
Climate Change and Ontario's Electricity Sector

May, 2017

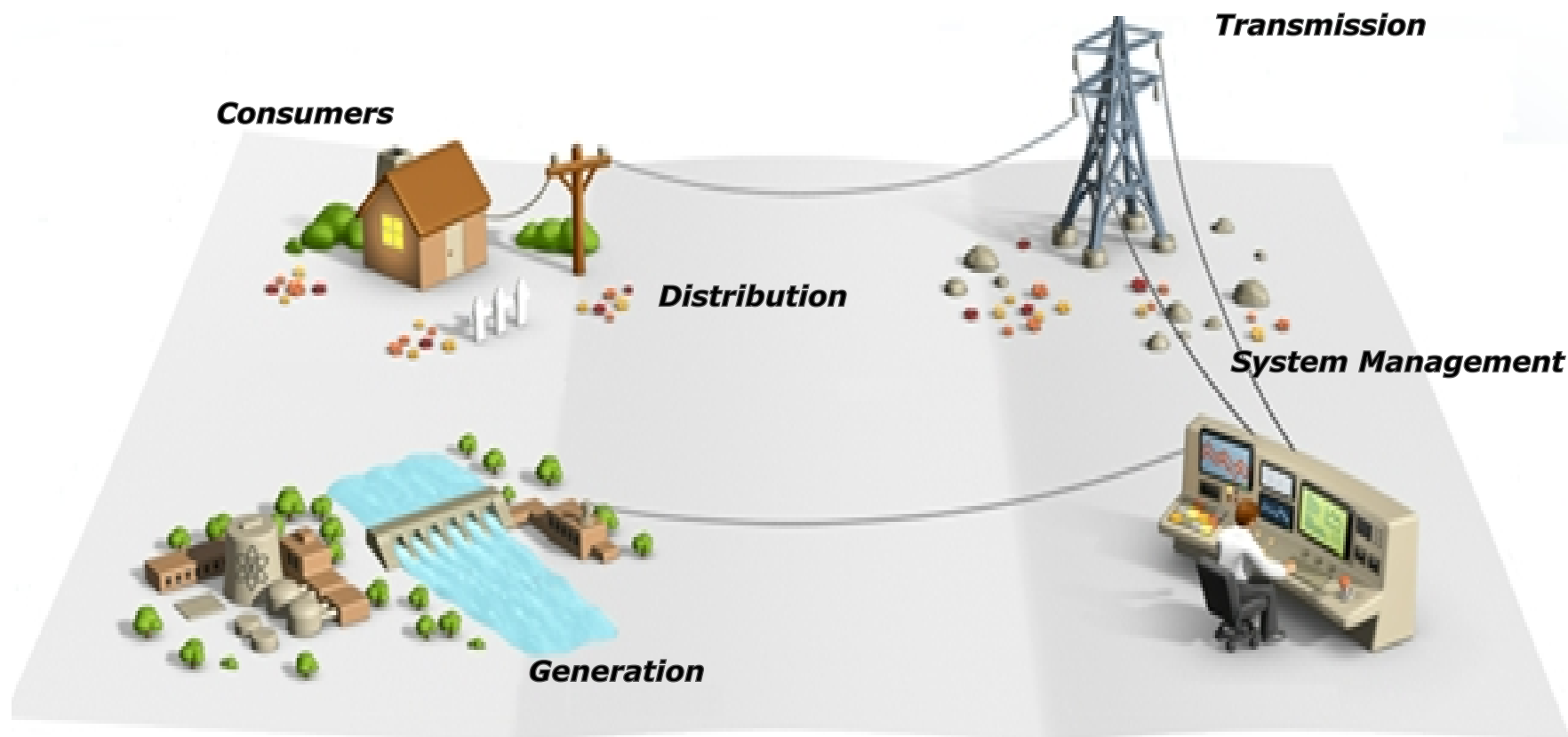
CONFIDENTIAL DRAFT

Overview

- Sector Overview
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 - Ontario's Net Metering Program
 - Conservation and Energy Efficiency
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Sector Overview

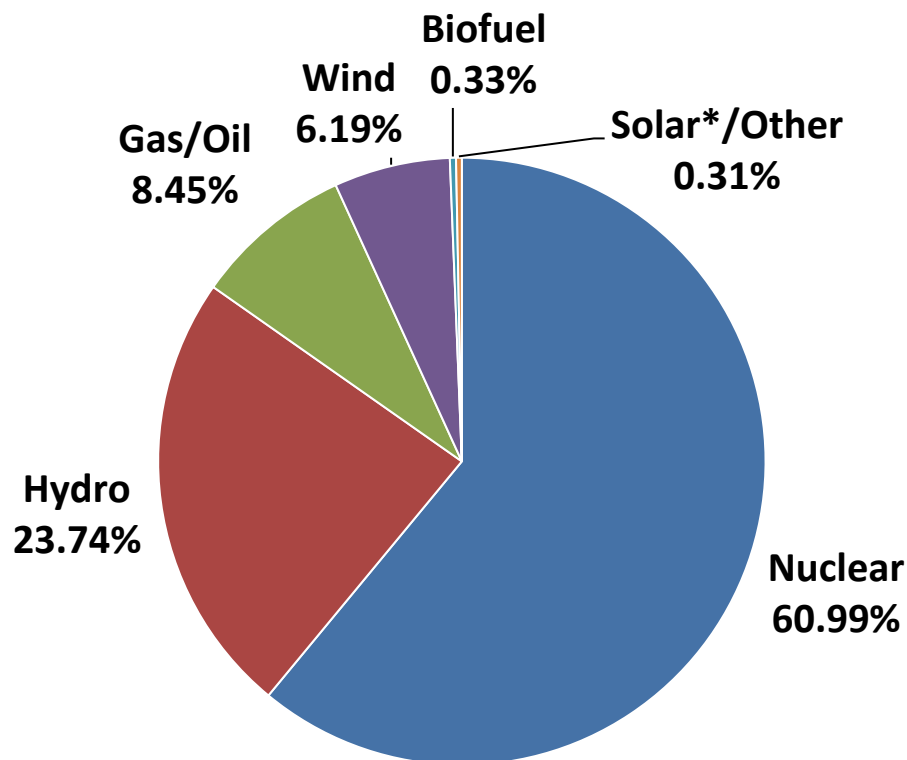
Ontario's Electricity System



The Electricity Supply Mix

Ontario's electricity system includes a diverse mix of resources. Our generation fleet continues to evolve, using cleaner forms of energy to safely and reliably meet the province's changing electricity needs.

2016 Generation by Fuel Type



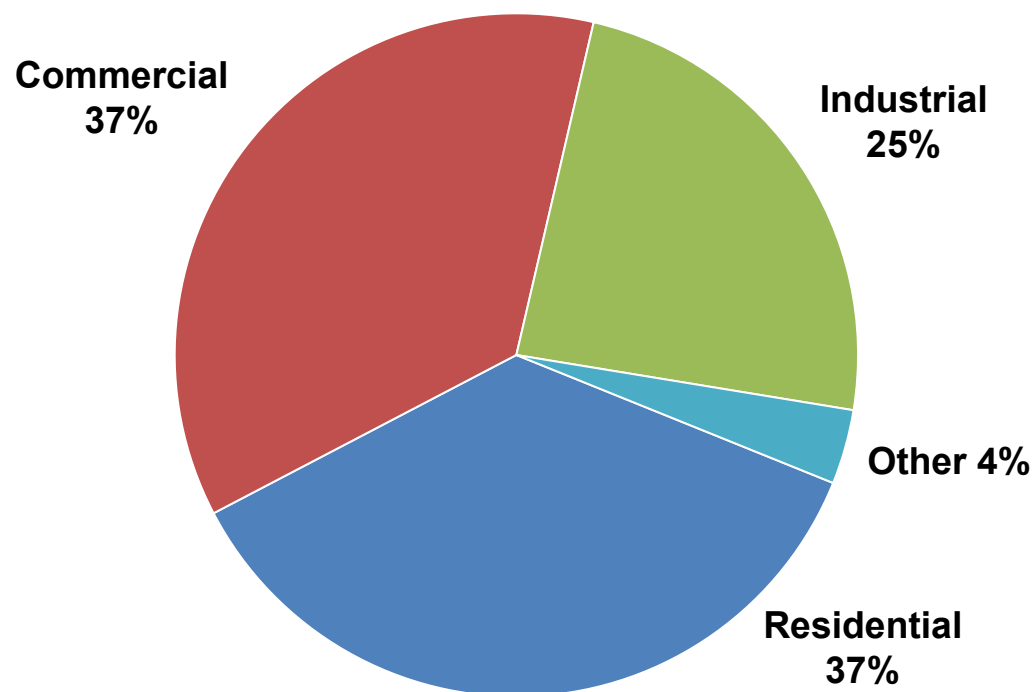
*Transmission-connected only

Source: IESO

Ontario Electricity Demand

Ontario's net demand forecast is based on the sum of electricity consumption from the residential, commercial, industrial, agriculture and transportation sectors.

**Proportion of Electricity Consumption
(2017 Projected)**

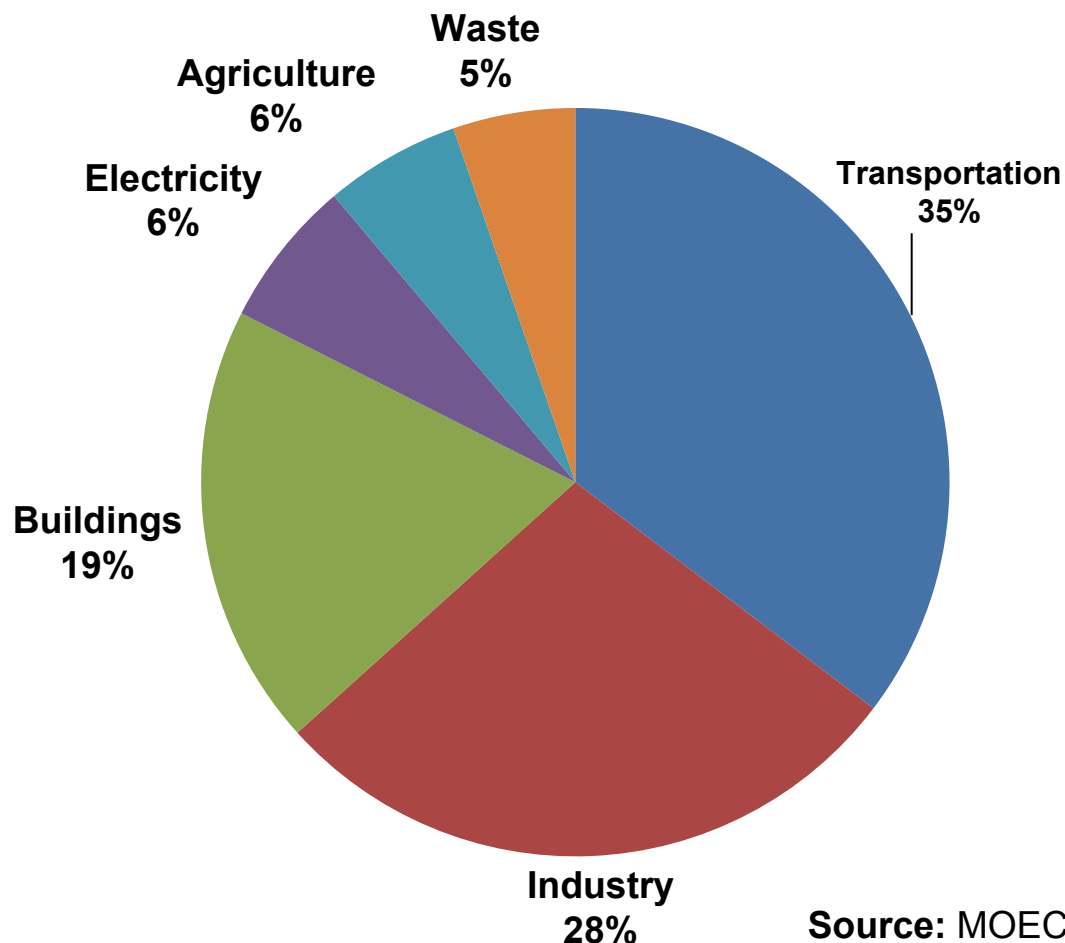


Source: IESO, *Ontario Planning Outlook*

The Electricity Sector's Contribution to Climate Change

- The electricity sector represents a small component of Ontario's GHG emissions as a result of phasing out coal
- Electricity now accounts for 7% of Ontario emissions
- Transportation and industry are the primary contributors to the province's emissions

2015 Ontario GHG Emissions by Sector



Source: MOECC

Emission Trends by Sector

Emission Trends 1990 - 2020 (Forecast)



Note: 2020 forecasts are based on Ontario's Climate Change Update Report 2014 and the 2014 National Inventory Report

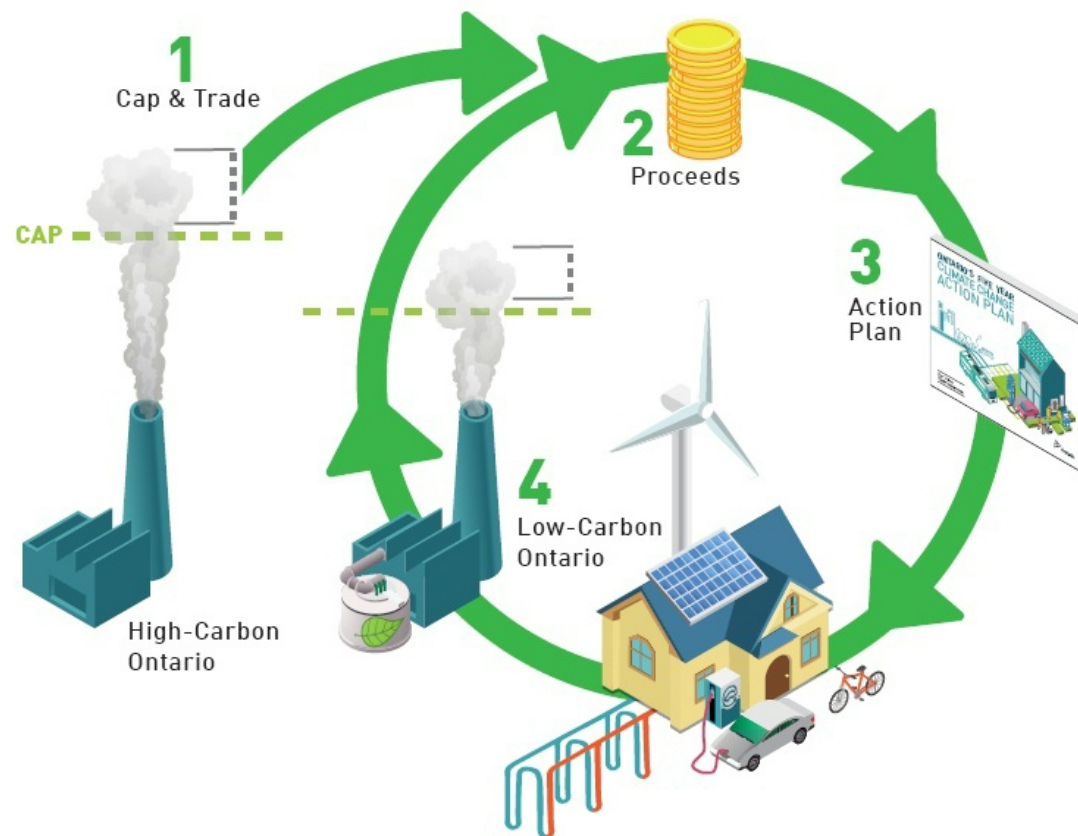
Source: MOECC, *Climate Change Action Plan*

Ontario's Climate Change Action Plan (CCAP)

CCAP is a 5-year plan that will help Ontario fight climate change, transition to a low-carbon economy and meet its GHG reduction targets.

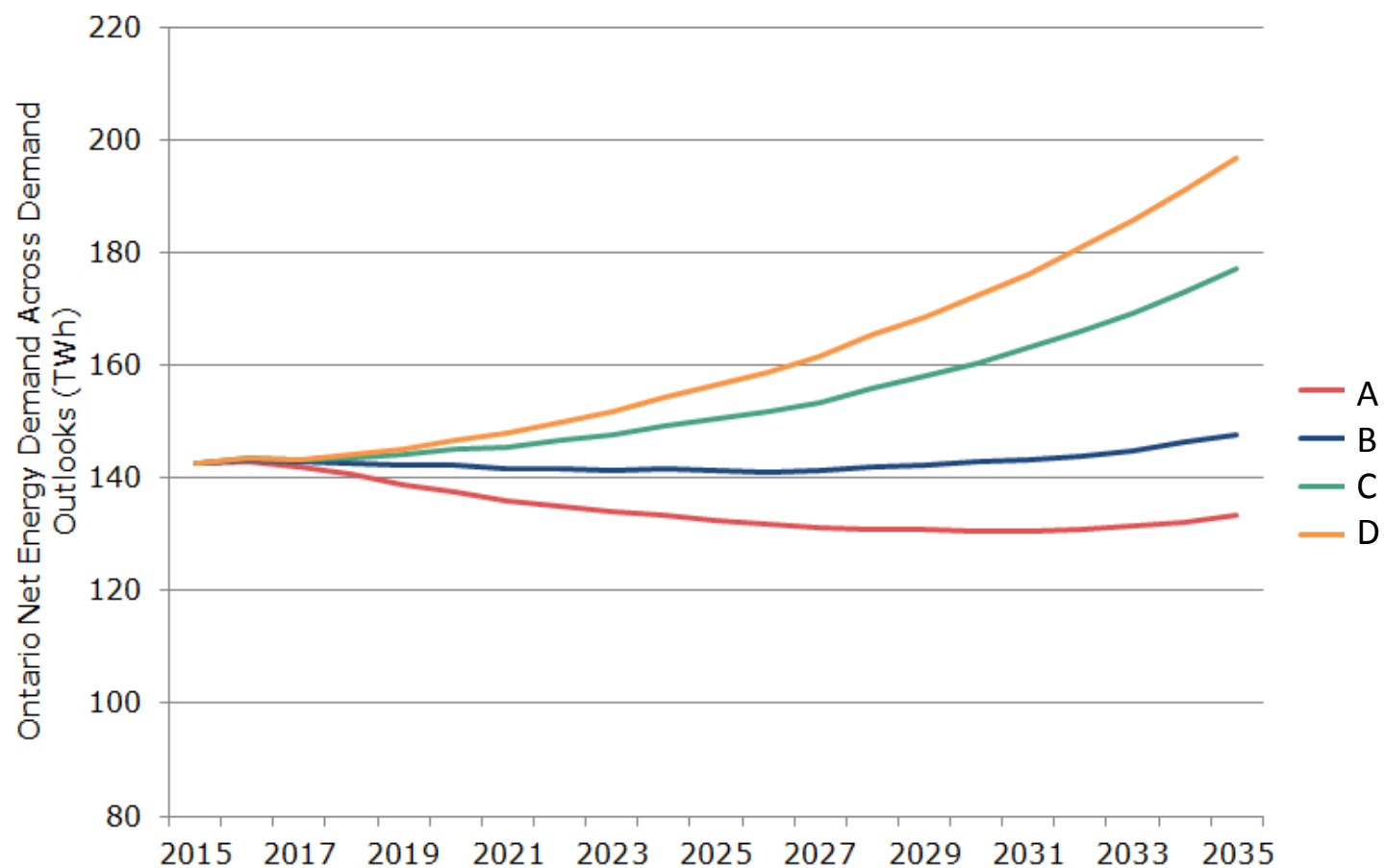
Policy areas include:

- Implementing Ontario's cap and trade program
- Establishing a green bank to help Ontarians reduce emissions from buildings
- Creating a cleaner transportation system, including electrification



Source: MOECC, CCAP

Impacts of Electrification



Source: IESO, Ontario Planning Outlook

Ontario Electricity Policy and Climate Change

The End of Coal

- From the 1910s-1950s, Ontario relied on hydroelectric stations to supply the province's power. Coal-fired generating stations were built to help power post-war industrialization.
- In 2003, coal-fired generation provided 25% of Ontario's electricity.
- The phase-out of coal-fired electricity generation represented the single largest greenhouse gas emissions reduction initiative in North America.

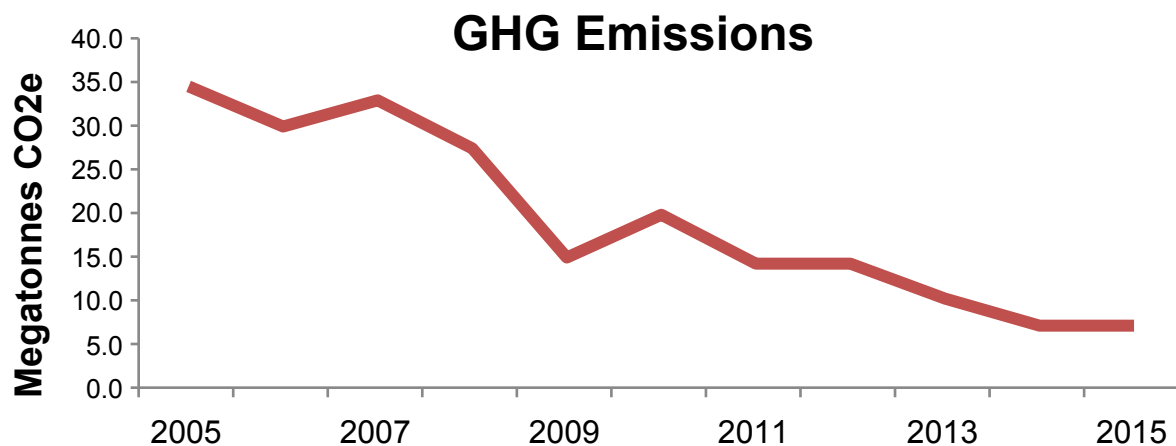
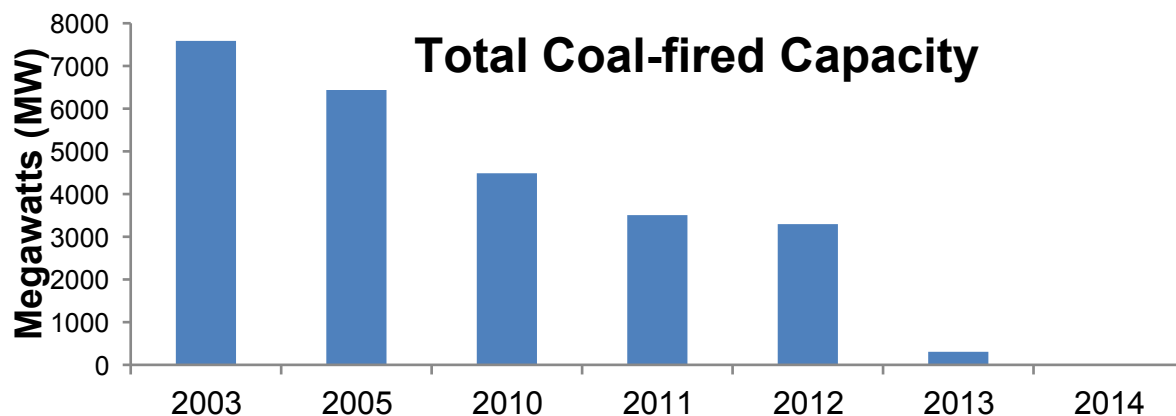
- Coal-fired generating stations (GS) in Ontario:

- Nanticoke GS (4,000 MW)
- Atikokan GS (230 MW)
- Thunder Bay GS (325 MW)
- Lambton GS (2,000 MW)
- Lakeview GS (2,400 MW)
- Hearn GS (1,200 MW)



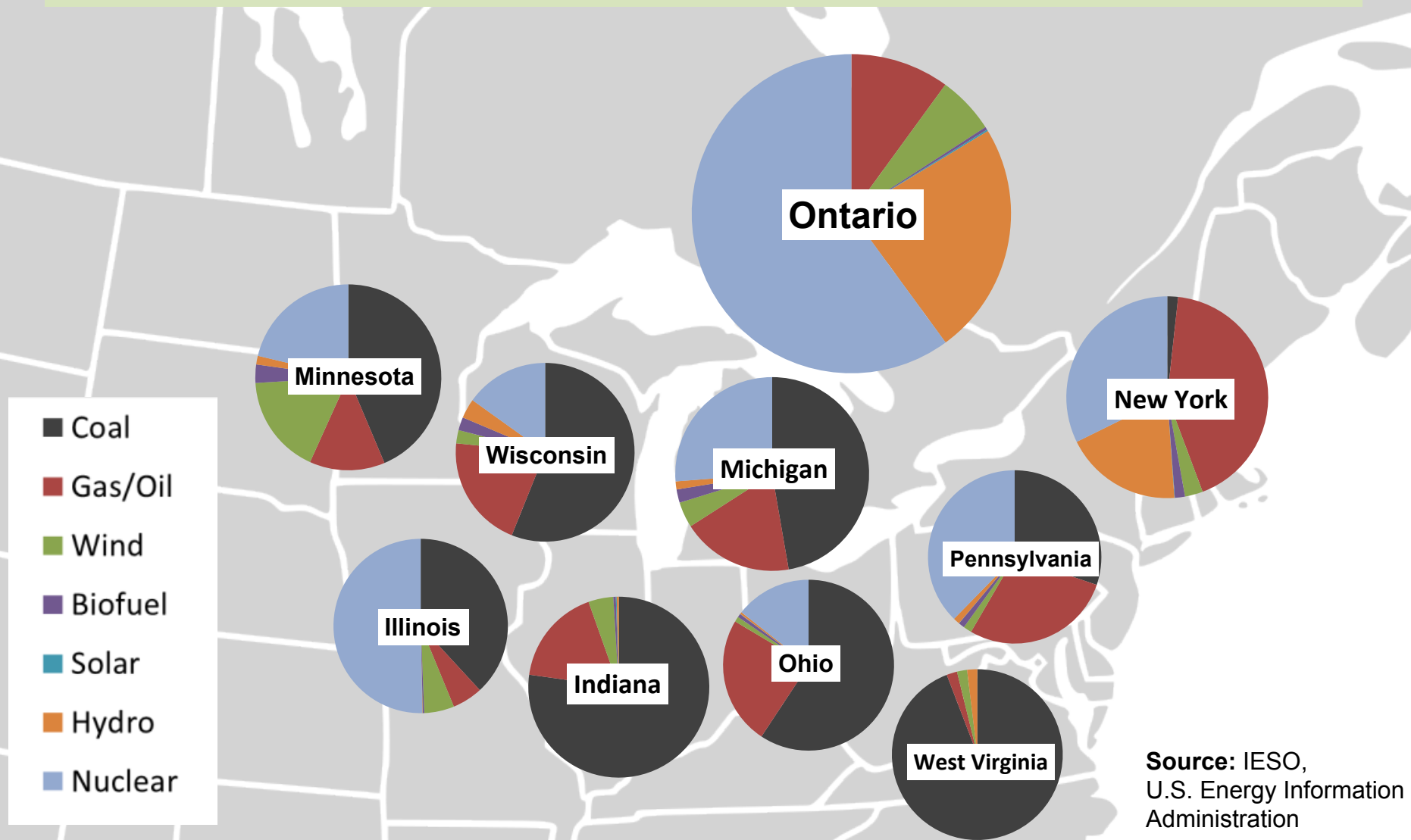
*Ontario's largest former coal plant,
Nanticoke Generating Station*

Coal Phase-Out Impacts on Emissions



Source: IESO

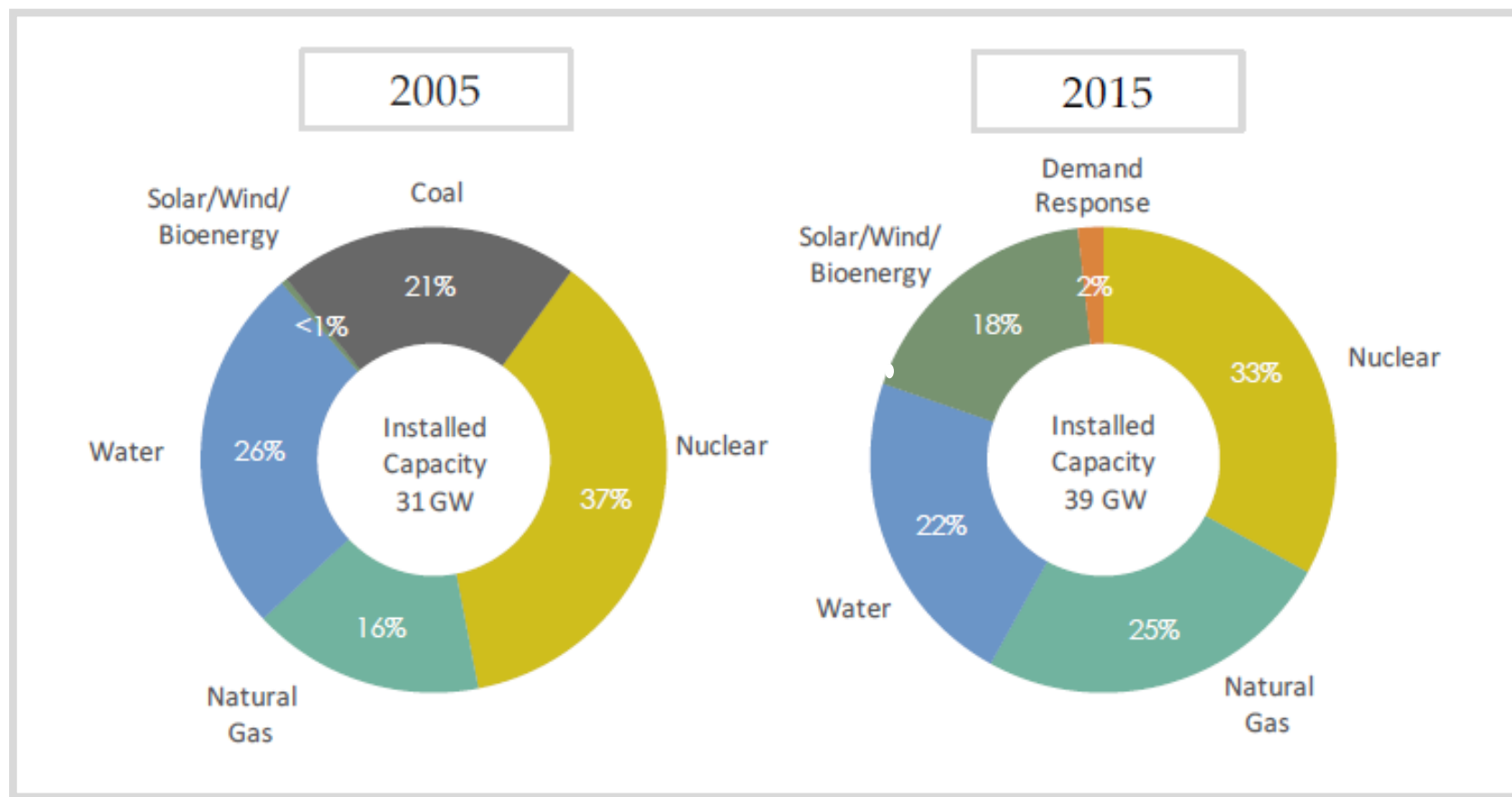
Jurisdictional Supply Mix Comparison



Source: IESO,
U.S. Energy Information
Administration

Renewable Energy in Ontario: Overview

Ontario's Supply Mix 2005 - 2015



Source: IESO, Ontario Planning Outlook

Renewable Energy in Ontario by Resource Type

Technology	Online (MW)	Contracted (MW)
Wind	4,800	1,300
Solar PV	2,200	460
Hydroelectricity	8,800	200
Bioenergy	500	7

Online and Contracted reflects data as at December 31, 2016. MWs are approximate.



Renewable Energy and Economic Development

- Ontario's Green Energy Act (GEA) was introduced in 2009 to expand renewable energy generation, encourage energy conservation and promote the creation of clean energy jobs.
- The Green Energy Investment Agreement (GEIA) between Ontario and Samsung has led to significant investments in the province, including establishing new renewable energy manufacturing facilities that has created 900 direct jobs.



FIT and microFIT Programs

Feed-in Tariff (FIT)

- FIT is a standard offer program open to renewable energy projects larger than 10 kilowatts (kW). Since 2013, it has been limited to projects up to 500 kW.
- The most recent set of FIT contract offers were announced by the IESO in June 2016, totalling 241 megawatts (MW) of capacity.
 - 74% of projects had Indigenous, municipal, public sector or community participation.
- FIT 5 is the final FIT procurement and has a target of up to 150 MW. Contract offers are expected in Q3 of 2017.

microFIT

- microFIT is for projects up to 10 kW and has been very popular with homeowners, farmers and other applicants – over 24,000 projects have been connected to the grid.
- microFIT will finish at the end of 2017. Ontario committed to examining the transition of the microFIT program to a net metering program.
- Over 95% of FIT projects and over 99% of microFIT projects are solar PV.
- Through annual price reviews, FIT and microFIT prices for new solar projects have been reduced between 50% and 75%.

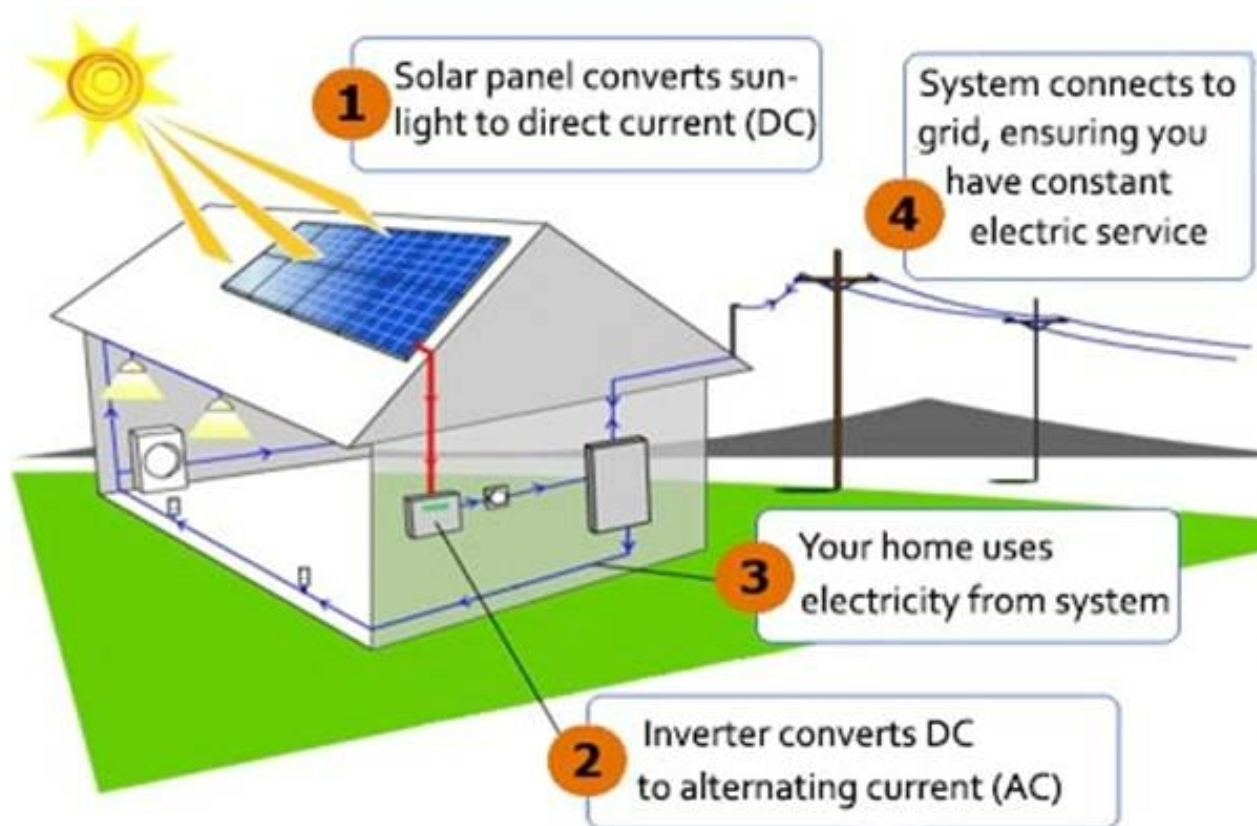
Large Renewable Procurement (LRP I)

- 16 successful proposals were awarded contracts in under LRP I:-
 - 5 wind energy projects
 - 7 solar projects
 - 4 hydroelectric projects
- More than 80% of these projects included participation from one or more Indigenous communities
 - 5 projects had more than 50% participation level
- 75% received support from local municipalities
- More than 60% had support from neighbouring landowners.



Ontario's Net Metering Program

Net metering is a billing arrangement that allows a homeowner or business to generate electricity from a renewable source for their own use, while drawing electricity power from Ontario's grid when needed.



Conservation and Energy Efficiency

Electricity conservation in Ontario is achieved through conservation programs, improved building codes and product efficiency standards.

System Benefits

- Helps families and businesses save money on their electricity bills.
- Reducing strain on our electricity system and the need to build expensive infrastructure.



Environmental Benefits

- Conservation can displace electricity and GHGs from existing peaking natural gas resources.
- Conservation can avoid the need to build new peaking natural gas generation.

Examples of Ontario Conservation Initiatives



A homeowner receives a \$400 incentive towards the installation of an efficient air conditioner (saveONenergy Heating and Cooling Incentive Program)



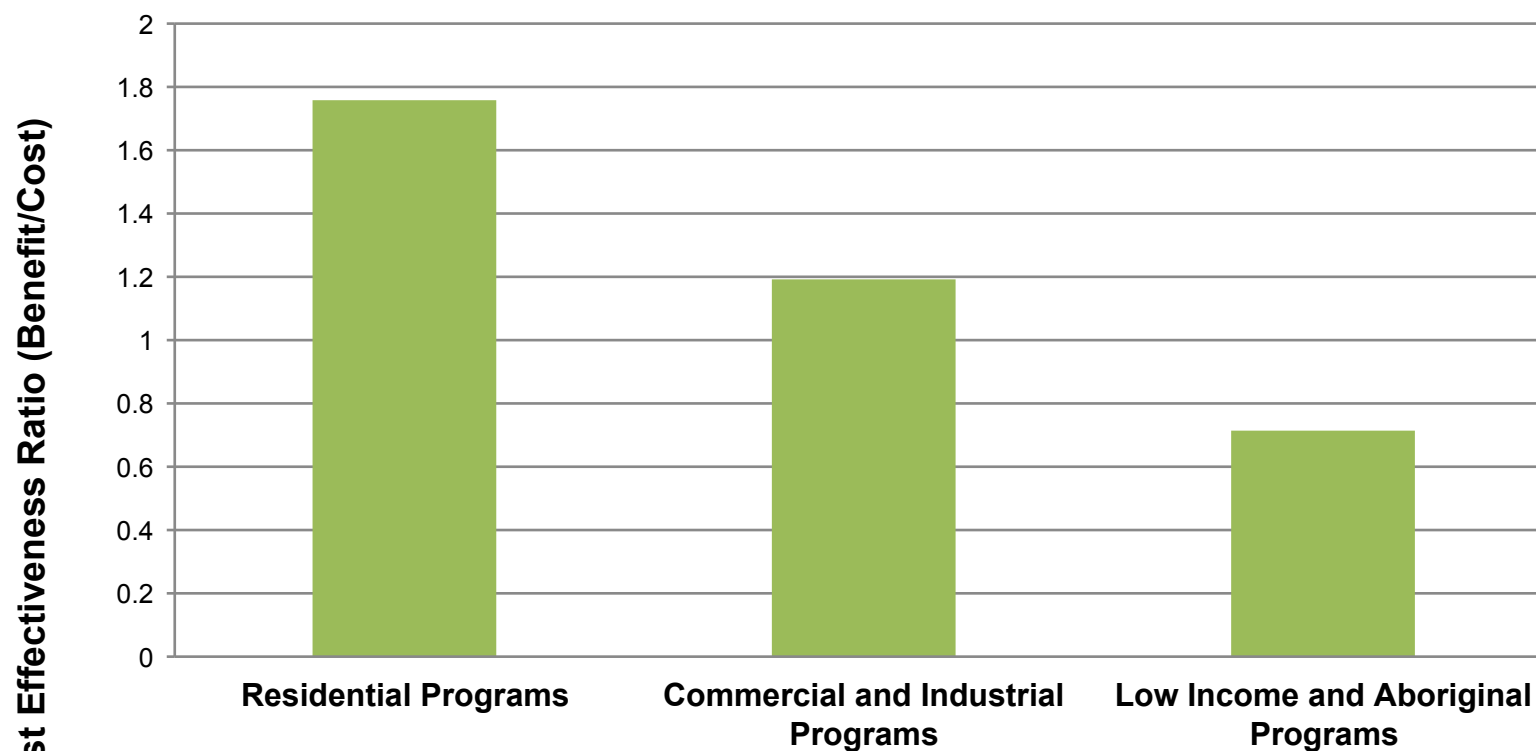
An industrial facility receives Demand Response payments to shift consumption in times of system need



Due to efficiency standards, new clothes washers use 80% less electricity than clothes washers from 2000.

Conservation and Efficiency Policy Considerations

2011-2015 Conservation Program Cost-Effectiveness

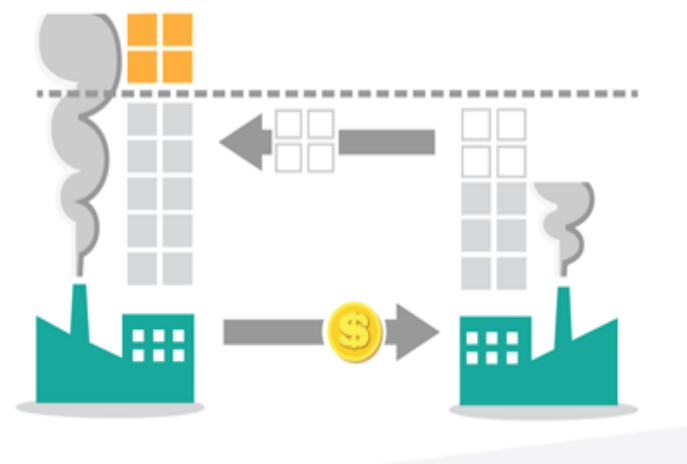
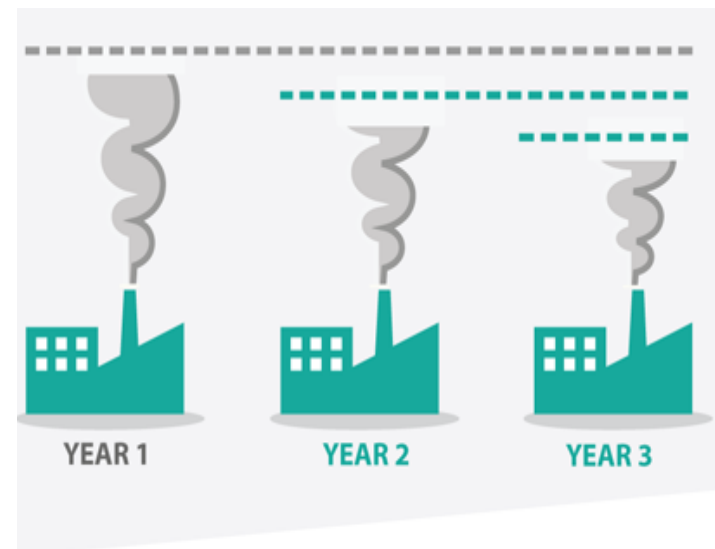


“Conservation and climate programs should have a single access point for Ontarians reducing confusion and increasing the likelihood of action.” - Canadian Energy Efficiency Alliance

Source: IESO

Ontario's Cap and Trade Program

- Cap and trade is a market-based system that sets a cap on the total GHG emissions covered sectors can emit.
- The cap then declines annually.
- GHG emission allowances are created in an amount equal to the cap and either sold or provided free of charge to Ontario emitters.
- Allowances authorize holders to release a specified quantity of GHG emissions.
- Participants must have enough allowances to equal their emissions.
- Those that need additional allowances to match their emissions can buy them. Allowances can be purchased at one of the government's quarterly auctions, or from another entity that holds allowances.



Cap and Trade and the Electricity Sector

Without Cap and Trade

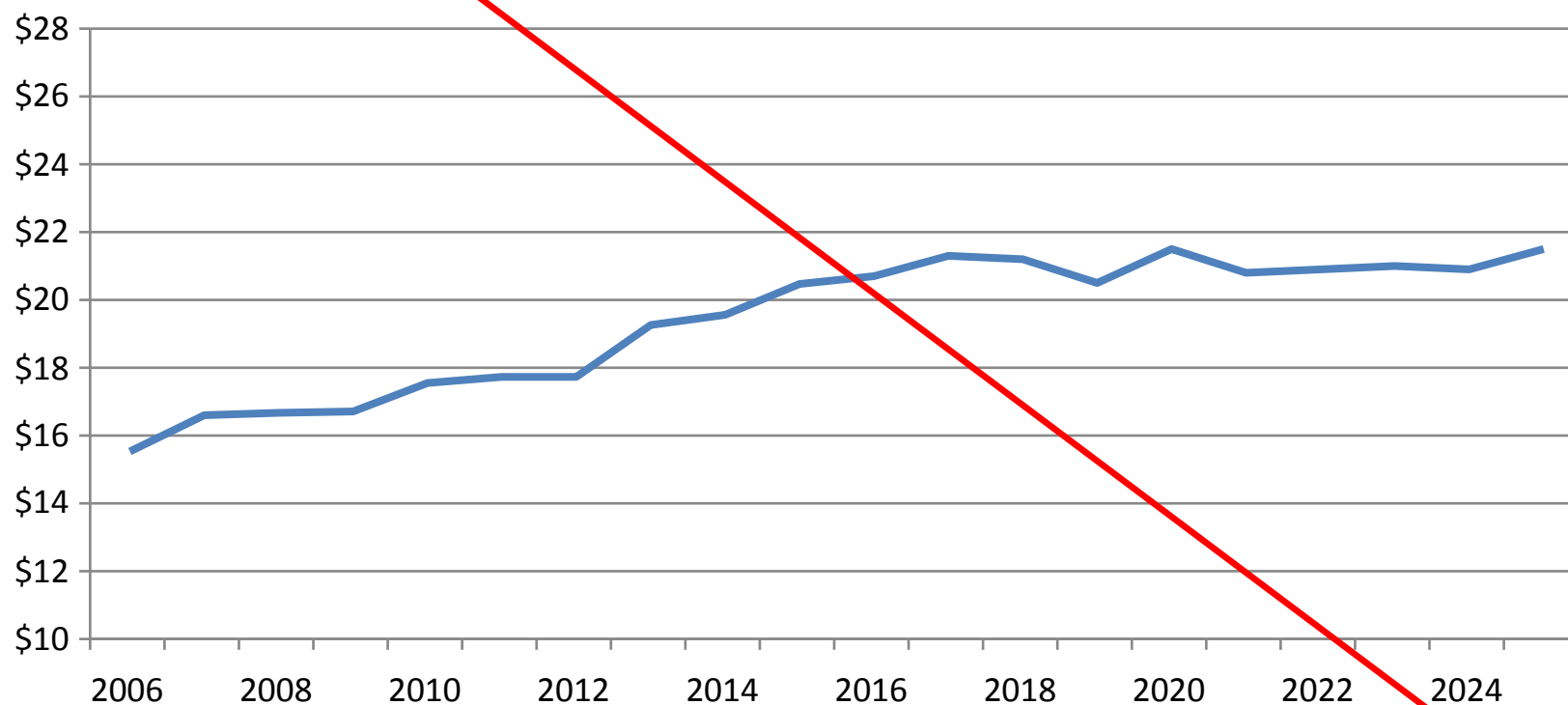
With Cap and Trade

Source: IESO, *Ontario Planning Outlook*

Policy Challenges: the Rising Cost of Electricity

The Increasing Cost of Electricity

Total Cost of Electricity Service Historical and Forecast (2016\$, Billions)



Source: IESO, Ontario Planning Outlook

Ontario's Fair Hydro Plan

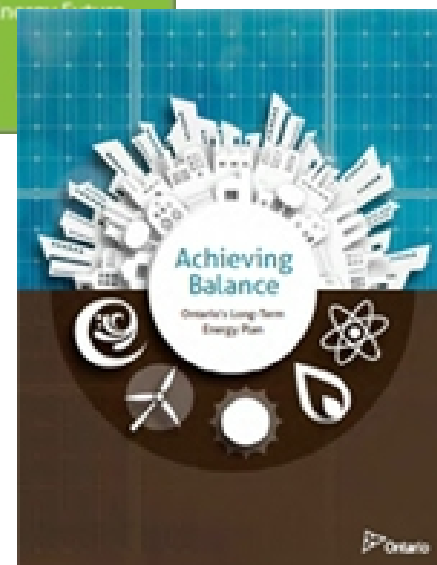
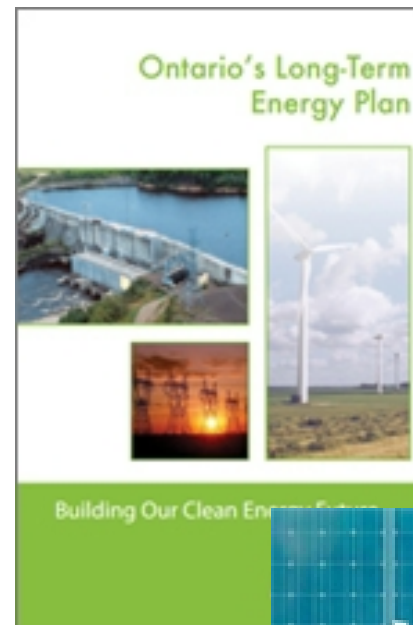
Ontario's Fair Hydro Plan proposes new measures to lower electricity bills by 25 per cent on average for residential consumers and hold increases to the rate of inflation for the next four years, as well as initiatives to reduce costs for businesses. The plan includes the 8 per cent rebate introduced in January and builds on previously announced initiatives to deliver broad-based rate relief on all electricity bills. The plan includes:

- Refinancing the Global Adjustment (GA) over a longer time period.
- Helping vulnerable electricity consumers by enhancing electricity support programs.
- Expanding ICI to include smaller manufacturers and greenhouses between 500 kW and 1 MW, in addition to the large consumers over 1 MW who are already eligible.
- Shifting cost recovery for RRRP and OESP from electricity bills to provincial revenues, lowering regulatory charges for everyone by approximately \$3/MWh.
- Improving sector efficiency and modernizing Ontario's electricity market, working in collaboration with the Independent Electricity System Operator (IESO) and the Ontario Energy Board (OEB).

Looking Forward

LTEP: Balancing Objectives (new slide)

- The LTEP is a road map setting out the direction for Ontario's energy future for the next 20 years.
- The Ministry released LTEP's in 2010 and 2013.
- The *Electricity Act* states the LTEP includes objectives related to:
 1. Cost-effectiveness
 2. Reliability
 3. Conservation and demand management
 4. Clean energy
 5. Consultation and public participation
 6. Air emissions from the energy sector



Long-Term Energy Plan (LTEP) 2017



- **The next LTEP will be released this year**
- **Incorporates the following into energy policy objectives:**
 - Climate change targets
 - Innovation, sustainability, and conservation goals
 - Engagement feedback
- **Opportunity to provide updates on:**
 - Emissions forecasts
 - Climate Change Action Plan Initiatives
 - Climate change adaptation
 - Integration with fuels sector

Incorporating Public Input: LTEP 2017



Open Houses and Sessions:

17 communities visited

- ~730 stakeholders
- ~500 members of the public

17 Indigenous Sessions

- ~200 participants
- ~100 Indigenous communities & organizations represented

Written and Online Input

- ~1,500 EBR Submissions
- ~200 letters, email & paper submissions
- ~2,800 online 'talks tool' comments

- **Ministry required by legislation to consider engagement feedback as it develops the LTEP**

What We Heard: LTEP 2017

Municipalities

- Support for particular types of generation in their region (e.g., strong support for nuclear from host communities)
- Support implementing community energy programs
- Provide more conservation programs

Industry Associations

- Support for particular types of generation and projects
- Encourage increased funds for innovation in the fuels sector
- Reduce prices and maximize existing assets

Indigenous Communities

- Build transmission lines and microgrids for remote First Nations to reduce diesel use
- More opportunities for Indigenous-ownership of businesses in the energy sector
- Continued renewable energy development opportunities

Environmental Organizations

- Support for electrification to help achieve decarbonisation goals
- Consider environmental impacts beyond GHG's (i.e., ecological risks)
- Push for more renewable generation