GREEN BUILDINGS MARKET FORECAST
Demand for Building Products, Metro Vancouver, 2019–2032

Measuring the Economic Impact of the BC Energy Step Code
About Us

The Vancouver Economic Commission (VEC) serves one of the world’s fastest-growing, low-carbon economies, contributing to a metro region representing 60 percent of B.C.’s economy and an annual GDP of $138B.

As the economic development agency for the city’s businesses, investors and citizens, VEC works to strengthen Vancouver’s economic future by supporting local companies, attracting high-impact investment and promoting international trade. VEC works collaboratively to position Vancouver as a global destination for innovative, creative, diverse and sustainable development.

Today, the green economy employs one in 15 Vancouverites and VEC works to unleash its economic potential by working with industry partners in the green buildings sector to:

- Support manufacturers in the transition to meet future demand
- Enhance B.C.’s industry relationships with key overseas markets
- Create more local IP while gaining access to global innovations
- Conduct and publish original research on the green economy
- Improve affordability and support the development of more efficient local supply chains

Report Author: Juvarya Veltkamp, Vancouver Economic Commission

Our Partners

We gratefully acknowledge the financial support of the Discovery Foundation, as well as BC Housing through the Building Excellence Research & Education Grants Program.

Funding Partner

Discovery Foundation

Advisory Committee Members

BC Housing  BC Hydro  City of Vancouver  Integral Group

Research Partner  Foundational Partners

Delphi Group  Regus  PwC

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“We’ve been trying to encourage curtain wall and fenestration manufacturers from Europe making Passive House-certified units to bring their products to Canada, and they are looking for hard data and market information on which way the market is going.

This report provides concrete market data, which can be very useful for them and other manufacturers, architects, municipalities, and developers.”

Cillian Collins
Senior Architect, Perkins+Will

ECONOMIC OPPORTUNITIES and B.C.’s Building Regulations

Vancouver and British Columbia’s zero emissions and net-zero energy ready building policies are stimulating a $3.3B market for high-performance building products and technologies in Metro Vancouver.

Vancouver has a long history of pioneering approaches to planning and built forms from the continuous public waterfront to the podium-tower development model that have been emulated worldwide and become globally branded as “Vancouverism.” In the 1980s and 90s, British Columbia’s “leaky condo crisis” sparked further development of deep local expertise in building envelope and mechanical system performance. The end of the crisis dovetailed with the Kyoto Protocol and a growing emphasis on reducing carbon emissions. Local engineers subsequently turned their attention to the next big topic related to building enclosures: energy efficiency. Vancouver has established expertise in these areas, and continual revisions of local building codes have set iteratively greener building standards. The World Green Building Council has recognized the City of Vancouver as having the “Best Green Building Policy” of any jurisdiction in the world.

Vancouver has a goal to be 100 percent powered by renewable energy by 2050, with all new buildings producing zero emissions before 2030. British Columbia (B.C.) plans to reduce carbon emissions by 40 percent by 2030 (based on 2007 levels), and the BC Energy Step Code charts a path for all new buildings across B.C. to be net-zero energy ready by 2032.

Constructing buildings to meet these high-performance standards is set to drive a $3.3 billion market for building products in Metro Vancouver (2019–2032). Globally, the green building materials market is estimated to be worth over $350 billion by 2022. B.C. currently imports many of the technologies required for high-performance buildings, in particular mechanical equipment such as heat pumps and heat recovery ventilators. Manufacturing the products required in Metro Vancouver from 2019–2032 would support an average of 925 jobs each year; currently, only one-third of these jobs are located in B.C. Installing these products would support an average of 770 local installation jobs.

This report is designed for manufacturers, suppliers, investment partners and other industry professionals to help them understand and prepare for changes in building product demand and performance requirements in Metro Vancouver as a result of the BC Energy Step Code.

The Vancouver Economic Commission (VEC) is working with a wide group of industry partners to advance economic development within B.C.’s green building sector with a focus on the following:

- Supporting local manufacturers with transitioning knowledge, equipment, and marketing to meet current and future demand
- Enhancing B.C.’s industry relationships with key overseas markets
- Creating more local intellectual property (IP) while accessing global innovation
- Improving affordability by creating more resilient and efficient local supply chains while reducing transportation distances, costs, and logistical risks
- Increasing the overall number of manufacturing jobs in B.C.

$3.3B
market value for building products in Metro Vancouver 2019-2032

$350B
market value for the global green building market by 2022

$12M
annual energy savings (2007–2015) for Vancouverites due to City of Vancouver’s successful reduction of carbon emissions from buildings

Photo: Andrew Latreille / Courtesy: Perkins+Will
Behind the Market Data
A Roadmap for Changes in Demand

The BC Energy Step Code is an amendment to the BC Building Code that provides consistency and predictability as the market transforms towards net-zero energy ready buildings. The performance requirements for each step were developed over two years through a province-wide, consensus-building process, supported by energy modelling and analysis. This analysis provided insights into the technologies suitable to meet the requirements of each step.

The VEC built on this analysis to develop a ‘Market Demand Forecasting Tool’ that forecasts the demand for building products and technologies—and the required performance level—as a result of the BC Energy Step Code.

The Market Demand Forecasting Tool was developed in consultation with a wide range of real estate and construction industry experts convened by the VEC over eight months in 2018, with modelling provided by The Delphi Group. All market forecast data in this report is from this tool unless otherwise stated.

Demand for Building Products
Metro Vancouver, New Construction, 2019–2032 Forecast (cumulative)

Methodology
The Market Demand Forecasting Tool is a responsive, Excel-based tool designed to estimate demand for six categories of building products. Key variables and inputs to the tool are illustrated in the graphic to the right.

Supply-side insights were developed from 30 key informant interviews with leading subject-matter experts. All research and modelling was conducted by The Delphi Group on behalf of VEC, and is further detailed in the technical policy report the BC Energy Step Code Supply Chain and Economic Opportunities December 2018.
Policy Drivers

City of Vancouver Bylaws
- New Construction
  - Zero Emission Building Plan: zero emissions for all new construction by 2030
  - Green Buildings Policy for Rezonings: Passive House requirements (or an alternative such as International Living Building Institute’s Net Zero Energy Building)
- Retrofits
  - Energy efficiency upgrades proportionate to nature and scale of renovation. E.g. home renovation >$5,000 requires energy audit

BC Building Code
- New Construction
  - Energy Step Code: net-zero energy ready buildings by 2032

National Energy Code for Buildings
- Commitment to net-zero energy ready model national building code by 2030

Regions Beyond Metro Vancouver
This study quantifies demand from projects built in Metro Vancouver but the BC Energy Step Code will impact new construction across the entire province. Metro Vancouver represents a population of 2.5 million while the population of B.C. has reached 5 million, so demand for building products is almost certainly double the $3.3 billion in Metro Vancouver. If we include demand from projects across the Cascadia megaregion (B.C., Washington, and Oregon) there would be demand from a region with a population of over 16 million. Looking beyond the continent, B.C. is a global gateway for trade with the Asia Pacific, offering North America’s closest ports and airports to Asian markets, super post-panamax port capabilities, and tens of billions of dollars invested in road, rail, port and airport infrastructure by the Pacific Gateway Alliance. Globally, the green building market is estimated to be worth $350 billion by 2022.~

Other Building Products and Professional Services
This study examines six categories of building products included in the original modelling for the BC Energy Step Code, but there are many other products (e.g. prefabricated wall panels, mass timber products or field-installed mechanical systems) and services (e.g. professional services, construction services) not quantified by the Market Demand Forecasting Tool.

Retrofit Projects
This study captures demand from new construction projects, which make up anywhere from 50–75 percent of all construction activity.~ Proposed updates to B.C. and Vancouver’s retrofit codes will further increase demand from retrofit- and renovation-type projects which could nearly double the forecast demand for most of the products in this study.

Green House Gas Intensity Requirements
Vancouver, Burnaby, the City of North Vancouver, New Westminster, Richmond and Surrey utilize a Low Carbon Energy System (LCES) or Greenhouse Gas Intensity (GHGi) metrics to various degrees. These requirements are expected to drive fuel switching, favouring renewable electricity and natural gas, the former further increasing demand for low carbon products like heat pumps.

The $3.3 billion figure for the size of the market is just the tip of the iceberg. Due to study limitations, the data does not include all the potential demand for building products in several key areas:

Accelerated Uptake of the BC Energy Step Code
Just five local governments (representing approximately 50 percent of Metro Vancouver’s new construction) had announced plans to adopt higher levels of the BC Energy Step Code when the Market Demand Forecasting Tool was developed in 2018. As more municipalities adopt similar standards, this will grow the forecasted demand beyond $3.3 billion. If all of the communities that have indicated interest adopt the standard, this would represent more than two-thirds of all new construction, and would increase forecasted demand by at least 30 percent.

The BC Energy Step Code: A High-performance Staircase
The BC Energy Step Code is a “high-performance staircase” that offers a voluntary path for local governments to require a higher level of energy performance than that required in the BC Building Code regulation.~ The BC Building Code itself will work its way up through the steps and the highest step of the BC Energy Step Code will become the minimum standard for all of B.C. by 2032. The CleanBC climate strategy indicates that Part 9 of the building code (small buildings and single family homes) will reach Step 3 by 2022; while Part 3 of the building code (large and commercial buildings) will reach Step 3 by 2027.

The BC Energy Step Code also means adoption of performance metrics (rather than just design standards), such as Total Energy Use Intensity (TEUI) and the energy demand for space heating, Thermal Energy Demand Intensity (TEDI). These metrics are used in various combinations in standards such as LEED, R2000, the Zero Carbon Building Standard and Passive House.

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**Benefits of Strengthening B.C.’s Green Building Supply Chain**

B.C. has strong capabilities and assets in green building engineering, design and construction, along with local access to raw materials including wood and mined metals. However, B.C. imports many of the products required for net-zero energy and zero emissions buildings, in particular mechanical equipment such as heat pumps and heat recovery ventilators.

A concerted effort to build on B.C.’s strengths and increase the proportion of high-performance building products manufactured or assembled in the province would allow B.C. to capture economic opportunities from relocating the supply chain. These opportunities include:

- The creation of local technology and IP
- Strategic investment into B.C.’s manufacturing infrastructure
- Workforce development
- The proliferation of well-paying, sustainable employment opportunities
- Reducing transportation distances from plant to site
- Improving access/affordability of building products in B.C.

For instance, if B.C. is not manufacturing a particular technology, there is an opportunity to leverage the market data in this report to catalyze local entrepreneurs and manufacturers or attract outside investment to B.C. Global partnerships and joint ventures with local companies offer the international partner access to local and regional markets (e.g. Cascadia, Asia Pacific), as well as an opportunity to customize and tailor their goods to local specifications. Local companies benefit from licensing or creating new, jointly owned IP and accessing global capital and supply chains worldwide.

This mirrors a global trend: uncertainties marked by trade wars, political shifts and volatile commodity markets, coupled with social and environmental concerns and technological advancements, are leading to relocationalization of supply chains around the world.

**B.C.’s Manufacturing Renaissance**

With sales of over $50 billion in 2017, B.C.’s manufacturing sector has grown more than 30 percent over the last five years and is a key driver of intellectual property, innovation and high-paying jobs.31, 32, 33

More than 65 percent of industrial businesses in Vancouver plan to expand in the next two years34. Globally, startups in sectors such as advanced manufacturing and robotics have seen a nearly fourteen-fold increase in total funding value (2012–2017).35

Even the dense, urban city of Vancouver is home to 60,000 industrial jobs in production, distribution and repair (15 percent of all jobs in the city), of which 58 percent pay a living wage.36 37 Small and medium-sized industrial enterprises contribute $2.4 billion annually in wages to Vancouver’s economy.37

Each manufacturing job in B.C. supports an additional 3.5 indirect or “spinoff” jobs (e.g. in transportation, packaging or accounting), and procurements from local businesses recirculate at least 30 percent of revenues within the local economy.38 39

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**Incentives**

This report highlights some of the incentives available for net zero energy buildings and high-performance building products – check out each product section for details of product-specific incentives.

**EfficiencyBC** | efficiencybc.ca

EfficiencyBC offers homeowners and businesses access to information and incentives to reduce energy use and greenhouse gas emissions in new and existing homes and buildings. Incentives are administered by BC Hydro, FortisBC and BC Housing.

**Fortis Commercial New Construction Performance Incentives** | fortisbc.com

Up to $500,000 for larger, more complex buildings that achieve a higher whole-building energy (TEUI) performance than the minimum B.C. Building Code.

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**Construction Industry by the Numbers**

**B.C. Construction Projects Value and GDP Contribution, 2014–2018**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Projects Underway (CAD$B)</th>
<th>Contribution to B.C. GDP (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$3</td>
<td>0.2%</td>
</tr>
<tr>
<td>2015</td>
<td>$4</td>
<td>0.3%</td>
</tr>
<tr>
<td>2016</td>
<td>$5</td>
<td>0.4%</td>
</tr>
<tr>
<td>2017</td>
<td>$6</td>
<td>0.5%</td>
</tr>
<tr>
<td>2018</td>
<td>$7</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

**City of Vancouver Building Permits Value and Number of Permits, 2014–2018**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Permits Issued (CAD$B)</th>
<th>Number of Permits Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$100</td>
<td>20,000</td>
</tr>
<tr>
<td>2015</td>
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<td>30,000</td>
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<tr>
<td>2016</td>
<td>$300</td>
<td>40,000</td>
</tr>
<tr>
<td>2017</td>
<td>$400</td>
<td>50,000</td>
</tr>
<tr>
<td>2018</td>
<td>$500</td>
<td>60,000</td>
</tr>
</tbody>
</table>

**Green Buildings Jobs Number of Jobs**

- **37,000** B.C., 2017
- **288,000** Canada, 2018
- **7,700** City of Vancouver, 2016

**Jobs Opportunity for Meeting Metro Vancouver Demand Annual Average Jobs, 2019–2022**

<table>
<thead>
<tr>
<th>Job Type</th>
<th>Required Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>325</td>
</tr>
<tr>
<td>Installation</td>
<td>730</td>
</tr>
<tr>
<td>City of Vancouver, VEC</td>
<td></td>
</tr>
</tbody>
</table>

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**Cascadia is pleased to be an innovator and manufacturer of products that enable buildings to be more energy conserving than ever before. VEC’s report further validates the need for this expertise, and that our industry’s supply chain is ready to advance to the highest of the BC Energy Step Code levels.”**

Michael Bousfield
Technical Director, Cascadia Windows & Doors
Vancouver has a long history of innovation at every stage of this value chain, driven by technical expertise and know-how as well as pioneering policies that make this region stand apart on issues of environment and climate change.

This report focuses on six key building products and technologies where the BC Energy Step Code is driving local demand for high-performance solutions: fenestration, insulation, heat recovery ventilators, heat pumps, domestic hot water, and drain water heat recovery. But B.C.’s green building sector is expansive and goes well beyond these products into a wide range of technologies, construction services and professional expertise that make up B.C.’s green building sector.

**Supportive Ecosystem**
- **B.C.’s Carbon Tax**
  - First in North America
- **CleanBC**
  - Province-wide GHG reduction targets with new financing and supportive policy advancing green buildings & low carbon energy
- **International Trade Agreement**s
  - CETA (Canada-EU)
  - USMCA (Canada-US-Mexico)
  - CPTPP (Canada-Asia Pacific including Australia and Japan)
- **Presence of many non-profit facilitators**
  - CaGBC
  - Light House Sustainable Building Centre
  - OPEN Green Building Society
  - Passive House Canada
  - Zero Emissions Building Centre (ZEBx)
- **Incentives & Financing Options**
  - BC Innovative Clean Energy Fund (BC-ICE)
  - NRCan Energy Innovation Program
  - NRCan Industrial Research Assistance Program (IRAP)
  - Scientific Research and Experimental Development (SR&ED) tax credit
  - Sustainable Technology Development Canada (SDTC) funds
- **Incentives for sustainable building**
  - Regulation for durable home design, house-as-a-system best practices
  - Trades training enable accelerated adoption of green construction practices e.g. BCIT High Performance Building Lab
- **Green Demolition Bylaw**
  - Promotes deconstruction and minimum recycling requirements; 86 percent diversion rate for single family homes
  - (City of Vancouver, 2017)
- **Reputation for excellence in building envelope, mechanical engineering, LEED and Passive House projects**
  - (Statistics Canada, 2010)
- **BCIT’s High Performance Building Lab**
- **Strength in control systems and using sensors and artificial intelligence for building automation and monitoring**
  - World-leading drain water heat recovery and district-scale sewage heat recovery projects
  - Niche HVAC components (membrane technology: custom tube and shell heat exchangers)
- **BIM Topics Lab, a centre of excellence in virtual design and construction at UBC**
- **World-class tech sector and startup ecosystem:** virtual & augmented reality for 3D visualization of blueprints, fine-grained analysis of materials, energy and geospatial data

**Vancouver’s Greenest City and Renewable City Action Plans**
- Set goals for Vancouver to be the greenest city in the world, and to use 100% renewable energy by 2050
- **BC’s Carbon Tax**
  - First in North America
- **CleanBC**
  - Province-wide GHG reduction targets with new financing and supportive policy advancing green buildings & low carbon energy
FENESTRATION
Windows, skylights and doors, structural glazing and curtain walls

Industry Competitiveness

Existing Manufacturing Base
Heavy, fragile products and low barriers to entry encourage strong local and regional supply chains. Today, there are >100 small and mid-sized manufacturers in B.C.

Certification Barriers
Higher barriers to entry for high-performing products (due to R&D, product testing, certification, technology) mean that large Canadian or international manufacturers dominate high-performing categories.

Future Retooling
Retooling to produce triple-glazed fenestration (U-value <1.0 W/m²K) similar in cost to retooling for U-value of 1.2 W/m²K; however, this requires new frame design and costs can be prohibitive for smaller companies.

Company Spotlight: Cascadia Windows and Doors
Manufacturer of high-performance fiberglass windows, employing 90 staff at a 90,000 square foot facility in Langley, B.C.

Company
25% increase in average annual revenues for last 10 years
5–15 new hires expected annually through 2023

North American Sales
Windows and Advanced Coverings

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>$11,930</td>
<td>$1,740</td>
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<tr>
<td>2017</td>
<td>$12,420</td>
<td>$1,710</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$11,620</td>
<td>$1,620</td>
</tr>
<tr>
<td>2019</td>
<td>$11,130</td>
<td>$1,830</td>
</tr>
<tr>
<td>2020</td>
<td>$10,550</td>
<td>$1,200</td>
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<tr>
<td>2021</td>
<td>$10,000</td>
<td>$1,100</td>
</tr>
<tr>
<td>2022</td>
<td>$9,550</td>
<td>$1,020</td>
</tr>
</tbody>
</table>

Source: BCC Research

B.C. Capabilities

ENERGY STAR
B.C. fenestration industry has proven responsive to new standards in the past, developing double and even triple-glazed products. Today, there are >50 ENERGY STAR-certified manufacturers across B.C.

High-Performance Ready
Larger B.C. manufacturers have indicated their capacity to upgrade capabilities and deliver high-performance and even Passive House-certified windows, given clarity on timelines and market demand.

High-Cost R&D Needs
Smaller B.C. manufacturers may risk being squeezed out if unable to invest in R&D, product testing, certification, and technology upgrades. However, the High Performance Window Certification Program provides support for transition – see Incentives below.

Market Opportunities

Pan-Canadian Market
Manufacturers may consider alignment with emerging federal standards that could require U-value <1.0 W/m²K across Canada.

Market Timing
Manufacturers can time investments into new product development using data from the Market Demand Forecasting Tool, phasing out low-performance by 2022 and low-medium performance before 2027.

Slab Style Doors
Doors have a critical role in ensuring envelope performance, yet there are very few high-performance slab-style doors manufactured in North America.

Risk Factors

Repetitive Retooling
Demand for different performance levels could co-exist, requiring repetitive retooling and inventory tracking.

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Incentives

High Performance Window Certification Program | fen-bc.org
B.C. manufacturers can access up to $80,000 to design, test, certify and manufacture new energy-efficient window products.

Home Renovation Rebate and Efficiency BC Program | efficiencybc.ca
Homeowners can receive $50/high-performance window/door (up to $1000).

QAI Laboratories | qai.org/doors-windows
Fenestration testing and certification

Insulating Glass Manufacturers Association of Canada | igmaonline.org
Certification program

$1.8B market value for fenestration products in Metro Vancouver (2019–2032)
**B.C. Capabilities: Prefabrication and Offsite Assembly**

B.C. is home to a strong and fast-growing prefabricated building and offsite assembly industry.

Prefabrication offers multiple benefits relevant in the current real estate cycle of high land values and construction costs. Productivity in the construction sector has grown only one percent annually since the 1990s, while manufacturing output has increased three times faster. The controlled environment offered by prefabrication, and the use of lean construction approaches, automation and additive manufacturing, allows improvements in productivity that can cut costs and improve affordability.

Around the world, prefabrication is attracting significant investment. Tech giant Amazon invested in Plant Prefab, betting on smart modular homes with short delivery times. B.C.’s wide-ranging capabilities span from structural insulated panels and wood wall assemblies to technology-driven solutions for multi-family, commercial and industrial buildings up to 25-stories (Stack Modular, Metric Modular, Horizon North, QUBE).

**Market Opportunities**

**Wood Fibre Insulation**

Demand for wood fibre insulation may grow due to drivers such as Passive House projects. Wood fibre insulation is not currently an area of expertise for B.C. lumber companies. This would require a different market mindset and partnerships with established European manufacturers to bring know-how, efficiencies and technology to B.C.

Prefabrication

Expand capacity to deliver prefabricated panelized wall and curtain wall assemblies, and invest in lean construction approaches such as automation, off-site modular and 3D-printing materials.

**Hemp Products**

Legalization of cannabis in Canada could create market for hemp insulation but requires more data and analysis.

**Deconstruction**

Vancouver’s Green Demolition Bylaw is diverting wood products from the landfill and driving market for deconstructed materials (e.g. Unbuilders, Octiscapes, Green Coast Rubbish).

**Building Envelope Innovations**

Increased investment and R&D into thermal break innovation, capacity building and product licensing.

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**Market Summary**

- **2016 US$M**: $800
- **2017 US$M**: $860
- **2018 US$M**: $880
- **2019 US$M**: $900
- **2020 US$M**: $920
- **2021 US$M**: $940
- **2022 US$M**: $960

**5% Growth**

**Market Opportunities**

- **Dowels, Cross Laminated Timber, Mass timber & Cross Laminated Timber (CLT)**
- **Rubbish from the landfill and driving market**
- **Bylaw is diverting wood products**
- **Unbuilders, Octiscapes, Green Coast Rubbish**
- **Building Envelope Innovations**

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**Incentives**

**Home Renovation Rebate and EfficiencyBC Program | efficiencybc.ca**

Homeowners can receive up to $5,500 in rebates for installing insulation in their homes.
**AIR SOURCE HEAT PUMPS**

Air-to-air heat pumps, air-to-water heat pumps, ductless mini-split heat pumps

**Demand Forecast for Air Source Heat Pumps**
New Construction, Metro Vancouver, 2019–2032

<table>
<thead>
<tr>
<th>Year</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
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<td>3,000</td>
<td>3,500</td>
<td>500</td>
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**Cold Climate Air Source Heat Pumps**
- Residential: 25 mbh
- Commercial: 720 mbh

**Split-Type Commercial Heat Pumps**
- 60 mbh

**Market Value**
- **Heat Pumps**: US$121M
- **Heat Recovery Ventilators**: US$228M

**Demand Forecast for Heat Recovery Ventilators**
New Construction, Metro Vancouver, 2019–2032

<table>
<thead>
<tr>
<th>Year</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
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<th>2023</th>
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**Energy Recovery Ventilators**
- Residential: 60% efficiency (75% in Metro Vancouver)
- Commercial: 80% efficiency

**Heat Recovery Ventilators**
- **Market Value**: US$228M
- **Global Sales**
- **North American Sales**

**Heat Pumps**
- **Market Value**: US$121M
- **Global Sales**
- **North American Sales**

**Metro Vancouver Context**
- **Units Required**
  - Residential: 119,600 in-suite units (100–200 cfm)
  - Commercial: 26,800 large commercial central units (>600 cfm)

**Heat Recovery Ventilators**
- **Market Value**: US$228M
- **Global Sales**
- **North American Sales**

**Heat Pumps**
- **Market Value**: US$121M
- **Global Sales**
- **North American Sales**

**Metro Vancouver Context**
- **Units Required**
  - Residential: 15,540 units (25 mbh)
  - Commercial: 10,200 small commercial units (60 mbh)
  - Large commercial units (720 mbh)

**Units Required**
- Residential: 15,540 units (25 mbh)
- Commercial: 10,200 small commercial units (60 mbh)
- Large commercial units (720 mbh)

**CFM**
- Cubic feet per minute

**BTU**
- British Thermal Unit

**mbh**
- Million British Thermal Units

**Source**
- **Heat Recovery Ventilators**: Transparency Market Research
- **Heat Pumps**: Freedonia Focus Reports

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**Heat Recovery Ventilators**
Heat recovery ventilators and energy recovery ventilators

**Heat Pumps**
Air-to-air heat pumps, air-to-water heat pumps, ductless mini-split heat pumps

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**Photo**
- Core Energy Systems
- Lamiot

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**Note**
- mbh = Million British Thermal Units
- cfm = cubic feet per minute

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**Photo**
- Core Energy Systems
- Lamiot

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**Note**
- mbh = Million British Thermal Units
- cfm = cubic feet per minute
Industry Competitiveness

**High Barriers to Entry**
The high capital investment and economies of scale required for manufacturing heating ventilation and air conditioning (HVAC) equipment, means high barriers to entry. This has resulted in the dominance of multinationals based in Asia, Europe and the United States; some limited manufacturing exists in Quebec and Ontario.

**Established Suppliers**
Builders and project developers tend to purchase complete HVAC systems and related components from established national and international manufacturers and suppliers.

**Niche Manufacturing**
Niche components, including high-performance membranes (Core Energy Recovery), custom tube and shell heat exchangers, ducting systems, and vents.

**Monitoring & Control Systems**
Strength in control systems allowing optimal operation and monitoring of HVAC and other energy efficiency or air quality equipment (Delta Controls, Ecotagious, Rainforest Automation, Sensible Building Science, TZOA).

Risk Factors

**Cold Climate**
Performance of air source heat pumps may suffer in below-freezing conditions; cold-climate air source heat pumps (optimized for temperatures as low as -25°C) are being tested and offered in Canada.

**Few High-Efficiency Models**
Current shortage of heat recovery ventilators >75 percent efficiency in B.C.

**Upfront Capital**
Investments in heat recovery ventilators can incur additional upfront construction costs. However, when evaluating an impact on affordability, the total cost of ownership should be considered, as lifetime heating costs for the owner are significantly lower.

HRV Models and Brands

By Sensible Recovery Efficiency (SRE)

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<tr>
<td>76% to 84%</td>
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Market Opportunities

**Phased Availability**
Manufacturers and suppliers can time investments into B.C. based on demand (residential heat pumps and 75-percent-efficient residential HRVs needed now; demand doubles after 2024).

**Co-Production**
Potential for partnerships to encourage product licensing, customization and assembly in B.C. For instance local component and control system companies can offer market access to international partners. The North American market for energy-efficient controls, including thermostats and smart home automation in residential buildings, was $2.5 billion in 2017 with an expected annual growth of 18 percent through 2022.

**Benign Refrigerants**
Cold climate heat pumps that work in colder climates, and CO₂ heat pumps that replace refrigerants with greater global warming potential.

**North American Market**
Manufacturers may consider early alignment with wider provincial, federal and U.S. standards driving demand for high-performance HVAC equipment.

Expanding Influence of Carbon Reduction Policies

Vancouver, Burnaby, New Westminster, Richmond and Surrey utilize a mixture of Low Carbon Energy System (LCES) and Greenhouse Gas Intensity (GHGi) metrics in addition to TEUI and TEDI standards. These requirements are expected to drive fuel switching, favouring renewable electricity and renewable natural gas, the former further increasing demand for low carbon technologies like heat pumps.

**Incentives**
Home Renovation Rebate and EfficiencyBC Program | efficiencybc.ca
Homeowners can receive up to $2,000 in rebates for installing central system, mini- or multi-split air source heat pumps in their homes. Select municipalities offer an additional $2,000 when converting from fossil fuels.

FortisBC Air Source Heat Pump Loan Program | fortisbc.com/rebates/home
Homeowners can borrow up to $6,500 at 1.9 percent interest for installing high-efficiency central or variable speed mini- or multi-split air source heat pumps.

FortisBC Air Source Heat Pump Rebate for Non-Profit Organizations | fortisbc.com/rebates/business
Co-ops, Indigenous housing providers, nonprofits or charities can receive incentives for cold climate, packaged terminal and Variable Refrigerant Flow (VRF) heat pumps.
DOMESTIC HOT WATER

Instantaneous natural gas, electric storage, hot water heat pumps, boiler combination systems (heating/hot water), condensing boilers

DRAIN WATER HEAT RECOVERY

Copper drain wrap arounds and large scale heat exchangers with or without storage

Demand Forecast for Domestic Hot Water Systems
New Construction, Metro Vancouver, 2019–2032

North American Sales

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Global Context

20,000 units drain water heat recovery units were manufactured and installed globally, almost exclusively in Canada in 2015

Metro Vancouver Context

3x increase in demand for drain water heat recovery products between 2019–2022

Demand by type 2019–2032:
- 36,300 residential in-suite units
- 3,500 commercial systems

$187M

market value for domestic hot water systems in Metro Vancouver (2019–2032)

Demand Forecast for Drain Water Heat Recovery
New Construction, Metro Vancouver, 2019–2032

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$37M

market value for drain water heat recovery systems in Metro Vancouver (2019–2032)
Industry Competitiveness

Global Significance
Highly competitive supply chain for domestic hot water systems and market dominated by large, global manufacturers; Canadian water heater manufacturing largely relocated to United States over past ten years due to labour costs, exchange rates

Cold Climate
Five primary manufacturers of drain water heat recovery units all located in Canada (EcoDrain, Ecoinnovation Technologies, RenewAbility Energy, SHARC Energy Systems, WaterCycles Energy Recovery). All report being able to meet growing demand with existing capacities.

B.C. Capabilities

Local Manufacturers
Some manufacturing of hot water tanks (Advance Metalpress) and several boiler makers (IBC Boilers)

Sewer Heat Recovery
Local manufacturing of drain water heat recovery (SHARC Energy Systems, that also specializes in district-scale sewage heat recovery systems)

Market Opportunities

Regulatory Changes
Drain water heat recovery demand growing across North America: required by code or supported by incentives in Ontario, Alberta, Manitoba; increasing in United States also; opportunity to ramp up capacity to meet greater demand, especially given timelines and market projections (bubbling demand across Metro Vancouver 2019–2022)

Incentives

Home Renovation Rebate and EfficiencyBC Program | efficiencybc.ca
Homeowners can receive up to $1,000 in rebates for installing heat pump water heaters, or up to $3,000 for combination space and water heat pump systems.

Company Spotlight: Vancouver’s Neighbourhood Energy Utility (NEU)
Operating since 2010, this district energy system captures energy from sewage and delivers heat and hot water to 5.3 million square feet of residential, commercial and institutional floor space

5.3 million sq. ft.
Floor space served

~45,000 MWh
Annual sales of energy

Company Spotlight: SHARC Energy Systems
Industry-leading DWHR technology manufacturer and installer, with neighbourhood-scale sewage heat recovery systems in operation around the world. A SHARC system is installed at Vancouver’s NEU to assist sewer screening in a hermetically-sealed environment, removing odour from sewer heat recovery

x7
Increase in revenues in past 5 years

up to 100
Employees in next 5 years (currently 12 in Canada)

5,000 sq. ft.
Facility in Port Coquitlam

Company Spotlight: Smartforme solutions
Provides a total heating, cooling and domestic hot water system that reduces carbon emissions on buildings to near zero levels using a combination of technologies

83%
Reduction in carbon emissions

Photo: Vancouver’s Neighbourhood Energy Utility (NEU)
VEC SUPPORT
for the Green Building Sector

The Vancouver Economic Commission (VEC) serves one of the world’s fastest-growing, low-carbon economies, contributing to a metro region representing 60 percent of B.C.’s economy and an annual GDP of $138B.

VEC strives to ensure inclusive, sustainable prosperity for all in our region. As the economic development agency for Vancouver, our approach is data-driven and aligns with the best practices of leading global peer cities, such as New York, Portland and London. VEC has defined, measured and reported on green economy metrics since 2010, and developed targeted programs that aid Vancouver’s transformation towards a low-carbon economy by supporting innovative local entrepreneurs, businesses and talent.

Green Building Market Acceleration Platform (MAP)

This report is the foundation for VEC’s efforts to advance the green building sector in response to the BC Energy Step Code. We continue to work with a wide group of partners with a focus on the following:

- Supporting manufacturers in transitioning to meet future demand
- Enhancing B.C.’s industry relationships with key overseas markets
- Creating more local IP while gaining access to global innovations
- Conducting and publishing original research on the green economy
- Improving affordability and supporting the development of more efficient local supply chains

Industrial Concierge | vancouvereconomic.com/space-sharing

The Industrial Concierge Service addresses industrial space challenges in Vancouver by activating underused industrial spaces and simplifying the space-sharing process for industrial operators. This service assists industrial businesses with finding industrial space, the permitting and licensing process, and establishing governance structures and financing models – occasionally through space-sharing projects such as the Material Innovation and Learning Lab (MILL).

Thriving Vancouver | thrivingvancouver.com

Thriving Vancouver empowers businesses to introduce sustainable options into their daily operations by connecting the Vancouver business community to curated resources, such as solutions providers, workshops, events and vendors.

Impact 6 Pack | vancouvereconomic.com/impact-6-pack

Over six weeks, participating businesses work with a collaborative and supportive cohort to craft their impact business model and implement impact strategies in their business. The course concludes with a celebratory wrap party attended by members of Vancouver’s growing impact ecosystem, special guests of the course, and previous Impact 6 Pack participants.

Capital Mentorship Program | vancouvereconomic.com/cleantech-capital

The Discovery Foundation Capital Mentorship Program is designed to help early-stage, for-profit entrepreneurs become more strategic in raising the capital critical to accelerating their ventures. The program is a series of impactful events featuring panels, workshops, pitch training, investor–company matching and networking opportunities.

Vancouver Startup City | vancouvereconomic.com/vancouverstartupcity

Vancouver Startup City increases access to funding and deal flow opportunities, investor networking, and startup education. Past programs have included Startup City: Capital and Startup City: Impact – both week-long activations of the Vancouver startup ecosystem.

The Tech Deployment Network (TDN) | vancouvereconomic.com/gddp

Launching in 2019, the TDN is a member-based demonstration network comprised of major asset owners in Vancouver sharing common visions, values, and goals around sustainability, intelligent facilities, and the customer experience. The program builds on the existing Green and Digital Demonstration Program (GDDP), but expands its impact regionally. TDN communicates the members’ challenges through an online portal and allows innovators to submit targeted project proposals through an intake process. VEC scouts, screens, and shortlists projects while promoting the region as a global hub for tech adoption.

“NDN is a technology partnership that eliminates traditional bureaucratic obstacles to innovation at the municipal level. The VEC acts as an external advocate, uniquely positioned to remove challenges that would otherwise curtail innovation.”

Jason Harmer
CEO, GetWorkers

“The VEC Industrial Concierge is an invaluable asset for groups looking to find affordable space in the scarcity of Vancouver’s industrial lands. In 2018 the Industrial Concierge was instrumental in helping the MILL Co-op take our next steps, both as an organization and towards finding our ideal location. We wouldn’t have gotten this far without them.”

Emily McGill
Founding Member, MILL Co-op
SELECT BUILDING PRODUCT COMPANIES

Across B.C.

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ENDNOTES

1 World Green Building Council. 2013
2 City of Vancouver. Renewable City Action Plan. (2011)
6 Projected demand in Metro Vancouver from new construction activity 2019–2032 (CAD0) for six categories of products and equipment (not including installation).
7 B.C. Energy Step Code (n.d.).
11 15,000 person years of employment
12 City of Vancouver. Statement of Building Permits Issued, Vancouver Data Catalogue. December 2018
13 The analysis is available in the “Energy Step Code: Building Beyond the Standard: 2017 Metrics Research” report, updated in 2018. The process was overseen by an Oversight Committee comprised of BC Housing, BC Hydro, the Province of B.C.’s Building and Safety Standards Branch, the City of Vancouver and Natural Resources Canada and analysis was conducted by Integral Group, Morrison Hershfield and ED Eko Group.
14 The “Market Demand Forecasting Tool” is being turned into an interactive online platform and will be directly accessible for users to generate their own data and reports by fall of 2019.
15 Surrey, Richmond, New Westminster and the City and District of North Vancouver
17 Canada’s Pacific Gateway. Website (n.d.)
19 City of Vancouver. Statement of Building Permits Issued, Vancouver Data Catalogue. December 2018
29 Defined as more than $200 million or $400,000 per annum
33 Green Building Materials Market Size Worth $364.6 Billion By 2022. Website (n.d.)
35 BC Housing. Statement of Building Permits Issued, Vancouver Data Catalogue. December 2018
37 BC Energy Code Step (n.d.).
45 Defined as more than $200 million or $400,000 per annum
49 Research briefing. “The Economics of Local Procurement.” May 2013
50 For example, most Canadian jurisdictions now require North American Fenestration Standard compliance, but these still include location specific requirements and so American NFs, verification may not comply with Canadian codes.
51 Key informant interviews
52 Large B.C. manufacturers surveyed by City of Vancouver expressed reservations to produce windows at U 1.2 W/m2K with an average of two and a half months’ lead time needed to adjust their product line. Shaikh, Arash. Research Local High-Performance Building Supply for New Low-Rise Homes. Greenest City Research Local High-Performance Building Supply for New Low-Rise Homes. Greenest City Research Local High-Performance Building Supply for New Low-Rise Homes. Greenest City (2016)
53 Smaller manufacturers with less internal capacity could require 12–24 months for proper retooling and shifting to manufacturer of higher performance products (Key informant interviews)
54 NRCan’s national energy code for buildings can push this standard according to key informant interview
55 Key informant interviews
57 Requires annual demand $23 billion (75% would include demand from outside of B.C. in the Pacific-Northwest) and possible changes to Energy Star in the United States would also push performance.

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- Shanna Killen, The Delphi Group
- Paul Shorthouse, The Delphi Group

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