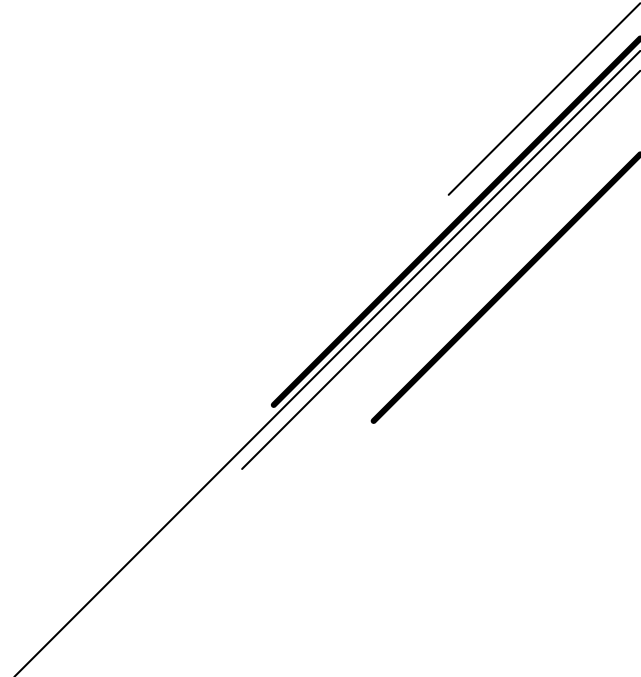


# PROPOSED INCENTIVES TO REDUCE CANADA'S CARBON EMISSIONS

July 2017

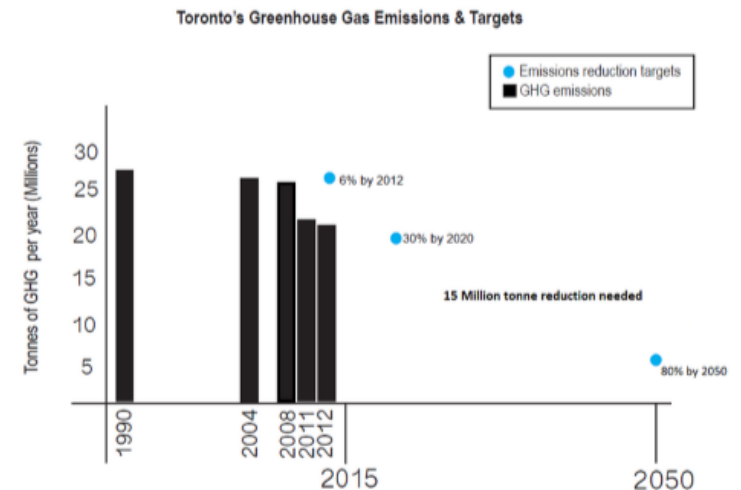
- ▶ Framework
- ▶ Incentives/Support recommended
- ▶ References

CONTENT

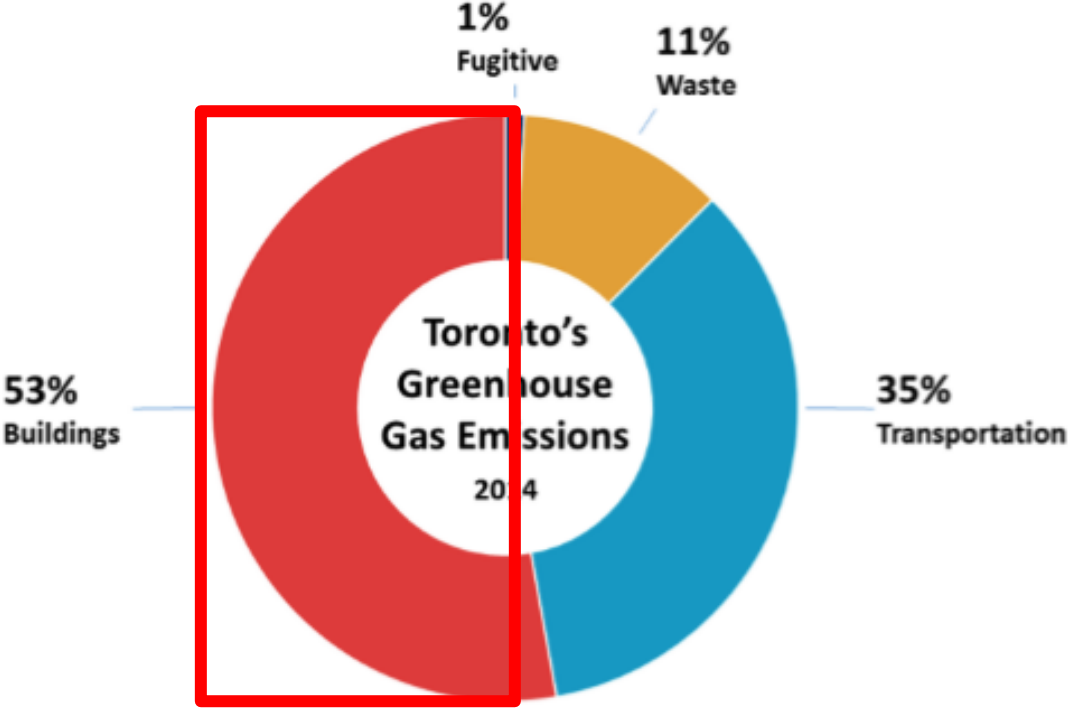


- ▶ The government of Canada is committed to taking actions on climate change and is pledge to reduce national carbon emissions by 30% between 2005 and 2030, including implementing regulations for how buildings or constructions to switch the main source of energy from hydrocarbons, such as natural gas or crude oil to renewable energy sources.
- ▶ In particular Toronto has established a goal of reducing greenhouse gas emissions by 80% by 2050 to support its vision of being one of the most sustainable and resilient cities in the world. (Source: \*1 in references)

## FRAMEWORK



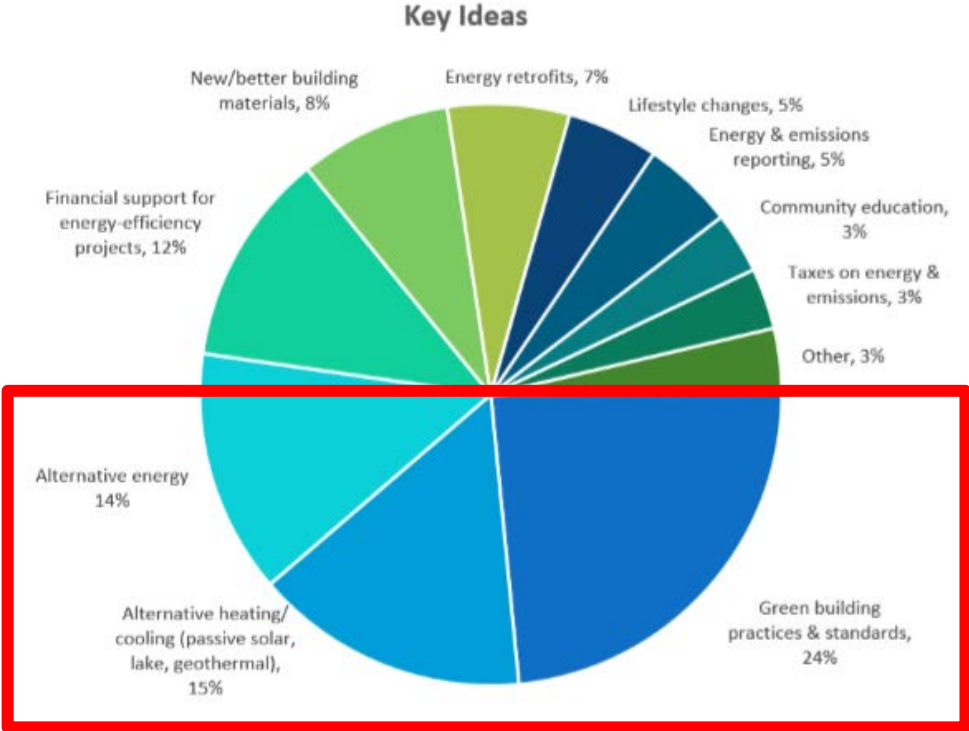
Toronto's emissions by sector, 2014 (Source: \*2 in references)



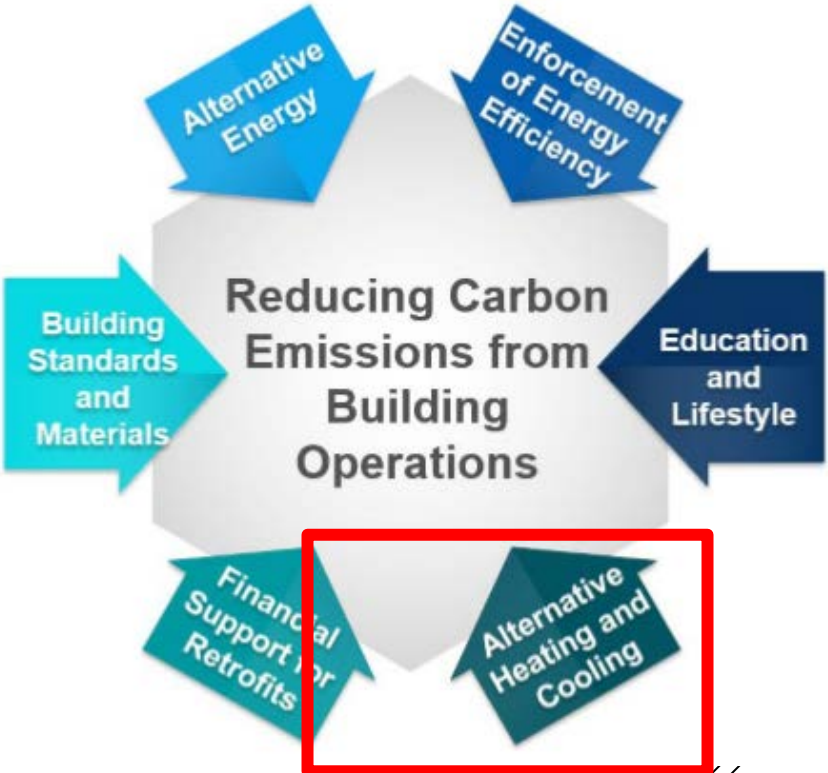
# FRAMEWORK – AREAS OF OPPORTUNITY

# Summary of Community Ideas that will reduce carbon emissions related to building operations in Toronto.

(Source: \*1 in references)

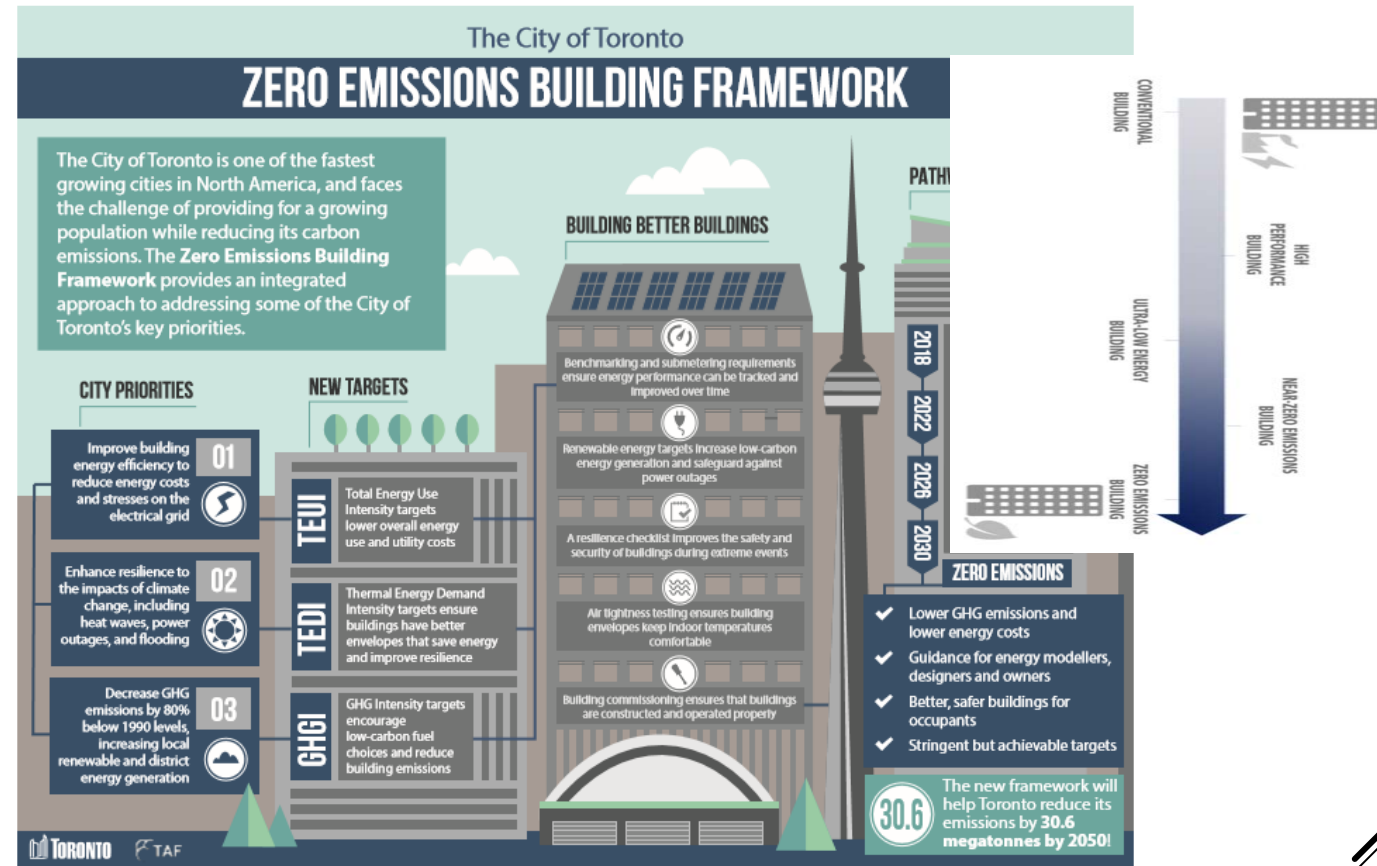


In general, the community ideas focused on six different strategies...



FRAMEWORK – AREAS OF OPPORTUNITY

The City of Toronto  
ZERO EMISSIONS  
BUILDINGS FRAMEWORK  
 Published: March 2017



FRAMEWORK – VISION

Source: \*2 in references

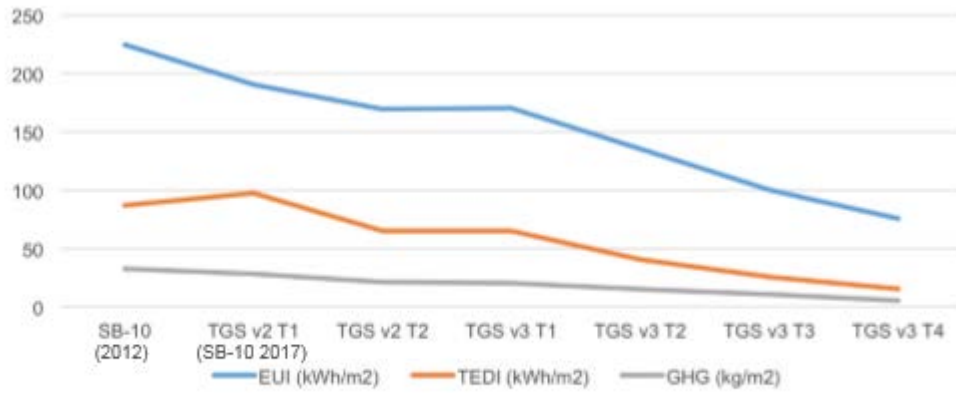


Figure 10: Target progression to near-zero emissions for High-Rise MURB

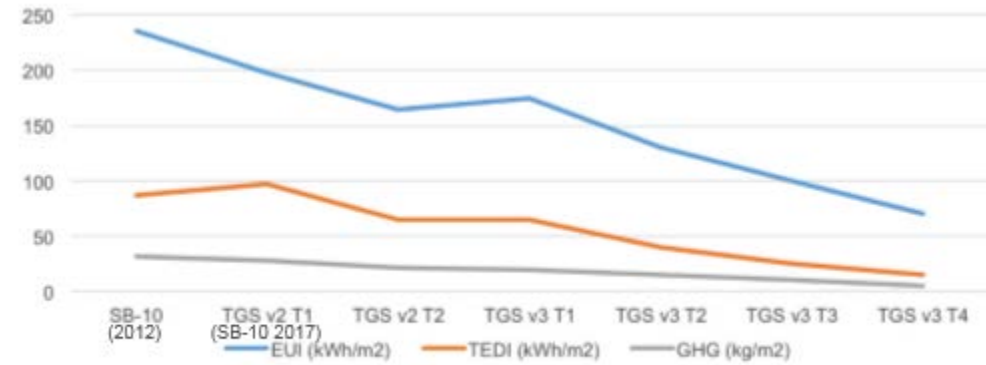


Figure 11: Target progression to near-zero emissions for Low-Rise MURB

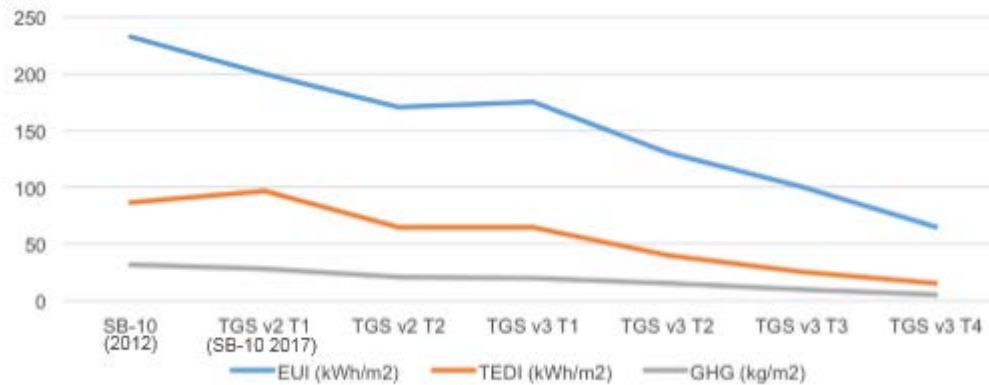
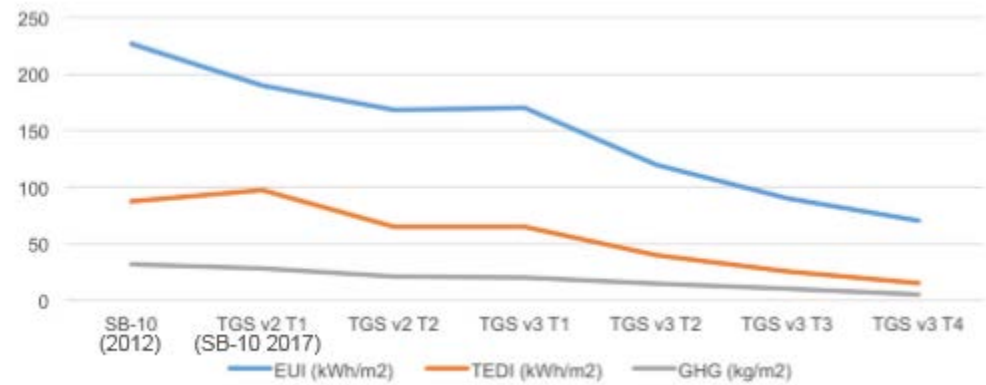
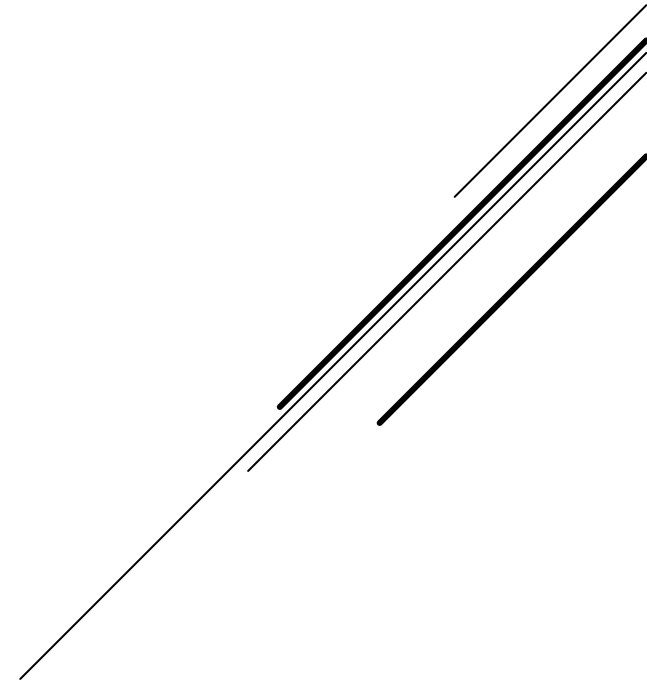


Figure 13: Target progression to near-zero emissions for Commercial Office



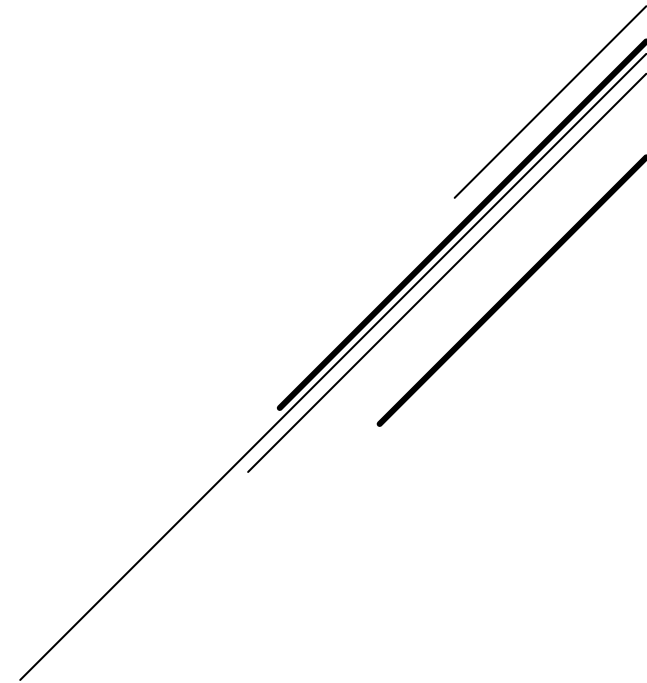
INCENTIVES/SUPPORT  
RECOMMENDED



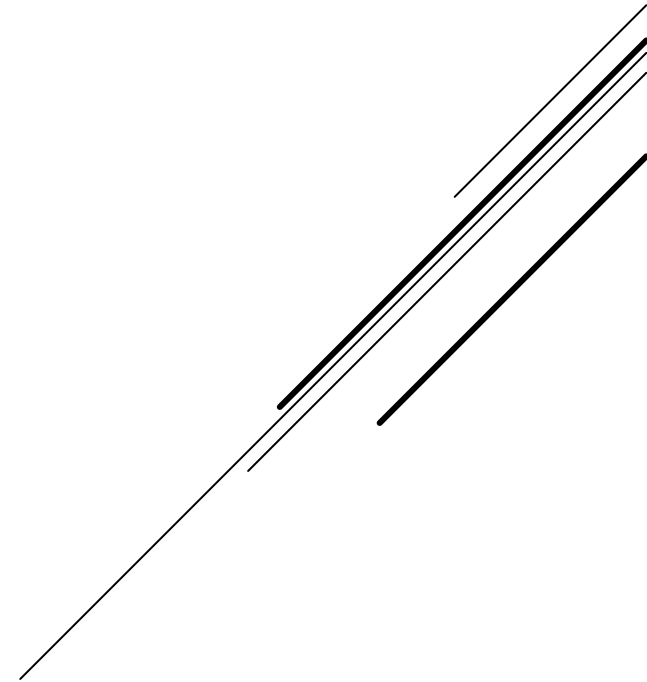


- ▶ THERMAL ENERGY DEMAND INTENSITY (TEDI), to ensure resilient buildings that improve both occupant comfort and thermal energy performance;
  - ▶ TOTAL ENERGY USE INTENSITY (EUI), to ensure buildings with low overall energy-use and utility costs; and
  - ▶ GHG INTENSITY, to encourage low-carbon energy sources and reduce building emissions.
- ▶ Per Toronto Green Standard (TGS)

PROVIDE INCENTIVES FOR:



ACTIONS IN MORE DETAIL



- ▶ Continue providing incentives for creating buildings “Solar Ready” by:
  - ▶ Designate an area of the roof for future solar PV and/or solar thermal and make it structurally sound to support it;
  - ▶ Provide two conduits from the roof to main electrical room (size of conduit to be determined based on maximum potential PV system size), and mechanical room (size of conduit to be determined based on maximum solar thermal system size);
  - ▶ Designate a 2m x 2m (6ft x 6ft) wall area in the electrical and mechanical rooms for future solar electrical/thermal equipment (meters, monitors, etc.) controls and connections; and
  - ▶ Where possible place the HVAC or other rooftop equipment on the north side of the roof, to prevent future shading.
  - ▶ 2000m<sup>2</sup> and height of 6 storeys or greater to construct a green roof. The larger the building, the larger the area of available roof space must be covered by a green roof. Areas for renewable installations are considered allowable deductions from total green roof area, making the use of green roofs and solar PV/ thermal compatible within the Bylaw.

## PROVIDE INCENTIVES FOR: SOLAR READINESS

These incentives will support the City of Toronto's Design Guideline for District Energy-Ready Buildings, that include:

- The ability to supply thermal energy from ground level;
- Adequate space at or below ground level for a future energy transfer station;
- An easement between the mechanical room and the property line to allow for thermal piping;
- Two-way pipes placed in the building to carry the thermal energy from the thermal energy network to the section in the building where the future energy transfer station will be located;
- A low temperature hydronic heating system that is compatible (i.e. large temperature differential, or "Delta-T") with a thermal energy network in order to reduce the pipe sizes and associated valves, fittings, etc.; and
- Appropriate thermal energy metering.

## PROVIDE INCENTIVES FOR: LOW-CARBON THERMAL ENERGY NETWORKS (DISTRICT ENERGY SYSTEMS)

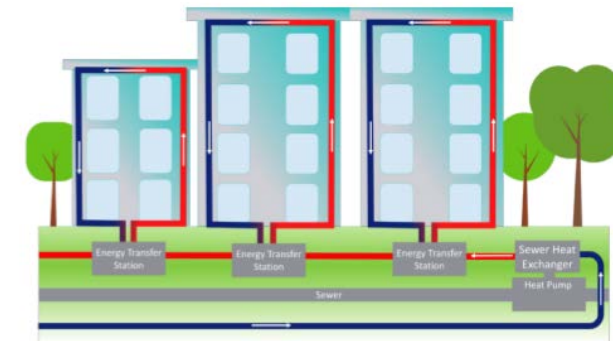


Figure 15: Low-carbon/renewable thermal energy networks (district energy systems) require little infrastructure within buildings, and can achieve high GHG reductions at relatively low cost (Source: City of Toronto)

- ▶ These incentives could include:
  - ▶ HVAC systems: all “complex systems” and systems with economizers, as well as “simple systems” with over 140 kWh cooling or 175 kWh heating;
  - ▶ Lighting and daylighting systems: 20 kW installed lighting overhead, or more than 10 kW with daylight or occupancy controls;
  - ▶ Domestic hot water systems: 60 kWh capacity;
  - ▶ Building envelopes; and
  - ▶ Renewable energy systems, such as:

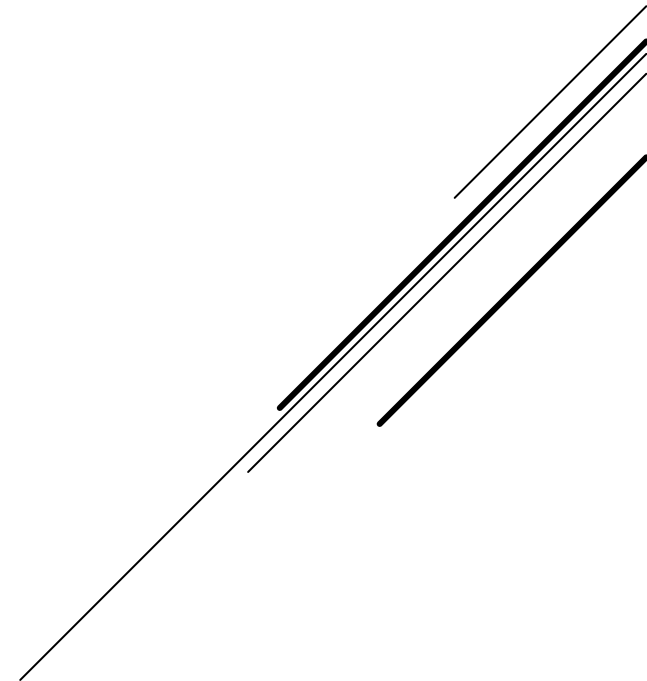
Energy Source	Description
<b>Photovoltaic panels</b>	Composite panels that convert solar energy into electricity, to be used within the building or exported to the grid
<b>Solar thermal systems</b>	Solar thermal collectors that convert solar energy into heating air or water for use within the building
<b>Biogas systems</b>	Fuel cells that use biogas to convert hydrogen and oxygen into electricity
<b>Biofuel systems</b>	Fuels produced directly or indirectly from organic material and combusted for the production of thermal energy or electricity*
<b>Wind systems</b>	Building- or site-integrated wind turbines that convert wind energy to electricity
<b>Geoexchange systems</b>	The use of ground source heat pumps that use electricity to harness heat from the ground under and/or surrounding a building

# PROVIDE INCENTIVES OR REWARDS FOR: BUILDING COMMISSIONING

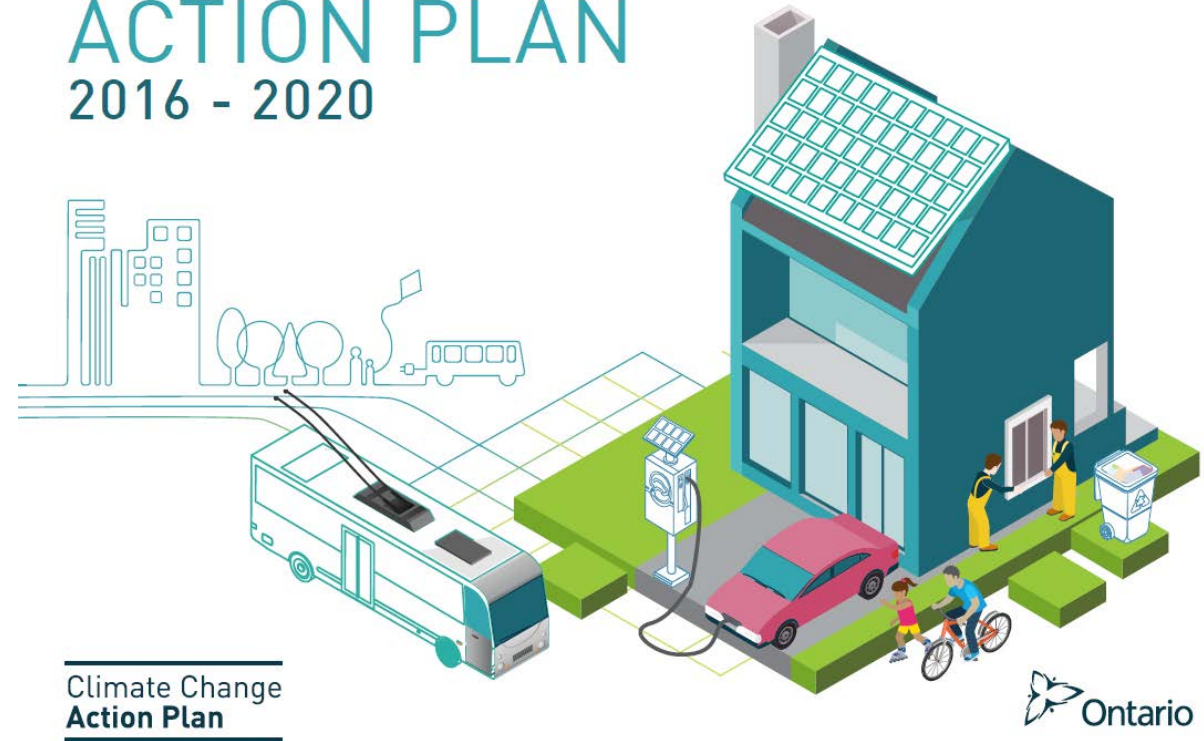
- ▶ For installation of in-suite thermal energy meters on **all heating and cooling** appliances in residential buildings, above and beyond existing requirements for individual suite meters for electricity use

## PROVIDE INCENTIVES FOR: SUBMETERING

Source: \*2 in references



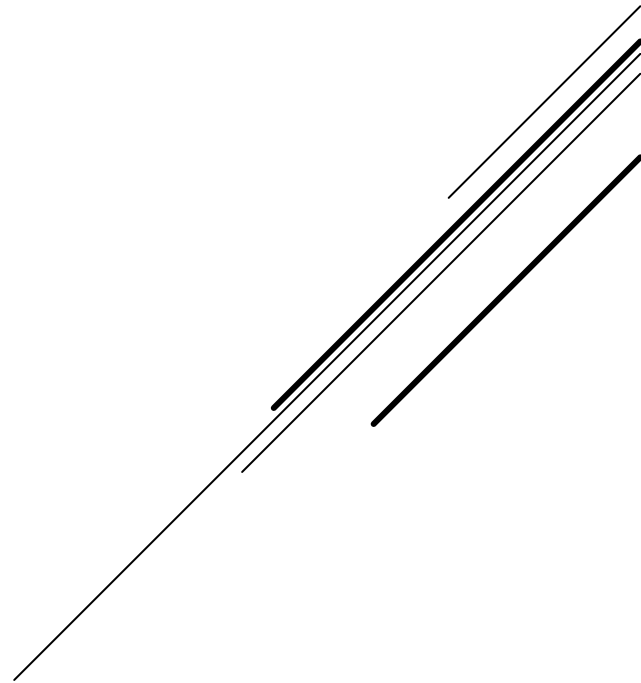
# ONTARIO'S FIVE YEAR CLIMATE CHANGE ACTION PLAN 2016 - 2020



OVERALL PROVIDE INCENTIVES TO ACTION  
THE CLIMATE CHANGE ACTION PLAN

Source: \*3 in references

# REFERENCES





- ▶ \*1) [Buildings and Energy in Low-Carbon Toronto](#)
- ▶ \*2) [The City of Toronto Zero Emissions Buildings Framework](#)
- ▶ \*3) [Ontario Climate Change Action Plan](#)

## REFERENCES

