Opportunities for Circularity of Wood in Construction, Renovation and Demolition in Canada

Workshop Report

Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canada

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CONTENTS

LIST OF TABLES

1. BACKGROUND

The construction, renovation, and demolition sector plays a significant role in the Canadian economy, contributing approximately $141 billion to the gross domestic product in 2020[1]. Simultaneously, the sector generates a significant volume of waste. Environment and Climate Change Canada's National waste characterization report identified construction, renovation, and demolition (CRD) waste as a major contributor to Canadian landfills[2]. Approximately 4 million tonnes of annual CRD waste was generated in Canada (according to Statistics Canada estimate), and this figure could be much higher depending on how this waste is tracked.[3] Globally, the construction industry uses about 30% of total raw materials extracted, and generates an estimated 30% of global waste.[4]

This volume represents not only a loss of economic value, but also greenhouse gas emissions from landfill methane, a demand on the solid waste management system and a driver for increased consumption of virgin materials. Strategies aimed at waste reduction in the CRD sector have the potential to achieve multiple economic and environmental benefits and accelerate the transition to a circular economy.

Furthermore, CRD waste generation has the potential to grow in the coming years, if left unchecked. With housing development expected to grow across Canada to address the national housing crisis, and renovations and deep retrofits expected to upgrade the building stock and improve energy efficiency, increased CRD sector activities are expected. Given current knowledge on CRD waste generated, and potential for reduction and diversion through new practices and policies, timing is critical to adapt and adopt practices and policies to improve the circularity of CRD materials, including wood.

Inaction would not only represent a loss of economic value, from the jobs and revenues that could be created by keeping CRD wood materials in circulation, but also continue to strain solid waste management systems by filling landfills and miss opportunities to reduce carbon emissions from landfill methane.

Although wood materials from construction, renovation and demolition activities in Canada have traditionally been treated as "waste", there is a growing body of evidence that individuals, companies, governments and organizations are recognizing these materials as valuable resources and keeping them circulating in the economy. Circular businesses, regional models for market exchanges, and emerging policies and initiatives are helping to seize and create new opportunities for jobs and revenues, waste diversion, GHG emission reduction, and other social benefits. Strategies for waste reduction in the CRD sector are imperative to advance Canada towards a circular economy model. They would lead to economic and environmental

[1] Delphi Group In Partnership with SCIUS Advisory (2021). *Circular economy and the built environment sector in Canada:* 1. https://delphi.ca/wp-content/uploads/2021/04/Circularity-in-Canadas-Built-Environment-Final-Report-April-14-2021.pdf
[2] Environment and Climate Change Canada (ECCC). (2020). *National Waste Characterization Report: The Composition of Canadian Residual Municipal Solid Waste.* URL: https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf
[3] Canadian Council of Minister of the Environment (CCME). (2019). *Guide for Identifying, Evaluating and Selecting Policies for Influencing Construction, Renovation, and Demolition Waste Management*: 18. https://ccme.ca/en/res/crdguidance-secured.pdf
[4] Delphi Group in Partnership with Dillon Consulting. (2023). *Economic & Environmental Assessment of Waste Diversion in Canada's Construction & Demolition Sector Study*: 7

benefits through enhanced waste diversion practices and expansion or creation of secondary markets for CRD wood.

Environment and Climate Change Canada's Waste Reduction and Management Division (ECCC-WRMD) contracted ERM to facilitate a workshop with key stakeholders from across Canada to gather information on the current sources of supply and demand for wood materials from CRD in Canada, identify challenges and opportunities around diversion and circularity of wood, and priority actions to drive circular solutions.

There are several ways that the federal government can support increased circularity in the CRD sector including:

- **Data** – Gather and/or fund waste audits and material flow analysis to collect data that support policy guidance at multiple levels;
- **Research Studies** – Address information gaps to support opportunities for collection, triaging, and processing of waste and to help understand and reduce barriers;
- **Convening stakeholders** – organize workshops or working groups to foster collaboration, receive and integrate input from multiple stakeholders and inform policy direction;
- **Tax Credits –** provide federal tax credits to encourage material recovery;
- **Pilot and Capital Projects –** provide funding to Federation of Canadian Municipalities and/or Regional Economic Development Agencies to support projects advancing circularity initiatives;
- **Codes & Standards** – participate in codes and standards development efforts for use of CRD materials to inform policy development and other initiatives;
- **Innovation** – fund the development of novel processes or products to expand secondary markets for wood from CRD;
- **Applied Research (including research, development and demonstration)** – fund National Research Council projects to develop processes and products for circularity of CRD wood to reduce volumes landfilled and enable higher value uses; potentially fund other organizations (e.g., academia, research centres).

1.1 ABOUT THIS REPORT

This report was prepared by ERM Consultants Canada Ltd. and summarizes the key findings of the workshop on *Opportunities for Circularity of Wood in Construction, Renovation, and Demolition in Canada* and recommendations for federal roles to support expanded circularity of construction, renovation, and demolition materials, with a focus on reclaimed wood.

2. ABOUT THE WORKSHOP

The full-day workshop took place on February 26th, 2024 in Ottawa, Ontario, and was facilitated by ERM and led by ECCC-WRMD. Through this workshop, ECCC-WRMD wanted to understand the current landscape and opportunities for diversion and circularity of wood materials in Canada. The objectives of the workshop were to:

- Identify current sources of supply of materials (e.g., from residential deconstruction and new construction sites);
- Understand current areas of demand for these materials (secondary market pathways for the reclaimed wood);
- Determine how existing and potential policies and initiatives, particularly federal/ECCC, might enable expanded circularity for these materials.

Several stakeholders from across Canada participated in the workshop, including municipalities, companies, non-governmental and non-profit organizations, and federal officials from various departments (See Appendix A for the attendee list). The workshop consisted of four panel discussions with experts in the fields of waste management, circularity, and CRD who shared their knowledge on the challenges and opportunities for diverting CRD waste, particularly wood materials. Between presentations, small group and plenary discussions were conducted to exchange ideas and identify potential solutions for the diversion of wood materials (See Appendix B for the agenda).

3. KEY FINDINGS

3.1 CURRENT INITIATIVES TO IMPROVE WOOD CIRCULARITY IN CANADA

The workshop featured panels who shared initiatives to improve CRD wood circularity in communities and nationally (initiatives are summarized below and organized by stakeholder group). Additional information about the organizations below can be found in Appendix C, along with information about other organizations that attended the workshop and their respective efforts related to CRD wood circularity.

3.1.1 NON-GOVERNMENTAL & NONPROFIT ORGANIZATIONS

Circular Economy Leadership Canada (CELC) *is an incubator and convener that brings stakeholders together to advance the circular economy in Canada*. Through their Construction and Built Environment work stream, CELC is focused on applying circular strategies to extend the life of existing buildings including preserving materials and embodied carbon. CELC co-leads this initiative with Canadian Standards Association (CSA) Group and is working with thought leadership organizations in Canada to develop a framework for a national circular built environment and construction strategic plan. Results of the first two phases of this initiative have been published in the form of two CSA research reports:

- The circular built environment in Canada: A review of the current state, gaps and opportunities
- The circular built environment in Canada: A strategic framework for future action

Canadian Standards Association (CSA) Group *has been a leading developer of standards-based solutions in Canada for over a century.* It manages the Canadian Mirror Committee to the ISO Technical Committee on Circular Economy (ISO TC 323), which is tasked with developing the first three international standards on circular economy, set for publication by summer 2024. Additionally, CSA is collaborating with stakeholders such as the National Research Council to advance the decarbonization of the construction sector through standards for construction materials, including secondary wood materials.

Circular Opportunity Innovation Launchpad (COIL) *drives circularity through organizations, supply chains and material streams with its trail-blazing and targeted systems-change programming.* COIL has implemented various pilot projects and interventions to address circularity of CRD wood materials such as:

- Source separation pilot at new residential construction sites;
- Deconstruction pilot;
- National CRD Circular Innovation Challenge;
- Developing a CRD waste management guidebook (with AET Group).

Climate Smart Building Alliance *is comprised of a group of building sector leaders, focused on achieving net zero and promoting climate action.* Collaborates with industry, governments, researchers, and innovators to test and prototype solutions for climate-smart systems change. The Climate Smart Building Alliance's priority pillars include:

- Increase use of low and zero carbon building materials;
- Reduce fossil fuel combustion and support a clean electrical system;
- Accelerate retrofits and net-zero new builds.

Habitat for Humanity Canada *is a global charity which operates in over 70 countries to provide decent and affordable housing while fostering community support for families in need.* Established ReStores across Canada that accept surplus building materials and gently used furniture for resale, redirecting them from entering landfills while directing the proceeds toward funding community housing projects. Habitat for Humanity Canada also works with national distributors to offer pick-up services for these materials.

3.1.2 COMPANIES

Light House – *provides research and project management services to businesses, policy makers, real estate and construction industries*. Operates Building Material Exchange which facilitates industrial symbiosis by connecting industries/companies to repurpose waste materials as inputs for others. Through this collaborative platform with contractors, developers, and building material producers, the Exchange helps to promote the reuse, repurposing and recycling of materials.

AET Group *is an environmental consultancy firm specializing in diverse services across 12 core practice areas, including building sciences, waste, and audits.* In 2023, AET developed the CRD Waste Management Guidebook for the City of Guelph.

Ouroboros Deconstruction *offers a sustainable alternative to demolition, specializing in deconstruction and material salvage.* Materials salvaged by Ouroboros are donated back to the community, sold through their burgeoning network of buyers or recycled through partners to ensure the highest and best use of materials and diversion rate from the landfill.

VEMA Deconstruction *provides a sustainable solution for the removal of buildings through deconstruction as the principal salvaging technique to recover materials for reuse or upcycling*. The community benefits from this not only by reducing landfill waste, but also by having access to affordable materials. Specializing in the deconstruction of single-family homes, the company primarily recovers valuable lumber. A significant partnership with Urban Machine highlights a transformative shift towards a future where sustainable deconstruction practices and environmental stewardship are paramount.

Heritage Lumber *manufactures and distributes reclaimed lumber and wood products that are salvaged from older buildings*. The company secures its reclaimed materials through various deconstruction and demolition firms throughout Canada. This network allows Heritage Lumber to offer a varied inventory that includes different sizes, qualities, and types of lumber. The company focuses on old-growth lumber derived from historic buildings and structures in British Columbia and beyond.

3.1.3 MUNICIPALITIES

The City of Toronto *is developing a Circular Economy Road Map, aiming to deliver circular outcomes within municipal operations, community-wide level programs and policies over a 10-*

year strategy. Based on a material flow analysis, the construction sector was identified as a high priority sector with high material consumption rates. The City of Toronto's waste utility manages a small portion of CRD waste, relative to the amount of waste being generated within its borders. The City offers diversion programs for its customers that include drywall, porcelain, and metals. Updates to the Official Plan include policies targeting waste reduction and circular economy goals, while the Toronto Green Standards offer voluntary performance measures and financial incentives for waste diversion and the adoption of sustainable building materials. The City of Toronto was also the first jurisdiction in North America to set whole-building embodied carbon caps on City-owned buildings.

The City of Edmonton – Focused on developing regulations and strategies, particularly for the industrial, commercial, and institutional (IC&I) sector, with plans to revisit regulations in the future. Additionally, they aim to align with climate and circular economy goals by developing a roadmap for IC&I waste management.

Metro Vancouver – Developed a Construction and Demolition Waste Reduction and Recycling Toolkit to provide contractors and building owners with practical information on sustainable alternatives to demolition. Several municipalities in the Metro Vancouver region have adopted regulations requiring diversion and/or reuse of CRD materials (e.g., including Vancouver's green demo by-law).

3.2 CHALLENGES AND BARRIERS AROUND DIVERSION AND CIRCULARITY OF CRD WOOD MATERIALS

Panelists and participants discussed the challenges and barriers around the circularity of CRD wood materials in Canada. The sections below summarize the key messages that emerged from discussions.

Misalignment between, and low levels of, supply and demand hinder secondary markets.

Limited Sources of Supply

Most CRD wood is landfilled with limited amounts being recovered due to several factors, including:

- Few collection channels (to collect, sort and process materials);
- Few incentives or policy signals to support recovery and reuse/repurposing;
- Few skilled recovery agents (e.g., for deconstruction, salvage, processing);
- Few physical locations for collection, storage, processing.

Limited Options for Secondary Markets

While some secondary markets exist, with regional variation, they are fairly limited and primarily for materials such as mulch waste to energy (e.g., process engineered fuel), rather than higher value products like flooring and furniture. These limited options are due to several factors, including few recovery and resale agents, and low market demand, given the infancy of this new 'system' (see other related challenges below). A deconstruction participant indicated based on experience; use of any salvaged lumber has to be regraded in all provinces.

Access to Reclaimed Wood and Cost Competitiveness

While there are examples of reclaimed CRD wood being cost competitive with new materials5, participants acknowledged that supply is largely not yet competitive with virgin materials. Factors influencing the price include:

- Whether the wood is coming from new construction, demolition, or deconstruction;
- The type and quality of the reclaimed wood, with barn boards, heavy timber, and old growth lumber being higher value compared with conventional lumber;
- Channels for collection and repurposing/resale;
- Existence of regional secondary markets;
- Whether or not there are policies in the region that encourage circularity of CRD wood materials.

All of these factors influence the potential for recovery and resale. To make supply competitive, wood needs to be high quality, clean, in high volume (for certain buyers/secondary markets), and cost-effective. Wood containing contaminants like spray foam, adhesives, lead based paints, hardwood finishes, or plastic based membranes are not a candidate for most secondary markets (except high temperature applications / industrial installations).

Connecting sellers and buyers

Collection of CRD materials requires storage capacity in locations that are accessible for the end user. Storage costs, whether rented or owned, and lack of infrastructure (to collect and store, sort and process) to facilitate distribution make accessibility of recovered wood difficult for both sellers and potential buyers.

Low demand for recovered materials is in part due to the abovementioned supply challenges, as well as a lack of collaboration, coordination, and awareness among potential partners that could send/receive wood materials.

The CRD sector is highly fragmented, requiring partnerships and coordinated efforts across multiple stakeholders to advance circularity initiatives.

Participants stated that CRD projects often involve multiple contractors and subcontractors which poses coordination challenges when trying to implement circularity initiatives. There are currently no existing codes (national or provincial) that address reduction of waste or incorporation of recycled content from CRD waste. That said, upcoming National Building Code updates are expected to address embodied carbon.

Companies that might otherwise support circularity by taking in and re-selling used wood, such as big box hardware stores, cannot because volumes are too low for it to be profitable or viable (reliable – i.e., consistent size/shape/quality of supply is also a factor) for them. Therefore, there needs to be more collaboration within and among companies, as well as across jurisdictions, to channel high volumes of good quality materials to enable the highest recovery rate for wood materials. In addition, they would not be able to sell such materials as 'structural' materials until and unless they are graded and certified, though there may be potential to explore them being sold 'as is' (without labeling as structural materials).

Varying levels of awareness and understanding of recovered wood materials.

[5] For instance, Habitat Restores sell lumber at a discount compared to new retail wood, and deconstruction firms have indicated they are able to sell some reclaimed wood at a discount, compared to new

There is a lack of common narrative or language around wood circularity nor clarity on how it could be cost-effective. Additionally, policies encouraging reuse and diversion are challenging to develop due to limited information on the wood supply chain and its drivers, which will differ regionally; though this gap is starting to be filled with research conducted at both the regional/municipal level (on material flow analysis) and at the national level (ECCC recent national waste characterization study and study of waste diversion for four C&D materials[6]). It was acknowledged that builders understand this issue of wood circularity from CRD as an 'embodied carbon' issue, which is something to consider for communications with builders.

Limited government support and intervention to enable scaling up of wood circularity.
Participants stated that there is limited support through current government policies (at all levels) for circularity of wood materials. Enabling policies may include: amending building code provisions (to allow for use of reclaimed wood, if graded/certified); providing incentives; coordination across and among orders of government to support complementary policies, where possible (and reduce unintended consequences – e.g., "moving the problem elsewhere"); and introducing and enforcing laws (or contractual requirements, in the case of public sector building demolitions) pertaining to the appropriate disposal of waste (e.g., requirements for recovery and recycling of materials during demolition, rather than waste disposal) with penalties introduced in cases of non-compliance.

Participants stated that developers favor demolition over deconstruction because demolition and clearing could take days, while deconstruction could take a few weeks. Municipal permitting processes can inadvertently reinforce this challenge. For example, demolition permits and building permits are typically issued at the same time to manage risks such as potential long-term empty lots, unattended open excavations, bad faith evictions and land speculation without building.

3.3 OPPORTUNITIES & DRIVERS AROUND DIVERSION AND CIRCULARITY OF CRD WOOD MATERIALS

Panelists and participants discussed the opportunities and drivers related to circularity of CRD wood materials in Canada to help address challenges and barriers. The sections below summarize the key messages that emerged from discussions.

Coordinated regional and national efforts to establish markets for CRD recovered wood could help address limited sources of supply.
Boosting supply to the system with policies and initiatives such as material exchanges (e.g., Regional District of Nanaimo) could encourage deconstruction, source separation of wood at new residential building sites, collection and donation[7] or delivery for recycling[8], instead of disposal. This should be done in parallel with expanding secondary market opportunities.

Expand secondary market opportunities.

[6] Economic & Environmental Assessment of Waste Diversion in Canada's Construction & Demolition Sector Study
[7] To Habitat Restores, where these exist, or to others as part of an exchange
[8] To facilities like TRY Recycling and Tomlinson Recycling, where these exist

In parallel with efforts to boost supply, expand secondary markets with policies and initiatives that encourage more recovery and resale agents to enter the market by addressing existing barriers. Develop and communicate policy measures to help create market incentives (as outlined in this report). Complement these efforts with innovation and applied research to develop additional potential market applications, develop and offer skills training to support recovery and processing of CRD wood materials (see other measures below).

Establish convenient and affordable infrastructure to store, sort, and/or process wood materials to support supply and demand alignment.
Participants expressed the need for source separation, storage and sorting infrastructure, and material hubs to make supply more accessible. For example, if there is insufficient wood material to meet buyer quantity requirements, long-term storage allows suppliers to maintain material inventories to satisfy quantity requirements instead of landfilling. Such infrastructure could also provide a space to clean and separate wood (by size, type, quality) to support characteristics required by various potential buyers and secondary markets. Locations for point of sale, which may or may not differ from sorting operations, should also be convenient for end users to access materials.

Strategic collaborations to enable the scaling up of wood circularity in Canada.
Participants discussed various types of partnerships that are needed, including:

- **Collaboration among complementary industry partners to exchange materials**. For example, replicate efforts to establish building material exchanges (e.g., in the Regional District of Nanaimo) – so one company's waste becomes another's resource. In addition, when a company is working on a demolition, collaborating with potential recovery companies or end users can prevent the wood from going to landfill by allowing some deconstruction/salvage before demolition.
- **Collaboration across the value chain to collect data** (e.g., volume of recoverable wood waste, construction/deconstruction/demolition waste – by region) which will support communication, guidance, and new initiatives and policy.
- **Collaboration among insurance companies, their contractors and recovery agents**. For example, when a building is damaged by flooding, contractors could be contractually obligated to donate salvageable materials to a charity (e.g., Habitat for Humanity Restores) or participate in building material exchanges – where these options exist.
- **Collaboration within regions to identify and help coordinate stakeholders.** Regional governments and municipalities could collaborate to identify and help organize communities of stakeholders (suppliers, buyers, intermediaries), for instance through material exchanges.
- **Collaboration across regions to share best practices and lessons learned.** Regions will differ in their available supply and demand, stakeholders involved, and related practices and policies. Sharing lessons learned will help practices and policies best suited to different regional circumstances become established more quickly and smoothly, enable supply and demand alignment (practices and systems), and help scale wood circularity initiatives.

- **Collaboration among construction and demolition stakeholders, and reuse and recycling partners to support consistent diversion**. Increase awareness of options to reuse and recycle, expand such operations in different regions. For instance, wood (unused or cut) at residential construction sites could be source-separated (e.g., with 'The Better Bin') and pick-up could be arranged with local Habitat Restores. Damaged or dirty (with stains, treatments) wood could be taken to construction and demolition recycling centers (e.g., TRY Recycling, Tomlinson Recycling) for processing into materials for secondary markets (e.g., finely ground materials for animal bedding, mulch for landscaping, chips for energy).

Education and awareness campaigns to showcase the benefits of wood circularity in the CRD sector.

Participants discussed the importance of articulating the benefits of taking on circular initiatives to different stakeholders. Some examples of the different lenses the issue could be expanded from include sustainability (including climate change/greenhouse gas emission reductions), affordability, communities, revenues, and employment to generate buy-in. Participants also talked about making a business case for circularity that demonstrates the cost of waste associated with conventional construction (e.g., savings of materials, and related cost savings, from adopting practices recommended in AET's Guidebook) and the cost of waste associated with demolition vs deconstruction. They discussed initiatives such as developing case studies and educational programs, developing guidance documents (e.g., list of local firms and their roles, protocols, guidelines) on diversion to provide contractors, celebrating organizations that are implementing initiatives, and leveraging the media to educate the public. Storytelling was discussed as an effective tool to support a culture shift around wood circularity in the CRD sector.

Participants also stated that standardized terminology for wood materials diversion that is accessible should be developed to ensure common understanding among stakeholders through using the same language and interpretations.

Leverage and/or create policy mechanisms to support wood circularity.

Participants mentioned specific areas for consideration, including:

- Developing a framework to identify and assess materials suited for recovery:
  - to inform municipalities' approach, in terms of which residential buildings are included in demolition bylaws that encourage recovery (e.g., expand this scope to additional buildings that contain materials where recovery may be warranted);
  - to outline options for supply (types of materials that could be recovered, sources) and demand (options for secondary markets).
- Identifying reusable or recyclable materials and developing corresponding policy and guidance for companies;
- When procuring services in government, ensuring companies are implementing their waste diversion initiatives through audits;
- Financial incentives for deconstruction, storage;
- Developing standards for embodied carbon in buildings and building design. For instance, the Canada Green Building Council (CaGBC) has developed a Design Standard

for new construction of certified Zero Carbon Buildings. In addition, in the next updates, National Building Code is expected to address embodied carbon;

- Implementing material passports at the building design phase to communicate material composition, enabling informed decisions to be made at the end of life.

Municipalities/ Regions

- Offering incentives (e.g., faster permitting, tax benefits) to property owners and developers to choose deconstruction over demolition;
- Demolition by-laws requiring a certain percentage of waste recovery;
- Decoupling deconstruction permits from overall permitting timelines (demolition before building, with demolition issued in sufficient time to support deconstruction) and ensure permits contain quotas to salvage materials, and/or that waste management plans are in place to meet permit requirements;
- Implementing a disposal surcharge for CRD wood materials at municipal/transfer stations landfills;
- Requiring/instituting burn permits with criteria that can disallow burning in favour of deconstruction (i.e., for barns);
- Conducting municipal/regional material flow analyses to understand existing and potential sources of CRD wood supply and demand for recovered CRD wood - important to conduct such analysis at the regional level, given opportunities will be region-specific.

Federal

- Requiring federal government CRD projects to incorporate extensive waste diversion and publicly report on outcomes to expand accessible information on challenges and solutions;
- Utilizing the carbon credit market as an incentive (e.g., offsets);
- Conduct (gather and/or fund) consistent national waste characterization studies (including support for waste audits and material flow analysis - to collect data that support policy guidance at multiple levels);
- Funding R&D projects focused on valorizing wood materials in the CRD sector;
- Provide evidence and engage with the Building Code process to have CRD considered for inclusion in the National Model Building Code. Support provincial and territorial adoption of CRD related activities in P&T building codes;
- The following additional forms of federal support, presented at the workshop, received support from participants:
    - **Research Studies** – Address information gaps to support opportunities for collection, triaging, and processing of waste and to help understand and reduce barriers;
    - **Convening stakeholders** – organize workshops or working groups to foster collaboration, receive and integrate input from multiple stakeholders and inform policy direction;
    - **Tax Credits –** provide federal tax credits to encourage material recovery;

- **Pilot and Capital Projects –** provide funding to Federation of Canadian Municipalities and/or Regional Economic Development Agencies to support projects advancing circularity initiatives;
- **Codes & Standards** – participate in codes and standards development efforts for use of CRD materials to inform policy development and other initiatives;
- **Innovation** – fund the development of novel processes or products to expand secondary markets for wood from CRD;
- **Applied Research (including research, development and demonstration)** – fund National Research Council projects to develop processes and products for circularity of CRD wood to reduce volumes landfilled and enable higher value uses; potentially fund other organizations (e.g., academia, research centres).

4. PRIORITY ACTIONS AND NEXT STEPS

Participants were asked to identify the priority actions the federal government can undertake to leverage the opportunities and drivers identified and improve/scale up wood circularity in the Canadian CRD sector. Multiple priorities were identified, summarized here:

Apply convening function to work with various stakeholders to advance national CRD wood circularity efforts	Foster coordinated action, informed by various perspectives, to advance national efforts and define and implement federal roles - e.g., supporting development and growth of circular businesses, material exchanges, and secondary markets; funding research to understand issues and opportunities; developing common vocabulary; sharing and developing best practices and guidance; collaboration with provinces and territories on areas of interest (e.g., national model building code was suggested at this workshop).
Develop policy that addresses key opportunities from this report, and from ongoing engagement efforts, and is substantiated by robust data collection processes.	Through ongoing stakeholder engagement, including federal collaboration, prioritize efforts and develop policy to address key opportunities. There was also support for consistent national waste characterization and regional material flow analyses to be developed and used to inform policy. Federal government, and others, could continue to explore and promote successful regional initiatives, to replicate and expand them (e.g., COIL, Nanaimo Building Exchange) and complementary national efforts (e.g., CSBA Pact, CELC work with CSA).
Provide funding, financial incentives for innovative projects, collaborations, and research advancing wood circularity.	Participants agreed that federal government should support applied R&D projects and initiatives that enable collaboration across the supply chain, bolstering supply and demand for CRD wood materials. They can also support and studies that expand the body of research in the CRD sector and CRD wood circularity. Funding and financial incentives could also be identified to address policy priorities outlined above.

Table 1 summarizes the challenges, corresponding opportunities, and next steps that should be undertaken to advance CRD wood circularity in Canada.

TABLE 1: NEXT STEPS FOR ACTION (TO ADDRESS CHALLENGES, OPPORTUNITIES)

Challenges	Opportunities	Next Steps
Misalignment between, and low levels of, supply and demand hinder secondary markets.	Coordinated regional and national efforts to establish markets for CRD recovered wood could help address limited sources of supply. Expand secondary market opportunities. Establish convenient and affordable infrastructure to store, sort, and/or process wood materials to support supply and demand alignment.	• Apply convening function to work with various stakeholders to advance national CRD wood circularity efforts. • Develop policy that addresses key opportunities from this report, and from ongoing engagement efforts, and is substantiated by robust data collection processes. • Provide funding, financial incentives for innovative projects, collaborations, and research advancing wood circularity.
The CRD sector is highly fragmented, requiring partnerships and coordinated efforts across multiple stakeholders to advance circularity initiatives.	Strategic collaborations would enable the scaling up of wood circularity in Canada.	
Varying levels of awareness and understanding of recovered wood materials.	Education and awareness campaigns to showcase the benefits of wood circularity in the CRD sector.	
Limited government support and intervention to enable scaling up of wood circularity.	Leverage and/or create policy mechanisms to support wood circularity.	

4.1 LOOKING AHEAD

Participants suggested that the private sector should play a key role, leading a cultural shift in the CRD sector, as they are key players in driving supply and demand and are responsible for implementation of wood circularity initiatives. However, support and guidance from the federal government is paramount for this shift to be successful. The whole lifecycle of buildings needs to be examined, down to everyday processes and practices (e.g., request for proposals, site practices).

Participants provided examples of specific changes that need to occur, for example, those working in deconstruction emphasized the need for companies to be proactive by considering circularity at the building design phase. Instead of demolition being the default, structures could be assessed for partial or full deconstruction, with demolition being the last option. The sector should also consider that while the ideal is to strive for the best use of the material (e.g., reuse), it may not always be feasible and other opportunities should be looked at (e.g., recycling into wood chips, mulch, when best suited for those products). Participants provided the following examples to demonstrate how wood materials can be used:

- Recovered mass timber or other forms of materials for non-structural or interior work*;
- Recovered wood for applications where integrity (i.e., structural material performance) is not required and grading and certifying the wood would not be required (e.g., for furniture or flooring;
- Wood going to fuels, displacing fossil fuels;
- Wood fiber insulation for padding which has lower embodied carbon than fiber glass.[9]

Participants noted that industry, governments, and other organizations might consider establishing circularity practices in the same way that other cultural shifts have changed the industry for good, with emphasis on non-competitive improvements; as is the case for safety culture. This may be enabled by increased education and awareness around the benefits of wood circularity as well as buy-in from leaders. Wood circularity commitments can be built into existing corporate net zero commitments or developed in tandem.

As with any emerging area, supply and demand for CRD wood will take time and coordinated effort to become established. There will be a need to expand collection, processing, and re-distribution/resale channels, and to identify, develop and implement any policies, incentives, and supporting initiatives that could be instrumental to establishing and expanding this new system.

[9] Given that currently building code provisions on reusing salvaged lumber for structural application don't exist, the accountability for the use of structural products listed above currently falls on the engineer of record on a project.

APPENDIX A ATTENDEE LIST

List of Attendees – ECCC Workshop February 26

#	Organization	Name
1.	City of Guelph	Vivian DeGiovanni
2.	Calgary	Lee-Anne Bell
3.	Metro Vancouver	Adriana Velazquez
4.	Gatineau	Christelle Honnet
5.	Ottawa	Nichole Bienasz
6.	Ottawa	Carol Hall
7.	Climate Smart Building Alliance	David Messer
8.	CSA Group	Dwayne Torrey
9.	CSA Group	Ivica Karas
10.	Habitat for Humanity	Lisa Voycey
11.	Habitat for Humanity	Alana Lavoie
12.	CERIEC	Alice Rabisse
13.	Dillon Consulting	Heidi Gerlach
14.	AET	Larry Freiburger
15.	City of Toronto	Meaghan Davis
16.	Circular Innovation Council	Joanne St. Godard
17.	Cooperators	Cyndi Seifried
18.	Ouroboros Deconstruction	Meredith Moore
19.	TRY Recycling	Derick Crane
20.	TRY Recycling	Christian Krupa
21.	Circular Innovation Council	Andrew Telfer
22.	Environment and Climate Change Canada	Beth Baxter
23.	National Research Council	Lexi Thompson
24.	Natural Resources Canada	Alexandre Bigonesse
25.	Federation of Canadian Municipalities	Corey Pembleton
26.	Boundless Accelerator	Christopher Coghlan
27.	Tomlinson	Lee Timmins

#	Organization	Name
28.	Wood-Source	Hank Vedder
29.	Canada Wood Council	Natasha Jeremic
30.	Treasury Board Secretariat	Rob Cooney
31.	Natural Resources Canada	Bruno Gagnon
32.	City of Vancouver	Andrea McKenzie
33.	Canada Mortgage Housing Corporation	Vinu Subashini Rajus
34.	Circular Economy Leadership Canada	Paul Shorthouse (Virtual)
35.	Heritage Lumber	Adam Corneil (Virtual)
36.	Vema Deconstruction	Erick Serpas Ventura (Virtual)
37.	City of Edmonton	Alison Abbink (Virtual)
38.	Light House	Gil Yaron (Virtual)
39.	Environment and Climate Change Canada (ECCC)	Catherine Kerr
40.	ECCC	Shankari Sreetharan
41.	ECCC	Sophie Bernier
42.	ECCC	Afreenish Yusirah
43.	ECCC	Samuel Kerr
44.	ERM	Katie Baker
45.	ERM	Savina Caporali
46.	ERM	Isha Mistry
47.	The Re4m Company	Heather Jeffrey (*colleague attended on her behalf*)

APPENDIX B WORKSHOP AGENDA

Opportunities for Circularity of wood in Construction, Renovation and Demolition in Canada Workshop Agenda

Objectives: Reduce domestic wood waste arising from Construction, Renovation and Demolition (and thereby reduce associated environmental impacts – e.g., volumes in landfill, GHGs), by focusing on expanding sources of supply and secondary market opportunities – identifying possible federal (ECCC) roles to support enhanced circularity.

Through three panels we will explore gap areas for possible federal (ECCC) support, followed by breakout sessions for discussion and brainstorming.

- *Panel 1 – National Approaches – Key Issues, Lessons from other Initiatives*
- *Panel 2 – National and Regional Systems for collection and connecting to secondary markets*
- *Panel 3 – Perspectives on Deconstruction- Input on experiences, lessons learned, recommendations*
- *Panel 4 – Municipal Efforts and Plans, Gaps for Federal Support (ECCC)*

Date / Time	February 26th, 2024	
8:30 – 9:00am	**Welcome refreshments**	• Coffee/tea will be provided upon arrival
9:00 – 9:05am	**Introduction and Opening Remarks**	• Introduction from ERM to open the session and welcome the group
9:05 – 9:20am	**Icebreaker and Introductions**	• Facilitated by Katie (ERM)
9:20- 9:30am	**Basis for Workshop**	• Presentation from ECCC/C. Kerr on **Setting the Policy Landscape** (issues and drivers)
9:30 – 10:15am	**Panel 1: National Approaches – Key Issues, Lessons from Other Initiatives**	• Panelists o *Panelist 1:* Paul Shorthouse, Managing Director (Circular Economy Leadership Canada – CELC) o *Panelist 2*: Andrew Telfer, Director – COIL, Circular Innovation Council o *Panelist 3*: David Messer, Director - Climate Smart Buildings Alliance o *Moderator:* Katie Baker (ERM)
10:15- 10:25am	**Health Break**	• Coffee/tea will be provided

10:25-11:10am	**Panel 2: National and Regional Systems for Collection and Connecting to Secondary Markets**	• Panelists: o *Panelist 1:* Larry Freiburger, Director of Operations (AET Group Inc.) o *Panelist 2:* Gil Yaron, Managing Director, Circular Innovation (Light house) o *Panelist 3:* Lisa Voycey, Director, ReStore Success (Habitat for Humanity Canada) o *Moderator:* Savina Caporali (ERM)
11:10-11:40am	**Breakout Session for Panel #2**	• Large group will break out into smaller discussion groups.
11:40-12:00pm	**Summary of Breakout Session for Panel #2 Key Messages**	• Summary in Plenary of Key Messages from Breakout Session for Panel #2
12:00-12:20pm	**Panel 3: Perspectives on Deconstruction**	• Panelists: o *Panelist 1:* Meredith Moore, Founder (Ouroboros Deconstruction) o *Panelist 2:* Erick Serpas Ventura, Owner, Project Manager (VEMA Deconstruction) o *Panelist 3:* Adam Corneil, CEO & Founder (Heritage Lumber) o *Moderator:* Katie Baker (ERM)
12:20-1:10pm	**Lunch**	• Lunch and beverages will be provided
1:10-1:55pm	**Panel 4: Municipal Efforts and Plans, Gaps for Federal Support (ECCC)**	• Panelists: o *Panelist 1:* Meaghan Davis, Manager, Circular Economy, and Innovation (City of Toronto) o *Panelist 2*: Alison Abbink, Senior Integrated Waste Policy Planner ICI Strategy Waste Services (City of Edmonton) o *Panelist 3*: Adriana Velázquez, Senior Project Engineer (Metro Vancouver – Solid Waste Services) o *Moderator:* Savina Caporali (ERM)
1:55-2:25pm	**Breakout Session for Panel #4**	• Group breaks down into smaller table groups of 4 each
2:25-2:45pm	**Summary of Breakout Session for Panel #4 Key Messages**	• Summary in Plenary of Key Messages from Breakout Session for Panel #4

2:45-3:00pm	**Health/Networking Break**	• Coffee/tea will be provided

3:00-4:20pm	**Possible Federal Roles and Next Steps**	• Facilitated discussion by Katie
		  ○ What are the opportunities for improved circularity of wood, and which federal roles will help get us there?
		  ○ What next steps would be required?

4:20pm	**Concluding Remarks**	• Closing remarks from Catherine (ECCC)

Pre-workshop networking event:

A reservation has been made for 6:00pm on Sunday, February 25th @ Johnny Farina on Elgin.

Post-workshop Networking Event:
A reservation has been made for 6:00pm on Monday, February 26th @ Spin Kitchen and Bar, located in the Ottawa Marriot Hotel (100 Kent Street)

APPENDIX C ADDITIONAL INITIATIVES

Non-governmental and nonprofit organizations

Circular Economy Leadership Canada serves as an incubator and convener that brings stakeholders together to advance the circular economy in Canada.

Circular Opportunity Innovation Launchpad (COIL) supports collaboration, innovation, policy and education, which are all enablers of the circular economy. Launched in April 2021 and originally led by Smart Cities Office of Guelph-Wellington, COIL's trademark, leadership and programming transferred to Circular Innovation Council in 2024. Since its inception, COIL's efforts to develop the circular economy have received widespread recognition across Canada. https://circularinnovation.ca/coil/

CSA Group has been a primary developer of standards-based solutions in Canada for over 100 years. Among others, CSA manages a Canadian Mirror Committee to ISO Technical Committee on Circular Economy (ISO TC 323) on behalf of the Government of Canada, This TC is in charge of developing first three international standards on circular economy, expected to publish by summer 2024: 1) on terminology and definitions, 2) on transition of business models and value networks and 3) on measuring and assessing circularity. Although not construction specific, these ISO standards will be an important start to develop construction-based solutions. In addition, CSA Group has developed a set of guidelines and standards supporting circular economy, such as CSA Z782-06 on Design for Disassembly and Adaptability in Buildings (2006), CSA Z783-12 Deconstruction of buildings and their related parts (2012) and CSA S478 Durability in Buildings (2019). Finally, CSA is working with a number of stakeholders, including the National Research Council to support the decarbonization of the construction sector through standard-based solutions for construction materials, products and systems, including for secondary wood materials.

Related Reports:

The Circular Built Environment in Canada: A Review of the Current State, Gaps and Opportunities (https://www.csagroup.org/wp-content/uploads/CSA-Group-Research-The-Circular-Built-Environment-in-Canada-A-Review-of-the-Current-State-Gaps-and-Opportunities.pdf)

Table 4 of this report identifies several opportunities for guidelines/standards specific to secondary materials (would suggest incorporating elements of this in the below table):

- Guidance for developing and operating material marketplaces, including establishing metrics for quantifying environmental impact reductions due to marketplace transactions;
- Specifications for composition, quality and quantity of manufacturing by-products;
- Standards that define salvaged materials and elements, describe the salvaging processes including safety considerations, provide metrics and guidelines or specifications for product reuse, and set out testing and evaluation methodologies for material re-use;
- End-of Waste criteria for construction materials.

Climate Smart Building Alliance is comprised of a group of building sector leaders, focused on achieving net zero and promoting climate action.

Habitat for Humanity Canada is a global charity which operates in over 70 countries to provide decent and affordable housing while fostering community support for families in need.

Companies

Light House provides research and project management services to businesses, policy makers, real estate and construction industries.

AET GROUP INC. Established in 1998, AET is a multi-disciplinary environmental consulting, auditing and scientific services company providing professional services in: Waste, Air, Compliance, Building Sciences, Mitigation, GHG, Sustainability, Audits, Water, Management Systems, Energy and Home Flood Protection. AET has a staff of 35 professionals and is headquartered in Kitchener, Ontario, with an additional office in Cambridge, Ontario. Over 60% of staff is dedicated to solid waste management services.

Many of AETs earliest projects were in the construction sector, assisting small and large-scale builders in assessing their waste disposal practices and recommending improvements. These projects resulted in the creation of multiple "Construction Solid Waste Management Plan" documents. In recent years, AET has returned to this area of waste, completing a CRD Waste Management Guidebook for the City of Guelph, and in-depth research project for ECCC assessing the viability of using CRD waste (specifically wood) in the construction of Tiny Houses. AET plans to continue work in this area, utilizing their experience in the waste and building sciences sectors.

Additional information on these and other projects can be provided by Larry Freiburger, Director of Operations (lfreiburger@aet98.com), or at www.aet98.com.

Ouroboros Deconstruction Offers a sustainable alternative to demolition, *specializing in deconstruction and material salvage.* Materials salvaged by Ouroboros are donated back to the community, sold through their burgeoning network of buyers or recycled through partners to ensure the highest and best use of materials and diversion rate from the landfill.

VEMA Deconstruction provides a sustainable solution for the removal of buildings by utilizing deconstruction as the principal salvaging technique to recover usable materials. In addition, they create jobs and donate goods, such as appliances, cabinets, furniture, and more (that otherwise would end up in landfills) to charities.

Heritage Lumber has clientele throughout Western Canada and along the Southwest coast of the United States.

Municipalities

City of Toronto is working on launching a Circular Economy roadmap, aiming to improve outcomes in municipal operations, community programs and policies over a 10-year strategy. The roadmap will include internal actions to enhance circular outcomes within Toronto's municipal government operations, as well as policies, programs, and services aimed at driving

positive circular outcomes for the community, alongside inspirational directions to align community actions with the city's circularity goals.

Metro Vancouver has conducted waste composition studies on its broader waste (not limited to CRD waste) to understand the materials entering the disposal stream. Other initiatives include providing temporary storage to facilitate house moving and a Disposal Ban Program.

City of Vancouver has taken several actions to increase diversion of CRD waste from landfill and incinerator, in support of its Zero Waste 2040 strategic plan. Vancouver's Green Demolition By-law requires 75% recycling of CRD waste from single-family homes built prior to 1950, which increases to 90% for heritage-listed houses and pre-1950 homes deemed to have character merit. Pre-1910 single-family homes and heritage-listed houses have an additional three tonne wood salvage requirement. Since deconstruction typically takes longer than traditional demolition, Vancouver's Zoning and Development By-law allows a deconstruction permit to be issued sooner than a regular demolition permit in some cases, to help make deconstruction competitive. The City awarded grant funding to Habitat for Humanity to help expand Vancouver's market for salvaged building materials, with a focus on wood. Habitat for Humanity used this funding to launch the Rebuild Hub, which accepts salvaged wood from deconstructed buildings for resale and distribution into secondary markets.

The City also has a target to reduce embodied emissions in new buildings by 40% by 2030.[10] To achieve this, the City implemented new requirements in its Building Bylaw, mandating that new Part 3 buildings report and limit their embodied carbon. The City's Embodied Carbon Guidelines encourage circular material use by allowing salvaged and reused materials to be excluded from embodied carbon assessments, leading to reduced overall building emissions. Additionally, they incentivize design-for-disassembly by assuming a 50% reduction in embodied carbon from building end-of-life scenarios, with plans for further incentives in the 2025 update of the guidelines.

The **City of Calgary's** Waste & Recycling Services has developed a Circular Economy Framework which identifies waste policy as primary focus area, with procurement, asset management and urban planning as secondary focus areas. The Framework further identifies construction and demolition waste as a priority issue within the waste policy area. The City of Calgary's most recent waste composition study (2019) found that clean lumber, pallets and crates, and other recyclable wood together make up 17 per cent of the construction and demolition loads received at our landfills. The City encourages diversion of CRD wood through policies such as a disposal surcharge for recyclable wood and offering source-separated commercial recycling options at our Waste Management Facilities. Currently, there are limited markets for clean wood and it is typically ground by a contractor and used for compost amendment or other similar purposes.

[10] Vancouver's Climate Emergency Action Plan: vancouver.ca/green-vancouver/buildings