ATTACHMENT 4a

2021 TORONTO HYDRO ENVIRONMENTAL

PERFORMANCE REPORT



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Toronto Hydro Corporation

The City of Toronto ("the City") is the sole shareholder of Toronto Hydro Corporation (THC). THC is a holding company which wholly owns two subsidiaries: Toronto Hydro-Electric System Limited, which distributes electricity, and Toronto Hydro Energy Services Inc., which provides street lighting and expressway lighting services in the city of Toronto (collectively, "Toronto Hydro" or "the Company").

The City requires the Company to uphold certain objectives and principles set out in the City's Amended and Restated Shareholder Direction (the "Shareholder Direction") relating to Toronto Hydro Corporation. This report describes how the Company conducts its affairs in accordance with environmentally related objectives set out in the Shareholder Direction by operating in an environmentally responsible manner while supporting the City's energy, climate change and urban forestry policies, and using emerging green technologies when appropriate.

Toronto Hydro has maintained a strong record of environmental performance over many years. Toronto Hydro operates an integrated Environment, Health and Safety (EHS) Management System, facilitating efficiencies to be realized by eliminating duplicate and redundant processes. In September 2021, Toronto Hydro passed an external audit confirming it effectively maintained its EHS Management System in accordance with the International Organization for Standardization's (ISO) 2015 Standard for Environmental Management Systems (ISO 14001:2015) and the ISO's 2018 Standard for Occupational Health and Safety Management Systems (ISO 45001:2018). This marks the ninth consecutive year that Toronto Hydro has been certified to stringent, internationally recognized standards for environmental and occupational safety management systems by independent third-party auditors.

In addition to the ISO 14001:2015 certification, Toronto Hydro is one of 11 electrical utilities in Canada to have earned the prestigious <u>Sustainable Electricity CompanyTM designation</u>, awarded by Electricity Canada (formerly the Canadian Electricity Association) following a comprehensive evaluation. Also, three of Toronto Hydro's four work centres are currently certified as meeting the Building Owners and Managers Association of Canada's (BOMA Canada) requirements for building environmental standards (BOMA BEST).

Overall, Toronto Hydro continues to strive to remain a sustainable electricity company. The Company regularly monitors and assesses all aspects of its environmental performance in an effort to reduce its environmental footprint and improve efficiency. Toronto Hydro also enables customers to be part of the shift to a sustainable economy by connecting renewable power and energy storage to the grid, encouraging the use of electrified transportation and offering online billing to reduce paper consumption.

Toronto Hydro has received recognition for its leadership in Environmental, Social and Governance (ESG) and sustainability and climate change adaptation from multiple sources for several years, including being recognized ninth in 2021 on the Corporate Knights' Best 50 Corporate Citizens in Canada list and second overall among electricity transmission and distribution companies.

Climate Action

The City has established an ambitious climate action strategy ("TransformTO Net Zero Strategy" or "NZ40 Strategy") to reduce greenhouse gas (GHG) emissions within the city to net zero by 2040.¹ Toronto Hydro is a key enabler of this strategy and has similarly committed to achieving net zero by 2040.

Climate Action Plan

As a clean energy leader, Toronto Hydro is committed to bold, practical climate action to support the City's net zero vision. In 2021, Toronto Hydro submitted a Climate Action Plan (CAP) to City Council that took into consideration the work and plans of other utilities across North America.

Toronto Hydro's CAP is designed to support the City's vision of the future and to: combat climate change, spur growth in Toronto's emerging green and cleantech companies, and contribute to greater social equity within the new economy. The CAP identifies three principal opportunities plus additional options, and offers a comprehensive means of delivering nationally significant environmental performance, economic stimulation and social equity advancement. This comprehensive, large-scale, innovative model would set a new standard in climate action through a best-in-class utility response to help achieve the City's NZ40 Strategy.

There are three specific climate action opportunities that Toronto Hydro can pursue to continue to improve Toronto's environment and help the City achieve its objective of net zero:

- 1. The Expanded Electricity Distributor: The most significant opportunity for Toronto Hydro to enhance its contributions to climate action is to substantially expand its existing, regulated electricity distribution business to build a grid that is capable of supporting the realization of the City's NZ40 Strategy. Extrapolating City modelling for a net zero future, Toronto Hydro calculates potential direct investments of up to \$10 billion in climate action infrastructure through 2040.
- 2. Climate Advisory Services: A second opportunity for Toronto Hydro to enhance its contributions to climate action is to create a new, unregulated Climate Advisory Services business to accelerate both customer-led climate action and growth of local cleantech markets. Toronto Hydro would work closely with its customers; cleantech companies in Toronto's growing, local climate action sector; funders such as Natural Resources Canada (NRCan); and other stakeholders to help remove barriers and enable delivery of projects in Toronto that electrify transportation, electrify and enhance the efficiency of buildings, and build renewable generators and energy storage systems. Toronto Hydro requires a new mandate from City Council to implement this new line of unregulated climate action business.
- 3. Climate Capital Investments: The third opportunity for Toronto Hydro to enhance its contributions to climate action is to pursue modernization of outdoor lighting within its existing unregulated streetlighting company and/or create a new, unregulated business to make unregulated capital investments directly in the other areas of climate action identified by the City: transportation electrification, building electrification and energy efficiency, and renewable generation and energy storage systems.

¹ https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto/transformto-climate-action-strategy/

The modernization of outdoor lighting would involve Toronto Hydro implementing a city-wide light-emitting diode (LED) conversion project, which could be undertaken within Toronto Hydro's existing unregulated business. In addition to the financial benefits resulting from lower energy costs and longer life of lightbulbs, LED conversions across Ontario and North America have produced community benefits of lighting quality improvements and GHG reductions.

Net Zero at Toronto Hydro

In addition to enabling the City's transition to a low carbon economy, Toronto Hydro is deeply committed to reducing its environmental impact throughout its own operations. Toronto Hydro has a target of achieving net zero as a company by 2040. This builds on Toronto Hydro's previous initiatives, and will focus on reducing emissions from its building and fleet operations, as well as from the use of sulfur hexafluoride (SF₆) as an insulating gas for its electrical equipment. To help track its progress towards net zero, Toronto Hydro introduced two new performance metrics on its corporate scorecard relating to environmental performance in 2022: Building Emissions Reduction and Fleet Electrification.

GHG Inventory

Toronto Hydro's GHG inventory includes Scope 1 and 2 emissions (explained in more detail below), quantified in accordance with national and provincial GHG reporting guidelines² and the GHG Protocol Corporate Accounting and Reporting Standard³. The organizational boundary of this GHG inventory includes all Toronto Hydro-owned and controlled (i.e. leased) facilities.

Scope 1 emissions consist of direct emissions from stationary combustion (natural gas combustion for facilities and propane combustion used for heating an aggregate storage shed), mobile combustion (fuel combustion for fleet) and fugitive sources (releases of SF_6 and refrigerant gases). Scope 2 emissions include indirect emissions from the use of purchased electricity (facilities and line losses). Scope 3 emissions consist of all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. Scope 3 emissions are not included in the Toronto Hydro GHG inventory.

The emission factors used to calculate GHG emissions are published by Environment and Climate Change Canada⁴ and are representative of Ontario's energy supply mix. GHG emissions are measured in tonnes of carbon dioxide equivalent emissions (tCO₂e).

Organizational Boundaries

Toronto Hydro's organizational boundaries include all Toronto Hydro-owned equipment and vehicles, as well as occupied buildings. There were no significant changes in 2021 to Toronto Hydro's organizational boundaries.

² Environment and Climate Change Canada, *Technical Guidance on Reporting Greenhouse Gas Emissions*, available at http://www.ec.gc.ca; Ontario Ministry of the Environment, Conservation and Parks, *Guideline for Quantification*, *Reporting and Verification of Greenhouse Gas Emissions*, available at https://www.ontario.ca/page/ministry-environment-conservation-parks.

³ The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (World Resources Institute and World Business Council for Sustainable Development), available at https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

⁴ Emission factors published in Environment Canada's *National Inventory Report 1990-2019: Greenhouse Gas Sources and Sinks in Canada*.

Data Sources and Assurance

Facilities Energy Data: Energy consumption data (electricity and natural gas) is gathered from utility providers for all Toronto Hydro-owned and controlled work centres. Building-specific energy consumption data is populated in a database (the "Sustainability Performance Indicators" database). Facility energy billing data is comprised of digital files for electricity and bills from utility companies for natural gas.

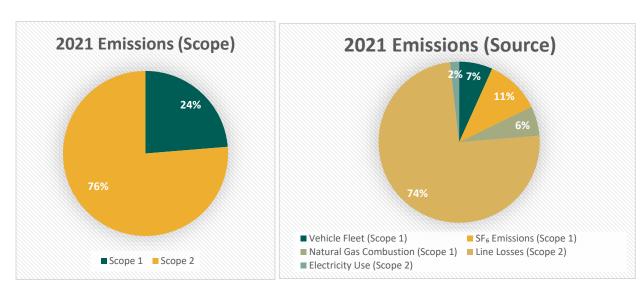
GHG emissions from stationary air conditioning and refrigeration equipment (refrigerant leaks) and emissions from propane combustion were deemed immaterial (<0.05% of emissions) and are not included.

Fleet Fuel Data: A similar process to the facilities' energy data collection and assurance is used for the fuel consumption data of the motor vehicle fleet. The Sustainability Performance Indicators database is populated from various datasets acquired from fuel suppliers and through billing statements.

SF₆ **Emissions Accounting Process:** Toronto Hydro gathers SF_6 emissions data by tracking the amount of SF_6 used to refill equipment and the amount of SF_6 released from decommissioned and repaired equipment. Toronto Hydro's SF_6 emissions are calculated in accordance with the SF_6 Emission Estimation and Reporting Protocol for Electric Utilities, published by Environment and Climate Change Canada.

Results and Analysis

The following diagrams show the make-up of Toronto Hydro's carbon footprint. In summary, 74% of emissions are from line losses, 11% are from SF_6 emissions, 8% are from facilities (electricity and natural gas use) and 7% are from fleet emissions. **Overall, Toronto Hydro's emissions have decreased 1% compared to 2020 and 35% over the last five years (i.e. since 2017).**



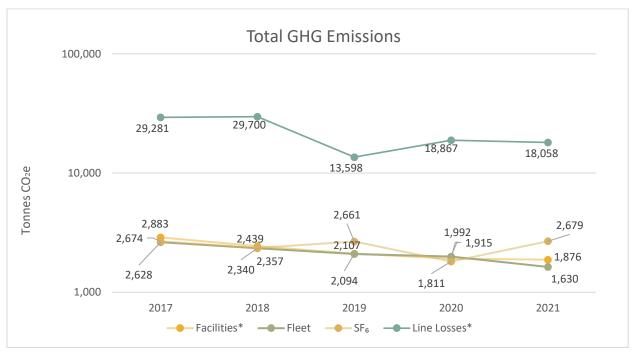
Natural gas combustion at Toronto Hydro's facilities decreased by 4% (33,721 m³) from 2020 and by 34% (392,173 m³) from 2017. Toronto Hydro's overall electricity use increased slightly, by 3% (360 MWh) in 2021 compared to 2020. However, overall electricity use decreased by 17% (2,898 MWh) over the last five years.

These improvements were partially due to increased work from home in response to COVID-19 as well as the optimization of the building automation systems at Toronto Hydro work centres. Additionally, three of Toronto Hydro's work centres have achieved BOMA BEST Certification in recognition of the resource efficiency and environmental programs implemented (discussed further in the Environmental Initiatives section).

The fleet fuel consumption and associated emissions decreased by approximately 18% relative to 2020. Fuel consumption decreased by 37% and emissions decreased by 38% relative to 2017. This decrease is attributed to continued efforts to increase the use of lower emission biofuels, to introduce fully electric vehicles, to reduce the number of vehicles and optimize their use (see details in "Fleet Related Initiatives" section below) and the implementation of the Idle Management System (Governor to Reduce Idle and Pollution or "GRIP"). Additional benefits, including reductions in idling time, fuel use and kilometres travelled, are included in the Environmental Initiatives section.

Multi-year investments to replace obsolete equipment are increasing the efficiency of the distribution system and contributing to reduced line losses. Toronto Hydro is replacing less efficient 4.16 kilovolt (kV) infrastructure with more efficient 13.8 kV and 27.6 kV infrastructure. In addition to reducing line losses, upgrading 4.16 kV infrastructure will allow Toronto Hydro to more efficiently accommodate new large customers, renewable generation connections and electric vehicle charging stations in high-growth areas of downtown Toronto. In 2021, Toronto Hydro's efforts to increase the efficiency of the system contributed to a 7% (48,649 MWh) reduction in line losses compared to 2020 and 18% (130,101 MWh) compared to 2017.

The following chart provides historical data on Toronto Hydro's GHG emissions by source (i.e. facilities, fleet and line losses). Toronto Hydro's 2021 GHG emissions were $24,242 \text{ tCO}_2\text{e}$ — a decrease of 1% relative to 2020.



^{*}Emissions associated with electricity are impacted by the annual emission factor for electricity in Ontario.

Environmental Initiatives

Electric Vehicles

Vehicles are one of the largest sources of GHGs in Toronto. In fact, the City stated that approximately one-third of the GHG emissions in Toronto are from vehicles. The City also indicated that the transition to electric vehicles (EVs) is one of the primary actions from the City's plan to achieve the 2040 goal of reducing emissions to net zero. Toronto Hydro supports the transition to EVs by increasing the availability of EV charging stations for the residents of Toronto, as well as Toronto Hydro employees. Additionally, Toronto Hydro has committed that, where available, all purchased light-duty passenger vehicles will be hybrid or fully electric.

In an effort to remove some of the barriers to EV ownership for employees, Toronto Hydro installed charging stations at three work centres. While users are required to pay for the use of these stations, the availability of charging infrastructure removes a major barrier to the adoption of EVs. Four charging stations are currently operational at the 500 Commissioners and 715 Milner locations, while ten are available for employees at the David M. Williams Centre.

Toronto Hydro also demonstrates leadership in the electrification of transportation through an ongoing project initiated to replace small cars in the Toronto Hydro fleet with fully electric vehicles. Currently, Toronto Hydro's fleet includes 13 fully electric, light-duty vehicles. In addition to the environmental benefits, the transition to EVs is expected to provide financial savings from decreased fuel consumption and reduced vehicle maintenance.

Toronto Hydro works with various customers, advocacy groups, industry associations and levels of government to enable the adoption of electrified transportation. At the municipal level, Toronto Hydro partners on the development of electrified transportation projects with agencies such as the Toronto Parking Authority (TPA) and the City's Transportation Services division. Toronto Hydro also supported the City's EV strategy through work with the City's Environment and Energy division. At the federal level, Toronto Hydro provides input to EV forums facilitated by NRCan, actively engages with Electricity Canada on federal EV advocacy, and provides input for a Measurement Canada working group related to the supply chain and efficiency of EV charging stations. The Measurement Canada working group (the Electric Vehicle Service Equipment Owner/Operator Working Group) focuses on identifying key concerns from service equipment owners and operators. It also proposes future requirements which minimize costs and regulatory burden for service equipment operators and manufacturers.

Toronto Hydro is represented on the Board of Directors of Plug'n Drive, a non-profit organization committed to accelerating the adoption of EVs. Toronto Hydro is also a member of Electric Mobility Canada and regularly participates in electricity industry stakeholder meetings to accelerate the transition to electric mobility across Canada. Participation in various EV projects and associations has allowed Toronto Hydro to establish a leadership position in the electrification of transportation. Toronto Hydro

⁵ Page 2 of https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf

also supports the electrification of transportation throughout the city by partnering on innovative charging station projects.

EV Charging Station Pilot Project

Toronto Hydro and the City have collaborated to install EV charging stations on select streets across the city. Toronto Hydro also worked with a Canadian charging station manufacturer and operator to install the stations. These stations are part of a pilot project, which aims to:

- Understand charging usage in Toronto
- Help permit holders gain access to on-street charging
- Support the reduction of GHG emissions and other emissions harmful to air quality

A total of 17 charging stations have been installed across nine locations throughout the city. The charging stations are located in areas that have enough capacity for dedicated EV parking spots. These locations were also chosen because the pole placement allowed for safe installation of the charging stations with minimal disruptions to pedestrians and the community. A variety of information including usage data, feedback from EV owners who use the stations and feedback from the community will be used to evaluate the pilot project.

Toronto Hydro is working with the City's Transportation Services division, the TPA and relevant stakeholders to install an additional 17 or more on-street charging stations in 2022, as requested by Toronto City Council.

EV Charging Partnership with the Toronto Parking Authority

Toronto Hydro is working with the TPA on a project, partially funded by NRCan, to upgrade existing charging stations and install new charging stations. In total, nine existing standalone charging stations will be upgraded to charging stations that have network connection capability. The connected stations will allow fee settlement and provide data on station use, which is critical for determining which areas require additional charging infrastructure. Furthermore, 23 new charging stations (20 level 2 stations and three level 3 direct current fast-charging stations) will be installed at TPA locations. Toronto Hydro will be purchasing and installing the equipment, and will offer the equipment for sale to the TPA after three years.

Elocity EV Charging Pilot Project

Toronto Hydro has partnered with a start-up company associated with the Ryerson Centre for Urban Energy. The start-up company (Elocity) has developed a device that transforms a typical 240-volt EV charging station into a smart charge station. The device connects to a customer's wi-fi account and allows the customer to monitor and control their charging through an app. Toronto Hydro is offering a demand response program that customers can opt into through the app in exchange for an incentive payment. The program allows Toronto Hydro to schedule charging to reduce the aggregate load on the grid, potentially allowing costly infrastructure upgrades to be deferred. There is a guaranteed duration of charging to provide the customer with an assurance that their EV will be sufficiently charged. The initial phase of the project is to confirm that the technology has the desired effect. Participant recruitment is beginning in early 2022, with equipment installation starting in mid-2022. The project will run for a minimum of two years with the possibility of a two-year extension.

Electric Buses

Toronto Hydro is supporting the Toronto Transit Commission's (TTC) move to electric buses. To meet the City's TransformTO climate change targets, the TTC plans to eliminate emissions from its entire fleet by 2040.⁶ Transportation is currently the largest source of GHG emissions in Ontario. With Ontario's relatively clean electricity generation mix, electric transportation provides an environmentally sound alternative to fossil fuel-based transportation.

Toronto Hydro assisted the TTC with the technical requirements for adopting electric buses and with selection of the first locations for the electric bus program. The first TTC garages to be used for charging (Arrow Garage, Eglinton Garage and Mount Dennis Garage) were selected based on their geographical location as well as available electrical capacity. All charging equipment was installed and in use by the end of 2019, allowing 60 buses to enter service by the end of 2020. This makes up the largest fleet of electric buses in North America.⁷

Toronto Hydro is also assisting the TTC in implementing three energy management and energy storage projects at TTC facilities. The construction of the 4-megawatt-hour (MWh) energy storage systems was substantially completed in 2021. This energy storage allows the TTC to balance its electrical load throughout the day and increase overall reliability at the garages. Toronto Hydro will continue to accommodate the future growth of electric buses by enhancing the electrical infrastructure required for new bus-charging equipment.

Fleet-Related Initiatives

Toronto Hydro operates a fleet of vehicles, which are a source of environmental impacts. Vehicle operation inevitably leads to waste, such as waste vehicle fluids and waste vehicle components as a result of vehicle maintenance (e.g. batteries, engine parts, etc.) and the emission of GHGs. In order to reduce this waste, Toronto Hydro decreased its fleet size by approximately 7% in 2021. Toronto Hydro also undertook a number of initiatives to help reduce engine operation, thereby decreasing the associated waste, vehicle maintenance and emissions while increasing the lifecycle of vehicles. These initiatives provide value to the residents of Toronto by reducing pollution, engine noise and odours, and aim to increase value to the shareholder and ratepayers by extending the useful life of vehicles and reducing repair and maintenance costs.

Anti-Idling Technologies

In 2021, Toronto Hydro continued its use of GRIP technology on Toronto Hydro vehicles. The GRIP system functions by shutting the engine off after one minute of idling, in accordance with the City of Toronto bylaw, and switching to the auxiliary battery power source requiring long-lasting batteries in order to fully optimize the GRIP system's use.

In total, 17% of Toronto Hydro's on-road vehicle fleet (29 cube vans, 24 bucket trucks and 13 pickup trucks) have been equipped with GRIP since use of the technology began in 2014. This led to an approximately 31% decrease in idling time for cube vans compared to other cube vans without GRIP technology. The GRIP module was added into the specification of nine new pickup trucks that went into service in 2021, enabling further evaluation of GRIP technology on pickup trucks. Five additional fully electric vehicles went into service in 2021. Furthermore, procurement took place for 55 hybrid vehicles (pickups, sport utility vehicles and minivans) to replace internal combustion engine vehicles in 2022-2023, thereby reducing

⁶ Page 60 of https://www.toronto.ca/wp-content/uploads/2019/06/90de-TransformTO-Implementation-Update.pdf

⁷ https://www.ttc.ca/News/2020/September/08 09 20NR ebus fleet announcement.jsp

GHG emissions. Procurement has also started for two fully electric pilot vehicles (one pickup truck and one full-size van) to test the technology in operational settings.

Toronto Hydro continues to pursue alternate emerging technology to reduce idling time and emissions generated from fleet vehicles, including an electric power take-off system (ePTO). In a standard vehicle, the power take-off uses the fossil fuel-powered engine to generate power for accessories such as aerial devices. The ePTO system will use 14-kilowatt-hour (kWh) lithium ion batteries to provide electric power and eliminate the emissions from the fossil fuel-powered engine. ePTO systems have been purchased and will be tested on two Toronto Hydro bucket trucks starting in 2022.

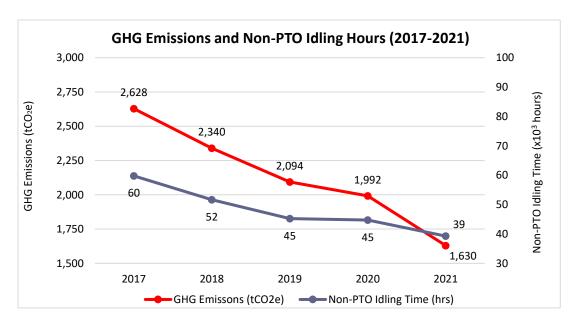
Bio-Diesel

Toronto Hydro uses combined bio-diesel and standard diesel to reduce emissions from its fleet. Bio-diesel generates approximately 8% less GHG emissions upon combustion than standard diesel. In total, the use of bio-diesel eliminated approximately 27 tCO₂e in 2021.

Cumulative Benefits

In 2021, Toronto Hydro leveraged its shared vehicle fleet to limit the occupancy of each vehicle to one employee to mitigate the transmission of COVID-19. The shared vehicles were used more frequently to comply with this limit. Despite the increased usage, Toronto Hydro's fleet-related initiatives helped achieve an 18% reduction in fuel use (138,480 litres) and a GHG reduction of 362 tCO₂e in 2021 relative to 2020.

The savings associated with the aforementioned fleet-related initiatives, compared to 2017, are: 37% reduction in total fuel consumed (approximately 375,000 litres); 38% reduction in GHG emissions (999 tCO₂e); 36% reduction in kilometres travelled (approximately 1,123,000 km); and 34% reduction in total non-PTO⁸ idling hours (approximately 20,500 hours). The following graph illustrates the correlation between the decrease in idling time and GHG emissions from vehicles.



⁸ Some of Toronto Hydro's vehicles (e.g. bucket trucks) require engines to be kept on (idling) in order to charge and operate the vehicle hydraulics. This is referred to as PTO idling time.

Smart Commute

Metrolinx and the City work together with businesses to promote the Smart Commute program to make commuting easier, healthier and more enjoyable. The program also strives to reduce traffic congestion, improve air quality and encourage community members to take action on climate change.

Recognizing the importance of sustainable workplace commuting, Toronto Hydro has collaborated with Smart Commute to provide programs and services to support efficient and sustainable commute options to employees at the 14 Carlton and 500 Commissioners work centres since 2015. Toronto Hydro has since expanded the program to include the David M. Williams Centre (71 Rexdale) and the 715 Milner work centre. All four Toronto Hydro work centres are now included in the program.

In 2021, Toronto Hydro completed internal communication campaigns to support Bike Month in June, along with numerous communications related to alternative transportation methods. In previous Smart Commute surveys, employees indicated that the alternative transportation method they would be most willing to try was carpooling. However, Toronto Hydro emphasized alternate methods of transportation that mitigated the transmission of COVID-19 (e.g. biking).

Reducing Hazardous and Non-Hazardous Waste

Similar to most electrical utilities in Canada, Toronto Hydro owns and operates equipment that has oil containing polychlorinated biphenyls (PCBs). The operation of this equipment is compliant with the current PCB Regulations under the *Canadian Environmental Protection Act, 1999*. In preparation for the legislation coming into effect in 2025, Toronto Hydro is proactively removing and arranging for the safe destruction of equipment and oil at risk of containing PCBs at a concentration greater than 50 parts per million (ppm) to ensure compliance with the new legislation.

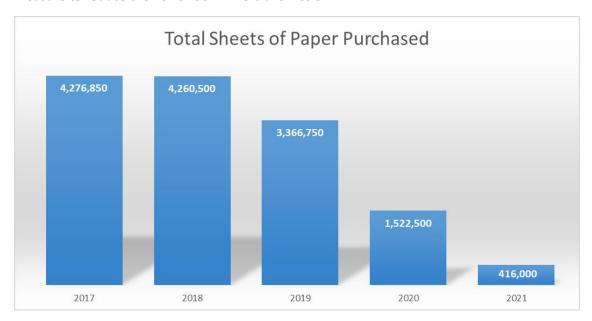
An organized approach to the removal and destruction of equipment and oil at risk of containing PCBs is enabled by proactive inspections of equipment suspected of having oil containing PCBs and testing of oil in equipment for the presence of PCBs. Approximately 15,700 kilograms of solid materials and 6,900 litres of liquids containing PCBs were shipped for destruction in 2021. The solid PCB materials shipped for safe destruction increased by approximately 9,970 kilograms and the liquid PCB materials increased by 4,600 litres compared to 2020, as Toronto Hydro continues to remove equipment containing PCBs.

A recycling rate is the percentage of total waste generated that is sent for recycling. Toronto Hydro measures the recycling rate of the waste included in *O. Reg. 103/94 Industrial, Commercial and Institutional Source Separation Programs* as well as some electric utility-specific waste, such as concrete and wood utility poles. Thanks to committed employees, effective source separation has led to an improvement in this recycling rate from 90% in 2020 to 91% in 2021. Recycling bins have been installed throughout buildings and in the yards at work centres to allow materials such as coffee cups, plastic bottles, metal cans, plastic shopping bags, paper towels and recyclable plastic material from the field to be diverted from landfill. Organic containers have also been installed throughout work centres to divert organic materials from the landfill.

Reduction of Paper Consumption

The key to reducing waste is eliminating consumption of the materials that generate waste. Toronto Hydro has implemented numerous initiatives to reduce the amount of paper used. Annual consumption was reduced by approximately 73% or 1,106,500 sheets in 2021 compared to 2020. This equates to savings of

approximately $45 \text{ tCO}_2\text{e}^9$ in associated GHG emissions and approximately \$7,900. These savings do not include other costs such as storage and transportation of paper records. The reduction of paper use in 2021 is partially attributed to an increased number of employees working from home as a preventative measure to reduce the risk of COVID-19 transmission.



The paper bills sent to customers are another source of paper waste. In 2021, Toronto Hydro developed a tree planting program with Tree Canada to encourage customers to switch to electronic bills (eBills). Toronto Hydro and Tree Canada will plant a tree in Ontario for eBills sign-ups. In addition to the environmental and financial savings of reducing paper bills, this program will facilitate the planting of up to 5,000 trees. Trees are an extremely valuable part of the ecosystem with benefits that include providing shelter for wildlife, slowing rainfall run-off, cleaning air and absorbing carbon dioxide.

Employee Tree Planting

In the past, Toronto Hydro has hosted an annual tree-planting event with the non-profit organization Local Enhancement & Appreciation of Forests (LEAF) and the City's Parks, Forestry and Recreation division. The purpose of this event is to engage employees to improve the natural environment in communities in which Toronto Hydro serves customers. Toronto Hydro did not host a tree planting event in 2021 as a preventative measure to reduce the risk of COVID-19 transmission. Instead, seeds for trees were mailed to more than 1,200 employees for planting. It is anticipated that annual tree-planting events will resume when it is safe to do so. Since 2004, more than 5,010 trees have been planted across the city through these partnerships.

BOMA BEST Certification

Toronto Hydro's David M. Williams Centre and the 715 Milner work centres have received BOMA BEST Gold Certification from BOMA Canada. The construction of these two work centres required the remediation of former industrial sites. Additionally, Toronto Hydro's facility at 500 Commissioners has received BOMA BEST silver certification. BOMA BEST certification is a nationally recognized voluntary framework for assessing the environmental performance and management of existing buildings of all

⁹ Environmental impact estimates were made using the Environmental Paper Network Paper Calculator Version 4.0. For more information visit papercalculator.org.

sizes. The independent third-party certification assesses the policies, programs and procedures in place at a building through a document review and onsite verification.

Energy Conservation and Demand Management

The Government of Ontario made changes in 2019 to conservation programs in Ontario, and directed the Independent Electricity System Operator (IESO) to deliver conservation and demand management (CDM) programs centrally. Agreements for the CDM programs in place prior to these changes remained in effect and Toronto Hydro remains responsible for its obligations under the agreements. Participants have until August 31, 2022 (December 31, 2022 if specific conditions are met) to complete the projects. Ontario businesses will continue to have access to incentives for retrofits and other energy-efficiency projects to help lower their energy costs.

In 2021, Toronto Hydro worked with residential, small business, industrial and commercial customers to implement energy-efficiency projects that had been initiated prior to the changes described above. Toronto Hydro's 2021 CDM programs led to an estimated energy savings of more than 80,200 MWh and reduced peak demand by 19 MW. These initiatives also helped to reduce GHG emissions in the city by $2,406 \text{ tCO}_2\text{e}^{10}$ since 2020.

Through Toronto Hydro's CDM initiatives, customers have reduced electricity consumption by a cumulative 2,789-gigawatt-hour (GWh) 11 and GHG emissions by a cumulative 138,848 tCO $_2$ e 12 since 2009. During the same period, Toronto Hydro's CDM programs helped customers reduce their peak demand by a cumulative 435 MW. 13



Renewable Energy

Toronto Hydro supports renewable generation across Toronto through the enabling of infrastructure and direct project investments. The initiatives described in the following section demonstrate how partnership

¹⁰ Estimated using 2018 Ontario emission factors published in Environment Canada's *National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada*.

¹¹ The energy and peak demand savings represent cumulative totals but do not account for savings persistence.

¹² Estimated using the Ontario emission factors published for each year between 2009-2018 in Environment Canada's *National Inventory Report*.

¹³ The peak demand savings do not include achievement from demand response programs.

with Toronto Hydro is helping to achieve the City's TransformTO goal of 50% of community-wide energy coming from renewable or low-carbon sources.¹⁴

Enabling Infrastructure

Toronto Hydro's connection process for renewable generation resources is governed by the Ontario Energy Board's (OEB) Distribution System Code.

Toronto Hydro provides support for connected renewable distributed energy resources to its grid, including: pre-assessments, connection impact assessments, and commissioning and engineering. Additionally, Toronto Hydro offers net metering for solar installations where the amount of energy produced by the solar panels is metered and used to offset the owner's electricity bill.

Toronto Hydro enabled 17 renewable distributed energy resources totalling approximately 2.1 MW capacity in 2021. Assuming a specific yield of 1,100 kWh/kWp¹⁵, these projects would produce 2.4 GWh and displace approximately 71 tCO₂e¹⁶ annually.

Development Projects

In addition to connecting customers' renewable energy projects, Toronto Hydro directly invests in renewable generation and energy storage projects.

Investment

Toronto Hydro jointly invested with the City in solar photovoltaic (PV) projects on City-owned facilities. These projects were separated into three groups (Groups A, B and C). Group A consists of 10 installations and has an installed capacity of 1 MW. The construction of these projects was completed between 2012 and 2013. In 2021, these projects generated 1,399 MWh and displaced approximately 42 tCO₂e. Group B consists of 10 installations with a combined capacity of 1.5 MW, constructed between 2015 and 2016. These installations generated 1,937 MWh and displaced approximately 58 tCO₂e in 2021. Toronto Hydro has majority ownership of the Group A projects, while the City has majority ownership of the Group B projects (both are split 51%/49%).

Group C consists of 52 installations with a combined installed capacity of 5.8 MW, completed in 2018. The City owns the majority of the Group C installations, with the exception of two installations at Toronto Hydro-owned facilities: the David M. Williams Centre and 715 Milner. Toronto Hydro owns 51% of these two installations, each with 500 kW capacity. The installation at the David M. Williams Centre generated 699 MWh in 2021 and displaced approximately 21 tCO_2e while the installation at 715 Milner generated 687 MWh in 2021 and displaced approximately 21 tCO_2e .

Toronto Hydro previously invested in two other renewable generation projects (Better Living Centre Solar and 500 Commissioners Solar), which together have an installed capacity of 500 kW, generated 722 MWh and displaced approximately 22 tCO₂e in 2021.

Combined Solar and Energy Storage

In 2019, Toronto Hydro worked with the City to pilot a combined solar and energy storage project at a Toronto Paramedic Services station. This was the first time that either Toronto Hydro or the City piloted a project of this nature. The project involved the installation of roof- and wall-mounted solar panels on

¹⁴ https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto/

¹⁵ kWp represents kilowatt peak, the maximum output of the system.

¹⁶ Estimated using 2018 Ontario emission factors published in Environment Canada's *National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada.*

the station, which are connected to a battery that stores the electricity generated by the panels. The solar panels have a generation capacity of over 8 kW and the batteries are capable of storing up to 27 kWh. A sufficient amount of electricity can be stored in the batteries to operate critical loads in the station during a power outage, thereby increasing the resiliency of the station. The excess electricity generated can be connected to Toronto Hydro's distribution grid and used to offset the cost of electricity at the station. The project helps improve the station's ability to respond to emergencies and provides a financial benefit to the City.

A second combined solar and energy storage project was initiated in 2019, building on the success of the project at the Paramedic Services station. The second project involved the installation of solar panels with a capacity of 120 kW and energy storage of up to 220 kWh at the Waterfront Neighbourhood Centre at 627 Queen's Quay West. The system will eliminate the need for fossil fuel-powered generators as backup power at the community centre, along with the associated GHG emissions. This project was energized in 2021. It is expected to be representative of a typical community centre in Toronto and will serve as a proof of concept for combined solar and energy storage at these types of buildings.

Bulwer Battery Energy Storage System (BESS) Project

The Bulwer BESS project is a 2 MW/2 MWh BESS that is located at Bulwer Municipal Station (MS), a retired 4.16 kV Toronto Hydro electrical substation located in downtown Toronto. This location was chosen because downtown Toronto is a highly populated area with ever-increasing demands for electricity that will lead to eventual strain on Toronto Hydro's infrastructure. The BESS allows electricity to be provided to customers when there is an outage, and is thereby expected to increase reliability of service to customers. The BESS also reduces peak loads on distribution equipment, enabling the utility to defer more costly infrastructure investments that would otherwise be required to maintain electricity services for customers. The project was completed with Renewable Energy Systems Canada and commissioned in 2020.

Eglinton Crosstown Light Rail Transit (LRT) BESS Project

This project will provide Metrolinx with clean and reliable emergency backup power to operate the new Eglinton Crosstown LRT spanning 20 kilometres between Mount Dennis and Kennedy stations. The project includes engineering, construction and commissioning of a 10 MW (30 MWh) BESS and 90 kW solar PV distributed energy resource. The project eliminates the need for fossil fuel-powered generators as backup power for the Eglinton Crosstown LRT, along with the associated GHG emissions. This solution was determined through outreach to residents of Toronto who would be impacted by the backup power system. Construction was completed in 2020 and the BESS was commissioned in 2021.

Energy Security and Supply

Toronto Hydro is working to help ensure adequate distribution capacity is available in Toronto. This work also supports the City's objective of ensuring infrastructure resiliency. Toronto Hydro collaborates with Hydro One to mitigate the potential impact of high-risk events that could result from the unplanned loss of critical transmission supply points for central Toronto, supporting key financial and hospital customers.

Investing in the Grid - Capital Expenditure Plan

Renewing the grid and replacing aging, deteriorating, obsolete and failing distribution equipment while meeting the needs of a growing city is a costly and complex endeavour. To address these challenges, Toronto Hydro develops and implements capital expenditure plans, which outline investment needs and explain how planned investments will achieve outcomes that deliver value to customers.

On December 19, 2019, the OEB issued its decision and on February 20, 2020, the OEB issued its rate order, both in relation to Toronto Hydro's 2020-2024 rate application filed on August 15, 2018. In its rate application, Toronto Hydro requested approvals to fund capital expenditures over the 2020-2024 period. The 2020-2024 capital plan continues Toronto Hydro's effort to harden the distribution system to make it more resilient when extreme weather hits. The plan saw a decrease in the distribution portion of the delivery charge of 17.4% for residential customers in March 2020 and the Toronto Hydro portion of the Delivery Charge is expected to remain below 2019 levels until at least 2024. Most rate classes for general service customers also saw a decrease in 2020.

The capital expenditure plan consists of four main investment categories: system access, system renewal, system service and general plant.

- Investments in the System Access category are driven by statutory and regulatory obligations to
 provide customers with access to Toronto Hydro's distribution system. This includes investments
 to connect renewable energy generation facilities, and metering-related investments to maintain
 compliance with regulations.
- 2. Investments in the System Renewal category target the renewal and refurbishment of distribution assets that have failed or are operating with an unacceptable level of performance risk. These programs focus on remediating assets that pose significant safety, reliability and environmental risks to customers, employees and the general public.
- **3. Investments in the System Service category** target system-wide critical issues such as capacity and operational constraints, security-of-supply, safety, system reliability and other considerations for the effective operation of the distribution grid.
- **4. Investments in the General Plant category** are essential to Toronto Hydro's 24/7 day-to-day operational activities. These investments include the renewal and upgrade of critical software and hardware systems, vehicles and associated equipment, and facilities.

Preventive Asset Maintenance and Vegetation Management

Toronto Hydro conducts proactive inspection and maintenance work to help mitigate a wide variety of risks. For example, the Company inspects underground transformers at a regular interval to gather information about their condition and to help reduce the number of equipment failures that may adversely impact the environment. Toronto Hydro increased the number of checkpoints included in the inspections in 2021 to further enhance the proactive inspection program. Information gathered through inspections has been used to develop a plan for the removal and replacement of transformers through 2024. In addition, inspections in 2021 allowed Toronto Hydro to identify and proactively replace transformers that were in poor condition.

The specific maintenance and inspection tasks that Toronto Hydro conducts on its equipment and assets, and their frequencies, were established using an engineering analysis framework called Reliability Centred Maintenance (RCM). At the heart of this framework is an emphasis on safe operations (from the perspective of both work crews and the public), environmental protection, compliance, and equipment reliability. Toronto Hydro adopted this framework in the mid-2000s and periodically reviews and updates its RCM analyses.

To mitigate tree-related interference with Toronto Hydro wires, the Vegetation Management program employs modern arboriculture techniques, which are designed to ensure proper care of trees. For example, when trees adjacent to a distribution line are pruned, adjacent distribution lines are expected to experience a reduction in the number of tree-caused power outages. Tree pruning is conducted in accordance with the City's Urban Forestry Tree Pruning Guidelines. In 2021, Toronto Hydro pruned approximately 41,000 trees that were adjacent to distribution lines in a manner that minimizes injury to the trees but helps improves system reliability. These vegetation management practices help protect the system against inclement weather by removing vulnerable sections of the tree canopy that may break during high winds or from the accumulation of ice and snow.

Climate Change and Adaptation

One of the core principles in Toronto Hydro's Environmental Policy is to mitigate the potential adverse effects of climate change on the organization. This is also a requirement of Toronto Hydro's ISO 14001:2015 certification. In 2021, Toronto Hydro continued to improve the system's resiliency to extreme weather events caused by climate change. Toronto Hydro also continued to collaborate on climate change adaptation with the City and other agencies. The purpose of the improvements and collaboration is to reduce the impacts of climate change on the residents of Toronto.

Integration in System Planning

In 2015, Toronto Hydro completed a vulnerability assessment study following the Public Infrastructure Engineering Vulnerability Committee protocol developed by Engineers Canada. The study conducted a risk assessment for the various components and areas of the distribution system that would be affected by climate change, and the results were used to develop a roadmap on climate adaptation initiatives.

The majority of the roadmap was completed by the end of 2017 and, since then, Toronto Hydro has continued to integrate considerations regarding the impact of climate change and the risks it presents into its operations. As an example, Toronto Hydro implemented procedures requiring consideration of climate risk when planning new projects.

The consideration of temperature and climate projections is an example of climate risk inclusion in the planning process. Toronto Hydro continually reviews sources of climate data to verify that projections used for planning purposes remain valid and widely accepted, particularly as government policy and economic factors continue to influence the direction of future climate action. For example, with this data, Toronto Hydro can mitigate climate risks to the grid by reviewing and updating equipment specifications, such as the use of tree-proof wire to reduce tree contact risks and associated outages.

Another climate change consideration included in the planning process is proximity of the project to urban flooding areas. Experts predict that flooding will continue to be an issue in the city of Toronto as extreme weather events become more intense and frequent.¹⁷ To mitigate this risk, Toronto Hydro plans to install more resilient equipment and infrastructure if a project is planned in an urban flooding area.

Participation in Industry Discussions

Toronto Hydro continues to be a leader in industry discussions about the awareness of climate change impacts in the electricity generation, transmission and distribution sectors. Specifically, Toronto Hydro contributed to Electricity Canada's Climate Change Adaptation Working Group and the Energy Working Group of Canada's Climate Change Adaptation Platform (organized by NRCan). The purpose of these working groups is to help increase the energy sector's resilience to the effects of climate change. Toronto Hydro has continued its leadership on these committees by sharing lessons learned from the adaptation planning measures described above with the Electricity Canada working group.

Extreme Weather

Toronto experiences a wide range of significant climate hazards. Human-caused climate change is expected to increase the number of longer-lasting heatwaves and storms, as well as more extreme cold, wind, ice and rain. The City's First Resilience Strategy calls for the City and the critical infrastructure owners operating within Toronto to adapt in the face of these chronic stresses and the acute shocks they bring. 19

In 2021, Toronto Hydro responded to five extreme weather events. The timely and effective response to these events has been attributed to the proactive work of dedicated employees, as well as to Toronto Hydro's Disaster Preparedness Management (DPM) program.

Disaster Preparedness Management Program

In addition to increasing the physical resiliency of the grid to the impacts of extreme weather events, Toronto Hydro continues to develop its DPM program to improve disaster/emergency response outcomes. The DPM program involves continued implementation of a comprehensive and industry-leading disaster readiness program that:

- Enhances Toronto Hydro's ability to plan for and operate during a large-scale emergency and/or disaster
- Ensures effective communication with customers and external stakeholders in anticipation of, during and following an incident
- Minimizes operational and financial impacts of disaster-related disruptions on Toronto Hydro's customers and operations

Grid Emergency Management Team

Toronto Hydro's Grid Emergency Management (GEM) team is the custodian of the DPM program and is responsible for:

1. Designing, developing, implementing, sustaining and enhancing the DPM program in the face of a changing risk environment in the city of Toronto, which includes:

¹⁷ Page 50 of https://www.toronto.ca/ext/digital comm/pdfs/resilience-office/toronto-resilience-strategy.pdf

¹⁸ Page 91 of https://www.toronto.ca/ext/digital_comm/pdfs/resilience-office/toronto-resilience-strategy.pdf

¹⁹ https://www.toronto.ca/wp-content/uploads/2019/05/97c7-Toronto-Resilience-Strategy-One-Page-Brief.pdf

- Employee emergency response readiness;
- Facility/system emergency response readiness; and
- Stakeholder relationship management.
- 2. Coordinating program activities, and aligning emergency management and business continuity activities both internally and with external stakeholders (e.g. the City's Office of Emergency Management, Hydro One, the IESO, etc.).
- 3. Promoting a culture of resilience at Toronto Hydro.

Employee Emergency Response Readiness

Training and emergency exercises are critical for ensuring Toronto Hydro is ready to respond to an emergency. The GEM team has made it a priority to integrate Ontario's *Incident Management System* emergency response methodology into the Company's Emergency Response Organization (ERO) framework. The majority of Toronto Hydro's senior management and professional employees have received formal training on their functions within the ERO and on how Toronto Hydro would transition into incident response using the ERO under emergency conditions.

The training program is administered through a Learning Management System (LMS) and Enterprise Resource Planning (ERP) System. All employees at Toronto Hydro are assigned emergency roles which correspond to pre-assigned e-training curricula in the LMS. The LMS-based training is complemented by exercises for select emergency roles (based on the complexity of the role). Training data is captured and updated on a monthly basis through the GEM Emergency Role Readiness Key Performance Indicator to ensure that minimum training thresholds are continually met.

The ERO framework was reviewed and adjusted to reflect the re-alignment of resources and incidents occurring in 2021. These adjustments were made to ensure an effective and flexible approach to best leverage the organization's resource skillsets and ensure an effective span of control for any incident.

Additionally, the ERO framework has been tested through real-life scenarios, which has allowed Toronto Hydro to improve response and recovery efforts. In 2021, the GEM team continued to test Toronto Hydro's response capabilities through real-time response to the COVID-19 pandemic. Leading into this event, just-in-time training was provided to key personnel on ERO roles and responsibilities, preparing them for company-wide mobilization to pandemic response. This response has been ongoing since March 2020.

At the outset of the pandemic, Toronto Hydro mobilized immediately to protect its workforce and the public while continuing to provide safe and reliable delivery of power throughout the city of Toronto. In recognition of its response to COVID-19, Toronto Hydro received the Most Effective Recovery Award from the Business Continuity Institute (BCI) Americas. The BCI, a global organization of business continuity and resilience professionals representing more than 100 countries worldwide, gives this award to an organization that was significantly impacted by an incident or crisis but managed to recover and demonstrate resilience.

In 2021, Toronto Hydro actively participated and developed material for GridEx VI (an exercise, involving many Ontario energy and utility participants, that tests the emergency response and preparedness of a

bulk power system failure). This exercise tested the response to cyber incidents affecting the control systems of the electrical power system and required the coordination of power system operators, information technology (IT) security teams and external utility partners. The Ontario Electricity Emergency Plan is also tested through the exercise, and participation positions Toronto Hydro's ERO framework into the IESO's Ontario utility framework (the Crisis Management Support Team).

In 2021, the rollout of Toronto Hydro's Business Continuity Management (BCM) program was initiated. The program framework and multi-year rollout plan was developed and approved. Software was procured and implemented to streamline the BCM process by facilitating the effective identification and mitigation of risks relating to departmental business continuity functions. This project was aligned with the IT Disaster Recovery program, creating a single unified system.

Facility/System Emergency Response Readiness

In 2021, Toronto Hydro continued to build on improvements to emergency response systems. This included introducing/optimizing several response information management systems that are used to facilitate effective extreme weather event response. These systems are operational and training will be introduced in 2022.

- Outage Management Application: A damage assessment application that enables damage assessment teams to more easily submit damage notices to dispatch personnel during storm response for resolution
- Weather Prediction Tool: High-precision weather forecasting and predictive damage modeling tool that enables Toronto Hydro to make more accurate response-resourcing estimates

Stakeholder Relationship Management

Toronto Hydro maintains close working relationships with City of Toronto and industry partners to ensure cooperative structures are in place to carry out safe and effective response. These include relationships with first responders and City of Toronto agencies, as well as with regional utility partners.

City Emergency Management

Toronto Hydro is a member of the City's Emergency Management Program Committee and Emergency Management Working Group. As a member of these groups, Toronto Hydro actively participates in planning/preparing for community-wide response to emergencies impacting the city of Toronto. The groups encompass all agencies, boards, commissions and key partners who play a role in major emergency response within the city. Some of these include:

- The City's Office of Emergency Management
- Toronto Water
- Toronto Fire Services
- Toronto Police Services
- Toronto Emergency Medical Services
- TTC
- Toronto and Region Conservation Authority

Utility Partner Relationship Management

Restoring power after a major storm is a complex task, and a speedy restoration requires significant logistical expertise, along with skilled line workers and specialized equipment. Electric companies affected by significant outages often turn to the industry's mutual assistance network — a voluntary partnership of electric companies from across the country — to help speed up restoration.

Mutual assistance is an essential part of the electric power industry's service restoration process and contingency planning. The mutual assistance network is a cornerstone of electric utility operations during emergencies.²⁰ Toronto Hydro is a member of three major mutual assistance groups:

- 1. Ontario Mutual Assistance Group (OnMAG): Toronto Hydro and Hydro One have partnered with Electricity Canada to establish an Ontario-specific mutual assistance group for Ontario's Local Distribution Companies. The aim of this group is to bolster capabilities within the province to respond to province-specific emergencies. The OnMAG is no longer in its pilot phase and is now operationalized as the official Mutual Assistance group for Ontario.
- 2. North Atlantic Mutual Assistance Group (NAMAG): The NAMAG is a group of over 30 utilities from across northeastern North America. These utilities work together during major disruptive events to exchange resources and/or internationally during large-scale emergencies.
- **3.** Canadian Mutual Assistance Group (CanMAG): The CanMAG consists of Canadian electricity industry companies and is coordinated through Electricity Canada. The purpose is for these companies to work together during emergencies including, but not limited to, those caused by storms and natural disasters.

²⁰ https://www.eei.org/issuesandpolicy/electricreliability/mutualassistance/Pages/default.aspx

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