

Preparing for an Electrified Future



GridSmartCity[®]

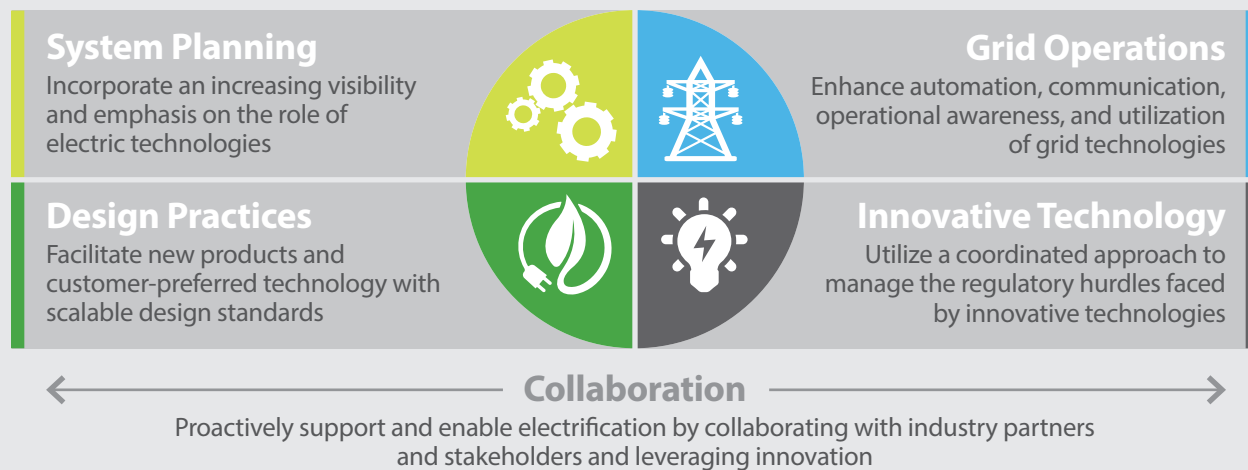
Electrification Strategy for Members

May 9, 2023

HATCH



Preparing GridSmartCity Utilities to anticipate and respond to future electrification demands will require the following strategies



Understanding the Ontario Context Around Electrification of Building Heating and Transportation

GridSmartCity Cooperative (“GSC”) is a consortium of utilities in Ontario that works collectively and collaboratively to address emerging industry challenges and opportunities related to the electrical grid. GridSmartCity has 13 individual local distribution company (“LDC”) members, managing almost \$3 billion in assets, serving approximately 794,000 customers across more than 40 communities. The consortium is focused on achieving net savings, efficiency gains, and information exchange in a variety of areas. One of the core committees, the New Technology committee:

“Investigates innovations shaping the LDC industry and the distribution grid of the future.”

2021-2022 GridSmartCity Cooperative Report

Decarbonization through electrification is a concept that is shaping the LDC industry in Ontario. To avert the worst impacts of climate change, the Government of Canada is committed to an emission reduction target of 40-45% in 2030 (from 2005 levels) and net-zero emissions by 2050. Given Ontario’s low-carbon grid, electrification will play a key role in achieving targets, primarily in the transportation and building heating sectors.

Replacement of Internal Combustion Engine Vehicles with Electric Vehicles

- Canadian mandate of 100% zero-emission vehicles sales by 2035 for all new light-duty vehicles. These electric vehicles (“EV”)s will require access to charging stations and unmanaged EV charging loads may overload and disrupt electric distribution equipment.
- 19.7% households within GSC members’ municipalities on average will own an EV by 2030, while currently there are on average 0.6% households that own an EV.
- The penetration of EVs in GSC service territories will increase 4-6x in 3 years and 23-40x in 7 years.

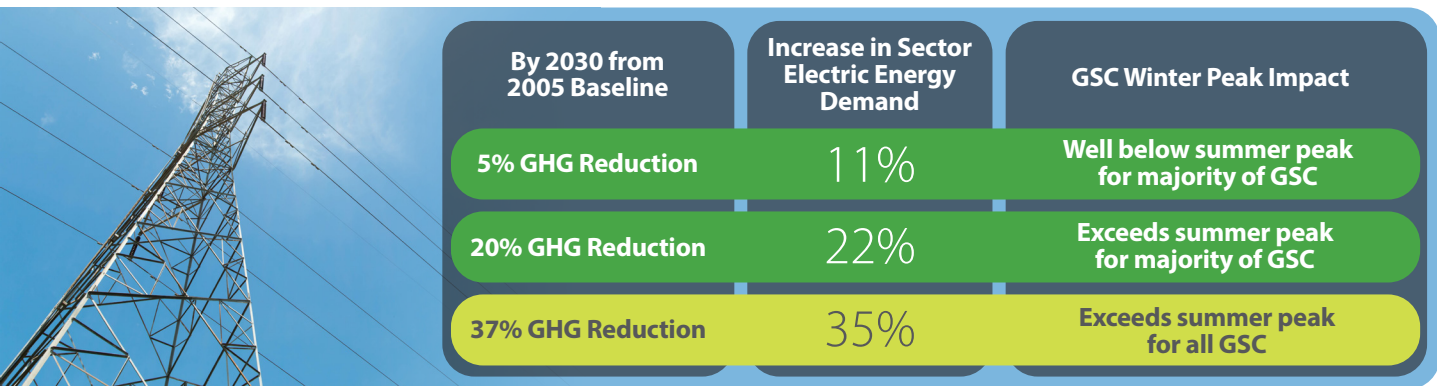


Increased Penetration of Electric Space and Water Heaters

- As per Canada’s Emissions Reduction Plan, a target was set by the federal government to reduce greenhouse gas (“GHG”) emissions from buildings by 37% in 2030 compared to 2005 baseline. This is a difficult target to achieve, and the undertaking will require increasing the pace of current adoption of electrification in buildings, substantial funding, access to labour and supply, and implications of affordability for households and businesses.
- More realistically, GHG emissions reduction beyond 20% is not expected in the 2030 timeline. This is in line with the Independent Electricity System Operator forecasts but are below the 37% Federal GHG reduction target.



- For GSC utilities, a GHG reduction rate of 20% will increase the winter peak electricity demand in the range of 25 to 72% and increase the annual energy output in the range of 12 to 38%. Majority of GSC utilities will transform from summer peaking to winter peaking.
- At a higher GHG reduction rate of 37%, there will be major impacts on the power distribution system and all GSC utilities will become winter peaking.



Proactively Support and Enable Electrification

System Planning



GSC incorporates an increasing visibility and emphasis on the role of electric monitoring and control technologies and distributed energy resources (“DER”) into system planning, while improving coordination between distribution, transmission, and system operators:

- Incorporate the impact of electrification technologies in system planning such as a periodic load forecast of EV chargers and electric space heating.
- Assess the locational value of DERs and its role in optimizing distribution, transmission, and system operational priorities.
- Develop a business case approach for electrification-related investments.
- Improve coordination between distribution, transmission, and system operators.
- Build visibility into the deployment and location of EVs in service territory, standardize EV asset and operational data capture, and assess opportunities for e-mobility services.
- Engage with real estate developers in the community to understand electrification plans. Develop a formalized process for innovation projects and collaboration with third parties.



Grid Operations



GSC enhances capabilities that support the reliable, secure, safe, and efficient operation of the electrical grid, with an increased level of automation, communication, operational flexibility, situational awareness, and the utilization of information from grid technologies:

- Implement scenario-based long-term forecasting that considers consumer choice, such as how DER incentives will impact the load forecast.
- Consider the impact of winter peaking on operations.
- In the near term, utilize the existing AMI 1.0 technology with improved data analytics and meter data management to have increased visibility of the grid.
- In the longer term, implement next-generation smart meters, the supporting infrastructure, and the use cases for advanced functionalities.
- Build visibility into EV charging data, perform analytics on the data and consider customer charging patterns for load forecasting and operational planning purposes.
- Develop capabilities to control customer EV charging directly or indirectly.

Design Practices



GSC facilitates new products and customer-preferred technology with scalable and innovative design standards:

- Perform a detailed secondary distribution load estimation, considering the impact of electrification on the customer peak demand load and service panel size.
- Re-assess the critical parameters that determine the appropriate size and loading of secondary distribution equipment, including fault current, voltage drop, and system losses.
- Study changing the process of service connection and service upgrades to collect data on loads that may cause significant shift in electrical demand or usage pattern.
- Consider reviewing the conditions of service to add requirements for fault current withstand of service panels that coordinate with the available fault current.

Innovative Technology



GSC utilizes a coordinated approach to manage the regulatory hurdles faced by innovative technologies and accelerate electrification readiness. Regulatory clarity in the treatment of innovative energy services, technologies, and approaches is still a work in progress. The regulatory landscape is catching up to address the constraints:

1. Diffused benefits and concentrated costs of grid modernization investments.
2. Lack of a standardized business case for DERs.
3. Customer data privacy concerns.

Given the ongoing policy initiatives and consultations conducted by the Ontario Energy Board and Independent Electricity System Operator, regulatory framework in Ontario seems to be in a place where change could be coming soon. These barriers are either currently being discussed in working groups or may have consultations starting soon.

