Regulation (requirement)	Remove restrictions/writing allowances on accessory dwelling units on lots as a part of city zoning (master plans); not intended for extra rentals like Air B&Bs.
	Regulation (requirement)	Apply requirements (like LEED and B3) for residential and commercial; notification to buyer at purchase to establish norms. Create a "certification" placard/promo to increase awareness.
	Regulation (requirement)	Create a regulation requiring a specific % of material sourced from used materials for building projects.
	Regulation (requirement)	Create regulation requiring buildings be built to allow flexible use (i.e. parking structure that can be repurposed in the future as an apartment).
	Regulation (requirement) and education	Establish a state mandate the use of building information modeling in a commercial setting.
	Regulation (requirement) and incentive	Require manufacturers prove products are durable, low/no toxicity, repairable, and receive a carbon tax based on the criteria they achieve. Funding is then used for the management of materials that align with those in the sold product (funding is provided only to certified demo/decon contractors to ensure it's used for materials that are managed correctly).
	Incentive	Encourage all government entities work together to create a program that would streamline building projects that meet B3 or higher standards for all permits and other regulations.
Best practice - voluntary action	Develop a list of contractors willing to work with and use salvaged materials (contractors would be certified so that the list can be maintained).	
Material value	Best practice - voluntary action	Determine process for auditing B3 projects to ensure compliance with standards (program has solid standards, but assumption is contractors aren't aware of the requirements and/or don't adhere to them without enforcement).
	Best practice - voluntary action	Modify local design and housing codes to encourage more unique architecture that would better create the space for reused materials.
	Education	Educate on-site project managers and get their buy-in around sourcing used/salvaged materials in construction.
	Education and pilot	Establish a state-funded deconstruction worker training program in partnership with existing educational institutions alongside their current construction training programs (i.e. St Paul College, Summit Academy, etc.).
	Formal research and incentive	Set up a program that has funding for research organizations to use challenging materials to create new products. During research process, use life cycle and product declarations to prioritize the materials selected for R&D.
	Incentive	Create separate funding pool within LCCMR that is set aside specifically for construction material R&D. In order to receive the funding, there must be a clear demonstration that the research is to make a material that reduces the environmental footprint for that construction function.

Incentive	Create grants for creating reuse building infrastructure to support this model of materials collection/exchange; requiring reporting and permitting.
Incentive and pilot	Create mechanism to have more time on the front-end of the project and create process with contractor that outlines savings/incentives to home owner for different reuse strategies (pre-permitting process).
Pilot	Set up a virtual information sharing site for collaboration across different material R&D centers.
Pilot	Identify location to start a pilot to add multiple dumpsters on job sites to do the sorting and determine an economic and process feasibility along with environmental impact measurement.
Pilot	Create funding (grants program) to pilot online directory for construction/building materials for existing orgs.
Pilot	Establish local process for recertifying structural lumber (mirror OR process).
Regulation (requirement)	Establish deconstruction certification/licensing program (includes training, formal certification, etc.) and demolition certification /licensing. Incorporate requirement as a part of permitting process that the contractor needs to be licensed in deconstruction.
Regulation (requirement)	Create a requirement to manage collection and storage as a part of solid waste system (i.e. at landfills and processing facilities).
Regulation (requirement)	Incorporate a building assessment into B3 standards that would be needed prior to any major project (regardless of assumed next steps being reno, demo, deconstruction, preservation, etc.).
Regulation (requirement)	Adjust building code restrictions to allow for reuse of recertified and regraded materials.
Regulation (requirement)	Give preference to furniture bids made from reused materials (other examples besides furniture?) within state contracts.
Regulation (requirement) and pilot	Identify location to start a pilot to require material checklists as a part of the residential and commercial pre-demo process. Tie the final project payment to the receipt of a waste plan (verified by third party participants managing the materials in the ways detailed in the plan). Longer-term would look towards regulation (likely metro to start) in order to influence greater enviro benefit.

Material processing and recycling efficiencies	Best practice - voluntary action	Create materials/resources that inform on materials that have higher risk for toxic elements.
	Best practice - voluntary action	Provide examples of a model business or best practices for smaller sorting facilities.
	Education	Create education campaign for homeowners including concepts of waste hierarchy and more sustainable building material management.
	Regulation (requirement)	Incorporate C&D waste hierarchy within B3 guidelines for materials management.
	Regulation (requirement)	Require processing of C&D materials before they go to a landfill.
	Regulation (requirement)	Deregulate some materials to generate markets, like allowing burning of salvaged wood for waste-to-energy.
	Regulation (requirement)	Refine definitions of "Construction & Demolition (C&D) debris" in statute, rule, and formal documentation - currently definitions are inconsistent and contradictory.
Regulation for collaboration	Best practice - voluntary action	Amend 10-day Notifications to include a waste plan (list where the following items will go: shingles, roofing, steel, non-ferrous, concrete, asphalt, sheet rock, flooring, etc.) as an initial step to tracking material flows across the state (limitations as this doesn't really account for residential).
	Best practice - voluntary action	Add ideas (best practices) related to redevelopment, reuse, and deconstruction to the GreenStep Cities Program and support them through education and workshops.
	Best practice - voluntary action	Create template for sustainable building ordinances that cities can mirror (Build Reuse ordinance guidance).
	Incentive	Provide grants to incentivize deconstruction over demolition for buildings with specific material value.
	Pilot	Create a pilot that deconstructs in different regions of the state to identify approach differences and building variety.
	Regulation (requirement)	Mandate that to receive a demolition permit for a house or duplex built before [1960 - determine best year based on markets and value of materials in the structures for that time/prior], the structure must be fully deconstructed so salvageable materials are diverted away from landfills for reuse, followed by recycling.
	Regulation (requirement)	Require annual reporting as a way to capture material types and amounts from the project completed by those contractors each year - accounts for commercial and residential.
	Regulation (requirement)	Require cities to create internal C&D policies that would include waste plans and goals for their city-owned properties. Cities could be given a time frame to adopt their own plan.
	Regulation (requirement) and incentive	Establish expedited demo permit review or waive some (all?) of permit fee for deconstruction practices and/or using reused building materials.
Regulation (requirement)	Refer to State of California's CalGreen construction waste requirements for guidance (California started with smaller requirement, 25 – 50%, and now requires 65% of C&D waste to be diverted). California verifies requirement through reporting either by a project-specific waste plan or using a verified company with existing waste documentation.	

New financial systems	Incentive	Create an incentive for more affordable multi-family housing structures, paired with requirements for larger homes (>2600 sq ft) to meet certain enviro specs in order to be built.
	Incentive	Create an incentive to dismantle/deconstruct first instead of taking materials offsite to be processed/recycled, paired with incentive for <i>use</i> of those reused materials to drive the market.
	Formal research and incentive	Establish funding to support ongoing R&D efforts for new materials with lower life cycle impacts and/or greater durability and reuse.
	Regulation (requirement)	Allocate a portion of the solid waste management tax specifically for C&D developments.
	Regulation (requirement)	Create a fee for teardowns/demolition mirroring what Portland, OR has implemented.
	Formal research	Initiate a research project to make the cost of demolition comparable to deconstruction and reflect the true cost of wasted materials.

Appendix D: 22 priority subgroup ideas and full SBG workgroup rankings

Ideas grouped by the subgroup that presented the idea	
Upstream building design	A: Create incentives (i.e. tax break, rebate, subsidy) when building construction uses low carbon materials (life cycle perspective) that are also less toxic.
	B: Create a tax incentive or financial incentive for buildings to be used/preserved, while still meeting energy efficiency standards.
	C: Set up a tiered incentive structure for building projects to use more sustainable products: <ol style="list-style-type: none"> Provide incentives for decision makers to require that products specified for projects have Environmental Product Declarations (EPDs). Provide further incentives if the products specified for a project perform better in the embodied carbon/greenhouse gas emissions category of the EPD than the industry average. Projects would be eligible for maximum incentives if they complete A and B above and also specify products from manufacturers that participate in extended producer responsibility programs like product takeback, free recycling, or other similar program.
	D: Include in LCA calculations the deconstruction or demolition of the existing building as well as the construction of the new building, and incorporate the information into the B3 standards for buildings in Minnesota (mandatory for State and government buildings).
	E: Conduct formal research to identify factors that result in certain buildings being removed faster (i.e. Dollar General and CVS building models tear down and construct new structures for every new store opened).
Material value	F: Establish a statewide, state-funded deconstruction training program that accompanies deconstruction/demolition licensing.
	G: Create statewide grants for expanding reuse building infrastructure to support a stronger model for materials collection/exchange (i.e. expand physical space/footprint for retailer storage and/or expand online marketplace options).
	H: Set up a program and funding pool specifically for organizations to use for projects testing/researching challenging C&D materials to create new products.
	I: Set up a virtual information sharing site for collaboration across different material R&D centers.
	J: Determine process for auditing B3 projects to ensure compliance with standards; environmental standards within B3 are comprehensive and detailed, but full review and enforcement of those standards is limited currently.
Material processing and recycling efficiencies	K: Establish C&D Waste Processing rule, requiring processing of C&D materials before they go to a landfill.
	L: Create, implement, and enforce 25-50% diversion requirement of C&D waste (including reuse and/or recycling) for new construction, demolitions, additions, and/or renovation projects.
	M: Deregulate certain materials to help create/expand additional uses (i.e. alternative daily cover, wood burning, etc.) for materials typically managed through landfill disposal.
	N: Establish C&D waste hierarchy in statute to be incorporated into existing guidelines (i.e. B3) and shared through an education campaign to various stakeholders.
	O: Redefine “construction and demolition (C&D) debris” within the C&D landfill rule definitions, since current definitions vary across statute, rule, and guidance documents. Additionally, clarify the definition to differently identify "debris" versus materials.

Regulation for collaboration	P: Create a deconstruction ordinance template that cities can adopt, establishing consistent standards across the state.
	Q: Provide grants to incentivize deconstruction.
	R: Require cities to create internal C&D policies that would include waste plans and goals for their city-owned properties.
New financial systems	S: Create an incentive (i.e. tax break, rebate, or subsidy) that encourages the use of reused, more repairable, and/or reusable materials in new building construction and/or renovation projects.
	T: Allocate a set amount of the solid waste management tax specifically for ongoing statewide C&D developments.
	U: Create an additional fee for teardowns/demolition to more closely align with the cost of deconstruction.
	V: Increase tipping fees for C&D disposal to more closely align with the cost of municipal solid waste (MSW) disposal.

Ideas ranked by SBG workgroup	Workgroup action
F: Establish a statewide, state-funded deconstruction training program that accompanies deconstruction/demolition licensing.	Research further and develop as final recommendation
B: Create a tax incentive or financial incentive for buildings to be used/preserved, while still meeting energy efficiency standards.	Research further and develop as final recommendation
K: Establish C&D Waste Processing rule, requiring processing of C&D materials before they go to a landfill.	Communicate concept as a consideration for C&D landfill rule writing
P: Create a deconstruction ordinance template that cities can adopt, establishing consistent standards across the state.	Research further and develop as final recommendation
L: Create, implement, and enforce 25-50% diversion requirement of C&D waste (including reuse and/or recycling) for new construction, demolitions, additions, and/or renovation projects.	Research further and develop as final recommendation
T: Allocate a set amount of the solid waste management tax specifically for ongoing statewide C&D developments.	Research further and develop as final recommendation
V: Increase tipping fees for C&D disposal to more closely align with the cost of MSW disposal.	Communicate concept as a consideration for C&D landfill rule writing
S: Create incentive (i.e. tax break, rebate, or subsidy) that encourages the use of reused, more repairable, and/or reusable materials in new building construction and/or renovation projects.	Research further and develop as final recommendation

Additional ideas that didn't rank in the top choices and were not developed further

N: Establish C&D waste hierarchy in statute to be incorporated into existing guidelines (i.e. B3) and shared through an education campaign to various stakeholders.
R: Require cities to create internal C&D policies that would include waste plans and goals for their city-owned properties.
O: Redefine "construction and demolition (C&D) debris" within the C&D landfill rule definitions, since current definitions vary across statute, rule, and guidance documents. Additionally, clarify the definition to differently identify "debris" versus materials.
Q: Provide grants to incentivize deconstruction.
A: Create incentives (i.e. tax break, rebate, subsidy) when building construction uses low carbon materials (life cycle perspective) that are also less toxic.
G: Create statewide grants for expanding reuse building infrastructure to support a stronger model for materials collection/exchange (i.e. expand physical space/footprint for retailer storage and/or expand online marketplace options).
U: Create an additional fee for teardowns/demolition to more closely align with the cost of deconstruction.
<p>C: Set up a tiered incentive structure for building projects to use more sustainable products:</p> <ol style="list-style-type: none"> a. Provide incentives for decision makers to require that products specified for projects have Environmental Product Declarations (EPDs). b. Provide further incentives if the products specified for a project perform better in the embodied carbon/greenhouse gas emissions category of the EPD than the industry average. c. Projects would be eligible for maximum incentives if they complete A and B above and also specify products from manufacturers that participate in extended producer responsibility programs like product takeback, free recycling, or other similar program.
M: Deregulate certain materials to help create/expand additional uses (i.e. alternative daily cover, wood burning, etc.) for materials typically managed through landfill disposal.

I: Set up a virtual information sharing site for collaboration across different material R&D centers.

H: Set up a program and funding pool specifically for organizations to use for projects testing/researching challenging C&D materials to create new products.

D: Include in LCA calculations the deconstruction or demolition of the existing building as well as the construction of the new building, and incorporate the information into the B3 standards for buildings in MN (mandatory for State and government buildings).

E: Conduct formal research to identify factors that result in certain buildings being removed faster (i.e. Dollar General and CVS building models tear down and construct new structures for every new store opened).

J: Determine process for auditing B3 projects to ensure compliance with standards; environmental standards within B3 are comprehensive and detailed, but full review and enforcement of those standards is limited currently.
