INDUSTRY GROWTH & ECONOMIC IMPACT
Growth of New LEED™ Certified Floorspace

From **2009** to **2014**, total LEED™ floor space has increased by **more than 10x**.

- **2004-2009**: 1,924,773 sq m
- **2010-2014**: 21,488,948 sq m
GROWTH OF LEED® MARKET PENETRATION BY SECTOR

RESIDENTIAL
- 2004-2009: 0.19%
- 2010-2014: 1.54%

COMMERCIAL
- 2004-2009: 1.25%
- 2010-2014: 22.14%

INSTITUTIONAL
- 2004-2009: 4.56%
- 2010-2014: 29.96%

INDUSTRIAL
- 2004-2009: 0.33%
- 2010-2014: 3.56%

TOTAL
- 2004-2009: 0.83%
- 2010-2014: 10.69%
## Growth of New LEED Floorspace by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Floorspace 2014 (sq m)</th>
<th>Floorspace % Growth 2009-2014</th>
<th>LEED Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>11,999,003 sq m</td>
<td>0.84% to 15.49%</td>
<td>LEED™ Silver</td>
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<tr>
<td>Nova Scotia</td>
<td>387,329 sq m</td>
<td>0.30% to 11.02%</td>
<td>LEED™ Silver</td>
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<tr>
<td>Quebec</td>
<td>4,332,169 sq m</td>
<td>1.22% to 10.15%</td>
<td>LEED™ Certification</td>
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<tr>
<td>Saskatchewan</td>
<td>783,068 sq m</td>
<td>0.93% to 9.76%</td>
<td>No requirement</td>
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<tr>
<td>British Columbia</td>
<td>2,842,449 sq m</td>
<td>0.95% to 8.89%</td>
<td>LEED™ Gold</td>
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<tr>
<td>Alberta</td>
<td>2,553,562 sq m</td>
<td>0.49% to 5.60%</td>
<td>LEED™ Silver</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>30,957 sq m</td>
<td>N/A to 5.39%</td>
<td>No requirement</td>
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<tr>
<td>New Brunswick</td>
<td>147,709 sq m</td>
<td>1.12% to 4.70%</td>
<td>LEED™ Silver</td>
</tr>
<tr>
<td>Manitoba</td>
<td>238,876 sq m</td>
<td>0.16% to 3.87%</td>
<td>LEED™ Silver</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>98,599 sq m</td>
<td>N/A to 2.99%</td>
<td>LEED™ Silver</td>
</tr>
</tbody>
</table>

- **LEED™ floorspace constructed 2010-2014**
- **LEED™ growth as % of total new floorspace**
- **Provincial LEED™ requirement for public buildings**
## LEED Certified Projects by Province

<table>
<thead>
<tr>
<th>Rank</th>
<th>Province / Territory</th>
<th>LEED certified projects (end of Q1 2015)</th>
<th>Total population (x100,000)</th>
<th>Projects per 100,000 people</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BC</td>
<td>395</td>
<td>46.310</td>
<td>8.5</td>
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<td>2</td>
<td>YT</td>
<td>3</td>
<td>0.365</td>
<td>8.2</td>
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<td>3</td>
<td>NS</td>
<td>72</td>
<td>9.427</td>
<td>7.6</td>
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<tr>
<td>4</td>
<td>AB</td>
<td>311</td>
<td>41.217</td>
<td>7.5</td>
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<tr>
<td>5</td>
<td>ON</td>
<td>928</td>
<td>136.787</td>
<td>6.8</td>
</tr>
<tr>
<td>6</td>
<td>MB</td>
<td>71</td>
<td>12.820</td>
<td>5.5</td>
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<tr>
<td>7</td>
<td>QC</td>
<td>426</td>
<td>82.147</td>
<td>5.2</td>
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<tr>
<td>8</td>
<td>PEI</td>
<td>5</td>
<td>1.463</td>
<td>3.4</td>
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<tr>
<td>9</td>
<td>NB</td>
<td>20</td>
<td>7.539</td>
<td>2.7</td>
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<tr>
<td>10</td>
<td>SK</td>
<td>29</td>
<td>11.254</td>
<td>2.6</td>
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<tr>
<td>11</td>
<td>NL</td>
<td>10</td>
<td>5.270</td>
<td>1.9</td>
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<tr>
<td>12</td>
<td>NWT</td>
<td>2</td>
<td>4.360</td>
<td>0.5</td>
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</tbody>
</table>
In 2014, Canada’s green building industry:

- Generated $23.45 billion in GDP
- Supported 297,890 direct jobs

The portfolio of LEED buildings in Canada certified between 2005 - 2015 will:

- $62.3 billion in total GDP over their lifetime (direct, indirect, and induced)
- 701,700 jobs over their lifetime (direct, indirect, and induced)
- $128.0 billion in gross output (direct, indirect, and induced)
Benefits of LEED Buildings

Over the past decade LEED buildings have benefitted Canadians by:

**Energy savings**
Energy savings of 6,503,647 eMWh which is enough to power 220,702 homes in Canada for a full year.

**Reduction in Greenhouse Gases**
A 1,261,016 CO₂ e tonne reduction in greenhouse gas emissions which equates to taking 238,377 cars off the road for a year.

**Water Savings**
Water savings totalling over 12.8 billion litres, the equivalent of 5,131 Olympic-sized swimming pools.

**Recycling Garbage**
Recycling over 1.6 million tonnes of construction/demolition waste which represents 431,174 garbage truck loads.

**Reducing urban heat**
Installing 231,608 sq metres of green roofs, or an area the size of 153 NHL hockey rinks, to reduce the urban heat island effect and mitigate storm water flows in urban areas.

2002 - 2015 LEED certified buildings
BUILDING SOLUTIONS TO CLIMATE CHANGE
Meet Canada’s Climate Change Targets

A. Invest in energy efficiency in existing buildings
B. Strengthen building performance
C. Invest in Net Zero Buildings
D. Reduce the Government’s GHG Emissions
## Carbon Forecast Model
100,000 buildings >25,000 sq ft

<table>
<thead>
<tr>
<th>Building Type Category</th>
<th>SCIEU 2009 Building Types</th>
<th>Inventory over 25,000 sq.ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>• Office Building (non-medical)</td>
<td>18,000 buildings</td>
</tr>
<tr>
<td></td>
<td>• Medical Office Building</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>• Elementary or Secondary School</td>
<td>12,000 buildings</td>
</tr>
<tr>
<td>Healthcare</td>
<td>• Nursing or Residential Care Facility</td>
<td>3,000 buildings</td>
</tr>
<tr>
<td></td>
<td>• Hospital</td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>• High-Rise with 5 or More Storeys*</td>
<td>1,200,000 units</td>
</tr>
<tr>
<td>Retail (excluding</td>
<td>• Food or Beverage Store</td>
<td>15,000 buildings</td>
</tr>
<tr>
<td>shopping centres**)</td>
<td>• Non-Food Retail Store</td>
<td></td>
</tr>
<tr>
<td>Other (excluding</td>
<td>• Warehouse</td>
<td>55,000 buildings</td>
</tr>
<tr>
<td>hotels and motels***)</td>
<td>• Other</td>
<td></td>
</tr>
</tbody>
</table>
Opportunities for Public Sector Owners to Reduce GHG Emissions

1. Establish high-performance targets for energy efficiency for new and existing buildings
2. Adopt energy benchmarking program across the provincial government’s building portfolio
3. Assess and prioritize the retrofit potential of buildings that are the best candidates for high performance green standards
4. Mandate that 60% of all government-owned buildings scheduled for significant renovations by 2030 meet high-performance targets for deep retrofits & recommissioning
5. Mandate LEED Gold or better for Existing Buildings focusing on large office properties
6. Further improve the performance of existing buildings by achieving zero carbon targets through a renewable energy or fuel switching options
7. Define strong procurement policies, leasing requirements for new and existing buildings, such as LEED Platinum or zero carbon targets
EXISTING BUILDINGS
Invest in Energy Efficiency in Existing Buildings

To contribute to meeting the 2030 GHG targets, the building sector needs to:

- Recommission the 80% of buildings that have yet to undertake any retrofitting activity to high-performance standards
- Undertake deep retrofits for 60% of buildings to high-performance standards such as LEED (example: upgrades to lighting, HVAC and envelopes)
- Incorporate solar or other renewable onsite energy systems for 40% of buildings
- Work with jurisdictions and the private sector to switch fuel sources in 20% of buildings

If these four initiatives are implemented in buildings over 25,000 square feet between 2017 and 2030, Canada can achieve a 40% reduction or 19.4 mt in emissions for these buildings by 2030, surpassing the Canadian target.
GHG Reduction from 2005 levels:

-44%

Fuel switching:
20% of buildings
-44% GHG

Renewables:
40% of buildings
-36% GHG

Deep retrofits:
60% of buildings
-31% GHG

Recommissioning:
80% of buildings
-18% GHG

2030 Economic Impacts:

19.4 million CO₂ reduction

$6.2 billion saved in energy costs

$32.5 billion direct and indirect GDP

260,741 annual employment

2% of labour force

$5.2 billion in tax revenue
ENERGY BENCHMARKING
Strengthen Building Performance
Energy Benchmarking

- Provides building owners with information on building performance
- Allows for comparisons against other buildings in a category or portfolio
- Creates foundation for building performance improvements
- Supports energy efficiency programs and policies through availability of and access to quality data
- Allows government to identify opportunities for action towards climate and energy goals

Definitions

**Energy benchmarking** is the process through which a building’s energy performance is tracked in order to gauge performance over time.

**Reporting** refers to the submission of benchmarking and attribute data to local, provincial, and/or federal governments or utilities.

**Disclosure** of data refers to making some or all of the building attribute and benchmarking data available to the public.

**Labelling** occurs when a public display of benchmarking or attribute data, either on site or linked to a website via GIS.
National Benchmarking Framework

Principles

- **Consistency** to improve data collection and facilitate comparison
- **Effectiveness** in achieving energy savings through quality data
- **Transparency** in sharing data/disclosure incl. labelling
- **Capacity Building** through awareness raising and training
What are the Benefits?

- Improved energy literacy among building owners & operators
- Engaged market in energy performance management & conservation
- Better targeting of investments & incentives for upgrades
- Costs savings to building owners & tenants from operational upgrades and retrofits
- Government leadership in energy measurement & reporting
NET ZERO CARBON BUILDINGS
Five Key Components of Zero Carbon Buildings

Renewable Energy Generation
A requirement that renewable energy be generated on-site or procured directly in order to ensure the addition of clean power generation.

Energy Intensity Metrics
Energy intensity metrics to incentivize the design of highly efficient, reliable and resilient buildings.

Embodied Carbon
An embodied carbon metric to recognize the importance of building material lifecycle impacts.

Lowering Emissions
A greenhouse gas intensity metric for assessing a building’s emissions.

Reducing Peak Energy Demand
A peak energy demand metric to encourage the use of “peak shaving” measures.

A Zero Carbon Building is...
A highly energy efficient building that produces on-site, or procures, carbon-free renewable energy in an amount sufficient to offset the annual carbon emissions associated with building operations.
National Net Zero Carbon Initiative

NEW BUILDINGS > 25,000 sq. ft

NET ZERO CARBON

2016 TO 2030

-17% GHG emissions from 2005 levels

7.5 MT CO₂e
International Model for LEED v4

- Global Consistency + local relevance
- Certification using LEED Online
- 21+ rating systems
- Higher thresholds on energy, water, waste & materials
- Greater emphasis on performance & measurement
- Applicable to small & large/urban & remote buildings
- Certification in Canada by CaGBC
## LEED v4 Credits Contributing to Resiliency

<table>
<thead>
<tr>
<th>LEED v4 CREDIT</th>
<th>LEED Pts</th>
<th>Reduced Flooding Risk</th>
<th>Resilience to Drought</th>
<th>Resilience to Heat Waves</th>
<th>Resilience during Power Loss</th>
<th>Resilience to Indoor Overheating if HVAC is Lost in Summer</th>
<th>Resilience to Low Temps/Freezing Indoor if HVAC is Lost in Winter</th>
<th>Improved Indoor Air Quality During Forest Fire Events</th>
<th>Resilience of Surrounding Ecosystem</th>
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<tbody>
<tr>
<td><strong>Integrative Process</strong></td>
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<td>Location and Transportation</td>
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<td>Sensitive land protection (e.g., floodplain)</td>
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<td>Reduced parking footprint</td>
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<td><strong>Sustainable Sites</strong></td>
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<td>Site assessment</td>
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<td>Site development – protect/restore habitat</td>
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<td>Rainwater management</td>
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<td><strong>Water Efficiency</strong></td>
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<td>Outdoor water use reduction</td>
<td>Rqd + 2</td>
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<td>Indoor water use reduction</td>
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<td>Building-level water metering</td>
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<td><strong>Energy and Atmosphere</strong></td>
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<td><strong>Innovation</strong></td>
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<td>Innovation (pilot credits included)</td>
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<td>Regional Priority</td>
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</tr>
</tbody>
</table>
LEED & Resiliency

- Buildings can be designed to be more resilient
- Buildings can reduce local impacts and global risks incl.
  - flooding
  - drought
  - heat waves
  - wildfires
## Local Resiliency Strategies
### Building & Site

<table>
<thead>
<tr>
<th>Flooding</th>
<th>Drought</th>
</tr>
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<tbody>
<tr>
<td>Protect/restore habitat</td>
<td>Protect/restore habitat</td>
</tr>
<tr>
<td>Rainwater management</td>
<td>Rainwater management</td>
</tr>
<tr>
<td>Sensitive land protection</td>
<td>Outdoor water use reduction</td>
</tr>
<tr>
<td>Reduced parking footprint</td>
<td>Indoor water use reduction</td>
</tr>
<tr>
<td>Site assessment</td>
<td>Cooling tower water use</td>
</tr>
<tr>
<td>Open space</td>
<td>Water metering</td>
</tr>
</tbody>
</table>

- Protect/restore habitat
- Rainwater management
- Sensitive land protection
- Reduced parking footprint
- Site assessment
- Open space
- Protect/restore habitat
- Rainwater management
- Outdoor water use reduction
- Indoor water use reduction
- Cooling tower water use
- Water metering
Local Resiliency Strategies
Building & Site

Heat Wave
- Reduced parking footprint
- Site assessment
- Protect/restore habitat
- Open space
- Heat island reduction
- Energy performance
Resiliency Strategies
Building

Power Loss
- Energy performance
- Renewable energy
- Daylighting
- Thermal comfort & ventilation
- Heat island reduction
Resilient Design Pilot Credits

1. Assessment and Planning for Resilience
   - Investigating threats & preparation

2. Design for Enhanced Resilience
   - Implementing mitigation strategies

3. Passive Survivability & Functionality During Emergencies
   - Meeting thresholds for temperature, power & water
In Summary

- Green buildings in Canada are an important pathway to lowering GHG emissions in Canada by 27.9m metric tonnes by 2030.
- Holistic building design and retrofit is key to reducing overall environmental impacts, enhancing resiliency and promoting human health.
- Existing buildings are a priority in achieving GHG reduction while promoting economic growth and jobs.
- Net zero carbon buildings drive innovation and “future proof” Canada’s building sector emissions.
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President & CEO
Canada Green Building Council
tmueller@cagbc.org