



Canada Green Building Council
Every Building Greener

Taking Net Zero to Scale

A Framework for Commercial /
Institutional Buildings

Net Zero Energy Workshop

Mark Hutchinson, VP Green Building Programs

» November 8, 2016

cagbc.org

LONG TERM GOAL:

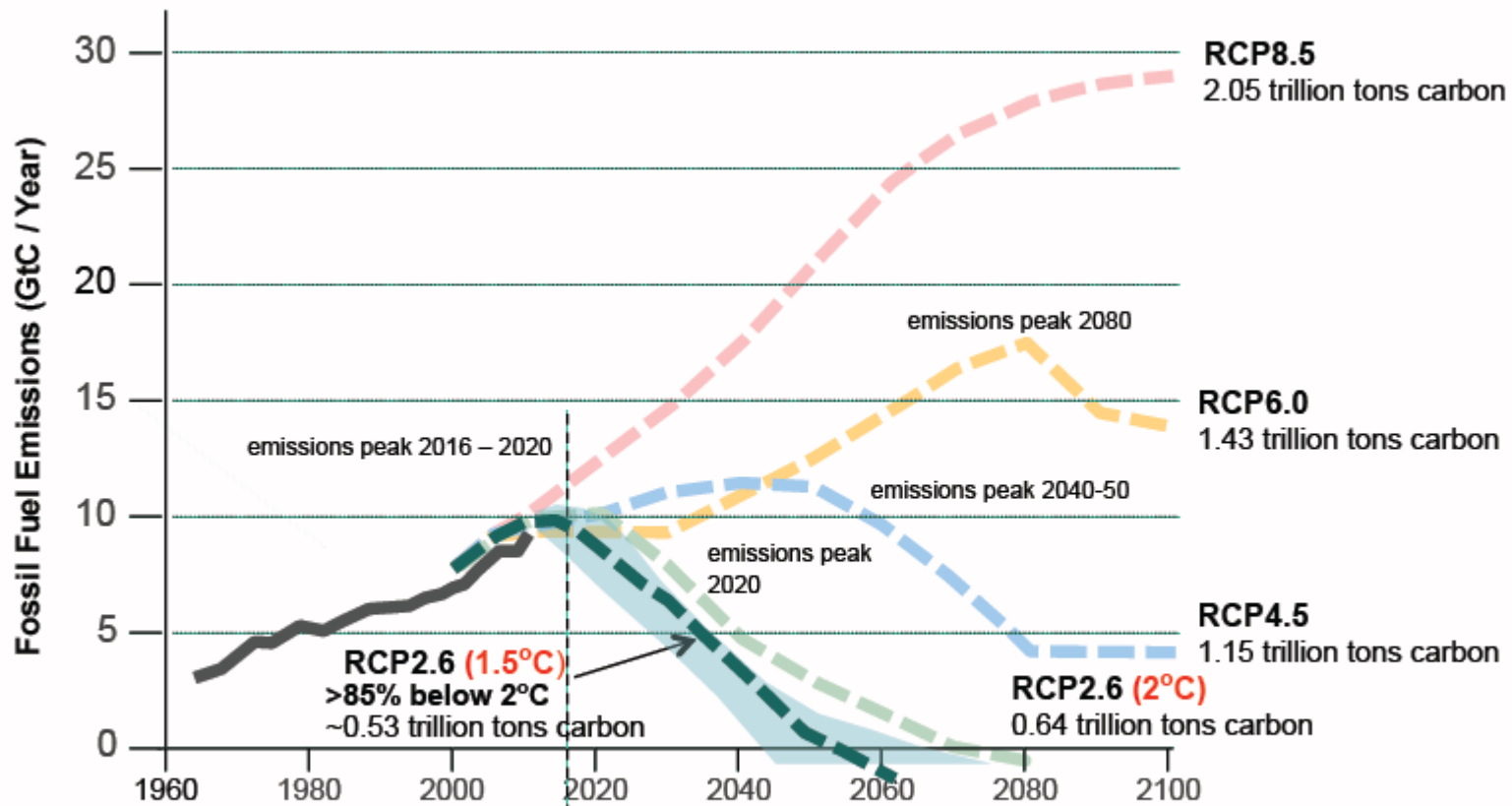
To keep global average temperature increase
“well below 2°C above pre-industrial levels and to pursue efforts
to limit the temperature increase to 1.5°C.”

December 12, 2015

COP21/CMP11

Paris France





Pathways for Fossil Fuel Carbon Emissions to 2100

Source: IPCC 2013, Representative Concentration Pathways (RCP); Stockholm Environment Institute (SEI), 2013; Climate Analytics and ECOFYS, 2014.

Note; Emissions peak and cumulative carbon budgets are for fossil fuel CO₂-only emissions.

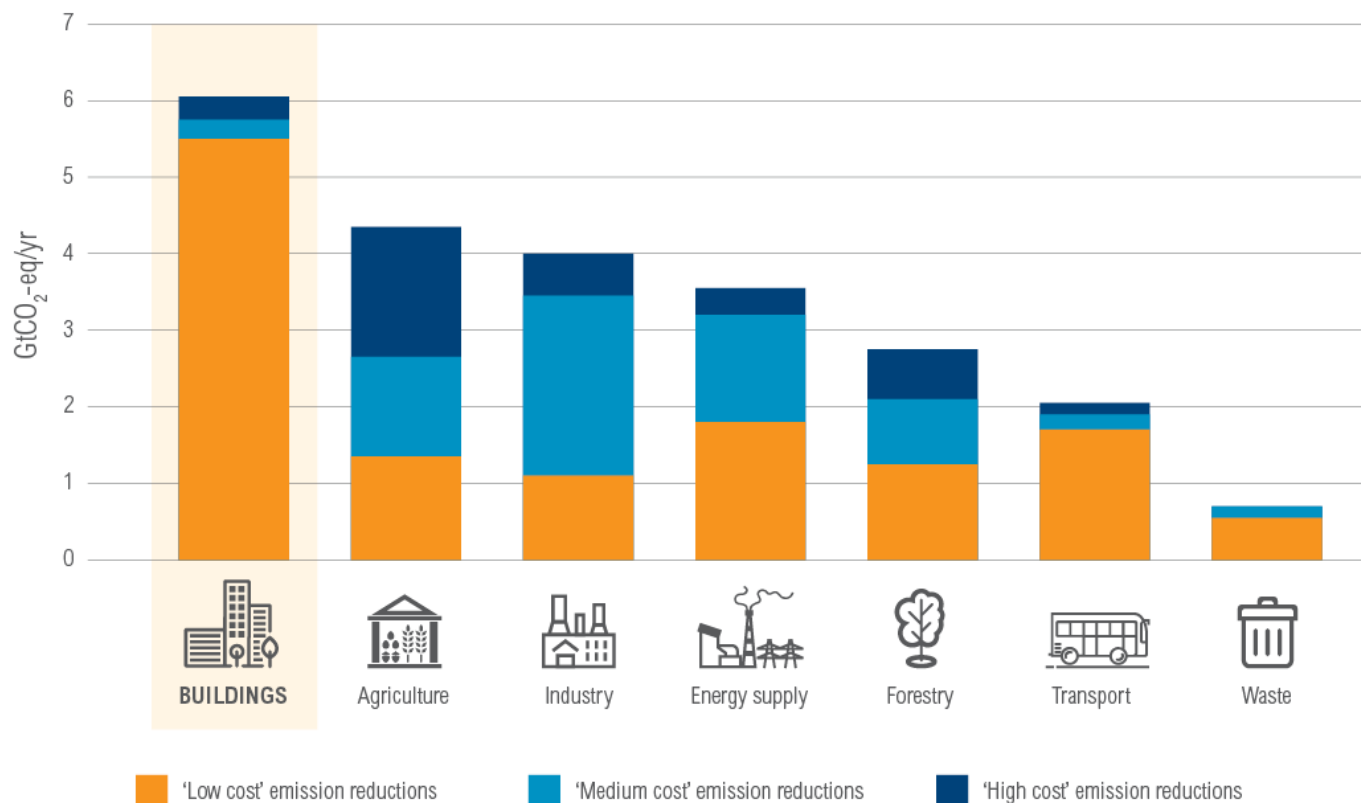


Canadian Context

- Vancouver Declaration on Clean Growth and Climate Change
- 30% reduction below 2005 levels of GHGs by 2030



Building Efficiency Is One of the Most Affordable Ways to Cut Emissions



Note: 'Low cost' emission reductions = carbon price <20 US\$/tCO₂-eq. 'Medium cost' emission reductions = carbon price <50 US\$/tCO₂-eq.

'High cost' emission reductions = carbon price <100 US\$/tCO₂-eq.

Source: IPCC. 2007. IPCC Fourth Assessment Report: Climate Change 2007: Synthesis Report. "4.3 Mitigation options." https://www.ipcc.ch/publications_and_data/ar4/syr/en/mains4-3.html

Impact of LEED



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.



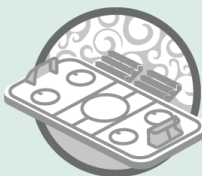
Reduction in Greenhouse Gases

A **1,261,016** CO₂e 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.

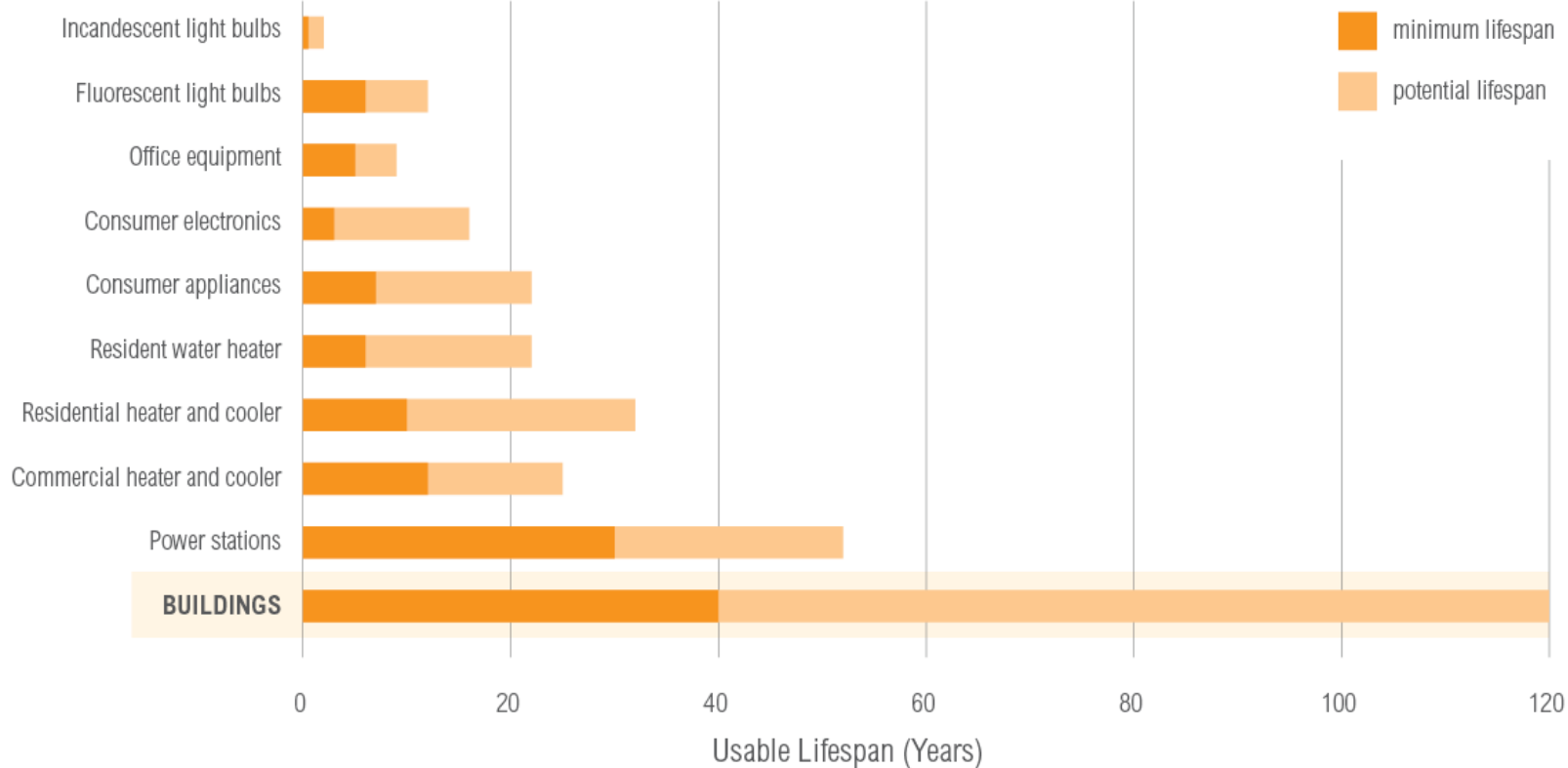
2002 - 2015 LEED certified buildings

LEED v4 - Renewed Emphasis on GHGs

- Whole building life cycle assessment
- EPDs
- Community scale renewables
- Carbon offsets
- Demand response
- Natural ventilation
- Enhanced energy performance
- Alternative energy metric pilot credit



Buildings Have Long Economic Lifespans Compared to Other Energy-Consuming Infrastructure



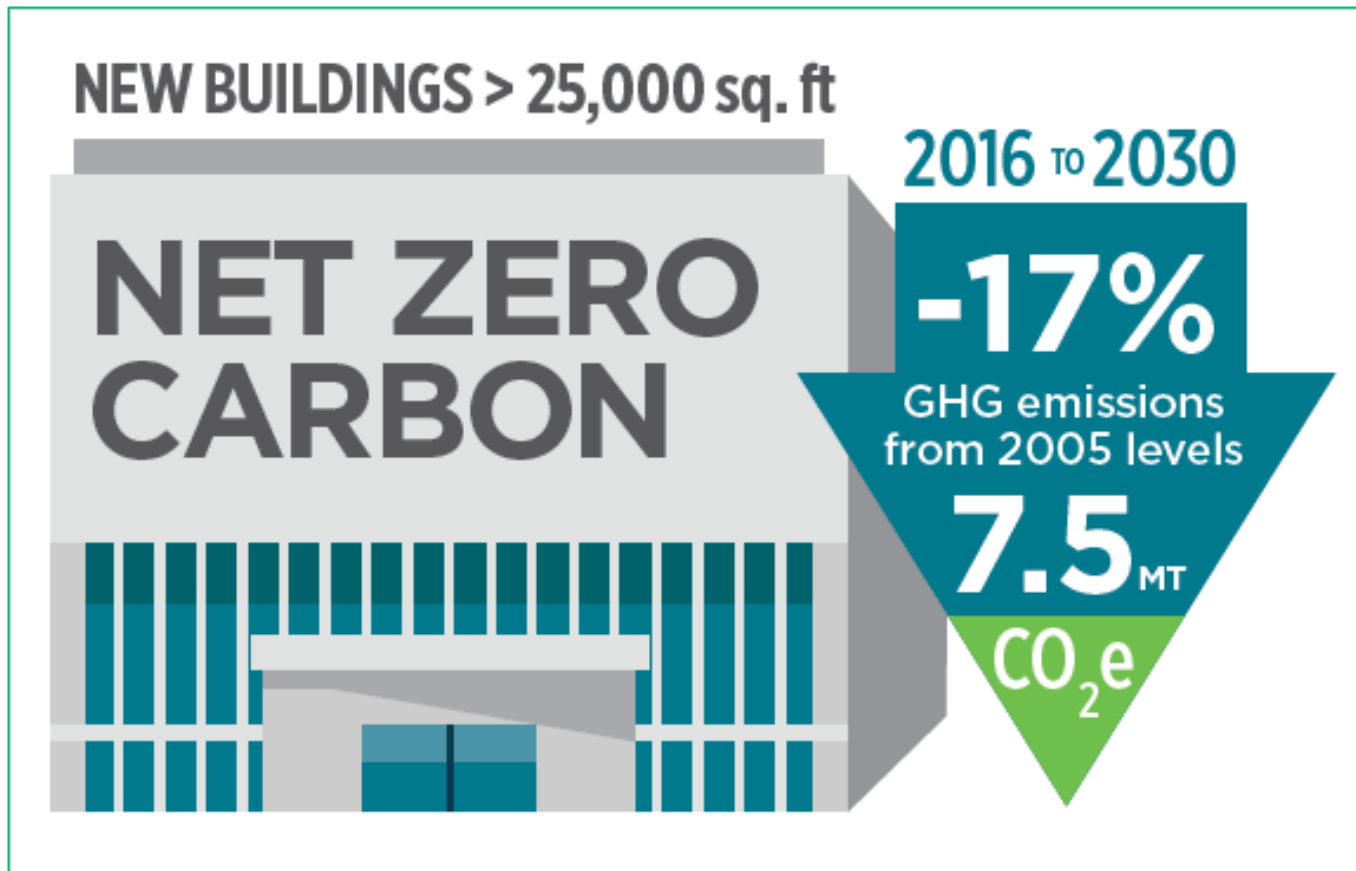
Source: International Energy Agency. 2013. Transition to Sustainable Buildings: Strategies and Opportunities to 2050. http://www.iea.org/publications/freepublications/publication/Building2013_free.pdf.

wri.org/buildingefficiency

 WORLD RESOURCES INSTITUTE

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- Conversely... it's critical to get every building right!





BUILDING SOLUTIONS TO CLIMATE CHANGE

How Green Buildings
Can Help Meet
Canada's 2030
Emissions Targets

September 28, 2016

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GHG REDUCTION

FROM 2005 LEVELS



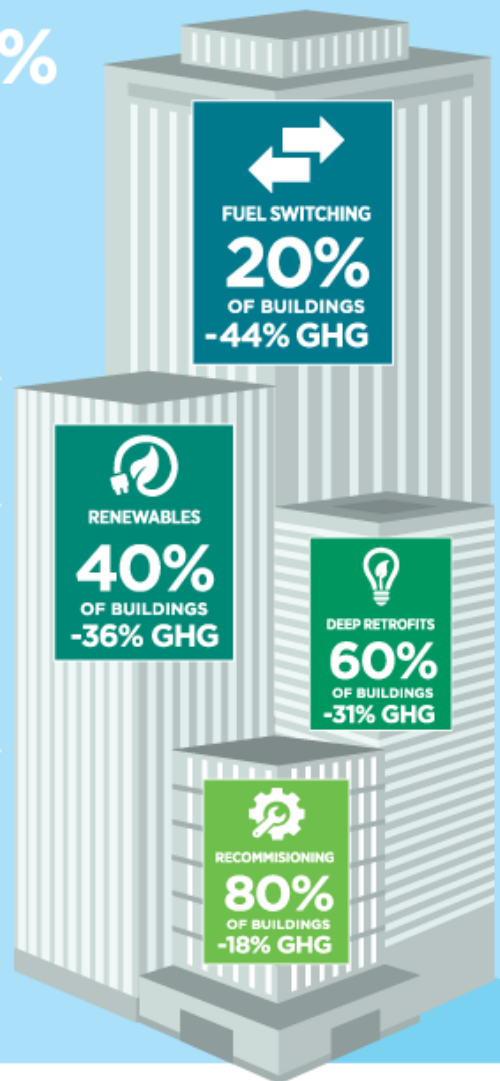
BUILDING UPGRADE RECOMMENDATIONS TO REACH 2030 TARGET

-44%

-36%

-31%

-18%



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



Leading by example

“Over the next three years, we’ll work toward a new, more ambitious target of reducing GHG emissions from federal buildings and fleets by 40% below 2005 levels by 2030.”

- Federal Sustainable Development Strategy







ENERGY BENCHMARKING, REPORTING & DISCLOSURE IN CANADA:

**A Guide to a
Common
Framework**



THE J.W. MCCONNELL
FAMILY FOUNDATION

LA FONDATION DE LA
FAMILLE J.W. MCCONNELL

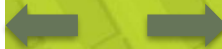


“You can’t manage what you don’t measure.”

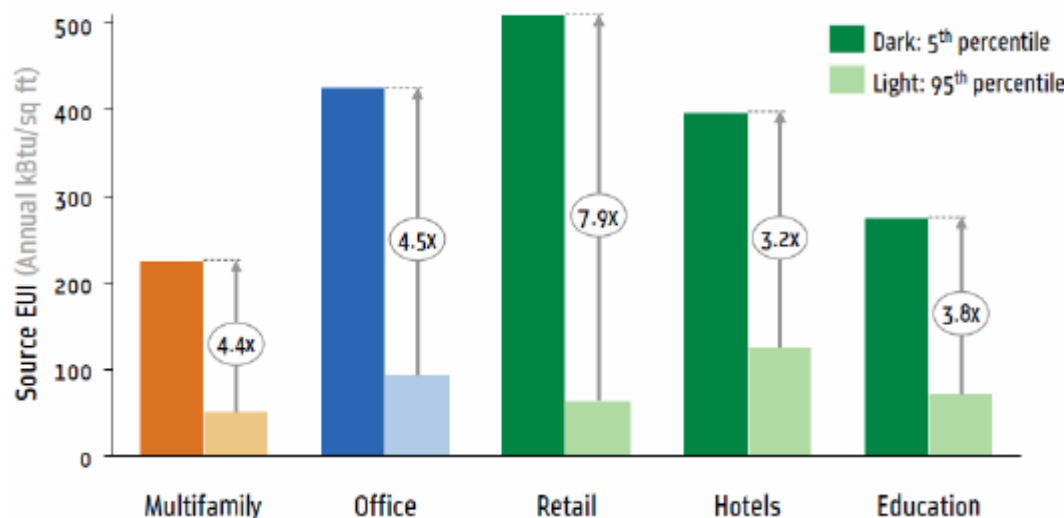
Dr. Edwards Deming

***“When there’s a scoreboard,
people play differently.”***

Ben Myers, Boston Properties



Early Findings from Energy Benchmarking in New York City



2012: In NYC the poorest performing buildings **use 3-8x the energy** of the highest performing buildings.

[Fig. 11] Variation in Source EUI by Sector (5th-95th percentile)
Source: NYC Mayor's Office

5th-95th Percentile
Outliers

2013: Energy use varies by a factor of 3-6 (5th-95th percentile)



Zero Carbon Buildings Initiative



Objective

- Catalyze action towards reducing GHG emissions associated with buildings

Market sector:

- Commercial / institutional buildings

Basis of evaluation:

- Design and operations



International Collaboration

- Participation in World Green Building Council's Advancing Net Zero initiative
- **Goals:**
 - All new buildings built to be net zero by 2030
 - All buildings to be net zero by 2050



Proposed Framework

1. A greenhouse gas intensity metric for assessing a building's emissions, using regional emissions factors.
2. Energy intensity metrics to incentivize the design of highly efficient, reliable and resilient buildings.
3. A peak energy demand metric to encourage the use of "peak shaving" measures.
4. An embodied carbon metric to recognize the importance of building material lifecycle impacts.
5. A requirement that renewable energy be generated on-site or procured directly in order to ensure the addition of clean power generation.








Prior Work

- City of Toronto Global Best Practices in Energy Efficiency Policy Study (2015)
- City of Vancouver Zero Emissions Building Plan (2016)



Providing Transparency



 A  B  C	
Building Facts	
Building Size	XXXm ² 2016
<hr/>	
Building Type	
Number of storeys (1-XX)	
Site Utilization (FAR)	
Climate Zone (1-7)	
<hr/>	
Carbon Intensity	kg CO₂e/m².yr
	
Carbon Intensity of Electricity	kg CO ₂ e/kWh
Embodied Carbon	kg CO ₂ e/m ²
<hr/>	
Site EUI	kWh/m².yr
	
TEDI	kWh/m ² .yr
Peak Energy Demand	kW/m ²
<hr/>	
Renewable Energy	kWh/m².yr
On-site	kWh/m ² .yr
District	kWh/m ² .yr
Procured	kWh/m ² .yr

Next Steps

- Collection of feedback on framework
- Piloting
- Program development
- Launch of verification program Spring 2017

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