July 27th, 2021

Attention: Advisory Committee on the Environment, City of London

Re: Climate Emergency Action Plan (CEAP) – London Hydro Questions

At the May 5th, meeting of the Advisory Committee on the Environment (ACE) it was requested that a representative of London Hydro be invited to a future meeting of ACE to speak to the following questions:

- future infrastructure improvements to assist with climate change reductions;
- alternative energy sources for providing power to the city;
- fuel forecasting to support the Climate Energy Action Plan and net zero targets; and,
- demand side management strategy and on-bill financing for home energy retrofitting;

Enclosed you will find the London Hydro responses to the above questions. A representative of London Hydro will attend a fall meeting of ACE to answer questions and provide additional information.

1) ***Future infrastructure improvements to assist with climate change reductions & Fuel forecasting to support CEAP and net zero targets?***

London Hydro partakes in Regional Planning exercises with Hydro One and the Independent Electricity System Operator (IESO) to ensure we have adequate capacity for load growth in our transformer stations and transmission system supplying the City of London. This 5-year cyclical planning process considers population and development forecasts provided by the City, generation/Conservation and Demand Management (CDM) forecasts provided by the IESO, and any known energy projects forecasted by our customers. The outcome of these planning exercises is to drive infrastructure improvements that support climate change reduction initiatives while ensuring capacity of the grid matches the demand. London Hydro does not participate in fuel forecasting.

London Hydro is also constantly reviewing the Electric Vehicle (EV) landscape and has produced several EV reports for internal use. London Hydro has also made significant investments in greening our fleet through the addition of EVs.

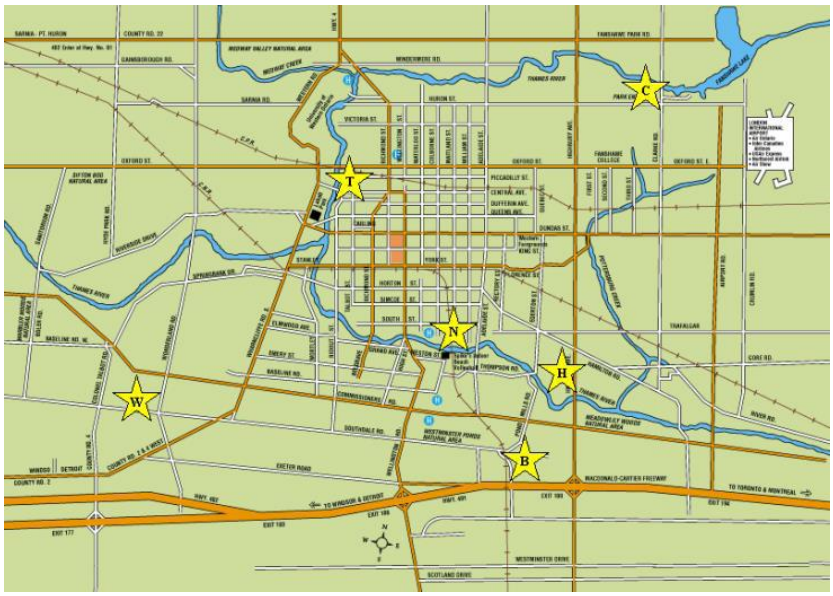
The Ontario Energy Board (OEB) maintains its regulatory oversight of Local Distribution Companies (LDCs) like London Hydro. They are tasked with enacting regulation that ensures that the public good is served while striving to have an energy system that meets Ontario's needs for today and tomorrow. They ensure that LDCs like London Hydro operate within their regulated framework.

2) Alternative energy sources for providing power to the City?

As a Local Distribution Company London Hydro takes great pride in providing safe, reliable and cost-effective access for our customers to connect their loads, generation or storage to the power grid. Over the years London Hydro has enabled 426 generation connections within the city of London. These generation sources provide 89,736 kW of local power to London. These connections include all kinds of energy sources including: PV solar, hydro, combined heat and power, natural gas and biogas to name a few. Approximately 24% (21,374 kW) of the local generation that has been connected to London Hydro's distribution system is generated by renewable energy sources. London Hydro provides equal grid access to all generation customers regardless of energy type. This is done in alignment with the terms of our distribution license. It is recognized that sometimes enhancements to the grid are required in order to facilitate the connection. The costs associated with these enhancements are borne by the requesting party in compliance with the provincial Distribution System Code. The enhancements may be on the London Hydro grid or on the Hydro One owned transmission grid.

Interconnecting Distributed Generation with the Electricity Distribution System

London Hydro receives supply from the provincial transmission system at six (6) transformer stations equipped with power transformers that step the voltage down from the common three-phase three-wire 115 or 230 kV transmission levels to the three-phase four-wire 16/27.6Y kV distribution levels prevalent in Ontario. See below.



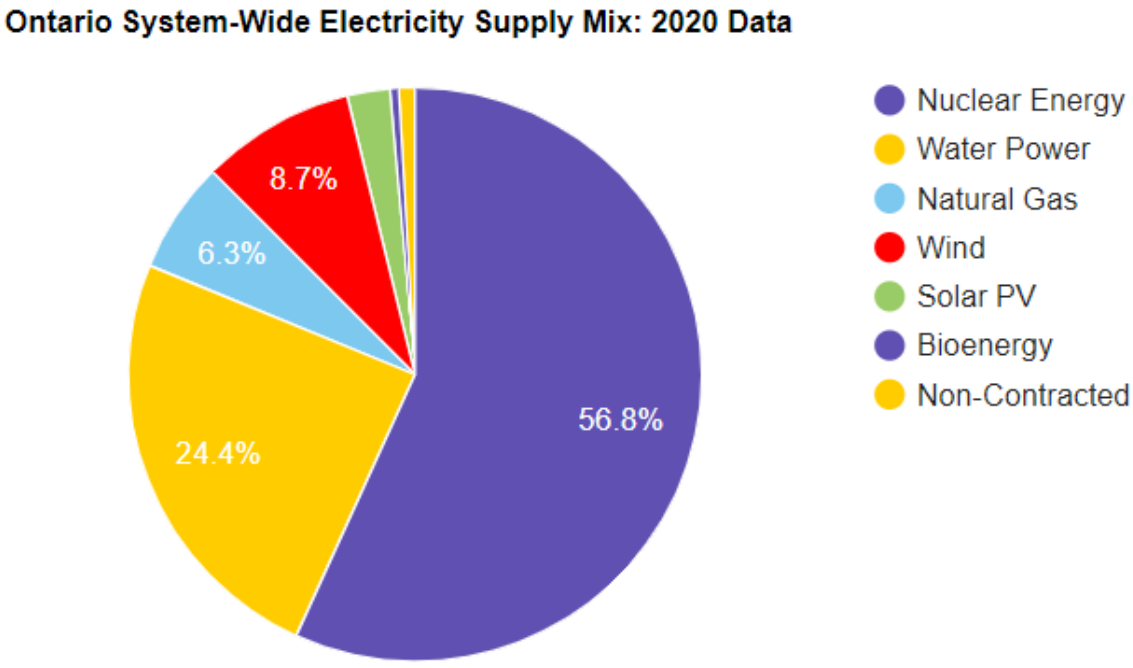
For these transformer stations (that are owned, operated and maintained by Hydro One Networks – the provincial transmitter), the selection of the circuit breaker withstand and interrupting ratings, the mechanical bracing of the bus, the impedance of the power transformers, the impedance of the grounding reactors, the design of the grounding and gradient control systems, etc. is predicated on a maximum short-circuit design criterion (i.e. 16,000 A for a 3-phase fault, 12,000 A for a line-to-ground fault).

Connecting down-stream sources of generation (e.g. solar photovoltaic generation, combined heat & power systems, electricity storage systems, etc.) will increase the available short-circuit conditions at, and in the vicinity of, the transformer station. When a transformer station is declared “connection capacity limited”, it means the interconnection of more downstream generation can result in conditions that exceed the short-circuit withstand and interrupting ratings of power apparatuses within the station itself and medium-voltage power fuses and interrupting devices in the vicinity of the station. In such instances, rather than a circuit breaker tripping or a fuse operating to clear the downstream fault condition, the device could fail in a catastrophic manner.

Within the City of London, there are 10 electrical bulk supply points (at Hydro One transformer stations) that have limited capacity available for connection of generation. Of the ten, two have been declared as restricted because of the generation that has been added. Hydro One Networks has an online screening tool (referred to as the Station Capacity Calculator tool). See #1 for ascertaining the connection capacity at the various transformer stations.

Current Provincial Electricity Supply Mix

In Ontario, coal-fired generation, which in the 1990’s was the largest single source of air-polluting and climate-destabilizing emissions in Ontario, was virtually phased out by 2011 and completely phased out by April 2014. See #2. Today, Ontario has a significant reliance on nuclear power generation which is recognized as “non-emitting” (and often referred to as “clean” energy) but not “renewable”. The Ontario Energy Board website includes information about the current makeup of electricity generation sources in this province and a key graphic has been replicated below for convenience of reference. See #3.



As illustrated above, in 2020, almost 93% of electricity in Ontario was produced from zero-carbon emitting sources: 56.8% from nuclear, 24.4% from hydroelectricity, 8.7% from wind, and 2.4% from solar. The remainder is primarily from natural gas with some biomass.

Note: The natural gas-fired generators are "standby" assets to compensate for the intermittent (and unpredictable) nature of the population of industrial wind turbine generators throughout the province. During periods when the wind isn't blowing, the natural gas-fired turbines (which are consuming natural gas and rotating) are brought online to compensate for the reduction of wind-energy generation.

It is important for the reader to understand that the Ontario electrical grid is already 93% "non-emitting" when seeking out opportunities for GHG reductions. For comparison it is also important to understand that the carbon intensity emission factor of Ontario's electrical energy is relatively low (30 g CO_2 e/kWh) when compared to the Canadian average (120 g CO_2 e /kWh). See #4. Ontario's carbon intensity for generating electricity makes it a favourable energy source to support the CEAP and net zero targets.

London Hydro prides itself in being an innovative leader in the industry. London Hydro's Mission is to provide safe, reliable electricity and value-added services. Our Vision is to pursue excellence as an industry leader.

London Hydro:

- Connected 21 MW of renewable generation.
- Between 2013 and 2020, helped save over 231 gigawatt-hours of electricity through CDM initiatives and reduced GHG emissions by 8,044 tonnes of CO_2e.
- Operates 460kW of solar generating app 700 MWh per year with 239 t CO_2e to-date reductions. In 2020, London Hydro operated solar generated the equivalent of 27.4% of the electricity used by London Hydro operations.
- Reduced distribution losses through voltage conversions etc. improving system reliability and saving 233,150 MWh (7,766 t CO_2e) over 7 years.

When envisioning the future efforts to facilitate the CEAP it is important to understand the regulatory limits imposed by the OEB on London Hydro.

3) Demand side management strategy and on-bill financing for home energy retrofitting.

Over the past 15 or so years, London Hydro has garnered significant success and accolades for the delivery of energy efficiency & demand response programs in London Hydro's franchise service territory. However, in the Spring 2019, the Ministry of Energy, Northern Development & Mines made a policy decision to centralize the delivery of energy-efficiency programs with the IESO. See #5. Consequently, London Hydro is in the final phase of finishing energy-efficiency projects in the queue and disbanding its staff resources.

Although London Hydro doesn't directly deliver energy efficiency programs as part of our customer engagement strategy anymore, we are still actively seeking resources to support the energy-efficiency objectives of our commercial, industrial and institutional customers.

With respect to the on-bill financing for home energy retrofits, London Hydro is not permitted to finance energy retrofits. The most effective solution to financing energy retrofits, and other carbon emission reduction initiatives would be through a Property-Assessed Clean Energy (PACE) program. PACE programs, originally conceived of in the United States of America, are expanding worldwide. PACE programs attach financing for carbon emission reduction initiatives to the property, rather than the property owner. The most important benefit of using a PACE funding solution is when the home is sold, the new home owner assumes the balance of the loan as well as the benefits of the installation. For example, the city of Toronto has implemented the Home Energy Loan Program (HELP) See #6 and the city of Ottawa has implemented the Better Homes Loan Program (BHLP) (See #7) and recently secured additional funding (See #8).

London Hydro prides itself in being an industry leader in innovation. Below you will find various initiatives and pilot projects that London Hydro has embarked on to help define the future ecosystem for distributed energy resources and to help empower customers to reduce their carbon footprint through Green Button based applications and systems.

- The London Hydro Energy Conservation Handbook is a handy guide to help customers save energy, water, money and reduce the impact on the planet. See #9.
- London Hydro was the industry's first utility to obtain Green Button Download My Data (DMD) certification for multiple types of Green Button (GB) usage data (See #10). London Hydro has developed platforms for customer like *MyLondonHydro* (See #11) and *Commerce* (See #12) which are powerful energy monitoring applications for residential, industrial, commercial and utility customers. London Hydro set an example for the Ontario government to forge ahead with the development of province wide regulation requiring all utilities to adopt GB standards.
- London Hydro is working on a pilot project with a local utility to optimize the energy usage for heating and cooling purposes.
- London Hydro pilots an Innovative Electricity Price Plan to help customers use electricity wisely and save money. London Hydro is proud to have been selected by the Ontario Energy Board to pilot two electricity plans: one is a real-time energy information program and the other is a critical peak pricing program. See #13.
- In 2020, Natural Resources Canada invested in London Hydro to develop and deploy a smart microgrid in the West 5 net-zero energy community in London, Ontario. This investment supports the design and development of Canada's first large-scale, fully integrated, net-zero energy community. The microgrid will integrate monitoring, data management and communications, electric vehicle infrastructure, distributed energy resource management, solar power generation and battery storage to reduce grid use. It consists of 2.2 MW of solar generation, 1.5 MW of battery energy storage and several level 2 and DC fast EV chargers. The goal of this project is to demonstrate that net-zero energy is feasible at the community level, which will promote sustainable development and inspire widespread change across Canada's construction industry. This innovative initiative will pave the way for Canada to achieve its net-zero emissions target by 2050. See #14.
- In 2020, London Hydro, with the support of Natural Resources Canada, entered into a partnership in the London-2-London project as part of the Power Forward Challenge. In this pilot project a London Hydro-led team is developing a scalable Open Data Distributed Energy Resource (DER) platform that will allow for effective integration and management of customer-owned DERs on the grid. The

project will utilize London Hydro's Green Button data platform and will also allow customers with DERs to monetize their energy. See #15.

- Also, as part of the L-2-L project, London Hydro and London & Middlesex Community Housing (LMCH) have partnered to install a mix of solar panels and residential batteries at seven LMCH homes and one apartment building. The savings from the installations will lower electricity costs for tenants in individual homes and create a pool of funds at the apartment building to improve building amenities that benefit all tenants. See #16.
- The Plus Pilot, a new energy conservation project offering 100 customers smart home devices to test leading-edge energy management tools. These tools are aimed at giving participants a predictable bill while lowering the carbon footprint of their homes, all within a comfort profile they select. See #17.
- Rogers TV interview with CEO Vinay Sharma on new energy conservation pilot projects, the London Hydro Plus Pilot. See #18.
- London Hydro collaborated with Elocity, a Toronto-based company focused on accelerating the adoption of electric vehicles through smart and intuitive technology, to launch an electric vehicle (EV) charging pilot. See #19.

In closing, London Hydro is developing the future ecosystem to empower customers' actions, introduce distributed energy resources and is well positioned to facilitate the electrification of transportation and heating. Our pilot projects and initiatives are in line with our vision of pursuing excellence as an industry leader and are at the forefront of sustainable energy practices. We look forward to working with all stakeholders and partners to achieve our mutual goals that are within our mandate to operate as a Local Distribution Company. London Hydro also looks forward to presenting at a fall meeting of ACE to provide answers to questions and additional information.

Endnotes

#1 Hydro One's Station Capacity Tool

https://www.hydroone.com/business-services/generators/station-capacity-calculator

#2 Ontario Clean Air Alliance report: Ontario's Coal Phase-Out – Lessons Learned from a Massive Climate Achievement; Brad Cundiff; April 2015; page 4

https://www.cleanairalliance.org/ontarios-coal-phase-out-lessons-from-a-massive-climate-achievement

#3 Ontario Energy Board Mission and Mandate – Ontario's Energy Sector

https://www.oeb.ca/about-us/mission-and-mandate/ontarios-energy-sector

#4 Canada's Submission to the United Nations Framework Convention on Climate Change - National Inventory Report 2021 (see NIR 2021 – Part 3)

https://unfccc.int/documents/271493

#5 IESO Ministerial Directive, Discontinuation of the Conservation First Framework

https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives/Discontinuation-of-the-Conservation-First-Framework

#6 City of Toronto, Home Energy Loan Program (HELP)

https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/home-energy-loan-program-help/

#7 City of Ottawa, Better Holmes Loan Program

https://engage.ottawa.ca/bhlp

#8 City News, City secures extra $12M for proposed new Better Homes Loan Program aimed to reduce greenhouse gas emissions

https://ottawa.citynews.ca/local-news/city-secures-extra-12m-for-proposed-new-better-homes-loan-program-aimed-to-reduce-greenhouse-gas-emissions-3929241

#9 The London Hydro Energy Conservation Handbook

https://www.londonhydro.com/search?search_api_fulltext=London+Hydro+Energy+Conservation+Handbook

#10 London Hydro was the industry's first utility to obtain Green Button Download My Data (DMD) certification for multiple types of Green Button usage data

https://www.londonhydro.com/about-us/news?published_year=&year=all&page=1

#11 MyLondonHydro

https://www2.londonhydro.com/site/myaccount

#12 Commerce

https://www.londonhydro.com/commerce-utilities

#13 London Hydro Pilots an Innovative Electricity Price Plan to help customers use electricity wisely and save money.

https://www.londonhydro.com/about-us/news/london-hydro-pilots-innovative-electricity-price-plan

#14 Canada Invests in Smart Grid Technology for London Net-Zero Energy Community

https://www.londonhydro.com/about-us/news/canada-invests-smart-grid-technology-london-net-zero-energy-community

#15 The London-2-London Pilot

https://www.londonhydro.com/london-2-london-pilot

#16 London Hydro, London & Middlesex Community Housing Install Solar and Battery at Local Residences

https://www.londonhydro.com/about-us/news/london-hydro-london-middlesex-community-housing-install-solar-and-battery-local

#17 London Hydro Builds on Past Success to Launch New Plus Pilot Project

https://www.londonhydro.com/about-us/news/london-hydro-builds-past-success-launch-new-pilot-project

#18 Rogers TV interview with CEO Vinay Sharma on new energy conservation pilot project.

https://rogerstv.com/media?lid=237&rid=9&gid=592746

#19 London Hydro Customers Participate in Electric Vehicle Charging Pilot

https://www.londonhydro.com/about-us/news/london-hydro-customers-participate-electric-vehicle-charging-pilot