OCTOBER 24, 2024

Burlington to Nanticoke Regional Electricity Planning

Engagement Webinar #3
Options Analysis and Draft Recommendations

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Agenda

- Ontario's Electricity Sector and IESO's Role
- Recap: Regional Electricity Planning Process, Demand Forecast and Electricity Needs
- Options Analysis and Draft Recommendations
- Update for Hamilton
- Discussion & Next Steps

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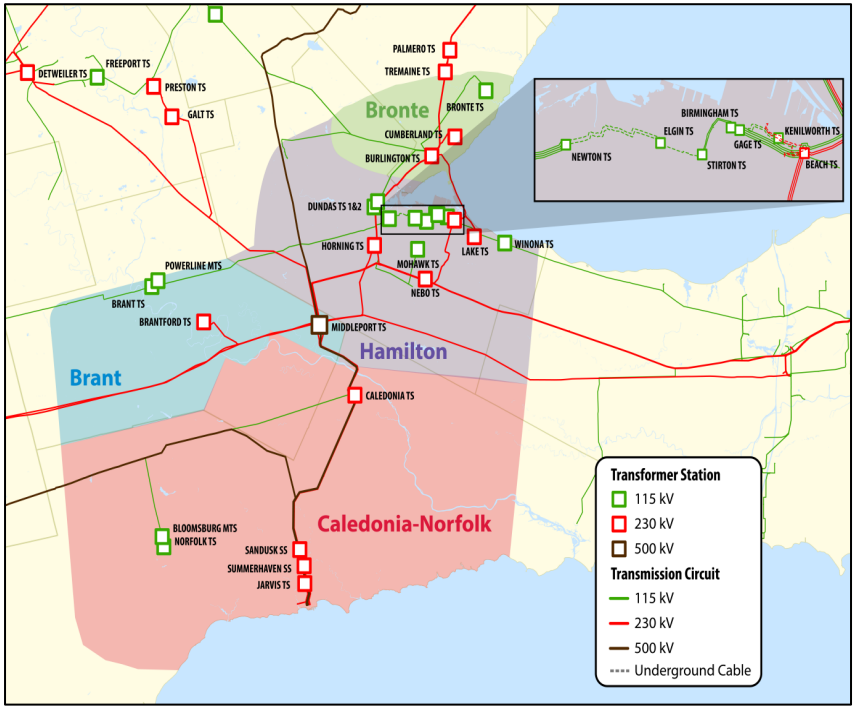
Burlington to Nanticoke Electrical Region

An electricity plan – Integrated Regional Resource Plan (IRRP) – is being developed for Burlington to Nanticoke to ensure a reliable supply of electricity over the next 20 years.

The IRRP is being developed by a Technical Working Group, led by the IESO, and consisting of the local distribution companies and the transmitter.

The area is divided into four electrical sub-regions.



Map for illustrative purposes.

Updates Since June Webinar

- In June 2024, the IESO hosted a public engagement webinar to share Caledonia-Norfolk and Brant's needs, and screening of potential options. The IESO requested public feedback and a response from the IESO was posted on the engagement webpage.
- The Technical Working Group, led by the IESO, and consisting of the local distribution companies and the transmitter, have progressed the studies in the region and will share the below updates in this webinar for feedback:
  - Caledonia-Norfolk and Brant option's analysis and draft recommendations
  - Hamilton's demand forecast
- The IESO is undertaking a parallel planning study, South and Central Bulk Study, that will review the capability of the bulk system to enable economic development between the Hamilton and Windsor areas.

Seeking Input

Local considerations and feedback are a critical component to the development of an Integrated Regional Resource Plan (IRRP). The IESO wants to understand:

- What feedback is there on the proposed recommendations?
- What information needs to be considered in these recommendations?
- How can the IESO continue to engage with communities and stakeholders as these recommendations are implemented, or in preparation for the upcoming addendum?
- What are some key developments, projects or initiatives that should be considered as the Hamilton demand forecast is finalized?

Please submit your written comments by email to engagement@ieso.ca by November 7, 2024

Recap: Regional Electricity Planning Process, Demand Forecast and Electricity Needs

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: Burlington to Nanticoke IRRP

Distribution Planning

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

Led by local distribution companies.

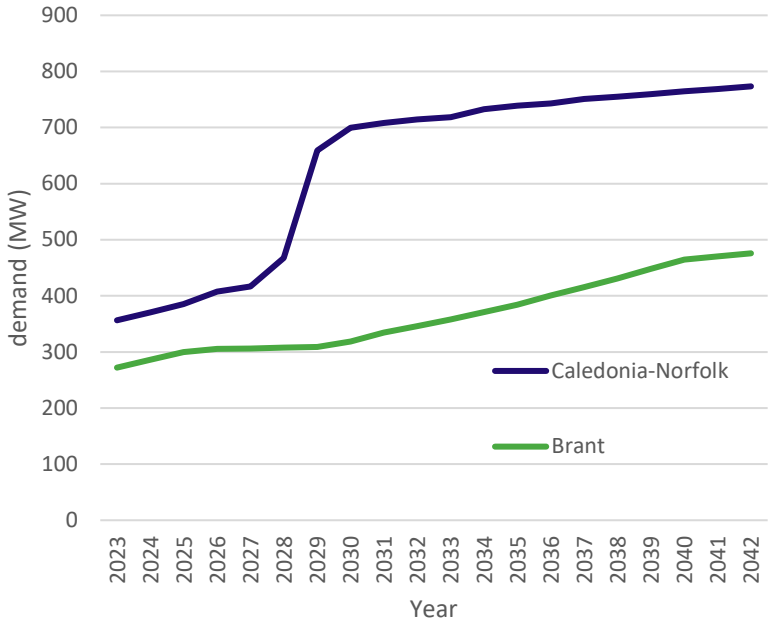
Components of an IRRP

Demand Forecast	Needs	Screening Solutions	Recommendations
How much power is needed over the planning timeframe?	What needs are emerging in the region that need to be addressed?	What kinds of solutions can meet the future needs for the region?	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?

Recap: Caledonia-Norfolk and Brant Demand Forecast

Key Details

- The forecast includes inputs from the local distribution companies, municipalities and customers. It also factors in key details, such as demand side management initiatives and weather.
- Growth in both sub-regions is expected to exceed the 2-3% annual growth rate for Ontario:
  - Caledonia-Norfolk: 6% annual growth rate, driven by industrial electrification
  - Brant: 4% annual growth rate, driven by industrial electrification and housing
- With the demand forecast final, the Technical Working Group used it to determined the infrastructure's electricity needs. Several technical studies were conducted to ensure the system can operate reliably and within standards.



Recap: Electricity Needs in Caledonia-Norfolk

In Caledonia-Norfolk, the sub-region has station and supply capacity needs. Details on these needs are outlined below:

			Magnitude	
Electricity Need	**Impacted Infrastructure**	**Timing**	**2023**	**2042**
Station Capacity: the ability of a station to deliver power from the grid down to the distribution system.	Bloomsburg Municipal Transformer Station (MTS)	Near-term	8 MW	16 MW
	Norfolk Transmission Station (TS)	2031	0 MW	16 MW
	Caledonia TS*	2034	0 MW	20 MW
Supply Capacity: the ability of the system to supply power through the transmission lines to a local area.	Line C9 & C12: 115kV lines from Caledonia TS to Bloomsburg MTS and Norfolk TS	Near-term	34 MW	79 MW

*Updated forecast shows an emerging capacity need at Caledonia TS

Update: Electricity Needs in Brant

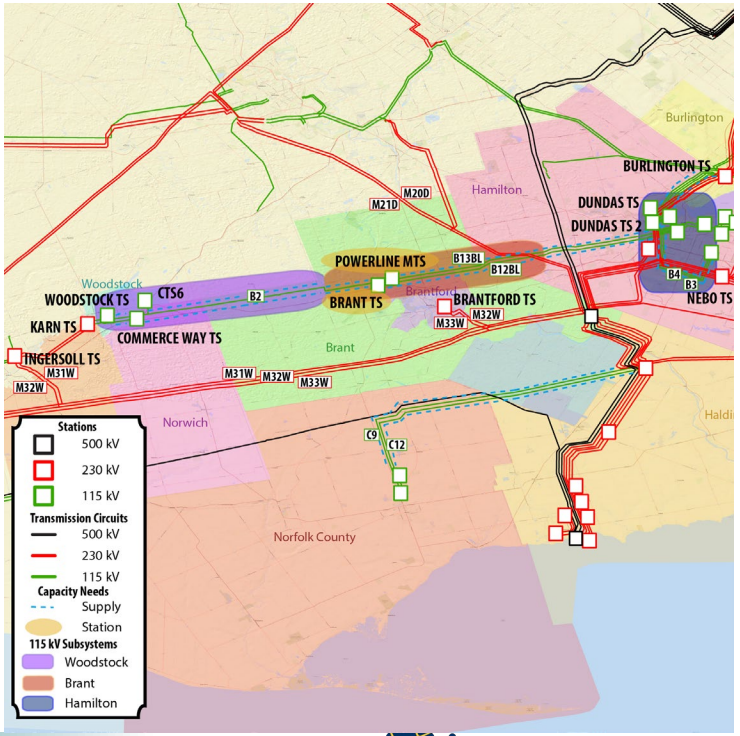
The study area for the Brant sub-region includes 115kV lines that run from the London Area Electricity Region (Woodstock Subsystem) to the Hamilton Electricity Region (Hamilton Subsystem).

To fully assess the supply capacity electricity needs in Brant, the Technical Working Group had to consider the entire 115kV lines rather than only the portion within the sub-region.

To clarify the different areas, they are grouped by the following subsystems:

- Woodstock
- Brant
- Hamilton

When referring to the three subsystems together, it is referred to as the "Brant Extended Area."



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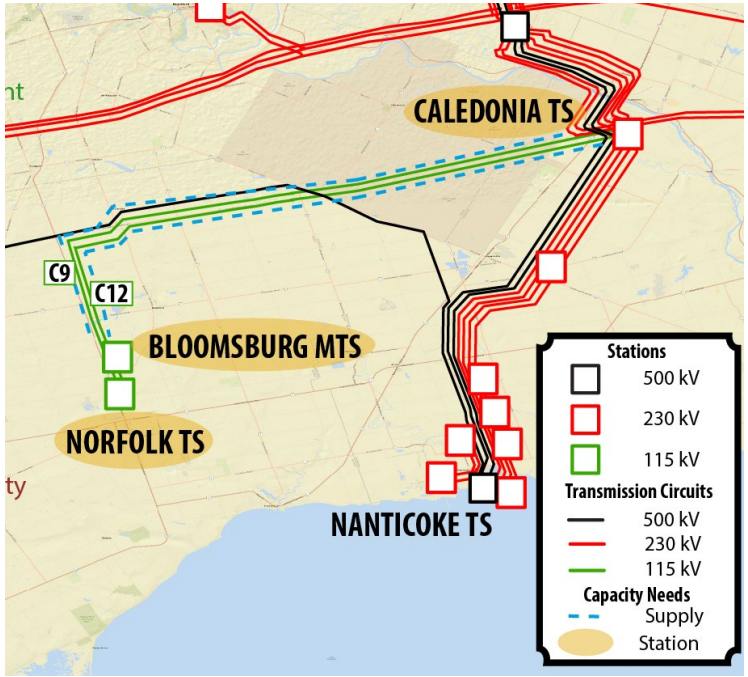
Recap: Electricity Needs in Brant

The Brant Extended Area has station and supply capacity needs. Details on these needs are outlined below:

			Magnitude	
Electricity Need	**Impacted Infrastructure**	**Timing**	**2023**	**2042**
Station Capacity: the ability of a station to deliver power from the grid down to the distribution system.	Powerline Municipal Transformer Station (MTS)	2026	0 MW	68 MW
	Brant Transmission Station (TS)	2027	0 MW	41 MW
	Dundas 1 TS	2025	0 MW	59 MW
	Dundas 2 TS	Near-term	1 MW	40 MW
Supply Capacity: the ability of the system to supply power through the transmission lines to a local area.	Brant 115 kV Subsystem	Near-term	1 MW	115 MW
	Brant + Hamilton 115 kV Subsystem	Near-term	5 MW	387 MW
	Woodstock 115kV Subsystem	Near-term	20 MW	47 MW

Recap: Caledonia-Norfolk Options Screening (1/2)

Need	Screened In	Screened Out
Station Capacity: • Bloomsburg MTS • Norfolk TS **Supply Capacity:** • Line C9 & C12	• Operational measures • Conservation and demand management (CDM) • Distribution-level load transfer • Transmission-connected generation* • Wire options	• Demand response is screened out due to magnitude and timing of need • Distributed generation was initially screened in; however, it had to be screened out due to short circuit and thermal limitations identified through options analysis studies

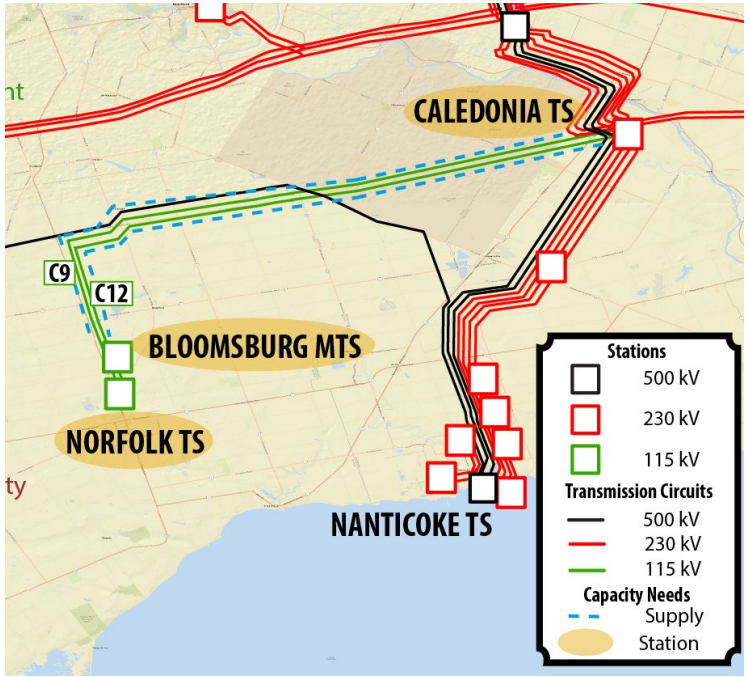


* Emitting resources were not considered.

New: Caledonia-Norfolk Options Screening (2/2)

This slide provides the options screening for the newly identified need at Caledonia TS.

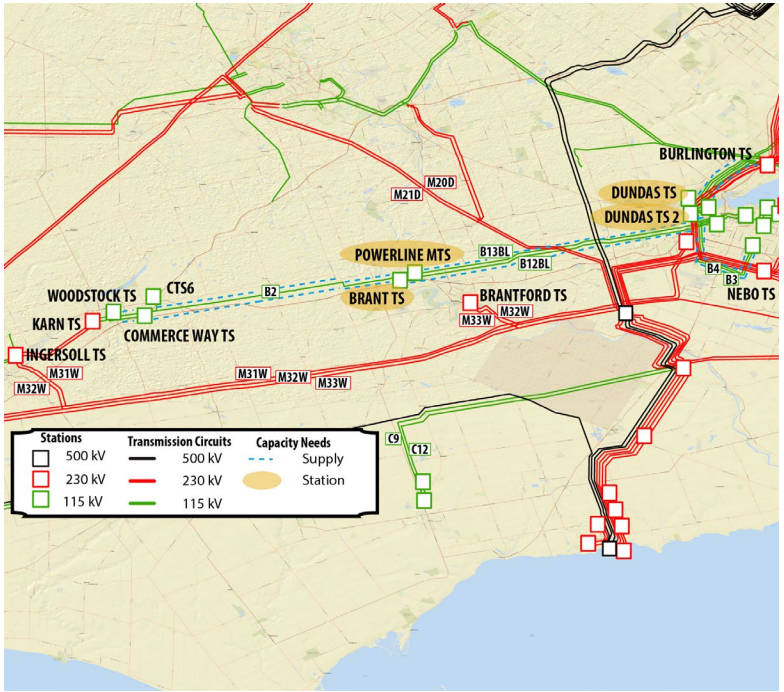
Need	Screened In	Screened Out
Station Capacity: • Caledonia TS	• Conservation and demand management (CDM) • Demand response • Distributed generation* • Distribution-level load transfer • Wire option (new stepdown transformers)	• Transmission-connected generation



* Emitting resources were not considered.

Recap: Brant 115kV Extended Area Options Screening

Need	Screened In	Screened Out
Station Capacity: • Powerline MTS • Brant TS • Dundas 1 • Dundas 2 **Supply Capacity:** • Brant Extended Area	• Operational measures • Conservation and demand management (CDM) • Transmission-connected generation* • Wire options	• Demand response is screened out due to magnitude and timing of need • Distributed generation was initially screened in; however, it had to be screened out due to short circuit and thermal limitations identified through options analysis studies



* Emitting resources were not considered.

Summary of Feedback Received

Feedback on Options	Consideration of Feedback into Draft Recommendation
Consider non-wires alternatives, such as Conservation and Demand Management (CDM), to support immediate and long-term needs	The Caledonia-Norfolk and Brant demand forecast includes forecasted demand savings from CDM programs and distributed generation. As part of the regional planning process, the IESO has screened and evaluated wire and non-wire options, such as transmission-connected generation or storage, CDM, distributed generation and demand response to meet the needs and consider reliability, cost, technical feasibility, maximizing the use of the existing electricity system (where economic), and community preferences. For more details regarding the analysis of non-wire alternatives during IRRPs, the IESO has developed a guide to the current general approach for evaluating non-wires alternatives (NWAs).
Preferences regarding the options and an interest in costs	A comparison of all options considered in this IRRP will be shared for feedback including the planning-level estimates of expected costs of each option. The Technical Working Group encourages all interested parties to provide feedback on these findings prior to the completion of the IRRP.

Options Analysis and Draft Recommendations

Options Analysis

Options are evaluated based on the following key considerations:

Technical Feasibility	• Can the option actually be executed? i.e., proximity to customers, routing and spacing considerations, operations
Ability to Address Needs	• Are the number, magnitude, and diversity of needs adequately addressed?
Integration & Cost-Effectiveness	• What is the lowest cost solution considering the possibility that one option may be able to address multiple needs simultaneously? • Would a combination of option types be most effective?
Lead Time	• New transmission infrastructure or resource procurement/development could take 4-10 years – how does this compare to the timing of needs?

Caledonia-Norfolk Draft Options

Screened In	Options
• Operational measures • Conservation and demand management (CDM) • Distribution-level load transfer • Transmission-connected generation • Wire options	(1) Open bus-tie breakers at Norfolk TS or Bloomsburg MTS as needed
	(2) Dynamic voltage support devices with additional conservation and demand management (CDM) and distribution-level load transfers at Norfolk/Bloomsburg stations
	(3) Build a transmission-connected battery storage facility capable of providing voltage support at Norfolk TS, potentially combined with other NWAs, e.g., a wind and/or solar farm, distribution-level load transfers, and additional conservation and demand management measures
	(4) Rebuild existing 115kV lines/stations between Norfolk TS to Caledonia TS into 230kV (5) Build a new 230kV lines/stations from Nanticoke-Middleport corridor to Norfolk/Bloomsburg area (6) Build a new 230kV lines/stations from Nanticoke TS to Norfolk/Bloomsburg area

*exact routing and siting are subject to transmitter-led development work after the regional plan

Caledonia-Norfolk Options Analysis (1/2)

An analysis for each option was conducted, which helped identified the draft preferred options.

Option	(1) Open bus-tie breakers at Norfolk TS or Bloomsburg MTS as needed	(2) Dynamic voltage support devices with CDM and distribution-level load transfers to meet near-term station capacity needs	(3) Transmission-connected battery storage facility capable of providing voltage support at Norfolk TS, potentially combined with other NWAs, e.g., a wind and/or solar farm, distribution-level load transfers, and additional CDM measures
Technical Feasibility	✓ Feasible	✓ Feasible	✓ Feasible
Ability to Address Need	✓ Meets near-term needs × Can reduce load supply reliability × Does not enable growth	✓ Meets near-term needs × Does not enable growth × Limits capacity of upstream 230 kV system	✓ Meets medium-term needs ✓ Provides capacity/energy benefits to the provincial grid, needed regardless of local needs ✓ Allows incremental investment as needs arise × Does not enable growth × Limits capacity of upstream 230 kV system
Cost Estimate*	No significant expenditures	$140 M + cost of load transfers	$260-310 M + cost of load transfers (system value of local resources has not been captured)
Lead-Time	None	2 years	4-6 years

*costs are in net-present-value (NPV) of the lifetime cost of the asset

Caledonia-Norfolk Options Analysis (2/2)

Option	(4) Rebuild existing 115kV lines/stations between Norfolk TS to Caledonia TS into 230kV	(5) New 230kV lines/stations from Nanticoke-Middleport corridor to Norfolk/ Bloomsburg area	(6) New 230kV lines/stations from to Nanticoke TS to Norfolk/ Bloomsburg area
Technical Feasibility	✓ Feasible	✓ Feasible	✓ Feasible
Ability to Address Need	✓ Meets long-term needs ✓ Enables growth ✓ Releases capacity of upstream 230 kV system	✓ Meets long-term needs ✓ Enables growth ✓ Releases capacity of upstream 230 kV system	✓ Meets long-term needs ✓ Enables growth in multiple areas ✓ Releases capacity of upstream 230 kV system
Cost Estimate*	$240 – $340 M	$140 – 200 M	$140 – 200 M
Lead-Time	7-10 years	7-10 years	7-10 years

*costs are in net-present-value (NPV) of the lifetime cost of the asset

Summary of Caledonia-Norfolk Analysis

Six non-wire and wire options to meet electricity needs and enable growth in the Caledonia-Norfolk sub-region were considered. The Technical Working Group's detailed options analysis is summarized below:

- **Near-term**: Operational measures like opening bus-tie breakers at Norfolk/Bloomsburg stations (Option #1) provides a low cost, immediate solution. This is preferable to utilizing dynamic voltage support with conservation and demand management (Option #2), which involves higher costs and longer lead time.
- **Medium-term:** A transmission-connected battery storage facility capable of providing voltage support at Norfolk TS, potentially combined with other NWAs, e.g. a wind and/or solar farm, distribution-level load transfers, and additional conservation and demand management measures (Option #3) offers a flexible non-wire solution. This approach allows incremental investment, reducing overbuilding, lowering provincial capacity procurement needs, and continuing to support the grid if the 115 kV system is offloaded onto the 230 kV system – something dynamic voltage devices (Option #2) cannot achieve.
- **Long-term:** To enable future growth across multiple areas, building new 230 kV lines/stations from Nanticoke TS to the Norfolk/Bloomsburg area (Option #6) is the leading option among three evaluated wire alternatives.
- **Monitoring**: Station capacity need at Caledonia TS is a long-term need with no immediate actions required. It is recommended to monitor the demand for any change that advances the station capacity need and explore potential non-wire options, such as CDM, to delay or meet the need.

Brant 115 kV Extended Area – Draft Options

Screened In	Options
• Operational measures • Conservation and demand management (CDM) • Transmission-connected generation • Wire options	(1) Open Brant DB2 Breaker and bus-tie breakers as needed
	(2) Implement additional conservation and demand management programs
	(3) Build a transmission-connected battery storage facility with voltage support, possibly in combination with additional CDM, wind farm, and/or solar farm at Brant TS and Newton TS
	(4) Upgrade the 110 km 115 kV lines/stations to higher capacity from Commerce Way TS to Burlington TS to higher capacity and install dynamic voltage support devices at Karn TS, Powerline MTS and Brant TS (5) Rebuild existing 115kV lines/stations between Woodstock TS to Burlington TS into 230kV lines (6) Offload the Brant 115kV extended area (a) Build new 230kV lines and stations from Brant/Powerline stations to i. Middleport-Buchanan circuits or ii. Middleport-Detweiler circuits (b) Build a new 230kV station to transfer load from Dundas 1 & 2 stations to i. Beck #2-Burlington-Middleport circuits or ii. Middleport-Burlington circuits

*exact routing and siting are subject to transmitter-led development work after the regional plan

Brant 115 kV Extended Area – Options Analysis (1/2)

Option	(1) Open Brant DB2 Breaker and bus-tie breakers as needed	(2) Implement additional conservation and demand management programs	(3) Build a transmission-connected battery storage facility with voltage support, possibly in combination with additional CDM, wind farm, and/or solar farm at Brant TS and Newton TS	(4) Upgrade the 115kV lines/stations from Commerce Way TS to Burlington TS to higher capacity	(5) Rebuild existing 115kV lines/stations from Woodstock TS to Burlington TS into 230kV lines
Technical Feasibility	✓ Feasible	✓ Feasible	× Require several facilities in dense urban areas to meet 450 – 600 MW need	✓ Feasible	✓ Feasible
Ability to Address Need	✓ Meets near-term needs × Can reduce load supply reliability × Does not enable growth	× Can only provide 70MW compared to the 300-400MW capacity needs	× Risks significant up-stream consequences during an outage	× Improves but does not meet any needs	✓ Meets long-term needs ✓ Enables growth
Cost Estimate	~$0 M ; no significant expenditures	275M (system value of CDM not captured)		800 M	1,200 - 1,400 M
Lead-Time	None	2 years		7-10 years	Over 10 years

Brant 115 kV Extended Area – Options Analysis (2/2)

Option	(6) Offload 115 kV lines			
	(a) Build new 230kV lines and station from Brant/Powerline stations to alleviate statin capacity needs and transfer loads from the 115kV lines to:		(b) Build a new 230kV station at Dundas 1 & 2 stations to alleviate station capacity needs and transfer loads from the 115kV lines to:	
	(i) Middleport-Buchanan circuits	(ii) Middleport-Detweiler circuits	(i) Beck #2-Burlington-Middleport circuits	(ii) Middleport-Burlington circuits
Technical Feasibility	✓ Feasible	✓ Feasible	✓ Feasible	✓ Feasible
Ability to Address Need	✓ Meets needs × May lead to downstream limitations	✓ Meets the needs ✓ Enables growth	✓ Meets needs ✓ Can address some Hamilton station capacity needs × May lead to downstream limitations	✓ Meets the needs ✓ Enables growth ✓ Can address some Hamilton station capacity needs
Cost Estimate	$195M	$120-195M	$80-100M plus cost of additional infrastructure	$80-100M
Lead-Time	7-10 years	7-10 years	7-10 years	5-7 years

Summary of Brant 115 kV Extended Area Analysis (1)

Several non-wire and wire options to meet electricity needs and facilitate growth in the Brant 115 kV Extended Area were considered. The Technical Working Group's detailed options analysis for the near-term and generation is summarized below:

- **Near-term:** Operational measures (Option #1) offer a no-cost, immediate response the region's needs. This approach is chosen over additional conservation and demand management (Option #2), which has a 2-year lead time and higher costs without addressing the needs.
- **Limited Feasibility of Generation**: Building a transmission-connected battery storage facility with voltage support, possibly in combination with additional CDM, wind farm, and/or solar farm at Brant TS and Newton TS (Option #3) in densely populated urban areas, such as downtown Hamilton, is not feasible due to the need of multiple facilities totaling 450 - 600 MW. Also, as part of the planning criteria to account for unplanned outages, if this critical generation is lost, the Brant Extended Area will lose power, resulting in significant up-stream consequences.

Summary of Brant 115 kV Extended Area Analysis (2)

Several non-wire and wire options to meet electricity needs and facilitate growth in the Brant 115 kV Extended Area were considered. The Technical Working Group's detailed options analysis for the long-term is summarized below:

- **Long-term:** A wire option is necessary to accommodate long-term needs and future growth. The IESO assessed upgrading the capacity of the 115kV lines (Option #4) and rebuilding the 115 kV lines into 230 kV (Option #5) but found these options prohibitively costly and inadequate for long-term demands. Consequently, the IESO explored options for transferring some of the load from the 115 kV lines to other electrical areas (Option #6) to meet future growth requirements.
- **Preferred Options for Load Transfer**:
  - For building new 230 kV lines/stations from Brant/Powerline stations to distribute some load to the Kitchener, Waterloo, Cambridge, Guelph (KWCG) region, the option with no downstream impacts on infrastructure is selected (Option #6, a, ii).
  - Regarding upgrading Dundas 1 & 2 stations to transfer load to the Hamilton electrical area, the lower-cost option with no downstream impacts on infrastructure is selected (Option #6, b, ii).

Summary of Draft Recommendations (1/2)

After an evaluation of all screened in options, the Technical Working Group identified the following draft recommendations to address the electricity needs in the Caledonia-Norfolk sub-region and the Brant Extended Area.

These draft recommendations represent a balanced approach, addressing both immediate operational needs and medium to long-term infrastructure development to support growth in the region.

Near-Term: Operational measures such as opening station bus-tie breakers at Norfolk/Bloomsburg stations and the Brant DB2 breaker, as required.

Monitoring: Monitor Caledonia TS for any change that advances the station capacity need and explore potential non-wire options, such as conservation or demand management, to delay or meet the need.

Summary of Draft Recommendations (2/2)

Draft medium and long-term recommendations in Burlington to Nanticoke include:

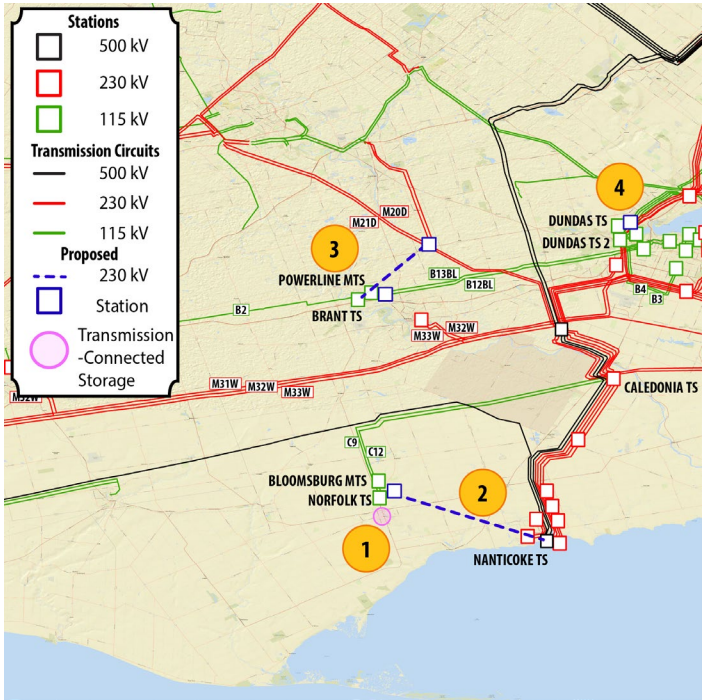
1. Build a transmission-connected battery storage facility capable of providing voltage support at Norfolk TS, potentially combined with other NWAs, e.g., a wind and/or solar farm, distribution-level load transfers, and additional conservation and demand management measures.

2. New 230kV line and station from Nanticoke TS to Norfolk/Bloomsburg area.

3. New 230kV line and station from Brant/Powerline stations to Middleport-Detweiler circuits, with further refinement to be conducted during the KWCG engagement.

4. New 230kV station at Dundas 1 & 2 stations to transfer load to Middleport-Burlington circuits.

Note: exact routing and siting are subject to transmitter-led development work after the regional plan.



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Update on Hamilton

Developing Hamilton's Demand Forecast

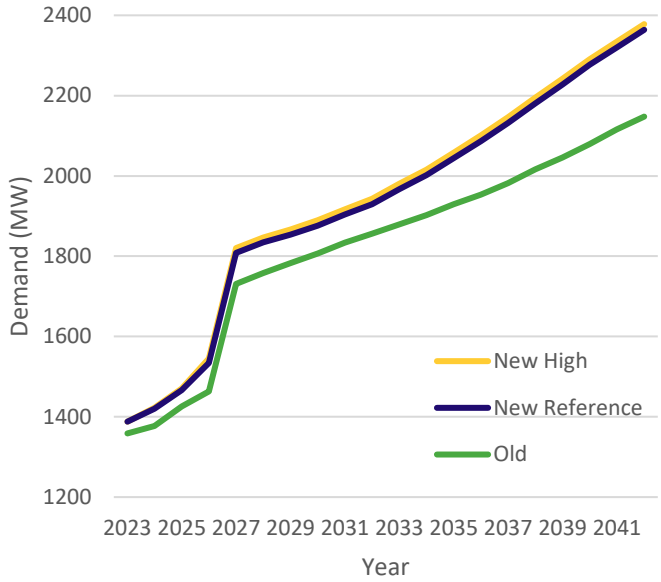
Hamilton's 20-year electricity demand forecast includes:

- Information from the region's local distribution companies (LDCs) such as:
    - Demand forecasts for each station in their service territory,
    - Incorporation of municipal and community plans such as Official Plan and Secondary Plan Areas,
    - Forecasting assumptions based on customer growth plans.
- Input from municipalities, customers, and other interested parties regarding potential growth and electrification plans.
- Accounting for the impacts of demand side management programs, planned distributed generation, and extreme weather conditions in the forecasted electricity demand.

Updated Hamilton Demand Forecast

Key Takeaway

- Electrification and decarbonization plans with a significant impact on the Hamilton area were identified after the September 2023 webinar.
- As a result, the reference forecast for Hamilton was updated in June 2024 and a high forecast was created.
- 6.7% near-term (5 years) and 3.3% average annual growth rate over 20-yrs, both exceed Ontario's annual growth rate of 2-3%
- The new high forecast will be used in the future assessments, given the marginal difference to the reference forecast.
  - Represents a 230 MW or 11% increase relative to the previous forecast.
- The updated demand forecast tables are posted on the engagement webpage.



Preliminary Station Needs in Hamilton

Based on the new Hamilton demand forecast, several station capacity needs were identified. These stations are outlined below. Station capacity needs for Dundas 1 TS and Dundas 2 TS have been assessed as part of the recommendations for the Brant Extended Area. The Hamilton Addendum will kick-off in 2025 and finish within 12 months to fully assess and address the remaining needs in the region.

Electricity Need	Impacted Infrastructure	Timing
Station Capacity: the ability of a station to deliver power from the grid down to the distribution system.	Dundas 1 TS*, Dundas 2 TS*, Mohawk TS, Nebo TS	Near-term
	Newton TS	Medium-term
	Elgin TS, Horning TS, Lake TS	Long-term

*Included in the Brant Extended Area

Next Steps

Next Steps

Upcoming milestones for the IRRP are:

- **November 7:** Deadline for feedback to the IESO on options analysis and draft recommendations.
- **November 28:** IRRP report, including the methodology and IESO's response to feedback will be completed and published on the Burlington to Nanticoke engagement webpage.

After the Burlington to Nanticoke IRRP is complete, the following next steps can be expected:

- For wire 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.
  - New 230kV line from Brant/Powerline stations to Middleport-Detweiler circuits will be further explored in the ongoing KWCG engagement.
- For non-wire solutions, implementation mechanisms for new resources and energy efficiency programs will be determined following plan publication.
- Hamilton Addendum will kick-off in 2025 and finish within 12 months of formal kick-off to fully assess and address the remaining needs in the region.
- In parallel, the IESO is undertaking the South and Central Bulk Study, that will review the capability of the bulk system to enable economic development between the Hamilton and Windsor areas.

Seeking Input

Local considerations and feedback are a critical component to the development of an Integrated Regional Resource Plan (IRRP). The IESO wants to understand:

- What feedback is there on the proposed recommendations?
- What information needs to be considered in these recommendations?
- How can the IESO continue to engage with communities and stakeholders as these recommendations are implemented, or in preparation for the upcoming addendum?
- What are some key developments, projects or initiatives that should be considered as the Hamilton demand forecast is finalized?

Please submit your written comments by email to engagement@ieso.ca by November 7

Summary

The forecasted growth in this region is primarily driven by industrial electrification projects and residential growth. After an evaluation of all screened in options, the Technical Working Group identified the following draft recommendations to address the electricity needs in the Caledonia-Norfolk sub-region and Brant Extended Area:

Near-term Option: Implementing immediate solutions such as opening station bus-tie breakers and the Brant DB2 breaker, as needed.

Monitoring: Monitor Caledonia TS for any change that advances the station capacity need and explore potential non-wire options, such as conservation or demand management, to delay or meet the need.

Medium-term Option: Build a transmission-connected battery storage facility capable of providing voltage support at Norfolk TS, potentially combined with other NWAs, e.g., a wind and/or solar farm, distribution-level load transfers, and additional conservation and demand management measures

Long-term Options:

- New 230kV line/stations from Nanticoke TS to the Norfolk/Bloomsburg area
- New 230kV line/stations from Brant/Powerline stations to Middleport-Detweiler circuits
- New 230kV station at Dundas 1 & 2 stations to transfer load to Middleport-Burlington circuits

The Hamilton sub-region has a draft forecast for public review. A recommendation for one of Hamilton's needs have been drafted above. The remaining needs and options will be addressed in an addendum to be initiated in 2025.

Your input will help ensure that any additional information or considerations are included as part of the decision-making process.

Thank You

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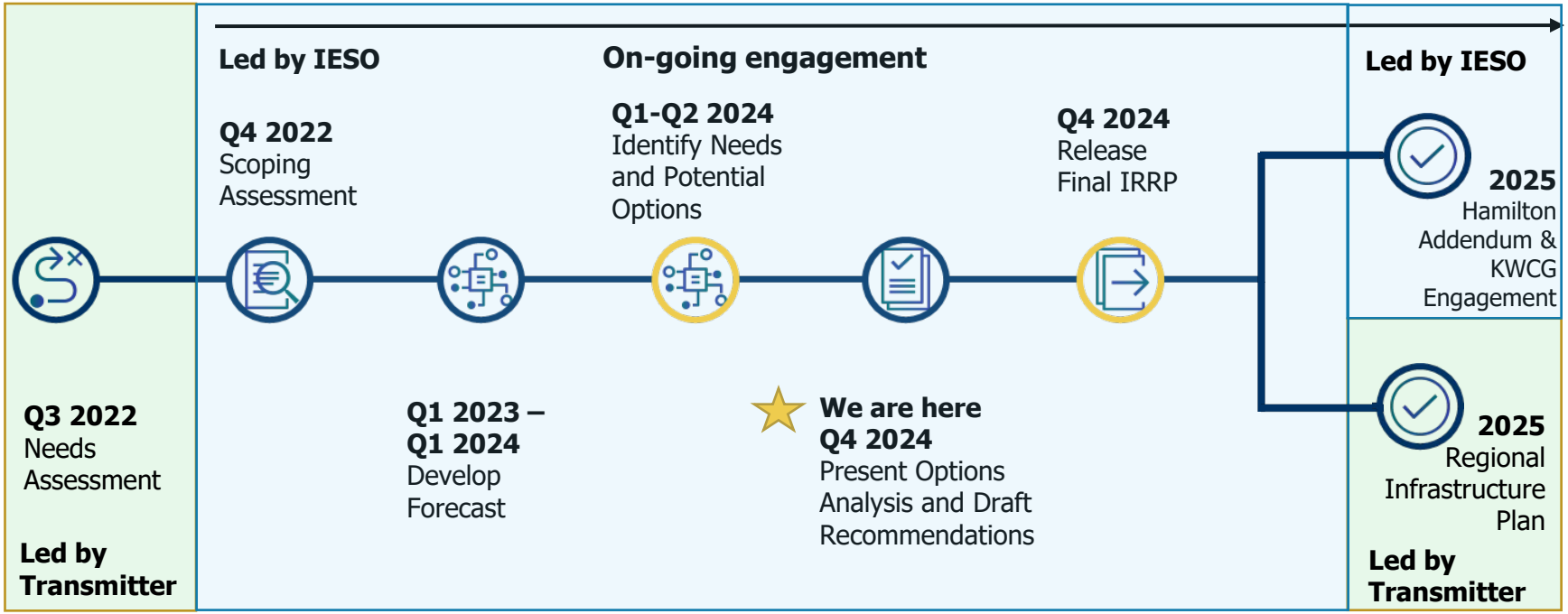
Appendix

Burlington to Nanticoke's Technical Working Group

Regional Planning Timeline



Previous Cycles of Regional Planning

Two cycles of planning have been completed for the Burlington to Nanticoke region:

- First cycle focused on the Brant and Bronte sub-regions and completed in April 2015 and June 2016 respectively
- Second cycle focused on the Hamilton sub-region and completed in February 2019

Determining Electricity Needs

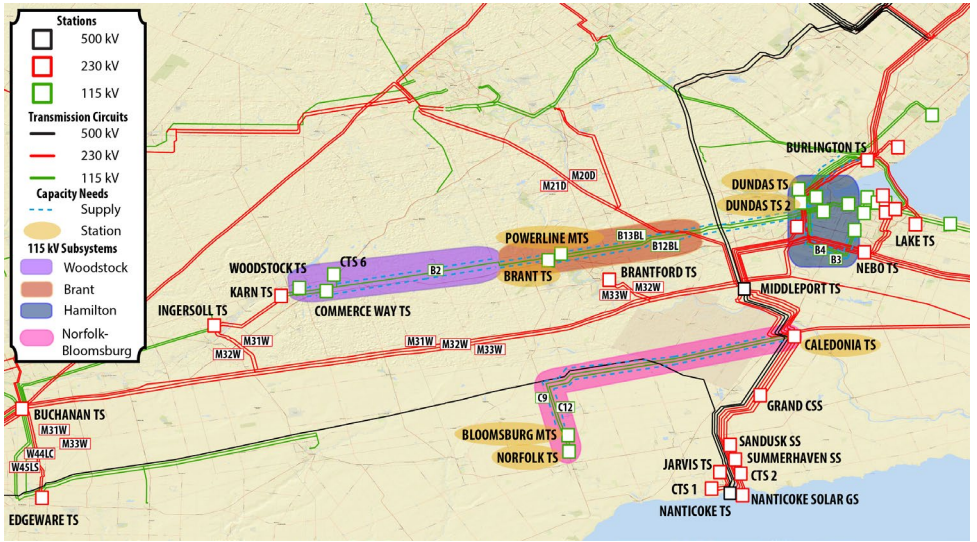
With the demand forecast finalized, the Technical Working Group assessed if the existing infrastructure could meet the forecasted growth within safe operating standards. If it cannot, the shortfall is categorized into one of five needs:

- **Station capacity:** Ability of a station to deliver power from the grid down to the distribution systems.
- **Supply capacity:** Ability of the system to supply power through the transmission lines to a local area.
- **Asset replacement:** Station or transmission equipment has reached end of life.
- **Load restoration:** Ability of the system to restore power after select contingencies.
- **Load supply security:** Maximum amount of power that can be lost during select contingencies.

Electricity Needs Summary

Key Takeaway:

- The future forecasted growth is primarily driven by industrial electrification projects and residential growth.
- The Technical Working Group has identified several supply capacity needs and station capacity needs in the Caledonia-Norfolk and Brant sub-regions.
- To fully assess the supply capacity needs in the Brant sub-region, the Technical Working Group considered the full 115kV line from Woodstock TS to Burlington TS, referred to as the "Brant 115kV Extended Area."
- To meet the identified needs, the Technical Working Group evaluated various wire and non-wire options, to determine the recommendations required to maintain reliability.



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Determining Options

A combination of wire and non-wire options will be explored to meet the region's electricity needs. Through the planning process, the Technical Working Group has:

Step 1: Screen various options to address the region's near, medium and long-term electricity needs including:

Traditional wires option to supply local area; and,

Non-wires alternatives (NWAs), such as transmission-connected generation or energy storage, CDM, distributed/embedded generation or demand response.

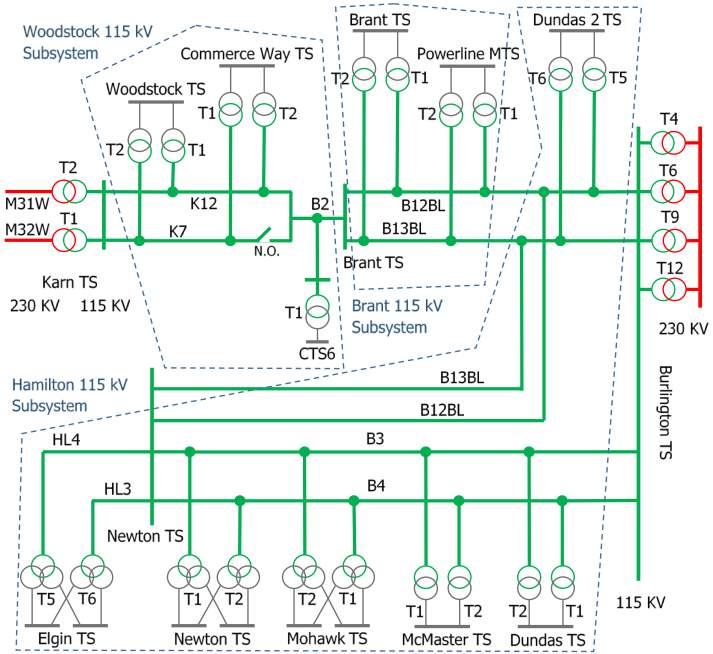
Step 2: Complete a detailed analysis of screened-in options to recommend solutions to meet needs.

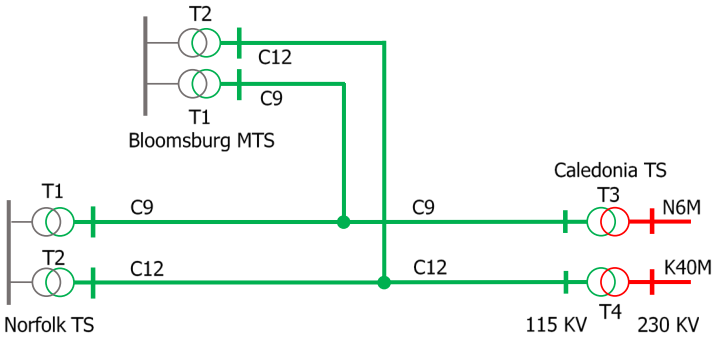
The following slides will recap the screening of options and then share the outcomes of the options analysis to seek community feedback to enhance development and evaluation of the options before making a final recommendation.

Screening Steps

Type of Need	Need Traits	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.

Single Line Diagrams





Regional Infrastructure Plan

The lead transmitter will undertake the development of a Regional Infrastructure Plan (RIP) with input from the Technical Working Group, if the Needs Assessment, Scoping Assessment or Integrated Regional Resource Plan (IRRP) identifies a wires solution.

The RIP report will:

- Provide a summary of the identified needs and wires plan identified in the previous planning phase.
- Assess if there are any new supply needs since the last planning study in the area.
- Provide a plan to address near and medium-term needs identified.

South and Central Bulk Study Update

The South and Central Bulk Plan Study will assess the bulk transmission system from Hamilton to Windsor. In 2024, the IESO initiated the bulk study to:

- Confirm the transmission reinforcements required to enable the connection of:
  - The small modular reactor project planned for the existing Darlington nuclear generator station (GS) site, and;
  - The Bruce C project to expand nuclear at Bruce nuclear GS.
- Consider the potential for future pumped storage at Meaford and Marmora.
- Determine the transmission reinforcements that would be required to enable decreased reliance on greenhouse gas emitting resources, specifically York Region Centre, Portlands Energy Centre, Halton Hills GS and Sithe Goreway GS.
- Determine the transmission reinforcements required to enable reliable supply under various long-term high growth, economic and electrification scenarios within the Greater Toronto Area and Windsor to Hamilton corridor.

The plan will be released in 2025.

Engaging with Indigenous communities, municipalities and stakeholders is key. The IESO will provide quarterly updates through public sessions, and offer targeted engagements, as needed, to understand feedback. Subscribe for updates at www.ieso.ca/subscribe.

Electricity Investment Costs

Cost allocation for transmission investment is set by the Ontario Energy Board (OEB), using two key principles:

1. Approved projects have to be "just and reasonable"
    - Firm loads will drive near-term expenditures
    - Other scenarios will be used to develop plans for additional growth, but conditional on the load materializing, so as to not overburden the customers ahead of commitments
2. Benefactor pays approach
    - Costs associated to connection facilities are allocated to the connecting customer since they are dedicated to one or a small group of customers
    - Costs associated with network facilities are typically allocated to all ratepayers since they form part of a transmission system that is shared by all users

Long-Term Procurements

To help inform important decisions related to the Long-Term Procurement, the IESO has several resources including:

- LT RFP community engagement webpage
- Resource Adequacy Updates and the May 9, 2024 Resource Adequacy Update
- Frequently asked questions on the procurements

For questions on the long-term procurements, please reach out to communityengagement@ieso.ca