

Presented at the 2017 ACEEE National Conference on Energy Efficiency
as a Resource

The Role of Climate Change Policy and Energy Efficiency on Natural Gas Distribution System Design

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The New Enbridge

- **4th largest company in Canada**
- **Operates the longest crude oil transportation system in the North America**
- **Operates Canada's largest energy distribution companies:** Enbridge Gas & Union Gas: serve consumer markets in Ontario, Quebec & New Brunswick and New York
- **Canada's second largest investor in renewables** (wind, solar, hydroelectric, geothermal etc.)



Enbridge in Ontario

- **Delivers 95% of Ontario's Natural Gas**
- **We deliver about 37% of Ontario's total energy use each year**
- Over 165 years of experience in safe and reliable service
- The Sarnia-area *Dawn Storage Hub* is Canada's largest and one of the top-5 natural gas trading hubs in North America
- Natural Gas Rural Expansion: \$100M expansion program to add rural communities and economic development projects



Natural Gas

3.5 M customers, heating more than 75% of Ontario homes, through two utilities

Renewables

7 projects: wind, solar and hydroelectric (490 MW).

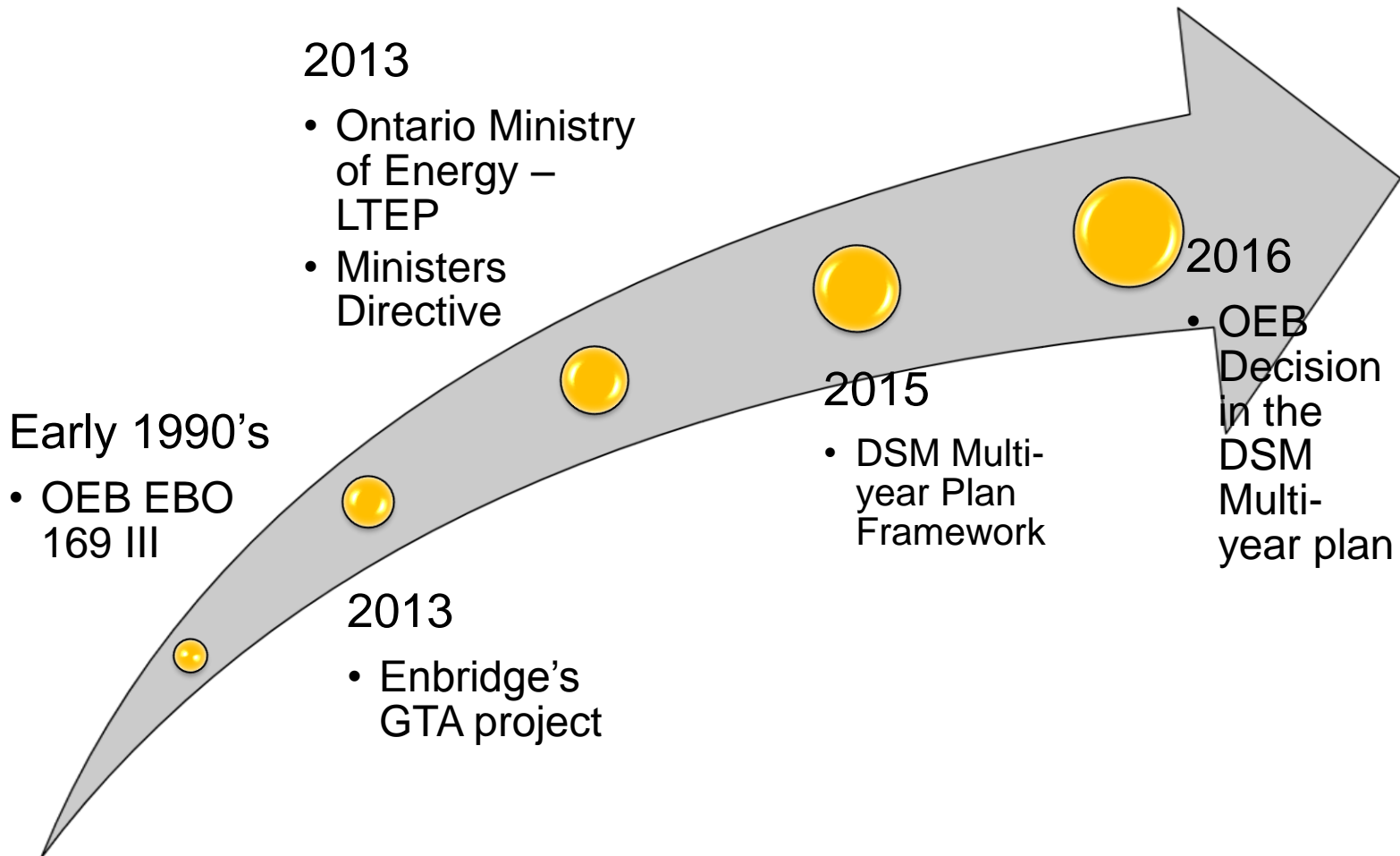
Infrastructure

~\$14 billion (2016) between Enbridge Gas Distribution and Union Gas

Employment

Over 4,500 Ontario-based permanent and temporary staff.

Background IRP Policy development in Ontario



Background Carbon Policy development in Ontario



Ontario Energy Board

Climate
Change Act
(May 2016)

C&T
Regulation
(July 2016)

OEB C&T
Framework
(Sept 2016)

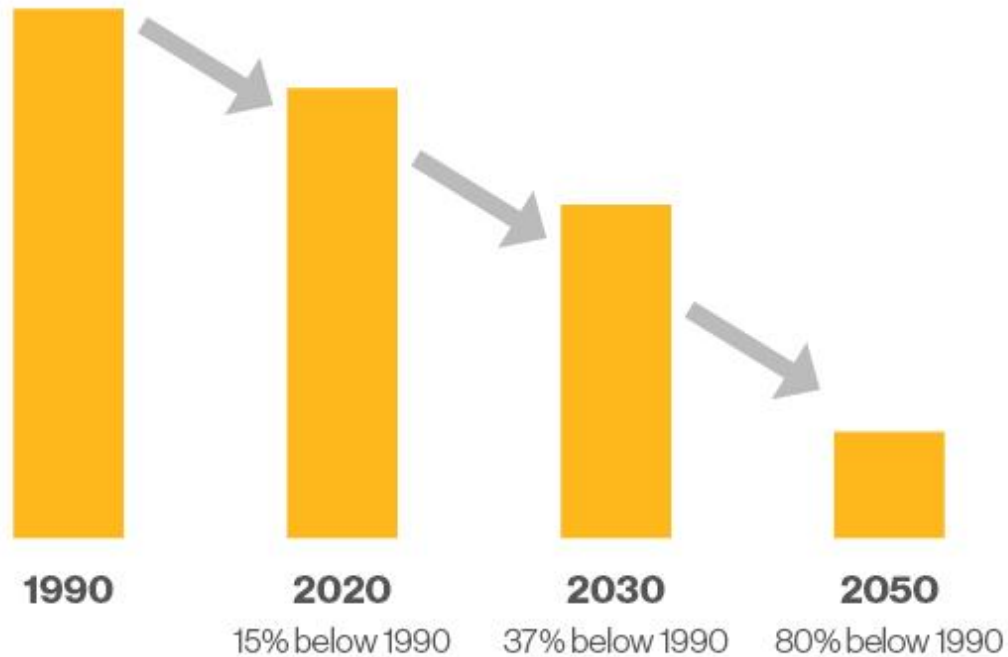
GHG
Reporting
and Forecast
of Obligation

NG Utilities'
Compliance
Plans Due
(Nov 2016)

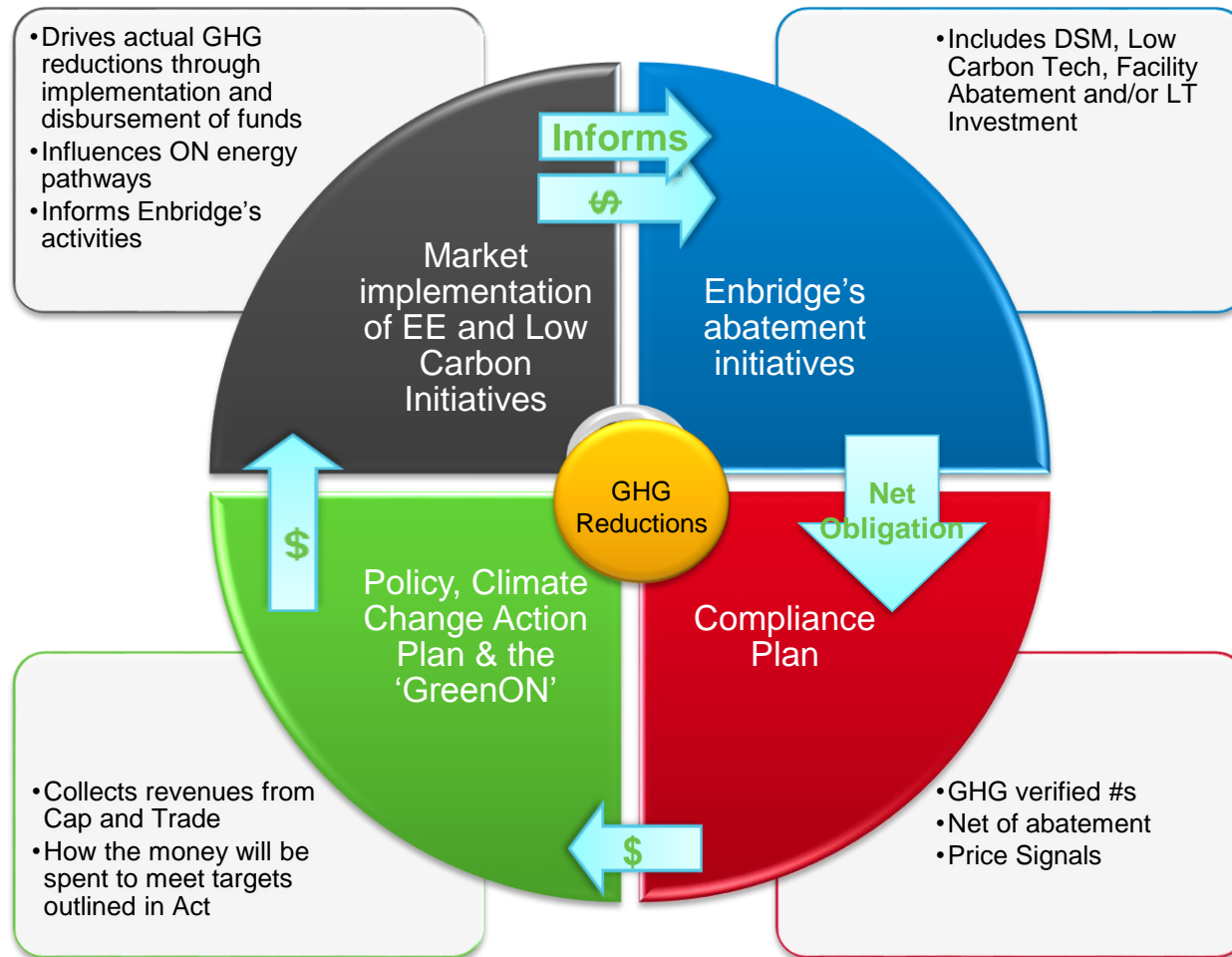
- Next Compliance Plan due November 2017
- Annual Monitoring Reports to be filed

Climate Change Policy in Ontario

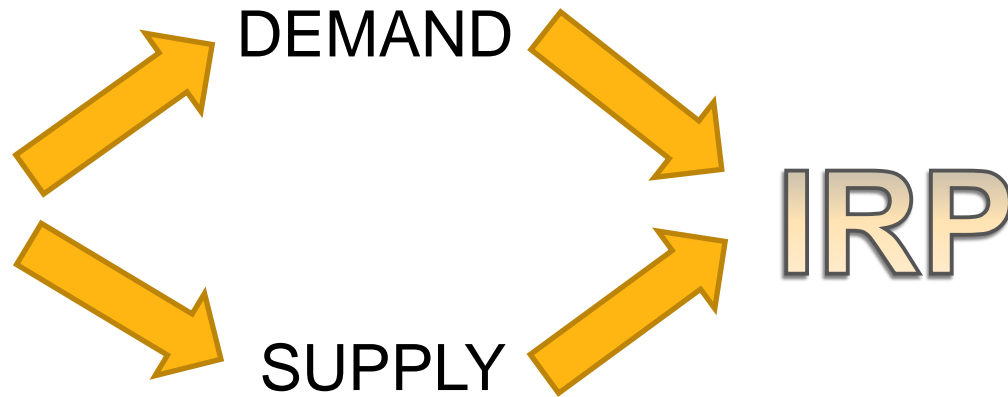
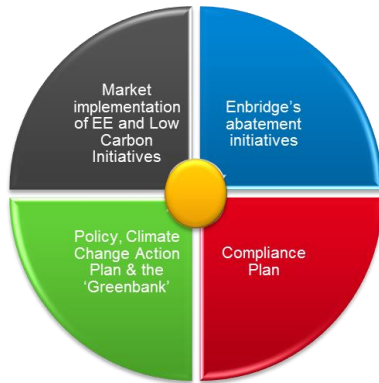
- *Cap and trade is part of Ontario’s Climate Change Strategy “designed to help fight climate change, and reward businesses that reduce their greenhouse gas emissions.” Government of Ontario*



Ontario's Climate Policy and Cap and Trade Continuous Cycle









Impacts



Climate Change Policies and Integrated Resource Planning

Heightened importance of coordinating climate change policy goals and infrastructure investments:

Increasingly higher Carbon Pricing costs coupled with Natural Gas Energy Efficiency = declining average gas usage	
EE technologies – Adaptive thermostats = decrease annual consumption with a potential increased peak hour demand	
Increased electrification of energy systems that may requiring higher amounts of new generation infrastructure at a time when nuclear is being retired = increased natural gas demand	
System expansion initiatives into rural communities to provide relief to rural electric ratepayers + new natural gas customer additions = expanded natural gas infrastructure	
NGV + Increased Green Vehicle penetration = increased natural gas throughput	
All of these scenario's have an unknown effect at this time on a natural gas distribution system	

Integrating IRP and Infrastructure Planning

Utilities:



Consultant:



- Theoretical study coupled with long term case studies in both utility jurisdictions
- Transition Plan on how the utilities will integrate and coordinate infrastructure and energy efficiency planning

Enbridge / Union Gas – IRP Study Scope of Work

Is examining the three areas where Energy Efficiency and Demand Response could potentially impact infrastructure planning:

- Broad-based energy efficiency impacts and planning forecasts of infrastructure investment (Passive Deferral)
- Potential direct impact of energy efficiency on subdivision planning (New System Design)
- Potential direct impact through targeted energy efficiency and demand response to achieve deferral of reinforcement projects (Active Deferral).

IRP Study Scope

- Study will consider whether the implementation of energy efficiency may be used to defer existing infrastructure.
- Recognize that Integrated Resource Planning may in time consider many energy solutions, including looking at scenarios that provide cost effective, safe and reliable energy while also considering carbon impacts.
- In the future this could include a review of a variety of different low carbon options such as:
 - expanded energy efficiency to defer existing regional and local infrastructure;
 - the impact of net zero ready subdivisions;
 - distributed energy resources;
 - community energy planning,
 - and the least cost lowest carbon solutions.

IRP Study Process

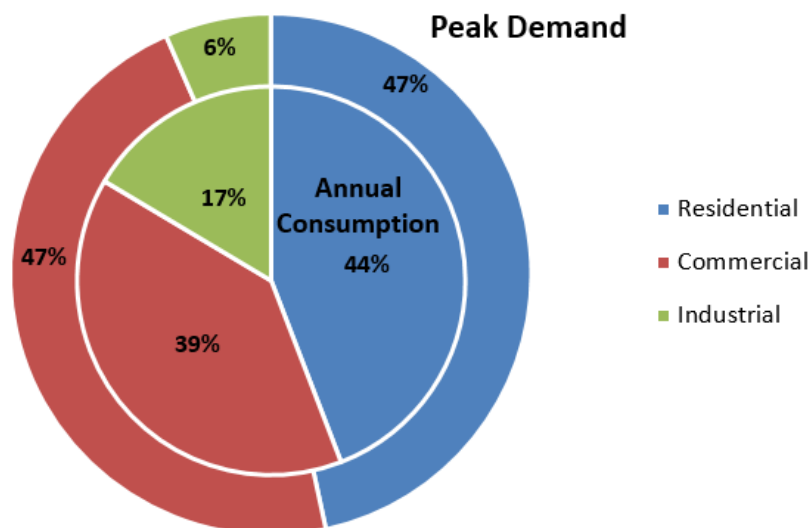
Includes:

- Review of industry practices
- Assessment of DSM impacts on peak period requirements
- Review of utility facilities planning
- Transition plan
- Avoided costs
- DSM impacts to infrastructure

Preliminary findings

Enbridge Gas Distribution

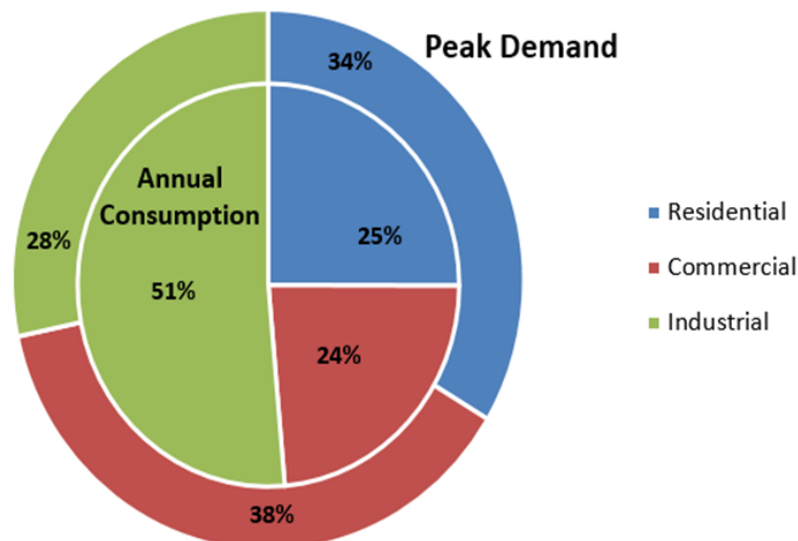
Comparison of Relative Contribution to Peak Period #1



- **Residential** sector accounts for 47% of the peak demand in peak periods #1
- **Commercial** sector also accounts for 47% of the total in peak periods #1

Union Gas

Comparison of Relative Contribution to Peak Period #1



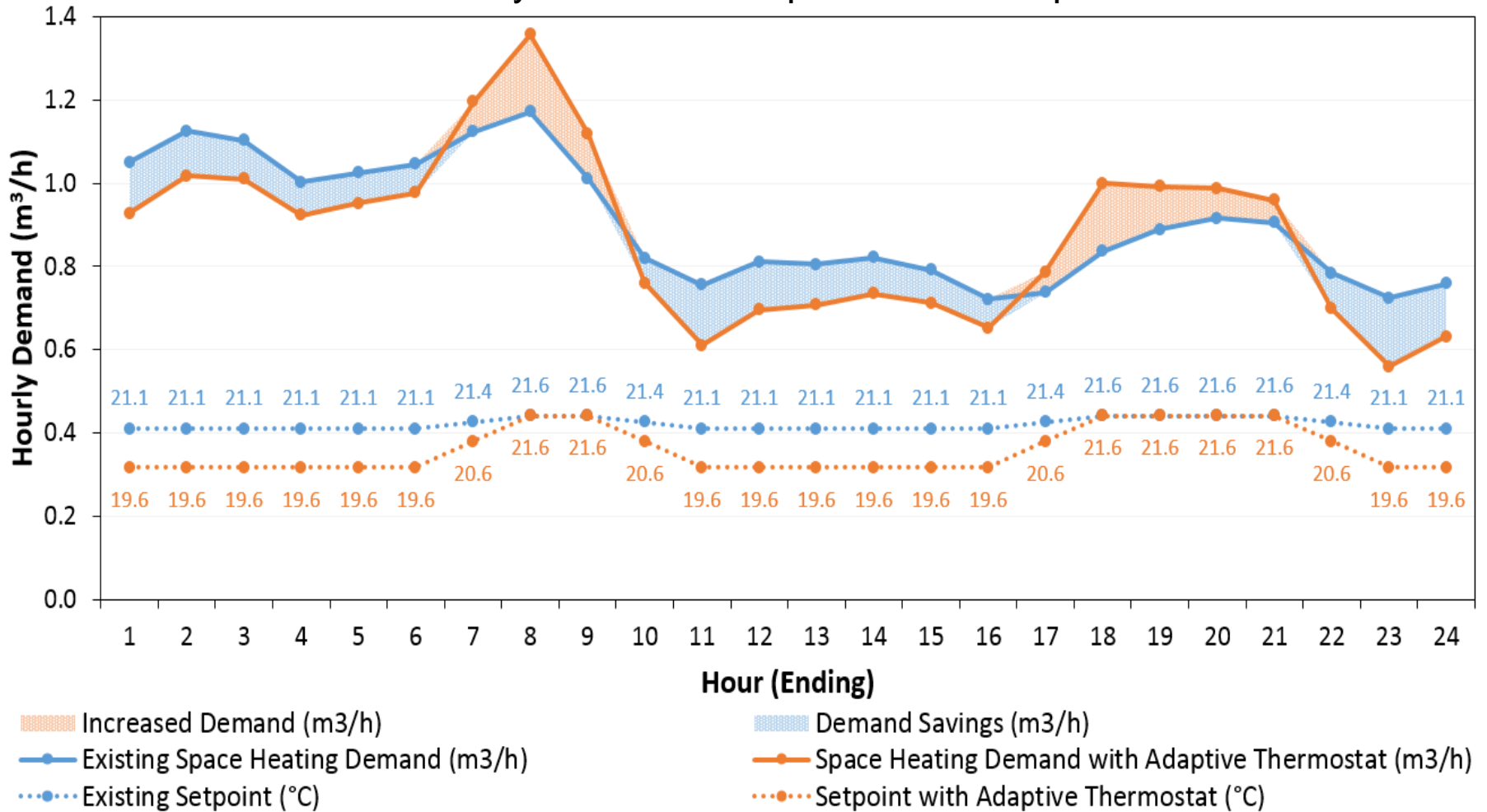
- **Commercial** sector accounts for 38% of the peak demand in period #1,
- **Industrial** sector accounts for 28% of the peak demand in period #1

Preliminary Findings - technologies

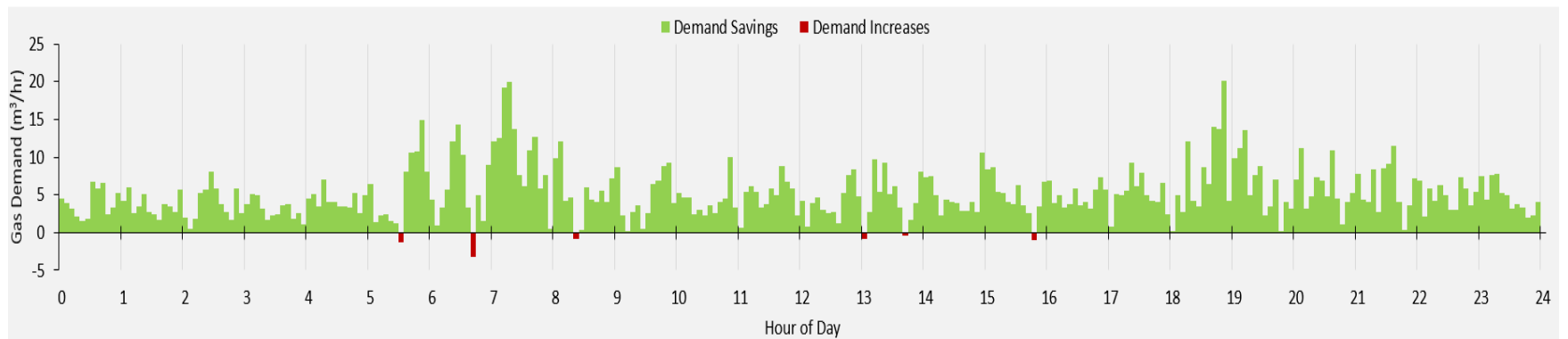
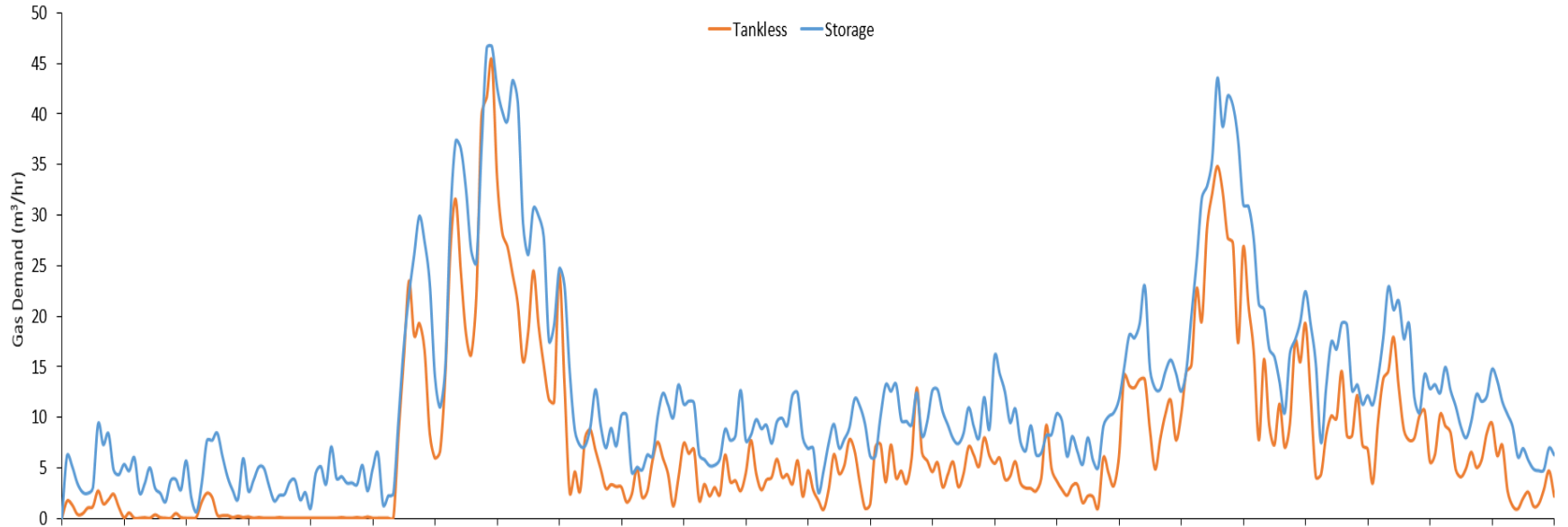
- Most energy efficiency technologies decrease annual savings and have a corresponding decrease to peak hour savings,
- However, not all of these technologies decrease peak hour,
- Much more definitive study is still required to fully understand the impacts of these technologies.

Adaptive Thermostats: Residential Sector Results

Residential Sector Hourly Demand Comparison for Adaptive Thermostats

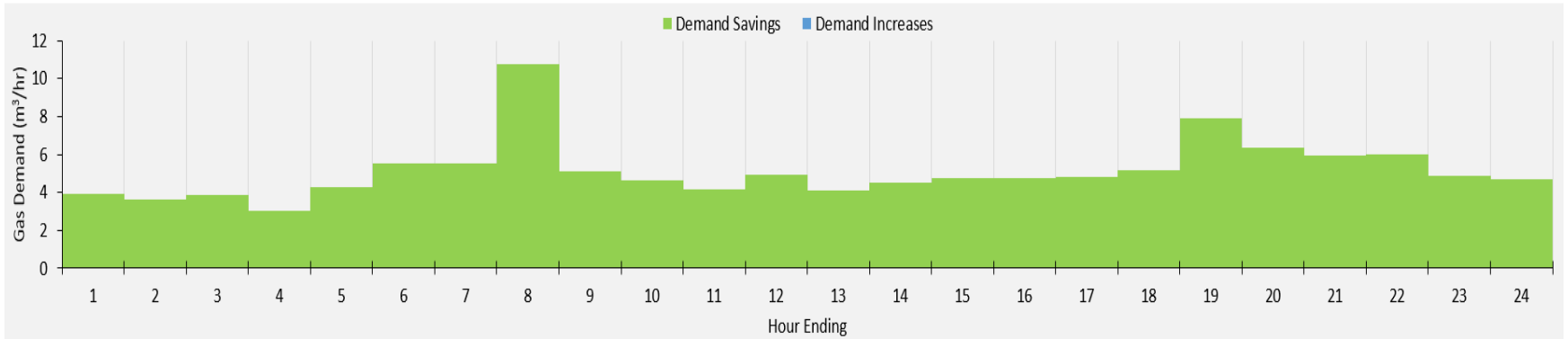
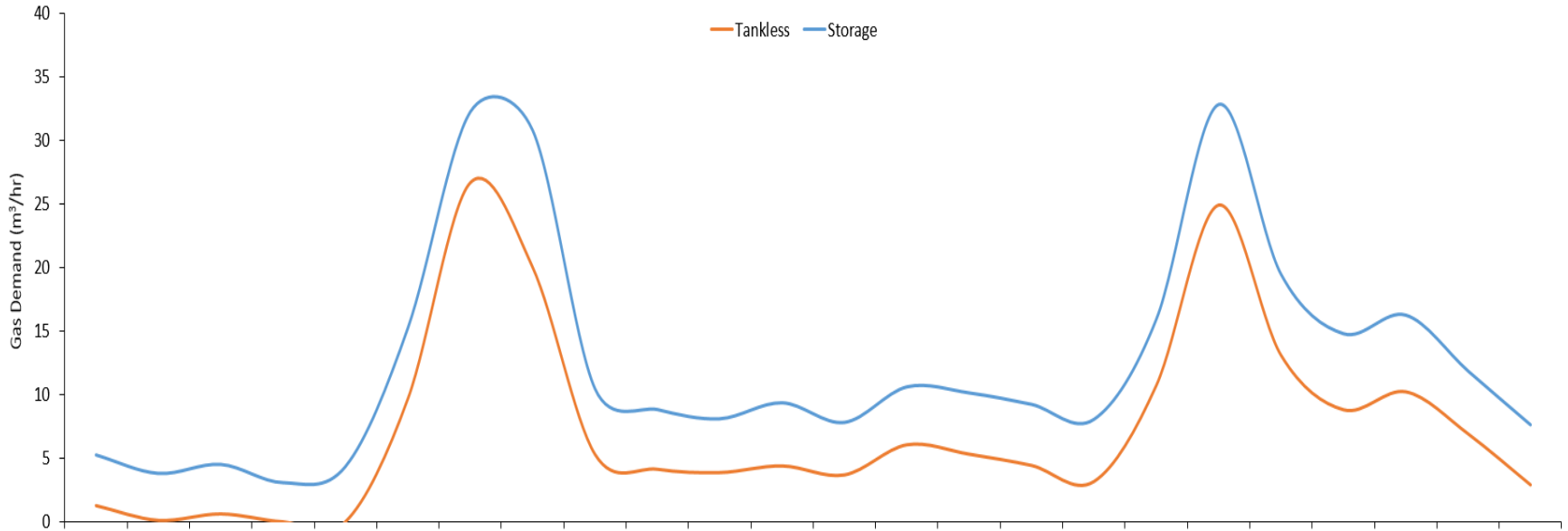


Tankless Water Heaters – Aggregate Profligate Profile (5 min Resolution)



Tankless Water Heaters – Aggregate Profligate Profile (1 hour Resolution)

- No increases to peak are visible at a 1 hour resolution



Future considerations

Key considerations:

- Interplay between carbon and infrastructure planning
- Changes in the approval process for Infrastructure targeted DSM
- Allocation of risk
- Equivalent rate of return
- Cross-subsidization
- Incentives for non-general services customers
- Establishment of an appropriate Leave-to-Construct (LTC) budget threshold for Geo-Targeted DSM programs
- Appropriate cost effectiveness test
- New business models for energy efficiency

Case Study - Deep River, Ontario





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