



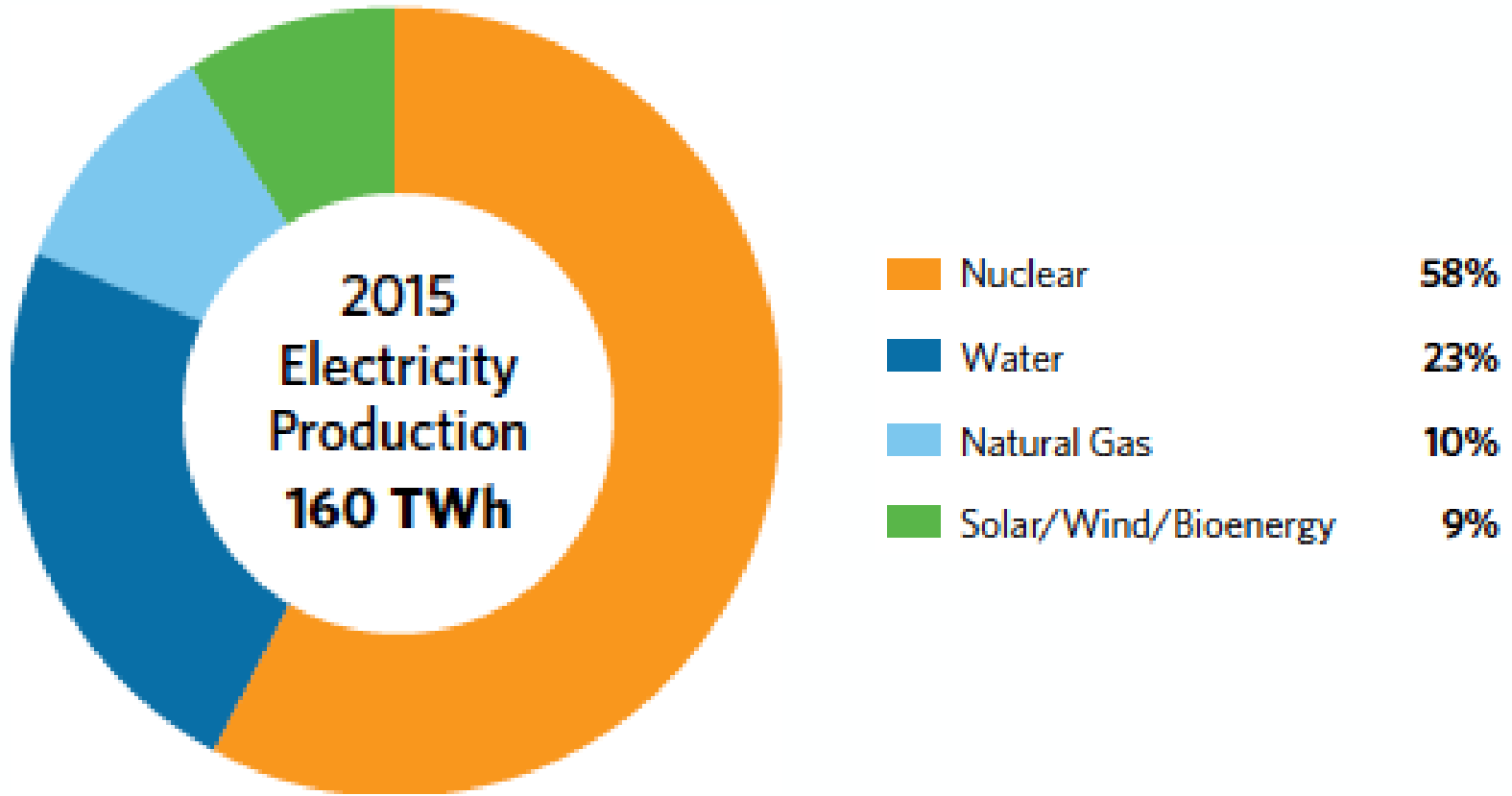
ADVANCED ENERGY CENTRE
MaRS Cleantech | Ontario, Canada

Ontario Small Urban Municipalities Convention

Paul Murphy
May 4, 2017

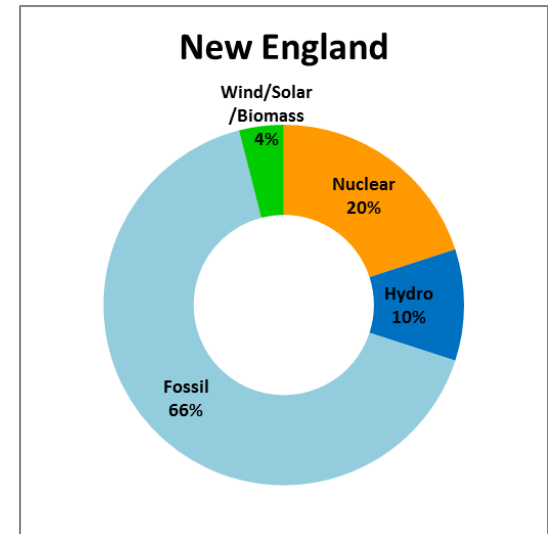
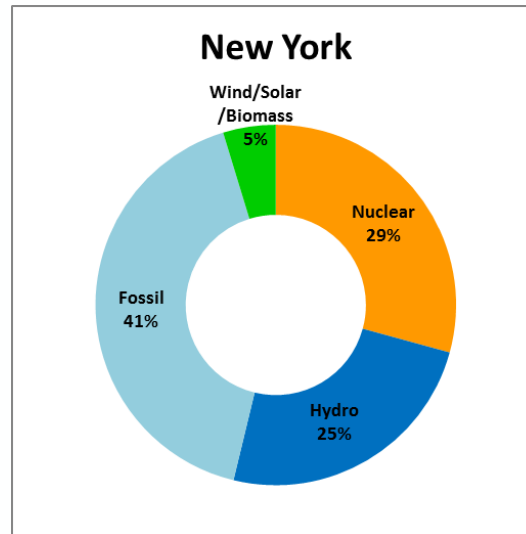
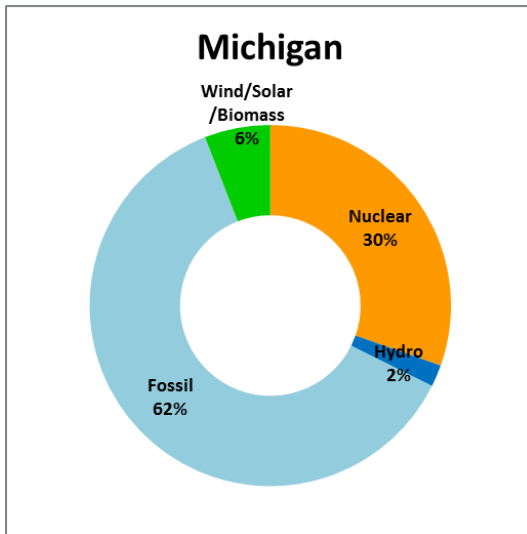
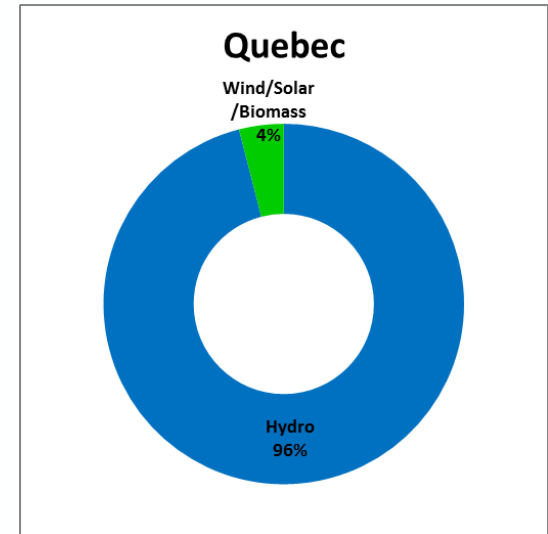
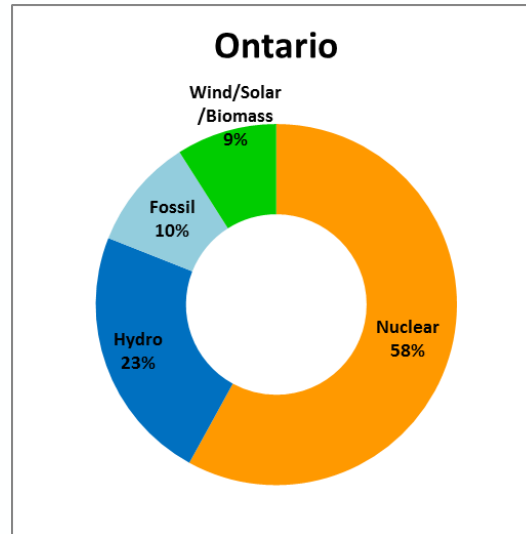
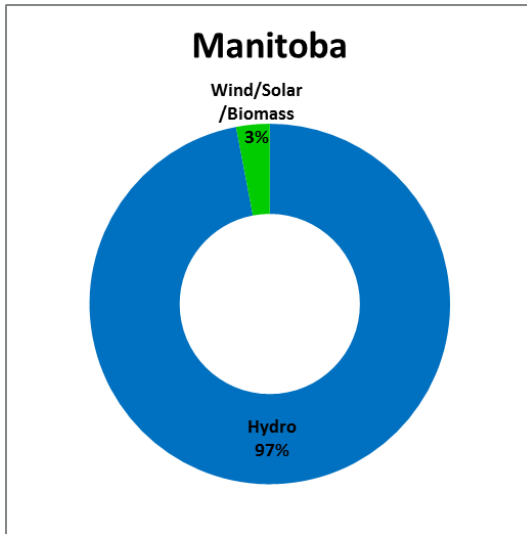


Ontario Supply Mix

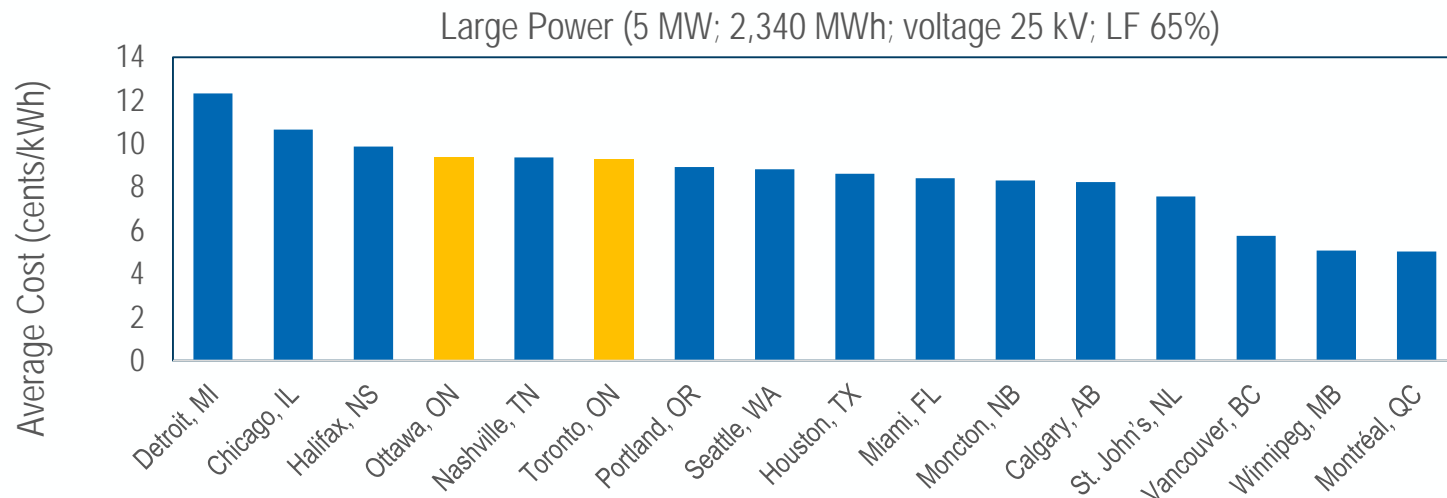
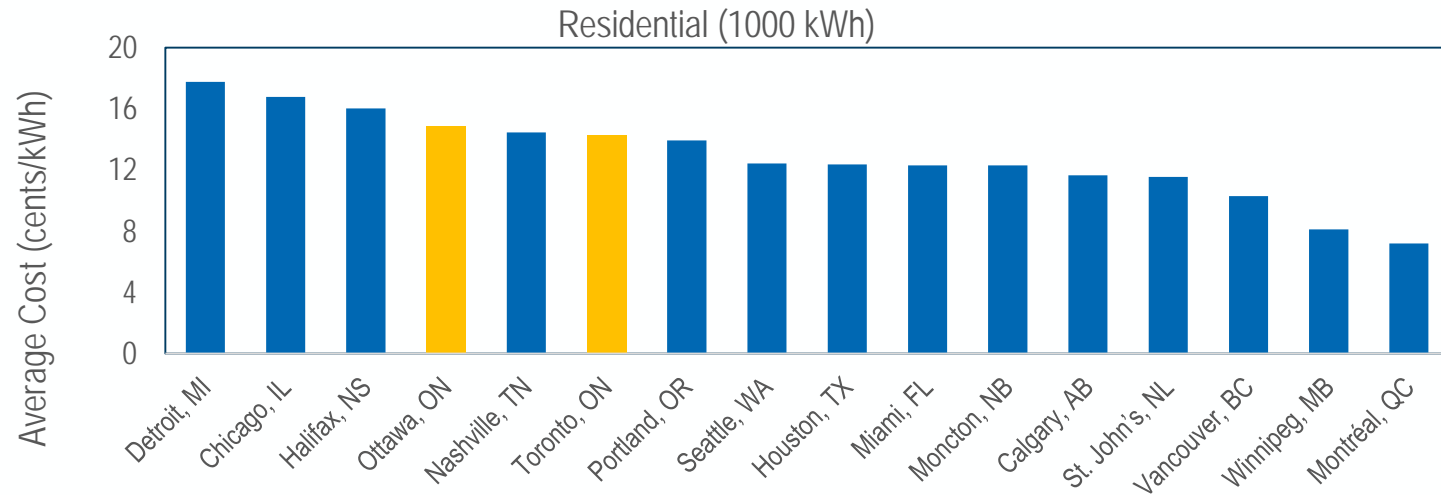


Source: IESO Ontario Power Outlook

Ontario Neighbour's Supply Mix



Ontario Rates Among the Highest in Canada & Some US States

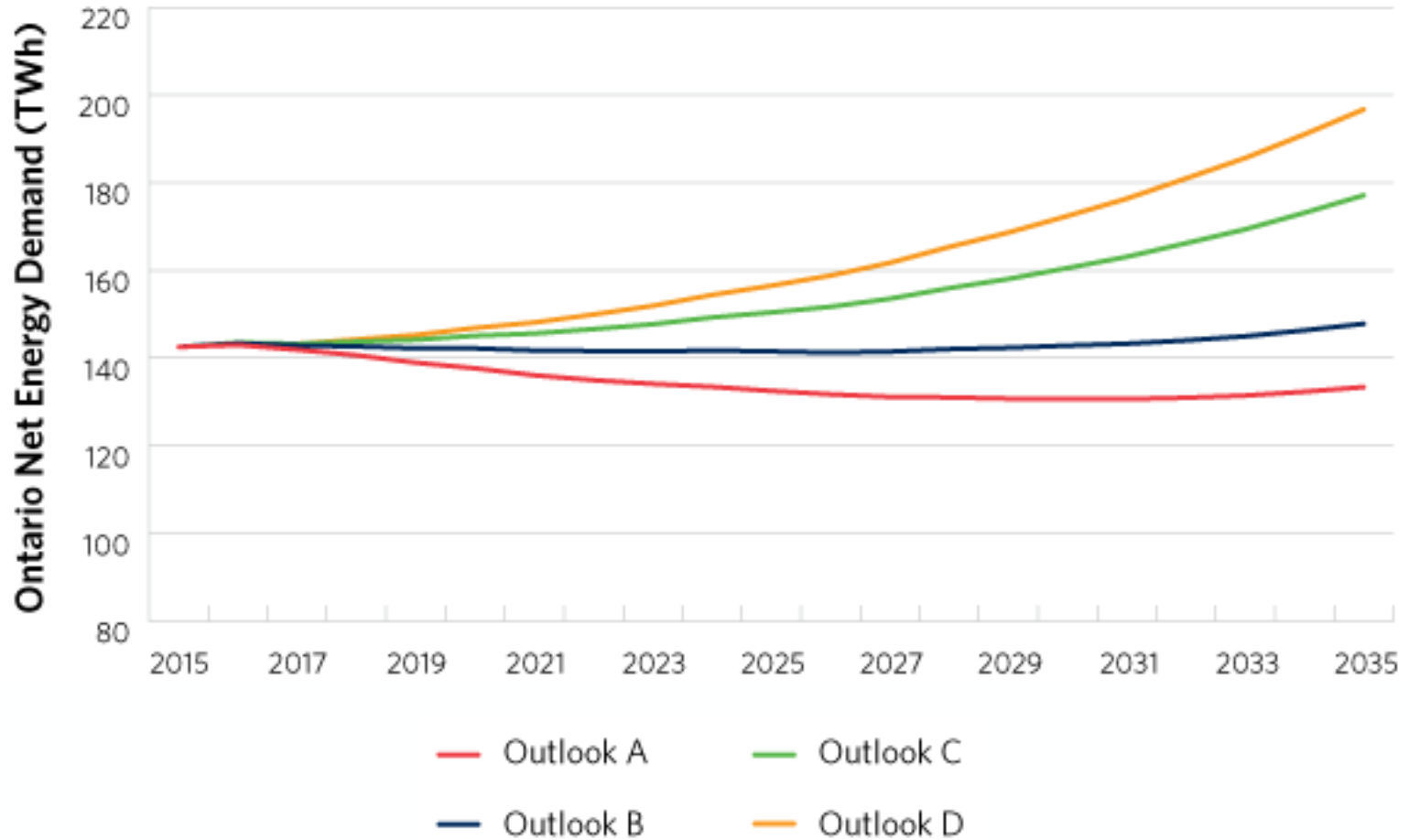


Source: Hydro Quebec

Key Drivers of Future Electricity Costs

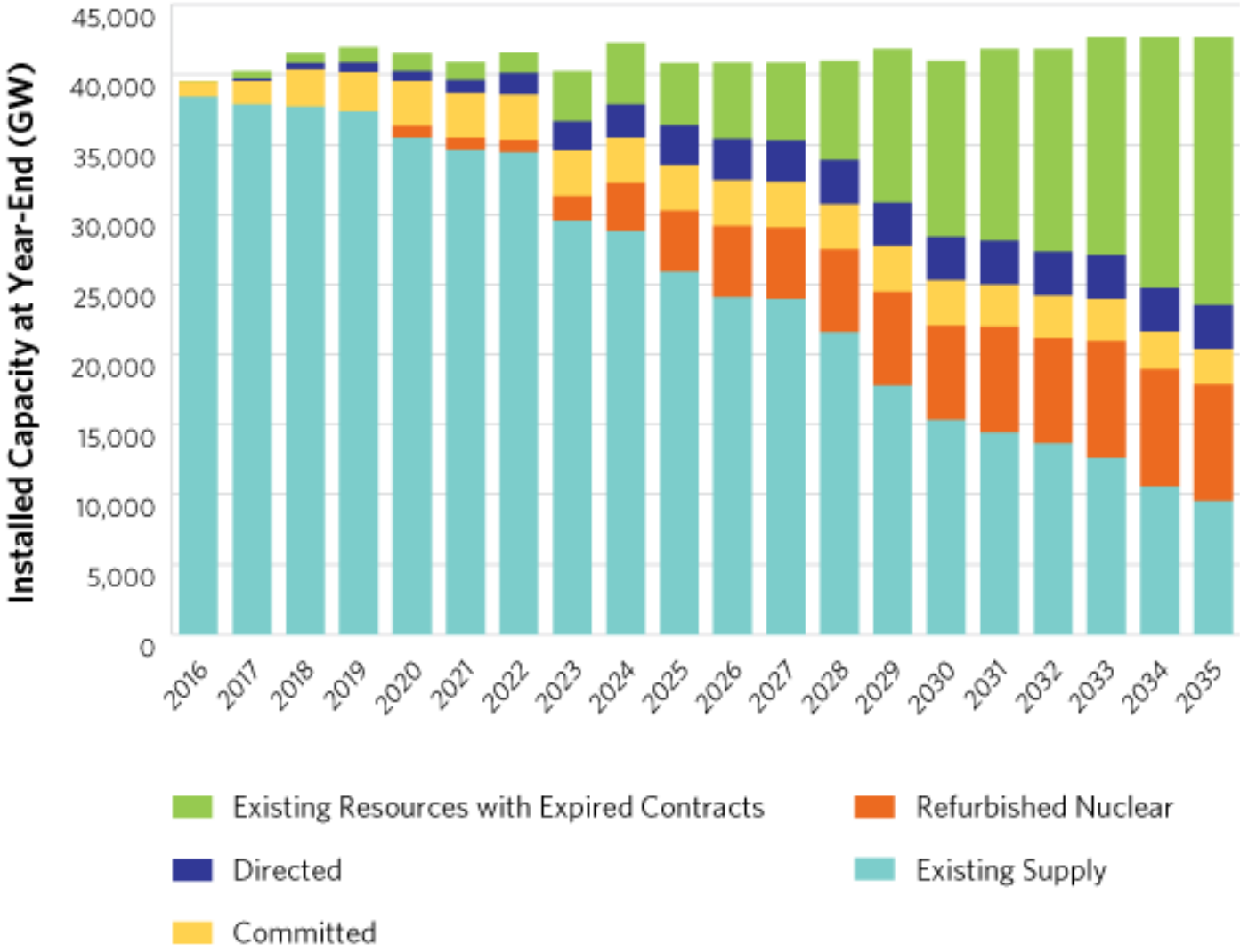
- Electricity Demand
- Expiring Generation Contracts
- Greenhouse Gas Reduction; Cap and Trade
- Innovative Technologies

Ontario Electricity Demand Forecast



Source: IESO Ontario Power Outlook

Ontario's Installed Generating Capacity



Source: IESO Ontario Power Outlook

IESO Market Renewal Will Reduce Costs of Expiring Contracted Generation

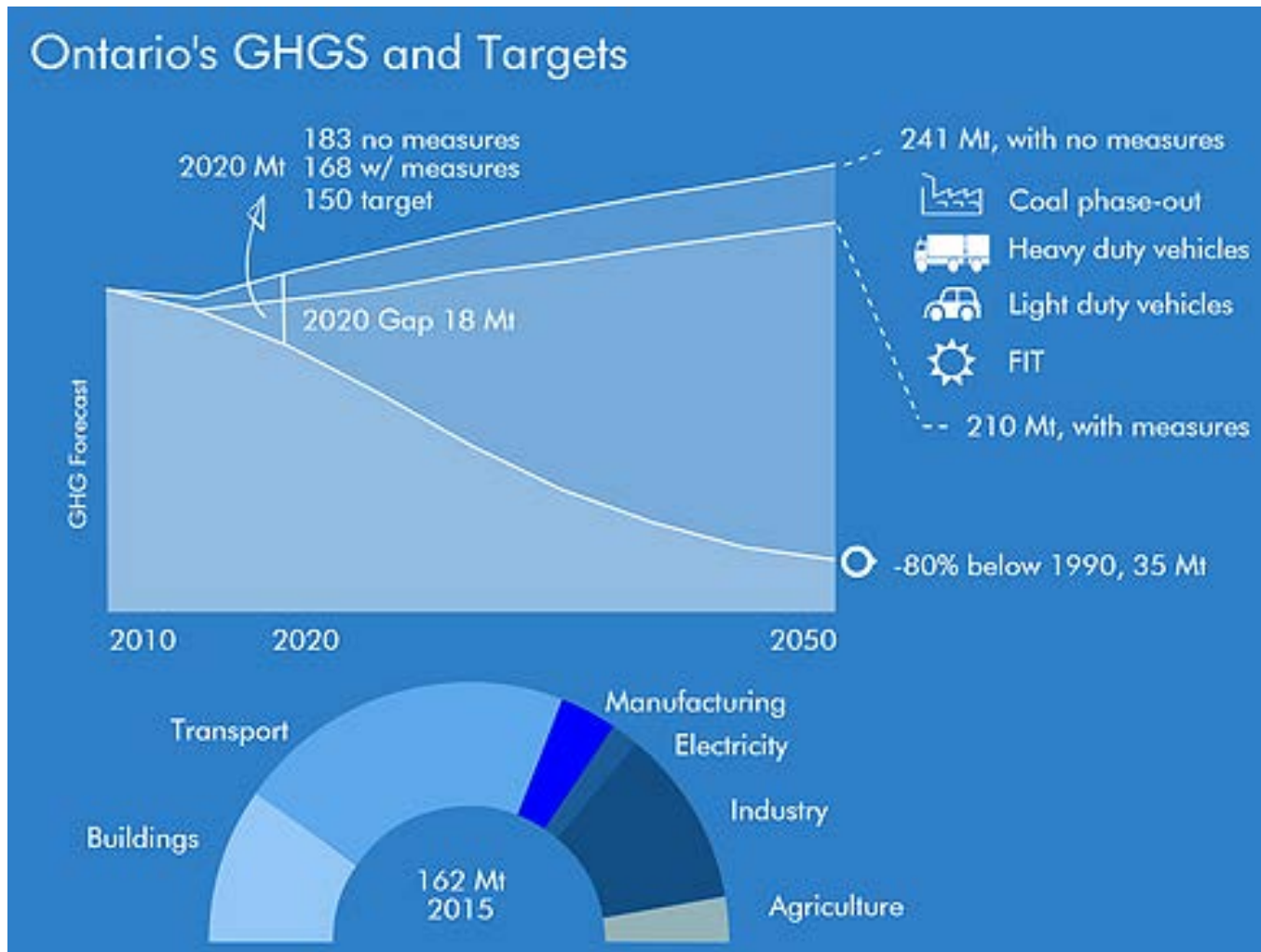
Ontario's System Operator plans changes to the Wholesale Market which began in 2002

- Improve Generation Scheduling Efficiency
- Increase Operating Flexibility
- Acquire Incremental Capacity Through Competitive Auction

A recent report estimates savings of between \$2.2 and \$5.2 billion over 10 years (about \$800 million/year in 2030)

GHG Reduction Will Change Everything

A huge challenge; increased electrification from clean supply is a must



Source: ENVIROECONOMICS

Innovative Technologies

- Intelligent Energy Management Systems
- Micro Combined Heat and Power
- Storage: batteries, flywheels, compressed air
- Solar Shingles
- Geothermal
- Air to Air Heat Pumps
- Hydrogen
- Electric Vehicles
- Offshore Wind
- Intelligent Lighting
- Community Energy Systems
- Microgrids

These can be enabled by Effective Policy and Regulation

What Can Ontario's Small Urban Municipalities Do?

Advocate Energy Policy Makers:

- Analyze the economic, environmental, and engineering implications of energy policies BEFORE decisions are made
- Develop technology neutral and market based approaches that allow the marketplace to create innovative solutions to achieve desired outcomes

Thank You

