



*This case study was developed to showcase applied circular principles and business/organizational practices and is intended only for educational and/or informational purposes.*

Circular Economy Unit, Waste Reduction and Management Division,  
Environmental Protection Branch/Environment and Climate Change Canada

# 1. Introduction

On a mission to maximize the recovery of construction, renovation, and demolition (CRD) materials, reduce waste, and lower the embodied carbon footprint of its projects, a “sustainable demolition” company is putting new ideas and technologies to the test.

Based in Metro Vancouver, British Columbia (BC), a deconstruction firm is boosting the circular economy on multiple fronts. In the process, the company is generating new options for homeowners, builders, local governments, and affordable housing providers, among others. With a “hand in everything,” as described by their CEO, this includes:

- Deconstructing homes and repurposing salvaged old-growth lumber in renovations and new builds;
- Developing its Deconstruction Donation program, directing surplus materials to local charities to sell;
- Working with local partners to develop a novel building material: prefabricated (“prefab”) panels made almost entirely (80%) from reclaimed material – and investing in research and practices to enable commercialization; and
- Building a proof-of-concept house in Burnaby, BC with the prefab wood panels (among other sustainable materials and practices) as a model for the CRD industry.

## Company Key Facts

**Location:** Metro Vancouver, BC.

**Impact:** 1,000,000 pounds (approx.) of lumber diverted from landfill since 2022.

From one 2,000 ft<sup>2</sup> house:

- 20,000+ pounds of salvaged wood
  - 50% shiplap, flooring, roof, walls, sheathing
  - 50% boards and beams.
- A \$15,000 tax credit (approx.) to the homeowner for donated lumber.

The company is experimenting with – and finding – solutions that are not only establishing them among leaders in the industry, but also creating new markets, jobs, and community benefits. This case study examines the challenges, solutions, and outcomes of its many efforts to date, and where they may take the CRD industry next.

*This is wood that should be in every coffee shop – it’s an amazing higher-end material to show off architecturally. It’s very good for furniture making, too – dry, tight grain, and beautiful.*

– deconstruction firm CEO

## 2. Project Challenges and Solutions

The company embodies many elements of local entrepreneurship – inventing and testing new approaches, creating new markets for salvaged wood, and leveraging opportunities to develop each of the “six pillars” required for sustainable deconstruction. Its creative and innovative approach is also offering solutions to a challenge shared by municipalities across Canada – how to increase the share of affordable housing in their communities.

### Making upcycling easier

As the CEO emphasizes, to maximize resource recovery and reintegration, all six pillars would be in place and working together. Today, in many municipalities/regions some, but not all, pillars of this framework are in place. For example, while one may have regulations that require a specific share of demolition materials be recycled, the receiving centres needed to store, process, protect, and sell the salvaged materials may not be established.

While the company is able to process salvaged wood at its own site – which involves transporting, sorting, de-nailing, regrading, and storing wood – others do not have access to an appropriate space to do this work. The CEO suggests that to grow the circular economy, shared sites might be established, available to multiple contractors. This would enable more contractors to participate in resource recovery and support reintegration.

Similarly, not every municipality has an established local charity, like a Habitat for Humanity, that is set up to receive, store, and sell lumber and other salvaged CRD materials. Contractors have to travel

#### Company’s “sustainable demolition” approach:

1. Appraise home’s recoverable material and value
2. Abatement (e.g. asbestos removal)
3. Deconstruction (from wood framing to concrete foundation)
4. Sort and process salvaged materials (e.g. de-nailing and regrading lumber)
5. Reuse materials in new homes
6. Donate surplus materials to charity
7. Send unusable materials for recycling or disposal.

#### Six pillars of deconstruction:





to donate and purchase materials, which adds to the costs involved in deconstruction – and particularly affects the bottom line of affordable housing providers.

Various stakeholders in Canada are involved in resource recovery and reintegration- municipalities, regional governments, businesses, non-profits. The roles of these stakeholders in establishing pillars of the framework may vary by region.

## Supporting innovation with novel materials and methods

In collaboration with a sustainable prefab wall manufacturer, the deconstruction company has developed a prefabricated wall panel using 80% reclaimed material, aiming to combat the waste of such valuable material. The prefab wall panels have now been installed in a new 3,700 ft<sup>2</sup> home in Burnaby and have already sparked inquiries from sustainable builders and panel manufacturers. With a construction management firm, the deconstruction company is designing a BC Energy Step Code 5 wall panel with potential to help builders achieve Passive House status.

| Company's salvaged wood classification:  |   |   |   |
|--|---|---|---|
| First Growth Era   | Antique   | Vintage   | Modern  |
|        |                |          |  |
| Rough Sawn on 4 sides<br>Old Growth Douglas Fir<br>pre 1920's<br>Large Dimension - 2"x4" | Rough Sawn on 2 sides<br>Old Growth Douglas Fir<br>1920 to 1945<br>Medium Dimension - 1.75"x3.75" | Smooth on 4 sides<br>Old Growth Douglas Fir<br>1946 to 1990<br>Modern Dimension - 1.5"x3.5" | Smooth on 4 sides<br>SPF Wood<br>1991 to Present<br>Modern Dimension - 1.5"x3.5"    |



To this end, the company and its partners are experimenting with wood fibre insulation, based entirely on reclaimed wood, that could lead to a made-in-Canada secondary market. The partners are working to address the need for a complete supply chain and for the wood fibre to be consistent, have a uniform shape, and be high quality. In the meantime, the company's wood panels, installed in the new 3,700 ft<sup>2</sup> home in Burnaby, are insulated with rock wool.

Their vision extends beyond this reclaimed lumber wall system to include accent walls, design elements, partition walls, back framing and exterior facades crafted from reclaimed lumber.

Working with reclaimed lumber requires builders to learn new techniques for handling and working with the material. The company is sharing its approaches, developing additional expertise, and sharing it with other builders.

They are also working with additional industry partners, including engineers and researchers, to study how materials from demolition can be repurposed (e.g. as building materials). To support use as

building materials, grading processes for reclaimed lumber are being explored. Currently, reclaimed lumber must be assessed and signed off by a qualified Agency lumber grader on the inspected lumber quality then a qualified professional engineer would review the regraded lumber and provide a letter of approval, also to be submitted to a municipal building official. It is worth highlighting that the National Research Council of Canada is starting a research project with partners to explore the reuse of structural lumber and establishing design specifications.

This deconstruction company also oversaw the end-of-life management of an 8-home land assembly demolition project in Vancouver, BC. In this novel approach, the deconstruction company determined that two of the homes would be deconstructed. In contrast, others (which were unfortunately burnt or abandoned) would have to be demolished and subcontracted to other firms. Notably, some of the wood salvaged from the two deconstructed homes was sent to another company for processing into finger-jointed lumber, which will be installed as back framing in a home. Most recently, the deconstruction firm was certified by Forest Stewardship Council as a provider of products sourcing reclaimed wood materials – the company’s wood products are FSC Recycled, SA-COC-006693-42. The first of its kind in Canada (certified reclaimed wood products sourced from a deconstruction firm).

**Some municipalities require contractors to have a material recovery plan, some explicitly mention wood salvage. For example:**

- Victoria: 40 kg or 28.3 board feet of wood per m<sup>2</sup> of above ground floor area must be salvaged for reuse in houses built 1960 or earlier.
- District of North Vancouver: 3.5 kg or 2.6 board feet of reclaimed lumber per ft<sup>2</sup> of the finished floor space must be reused or salvaged for pre-1950 homes (e.g. - in a 2,000 ft<sup>2</sup> house, approx. 7000 kg of lumber must be salvaged).
- Vancouver: 75% and 90% of building materials by weight (wood, concrete, etc.) must be reused or recycled from pre-1950 residential and character homes, respectively. Additionally, pre-1910 residential and pre-1950 heritage-listed homes must salvage at least three tonnes of wood for reuse.

For all requirements outlined above, the volumes and percentages mentioned must be fulfilled to recover 100% of the waste management security or demolition permit deposits paid upfront.

### 3. Outcomes, Benefits, and Opportunities

The company is hoping to help enable the CRD industry to do things differently by developing more circular options for adoption, including ideas for approaches, processes and products. Several immediate benefits and longer-term opportunities exist to grow the circular economy, particularly for salvaged wood.

#### Benefits

**Environmental:** Reduces the impact on natural resources and the need for virgin materials by enabling complementary fibre supply. Keeps materials in use rather than ending up in landfill.

**Economic and Social:** Stimulates job creation in areas such as sawmilling, wood finishing, and custom carpentry, and on processing sites. Generates economic opportunities across multiple sectors: new secondary markets for novel building materials, as well as new applications, such as in new affordable and sustainable homes built by or with municipalities, industry, and non-profits.

**Financial and Social:** Charities receive CRD wood materials to sell, which gives them revenues and (for those involved in affordable housing) donated materials that may be featured in new builds; which could reduce the cost of new affordable housing. Homeowners receive a tax credit for donated materials, offsetting their costs for deconstruction.

#### Company's Deconstruction

**Donation program** diverts a variety of materials to charities and proper recycling facilities, including old-growth Douglas Fir lumber; roof shingles made from asphalt, metal, shingles, and clay; exterior stucco, wood, vinyl, brick, and stone; drywall, all-metal material, insulation, and flooring; and windows, doors, frames, and appliances.

In return, homeowners receive a tax credit for donated materials that offsets their costs.

#### High-quality, old-growth Douglas Fir typically reclaimed from one 2,000 ft<sup>2</sup> home:

- 2x4 studs, plates, rafters
- 2x6 and 2x10 joists
- 10" shiplap
- 4" flooring
- 8" shiplap roof sheathing
- 6x6 beams (close to 60 feet)
- Plywood.

| Advantages of prefabricated walls made from salvaged wood: |   |   |
|--|---|---|
|  | Prefab walls used to build:   | Traditional on-site build:  |
| Faster   | <ul style="list-style-type: none"><li>• 3 weeks (for a 3,700 ft<sup>2</sup> home)</li></ul>   | <ul style="list-style-type: none"><li>• 2 to 3 months</li></ul>                                   |
| Cheaper  | <ul style="list-style-type: none"><li>• Requires fewer trades (e.g. comes pre-drilled)</li><li>• Cost competitive, particularly if using wood from a deconstructed home onsite and leaving it onsite (no transportation or “middleman”)</li></ul> | <ul style="list-style-type: none"><li>• Individual trades</li><li>• Costs of new lumber</li></ul> |
| Enhances circularity                                       | <ul style="list-style-type: none"><li>• Continues to put value back into the economy by upcycling/re-use/donation</li></ul>   | <ul style="list-style-type: none"><li>• Uses virgin wood</li></ul>                                |

## Opportunities

As the company makes progress on multiple fronts, several opportunities stand out:

- Materials that are unused in a new home go to a charity that helps support new affordable housing – a model that may be replicated across Canada, where such charitable organizations exist.
- New industries and secondary markets are being developed, and with some investment, could operate at a much larger scale, such as prefabricated building components (like walls), sustainable house design, and furniture and retail uses of salvaged wood.
- There is potential for new jobs in processing and building with reclaimed lumber.
- Wider adoption of local policies and regulations that require salvage, encourage deconstruction and upcycling, and development of sites that facilitate processing of materials, could significantly enhance circularity.

## 4. Conclusion

The novel approaches, novel building materials, and other collaborative projects mentioned in this case study are making a significant contribution to developing the circular economy in Metro Vancouver – one that may be replicated in various regions across Canada. As new ideas and products/technologies are developed, deconstruction has the potential to become even more widely understood and practised. The company’s multipronged approach, combined with its spirit of experimentation, reveals the incredible potential to expand secondary markets for CRD materials across Canada, with multiple spin-off benefits for homeowners, builders, local governments, and affordable housing providers.

## Recommended Resources

UBC Blog: [Seven Generations for Wood](#).

### Photo Credits:

Cover page: Image of wooden building from the prefab wall manufacturer.

Page 4 (top): Images of different types of wood from the Deconstruction firm.

Page 4 (bottom): Images of prefab wall panels from the Deconstruction firm.

**About this series:** The Waste Reduction and Management Division profiles opportunities to recover and reintegrate construction, renovation, and demolition (CRD) materials to develop the circular economy of Canada's CRD sector. This series focuses on the diversion of wood from landfills through improved secondary markets, boosting recovery of materials, and connecting supply and demand.