



# MEETING CANADA'S CLIMATE CHANGE CHALLENGE: GREEN & RESILIENT BUILDINGS

2016 Public Sector  
Climate Leadership Symposium  
Richmond, BC  
November 22, 2016



# 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



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# 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%**



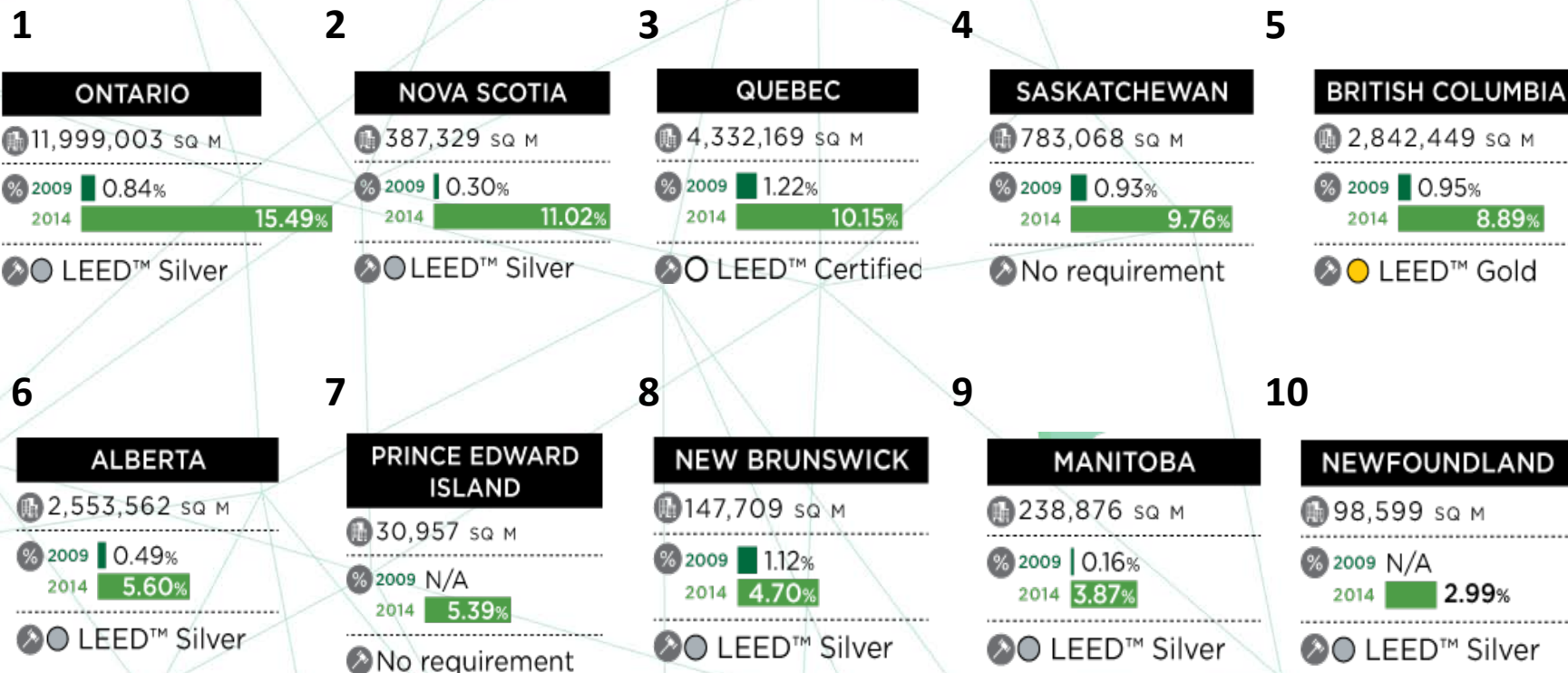
## TOTAL

2004-2009 | 0.83%  
2010-2014 **10.69%**



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# Growth of New LEED Floorspace by Province



LEED™ floorspace constructed 2010-2014 
 LEED™ growth as % of total new floorspace 
 Provincial LEED™ requirement for public buildings



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# LEED Certified Projects by Province

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



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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)



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# 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.



## Water Savings

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



## Reduction in Greenhouse Gases

A **1,261,016** CO<sub>2</sub>e tonne reduction in greenhouse gas emissions which equates to taking **238,377** cars off the road for a year.



## 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



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# 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

Building Type Category	SCIEU 2009 Building Types	Inventory over 25,000 sq.ft
Commercial	<ul style="list-style-type: none"><li>• Office Building (non-medical)</li><li>• Medical Office Building</li></ul>	18,000 buildings
Education	<ul style="list-style-type: none"><li>• Elementary or Secondary School</li></ul>	12,000 buildings
Healthcare	<ul style="list-style-type: none"><li>• Nursing or Residential Care Facility</li><li>• Hospital</li></ul>	3,000 buildings
Residential	<ul style="list-style-type: none"><li>• High-Rise with 5 or More Storeys*</li></ul>	1,200,000 units
Retail (excluding shopping centres**)	<ul style="list-style-type: none"><li>• Food or Beverage Store</li><li>• Non-Food Retail Store</li></ul>	15,000 buildings
Other (excluding hotels and motels***)	<ul style="list-style-type: none"><li>• Warehouse</li><li>• Other</li></ul>	55,000 buildings





# 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

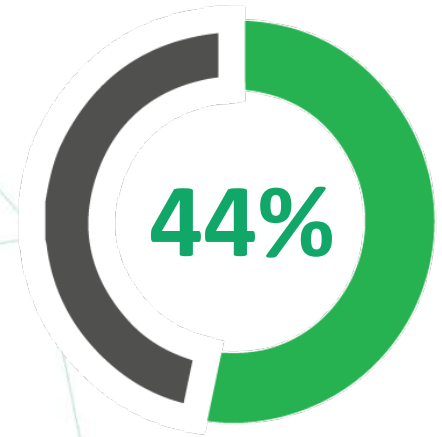


# EXISTING BUILDINGS

# 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



# 2030 ECONOMIC IMPACTS

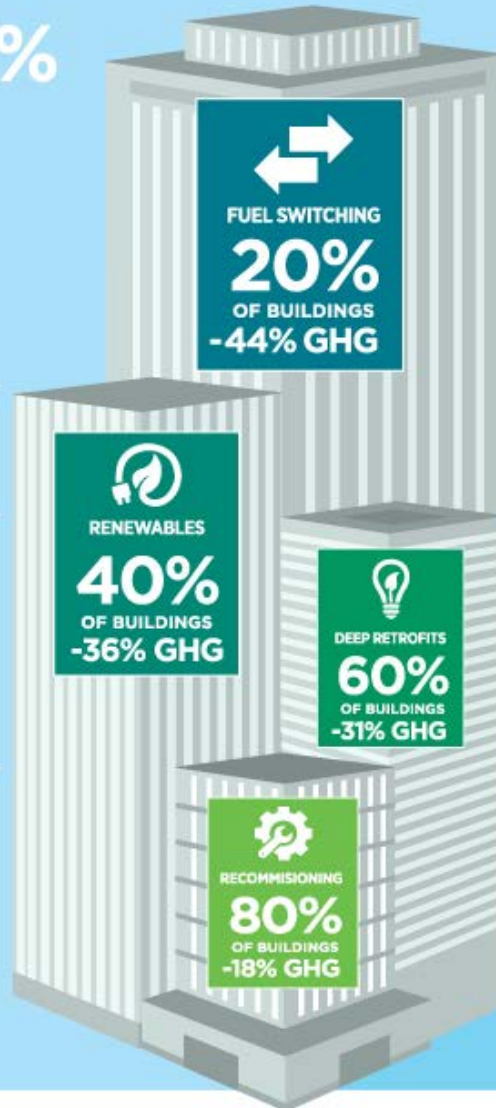
BUILDING UPGRADE RECOMMENDATIONS TO REACH 2030 TARGET

-44%

-36%

-31%

-18%



=

**19.4**  
MILLION  
CO<sub>2</sub> REDUCTION

**\$6.2**  
BILLION  
SAVED  
IN ENERGY COSTS

**\$32.5**  
BILLION  
GDP DIRECT / INDIRECT

**260,741**  
ANNUAL  
EMPLOYMENT  
**2%** OF LABOUR  
FORCE

**\$5.2**  
BILLION  
IN TAX REVENUE



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# 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.



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# National Benchmarking Framework

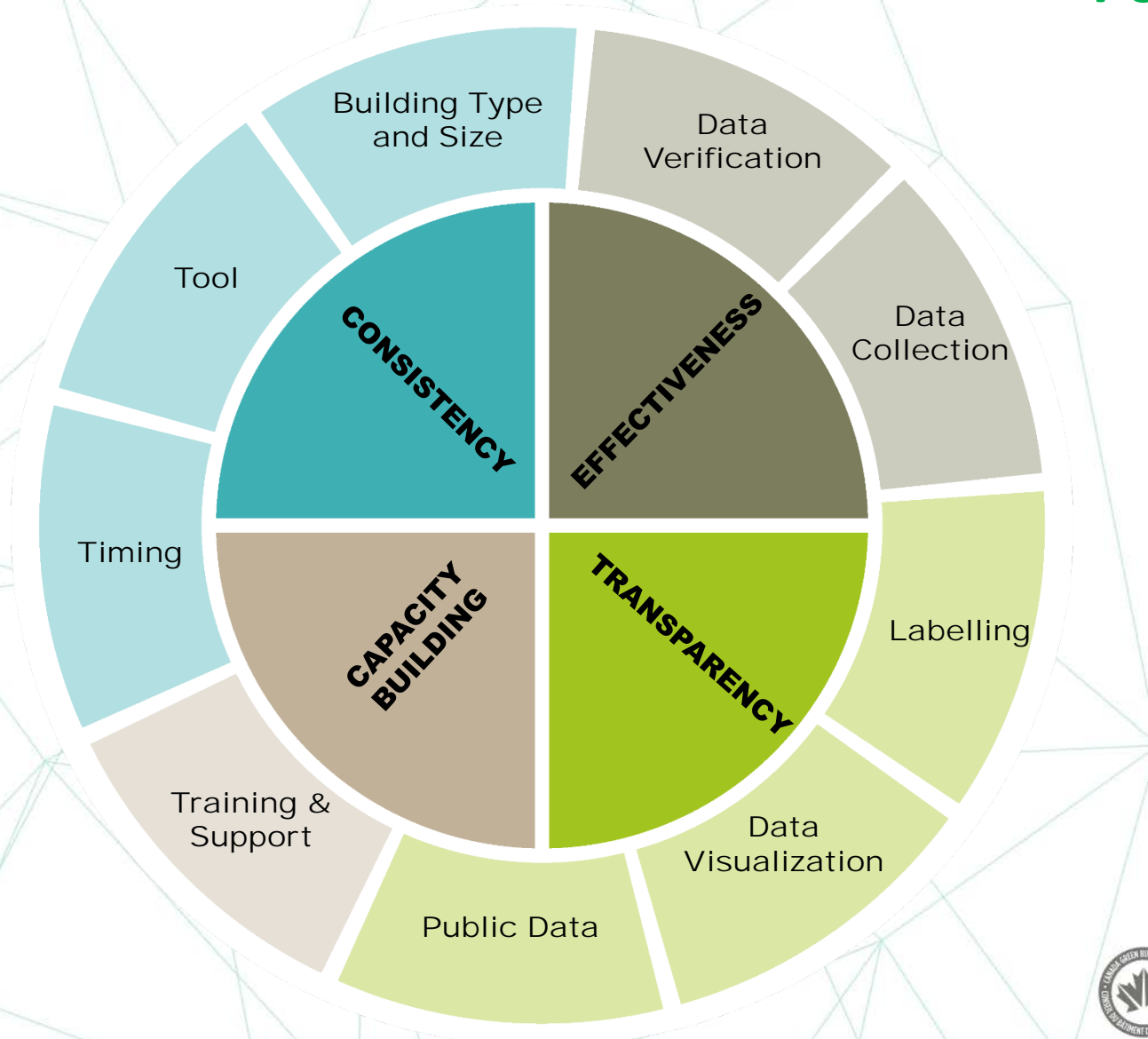
## Principles

- **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



# National Benchmarking Framework

## Policy Options



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# 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



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# 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.

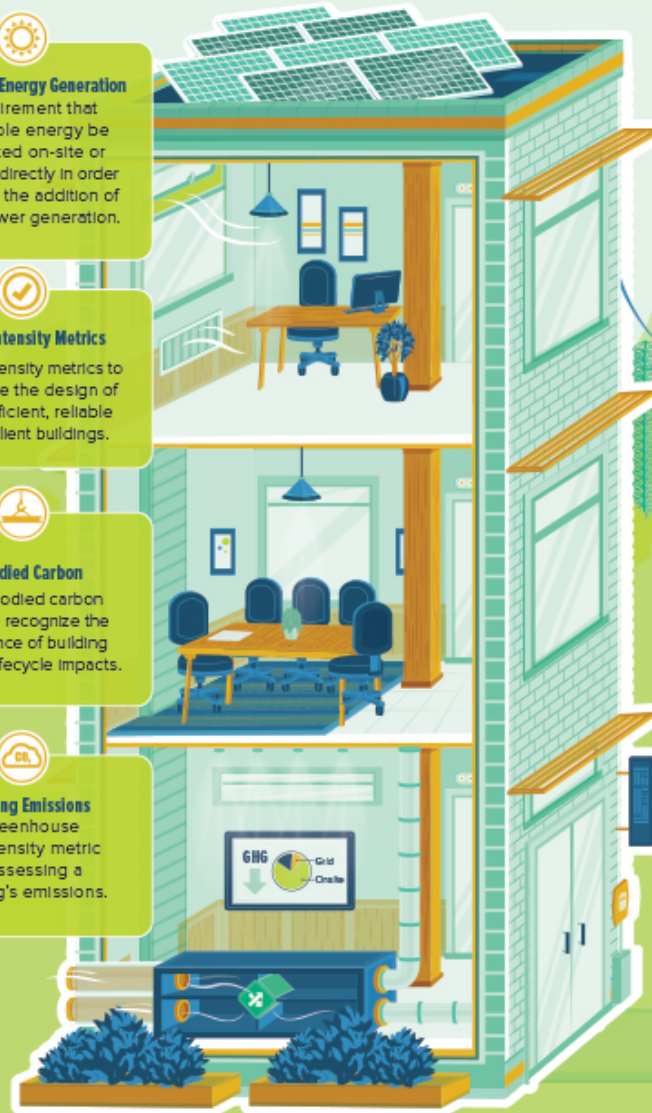
## A Zero Carbon Building is...

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.



## Reducing Peak Energy Demand

A peak energy demand metric to encourage the use of "peak shaving" measures.



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# 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<sub>MT</sub>**

**CO<sub>2</sub>e**



# LEED & RESILIENCY





LEED  
v4

# 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

Column1 LEED v4 CREDIT	Contributes to .... LEED Pts	Reduced Flooding Risk	Resilience to Drought	Resilience to heat waves	Resilience during power loss	Resilience to indoor overheating if HVAC is lost in summer	Resilience to low temps/freezing indoor if HVAC is lost in winter	Improved Indoor Air Quality During Forest Fire Events	Resilience of Surrounding Ecosystem
<b>Integrative Process</b>	1	X	X	X	X	X	X		
<b>Location and Transportation</b>									
Sensitive land protection (e.g., floodplain)	1	X							X
Reduced parking footprint	1	X		X					
<b>Sustainable Sites</b>									
Site assessment	1	X		X					
Site development – protect/restore habitat	2	X	X	X					
Open space	1	X		X					
Rainwater management	3	X	X						
Heat island effect	2			X		X			
<b>Water Efficiency</b>									
Outdoor water use reduction	Rqd + 2		X						
Indoor water use reduction	Rqd + 6		X						
Building-level water metering	Rqd + 1		X						
<b>Energy and Atmosphere</b>									
Energy Performance (Envelope)	Rqd + 18			X	X	X	X		
Renewable energy production	3				X				
<b>Materials and Resources</b>									
Building Life-Cycle Impact Reduction (flexibility)	4					X	X		
<b>Indoor Environment Quality</b>									
Daylighting	3				X				
Enhanced indoor air quality strategies	2			X	X	X		X	
Thermal comfort (e.g., Operable windows)	1			X	X	X			
<b>Innovation</b>									
Innovation (pilot credits included)	5	X	X	X	X	X	X		
LEED accredited professional	1	X	X	X	X	X	X		
<b>Regional Priority</b>	4				Depends on regional priority				

# 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

### Flooding

- Protect/restore habitat
- Rainwater management
- Sensitive land protection
- Reduced parking footprint
- Site assessment
- Open space

### Drought

- 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



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# Resiliency Strategies

## Building

### Power Loss

- Energy performance
- Renewable energy
- Daylighting
- Thermal comfort & ventilation
- Heat island reduction



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# 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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