JULY 8, 2025

GTA North Regional Electricity Planning

Webinar #2
Needs and Options Screening

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Territory Acknowledgement

The IESO acknowledges that the GTA North (York Region) is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples, including those covered by the Williams Treaties.

The IESO would also like to acknowledge all First Nations, Inuit and Métis peoples and their valuable past and present contributions to this land.

Agenda

1. Ontario's Electricity Sector and the IESO's Role
2. Recap: Overview of Regional Electricity Planning, Demand Forecast and Feedback Received to Date
3. Preliminary Needs and Options Screening
4. Next Steps & Discussion

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We work with:

Generators >>> **Transmitters** >>> **Local Distribution Companies** >>> **Energy Consumers**

<<< **Communities** >>>

Summary

- In York Region, electricity demand could double by summer 2044, and triple by winter 2044 - driven by community growth, economic development and the electrification of buildings and vehicles.
- Meeting the pace of growth in York Region will require significant investments in new electricity infrastructure, including large-scale wires and non-wires solutions.
- Needs in York Region are primarily capacity driven or related to demand growth exceeding the existing infrastructure's supply limits.
- Both wires and non-wires options have been technically screened in to meet the needs. A detailed options analysis will be completed over the coming months to identify draft recommendations.
- Understanding feedback and community perspectives is important throughout the process.

Seeking Input

As you listen to the presentation today, we want to understand your feedback on the following:

- High-level wire and non-wire options screening
- Additional information that should be considered in the assessment of these options
- Perspectives on reducing reliance on York Energy Centre, including if transmission is the alternative option
- Additional information that should be provided in future engagements to help understand perspectives and insights

IESO welcomes written feedback until July 29.
Please submit feedback to engagement@ieso.ca using feedback form.

Recap: Regional Electricity Planning Process & the Demand Forecast

Electricity Planning in Ontario*

Provincial/Bulk System Planning

Addresses provincial electricity system needs and policy directions.

Underway: South and Central Bulk Study

Regional Planning

Addresses local electricity system needs at the transmission system level.

Underway: GTA North (York Region) Regional Plan

Distribution Planning

Addresses local electricity system needs and priorities at the distribution system level.

Led by local distribution companies.

*In the energy sector, the Ontario Energy Board ensures that consumers are treated fairly and projects are in the public interest.

York Region Area Summary

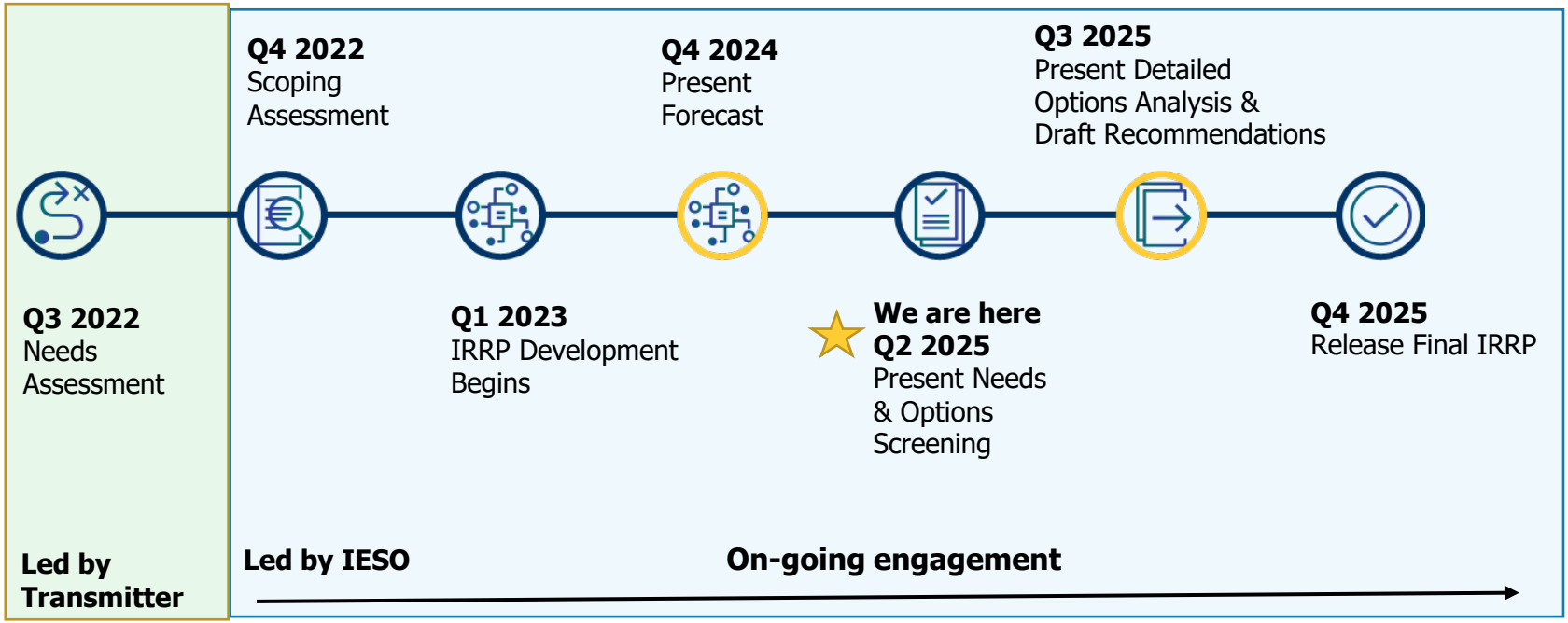
- Area is serviced by 500 kilovolt (kV) and 230 kV lines and transformer stations (TS).
- Majority of the electricity consumed in the region is generated outside of the region and brought to it through transmission.
- Infrastructure built over previous decades is concentrated to the south.
- York Energy Centre provides local capacity - crucial to meeting local reliability during periods of peak demand, or transmission outages.
- York Energy Centre contract expires in 2035 and will leave a supply gap of 400MW. Scenarios are being evaluated to understand the timing and options to address resulting needs.

Map for illustrative purposes

Background on Electricity Planning in GTA North

- Regional planning has been on-going in the GTA North electrical area (York Region) since 2005 as part of a broader, province-wide effort to address Ontario's evolving electricity needs.
- Previous recommendations to meet growing electricity needs included targeted funding for energy efficiency and innovation projects, and additional infrastructure (e.g. step-down stations) to address the modest growth that was forecasted.
- These solutions have ensured a reliable supply of electricity. Demand continues to grow, requiring more electricity planning.
- In parallel, a South and Central bulk system study is also underway and includes York Region.

Regional Planning Timeline



Components of a Regional Plan

Demand Forecast

How much power is needed over the planning timeframe?

We are here

Needs

What needs are emerging in the region that need to be addressed?

We are here

Potential Options

What kind of wires and non-wires options can meet the future needs for the region?

Recommendations

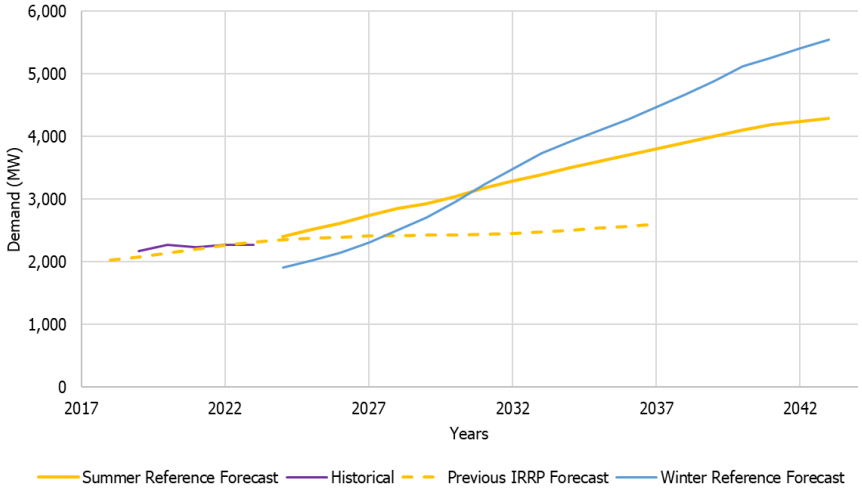
Based on an assessment of potential options, what recommended actions will ensure a reliable and adequate electricity supply for the region over the long-term?

Final York IRRP Demand Forecast

In York Region, demand could **double in the summer and triple in the winter by 2044** – by comparison, Ontario electricity demand could grow by 75% by 2050.

- Electrification of buildings and vehicles are a significant contributor to increasing electricity demand.
- The pace of growth is significant and would require large-scale wire and non-wire options.

The IESO will also evaluate a scenario to reduce reliance on York Energy Centre (YEC), by understanding the options and timing to ensure a reliable and affordable supply of power.



Feedback Received

Key Areas of Feedback	Incorporating Feedback/Considering Feedback
Greater transparency of forecasting considerations and methodology	To develop the draft demand forecast, forecast data is provided by each of the local distribution companies in the GTA North electrical area. The forecast data is based on established forecasting assumptions, customer connection requests, and insights from municipalities and stakeholders. To enable meaningful feedback, the IESO has posted the detailed methodology which contains inputs from the local distribution companies including Alectra, Hydro One Distribution, and Newmarket-Tay Hydro.
Consider non-wires solutions and support for district heating and cooling systems (DHCS)	Now that the forecast is finalized, the IESO has identified technical needs and completed an initial screening of wire and non-wire options. The Technical Working group (TWG) welcomes input on options available to reduce demand using low-carbon fuels and district energy. District heating and cooling will be considered on a case-by-case basis, dependent on the nature of the needs, in the options analysis phase.

Regional Electricity Needs

A Note on Planning Concepts

Capacity vs. Energy vs. Voltage	• Capacity represents the maximum amount of electricity that the system can supply in a point of time (measured in MW), energy (measured in MWh) represents the amount electricity provided over a period of time. Electricity is transmitted via different voltage levels (ranging from 13.8 to 500 kV) depending on the amount of electricity needed.
Peak demand	• Represents the highest levels of electricity consumption during specific periods of the year (i.e., summer, winter). This plays a very important role as there needs to be enough capacity to meet the highest level of demand.
Timing	• Near-term (2025 to 2030), and longer-term (2030+).
10 MW vs 100 MW	• 10 MW could power a university campus including dorms, classrooms and buildings, while 100 MW could power a substantial part of a city's infrastructure, including neighborhoods, commercial and public services. • 10 MW is significant but manageable, while 100 MW requires a number of solutions to meet the need.

Electricity Need Types

Generally, needs identified in this process fall under the following categories:

- **Station capacity:** Ability of a station to deliver power from the high-voltage grid down to the distribution system.
- **System capacity:** Ability of the transmission system to supply power through the transmission lines to a local area.
- **Asset renewal:** Station or transmission equipment replacement as determined by age and the assessed condition of the asset.
- **Load supply security:** Maximum amount of power that can be interrupted following specific planning contingencies.
- **Load restoration:** Ability of the system to restore power after an interruption or loss of load.

Needs Triggering Regional Planning (1/2)

	Need Type	Location of Need	Description
1-3	Station Capacity	Northern York Region, Markham, Richmond Hill	• Northern York Region's stations are at their capacity limit or require costly distribution to access. New station is recommended. • Markham area stations are expected to exceed their capacities by 2028. • Richmond Hill area stations are expected to exceed their capacities by 2030.
4-5	System capacity	Northern York	• Thermal overloads and voltage declines under certain worst-case contingencies. • Currently being managed by arming load rejections.
6	System Capacity	Parkway – Buttonville	• Circuits supplying Markham MTS #4 and Buttonville TS are expected to exceed their capacities by 2031.
7-8	Station Capacity (longer term)	Vaughan, Northern York, Markham	• Vaughan area stations are expected to exceed their capacities by 2032. • Northern York and Markham exceed capacities by mid-2030s.

The numbers correspond to the needs Map on slide 20.

Needs Triggering Regional Planning (2/2)

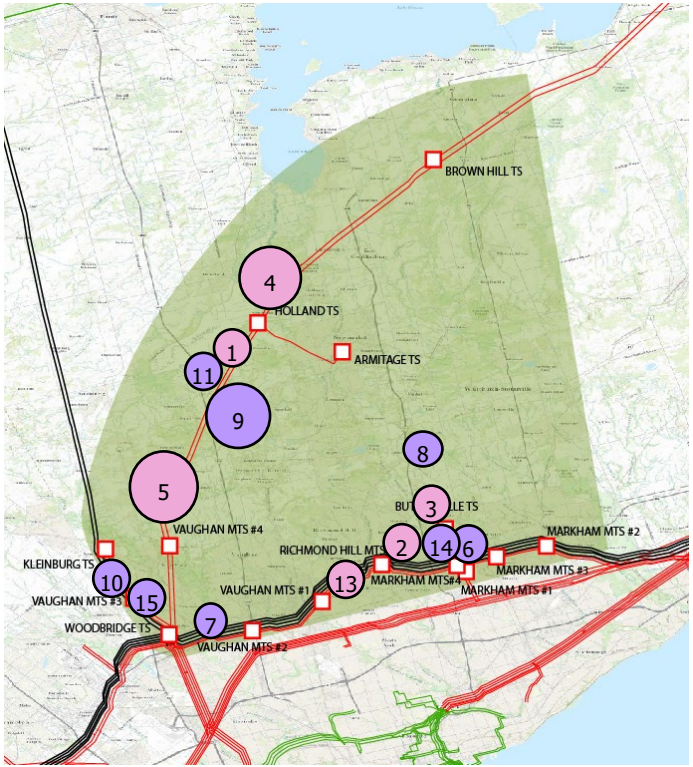
	Need Type	Location of Need	Description
9	System Capacity	Northern York: Claireville – Holland – Brownhill	Circuits supplying Northern York Region stations can exceed thermal capacity today. Currently being managed by arming Load Rejection during high peak periods. Additional capacity required to accommodate new step-down stations.
10-12	Load Restoration (immediate and longer term)	Claireville – Kleinburg Claireville – Holland – Brownhill Parkway – Buttonville	• Inability to restore customer loads within the timelines established by planning criteria following a major system disturbance
13-15	Load Security (immediate and longer term)	Parkway - Claireville Parkway – Buttonville Claireville – Kleinburg	• The loss of this line can result in an interruption to over 600 MW of customer load, which is more than permitted by planning criteria

The numbers correspond to the needs Map on slide 20.

Electricity Needs in York Region

Based on forecasted growth, the following needs have been identified:

Timing	Impacted Equipment
Near-term	3 station capacity needs 2 system capacity needs 1 load security need
Longer-term	3 station capacity need 2 system capacity need 3 load restoration needs 2 load security need



The numbers correspond to the needs detailed in slides 18 and 19.

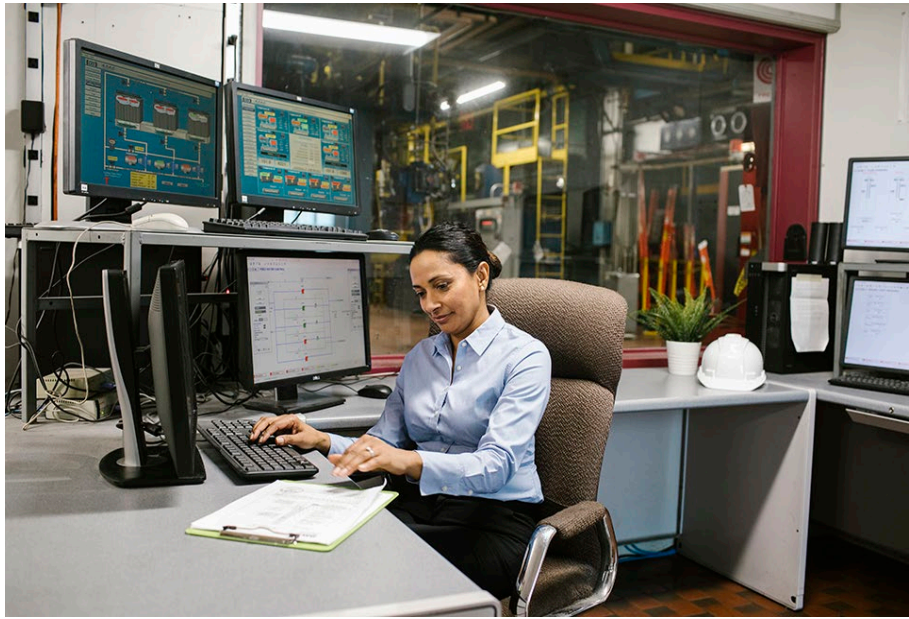
Electricity Needs in York Region

Significant electricity infrastructure needs are required to meet growing demand, which will require innovative solutions.

- Needs are primarily capacity driven or related to demand growth exceeding the existing infrastructure's supply limits.
- More transmission is needed in the North to support anticipated growth.

Given the magnitude of the forecast, actions will be recommended **primarily to address near-term needs.** Solutions will be identified to address longer-term needs and will be recommended once needs arise.

In addition to meeting longer term needs, a scenario is being evaluated to reduce reliance on York Energy Centre (YEC) and address the 400MW supply gap - a combination of wires and non-wire options will be needed.



Options Screening

Background: Determining Options

A combination of wire and non-wire options may be needed to address the needs, and over the course of the planning process, the Technical Working Group will:

- **Screen various options** to address the region's near, medium and long-term electricity needs for the reference forecast, including:
  -  Traditional wires options to supply the local area
  -  Non-wires alternatives (NWAs), such as transmission-connected generation or energy storage, conservation and demand management, distributed generation or demand response
- **Complete a detailed analysis** of screened-in options to recommend solutions to meet needs.

The IESO will share the outcomes and seek community feedback at key milestones to enhance development and evaluation of options before making a final recommendation. The Technical Working Group will recommend options that address needs from the reference forecast and also consider options to address potential growth as part of the high electrification forecast to act quickly if/when higher growth materializes.

Screening Steps

1. Type of Need	2. Need Traits	3. Additional Considerations
Evaluate the compatibility of the need with the various option types, based on technical requirements and permissibility under planning standards and criteria.	Further filter compatible options with high-level need traits (such as timing, size, and coincidence with system needs).	Take into account local factors that may require further analysis of non-wire alternatives, even if earlier steps haven't identified non-wires alternatives as suitable.

Screening Option Type Outcomes

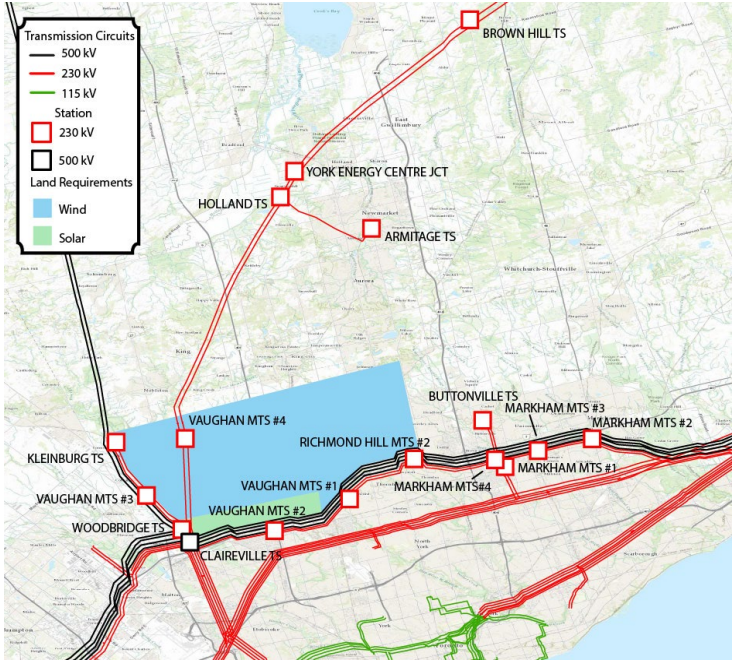
Need Type	Screened in for further detailed evaluation	Screened out to solely meet the need(s)
System Capacity	• Wires (such as upgrading existing lines or building new lines) • Wires plus integrated approaches (Energy Efficiency, Energy Resources, i.e., dispatchable generation, energy storage)*	• Transmission connected intermittent generation such as wind generation, and wind and/or solar + battery storage
Station Capacity	• Wires • Wires plus integrated approaches (Energy Efficiency)	• Transmission connected intermittent generation such as wind generation, and wind and/or solar + battery storage
Load Restoration & Security	• Wires (such as upgrading existing lines)	• Distributed generation and transmission connected generation

Screened Out Options

Transmission connected renewable generation was screened out to solely meet the station and system capacity needs, given:

- Intermitted resources like solar and wind, require large battery and charging equipment to meet the needs.
  - Given, the long-term winter needs, in addition to summer needs, a solar-only solution was screened-out.
  - Wind-only solutions would require around 20,263 hectares of land in York Region – very large land requirements.
- Combination of solar, wind, and batteries would still have large land requirements, and if built further away would require new transmission to connect the generation and BESS facilities.

All these options as standalone solutions to meet the needs are not sufficient, but in combination with wires will be further evaluated.



Conceptual visualization of the land needed for screened out options.

Options Under Evaluation to Address Near-term Needs

To address near-term needs, a number of options are technically feasible and will be further evaluated:

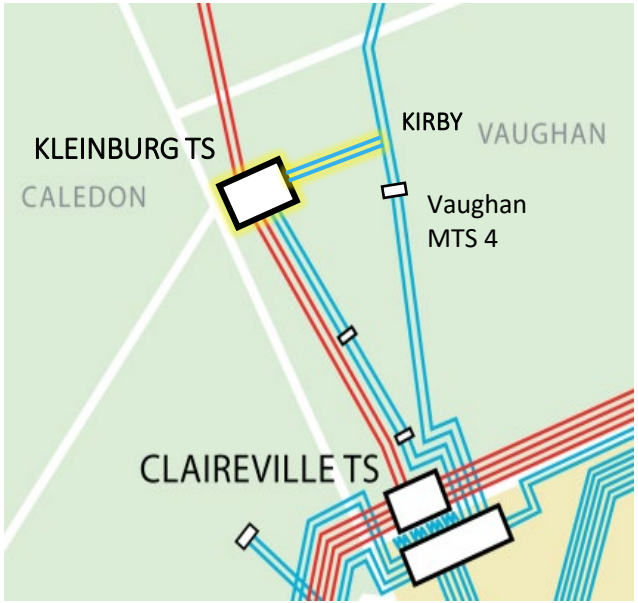
Wires

- New transmission from Kleinburg-Kirby (*see green highlight on map*):
- Build out of Kleinburg Transmission Station (*see dark green on map*)
- Replace or upgrade existing wires on transmission lines (*see yellow on map*)
  - Parkway to Buttonville and Kirby to Holland
- Increase resilience and reliability of connection arrangement for YEC (*see purple*)
- New step-down stations (*see red on map*)
  - Northern York, Markham and Richmond Hill

In combination with wires, non-wire options such as transmission-connected generation and/or storage, and energy efficiency will also be evaluated.

New Kleinburg to Kirby Transmission Line

- Approx 6-8 km new transmission section linking Kleinburg transmission station (TS) to existing transmission near intersection of Kirby and Kipling Ave, see highlight in yellow on map.
- Co-location with proposed Highway 413.
- Enables additional station capacity further north.
  - Replacing or upgrading existing wires north of the Kirby intersection could potentially enable additional load meeting capacity.
- Coordination with bulk system enhancements at Kleinburg TS, and regional growth meeting needs in GTA West.



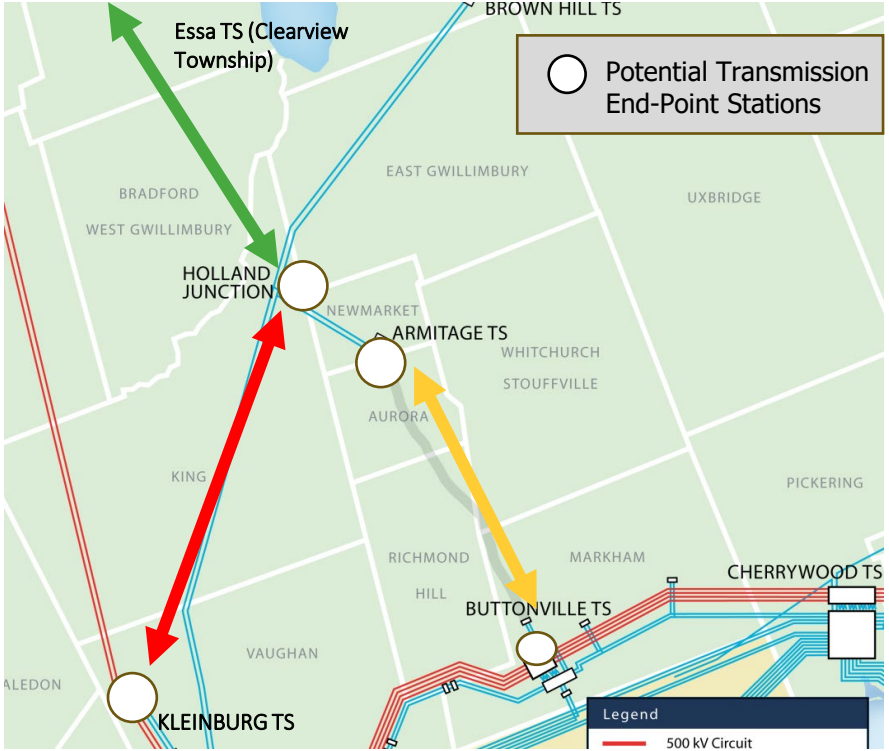
Options Under Evaluation to Address Longer-term Supply Needs

To meet long-term needs and reduce reliance on York Energy Centre, the following options are technically feasible and will be further evaluated:

Wires

- Expanded Kleinburg TS facilities, plus new transmission to address supply post YEC.
- New transmission line options to provide supply into northern York (notionally shown as Holland junction):
  - Between Kleinburg-Holland Junction (shown in red)
  - Between Essa-Holland Junction (shown in green)
  - Between Buttonville-Armitage (shown in yellow)

In combination with wires, non-wire options such as transmission-connected generation and/or storage, and energy efficiency will also be evaluated.



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Options Under Evaluation to Address Longer-term Station Needs

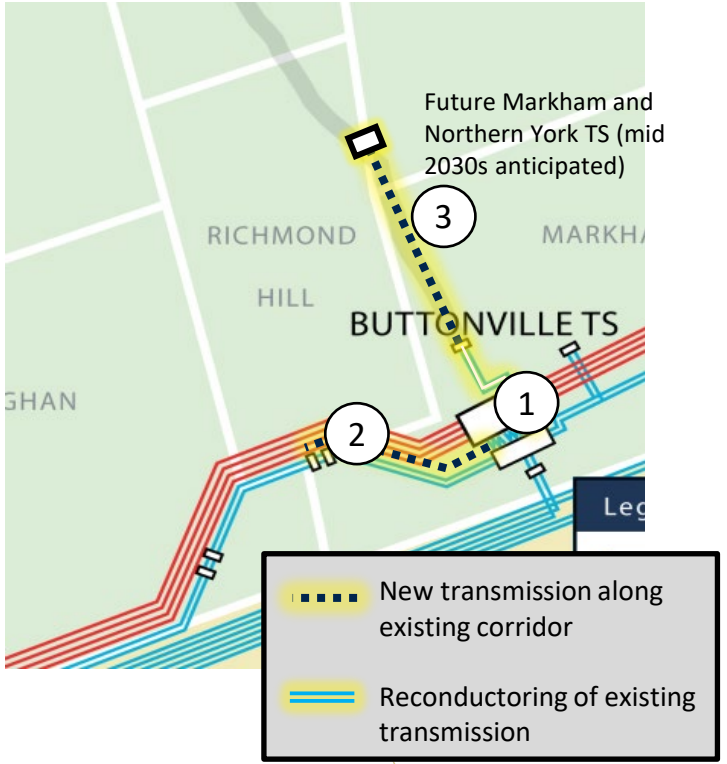
To meet needs associated with longer-term step-down stations in Vaughan, Markham, and Richmond Hill:

Wires

1. Reconductoring of existing lines between Parkway TS and Buttonville TS.
2. New transmission along existing corridor to provide alternate supply into Markham and Richmond Hill.
3. Rebuild existing idle transmission north into Markham to supply Markham and Northern York step down stations closer to load growth area.

In combination with wires, non-wire options such as transmission-connected generation and/or storage, and energy efficiency will also be evaluated. This may become crucial if winter peaks significantly exceed summer peaks in the longer term.

Need not anticipated until mid 2030s.



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York Energy Centre Considerations

A scenario is being evaluated to understand the timing and options to reduce reliance on York Energy Centre (YEC), and address the 400MW supply gap, in addition to meeting incremental growth in the area. Some considerations to address this long-term need include:

- A high-voltage transmission line can bring in sufficient energy from sources located in other regions, OR;
- Building ~400MW of effective capacity through new local power generation within York Region, plus additional ability to meet incremental growth needs would maintain a local supply solution. Key considerations:
  - If source is intermittent, must also be supported by battery storage to ensure reliability. Typically, double the capacity of storage would be required because renewables are variable, and storage must compensate for both generation shortfalls and demand spikes, while being available during several hours of peak conditions (~800MW needed, in addition to incremental growth needs). Significant land use requirement for solar and wind (see earlier slide).

Given limitations with siting both transmission and generation in York Region, reducing reliance on YEC could be achieved, but would likely require a combination of wires and non-wire options to address the system needs.

Options Summary

Timeframe	Approach	Addresses
Near-Term	• Urgent transmission options (Kleinburg to Kirby line, replacing existing wires, and new & upgraded stations) • York Energy Centre station service • Non-wire options (Energy Efficiency, Energy Resources, i.e., dispatchable generation, energy storage)	• Northern York Region, Markham, Richmond Hill station needs • Northern York: Claireville – Holland – Brownhill supply needs • Immediate capacity constraints due to load growth • Increases customer reliability
Longer-Term	• New transmission lines to provide additional supply into Northern York • New transmission to provide supply into Northern Markham and Richmond Hill • Non-wire options (Energy Efficiency, Energy Resources, i.e., dispatchable generation, energy storage)	• York Energy Center phase out • Parkway – Buttonville supply needs • New supply into Markham and Richmond Hill • Vaughan station needs • Enables system wide reliability & capacity

Key Considerations for Determining Options

Next, we will conduct a detailed analysis of all screened in options and then share the draft recommendations. The below table illustrates key considerations for the analysis:

Consideration	Key Details
Technical Feasibility	The TWG will screen all options, including wires and non-wires alternatives, with respect to established criteria and guidelines (e.g., ORTAC, Guide to Assessing Non-Wires Alternatives, etc.). Only options that can meet technical criteria will be considered further.
Economics	All technically feasible options are assessed for their cost-effectiveness. Typically, the options with the lowest net present value of annual net consumer costs are usually selected as the preferred recommendations in IRRPs. Preferred options that have similar economic performance would be subject to other considerations before arriving at a recommendation.
Timing	The IRRP recommendations will depend on timing of need and lead time of most appropriate solution. E.g., energy efficiency programs can be implemented quickly, while transmission reinforcement projects require 7-10 years.
Community Considerations	Community preferences and feedback regarding potential options, for example resiliency.

Energy Efficiency Opportunities

- To help meet the province's rapidly growing demand for electricity, the IESO's energy efficiency programs, through Save on Energy, has been expanded from $1 billion over four years, to $10.9 billion over 12 years.
- Key programs of interest to your municipality, residents and small businesses include:
  - Peak Perks – Residential and small business electricity customers with an eligible smart thermostat can be rewarded for reducing their energy use when demand for electricity is high in the summer.
  - Home Renovation Savings – Homeowners can get rebates up to 30% for home energy efficiency renovations and improvements.
  - Retrofit – Facility/building owners and lessees can get up to 50% of eligible project costs covered for targeted energy efficiency retrofits.
  - Energy Affordability Program – Support for income-eligible electricity customers to better manage monthly electricity costs and increase their home comfort.
- Some programs will expand later in 2025 – to stay informed, sign up for the quarterly newsletter.

Next Steps & Discussion

Ongoing Engagement

Your input plays an important role in developing the electricity plan.

Participate in upcoming public webinars

Subscribe to receive updates on the IESO website –> select GTA North

Follow the GTA North regional planning activities online

Visit Powering the GTA website

Next Steps

The IESO will continue to engage throughout the IRRP's development. Communities can expect to hear from the IESO at these milestones:

July 29, 2025: deadline for feedback to the IESO on needs and options screening webinar.

Q3, 2025: draft recommendations are presented in a public engagement webinar with an opportunity to provide feedback.

Q4 2025: IRRP report and data tables will be completed and published on the webpage.

After IRRP: Depending on the recommendations of the IRRP, the following next steps can be expected:

- For wired solutions, the transmitter will lead the development of a Regional Infrastructure Plan, which assesses and develops a detailed plan on how wire options can be implemented.
- For non-wire solutions, new resources will be procured through the IESO's Resource Adequacy Framework (e.g., competitive procurements), while new energy efficiency programs would be implemented through the IESO's Conservation and Demand Management Framework.

Summary of Needs and Options Screening

- Needs in York Region are primarily capacity driven or related to demand growth exceeding the existing infrastructure's supply limits.
- The transmission system is primarily concentrated in the South of York Region. Therefore, more transmission is needed in the North to support anticipated growth.
- Wire options were screened in to address the system and station capacity needs in GTA North because they are proven to be scalable, reliable, and cost-efficient. Screened in options include new step-down stations, new transmission, and upgrading/replacing existing transmission.
- Renewable generation and storage as standalone solutions to meet the needs are not sufficient. Non-wires such as generation and/or storage and energy efficiency, will be evaluated in combination with wires.
- In addition to meeting incremental growth in the area, a scenario is being evaluated to reduce reliance on York Energy Center (YEC). At this stage, technically feasible options include new transmission, and non-wires in combination with wire options are being evaluated.

Seeking Input

Local considerations and feedback are a critical component to the development of an Integrated Regional Resource Plan (IRRP). As the options phase of the IRRP continues to identify how to best meet the area's infrastructure needs, the IESO wants to hear your perspectives about:

- High-level wire and non-wire options screening
- Additional information that should be considered in the assessment of these options
- Perspectives on reducing reliance on York Energy Centre, including if transmission is the alternative option
- Additional information that should be provided in future engagements to help understand perspectives and insights

IESO welcomes written feedback until July 29.
Please submit feedback to engagement@ieso.ca using feedback form.

Thank You

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Appendix

IRRP Technical Working Group

Team Lead, System Operator	• Independent Electricity System Operator
Lead Transmitter	• Hydro One Networks Inc. (Transmission)
Local Distribution Companies	• Alectra Utilities Corporation • Newmarket-Tay Power Distribution Ltd. (NT Power) • Hydro One Networks Inc. (Distribution)

Regional Electricity Planning in GTA North

Regional planning has been on-going in the GTA North (York Region) electrical area and across Ontario to address electricity needs.

Informed by feedback, the plan considers new growth, redevelopment, alignment with climate action plans, and the implications of reducing reliance on the York Energy Centre.

Indigenous communities that may be potentially impacted or may have an interest based on treaty territory, traditional territory or traditional land uses: Alderville First Nation, Beausoleil First Nation, Chippewas of Georgina Island First Nation, Chippewas of Rama First Nation, Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation, Mississaugas of the Credit First Nation, Six Nations of the Grand River as represented by Six Nations Elected Council as well as the Haudenosaunee Confederacy Chiefs Council, and Métis Nation of Ontario.

Map for illustrative purposes

Screened in - Wires

Wires options were screened in to address the system capacity needs in GTA North because they are proven to be scalable, reliable, and cost-efficient. Wires options can:

- support growing electricity needs by **moving large volumes of electricity** into York Region where local generation alone can't supply
- Provide high reliability by enabling **fast response** to system needs during peak hours or emergencies
- Improve redundancy by offering **multiple paths for power to flow**, reducing risk of equipment failure or weather events
- provide an opportunity to build step down stations which are **critical for safe, local power distribution** which convert high-voltage power to the lower voltage needed for homes and businesses.
- Are often **more affordable on a per-megawatt basis**, especially when sharing infrastructure across regions

NWA such as storage and energy efficiency, will be evaluated in combination with wires given the growing electricity demand identified in York Region. NWA may be helpful in improving customer reliability, particularly before transmission can come into service.