



# 2018 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 (THESL), which owns and operates an electricity distribution system and engages in Conservation and Demand Management (CDM) activities; and Toronto Hydro Energy Services Inc. (THESI), which provides street lighting and expressway lighting services in the City of Toronto. (THC, THESL and THESI on a consolidated basis are referred to as “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 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, urban forestry, and utilization of emerging green technologies as appropriate.

Toronto Hydro operates an integrated Environment, Health and Safety (EHS) Management System allowing efficiencies to be realized by eliminating duplication and redundant processes. In November 2018, Toronto Hydro underwent and passed an external audit to re-certify its Health and Safety Management System to the Occupational Health and Safety Assessment Series Standard for Occupational Health and Safety Management Systems (OHSAS 18001:2007). The audit also confirmed that Toronto Hydro has effectively maintained its Environmental Management System certification in accordance with the International Organization for Standardization’s 2015 Environmental Management Systems Standard (ISO 14001:2015). This marks the sixth consecutive year that Toronto Hydro has been certified to stringent internationally recognized standards for environmental and occupational safety management systems.

In addition to the ISO 14001:2015 certification, Toronto Hydro is only one of five electrical utilities in Canada to have earned the prestigious [Sustainable Electricity Company designation](#) by the Canadian Electricity Association (CEA) following a comprehensive evaluation by the CEA. Also, all three of Toronto Hydro work centres have been 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 achieve zero injuries and 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; offering online billing to reduce paper consumption; and offering a variety of commercial and home energy-efficiency programs.

As a testimony of its long-standing commitment to sustainability, Toronto Hydro was awarded second place by Corporate Knights Magazine on its Best 50 Corporate Citizens ranking. The Best 50 Corporate Citizens ranking is a prestigious, annual ranking that is recognized internationally, designed to showcase Canada’s sustainability leaders.

Additionally, Toronto Hydro received the 2018 award for Leadership in External Collaboration and Partnerships by the CEA. This award was in recognition of Toronto Hydro’s commitment to collaboration with local communities during the planning of a backup power source for the Eglinton Crosstown Light

Rail Transit (LRT) Project. Originally, the backup power source was a gas fired Combined Heat and Power (CHP) plant. Discussions with the local community revealed concern about the environmental impact of the emissions from a gas-powered plant. The project was re-evaluated with input from the community, and an environmentally friendly battery storage facility was selected as the backup power source instead of a CHP plant.

## Energy Use and Greenhouse Gases

Toronto Hydro operates in an environmentally responsible manner consistent with the City's Climate Change, Clean Air and Sustainable Energy Action Plan<sup>1</sup>. The City has established targets to reduce greenhouse gas (GHG) emissions from 1990 levels by 30% by 2020 and 80% by 2050. Toronto Hydro is supporting these goals by reducing its own GHG emissions associated with its fleet, facilities, line losses, releases of sulphur hexafluoride (SF<sub>6</sub>) gases, and facilitating the transformation to a carbon-free city through the electrification of activities and equipment currently powered by fossil fuels.

GHG emission reductions through Toronto Hydro's CDM activities are covered in the CDM section of this report. GHG emission reductions associated with Toronto Hydro's solar photovoltaic (PV) project investments are covered in the Development Projects section of this report.

### 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 guidelines<sup>2</sup> and the GHG Protocol – Corporate Accounting and Reporting Standard<sup>3</sup>. 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 tools and heating the aggregate shed), mobile combustion (fuel combustion for fleet) and fugitive sources (releases of SF<sub>6</sub> 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 the GHG emissions are the provincial values<sup>4</sup> representative of Ontario's energy supply mix and measured in tonnes of carbon dioxide equivalent emissions (tCO<sub>2e</sub>) per gigawatt-hour.

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<sup>1</sup> <https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto/>

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

<sup>3</sup> 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>.

<sup>4</sup> Emission factors published in Environment Canada's National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada.

### 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 2018 to Toronto Hydro’s organizational boundaries.

### Data Sources and Assurance

**Facilities Energy Data** – The energy consumption data (electricity and natural gas) is gathered from utility providers for all Toronto Hydro-owned and controlled work centres. This 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, paper bills from utility companies for natural gas, and consolidated billing files from third-parties for leased buildings.

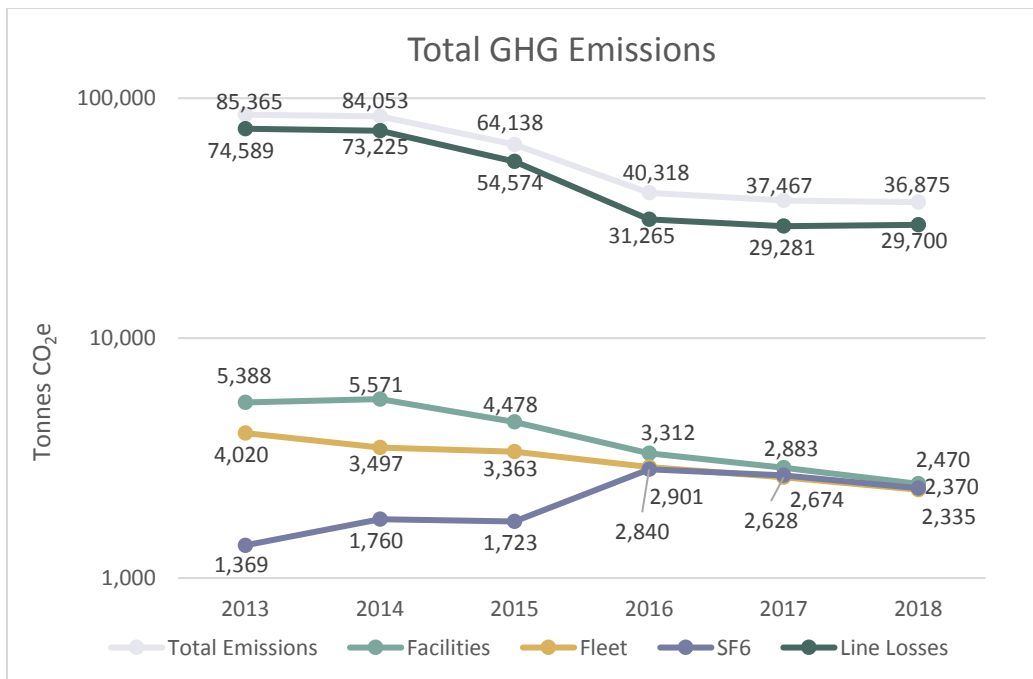
GHG emissions from stationary air conditioning and refrigeration equipment (refrigerant leaks), and emissions from propane combustion are not included as they were deemed not material (<0.05% of emissions).

**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 paper billing statements.

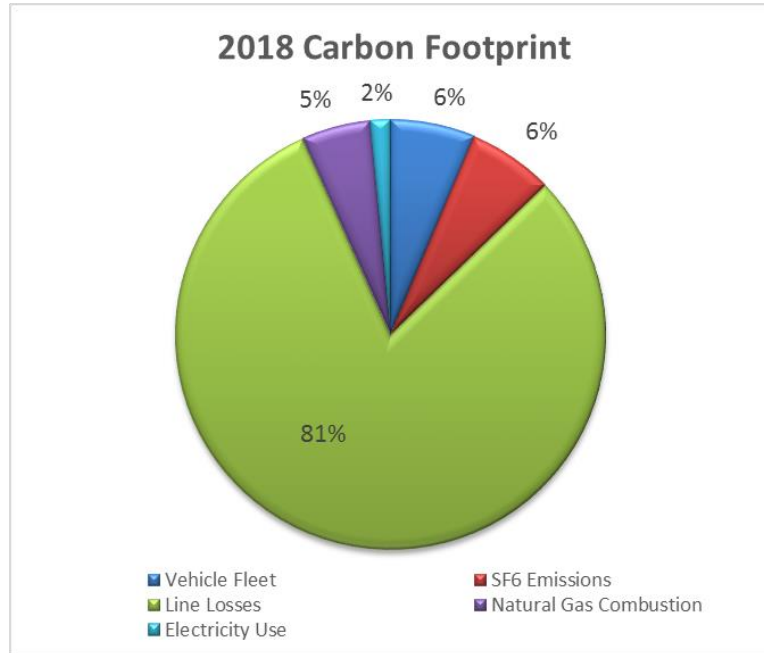
**SF<sub>6</sub> Emissions Accounting Process** – Toronto Hydro gathers SF<sub>6</sub> emissions data by tracking the amount of SF<sub>6</sub> used to refill equipment and the amount of SF<sub>6</sub> released from decommissioned and repaired equipment.

### Results and Analysis

Toronto Hydro’s 2018 GHG emissions were 36,875 tCO<sub>2</sub>e, a decrease of 2% relative to 2017. Below is the historical data on Toronto Hydro’s GHG emissions by source (i.e. facilities, fleet and line losses).



The make-up of the carbon footprint, shown in the following diagram, is as follows: 81% of the emissions attributed to line losses, 7% are from facilities (electricity and natural gas use), 6% is attributed to fleet emissions, and SF6 emissions are responsible for 6% of GHG emissions.



The fleet fuel consumption and associated emissions decreased by approximately 11% relative to 2017 and by approximately 33% relative to 2014. This is the result of continued efforts to reduce the number of vehicles and optimize their use (see details in “Fleet Related Initiatives” section below), the implementation of the Idle Management System (Governor to Reduce Idle and Pollution - GRIP), as well as the creation of satellite work sites in close proximity to capital project locations. For additional benefits, such as reduction in idling time, fuel use and kilometres travelled, please refer to the Environmental Initiatives section.

The total electricity use (in kWh) and natural gas use (in m<sup>3</sup>) in Toronto Hydro facilities decreased by 20% and 13%, respectively from 2017. These improvements were largely due to the completion of the Operating Centres Consolidation Program (OCCP). This program reduced the number of Toronto Hydro facilities from nine to five. The largest portion of the project involved moving operations from two leased facilities to buildings that are owned by Toronto Hydro. Ownership of these buildings allowed Toronto Hydro to reconstruct the buildings to be energy and water efficient in 2017. The two reconstructed buildings achieved BOMA BEST Gold Certification in 2018 as a recognition of the resource efficiency and environmental programs implemented (discussed further in the Environmental Initiatives section).

The 20% decrease in total GHGs from electricity use, are partially attributed to the lower provincial emission factor (the electricity mix in Ontario was less GHG intensive in 2018 relative to 2017).

## Environmental Initiatives

### BOMA BEST Gold Certification

In 2018, Toronto Hydro achieved BOMA BEST Gold Certification at the David M. Williams Centre (71 Rexdale Blvd.) and the 715 Milner Ave. work centre from the Building Owners and Managers Association of Canada (BOMA Canada). (In 2017 the Toronto Hydro facility at 500 Commissioners St. achieved 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 sizes. The independent third-party certification assesses the policies, programs and procedures in place at a building, as well as the physical conditions.

### Fleet-Related Initiatives

Toronto Hydro operates a fleet of vehicles, which are a potential source of environmental impacts. Vehicle operation inevitably leads to waste, such as waste vehicle fluids and waste vehicle components (e.g. batteries, engine parts, etc.) and the emission of GHGs. Toronto Hydro has undertaken a number of initiatives to help reduce engine operation, thereby decreasing the associated waste and emissions while increasing the life cycle of vehicles. These initiatives provide value to the residents of Toronto by reducing pollution, engine noise, odours and aim to increase value to the shareholder and ratepayers by extending the life cycle of vehicles and reducing repair and maintenance costs.

### Anti-Idling Technologies

In 2018, Toronto Hydro continued its use of the Governor to Reduce Idle and Pollution (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. The GRIP technology has been installed on 29 cube vans, 19 bucket trucks and five pick-up trucks since the use of the technology began in 2014. This has led to an approximately 30% decrease in idling time for cube vans compared to other cube vans without the GRIP technology.<sup>5</sup> Similar results have not been found on the pick-up trucks and bucket trucks with the GRIP system installed. As such, Toronto Hydro intends to use the GRIP technology only on new cube vans moving forward.

Toronto Hydro has identified that increasing battery life through the introduction of lithium ion batteries can lead to further idling reductions. In 2018, Toronto Hydro undertook Phase II of a pilot project to test the effectiveness of lithium ion batteries in vehicles. Phase I of the project was completed in 2017. This project has been conducted in collaboration with Centennial College and eCamion. The lithium ion batteries last longer than the current lead acid batteries. This reduces the emissions associated with idling by optimizing the performance of the GRIP system to allow vehicles to operate off the battery for a longer period of time. The lithium ion batteries also have a longer lifespan compared to the lead acid batteries, which reduces the amount of wasted batteries. Another benefit of running vehicles off a battery for longer period of time is the reduction of engine noise.

Toronto Hydro also trialed the use of electric power take-off (ePTO) that eliminates the need to run the vehicle engine in order for the power take-off (PTO) to function. Bucket trucks require the engine to be running, resulting in emissions any time a bucket is used. The ePTO would run off a lithium-ion battery

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<sup>5</sup> The GRIP technology was installed on new cube vans and no historical data was available.

and has been shown to greatly reduce the emissions from PTO use. As the ePTO technology evolves and becomes more cost-effective, Toronto Hydro will consider its use on more bucket trucks.

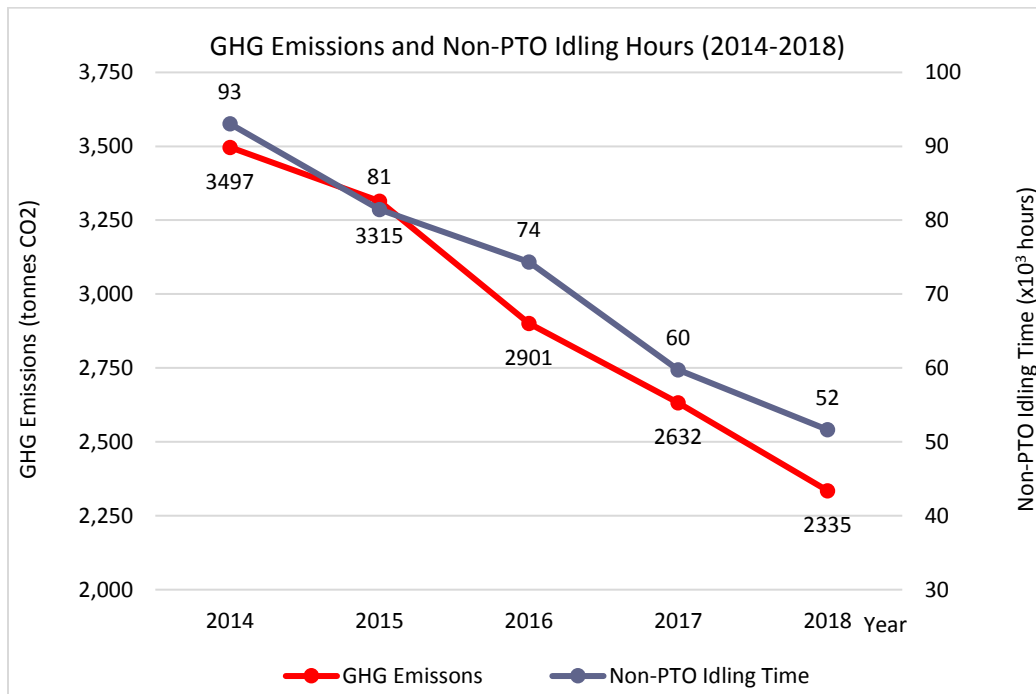
**Bio-diesel**

Toronto Hydro uses combined bio-diesel and standard diesel to reduce the 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 5.9 tCO<sub>2</sub>e in 2018.

**Cumulative Benefits**

As a result of the fleet related initiatives, Toronto Hydro saw an 11% reduction in fuel use (108,300 L) saving about \$130,000 and a reduction in GHGs of 297 tCO<sub>2</sub>e, in 2018 relative to 2017.

The cumulative savings associated with the fleet related initiatives mentioned above, since 2014, are: 34% reduction in total fuel consumed (approximately 458,000 L); 33% reduction in GHG emissions (1,162 tCO<sub>2</sub>e); 32% reduction in kilometres travelled (approximately 1,281,790 km); and 44% reduction in total non-PTO<sup>6</sup> idling hours (approximately 41,400 hours). The graph below illustrates the correlation between the decrease in idling time and GHG emissions from vehicles.



**Smart Commute**

Metrolinx and the City of Toronto 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 take action on climate change.

<sup>6</sup> 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.



Recognizing the importance of sustainable workplace commuting, Toronto Hydro has collaborated with Smart Commute since 2015 to provide programs and services to support efficient and sustainable commuter options to employees at the 14 Carlton and 500 Commissioners work centres. In 2018, Toronto Hydro expanded the program to include the David M. Williams Centre and the 715 Milner Ave. work centre. All four Toronto Hydro work centres are now included in the program.

Baseline questionnaires were completed by employees to provide insight into their commuting practices and preferences. Carpooling, public transit and cycling were identified by employees as the top three alternative modes of travel they may be interested in trying. However, overall interest in carpooling was significantly greater than interest in the other two modes of travel, with more than 50% of employees expressing willingness to try carpooling.

In 2018, Toronto Hydro initiated the following campaigns related to the sustainable commuting options employees were the most interested in:

- A campaign to assist employees with carpool matching
- A communications campaign encouraging participation in bike month in June

### Electric Vehicles

One of the largest sources of GHGs in Toronto are vehicles. In fact, the City of Toronto has stated that approximately one-third of the GHG emissions in Toronto are from vehicles. The City has also indicated that the transition to electric vehicles is one of the primary actions from the City's plan to achieve the 2050 goal of reducing emissions by 80%. Toronto Hydro is supporting the transition to electric vehicles by increasing the availability of charging stations for electric vehicles to the residents of Toronto, as well as Toronto Hydro employees.

In efforts to remove some of the barriers to electric vehicle ownership, Toronto Hydro has 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 electric vehicles. Four charging stations are currently operational at the 500 Commissioners and 715 Milner Ave. locations, while ten are available for employees at the David M. Williams Centre.

Toronto Hydro is also demonstrating leadership in the electrification of transportation through a project initiated to replace small cars in the Toronto Hydro fleet with fully electric vehicles. In 2018, eight fully electric Chevrolet Bolts were purchased and introduced into Toronto Hydro's fleet to replace hybrid cars that were at the end of their useful life. In addition to the environmental benefits, the transition to electric vehicles is expected to provide financial savings from decreased fuel consumption and reduced vehicle maintenance.

Toronto Hydro is working with various industry and government agencies to develop strategies and policies that enable the adoption of electrified transportation. At the municipal level, Toronto Hydro collaborates on the development of electrified transportation projects with agencies such as the Toronto Transit Commission, Toronto Parking Authority and the Transportation Services division of the City of Toronto. At the Federal level, Toronto Hydro provides input to electric vehicle forums facilitated by Natural Resources Canada. Participation in various electric vehicle projects and associations has allowed Toronto Hydro to establish a leadership position in the electrification of transportation.

## Tree Planting

Toronto Hydro hosts an annual Tree Planting Event with the non-profit organization, Local Enhancement & Appreciation of Forests (LEAF) and the Parks, Forestry and Recreation division of the City of Toronto. The purpose of this event is to engage employees in the improvement of the natural environment in Toronto. In 2018, over 180 Toronto Hydro employees and family members, planted 330 trees and shrubs at Earl Bales Park. Since 2004, more than 4,660 trees have been planted across the city through this partnership.

## 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 legislation coming into effect in 2025, Toronto Hydro is proactively removing and arranging for the safe destruction of equipment and oil containing PCBs to ensure compliance with the new legislation is achieved.

This removal and destruction has been accelerated in recent years and has been enabled by proactive inspections of equipment suspected of having oil containing PCBs and testing of oil in equipment for the presence of PCBs. In addition, Toronto Hydro completed a capital program to replace submersible transformers in the distribution system that were manufactured prior to 1986 (i.e. submersible transformers suspected of containing oil with PCBs). The objective of the program was to eliminate the risk of submersible transformers leaking oil containing PCBs into the natural environment. To date, all evidence indicates this program has been successful in achieving the stated objective.

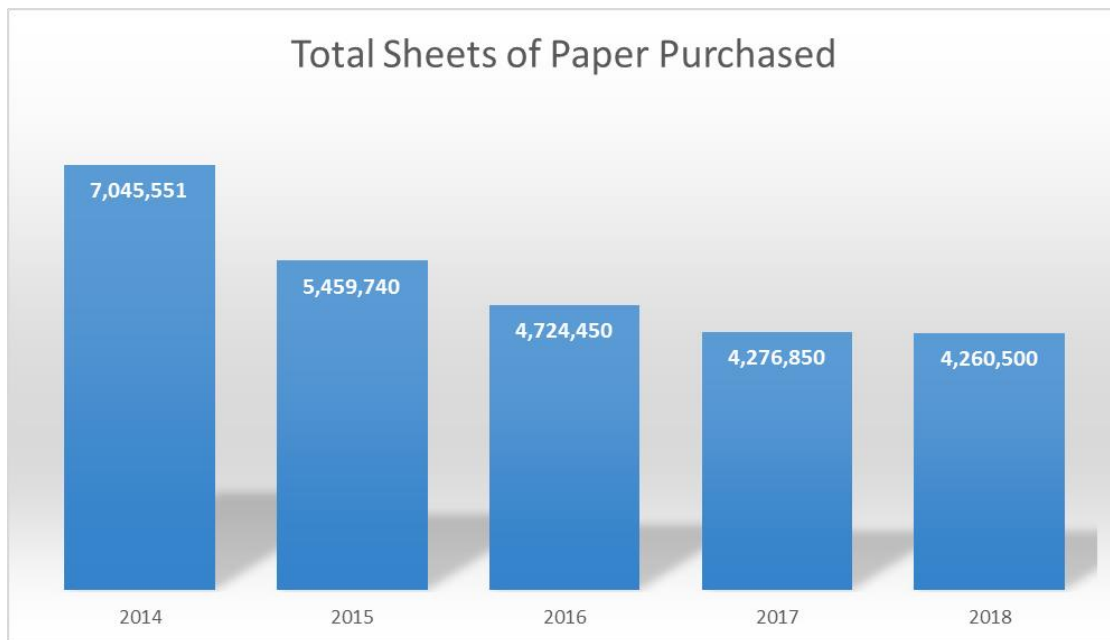
The submersible transformer replacement program has likely contributed to an increase in the amount of PCB material shipped for safe destruction in 2018. The amount of material sent for destruction increased by approximately 9,000 kilograms compared to 2017. In total, approximately 18,900 kilograms of material and 11,600 litres of liquids containing PCBs were shipped for destruction in 2018.

A recycling rate is the percentage of total waste generated that is sent for recycling. Toronto Hydro measures two recycling rates and tracks both as key performance indicators. The first is the recycling rate of the waste included in *O. Reg. 103/94: Industrial, Commercial and Institutional Source Separation Programs*. Thanks to committed employees, effective source separation has led to an improvement in this recycling rate from 49% in 2013 to 71% in 2018. 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.

For the second recycling rate (i.e. the corporate recycling rate), Toronto Hydro includes metals from transformers and cables, wood poles removed from service, fluorescent lights, batteries and electronic waste (e-waste). The corporate waste recycling rate was developed in 2017 to account for this broader pool of waste streams. The purpose of the corporate waste recycling rate is to provide a more comprehensive picture of the diversion efforts of the company. An annual target is established for the corporate recycling rate and performance is monitored on a monthly basis. Toronto Hydro exceeded the 2018 target of 90% with a year-end corporate waste recycling rate of 92%.

## 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. Toronto Hydro has reduced annual consumption of paper by approximately 40% or 2,785,000 sheets in 2018 compared to 2014. This equates to savings of approximately 113 tCO<sub>2</sub>e<sup>7</sup> of associated GHG emissions and approximately \$19,800<sup>8</sup> in 2018 when compared to 2014. These savings do not include other costs such as storage and transportation of paper records.



## Energy Conservation and Demand Management (CDM)

Toronto Hydro operates in a manner consistent with the City's Sustainable Energy Strategy<sup>9</sup>, which includes targets to reduce electricity system demand by 550 MW and increase renewable generation by 550 MW by 2020. Toronto Hydro supports the achievement of these targets through a variety of programs involving municipal and provincial governments, regulatory bodies, industry representatives and customers.

### Conservation Results

Toronto Hydro is one of the largest contributors to the Ontario Ministry of Energy's (MOE) provincial CDM mandate.

In 2018, Toronto Hydro continued to work with residential, small business, industrial and commercial customers to implement energy-efficiency projects. Toronto Hydro's 2018 CDM programs led to an

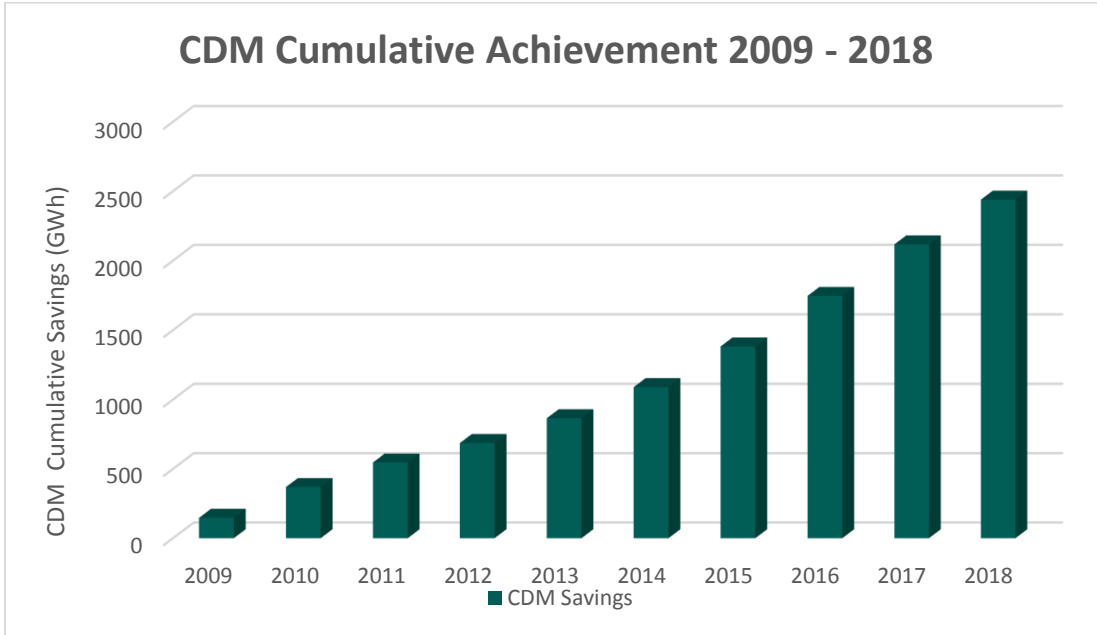
<sup>7</sup> Environmental impact estimates were made using the Environmental Paper Network Paper Calculator Version 4.0. For more information visit [papercalculator.org](http://papercalculator.org).

<sup>8</sup> Cost from Staples = \$3.56/ream of 500 sheets 8.5 x11

<sup>9</sup> The Power to Live Green: Toronto's Sustainable Energy Strategy (October, 2009).

estimated energy savings of more than 321,200 MWh<sup>10</sup> and reduced summer peak demand by 41 MW. These initiatives also helped to reduce GHG emissions in the city by 10,566 tCO<sub>2</sub>e<sup>11</sup> since 2017.

Since 2009, through its CDM initiatives, Toronto Hydro has helped its customers reduce electricity consumption by a cumulative 1,974 GWh<sup>12</sup> and reduce GHG emissions by 71,073 tCO<sub>2</sub>e.<sup>13</sup> During the same period (since 2009), Toronto Hydro’s CDM programs helped customers reduce their peak demand by a cumulative 327 MW<sup>14</sup>, representing 59% of the City’s 2020 goal.



### CDM Highlights

#### Retrofit Program

In 2018, Toronto Hydro’s most successful initiative remained the Retrofit program. This program is the longest running CDM program in Ontario and consists of a wider range of eligible initiatives than any other CDM program. The program offers incentives to business customers to encourage investment in more energy-efficient equipment, including lighting, space cooling, ventilation, controls and various other measures. As a result of this program, 179,873 MWh of electricity was conserved in 2018. The GHG emissions reduction achieved in 2018 through this program was 6,475 tCO<sub>2</sub>e<sup>15</sup>.

#### High Performance New Construction (HPNC)

HPNC is a program that offers incentives to building owners and design decision-makers (architects, engineers, consultants, etc.) to build beyond Ontario Building Code requirements. Toronto Hydro and

<sup>10</sup> 2018 CDM energy and peak demand savings have not yet been verified by the IESO.

<sup>11</sup> Estimate using 2016 Ontario emission factors published in Environment Canada’s National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada.

<sup>12</sup> The energy and peak demand savings represent cumulative totals but do not account for savings persistence.

<sup>13</sup> Supra note 11.

<sup>14</sup> The peak demand savings do not include achievement from demand response programs.

<sup>15</sup> Estimate using 2016 Ontario emission factors published in Environment Canada’s National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada.

the City of Toronto work together in the delivery of this program. The HPNC program achieved 3,137 MWh in energy savings in 2018, resulting in 113 tCO<sub>2</sub>e in GHG emissions.

### Shaping Provincial Conservation Directives

Toronto Hydro also participates in the Conservation First Implementation Committee (CFIC). This group of Local Distribution Companies (LDCs), the IESO, and other related industry representatives has been guiding the implementation of the 2015-2020 Conservation First Directive, issued by the MOE in 2014 as an extension to the 2011-2014 SaveONenergy CDM framework. Toronto Hydro also has a strong presence on all of the supporting working groups and committees aimed at satisfying the mandate to achieve the targeted savings.

The Conservation First Framework is an integral part of the province's Long-Term Energy Plan (LTEP). The LTEP includes a 7 TWh reduction in electricity consumption in Ontario by 2020, resulting from conservation programs delivered by LDCs. Toronto Hydro has been allocated the largest electricity savings target in the province at 1.58 TWh.

In response to this significant challenge, Toronto Hydro has worked to develop and launch a new CDM program in 2018 (SUITEsaver). This program is in addition to the various programs offered in previous years. The SUITEsaver program is designed to provide a building-wide lighting upgrade in suites in qualified multi-unit residential buildings. The program also includes an exchange of old power bars to new, energy-efficient bars.

## Renewable Energy

Toronto Hydro has been supporting renewable generation across Toronto through enabling infrastructure and direct project investments. The initiatives described in the following section demonstrate Toronto Hydro's support of the City's renewable energy goal of installing 550 MW of renewable generation by 2020, including 166 MW of solar PV generation.<sup>16</sup>

### Enabling Infrastructure

Toronto Hydro provides enabling infrastructure for connecting renewable generation resources consistent with the provincial *Green Energy and Economy Act, 2009* and the Ontario Energy Board's Distribution System Code.

Toronto Hydro provides support including pre-assessments, connection impact assessments and commissioning and engineering support for renewable generation resources under a streamlined process. In 2018, Toronto Hydro enabled 245 microFIT (10kW or less in capacity) interconnections. This totals more than 2.1 MW of generation. During the same period, Toronto Hydro enabled a total of 59 FIT (greater than 10kW capacity) interconnections totalling more than 9.6 MW of generation. The last year for new FIT contracts to be offered was 2017 and the installations of the projects had to be completed by the end of 2018.

Although the FIT program has ended, residents of Toronto have other options to assist with the affordability of solar installations. For example, 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

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<sup>16</sup> The Power to Live Green: Toronto's Sustainable Energy Strategy (October, 2009).

electricity bill. Additionally, the Home Energy Loan Program (HELP) offered through the City provides homeowners with a low interest loan of up to \$75,000 to make home energy improvements, including the installation of rooftop solar installations. Toronto Hydro worked with the City in 2018 to increase the uptake of HELP, including working with some community associations to organize multiple installations.

Toronto Hydro is also investigating new and more efficient methods for connecting renewable technologies to the distribution grid. In 2018, the focus was on reviewing the impact of using enhanced inverters with renewable installations. These inverters are expected to increase the ease of installation of renewable generation, as well as improve grid resiliency by providing power factor and load support as required.

Toronto Hydro has enabled approximately 2,050 renewable generation interconnections totalling approximately 109 MW between 2009 and 2018, representing 20% of the City's 2020 renewable energy generation goal, and approximately 66% of the City's 2020 goal for solar PV generation. Assuming a specific yield of 1,100 kWh/kWp<sup>17</sup>, these projects would produce 120 GWh and displace approximately 4,253 tCO<sub>2</sub>e<sup>18</sup> annually.

### Development Projects

In addition to installing enabling infrastructure for customers' renewable energy projects, Toronto Hydro is directly investing in renewable generation and energy storage projects.

### Investment

Toronto Hydro has jointly invested with the City in solar PV projects on city-owned facilities. These projects were separated into three groups (Group 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 2018, these projects generated 1,380 MWh and displaced approximately 50 tCO<sub>2</sub>e. Group B consists of 10 installations with a combined capacity of 1.5 MW constructed between 2015 and 2016. These installations generated 1,884 MWh and displaced approximately 68 tCO<sub>2</sub>e in 2018. Toronto Hydro has majority ownership of the Group A projects, while the City of Toronto has majority ownership of the Group B projects (both are split 51%/49%).

Group C consists of significantly more installations than the previous two projects. FIT contracts for 52 projects (36 FIT, 16 microFIT) were secured in 2016. The construction of all 16 microFIT and 36 FIT installations were completed by the end of 2018. Toronto Hydro worked closely with the City of Toronto to ensure these installations were completed. The City of Toronto 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 Ave. Toronto Hydro has a 51% ownership of these two installations, each with a 500 kW capacity. The installation at the David M. Williams Centre generated 655.2 MWh in 2018 and displaced approximately 24 tCO<sub>2</sub>e, while the installation at 715 Milner Ave. generated 646.2 MWh in 2018 and displaced approximately 23 tCO<sub>2</sub>e.

<sup>17</sup> kWp represents kilowatt peak, the maximum output of the system.

<sup>18</sup> Estimate using 2016 Ontario emission factors published in Environment Canada's National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada.

Toronto Hydro has previously invested in three other renewable generation projects (Exhibition Place Wind Turbine, Better Living Centre Solar and 500 Commissioners St. Solar) which, together, have an installed capacity of 1.2MW, generated 1,250.8 MWh and displaced approximately 45 tCO<sub>2</sub>e in 2018.

*Combined Solar and Energy Storage* – Toronto Hydro is working together with the City of Toronto to pilot a combined solar and energy storage project at a Toronto Paramedic Services station. This is the first time that either Toronto Hydro or the City will be piloting a project of this nature. The project will involve the installation of roof and wall mounted solar panels on the station, which will be connected to a battery to store the generated electricity. The solar panels will have a generation capacity of over 8KW and the batteries will be capable of storing up to 27 kWh. A sufficient amount of electricity will be stored in the batteries to operate the critical loads in the station during a power outage. The excess generated electricity will be connected to Toronto Hydro’s distribution grid and used to offset the cost of electricity at the station. The project will help improve the ability of the station to respond to emergencies and provide a financial benefit to the City. Construction on this project was initiated in 2018 and the system is expected to be operational in early 2019.

*Bulwer Battery Energy Storage System (BESS) Project* - The Bulwer BESS project is a 2MW/8MWh Ontario Smart Grid funded project that will be located at Bulwer Municipal Station (MS), a retired 4.16kV Toronto Hydro electrical substation located in downtown Toronto. This location was chosen as downtown Toronto is a highly populated area with ever increasing demands for electricity that lead to eventual strain on Toronto Hydro infrastructure. The BESS allows electricity to be provided to customers when there is an issue with usual electricity supply, and is thereby expected to increase reliability of service to customers. The BESS also reduces peak loads on distribution equipment, which enables the utility to defer more costly infrastructure investments which would otherwise be required to maintain electricity services for customers. The project is being completed with *Renewable Energy Systems Canada*. The project was originally expected to be completed by the end of 2018, however the expected completion has been delayed to the end of 2019.

### GHG Reductions Summary

In 2018, Toronto Hydro achieved a reduction in GHG emissions as a result of its CDM projects, renewable energy generation and operational initiatives (related to fleet and facilities) compared to 2017.

	Energy Saving	GHG Reduction <sup>19</sup>
CDM Projects 2009-2018	1,974 GWh	71,073 tCO <sub>2</sub> e
CDM Projects 2018	321 GWh	10,566 tCO <sub>2</sub> e
	Energy Generated <sup>20</sup>	GHG Reduction <sup>21</sup>
Renewable Energy Generation Projects 2018	120 GWh	4,253 tCO <sub>2</sub> e

<sup>19</sup> Estimate using 2016 Ontario emission factors published in Environment Canada’s National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada.

<sup>20</sup> Based on renewable generation projects Toronto Hydro has provided interconnections and enabled infrastructure for connecting renewable generation resources.

<sup>21</sup> Supra note 20.

	Energy Reduction	GHG Reduction <sup>22</sup>
Facilities Energy-Efficiency Projects 2018 (Electricity)	1.89 GWh	138 tCO <sub>2</sub> e
Facilities Energy-Efficiency Projects 2018 (Natural Gas)	332,252 m <sup>3</sup>	631 tCO <sub>2</sub> e
	Fuel Reduction	GHG Reduction
Fleet Fuel Efficiency Projects 2018	106,700 L	293 tCO <sub>2</sub> e
		GHG Reduction
Total 2018 GHG Reduction		15,881 tCO <sub>2</sub> e

## Energy Security and Supply

Toronto Hydro is working to ensure adequate distribution capacity is available in Toronto. This work also supports the City's objective of ensuring infrastructure resiliency. Toronto Hydro is collaborating with Hydro One to help mitigate the potential impact of high-risk events that could result from the unplanned loss of either Leaside Transformer Station (TS) or Manby TS. Leaside TS and Manby TS are critical transmission supply points for central Toronto, supporting key financial and hospital customers. Approximately 1,200 MW peak demand is provided through Leaside TS and approximately 800 MW peak demand is provided through Manby TS.

### Investing in the grid - Capital Expenditure Plan

Toronto Hydro's 2015-2019 capital program is designed to improve service reliability and address the need for additional distribution capacity. The program consists of four main investment categories: (1) System Access, (2) System Renewal, (3) System Service and (4) General Plant.

1. **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.

<sup>22</sup> Supra note 20.



## 2020-2024 Capital Expenditure Plan

Toronto Hydro's capital expenditure plan for the 2020-2024 period is currently under review by the Ontario Energy Board. The proposed plan contains the same four main investment categories as the 2015-2019 plan, and was developed through an outcome framework which aligns Toronto Hydro's goals and objectives with customer-focused outcomes in the areas of customer service, reliability, safety, public policy, environment and financial. Under this framework, Toronto Hydro has developed a plan that reflects the priorities of its customers regarding price, safety and reliability, and balances those priorities with the legal, operational and technical requirements of the utility and the distribution system.

## Preventive Asset Maintenance and Vegetation Management

Toronto Hydro conducts proactive inspection and maintenance work to help mitigate a wide variety of risks. Each year, the Company inspects underground transformers to gather information about their condition and to help mitigate equipment failures that may adversely impact the environment. Information gathered through inspections has been used to develop a plan for the removal and replacement of transformers over the next five years. In addition, inspections in 2018 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, have been established using an engineering analysis framework called Reliability Centred Maintenance (RCM). At the heart of this framework is an emphasis on safe operations (both from the perspective of 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 help 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 of Toronto's Urban Forestry Tree Pruning Guidelines. On average, Toronto Hydro has been pruning approximately 53,000 trees annually that are adjacent to distribution lines in a manner that minimizes injury to the trees but helps improve 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

In 2018, 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 of Toronto and other agencies. The purpose of the improvements and collaboration is to help reduce the impacts of climate change on the residents of Toronto.

### Climate Change Adaptation – Integration in System Planning

In 2015, Toronto Hydro completed a vulnerability assessment study following the Public Infrastructure Engineering Vulnerability Committee (PIEVC) 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 road map on climate adaptation initiatives.

The majority of the road map 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, when planning new projects, Toronto Hydro has put in place procedures to ensure that climate risk is specifically considered in developing the project.

An example of a climate change consideration in the planning process are future temperature and climate projections. Toronto Hydro continually reviews sources of climate data to verify that the projections used for planning purposes continue to be valid and widely accepted, particularly as government policy and economic factors continue to influence the direction of future climate. This review is currently completed on an ad hoc basis, however, the review will be a requirement of the system planning guidelines in the project planning process. 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. To mitigate this risk, Toronto Hydro plans to install more resilient equipment and infrastructure if a project is planned in an urban flooding area.

### Support of the City of Toronto's Resiliency Goals – Urban Flooding Resilience

The City of Toronto is currently drafting a resilience strategy to allow Toronto to adapt and thrive when presented with any challenge, including climate change. One of the components of the resilience strategy is to become a world leader in urban flooding resilience. In 2018, Toronto Hydro joined the Urban Flooding Working Group with many other companies, including the University of Toronto, the City of Toronto and the Toronto Transit Commission. One of the purposes of this working group is to identify how Toronto would be affected by future urban flooding events and develop recommendations to mitigate the impacts.

The Urban Flooding Working Group developed a number of recommendations including the development of a city-wide Urban Flooding Prioritization Tool. This mapping tool will allow for a more efficient identification of problematic urban flooding areas. As noted above, Toronto Hydro will be including consideration of urban flooding areas in the system planning guidelines. A more accurate map, which includes aspects such as the sewer infrastructure in Toronto, will allow Toronto Hydro to more effectively mitigate the impacts of flooding, thereby helping to reduce potential power outages. It is expected the recommendations will be brought to the City of Toronto Council for approval in 2019.

### 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 the Canadian Electricity Association's Climate Change Adaptation Working Group and the Energy Working Group of Canada's Climate Change Adaptation Platform (organized by Natural Resources Canada). The purpose of these working groups is to help increase the resilience of the energy sector to effects of climate change.

Additionally, Toronto Hydro is participating in a project led by the Canadian Standards Association (CSA) to develop climate change adaptation solutions within the framework of the Canadian Electrical Code Parts I, II and III. This project involves collaboration with many organizations across the industry and will continue into 2019.

### Increased Extreme Weather Events

Extreme weather events have been occurring more frequently, likely as a result of climate change. In 2018, the City of Toronto experienced a number of significant weather events which resulted in impacts to Toronto Hydro's distribution system. The following chart summarizes the extreme weather events and their impacts on Toronto Hydro.

Date of Event	Event Description	Restoration Duration	Customers Impacted (approx.)
April 4, 2018	High winds in excess of 98 km/hr resulting in many wires down throughout the city	2 days	97,300
April 14, 2018	Freezing rain and high winds in excess of 90 km/hr resulting in wires down and flooding throughout the city	4 days	85,200
May 4, 2018	High winds in excess of 119 km/hr resulting in wires and poles down throughout the city	6 days	299,100
June 13, 2018	High winds in excess of 87 km/hr resulting in many wires down throughout the city	2 days	51,400
September 21, 2018	Thunderstorm with high winds in excess of 90 km/hr resulting in wires down throughout the city	2 days	8,600

The timely and effective response to the extreme weather events in 2018 has been attributed to the hard work of dedicated employees, as well as to the significant improvements to Toronto Hydro's disaster preparedness program and processes that have been introduced to the company.

### Grid Emergency Management (GEM)

In addition to increasing the resiliency of the grid to the impacts of extreme weather events, Toronto Hydro has developed a formal GEM program to help improve the response to disasters and large-scale emergencies impacting grid operations. This program is expected to continue to provide value to customers who expect reliable service delivery from Toronto Hydro, despite the city's changing hazard landscape.

#### GEM Program

The GEM program was established in 2014 to implement the recommendations identified by an independent review panel following Toronto Hydro's response to a massive ice storm in December 2013. Since the creation of the GEM program, Toronto Hydro has been implementing numerous

initiatives to help ensure efficient response to extreme weather events and other large-scale emergencies.

In 2018, the following initiatives were incorporated into the GEM program:

- Began aligning the company's disaster preparedness program to the Canadian Standard on Emergency and Continuity Program Management (CSAZ1600), which goes above and beyond the recommendations from the independent review panel
- Implemented emergency management software, DisasterLAN (DLAN), to streamline the communication during an emergency response
- Began development of a robust Employee Preparedness Program, which will equip employees with information to fulfill emergency response functions above and beyond their day-to-day duties

**Employee, facility, and system response readiness** - Training and emergency exercises are critical for ensuring Toronto Hydro is ready to respond to an emergency. Toronto Hydro's emergency management team has made it a priority to integrate Ontario's Incident Management System (IMS) 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 how Toronto Hydro would transition into incident response using the ERO under emergency conditions. The ERO framework has been tested through real-life scenarios, which has allowed Toronto Hydro to improve response and recovery efforts.

In 2018, six table-top emergency exercises were conducted, which included approximately 50 employees representing dozens of business units. These exercises tested specific training and processes and enabled Toronto Hydro to introduce improvements to company emergency response plans. Fewer exercises were scheduled in 2018 compared to previous years because the number of actual emergencies increased. This provided Toronto Hydro the opportunity to learn from real-life situations and eliminated the need for additional table-top exercises. Evaluation of each emergency situation (both simulations and real-time events) is completed through questionnaires with all participants in the emergency response. Numerous opportunities for improvement have been identified through these evaluations, including the implementation of the DLAN system noted above.

**Working with the stakeholders** - Toronto Hydro is a member of Edison Electric Institute's mutual assistance program, the North Atlantic Mutual Assistance Group (NAMAG). Toronto Hydro is also part of the Canadian Mutual Assistance Group (CanMAG), coordinated through the CEA.

Locally, Toronto Hydro participates in the City of Toronto's Emergency Management working group and the Toronto Emergency Management Program Committee, along with organizations including:

- City of Toronto's Office of Emergency Management
- Toronto Water
- Toronto Fire Services
- Toronto Transit Commission
- Toronto Region Conservation Authority

**Mutual Aid** - Toronto Hydro understands how important it is to help support our neighbouring utilities who need post-storm restoration efforts. In 2018, Toronto Hydro travelled to New York to assist with

the restoration following winter storms Riley and Quinn. In total, crews spent nine days working to bring power back to communities in upstate New York.

Ultimately, through a long-term sustained effort, Toronto Hydro aims to improve its ability to efficiently and effectively respond to and recover from major grid disruption events, and to do so while providing customers and the community with timely and accurate information.

## Emergency Preparedness for Customers

Emergency preparedness is a top priority for customers. In 2018, Toronto Hydro provided customers with emergency preparedness advice and tips through direct outreach campaigns via newsletters, brochures and community events, and public relations campaigns. Additionally, Toronto Hydro distributed more 1,380 emergency preparedness kits in 2018 to low income residents of Toronto.