

The Link to Energy Efficiency and the role of the IESO

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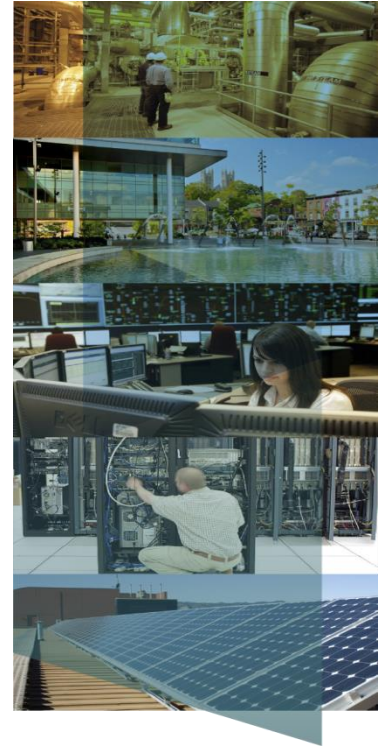
February 22, 2017

Who We Are and What We Do

The Independent Electricity System Operator (IESO) works at the heart of Ontario's power system – ensuring there is enough power to meet the province's energy needs in real time while also planning and securing energy for the future

We do this by:

- Planning
- Enabling Conservation
- Operating the Grid and Wholesale Market
- Ensuring Supply
- Engaging Stakeholders and Communities



Electricity Sector Players



Determines the province's energy policy, including the Long-Term Energy Plan



Regulates the province's electricity sector



Generates electricity for Ontario from nuclear, hydroelectric, gas, wind, solar and bioenergy plants, including non-utility generators



Delivers power across the province to local distribution companies and industrial consumers

Local Distribution Companies

Distributes power from transmitters to homes and businesses. There are over 70 local distribution companies in Ontario.



Plans and operates the Ontario electricity system and market, develops a conservation culture in the province



Ontario at a Glance

Installed Capacity	36,070 MW (December 2016)
Record Summer Peak	27,005 MW (August 1, 2006)
Record Winter Peak	24,979 MW (December 20, 2004)
Total Annual Energy Consumed	137 TWh (2016)
Energy Savings Through Conservation (2015)	1.3 terawatt-hours (TWh)
Customers	4.9 million
Ontario Import Capability	4,800 MW
Transmission Lines	30,000 km
Interconnections	New York, Quebec, Manitoba, Michigan, Minnesota

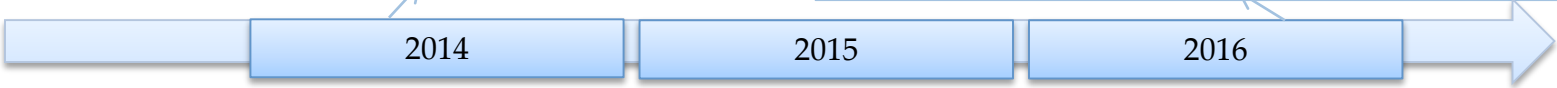


The IESO is the reliability coordinator for Ontario and works closely with other jurisdictions to ensure energy adequacy across North America.

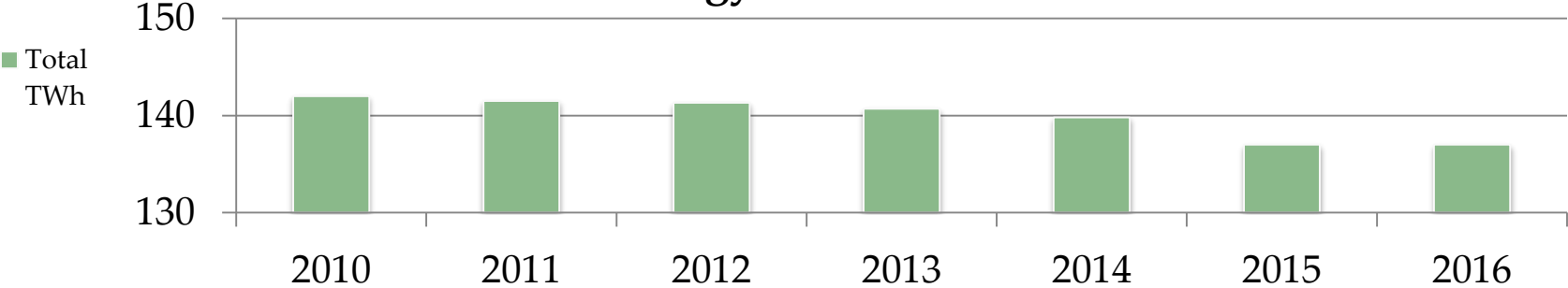
Ontario Demand

2014: Demand for electricity peaked at **22,774 MW** on January 7, the highest demand seen in winter in Ontario in 10 years

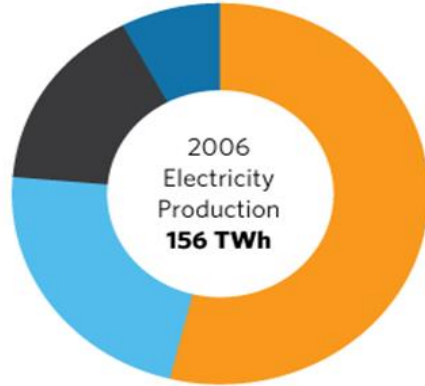
2016: Demand for electricity peaked at **23,213 MW** on September 7, the highest peak since July 17, 2013



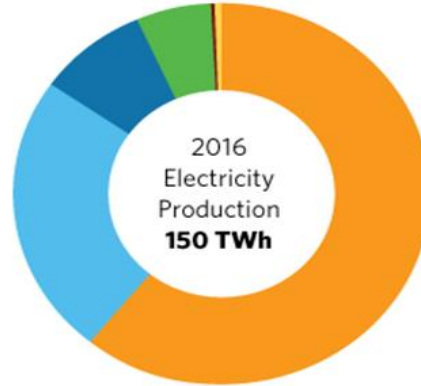
Total Annual Energy Demand 2010-2016 (TWh)



Electricity Production 2006/ 2016

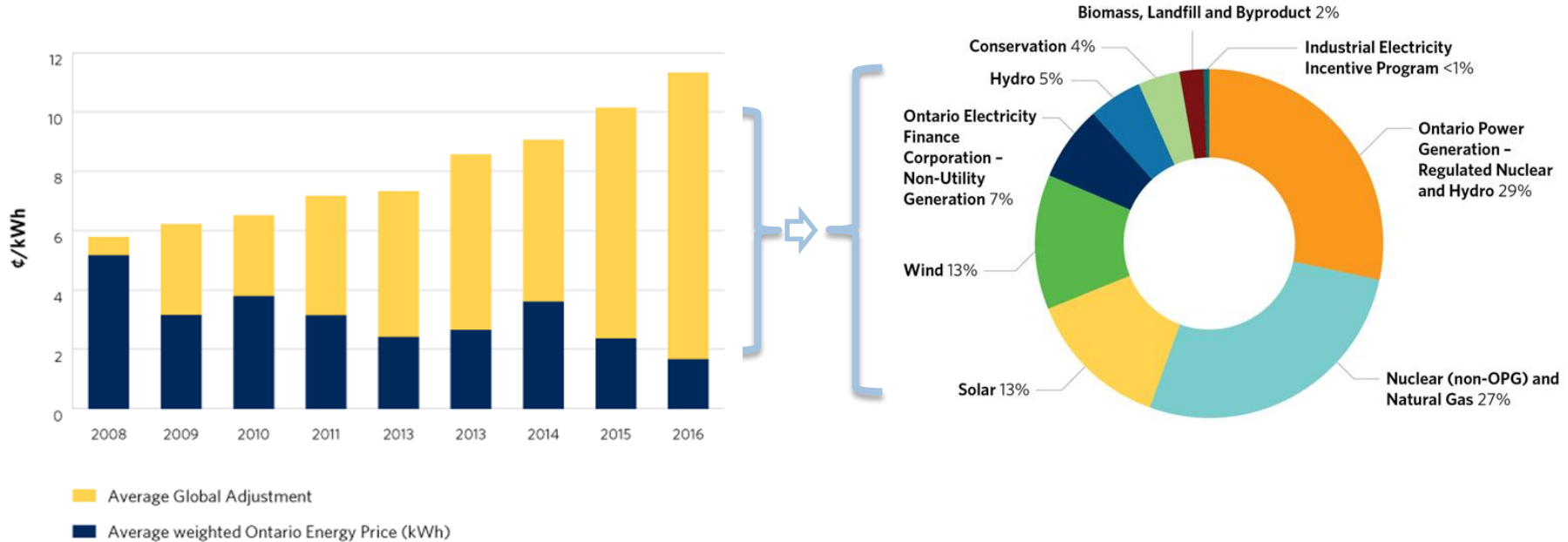


 Nuclear	84.4 TWh or 54%
 Hydro	34.8 TWh or 22%
 Coal	25 TWh or 16%
 Other (gas, oil, alternative sources)	11.8 TWh or 8%

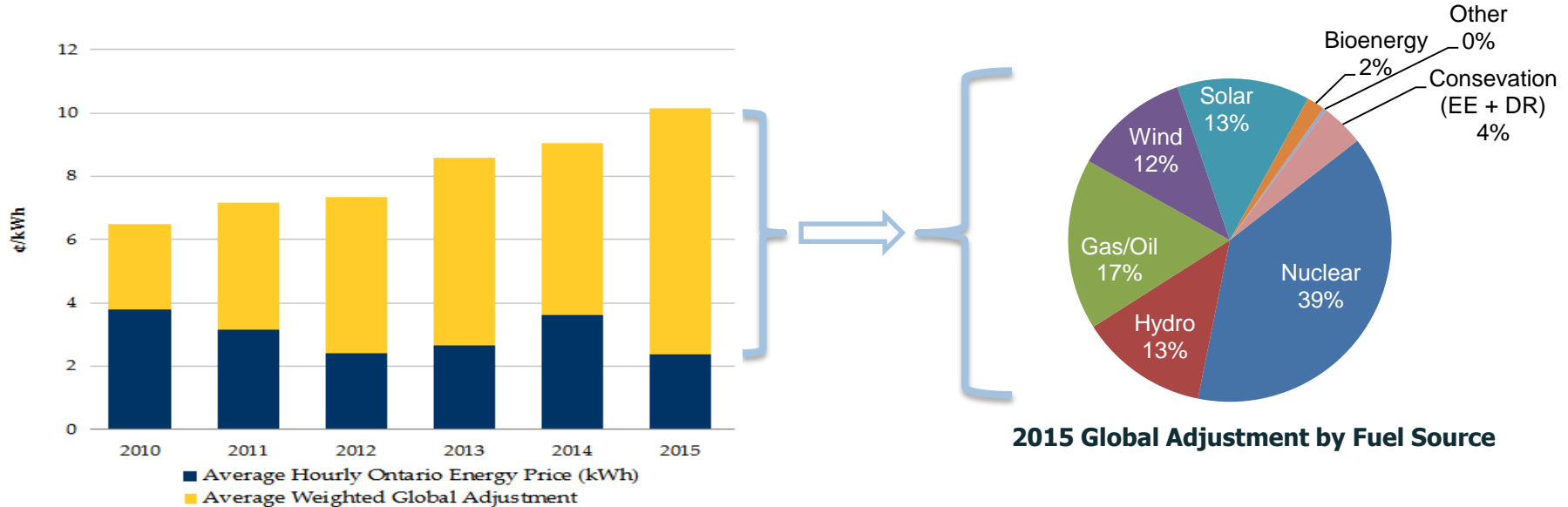


 Nuclear	91.7 TWh or 61%
 Hydro	35.7 TWh or 24%
 Gas/Oil	12.7 TWh or 9%
 Wind	9.3 TWh or 6%
 Biofuel	0.49 TWh or <1%
 Solar/Other	0.46 TWh or <1%

Electricity Pricing Trends and Global Adjustment Contributors



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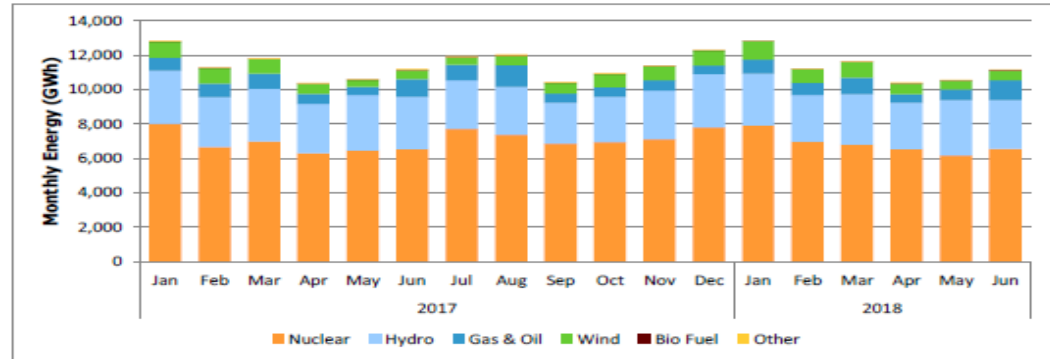


Ontario's Future Electricity Needs

- The IESO plans and prepares for Ontario's future electricity needs by conducting forecasts and assessments of Ontario's current and short-term electricity requirements, as well as the adequacy and reliability of the integrated power system.
- Decisions made over the past decade mean that Ontario demand supply picture will remain positive for the foreseeable future.

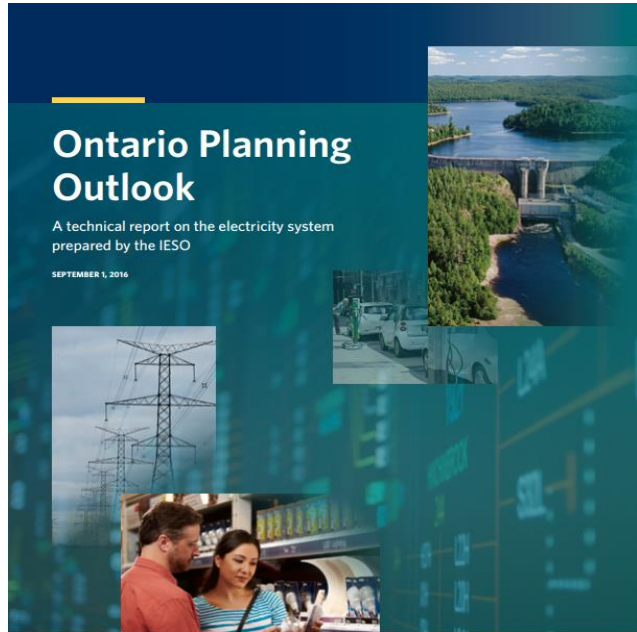
18 Month Outlook

An Assessment of the Reliability and Operability of the Ontario Electricity System



- Adequate supply from a diverse supply mix
- Demand expected to remain flat for the long term
- Growth to be offset by conservation savings

IESO's Ontario Planning Outlook



Electricity System Planning

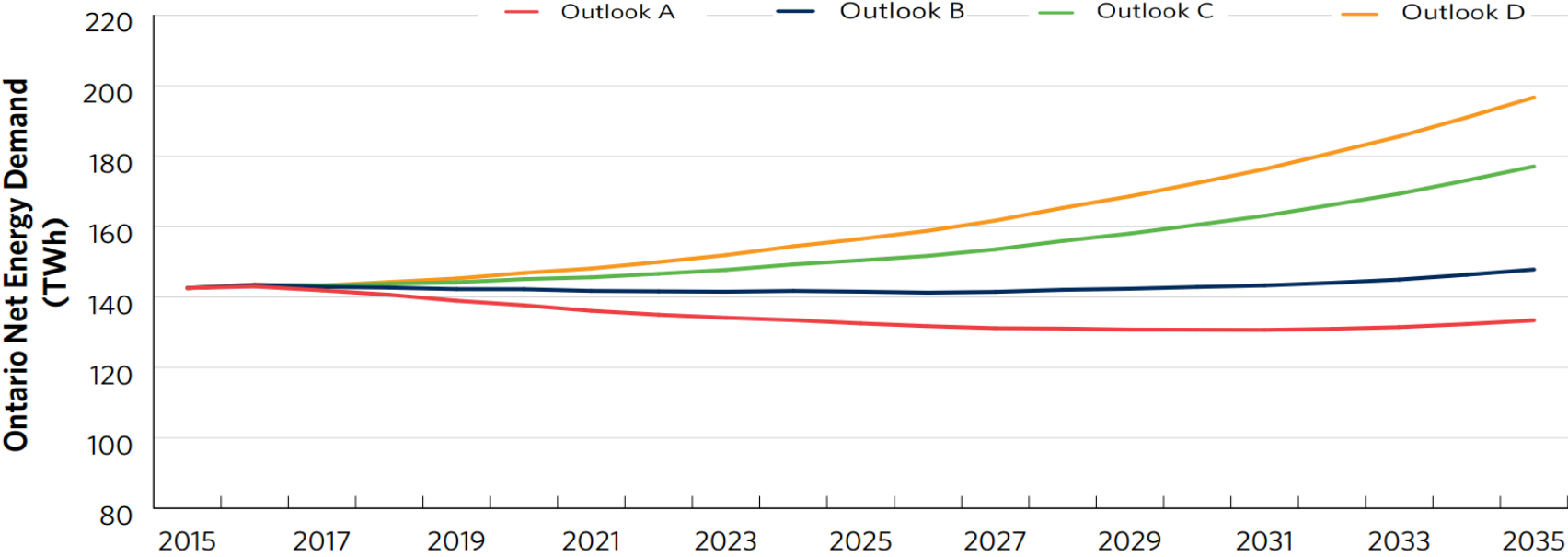


The **Ontario Planning Outlook** provides planning context for the public, policy makers and industry stakeholders and serves as an early input into the Ministry of Energy's LTEP consultation process. It includes a 10-year review and a 20-year outlook for Ontario's electricity system.

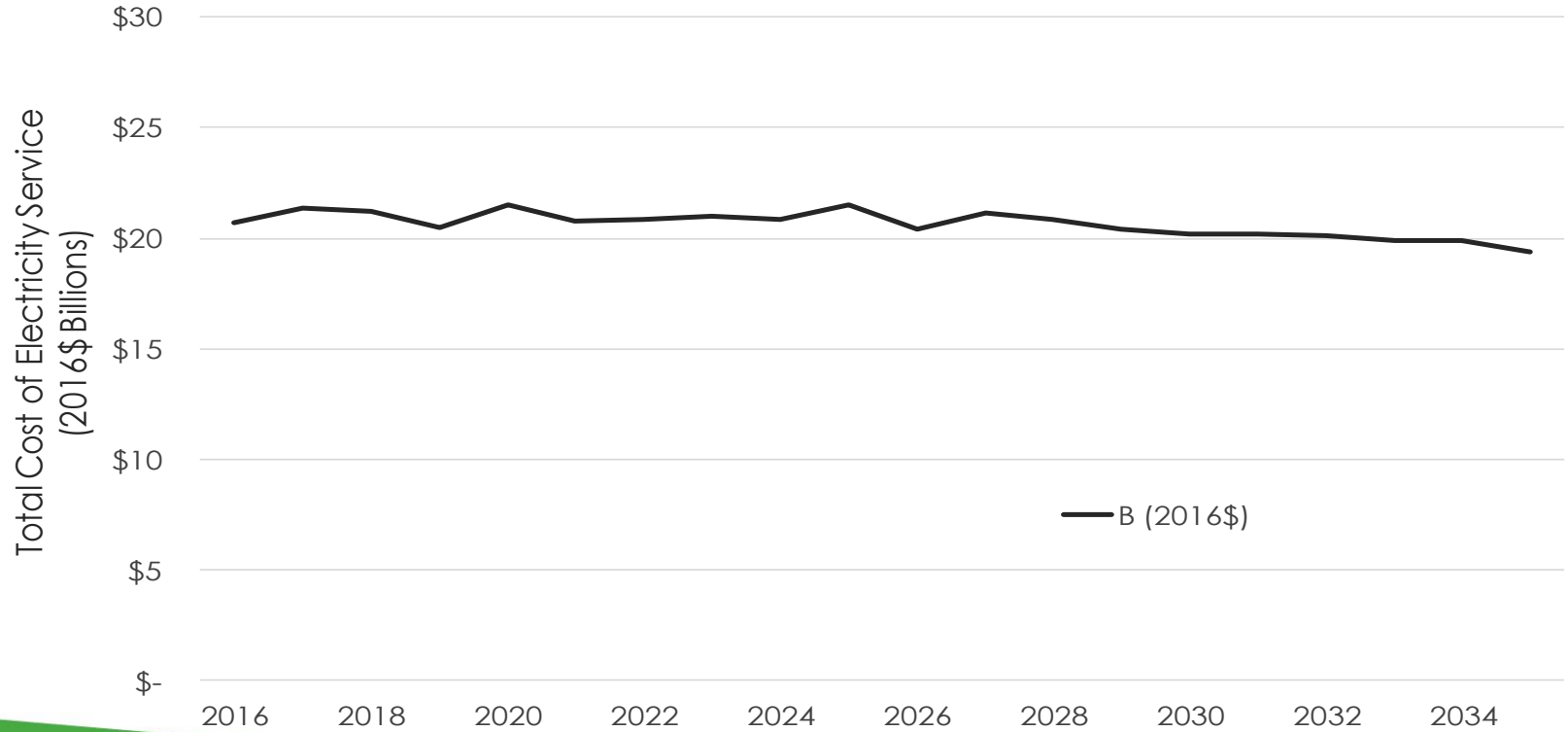
The report can be found on the main page of the IESO's website @ ieso.ca



Net Energy Demand Across Four Demand Outlooks

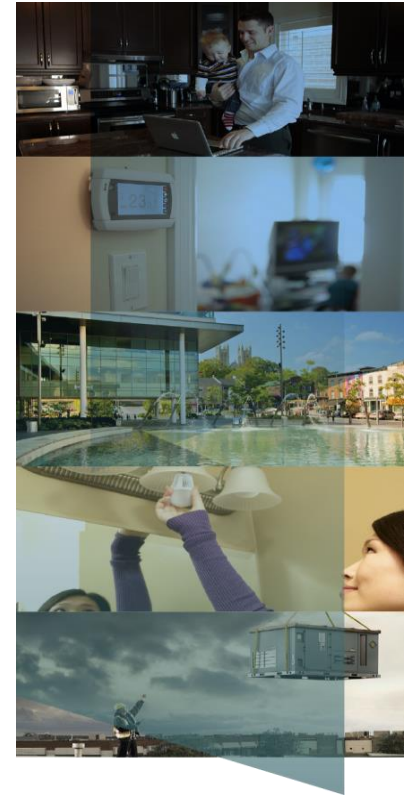


Electricity System Cost Outlook



Putting Conservation First

- Conservation provides the **cleanest and most cost-effective** alternative to building new generation
- Conservation also lowers peak demand, allowing the IESO to defer or avoid the need to build new infrastructure
- The IESO aims to reduce electricity consumption by 8.7 TWh – **the equivalent of powering Mississauga and Sudbury for a year** – by December 31, 2020
- According to Ontario's *Long-Term Energy Plan*, conservation will offset almost all demand growth until 2032
- **Save on Energy** initiatives offer incentives and programs for residential and business customers



Achievements

Fourth consecutive year of increased energy savings results

- LDCs achieved 1.1 TWh of net annual energy savings that persist to 2020 (or 1.2 TWh of net first year energy savings) in 2015
- On track to meet the CFF 2020 Energy Savings Target -- As of Q3 2016, 23% (1.63TWh) of 7TWh CFF target has been achieved
- Portfolio remains cost-effectiveness - within 4¢/kWh

Highest
annual
energy
savings
to date
achieved in
2015



Save on Energy has programs, rebates and resources to help you:

- ✓ SAVE MONEY
- ✓ SAVE ENERGY
- ✓ STAY COMFORTABLE



For Homes

HEATING & COOLING INCENTIVE +

Peaksaver Plus®

COUPONS +

Buying a New Home +

Home Assistance Program +

For Business

Small Business Lighting

Retrofit Program +

Peaksaver Plus®

AUDIT FUNDING +

EXISTING BUILDING COMMISSIONING +

Energy Managers +

HIGH PERFORMANCE NEW CONSTRUCTION +

PROCESS AND SYSTEMS +

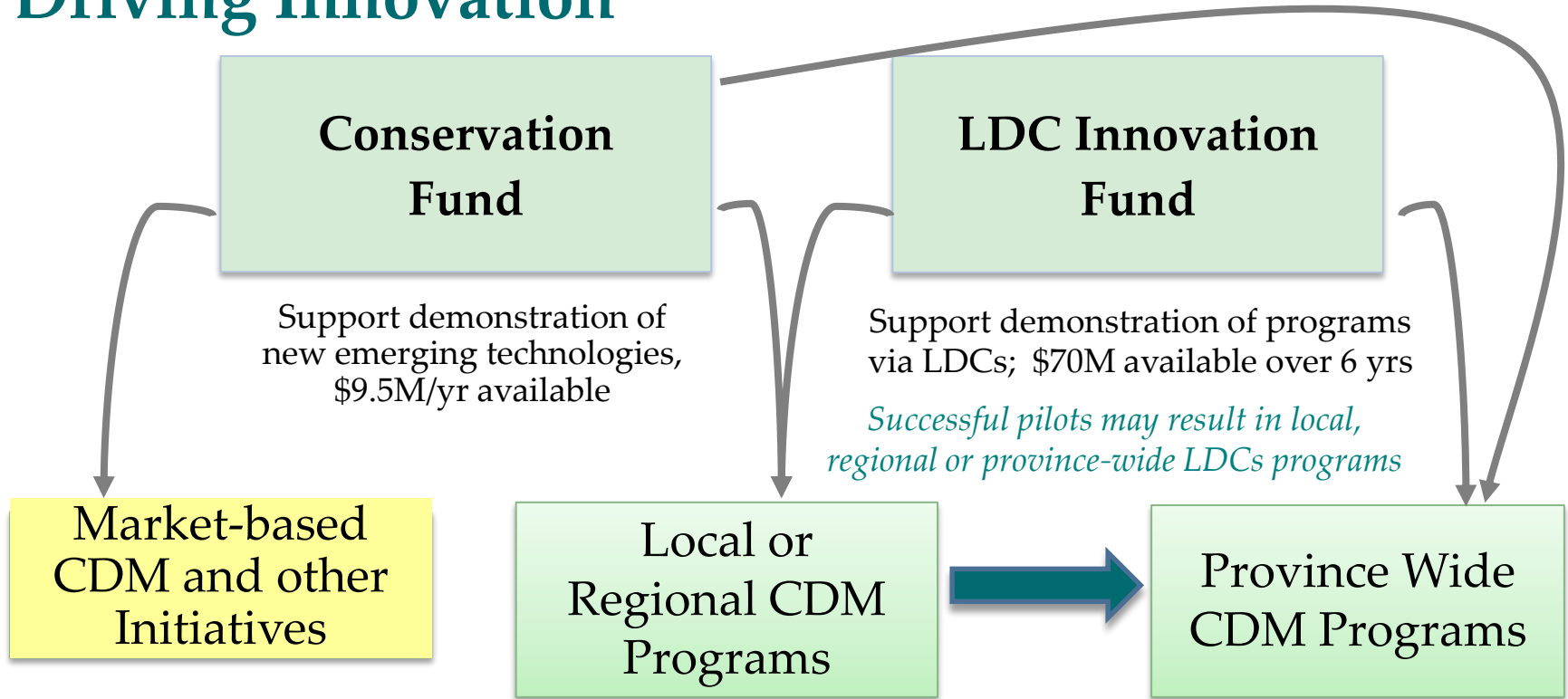
DEMAND RESPONSE

TRAINING & SUPPORT +

NEW HOME CONSTRUCTION +

Social and Assisted Housing

Driving Innovation



Conservation Fund

The Conservation Fund supports innovative electricity conservation projects that:

- Build marketplace capacity for conservation actions
 - Test new or unique conservation program elements
 - Verify the energy savings potential and cost-effectiveness of novel demand-side technologies and processes
 - Can be scaled-up to achieve significant energy savings in Ontario.
- Applications welcomed from a wide range of entities, including LDCs, technology companies, consulting firms, industry associations, educational institutions, and public sector organizations.



How is IESO currently supporting implementation of geothermal technology?

- IESO providing \$260,000 Conservation Fund grant to support The Atmospheric Fund's Pumping Energy Savings Project
 - To develop the background market research and financial analysis to build the business case to increase the number of air- and ground-source heat pump retrofits in multi-unit residential buildings, particularly electrically heated ones
- Incentives are available through Save on Energy programs for commercial projects
 - High Performance New Construction and Retrofit programs, in the custom project stream



Previous project support

- With the Ontario Centres of Excellence, the IESO supported DY Refrigeration in the development of a new thermally driven heat pump unit for combined heating and cooling supply



» Allows heat from renewable sources such as geothermal, solar thermal, biomass or waste heat from engines to drive the refrigeration cycle, reducing electrical load

LDC Innovation Fund

- The IESO supports LDC-led program design and market testing of new initiatives.
- Testing and learning from small-scale pilot programs (pilots) will contribute to the success and cost effectiveness of the full-scale launch of a new program.



» Through the piloting process, LDCs have the chance to market test the delivery mechanisms and savings realization of new innovative program offerings before including them in their CDM plan and budget.

Examples of LDC Innovation Fund pilots

- Hydro One Networks – Air Source Heat Pump for residential space heating
 - 120 residential customers with electric space heating – subsidized 50% of installed cost of air source heat pump
- Enwin Utilities – Residential Ductless Heat Pump Pilot
 - ~100 residential customers with electric space heating – offer incentive and financing for the supply and installation of air source ductless heat pump



Emerging technologies

- IESO has a strong history of assisting emerging technologies establish themselves in the market through the Conservation Fund
 - Supported research by NRCan verifying the performance of residential Cold Climate Air Source Heat Pumps
 - Supported Temporal Power and ENBALA Networks in field demonstrations of their grid-balancing technologies
 - Co-funded with NRCan the creation of LightSavers initiative to develop tools and templates to assist municipalities understand the business case and implement the conversion of street lighting to LEDs, now expanded to parking lots and garages



Areas of interest for further research

- Impact of geothermal heat pumps on residential and commercial energy use and load profile (time of day and seasonality)
- Cost/benefit of retrofits in gas and electrically heated homes
- Capability of geothermal heat pumps to provide demand response



IESO Resources – *Keep in Touch*



Navigation: About the IESO | Ontario's Power System | Participate | Power Data

An Interdependent System

The IESO works at the heart of the electricity system, connecting the industry players who produce power, and then transport power on high voltage lines to the local utilities that distribute it to individual consumers. [Ontario's Power System >](#)

Ontario's Power System

Learn how all the components of Ontario's power system work together. New ideas and technologies are changing the way the IESO operates the grid.

Ontario's Power System =
Supply Mix =
Electricity Pricing =
Smart Grid =

Participate

Power Data

More Power Data >

DEMAND

WEDNESDAY, JULY 16, 2014

16,622 MW
Current Hour's Demand at 4:00 p.m. EDT

Projected Demand at 5:00 p.m. EDT: **16,846 MW**
Today's Projected Peak at 6:00 p.m. EDT: **17,050 MW**
Summer Record Peak Aug 1, 2006: **27,005 MW**

Ontario Demand (MW) Projected Actual

Hour	Projected (MW)	Actual (MW)
3	13,500	13,500
6	14,500	14,500
9	15,500	15,500
12	16,500	16,500
15	16,800	16,800
18	17,000	17,000
21	16,800	16,800

SUPPLY

Hourly Output by Fuel Type at 4:00 p.m. EDT

Fuel Type	Output (MW)
Nuclear	10,745
Hydro	3,911
Gas	1,805
Wind	522

PRICE

1.72 ¢/kWh
Current Hourly Price at 4:00 p.m. EDT

Hourly Ontario Energy Price (\$/MWh)

Phone: 905.403.6900
Toll-free: 1.888.448.7777

E-mail: customer.relations@ieso.ca

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SAVE ON ENERGYTM

POWER WHAT'S NEXT

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