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# CEM/GABC: Energy Efficiency in Buildings: How to accelerate Investments

## Session 1B: How to accelerate the deployment of new energy efficient buildings

### Energy Efficiency in Buildings in Canada: Domestic and APEC Experience

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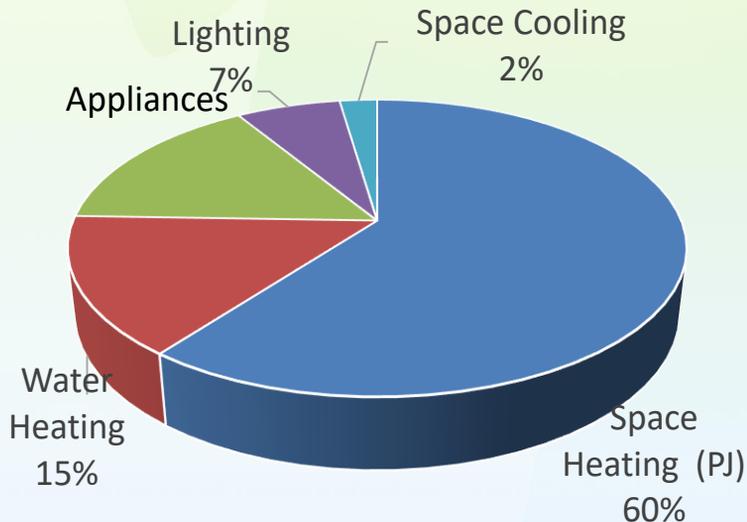


# Buildings : a Key Area of Opportunity in Canada

**Residential, commercial / institutional = 17% of Canada's GHG**

- Need to address new and existing buildings
  - 75% of buildings in 2030 are already standing
  - 25% of 2030 floor space will be built after 2017
  - Heating is our biggest challenge
  - GHG intensity is improving, but more to be done

Building Energy Use, 2013 (PJ)



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# Energy is a shared jurisdiction

## FEDERAL

Regulated standards

Model energy codes

National labels and certifications

## PROVINCIAL / TERRITORIAL

Regulated standards

Code Implementation

Incentives rebates

R & D



# The Pan-Canadian Framework (PCF) : Buildings Sector

**FPT Energy Ministers endorse strategies to improve EE of buildings and equipment**  
August 2017

2016 **Consultation: Federal, sub-national, industry, NGOs** 2017

**FPT Approval Dec 2016**

**Initiatives will transform how homes / buildings are constructed, operated and renovated to increase energy efficiency / reduce GHG emissions**

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# PCF measures for the Buildings and Housing Sector

## ➤ **Federal Budget 2017**

- Buildings and Housing-CAD182M /5 years;
- Federal government operations-CAD29.7 M/ 11 years

## ➤ **Making new buildings and existing buildings more energy efficient**

- Net-Zero Energy Ready Codes adopted by 2030
- Model energy codes for existing buildings developed by 2022 and Labelling/Disclosure by 2019
- Financial support to PTs through Low Carbon Economy Fund (LCEF) and Infrastructure funding

## ➤ **New standards for high-efficiency equipment and appliances**

## ➤ **Building codes and energy efficient housing in indigenous communities**

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# Residential Buildin



14M homes across Canada



17% of Canada's energy use



14% of GHG emissions



64% of energy used in homes is for space heating

## ENERGUIDE

- >1 M homes rated
- >800,000 home retrofits
- >50 programs / regulations use Energuide



- 65,000 certified homes
- 400 participating builders

### R-2000

- 22% of EE improvement
- A R-2000 home built in 2005 is now a typical home

### 1990-2014

- EE improvements: 47%
- Cost Saving : CAD12.4B
- Energy savings: 671 PJ
- GHG savings: 30 MT

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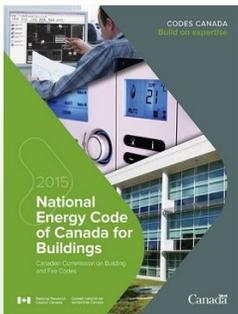


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# Commercial Buildings



## National Energy Code of Canada for Buildings (NECB)

- NECB 2011 –25% more stringent than 1997 version
- NECB 2015 –13-15% more stringent than NECB 2011
- Work underway for NECB 2020 – toward net-zero energy ready

## ENERGY STAR Portfolio Manager Benchmarking

- Energy benchmarking based on national energy use data, Canadian climate
- Considered by sub-national governments for mandatory energy disclosure (Ontario 1<sup>st</sup> to use)
- Adopted by over 22% of Canadian floor space

## Equipment Regulations

Remove least efficient products from market, by setting minimum performance standards



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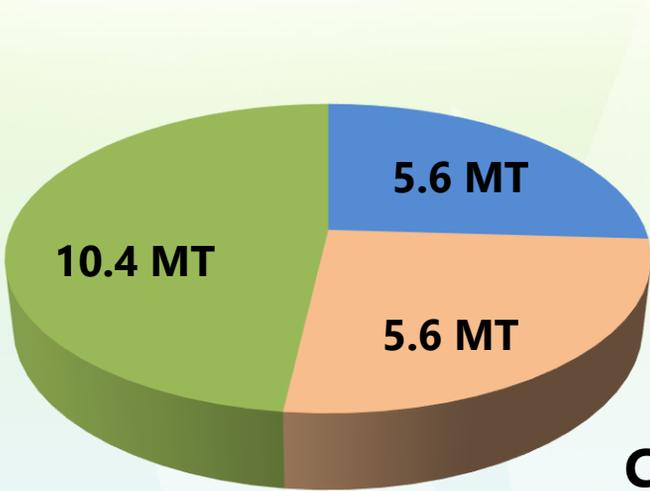


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# Potential Impacts from Buildings Strategy by 2030



- New building codes
- Existing building codes and labels

**Total: 21.6 MT**

## Co-Benefits:

- Job creation
- Healthier indoor environments
- Long-term decarbonization

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# Canada Promoting NZEB

## IEA Solar Heating and Cooling Task 40 / EBC Annex 52 on net zero energy buildings, 2008-2013

- Canada led
- Providing harmonized international definitions framework, tools, innovative solutions and industry guidelines

Mosaic Center



### Examples of Net or Near 0 Buildings

- Mosaic Center, Edmonton (Alberta)
  - Earth's northernmost net-zero energy commercial building
- Varennes Public Library (Quebec)

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# APEC Program - Nearly (Net) Zero Energy Building

## APEC Leaders' Declarations, 2011, re-confirmed in 2013:

- *Aspire to reduce APEC's aggregate energy intensity by 45 percent by 2035 on the basis of 2005.*
- *2014 Beijing Declaration: aspirational goal of doubling the share of renewables in the APEC energy mix, including in power generation, from 2010 levels by 2030.*

## Supported by

- APEC- Energy Working Group
  - APEC Program-Nearly (Net) Zero Energy Building (NZEB),  
Chaired by China
- Experts Group Energy Efficiency & Conservation

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# APEC Program - NZEB: Countries Engagement

## 20 APEC Economies engaged: series of meetings

- Task Group meetings since 2013
- Canada represented by Concordia University Smart Net-Zero Energy Buildings Strategic Research Network
- Meetings planned for 2018; options to host in Canada

## Key Projects

- APEC NZEB Best Practices and Energy Reduction Results Comparative Study
- APEC Nearly (Net) Zero Energy Building Roadmap Study responding to COP21

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# Progress to date

## Study: NZEB Best Practices and Energy Reduction

### Results

Systematic information collection on existing 100 NZEB projects for new and existing buildings to establish best practices in APEC regions

- Project Objectives
  - Inventory of demonstration projects
  - Project distribution by building type and climate zone
  - Identify key technologies and quantify actual energy reduction
  - Promote NZEB best practices in APEC region to accelerate emission reductions

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# Progress to date

## Findings

- 36/100 projects achieved Net-0; 28/100 projects achieved 120 kWh/m<sup>2</sup> (220-300 kWh/m<sup>2</sup> for typical buildings)
- Country comparison difficult : different statistical basis
- Technical requirements to meet NZEB:
  - Envelope: high insolation and air tightness. Very high insolation may be more expensive than photovoltaic;
  - Daylight harvesting, EE lighting, natural ventilation, integrate passive solar heat gain, PV, solar tube, geothermal
- Greatest obstacle to adoption: incremental cost

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# Progress to date

## Some Key Conclusions from the APEC work until now

- **Energy efficiency goals** will vary by region, climate, energy sources and environmental goals (resilience, etc.); i.e.: in North America, NZ ready office = 65-70 kWh/ m<sup>2</sup> per year;
- **Net-zero, with photovoltaic system**, the building form needs to provide enough envelope area for the PV.

NREL RSF, USA



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Varenes Library, Canada



# Future APEC Work

## Questions similar to CEM/GABC questions

1. What building sector goal could APEC set, as a whole and in each economy?
2. What are the policies used and their outcomes?
3. Which priority policies would support a potential NZEB goal? What kind of technology could have a market potential?

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