TORONTO HYDRO®

CUSTOMER CONNECTION GUIDE:

HOW TO POWER UP WITH TORONTO HYDRO

A TECHNICAL OVERVIEW

The intent of this manual is to provide an overarching view of the Ontario electricity sector structure and Toronto Hydro's connection procedures for prospective connections with Toronto Hydro distribution services.

This manual is not a technical guide to interconnect to the Toronto Hydro system or support the execution phase of a project. However, it outlines the early planning and development of a project with Toronto Hydro to help ensure that existing or prospective customers are prepared in advance of the formal connection process.

Toronto Hydro strives to operate as a utility of the future with a forward-looking mindset. To that end, we've initiated grid modernization offerings, developed a Climate Action Plan, and are implementing the City of Toronto's Green Standard. These topics are addressed towards the end of this manual to help increase awareness for developers when planning and designing their projects.

For more information on powering up with Toronto Hydro, please refer to our Conditions of Service at **torontohydro.com/conditionsofservice**.

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ONTARIO ELECTRICITY SECTOR

Ontario is the second-largest producer of electricity in Canada. In 2024, the grid-connected capacity totalled 37,205 megawatts (MW).[1] The robust electricity system includes generators, transmitters, distributors and numerous governing bodies that work together to provide safe and reliable electricity to residents of Ontario.

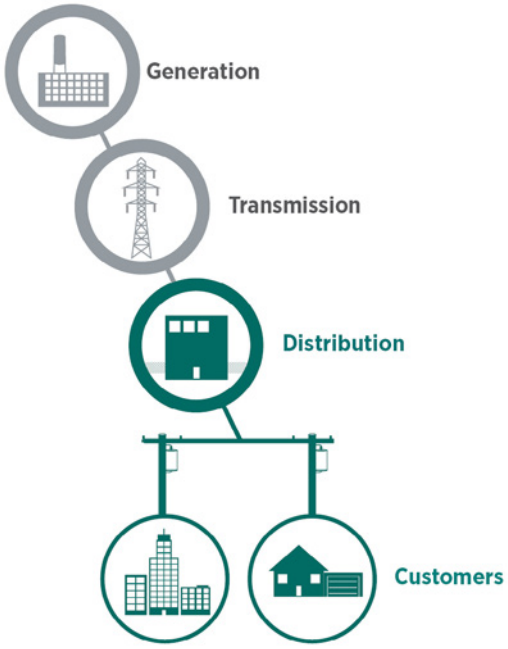
The Ontario electricity sector is on the cusp of a major period of growth. The drivers of growth are varied and include the imperative to reduce emissions to mitigate the risks of climate change, rapid developments in artificial intelligence and the need to increase domestic energy security. Every decarbonization pathway shows that electricity will be vital to cleaning the global economy, especially for buildings and transportation. The 2022 IESO Pathways to Decarbonization study found that the electricity sector needed to double in size to enable deep decarbonization of Ontario.[2] This represents a significant growth opportunity for the sector.

[1] 2024 Year in Review, available at **ieso.ca/en/corporate-IESO/media/year-end-data**
[2] Pathways to Decarbonization, available at **ieso.ca/en/Learn/The-Evolving-Grid/Pathways-to-Decarbonization**

Generation, transmission and distribution of electricity in Ontario

The process of generating power and supplying it to customers throughout Ontario involves planning and coordination between multiple entities. *Figure 1* illustrates the traditional electricity flow structure, which moves from generation to transmission to distribution.

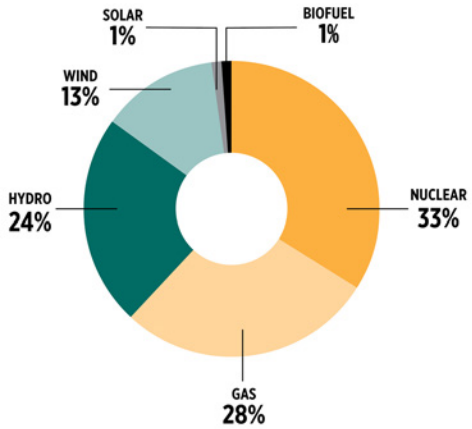
FIGURE 1: Electricity flow structure



Generation

Electricity is produced by generation companies. Ontario Power Generation (OPG), a provincially owned company, is the largest generator in Ontario, with the bulk of power generation coming from nuclear facilities. However, Ontario's electricity supply mix comes from multiple sources, as shown in *Figure 2*.

FIGURE 2: Ontario's transmission-connected capacity (May 2024)



The total provincial transmission-connected generating capacity is 37,205 MW. This number doesn't include the electricity generated from Distributed Energy Resources (DERs) or the electricity that is traded through energy market interconnections.

Transmission

The generated electricity must travel across Ontario on high-voltage transmission lines to reach local utilities. In Ontario, most of these transmission lines are owned and operated by Hydro One.

Hydro One assets interface with distribution assets across Ontario, and act as the only interface for distribution assets owned and operated by Toronto Hydro. Toronto Hydro works closely with Hydro One to supply power to the city of Toronto.

Hydro One and the Independent Electricity System Operator (IESO) conduct regional infrastructure planning as part of a scheduled process or may develop plans as a result of a substantial service demand requirement from developers or customers on the Toronto Hydro system. This regional and infrastructure planning process drives the transmission-scale investments that could occur within Toronto Hydro's service territory.

Distribution

The vast majority of Ontarians receive electrical supply through Local Distribution Companies (LDCs) such as Toronto Hydro. Also known as utilities, LDCs own and operate distribution assets to deliver electricity to customers under rules and policies set out by the Ontario Energy Board (OEB). In addition, LDCs are mandated to report annually to the OEB on a set of performance indicators to ensure safe and efficient operation of the distribution system.

Toronto Hydro is the electricity distributor in the city of Toronto. As such, Toronto Hydro owns and operates a network of distribution assets to supply power to all customers in the city. Toronto Hydro employs a modern asset management system that ensures all assets are maintained or renewed to achieve the optimum return-in-value and deliver a safe and reliable power supply to customers.

Regulators, policymakers and key stakeholders

The following governing bodies regulate and set policies for the entire electricity system in Ontario.

Ontario Energy Board

The Ontario Energy Board (OEB) regulates the provincial energy sector in the public interest. The following table outlines some of the entities that operate under the rules and requirements set out by the OEB.

TABLE 1: OEB's role across key entities

ENTITY	OEB ROLE
Generators	Issues licenses to all generation companies.
Transmitters	Licenses transmission companies, reviews and sets the transmission rate, and sets and enforces rules and customer service standards.
Independent Electricity System Operator (IESO)	Licenses IESO and sets fees that IESO can charge.
Local Distribution Companies (LDCs)	Issues distribution licenses to LDCs, sets and enforces rules and customer service standards, and reviews and sets delivery rates.
Energy Retailers	Licenses energy retailers who operate under a set of consumer protection rules. Visit the OEB website for a list of active energy retailers in Ontario: **oeb.ca/consumer-information-and-protection/energy-contracts/licensed-energy-retailers**
Customers	Promotes consumer awareness and protection. Visit the OEB website for more information on the OEB's role regarding consumer awareness and protection: **oeb.ca/consumer-information-and-protection/oebs-consumer-protection-role**

The OEB is responsible for approving the prudent capital and operational investments undertaken by utilities within Ontario. Toronto Hydro is required to submit Distribution System Plans for regularly forecast periods to provide the OEB and interested stakeholders with information around the utility's approach to asset performance, lifecycle asset management planning, capital-related expenditure planning, and planned investments related to all assets and the connection of Renewable Energy Generation (REG). There are four key investment categories as part of a Distribution System Plan:

- System access
- System renewal
- System service
- General plant

For these investment categories, utility rates become the means by which the weighted average cost of capital is paid over time.

As some developers and customers engage Toronto Hydro, their requested service connections or expansions may trigger investment requirements that would be captured in a Distribution System Plan. These service connections or expansion requests could impact developer project timelines and costs, as Toronto Hydro may have to coordinate with other investment plans and capital work identified in the Distribution System Plan. For more information on the OEB's distribution system planning requirements, visit **oeb.ca/regulatory-rules-and-documents/rules-codes-and-requirements/filing-requirements-transmission-distribution-applications**.

Distribution System Code

The Distribution System Code (DSC) is set out by the OEB and highlights the requirements that a local utility must meet to distribute electricity within its licensed service area. While the DSC mostly consists of rules and requirements pertaining to utilities, it also includes relevant information for developers looking to connect to Ontario's electricity system.

Visit the OEB website to learn more about the DSC at **oeb.ca/regulatory-rules-and-documents/rules-codes-and-requirements/distribution-system-code-dsc**.

The DSC also requires all utilities to produce a Conditions of Service document highlighting the types and levels of service available to customers within the licensed service territory. The Conditions of Service outlines the rights and obligations of the distributor and the customer, and forms a binding contract between them for the duration of the acceptance of supply of electricity from the distributor.

The Toronto Hydro Conditions of Service are referenced extensively in this developer manual. To access a copy of our Conditions of Service, visit **torontohydro.com/conditionsofservice**.

Distribution licence

The OEB supplies licences to utilities such as Toronto Hydro to distribute electricity to customers. The distribution licence defines the service area for a utility company, where it may only operate within its licensed territory. No utility company is allowed to sell electricity in Ontario without a distribution licence, which imposes various rules and requirements that must be followed.

Rate development

Regulated utilities and distribution companies generate revenue through rates — where they charge their customers for the regulated services. The OEB sets requirements for distributors to submit a rate application along with their Distribution System Plan. The rate application outlines the requested rates of service that a distributor will charge its customers. Rates are then annually adjusted by a regulated formula until the next application.

These details are outlined in the Utility Rate Application — a document published by the OEB that provides guidance and information on how to calculate rates or payments. For access, visit **oeb.ca/regulatory-rulesand-documents/rules-codes-andrequirements/handbook-utility-rate-applications**.

For information on Toronto Hydro's rate development methodology, visit **torontohydro.com/investmentplan**.

LDC capital structure

The OEB provides guidelines through its Report of the Board on Cost of Capital for Ontario's Regulated Utilities and sets values to determine the Return on Equity (ROE), deemed long- and short-term debt rate for cost of service, and financing approaches. Toronto Hydro sets its capital structure in accordance with this guideline for rate-making purposes. To learn more about Toronto Hydro's capital structure, please refer to Schedule 1, Exhibit 5 — Cost of Capital and Capital Structure from the 2025 to 2029 Cost of Capital filing, found at **torontohydro.com/rateapplication**.

Independent Electricity System Operator

The Independent Electricity System Operator (IESO) directs the flow of electricity across the bulk grid and controls the wholesale electricity market. It also sets the hourly Ontario electricity price and ensures that Ontario's power needs are met in a timely manner. The IESO is regulated by the OEB.

The Regional Planning Process is an important activity led by the IESO. This planning process ensures a reliable supply of electricity to Ontario's 21 electricity planning regions, and considers conservation, generation, transmission and distribution, and innovation as part of the process. Significantly large developments in the Toronto Hydro service area could trigger the IESO planning process and require coordination with Hydro One, and could ultimately lead to a Regional Planning Study.

For new loads that are greater than 10 megavolt-amps (MVA), a System Impact Assessment is required to be conducted by the IESO as per Section 2 of the IESO Market Manual. This may require additional time for IESO and Hydro One review and approval, and may also increase the cost of the assessment. For more information, visit **ieso.ca/en/sector-participants/connection-process/overview**.

Developers with large connection or expansion projects should contact Toronto Hydro during the initial planning phase.

IESO funding programs

In addition to the Regional Planning process, the IESO also offers funding programs to incentivize developers and promote the evolution of the Ontario electricity system. Further information about funding programs led by the IESO can be found at **ieso.ca/en/get-involved/funding-programs**.

The IESO also initiated Save on Energy, which is an energy efficiency program offered to provide incentives and resources to make energy efficiency projects more affordable. The program also raises awareness on ways to help reduce energy waste. For more information about these programs, visit **saveonenergy.ca/en/about**.

Electrical Safety Authority

The Electrical Safety Authority (ESA) is a not-for-profit organization that regulates and promotes electrical safety in Ontario. The ESA identifies and targets leading causes of electricity-related harm, promotes public safety awareness, and works with utilities and other stakeholders to improve electrical safety in Ontario. Under Part VIII of the Electricity Act, the ESA administers the following four regulations:

- Ontario Electrical Safety Code
- Licensing of Electrical Contractors and Master Electricians
- Electrical Distribution Safety
- Electrical Product Safety

The Ontario Electrical Safety Code (OESC) outlines detailed safety standards for electrical installations, products and equipment in Ontario. Along with regulations under the Canadian Electrical Code (CEC) Part I set by the Canadian Standards Association (CSA), the OESC also has Ontario-specific amendments with which all developers must comply. The ESA undertakes inspection of service equipment and related wiring installations, and reviews work at each stage of electric installation. As such, developers must request an inspection with the ESA and receive approval prior to energization of a project by Toronto Hydro. Please contact your designated Toronto Hydro representative for the service layout and visit **esasafe.com** for guidance on developer obligations.

More information on inspections required before connection and associated timelines can be found in Section 2.1.4 of our Conditions of Service.

City of Toronto

The City of Toronto is Toronto Hydro's sole shareholder. Toronto Hydro's Board of Directors is responsible for supervising the management of the business and affairs of the corporation through a City Council-approved Shareholder Direction, which provides the Board with the City's fundamental principles regarding Toronto Hydro's business. This framework sets out the accountability, responsibility and relationship between the Board and the City.

The Toronto Hydro Board consists of 11 members appointed by City Council and comprises of eight public members appointed through the City's public appointments process and three City Council members, one of whom is the Mayor or Council member-designate.

Toronto Hydro's relationship with the City and other affiliates is subject to the OEB's Affiliate Relationships Code.

Government of Ontario

The Ministry of Energy establishes energy policies in accordance with the provincial government's policies and mandate.

TORONTO HYDRO

Toronto Hydro Corporation owns two subsidiaries — Toronto Hydro Electric System Limited (THESL, but usually referred to as Toronto Hydro) and Toronto Hydro Energy Services Inc. (THESI). THESL owns and operates the electricity distribution system in the city of Toronto, while THESI provides streetlighting and expressway lighting services.

Characteristics

Toronto Hydro is one of the largest municipal electricity distribution companies in Canada. We are responsible for delivering safe and reliable electricity to our customers, operating efficiently and sustainably, and providing high-quality customer service. Toronto Hydro is an amalgamation of former hydro-electric commissions from six different municipalities that came together on January 1, 1998, to form the amalgamated city of Toronto.

Customers

Toronto Hydro distributes electricity to approximately 796,000 customers. As of 2024, there are three customer classes:

- 712,604 **Residential Service** customers, which include houses, apartments and condominiums
- 83,000 **General Service** customers, which include schools, restaurants and shopping malls
- 53 **Large Users**, which include hospitals, universities and large manufacturers requiring monthly peak demand greater than or equal to 5,000 kilowatts (kW)

Assets owned

As of December 31, 2024, Toronto Hydro owns the following approximate number of assets and infrastructure:[2]

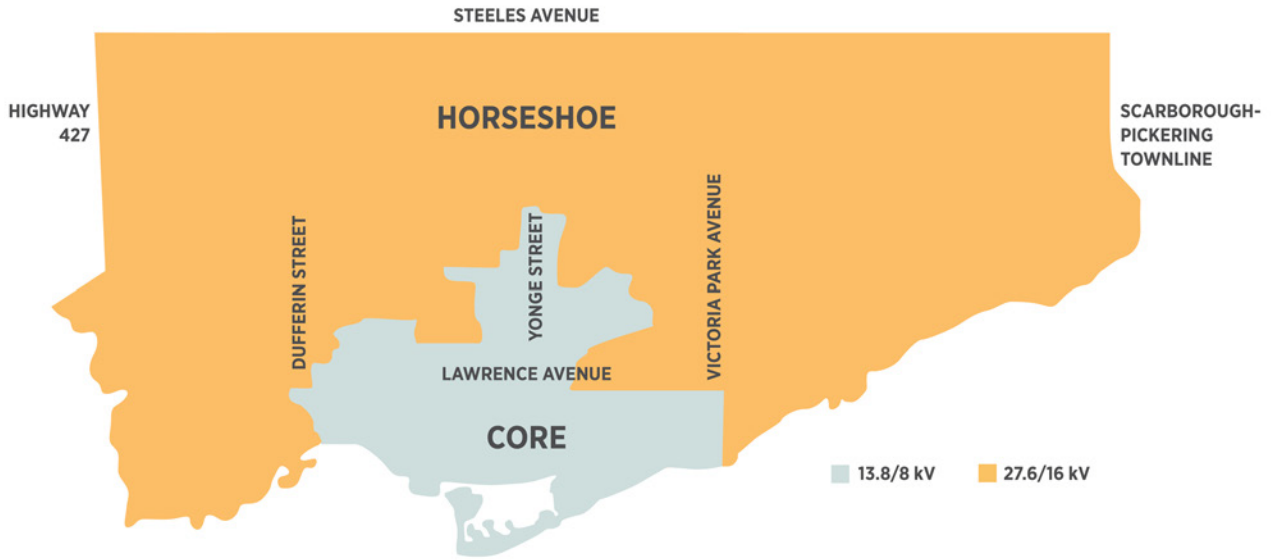
- 2 control centres
- 15,349 circuit kilometres of overhead wires
- 14,043 circuit kilometres of underground wires
- 136 in-service municipal substations
- 16,720 primary switches
- 61,630 distribution transformers

Service area

Toronto Hydro serves the city of Toronto, bounded by Steeles Avenue to the north, Lake Ontario to the south, Mississauga to the west and Scarborough/Pickering Townline to the east. As shown in *Figure 3*, Toronto Hydro's service territory includes the urban centre in downtown Toronto, referred to as the "Core" and suburban area referred to as the "Horseshoe" area.

Toronto Hydro provides the same high level of service throughout our territory; however, some system operation configuration requirements differ depending on the location or supply district within that service territory. The primary differences in supplies can be seen in *Figure 3*, with Toronto Hydro primarily operating 13.8/8 kilovolt (kV) circuits within the Core and 27.6/16 kV circuits within the Horseshoe area. These differences are explored further in Section 2.3.4 of our Conditions of Service.

FIGURE 3: Areas of the Toronto Hydro distribution system



Peak annual demand

Toronto Hydro has experienced a steady increase in customers over the years. As of 2023, Toronto Hydro's overall system average peak demand was 3,658,234 kW.[3] Certain areas with a high concentration of condominiums and other urban developments have seen an increase in demand.

Distribution voltages

Toronto Hydro typically connects new customers at 27.6 kV or 13.8 kV primary voltage levels. Toronto Hydro still maintains the legacy 4.16 kV supply and has an ongoing program to gradually convert these plants to the standard voltages of 27.6 kV in the Horseshoe and 13.8 kV in the Core.

Similarly, Toronto Hydro's nominal secondary voltages are as follows:

- 120/240 volts (V), single phase, three wire
- 120/208 V, three phase, four wire
- 347/600 V, three phase, four wire

To learn more about standard voltage offerings at Toronto Hydro based on customer class, please refer to Section 2.3.4 of our Conditions of Service at **torontohydro.com/conditionsofservice**.

Distribution configuration

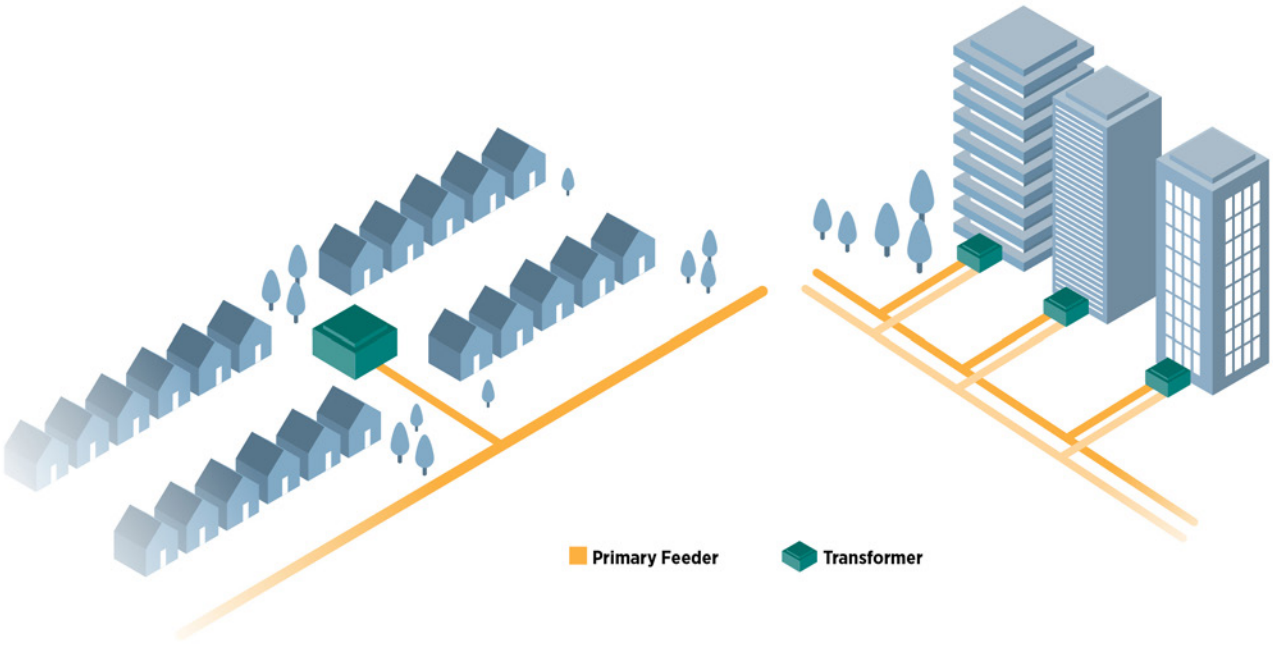
This section describes the different distribution system configurations that operate within Toronto Hydro's system.

The Horseshoe area system is primarily arranged in a looped configuration. All feeders in the 27.6 kV system are designed in an open-loop configuration with tie points that connect to other feeders. Although underground configurations may either be radial or looped, the Core area's predominant configuration is a dual radial scheme. For the 13.8 kV system in the Core area, there are three types of distribution design system:

- Radial and dual-radial systems
- Looped systems
- Secondary network

Figure 4 shows **radial and dual-radial configurations** in residential, multi-residential and high-rise developments.

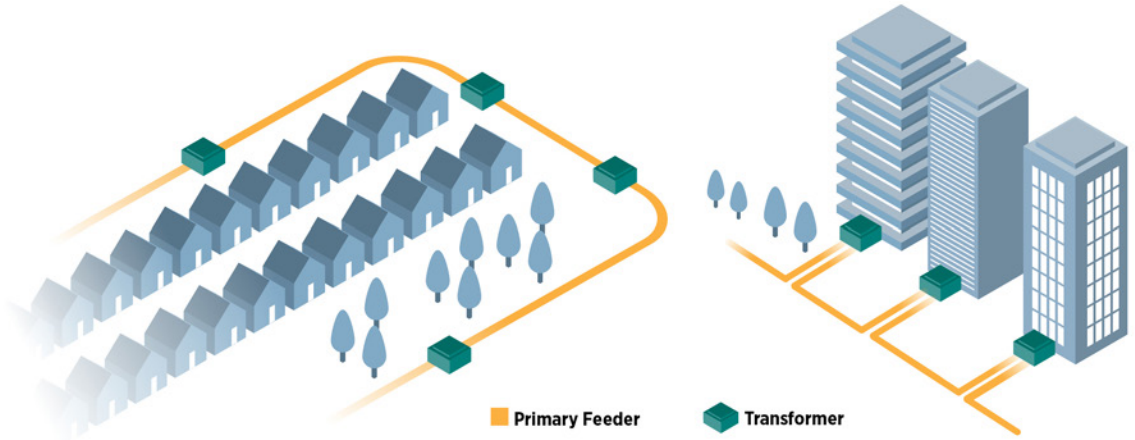
FIGURE 4: Radial and dual-radial configurations — residential, multi-residential, high-rise



[3] **oeb.ca/open-data/electricity-reporting-record-keeping-requirements-rrr-section-2155-utility**

Similarly, *Figure 5* shows **looped configuration** in residential, multi-residential and high-rise developments.

FIGURE 5: Loop configuration — residential, multi-residential, high-rise



Depending on customer needs and existing system infrastructure nearby, there are three key supply scheme offerings available to developers to connect to the Toronto Hydro system:

- Direct supply from Toronto Hydro's transformer on public road allowance
- Supply from Toronto Hydro's equipment on customer's property
- High-voltage supply from Toronto Hydro with customer-owned transformation on private property

The following section provides supporting information on these supply offerings, including customer classification type, primary voltage, supply voltage, service size and supply configuration.

Toronto Hydro will determine, at its sole discretion, the customer's type of supply based on factors that include, but are not limited to, reliability, capacity, and operational and system design considerations.

Direct supply from Toronto Hydro's transformer on public road allowance

Toronto Hydro may supply electricity to the customer from its transformer installed on public road allowances when the customer-requested service size is within the maximum service size limit, as summarized in *Table 2*. (Table 2 in Section 5 of Toronto Hydro's Conditions of Service provides more details on this topic at **torontohydro.com/conditionsofservice**.)

TABLE 2: Toronto Hydro transformer supply offerings from secondary distribution system in public road allowance

CUSTOMER TYPE	PRIMARY VOLTAGE	SUPPLY VOLTAGE	MAX. SERVICE SIZE	SUPPLY ARRANGEMENT
Residential (≤ 6 dwelling units)	All	120/240 V, 1ph, 3w	200 A	OH/UG
			400 A[4]	UG
General Services • **Commercial** • **Industrial** • **Mixed-Use** • **Multi-Residential (> 6 dwelling units)**	All	120/240 V, 1ph, 3w	200 A	OH/UG
			400 A[5]	UG
		120/208 V, 3ph, 4w	200 A	OH/UG
			400 A[6]	UG
		347/600 V, 3ph, 4w	100 A	OH/UG
			200 A	OH/UG

ph = phase w = wire kVA = kilovolt-amps

Notes:

[4] 400A residential services are to be supplied via underground supply arrangement only. Where the service is located in an area with an overhead secondary distribution system, then the service must be connected directly to the transformer via an underground supply arrangement.

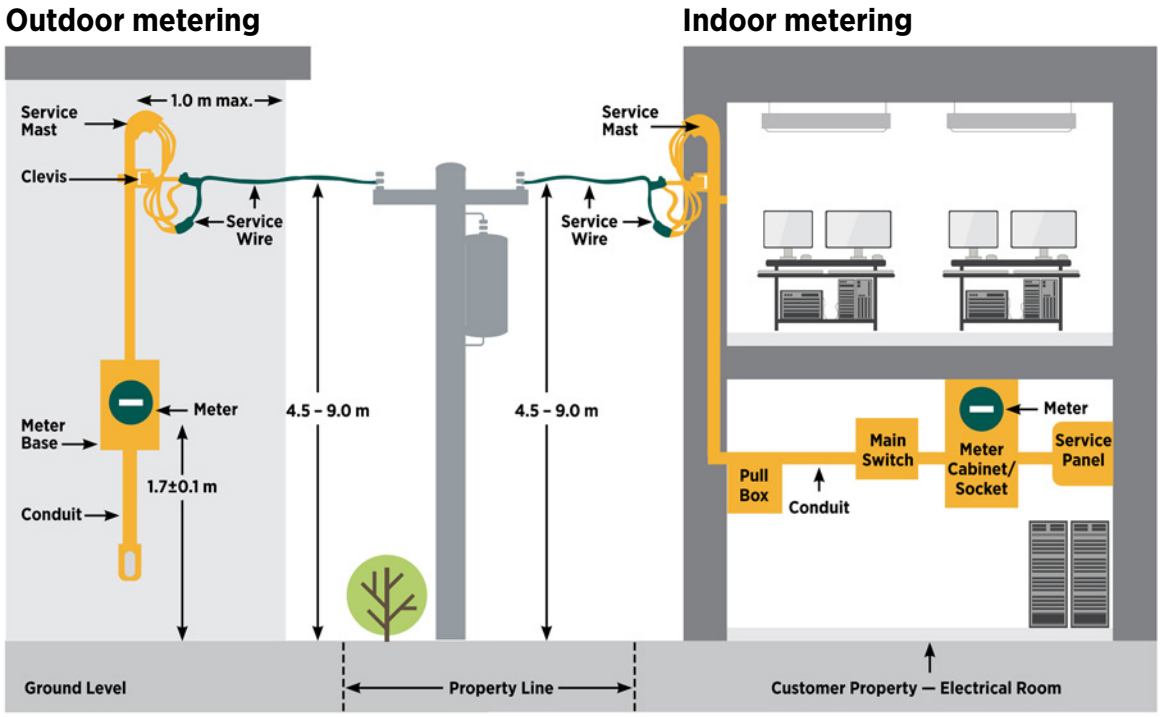
[5] Services up to 200A are supplied overhead or underground based on area availability, where services at 400A are typically supplied underground subject to system conditions in the vicinity.

[6] Depending on the system availability, customers located in the downtown core seeking a demand load greater than 400A at 120/208 V may have the option of being supplied from the secondary network distribution system.

The supply configuration may depend on the service area and which system is available for the proposed connection to the Toronto Hydro system. Please refer to *Figure 6* to understand customer responsibilities for overhead electrical service and *Figure 7* for underground electrical service. Please note that diagrams are not represented to scale and should only be used as a general reference.

FIGURE 6: Overhead electrical service for direct supply from Toronto Hydro's transformer

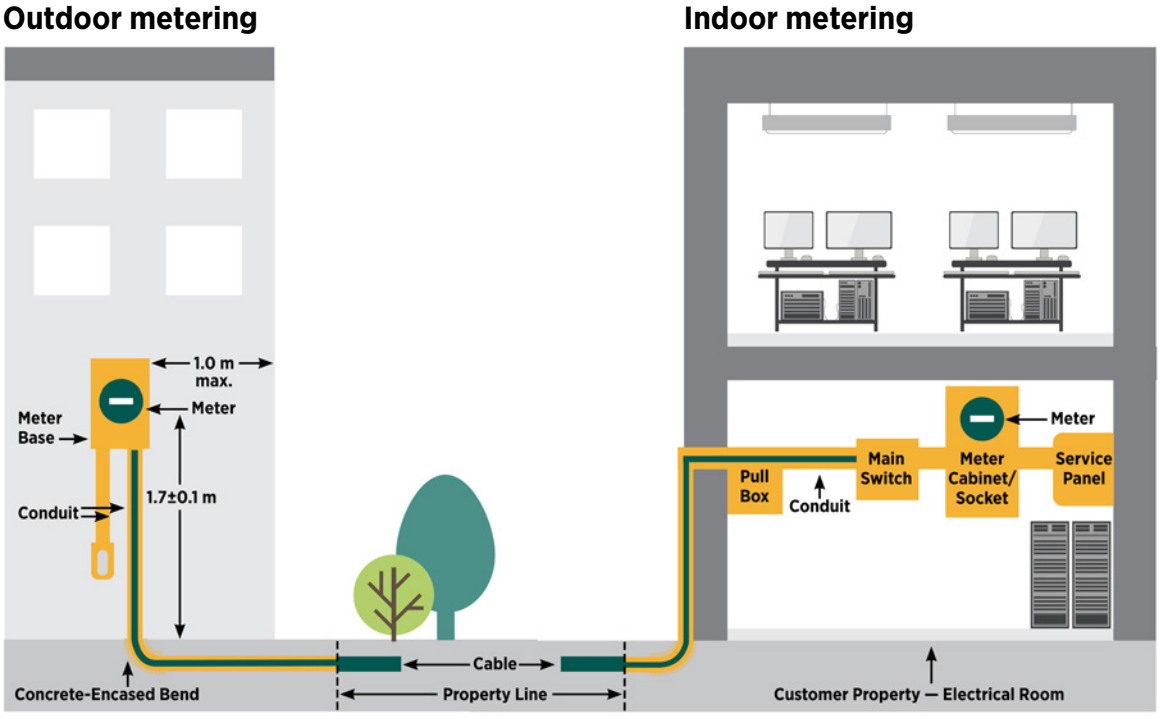
Customer's responsibility **Toronto Hydro's responsibility**



For reference only. Drawing is not to scale.

FIGURE 7: Underground electrical service for direct supply from Toronto Hydro's transformer

Customer's responsibility **Toronto Hydro's responsibility**



For reference only. Drawing is not to scale.

Supply from Toronto Hydro's equipment on customer's property

Toronto Hydro requires customers to install and pay for a Toronto Hydro-owned transformer on their property should their service size exceed the threshold as described in *Table 2*. Customers have the option to choose between a pad-mounted or a building vault transformer at the discretion provided by Toronto Hydro. *Table 3* provides more details on Toronto Hydro's transformer offerings and maximum load size.

For more information, please refer to Table 3 in Section 5 of our Conditions of Service.

TABLE 3: Toronto Hydro transformer supply offerings on customer's property

EQUIPMENT TYPE	PRIMARY VOLTAGE	SUPPLY VOLTAGE	MAX. TRANSFORMER SIZE	SUPPLY CONFIGURATION	SERVICE AREA
Pad-Mounted Transformer	All	120/240 V, 1ph, 3w	167 kVA	• Radial • Looped	Core/ Horseshoe
	13.8/8 kV	120/208 V, 3ph, 4w	500 kVA[7]	• Radial • Looped	Core/ Horseshoe
		347/600 V, 3ph, 4w	500 kVA[7]		
	27.6/16 kV	120/208 V, 3ph, 4w	750 kVA[8]	• Radial • Looped	Horseshoe
		347/600 V, 3ph, 4w	3,000 kVA		
Vault Transformer	All	120/240 V, 1ph, 3w	167 kVA	• Radial • Looped	Core/ Horseshoe
	13.8/8 kV	120/208 V, 3ph, 4w	1,500 kVA	• Dual Radial • Looped	Core/ Horseshoe
		347/600 V, 3ph, 4w	2,500 kVA		
	27.6/16 kV	120/208 V, 3ph, 4w	1,500 kVA	• Radial • Looped	Horseshoe
		347/600 V, 3ph, 4w	2,500 kVA		
Network Transformer[9]	13.8/8 kV	120/208 V, 3ph, 4w	1,000 kVA (2-unit) 2,000 kVA (3-unit)	• Grid Network • Spot Network • 600 V Network[10]	Core

ph = phase w = wire kVA = kilovolt-amps
For all service sizes and types, the customer is required to install appropriate fusing to ensure that demand load does not exceed the transformer capacity.

Notes:

[7] 750 kVA-sized pad-mounted transformers may be available in some areas of the pre-amalgamation Metro Toronto area with 13.8/8 kV primary voltage, and are subject to Toronto Hydro's review and approval.

[8] 1,500 kVA-sized pad-mounted transformers may be available in some areas of Etobicoke, York, North York, East York and Scarborough with 27.6/16 kV primary voltage, and are subject to Toronto Hydro's review and approval.

[9] Customers seeking demand loads greater than the two-unit and three-unit transformer vault thresholds noted in *Table 3* may be supplied from additional transformers. These transformers may be situated within the same vault or additional vaults. The availability of supply options can vary by area. Selections are subject to Toronto Hydro's review and approval.

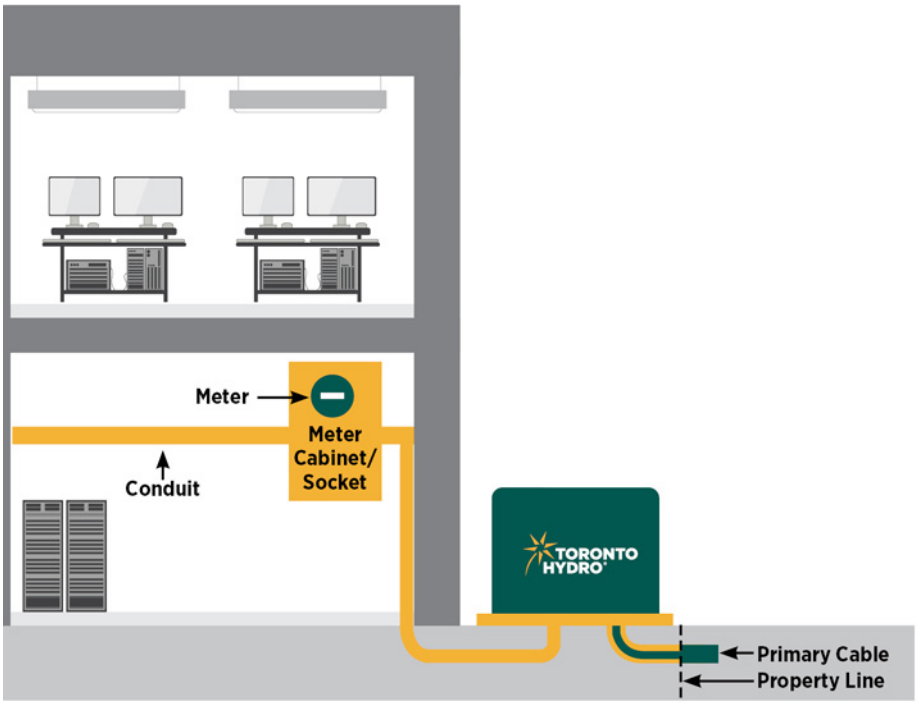
[10] The 600 V Network is currently a pilot project available to select customers. Selections are subject to Toronto Hydro's review and approval.

Pad-mounted transformers

Pad-mounted transformers are situated at ground level and connected through an underground connection. *Figure 8* shows how a pad-mounted transformer would be used to supply electricity to the customer. To learn more about the requirements for pad-mounted transformers, please refer to Reference #5a — "Requirements for the Design and Construction of Customer-Owned Structures" in our Conditions of Service.

FIGURE 8: Pad-mounted transformer **Customer's responsibility** **Toronto Hydro's responsibility**

Indoor electrical room



Pad-mounted transformer

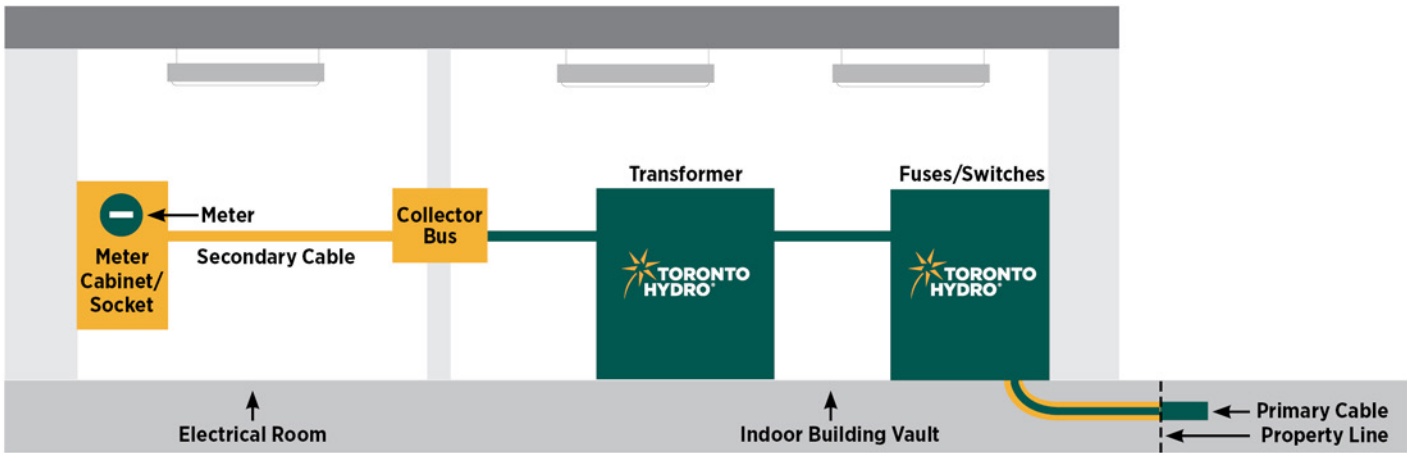
For reference only. Drawing is not to scale. Actual configuration/layout may vary.

Vault transformer

Toronto Hydro-owned transformers should be stored in a customer-owned building vault on private property, as seen in *Figure 9*. Please refer to Reference #5a — "Requirements for the Design and Construction of Customer-Owned Structures" in our Conditions of Service to learn more about the requirements for transformer vaults.

FIGURE 9: Vault transformer supply on customer's property **Customer's responsibility** **Toronto Hydro's responsibility**

Indoor electrical room



For reference only. Drawing is not to scale. Actual configuration/layout may vary.

Network transformation

Network transformation at demand loads highlighted in *Table 3* is available for some customers in the Core area. Please refer to Section 2 of our Conditions of Service to learn more about network transformation and options available when the demand is within the threshold mentioned in *Table 3*. Network transformation may be located on either the customer's property or the public road allowance, depending on factors such as area, location constraints, space availability and connection arrangements. In contrast, customer-owned substations are always located on the customer's property.

The network system provides high reliability and resiliency, as multiple network transformers are interconnected on the secondary side to collectively supply one or multiple customers. As additional feeders, network vaults and transformers are introduced to a network system, the resiliency and capacity of the overall system increases, as the network can potentially withstand multiple contingency events and assets can be loaded to a higher degree. There are two main configurations of the network system:

- **Spot Network:** Single network vault that supplies one or more customers as illustrated in *Figure 10*. Typically supplies one large customer at 120/208 V or 347/600 V (see page 30 of this manual to learn more)
- **Grid Network:** Multiple network vaults that are tied together on the secondary side and supply multiple customers as illustrated in *Figure 11*. Typically supplies multiple customers in high load-density areas at 120/208 V

High-voltage supply from Toronto Hydro with customer-owned transformation on private property

When the requested service size exceeds Toronto Hydro's supply offerings outlined in *Table 3*, customers will need to install a high-voltage substation on their property to receive primary voltage supply from Toronto Hydro. In this supply scheme, the customer will be responsible for installing and maintaining a customer-owned substation on their property.

In some instances, large customers will be required to install multiple conductors as connection assets to satisfy Toronto Hydro's thermal requirements. In the Core area, when two or more feeders are designed to operate in parallel, circuit breakers and line differential (pilot wire) relay protection, and remote trip receiving relay(s) are required. This may result in additional costs.

Please refer to Reference #4 — "Requirements for the Design and Construction of Customer-Owned High-Voltage Substations" in our Conditions of Service to learn more.

FIGURE 10: Typical spot network

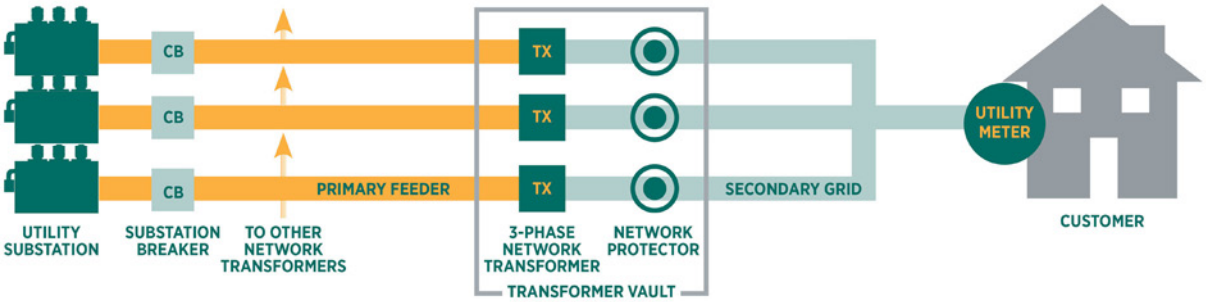
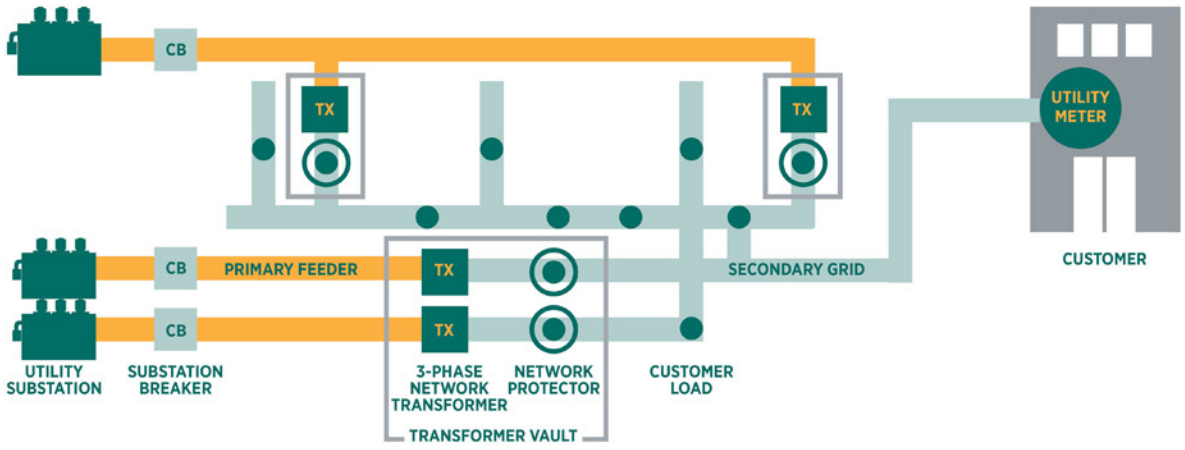


FIGURE 11: Typical grid network



Customer classifications

Toronto Hydro has a broad spectrum of developers that require service, ranging from mixed and multi-residential high-rise towers to industrial and commercial single-feed supply connections. Toronto Hydro will facilitate the connection requirements of a developer based on their unique technical requirements and project considerations.

Table 4 outlines categories of connection based on demand size. This information is also available in our Conditions of Service (Section 5, Table 1).

TABLE 4: Connection categories

CLASS	DEMAND SIZE	CUSTOMER CLASS
1	Single Service	Residential
2	< 50 kW	General Service/Single Service
3a	50 – 999 kW	Single building/bulk-metered/suite metering
3b	50 – 999 kW	Multi-unit/townhouse complex/transformation facilities on private property
3c	50 – 999 kW	Residential subdivision
4 & 5	> 1,000 kW	Single or multiple building/transformation facilities on private property

Key documents and references

The following documents, guidelines and references provide detailed information on Toronto Hydro's supply offerings and connection process.

Conditions of Service

Toronto Hydro's Conditions of Service and its reference documents provide information on Toronto Hydro's service offerings, connection rules as prescribed in the DSC, requirements from customers and Toronto Hydro's obligations to our customers. The Conditions of Service is a requirement by the DSC to be produced and maintained by LDCs operating in Ontario.

Developers should thoroughly review the appropriate sections of our Conditions of Service to verify their rights and obligations, and applicable distribution configuration and supply scheme requirements for a connection to the Toronto Hydro system.

The following reference documents associated with our Conditions of Service provide more detailed information about Toronto Hydro's service offerings and obligations to our customers:

Reference #1 — "Economic Evaluation Model for Distribution System Expansion"

- Outlines the methodologies and assumptions used in the economic evaluation model. This section provides developers with guidance on how Toronto Hydro calculates the cost associated with system expansions
- Describes which costs would be covered by the utility and which costs may require funding from the developer

Reference #2 — "Standard Connection Agreements — Terms of Conditions"

- Highlights the terms and conditions of a Standard Connection Agreement between Toronto Hydro and our customers
- Outlines the binding commitment that Toronto Hydro has with the developer to provide a connection to the distribution system and includes, but is not limited to, reliability, maintenance, testing and dispute arbitration

Reference #3 — "Distributed Energy Resource Requirements"

- Provides information on various types of generating facilities interconnections available to customers and how the interconnection will be implemented for developers
- Outlines detailed information on governing laws, technical requirements, timelines and connection costs for generation facilities intending to connect to Toronto Hydro's distribution system

Reference #4 — "Requirements for the Design and Construction of Customer-Owned High-Voltage Substations"

- Outlines the requirements for Toronto Hydro customers when designing and constructing 13.8 kV or 27.6 kV customer-owned substations with the purpose of (a) assuring safe conditions for the customer and Toronto Hydro personnel in operating and maintaining customer-owned substations and (b) assuring a continuity of supply to all customers by using adequate specifications and proper design factors

Reference #5a — "Requirements for the Design and Construction of Customer-Owned Structures"[11]

- Provides guidance to Toronto Hydro customers and their agents in the preparation of plans and proposals for the construction of new or rebuilding of existing customer-owned structures (e.g., poles, cables chambers, cable pull rooms, duct banks, etc.)

Reference #5b — "Construction Standards Referenced in Requirements for the Design and Construction of Customer-Owned Structures"[11]

- Provides design drawings and diagrams supporting the construction standards for the design and construction of customer-owned structures

Reference #6 — "Metering Requirements 750 V or Less"

- Provides guidance to Toronto Hydro customers and their agents in the design, preparation of plans and proposed service installation for 750 V or less
- The requirements apply to all new, rearranged or upgraded services (both permanent and temporary) and are intended to provide an efficient and safe supply with respect to revenue metering

Reference #7 — "Metering Requirements for 13.8 kV and 27.6 kV Customer-Owned Substations"[11]

- Provides guidance to Toronto Hydro customers and their agents in the design, preparation of plans and proposed service installation for 13.8 kV and 27.6 kV customer-owned substations
- The requirements apply to all new, rearranged or upgraded services (both permanent and temporary) and are intended to provide an efficient and safe supply with respect to revenue metering

Reference #8 — "Metering Services and Charges"

- Provides information on customers' type of service connection and metering configuration based on factors that include, but are not limited to, reliability, capacity, and operational and system design considerations

Reference #9 — "Electric Vehicle Charging Connection Requirements"

- Outlines the requirements for connecting non-residential Electric Vehicle Supply Equipment (EVSE) to Toronto Hydro's distribution system in compliance with the OEB's Electric Vehicle Charging Connection Procedures (EVCCP)

Connection Agreement

Once the developer and Toronto Hydro come to an understanding upon the conditions of connection and delivery of electricity through that connection, the two parties may enter into a contract through a Connection Agreement.

In addition to outlining the terms of the connection, the agreement also identifies a customer's initially requested capacity.

Underused feeder capacity may be reallocated to other customers after a specified time period if not materialized. Consequently, customers contemplating projects that may lead to load changes should advise Toronto Hydro, even when these changes appear to fall within the limits of an earlier Connection Agreement. Please refer to Schedule A of Reference #2 — "Standard Connection Agreements — Terms of Conditions" and Section 2.1.7.4 in our Conditions of Service to learn more about Toronto Hydro's standard Terms of Conditions.

Operating Agreement

In addition to the Connection Agreement, in accordance with Section 2.1.7.5 of our Conditions of Service, developers who fall under Customer Classes 3, 4 and 5 may be required to enter into an Operating Agreement. The purpose of the Operating Agreement is to clarify the responsibilities of Toronto Hydro and the property owner pertaining to the work coordination, work protection and operating control of the electrical equipment connected. Please contact your designated Toronto Hydro representative to learn more about this.

Clearance and Electrical Safety Guides

Toronto Hydro's clearance and electrical safety guides provide information to help keep construction crews and the public safe. Developers and contractors are responsible for maintaining minimum clearance requirements to ensure compliance with all applicable standards, laws and regulations, including those set out by Toronto Hydro and the OESC.

For work and building clearances to Toronto Hydro infrastructure, please refer to the guides available on Toronto Hydro's website: **torontohydro.com/clearance-guides** and **torontohydro.com/electrical-safety**.

[11] These Conditions of Service reference documents also provide detailed information on design and construction requirements, construction standards and metering requirements for customer-owned structures.

Climate Action Plan

Following on the City of Toronto's declaration of a climate emergency and setting a goal of achieving net zero by 2040,[12] Toronto Hydro partnered with the City to do its part to address the climate emergency through the development and implementation of a Climate Action Plan. Toronto Hydro worked with various key stakeholders, including Pembina Institute, Natural Resources Canada and the cleantech community. In July 2022, Toronto Hydro received a mandate from the City to implement its Climate Action Plan. The plan has two main areas of focus:

- **Facilitating decarbonization** through expanding, modernizing and future-proofing the grid and operations to enable customers to use more electricity, have more choice and participate more inclusively in the electricity market
- **Driving climate action** by providing a free service to help residents and businesses on their journey to net zero, while also helping to develop the cleantech market in Toronto

Facilitating decarbonization

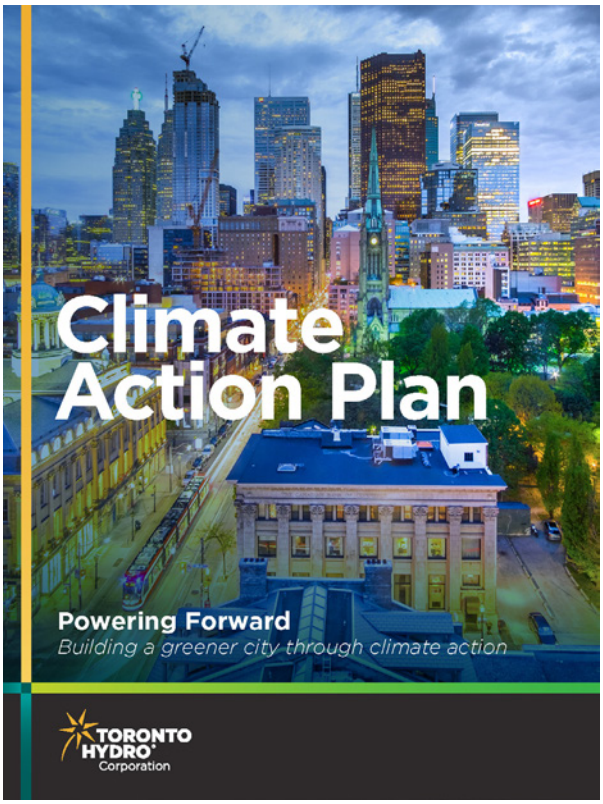
Approximately 75% of the City's greenhouse gas reduction goals depend on Toronto Hydro's core regulated business and grid. In recognition of our key role, Toronto Hydro successfully received approval from its regulator, the OEB, for a capital and operations investment plan that facilitates decarbonization. Toronto Hydro has been granted funding through the end of the decade to expand, modernize and future-proof its grid and operations. This ensures a strong foundation of utility operations, but also creates the foundations to enable Torontonians to safely and reliably use more electricity, have more choice and participate in the electricity market.

Climate Advisory Services

One key area of focus involves Climate Advisory Services, which works directly with customers, cleantech companies, funders and other stakeholders to identify and remove barriers to enable the efficient electrification of critical sectors, such as buildings and transportation.

Climate Advisory Services can help electrify existing buildings or even new developments by providing help on electrification of heating and transportation by:

- Coordinating Electric Vehicle Customer Connection Procedures



- Coordinating building electrical connection upgrade information, including cost and construction time estimates
- Providing preliminary decarbonization audits using remote commercial-grade software and setting up ENERGY STAR® Portfolio Manager® accounts
- Providing ongoing electrical consumption energy data into ENERGY STAR® Portfolio Manager®
- Advising on incentives for qualifying electrification projects
- Helping customers connect with trusted cleantech companies through our Cleantech Services Directory
- Making technical heat pump training available to the marketplace

To learn more, and for detailed information on Toronto Hydro's Climate Action Plan, visit **torontohydro.com/climateaction**.

[12] City of Toronto, TransformTO Net Zero Strategy: A climate action pathway to 2030 and beyond (2021), pg. 16 available at: **toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173758.pdf**

GRID CONNECTIONS

In accordance with the DSC and the Electricity Act, Toronto Hydro has an obligation to connect customers within our service territory to our distribution system. Depending on the type of connection and service request, the connection process, cost and timeline may differ.

Toronto Hydro strives to streamline customer needs through a one-window engagement model through the Large Customer and Key Accounts team. This team works closely with the Development Planning team to provide technical support to developers.

Please contact Development Planning through your existing Key Accounts representative for any additional support you need. If you don't have a Key Accounts representative and are looking for one, you can submit this request at **keyaccounts@torontohydro.com**.

Load connections

Load connections require power supply from Toronto Hydro and may include expansions or modifications to the existing distribution system (excluding generation connections). Please refer to Section 2 of our Conditions of Service at **torontohydro.com/conditionsofservice** to learn more about load connections.

Transportation electrification and electric vehicle chargers

The mass adoption of electric vehicles (EVs) has been one of the significant factors influencing the grid structure and loading requirements on Toronto Hydro's distribution system. Due to the high electricity demand for EVs, network and infrastructure upgrades may be required to connect EV chargers to the grid.

Toronto Hydro continually monitors the needs of the city to manage capacity, and ensures that strategic capital investments are made to enable sufficient growth of the grid. Adequate development planning will enable Toronto Hydro to assess the required capacity and help ensure that it's available to all developers in a timely manner, so they can be confident that their projects can be accommodated on Toronto Hydro's distribution system.

If developers are interested in installing EV charging stations, they should consult with an electrical contractor to assess and determine whether the facility needs an upgrade in electrical service. Choosing the correct EV charger level is crucial in determining the type of connection required. Currently, there are three EV charger levels available. This information is available at **torontohydro.com/electricvehicles**.

Prior to proceeding with an EV charger installation project, the contractor must obtain Toronto Hydro's confirmation that the existing service is adequate for the intended EV charger duty. If a service upgrade is required, please follow the standard process of submitting a connection request to Toronto Hydro.

Generation connections

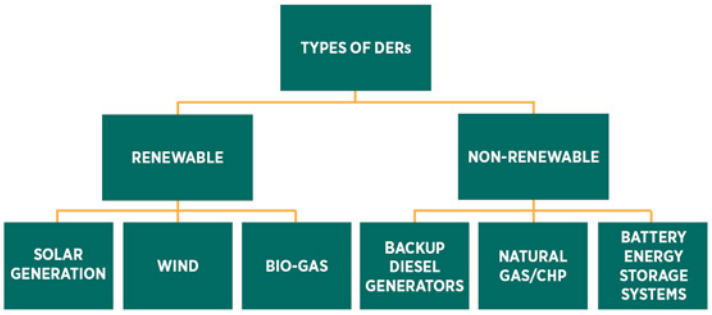
Developers can request a generation connection which may include conventional generation plants such as Combined Heat and Power (CHP) units, reciprocating engines units (synchronous and induction) or renewable energy sources such as Wind Turbines, Solar Photovoltaic (PV) and Battery Energy Storage Systems (BESS).

Please refer to Reference #3 — "Distributed Energy Resources Requirements" in our Conditions of Service to learn more about generation connections and Section 2.3.6 to review the terms, conditions and requirements for generation facilities at **torontohydro.com/conditionsofservice**.

DER connection is a form of generation connection that can be facilitated by Toronto Hydro. Refer to *Figure 12* for types of Toronto Hydro DER connections. A DER or Distributed Generation (DG) asset refers to a generation unit that is connected directly to Toronto Hydro's distribution network. Depending on the purpose of generation, Toronto Hydro offers the following DER connections to our distribution system:

- Micro-Embedded Generation (< 10 kW)
- Small and Mid-Sized Embedded Generation (10 kW – 10 MW)
- Large Embedded Generation (> 10 MW)
- Wholesale Market Participants

FIGURE 12: Overview of DER connections



For DER connections operated in parallel with the grid, please refer to Reference #3 — "Distributed Generation Requirements" in our Conditions of Service, which provides detailed information on the connection process and requirements for DER facilities.

Sections 2.1.7.4 and 3.5 of our Conditions of Service provide insight into DER system connection requirements. For renewable types of DERs, customers may be eligible for Toronto Hydro's Net Metering program. The Net Metering program allows customers with renewable DER systems (i.e., solar PV) to accumulate bill credits that can be used against their bill for one year. For more information, customers can visit **torontohydro.com/grid-connections/net-metering**.

Depending on the size of the DER, there could be additional requirements. For example, installations greater than 10 kW will require a Connection Impact Assessment (CIA) to be completed either by Toronto Hydro or by both Toronto Hydro and Hydro One. Connections greater than 10 MW require a System Impact Assessment (SIA) through the IESO and may result in added costs. Toronto Hydro will initiate these assessments on behalf of the customer.

Since DERs are an evolving technology, Toronto Hydro can work with developers to help facilitate their other DER needs.Please contact the Development Planning team through your Key Accounts representative if your development is considering inclusion of DER facilities.

Temporary service connections

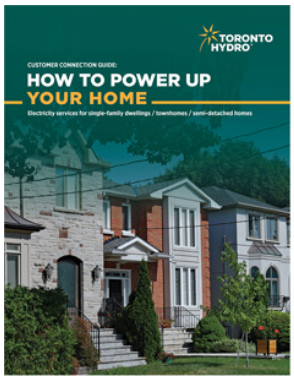
A temporary service connection is one that requires electrical supply from Toronto Hydro for a limited duration, after which point the service is disconnected and removed. The connection could be from either the overhead or underground system and would be metered as determined by Toronto Hydro. There are multiple temporary service offerings from Toronto Hydro, including residential, high-rise, transit and special event services.

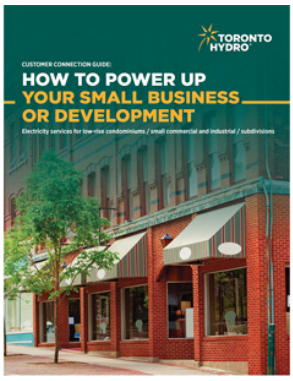
Temporary service connections follow a similar connection process to other Toronto Hydro services. Temporary service connections are scoped, designed and estimated in a similar manner, and developers or customers requiring temporary service are responsible for 100 per cent of the cost associated with supporting the temporary connection. Similar to other connections, temporary service connections are also subject to inspections and regulatory approvals. To learn more about technical requirements for temporary service connections, please review Section 2.6 of our Conditions of Service at **torontohydro.com/conditionsofservice**.

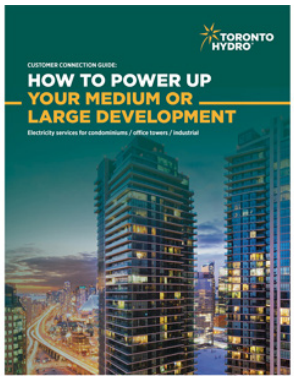
Connection process

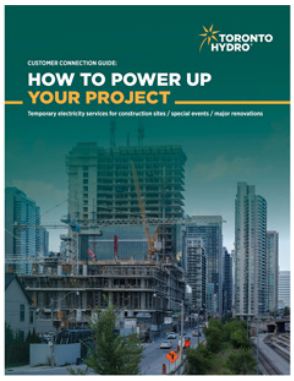
On the following page, our "10 steps to get you connected" outlines a step-by-step guide to Toronto Hydro's standard load connection process. For DER connection guidelines, visit **torontohydro.com/grid-connections/connection-process**.

We also offer a series of guides that specifically cover the connection process for your home, small business or development, medium or large development, and projects. To access these guides, visit **torontohydro.com/connectionguides**.









For more detailed information on the overall connection process and timing, Toronto Hydro's supply offerings, and billing and payment requirements, please refer to Section 2 of our Conditions of Service at **torontohydro.com/conditionsofservice**.

10 steps to get you connected

To help ensure a smooth process, the following steps[13] must occur in sequential order:

CUSTOMER STEPS

1 Submit Service Request
- Complete and submit an online Service Request at **torontohydro.com/servicerequest**
- You'll need to include all required project information, including the site plan, proposed electrical drawing, building permits, zoning certifications and load calculations, in order to proceed

4 Sign agreement and return it with payment
- Sign and return the job quote or Offer to Connect, along with required payments as instructed on the documents

6 Prepare site for connection
- You or your general contractor will need to complete all applicable civil and electrical construction on your property, and make sure the site is safe for us to begin work
- It's important that you provide clear access to the property, especially leading to and in front of the meter location

8 Schedule Electrical Safety Authority (ESA) inspection[14]
- After the electrical and civil installation is done, you're required to schedule and complete a safety inspection with the ESA
- You or your contractor can contact the ESA and submit a request on their website at **esasafe.com**

TORONTO HYDRO STEPS

2 Review project details
- One of our representatives will contact you to review the details within five to ten business days, depending on the type of project
- We may require a design pre-payment that must be paid prior to commencing design work. This design pre-payment will be credited towards your financial obligations for the project

3 Provide a job quote or Offer to Connect
- We'll complete the design and estimate to determine the course of action once we receive all the required project information
- Our representative will provide a job quote or Offer to Connect. This will specify the project details, timelines and financial requirements to proceed with the application request

5 Complete design, arrange for permits and order material (if applicable)
- We'll complete the detailed design, apply for the required permits, order materials and issue the project for construction

7 Begin construction (if applicable)
- We'll begin civil and electrical construction work where the responsibility resides with Toronto Hydro (e.g., civil construction work on road allowance)

9 Complete final inspection[14]
- Once we receive ESA connection authorization, we'll conduct a final site inspection to ensure it meets our standards and conditions as set out in the agreement

10 Connect you to the grid
- Upon successful completion of the site inspection and receipt of any outstanding project information, we'll schedule and complete the service connection within five business days for services 750 V or less, or ten business days for services greater than 750 V

For additional details, visit **torontohydro.com/serviceconnections**.

[13] Costs and durations may vary greatly depending on location, type of request, amount of construction involved, etc. For a list of standard service charges, visit **torontohydro.com/servicecharges**.

[14] This step is not applicable for relocations or demolitions.

Offer to Connect

Once developers have submitted a service request for load connections at **torontohydro.com/serviceconnections**, Toronto Hydro will respond to the written request. After pre-payment is received, Toronto Hydro's Design and Planning groups will then conduct analysis and confirm work required to supply demand based on the information provided by the developers. After this, Toronto Hydro will make an Offer to Connect (OTC) to the developer in the form as determined by Toronto Hydro (e.g., job quote, short-form OTC, long-form OTC). Toronto Hydro will strive to provide an OTC within 60 calendar days of receiving the written request and the design deposit payment, but the timeline may change based on the project's complexity or requirements to interface with other entities.

The OTC is a binding agreement between Toronto Hydro and developers that details the process and work required to connect developers to Toronto Hydro's system. The OTC includes information on project costs, work breakdown, economic evaluation, cost allocation and other financial obligations. To prepare the OTC, Toronto Hydro requires relevant information from developers, which will be communicated by Toronto Hydro once the connection request is made. After the OTC is delivered, developers are required to execute on the OTC within a certain timeframe as indicated in the OTC. To learn more about the process, timing and terms of OTC, please review Section 2.1 of our Conditions of Service at **torontohydro.com/conditionsofservice**.

Economic evaluation methodology

Toronto Hydro follows the DSC's economic evaluation methodology to establish capital contribution requirements for expansion work in the OTC.

This evaluation is required to determine cost obligations between the developer and Toronto Hydro where network expansions are required on the main distribution system and not categorized as connection assets. Expansions can include any system upgrade required to meet the requested load demand. This methodology is established by the OEB for all LDCs in Ontario and is a standard process for the calculation of sharing expansion costs.

As seen in *Figure 13*, the economic evaluation model uses a Discounted Cash-Flow (DCF) method to calculate the Net Present Value (NPV) of a project. Revenues are estimated based on forecasted connections, operating rates, demand load, etc., whereas costs are estimated based on capital costs, and fixed and variable ongoing maintenance and administration costs.

Once the present value of the project is calculated, developers are required to pay the difference between revenues and costs as a capital contribution. However, if the NPV is positive, no capital contribution is required. In addition, Toronto Hydro collects an Expansion Deposit from developers to ensure customers reach the requested peak demand.

For instances where the requested load doesn't fully materialize within the time frame set by the DSC (typically five years), the expansion deposit is not refunded in full. The amount refunded is proportional to the peak demand achieved and the peak demand requested. This ensures that expansion work initiated by a customer is paid for in part by the customer for the portion which actually materialized rather than using rates to subsidize customer expansion work.

Following the five-year period, the established load for the customer will be based on actual demand from the customer, and not the original demand requested. If the customer wants to add load in addition to the established demand in the future, then a new request needs to be submitted. Please see *Figure 14* for an illustration of asset types.

Please refer to Appendix B of the Distribution System Code to learn about the methodologies and assumptions used to evaluate economics for expansion work in an OTC. Sections 3.2.1 to 3.2.30 of the Distribution System Code provide detailed information about generation connections. Learn more at **oeb.ca/regulatory-rules-and-documents/rules-codes-and-requirements/distribution-system-code-dsc**.

FIGURE 13: Toronto Hydro's economic evaluation methodology

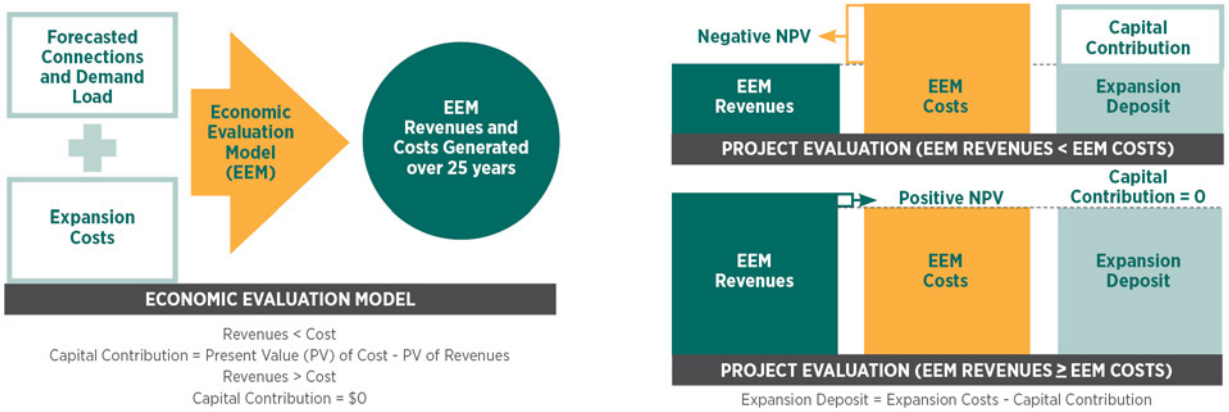
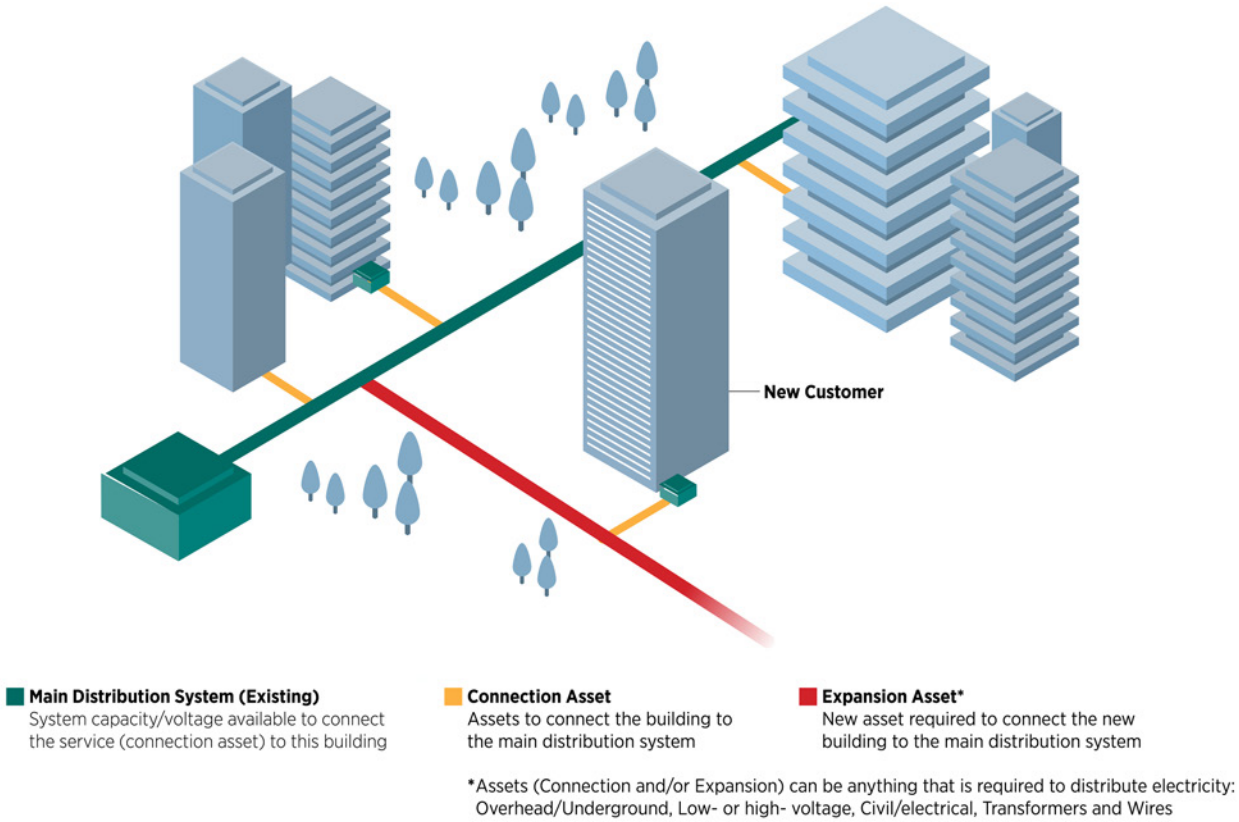


FIGURE 14: Illustration of asset types



Capacity allocation

Capacity is allocated based on the developer's peak demand in the OTC. This process requires Toronto Hydro to evaluate our distribution system and other customer connections. Toronto Hydro will only confirm capacity allocation upon execution of the OTC between the developer and Toronto Hydro on a first-come, first-served basis. The customer must meet the requested capacity peak within a five-year period upon execution of the OTC and capacity being allocated.

Please refer to Section 2.2.2.1 of Reference #3 — "Distributed Energy Resource Requirements" in our Conditions of Service to learn about terms and conditions on capacity allocation.

Common challenges and solutions

During the connection process, developers should keep the following challenges and solutions in mind:

- **Determining the location of customer's service entrance equipment** — this is subject to approval by Toronto Hydro and the ESA
- **Understanding connection costs and fees** — refer to Section 5, Table 1 of our Conditions of Service at **torontohydro.com/conditionsofservice** for more information on connection and disconnection fees. Once connected, developers and business connections can find information on rates and charges information at **torontohydro.com/rates**
- **Lack of accurate loading requirements or project timelines** — when developers bring connection requests to Toronto Hydro without clearly defining their timelines or load requirements, it can impact connection process timelines and OTC delivery. When submitting a Feeder Request to Toronto Hydro, developers should have this information available to help avoid delays. Further, not manifesting the requested load requirements could impact the expansion deposit recovery as explained in *Figure 13*

Toronto Hydro can only connect the customers to our distribution system once all required approvals and inspections are completed through the relevant regulatory bodies. Please be aware of the approval timelines and plan accordingly. Additionally, developers seeking to connect their generation facilities to Toronto Hydro's distribution system require additional approvals from the IESO, OEB, ESA and other parties. Please review Appendix 1 (ii) of Reference #3 — "Distributed Energy Resource Requirements" in our Conditions of Service for an embedded generation overview.

Metering

Pulse outputs

Interval metered customers with a demand exceeding 50 kW may request access to their real-time meter data. To initiate this process, customers need to send an email request to **THRIMS@torontohydro.com**. Toronto Hydro's metering team will evaluate each request for technical feasibility. If it is determined feasible, metering outputs will be enabled for the customer. If the existing meter is not capable of providing metering outputs, it will be replaced with a compatible meter at no cost to the customer.

Customers are responsible for any costs associated with integrating metering outputs into their systems.

PowerLens® Business

Interval metering allows customers to monitor their energy consumption by tracking their hourly usage. Toronto Hydro's interval metering customers can gain insight on their electricity usage through PowerLens® Business.

Customers on interval metering include those that have a renewable energy generation agreement, such as Feed-in-Tariff (FIT), microFIT or net metering. Interval customers also include customers with demand greater than 50kW.

Eligible customers can access their interval metering data through PowerLens® Business, an online customer portal, at **powerlensbusiness.torontohydro.com**. Here, you can:

- Monitor your energy usage and access metering data
- Determine how your facility uses energy
- Compare electricity usage across multiple locations
- View your minimum, maximum and average demand

Toronto Hydro customers need to register as Primary Users. If you're a Toronto Hydro customer and wish to grant access to a third party, they must register as Secondary Users.

Electric Vehicle Charging Connection Procedures (EVCCP)

Toronto Hydro is working closely with our customers to support and guide the connection process for the purposes of Electric Vehicle Service Equipment (EVSE) installations. This year, Toronto Hydro successfully developed and implemented the OEB's Electric Vehicle Charging Connection Procedures (EVCCP). This process has been designed to provide customers preliminary information at no cost to assist in non-residential EVSE installation decision making.

There are two steps involved in the EVCCP process for customers: 1) the Electric Vehicle Preliminary Consultation Information Request (EVPCIR); and 2) the Service Connection Request. The EVPCIR is a first optional step for customers who are exploring the feasibility of a site connection, or who are evaluating multiple potential site connections for EVSE. Within 15 calendar days of an EVPCIR submission, Toronto Hydro will provide the customer with an Electric Vehicle Preliminary Consultation Report (EVPCR) detailing the preliminary assessment on available capacity and complexity of the potential connection. If the customer has already decided on a specific location for the EVSE, the customer may choose to proceed directly to a Service Connection Request.

Toronto Hydro will provide an initial estimate Offer to Connect at no cost to the customer within 60 calendar days of the completed Service Connection Request, which details available capacity, complexity of work involved and estimated costs of the EVSE connection. Learn more at **torontohydro.com/for-business/electric-vehicle-charging**.

Non-Binding Estimates (NBE)

Toronto Hydro is committed to providing help and support to our existing and future customers with their projects in new construction or facility upgrades. As a result, Toronto Hydro has developed a Non-Binding Estimate (NBE) process to provide high-level information to enable the requester to have an understanding of capacity, cost and timeline information that may relate to their project. The NBE process is for non-EVCCP requests as described in the previous section.

The NBE analysis result is based on the snapshot of the grid condition at the time of request, and it is subject to change when the customer makes a formal connection request at a later time. There are two levels of NBE requests: Level 0 and Level 1. A Level-0 NBE is free of charge and provides basic capacity availability information and a high-level cost and timeline estimate for connection. A Level-1 NBE requires the requester to pay a fee for the study. In addition to the estimated connection timeline, it contains a more detailed analysis of required work and a breakdown of estimated costs, similar to the cost structure in an official Offer To Connect. However, all costs and timelines contained in the NBE analysis are non-committal by Toronto Hydro, and only to be used by the customer for high-level project planning purposes. Toronto Hydro does not reserve capacity for any customer from the NBE analysis. Capacity is reserved for a customer only after the formal connection request is submitted to Toronto Hydro, an OTC is signed and the required payment is made.

Additionally, if the NBE request is made by the owner's representative, Toronto Hydro will require the owner's consent for Toronto Hydro to release the NBE information to the representative.

NBE process

1. Submit a New Service Installation or a Service Upgrade request on Toronto Hydro's website, citing the level of NBE assessment required. The customer should provide the project demand information.
2. Toronto Hydro will confirm billing information if a Level-1 NBE has been requested.
3. Once billing information is confirmed (where applicable), Toronto Hydro will issue a job quotation that must be returned signed.
4. An invoice for the job quotation amount is then generated and sent to the customer for payment.
5. Once payment has been confirmed, the assessment will begin.
6. The completed assessment will be provided.

To submit a NBE, customers can visit **torontohydro.com/servicerequest**. To learn more and see how the NBE process can help you plan your project, please reach out to your Key Account Consultant directly or through **keyaccounts@torontohydro.com**.

Load Capacity Map

To support our customers and developers with their new developments, electrification or facility expansion initiatives, Toronto Hydro has launched a web-based system wide Distribution System Load Capacity Information Map (Load Capacity Map) that is accessible by the public. The Load Capacity Map is intended to provide users with approximate information on the estimated available electrical load capacity within our service territory. This Load Capacity Map is being shared for informational purposes only, and is provided on an as-is and as-available basis at the time of publication. For greater clarity, nothing in this Load Capacity Map is intended to provide information on the applicable cost(s), nor provide an estimate of the cost(s) required to facilitate or complete a connection to Toronto Hydro's distribution system. Until the parties enter into an Offer to Connect, neither party shall have any obligation, liability or recourse to the other party in respect of any connection work.

To utilize this tool and learn more, customers can visit **torontohydro.com/loadcapacitymap**.

GRID MODERNIZATION

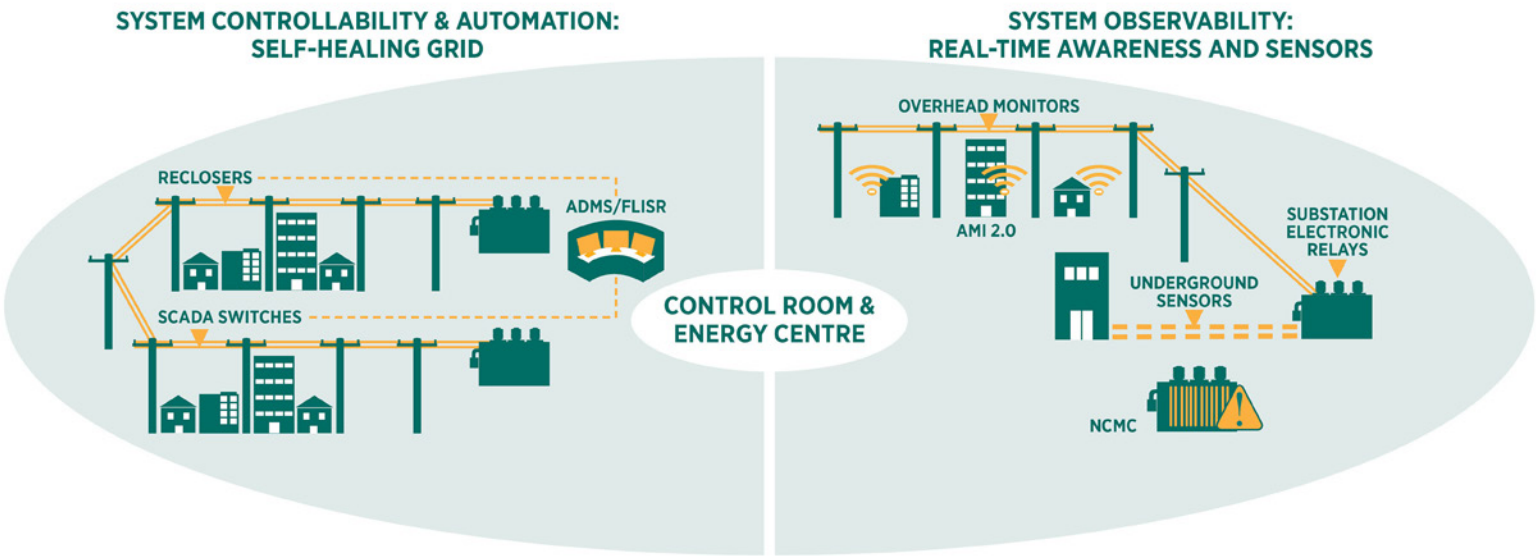
Grid modernization refers to changes being implemented using the most recent technologies in automation and power electronics to optimize the generation, transmission and distribution of electricity. Toronto Hydro's strategic objective is to become a utility of the future through grid modernization activities and intelligent grid pilot programs, with the goal of meeting climate action targets and municipal energy requirements.

In order to transition the current grid infrastructure into something even more robust and resilient — that will meet the needs of the future — collaboration is required between all levels of the energy sector. For example, Toronto Hydro is currently working with the IESO to create a demand management program known as Local Demand Response, which will help alleviate distribution system constraints during peak demand periods.

Another example of how Toronto Hydro is pushing grid modernization forward is through energy storage procurement projects. As the City of Toronto moves towards its greenhouse gas (GHG) reduction targets, many new developers and development retrofits are aiming to incorporate transportation electrification, heating electrification and DERs. While these are all necessary improvements, they will produce stress on the distribution network unless properly managed. These grid modernization systems can be used to enable renewable generation, provide a backup source of power for customers who require a high level of resiliency, as well as enable quick fault detection and automatic restoration for enhanced reliability.

As Toronto Hydro pursues its goal of developing into a utility of the future, exploration into future use-cases to assess the viability of these technologies is vital. Some of these use-cases are being explored through projects illustrated in *Figure 15* as part of the intelligent grid portfolio.

FIGURE 15: Intelligent grid components



The following section describes some of the ongoing grid modernization initiatives at Toronto Hydro. For more information about the feasibility of innovative and intelligent grid solutions, please reach out to the Toronto Hydro Development Planning team through your Key Accounts consultant or **keyaccounts@torontohydro.com**.

Intelligent grid

Toronto Hydro continues to pursue opportunities to modernize the existing distribution system and promote the development of a self-healing system. To do this, Toronto Hydro is installing enhanced communication infrastructure, introducing advanced grid configurations, and enabling enhanced monitoring, automation and remote control. Some approved grid automation initiatives that Toronto Hydro has underway include installing fibre optic cables through the Core, installing and testing pilot equipment, installing sensors for monitoring points, and commissioning and operationalizing Supervisory Control and Data Acquisition (SCADA) at automated and remote-controlled sites. These initiatives are modernizing Toronto Hydro's supply schemes to better service customers.

Dual radial modernization and automation

Toronto Hydro is installing switchgear and automation/remote controllable equipment in customer-owned dual radial vaults. This equipment is standardized as of 2021.

Benefits of adding dual radial automation to the Toronto Hydro system include the following:

- Provides a more reliable option compared to the existing dual radial system
- Allows for faster restoration after an outage which reduces outage frequency and duration
- Enables pre-emptive response to potential failures like low gas pressure or faults
- Creates operational flexibility and improved safety with remote switching capabilities
- Can be installed with new connections or retrofitted with existing connections (if space allows)

This system is the latest standard for dual radial systems and is available to customers who fall into this category based on *Table 2* of this manual.

Network modernization — Network Condition Monitoring & Control

Toronto Hydro is enhancing the general network system by enabling real-time, two-way communication between our network system and our control room. This will allow Toronto Hydro to monitor and identify trends in asset condition over the life of the asset to anticipate problems that otherwise may not be apparent, as well as improve contingency management by obtaining real-time loading information. In order to enable Network Condition Monitoring & Control (NCMC), Toronto Hydro is investing in communication infrastructure throughout the system by enhancing equipment at network vault locations and installing sensors.

As NCMC is commissioned at network vaults throughout the distribution system, customers supplied by the network system will benefit from this enhanced monitoring and control of network assets.

Network modernization — 600 V network

Toronto Hydro is offering a 347/600 V network solution for customers that require high reliability. The supply offerings for the 600 V network are shown in *Table 2*. The 600 V network will provide a secondary network solution for high-rise buildings (25+ storeys) and is currently being offered to customers on a pilot project basis. The 600 V network can be installed for any customer size depending on available space in the vault, and capacity of each unit is 1 or 2 MVA. Benefits of the 600 V system include the following:

- A highly reliable solution to meet the customer's needs for higher secondary voltage supply
- Modernization of operations, monitoring and control via SCADA
- New load break primary switches with fault interruption and remote switching capabilities

Distribution automation

Toronto Hydro is aiming to improve system operational efficiency for our feeders by employing a self-healing, smart grid technology that will reduce the duration of feeder outages. This is being accomplished by the implementation of an automated Fault Location, Isolation and Service Restoration (FLISR) system. During a fault on the overhead system, the faulted section is automatically detected and assessed based on current conditions. After this, the system performs switching operations to isolate the faulted section and restore power to undamaged segments of the feeder. This way, customers who can be restored will be done so quickly and efficiently.

As the automated FLISR solution is implemented in the distribution system, customers supplied by the overhead system will benefit from this increased service reliability.

Non-Wires Alternatives

Non-Wires Alternatives (NWAs) refer to operating practices, activities or technologies that can enable the utility to defer the need for specific distribution projects, at lower total resource cost, by reliably reducing distribution system constraints at times of maximum demand in specific areas of the grid. Typically, these NWAs leverage the use of DERs, often in partnership with utility customers or with other enabling third parties.

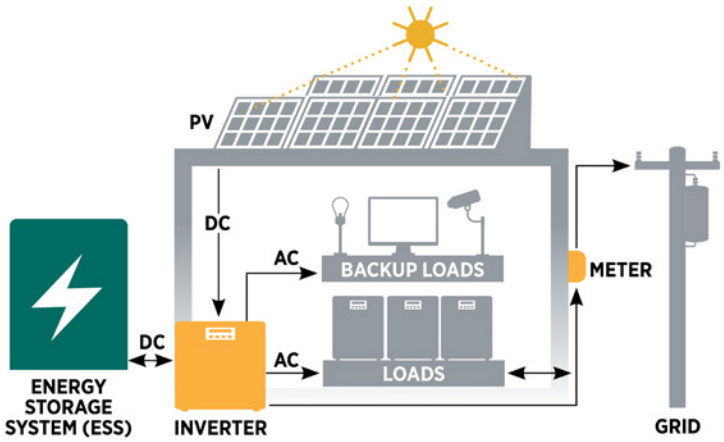
Toronto Hydro currently uses targeted demand response programs and front-of-the-meter BESS to support NWA initiatives. Developers interested in participating in demand response programs may reach out to the Toronto Hydro Development Planning team through your Key Accounts consultant or **keyaccounts@torontohydro.com** to confirm eligibility.

Energy storage

Energy storage is defined as the capture of energy produced at one time for use at a later time to reduce imbalances between energy demand and energy supply. *Figure 16* shows a typical energy storage system as an example. Developers seeking to install a BESS will require a Generation Connection Agreement even though they may be a net-metered customer. Some of the benefits of installing BESS for developers are as follows:

- Saves money on electricity bills by storing energy when the price is low (off-peak) and dispatching it when the price is high (on-peak)
- Requires minimal changes within developments to add BESS to the electrical system
- Provides resiliency through fast-acting performance during grid events
- Maximizes the financial benefits of intermittent energy sources such as solar and wind by facilitating the integration of renewable sources

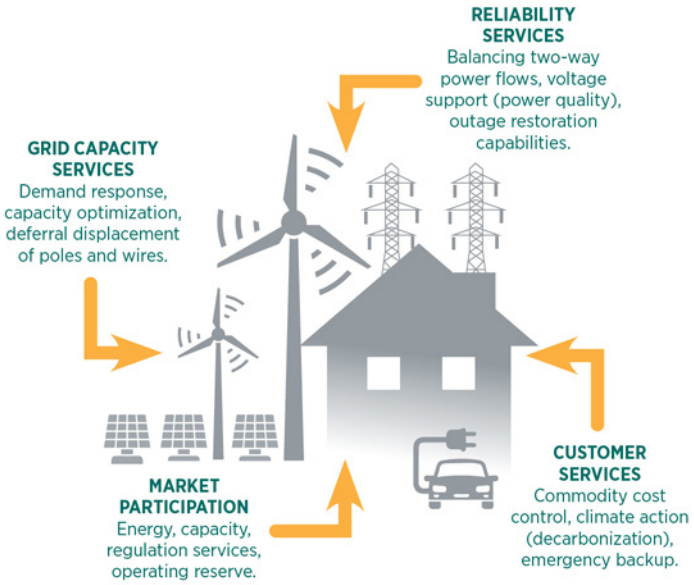
FIGURE 16: Typical energy storage system



Toronto Hydro investments in front-of-the-meter BESS projects that support traditional distribution system activities include grid performance systems for peak-shaving and power quality, as well as renewable enabling systems, which address generation-to-load imbalances resulting from high volumes of solar generation. *Figure 17* highlights some of the benefits of deploying NWAs.

Currently, Toronto Hydro does not have an incentivizing program for developers who are planning to install a BESS. However, we are willing to explore future applications. As such, developers considering energy storage and adding BESS components to new Toronto Hydro connections can reach out to the Toronto Hydro Development Planning team through your Key Accounts consultant or **keyaccounts@torontohydro.com**.

FIGURE 17: Value proposition of NWAs



Local Demand Response

The Local Demand Response (LDR) program is Toronto Hydro's flagship NWA initiative, which has been deployed successfully since the 2015-2019 rate period. The LDR program is a big step forward in evolving conventional utility station planning to include the consideration of NWAs alongside traditional poles and wires investments. This program is designed to help address short- to medium-term capacity constraints at targeted transformer stations by identifying opportunities where DR, including behind-the-meter and customer-owned DERs, can be leveraged to support the broader distribution system in a way that is cost-effective.

The LDR program relies on contractual capacity commitments made by third parties to Toronto Hydro. Meaning, Toronto Hydro will not be directly controlling or dispatching the LDR capacity.

Proponents will provide Toronto Hydro with a capacity offer via the procurement process, outlining the magnitude of capacity available (MW), the duration of this capacity (minimum of four hours of LDR), and the time period of availability (e.g., every summer business day between 11 a.m. and 9 p.m.).

Successful proponents will enter into a contractual agreement with Toronto Hydro, outlining the committed capacity and its attributes, the maximum number of LDR events, measurement and verification expectations, and all other program requirements.

During the obligation period, successful proponents will be considered "on-call" for Toronto Hydro to deploy as necessary to manage peak demand at the identified stations, as noted in *Figure 18*.

In exchange for their participation in the program, proponents will earn capacity payments relative to the capacity that they offer to be on standby for dispatch. LDR can provide an additional revenue stream for participants that are able to provide peak-shaving capability.

For more information on non-wires pilot projects and alternatives supported by Toronto Hydro within our system, speak to the Development Planning team during your project engagements.

FIGURE 18: LDR peak demand management schedule

Vehicle-to-grid electrification

Toronto Hydro understands that the world is changing rapidly. The evolving technology of EV batteries and chargers is expected to make it possible in the future for EVs to operate as Vehicle-to-Grid (V2G). This feature will add multiple benefits in addition to those already mentioned, for example:

- EVs will act as a BESS and Time-of-Use rates will make it possible for developments to save on their electricity bills by taking advantage of peak-shaving or energy arbitrage
- Participating in demand response programs can add to the savings on electricity bills and potentially add additional revenue streams
- Possibility of using more advanced control and management charging schemes to lower electricity bills
- EV batteries that have the capability to be deployed as BESS when not in transit can additionally form a microgrid connection with the use of grid automation technologies. This will enable the customer to enhance service resilience for their site

Toronto Hydro continues to expand our grid modernization and technologies to support our pursuit of being a forward-looking utility that works with developers to build for tomorrow. Any grid modernization or new technological considerations should be shared with the Development Planning team at Toronto Hydro during engagement and the connection process to ensure Toronto Hydro maintains our commitment to this pursuit.

Learn more about customer connections

For further details, please refer to our Conditions of Service at **torontohydro.com/conditionsofservice**.

Alternatively, you can speak to a Customer Service Representative directly by calling 416-542-8000 (press 4, then press 1 for services east of Yonge Street or 2 for services west of Yonge Street) from Monday to Friday, 8 a.m. to 4 p.m.

Additional connections

- For Distributed Energy Resource connections (such as solar panels and back-up generators), please visit **torontohydro.com/gridconnections**
- For information on electric vehicles and charging stations, visit **torontohydro.com/electricvehicles**

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