NOVEMBER 18, 2020

IESO Planning Overview and Updates

ieso
Connecting Today. Powering Tomorrow.

Part I: Introduction to IESO Planning

Part II: Update on Bulk Planning Initiatives

Part III: Regional Planning Activities and Community Engagement

Part I: Introduction to Planning

- 2020 Annual Planning Outlook – Preliminary Insights
- Formalizing the Integrated Bulk System Planning Process
- Regional Planning Process Overview

Executive Summary

System Needs

- System needs are primarily for capacity
- Needs in the longer term continue to be driven by Pickering retirement
- In the near term, needs are lower than previously forecast driven by changes to demand and supply

Executive Summary

Demand

- Near-term demand forecast continues to be uncertain as consumption patterns evolve and economy adapts to and recovers from pandemic
- In the near term, demand forecast is lower
- In the longer term, forecast is higher as remote work increases, greenhouse markets grow and investments in transit accelerate

Executive Summary

Supply

- Available supply forecasts are higher as nuclear schedules evolve and outage schedules are optimized
- Nuclear operators have worked with IESO to help manage the impact of refurbishment schedules and major outages
- Operators have adapted their major maintenance schedules to minimize needs in the 2023-2024 timeframe

Executive Summary

Sources of Uncertainty

- The APO uses two scenarios to account for significant uncertainty over the next five years
- Demand forecast is dependent on the pace of economic recovery
- Policy decisions at the provincial and federal level have potential to impact both supply and demand
- Pickering extension to end of 2025 is dependent on regulatory approval, creating significant uncertainty in 2025

Annual Planning Outlook (APO) Scenarios Overview

- Two 2020 APO scenarios are both extension and refinement of Interim APO scenarios
- Scenarios continue to represent "bookends" of likely future conditions, with greater clarity in assumptions:
  - Supply: revised nuclear refurbishment schedules reveal less disruption than previously expected
  - Demand: about four months of additional demand data have shed light on changing demand patterns

Demand Forecast – Scenarios and Assumptions

- Both scenarios project lower demand in the near term and higher demand in the long term compared to the 2019 APO
- Forecast recovery to actual 2019 energy levels:
  - Scenario 1 by end of 2022; Scenario 2 by end of 2024
- Both scenarios reflect the Ministerial Directive for 2021-2024 Conservation and Demand Management (CDM) Framework, which the IESO received on September 30, 2020
- **Note:** for 2020 APO and beyond, the Industrial Conservation Initiative has been repositioned as a supply side resource

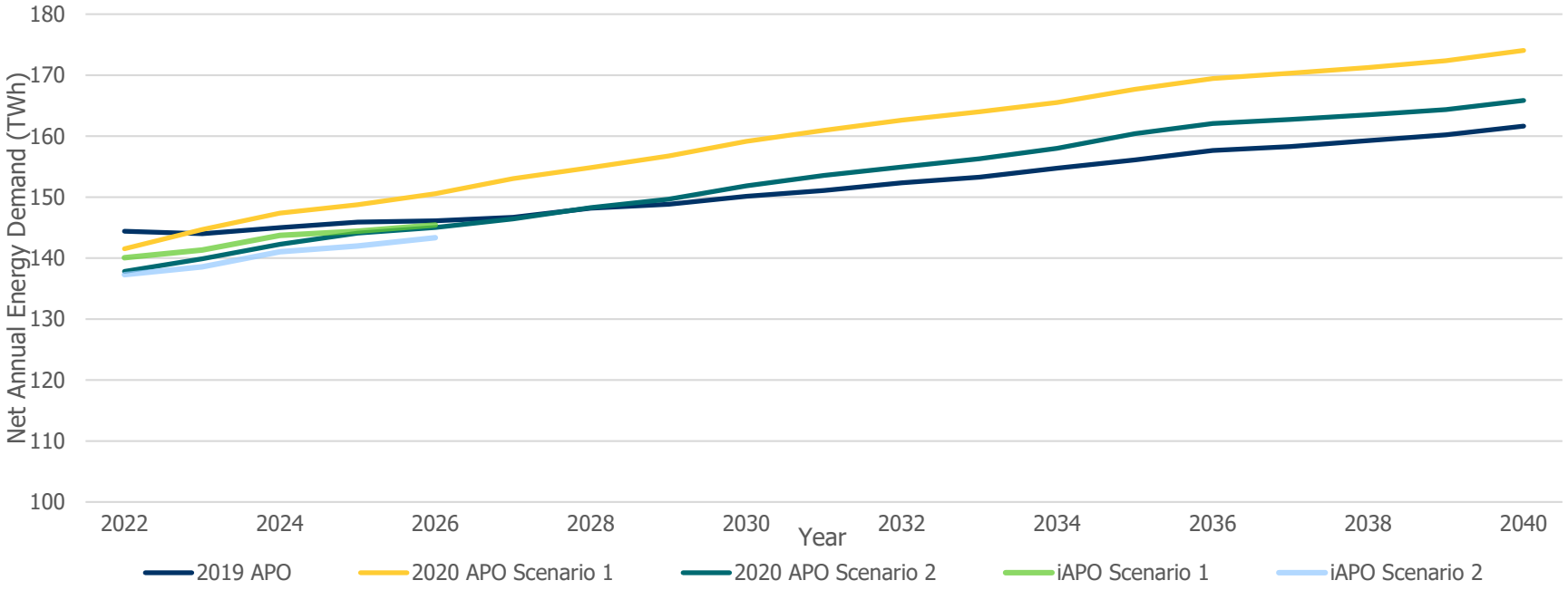
Demand Forecast – Major Updates

- **State of the Economy:** Near-term recession leads to lower near-term electricity demand followed by a multi-year recovery
  - Economic restructuring will lead to long-term changes in sectoral composition of electricity demand
- **Residential sector:** Household count projections, end-uses (e.g., HVAC) lead to higher demand in long term
- **Agriculture:** Greenhouse growth in Windsor-Essex is expected to increase winter demand by 950 MW by 2033 or 2036 (scenario dependent)

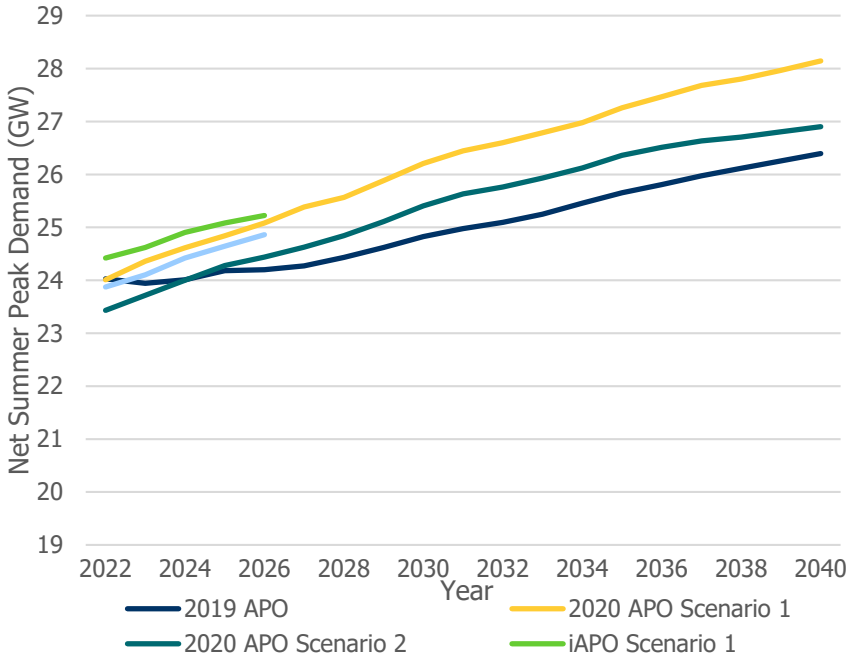
Demand Forecast – Major Updates (cont'd)

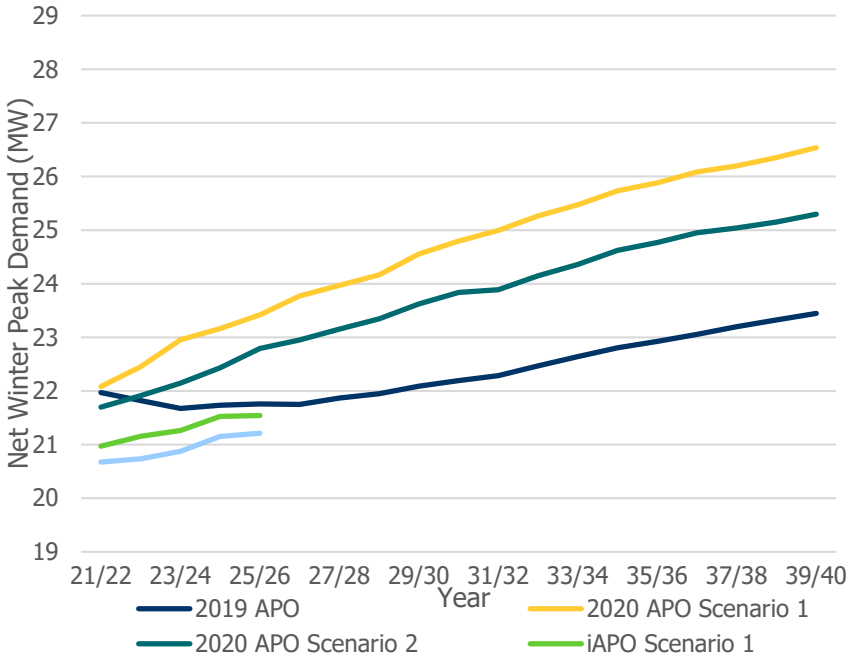
- **Commercial sector:** will be most negatively affected; however, it is more likely to rebound over time
- **Industrial sector:** has faced minimal pandemic impacts to date and has been surprisingly resilient and stable
- **Increased transit electrification**
- **Updated Price forecast:** lower long-term electricity rates influence increased electricity demand

Energy Demand Forecast



Seasonal Peak Demand Forecast





Supply Outlook

- Supply outlook is relatively unchanged from previous outlooks (2019 APO and iAPO)
- Slightly higher resource availability in the early 2020s is the result of Ontario Power Generation's deferral of nuclear refurbishments and the Pickering extension
- Due to the refurbishment and retirement of the nuclear fleet, total installed capacity varies between 38 and 40 GW during the 2020s, levelling off at 40 GW in the 2030s

Supply Outlook (cont'd)

- Turnover in nuclear supply/capacity continues through the 2020s, as refurbishments proceed. Pickering retirement creates long-term reduction in available supply.
- Over the course of the outlook period, many contracts held by existing resources reach end of term
- Most contracts that expire in 2020s are gas; wind, hydroelectric and solar contracts begin to expire in the 2030s

Summer Resource Adequacy Outlook

- Continue to see a need to acquire resources for the summer in the near term across the two demand scenarios
- Capacity need emerges in 2022 similar to 2019 APO and 2020 iAPO. However, a need for new resources emerges in 2025
- Near-term need is lower, largely due to a lower near-term demand forecast and Pickering extension
- Long-term summer capacity need is consistent with 2019 APO and higher in Demand Scenario 1

Winter Resource Adequacy Outlook

- A winter capacity need emerges in 2022/2023 consistent with the 2019 APO (year earlier than in 2020 APO). Need for resources beyond what existing resources can provide emerges in 2025/2026
- In the near term, the winter capacity need is consistent with the 2019 APO, but higher than in the 2020 iAPO due to higher winter demand
- In the long term, the 2019 APO saw a temporary need for new winter capacity during the refurbishment period. Although this is generally still the case for Demand Scenario 2, a long-term persistent need for new resources is observed under Demand Scenario 1

IESO Planning Processes

Different Levels of Planning in Ontario

Provincial/Bulk System Planning

Regional Planning

Distribution Planning

Active Planning Process Initiatives

Formalizing the Integrated Bulk System Planning Process

The Bulk System Planning Process Engagement Page

Regional Planning Process Review

The Regional Planning Process Review Engagement Page

Formalizing the Integrated Bulk System Planning Process

Integrated Bulk System Planning Process

Goal: To develop a process transparently and with stakeholder input

Identifies future changes to how electricity will be produced and consumed at the provincial level and to the status of transmission assets

Changes could be due to:

- Government policy
- New customers
- Retirement/refurbishment of assets

Assesses the effects of those changes on reliability and explores opportunities to enable economic efficiency

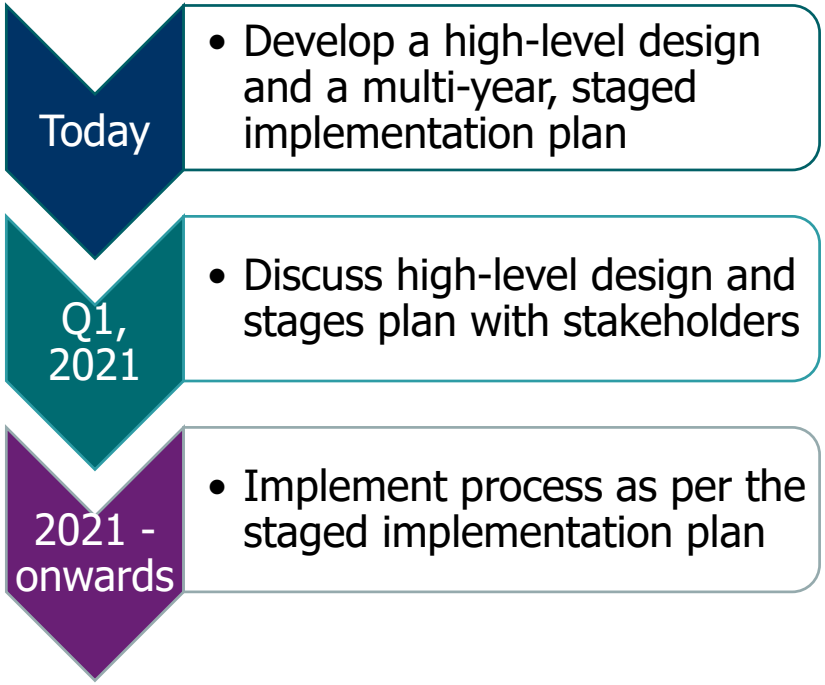
- Assessments will be carried out based on operating, transmission planning and resource adequacy standards

Recommends actions to maintain reliability and enable economic efficiency

- Actions could include acquiring supply resources as per the IESO's resource adequacy strategy or recommending new transmission infrastructure

Designing the Process

- The high-level design will include:
  1. The stages in the process from information gathering to the recommendation of actions, including timing
  2. The interaction with the IESO's resource acquisition mechanisms and with other planning processes (e.g. Regional Planning)
  3. How stakeholders can participate in the planning process, and will be kept informed



Regional Planning Process Review

Focus of the Regional Planning Process Review

Process efficiency and flexibility

Planning for assets reaching end of life

Eliminating barriers to non-wire options

Update

Feb 2020	• Released a report with draft recommendations in each of the focus areas
July 2020	• Released a document that identified the lead organization (IESO or OEB) responsible for implementing each recommendation
Q4, 2020	• Will issue a final report that confirms the recommended actions and outlines next steps for implementing those actions
Q1, 2021	• IESO will schedule a webinar to discuss the implementation of the recommendations assigned to the IESO

Recommendations at a High Level

Process Efficiency and Flexibility

- Made recommendations that:
  - Improved the hand-off between the IESO and the Transmitter after each stage in the process, and that reduced redundant activities
  - Accelerated the planning process, when appropriate
  - Improved coordination with other planning processes

Planning for assets reaching end of life

- Recommended a process where the transmission owner would, annually, provide the IESO with information on assets likely to reach end of life over the next 10 years

Eliminating barriers to non-wire solutions

- Made recommendations that addressed the challenges in identifying, assessing and implementing non-wire options

Part II: Update on Bulk Planning Initiatives

- Flow East Toward Toronto Plan
- West of London Bulk Study
- Gatineau Corridor End-of-Life Study

Flow East Towards Toronto Plan

The Flow East Towards Toronto (FETT) Interface

The FETT interface is the main interface between the West, Southwest, Bruce and Niagara zones (sending sub-system), and Toronto, Essa, East, Ottawa, Northeast and Northwest zones (receiving sub-systems).

Peak demand east of FETT is about 65% of total Ontario peak demand.

The amount of available supply supporting the system east of FETT becomes a concern when Lennox GS contract expires and Pickering GS retires along with Darlington GS unit outages for refurbishment to 2026.

The Flow East Towards Toronto (FETT) Interface

FETT interface consists of three paths:

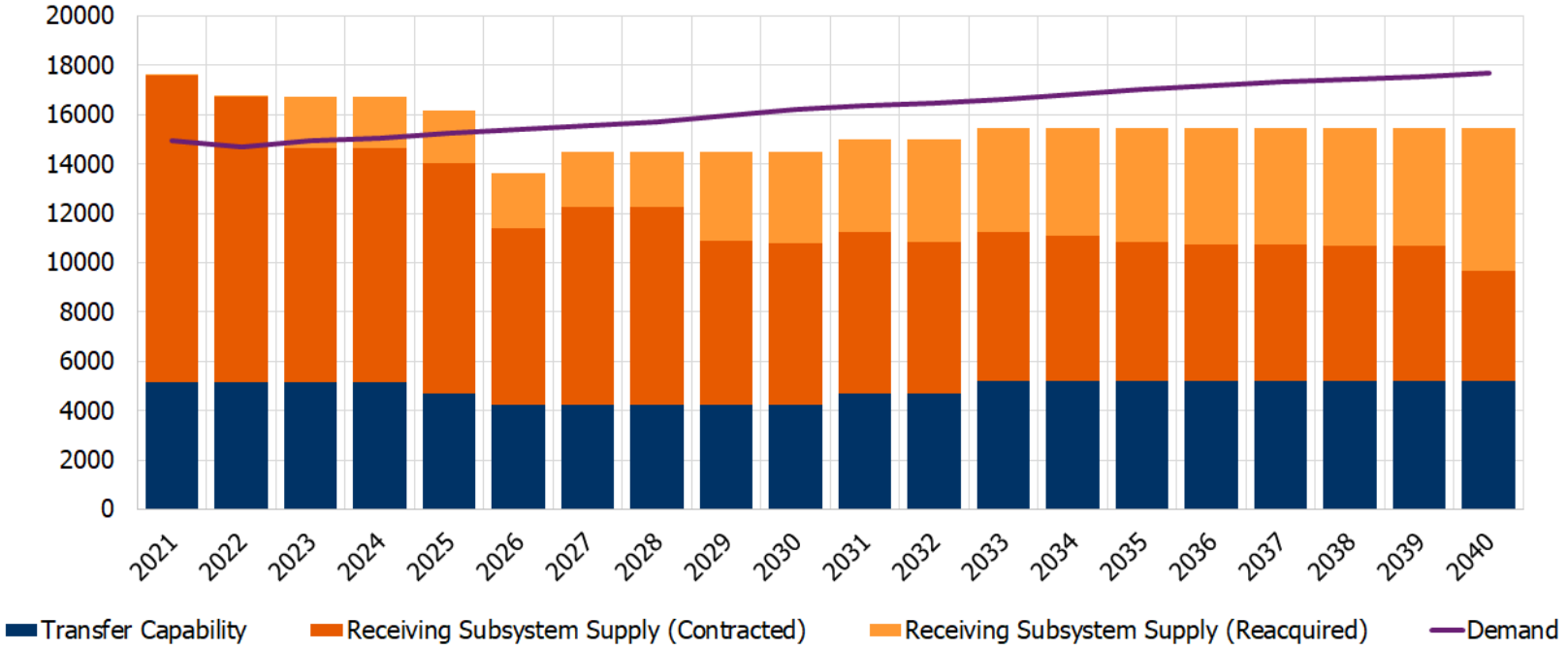
1. 500 kV circuits into Claireville TS from west
2. **Richview TS x Trafalgar TS 230 kV circuits**
3. Orangeville TS x Essa TS 230 kV circuits

FETT interface is thermally limited by the Richview TS x Trafalgar TS circuits, and most restrictive during summer peak (lower ratings and higher demands).

Fewer units available at Pickering GS and Bruce GS (refurbishment outages), as well as 500 kV transmission outages further restricts FETT transfer capability.

Trafalgar TS x Richview TS path

Draft Transmission Security Needs (finalizing with APO)



Draft Transmission Security Needs (finalizing with APO)

If resources with expiring contracts are considered to be re-acquired at the end of their contract terms, a need for additional or reinforced capacity to supply the east of FETT portion of the system emerges in 2026 of approximately 2,000 MW.

This need for additional or reinforced capacity persists throughout the planning horizon, and increases, depending on demand growth and the future of firm supply resource acquisition.

Recommended Plan

Recommended for phase 1

Upgrade Trafalgar TS x Richview TS 230 kV transmission lines by 2026; maximizing use of existing infrastructure.

Increases FETT capability by over the required 2000 MW at the lowest cost per capacity increase of available options.

Preparing to hand-off project to Hydro One by end of year, who owns the Trafalgar TS x Richview TS transmission lines, to seek OEB and EA approval.

Recommended for phase 2

Beyond 2026, needs east of FETT must be coordinated with resource acquisition frameworks being developed.

Depending on where existing resources are re-acquired or new resources are constructed, additional reinforcement to the FETT interface may be required.

Phase 2 does not require a decision at this point, and will consider stakeholder input through various engagement forums, e.g., Resource Adequacy Engagement.

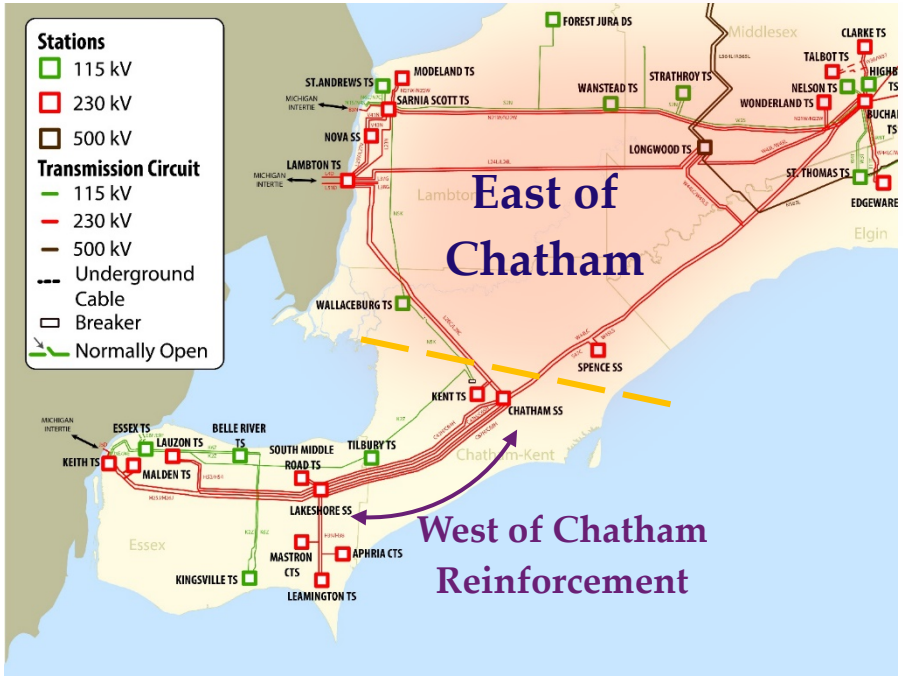
West of London Bulk Study

Background

2019 Windsor-Essex bulk study recommended upgrades that addressed all transmission system limitations west of Chatham; however, transmission limitations remain east of Chatham, impacting the connection of:

- 400 MW of load at South Middle Road TS, expected by 2022/23 – currently undergoing a connection assessment; and
- Any further load around the Chatham area

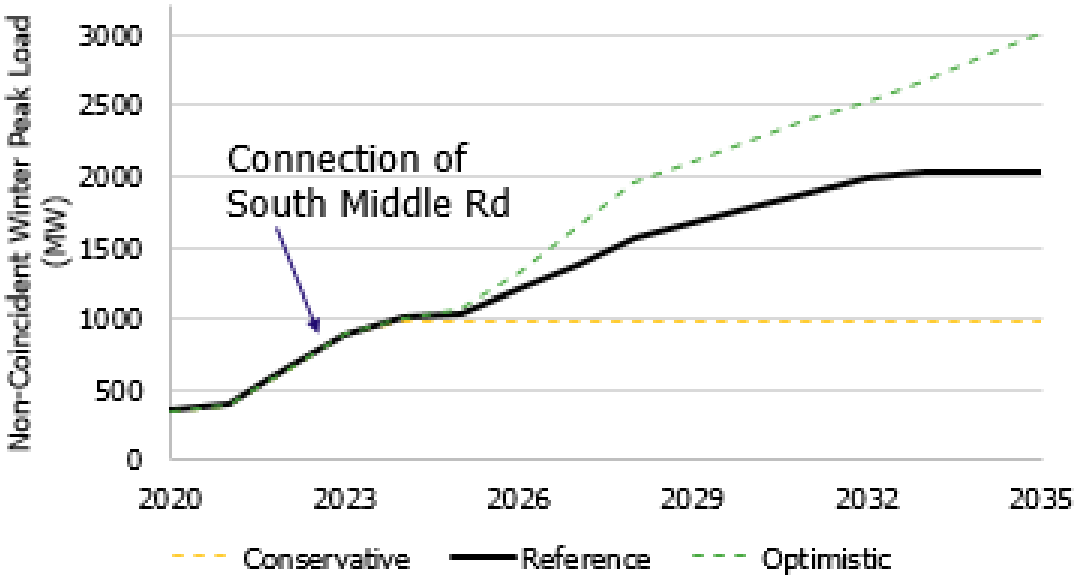
The reinforcements needed east of Chatham are being determined through this West of London study



ieso
Connecting Today. Powering Tomorrow.

West of London Greenhouse Load Forecasts

- The Reference forecast anticipates an additional 1,100 MW of growth on top of South Middle Rd



West of London Plan – Staged Approach

Stage 1 of the bulk study has focused on:

- Ensuring sufficient bulk transfer capability east of Chatham to supply the forecasted greenhouse load, while meeting planning criteria in ORTAC; and
- Enabling existing generation in the Lambton-Sarnia area to operate at levels historically seen during peak hours

Stage 2 will reaffirm the Stage 1 recommendation, and develop the full set of recommendations, considering:

- Full set of forecast scenarios
- Enabling up to the full capability of existing generation to help meet provincial needs
- Maintaining Ontario-Michigan interchange capability; and

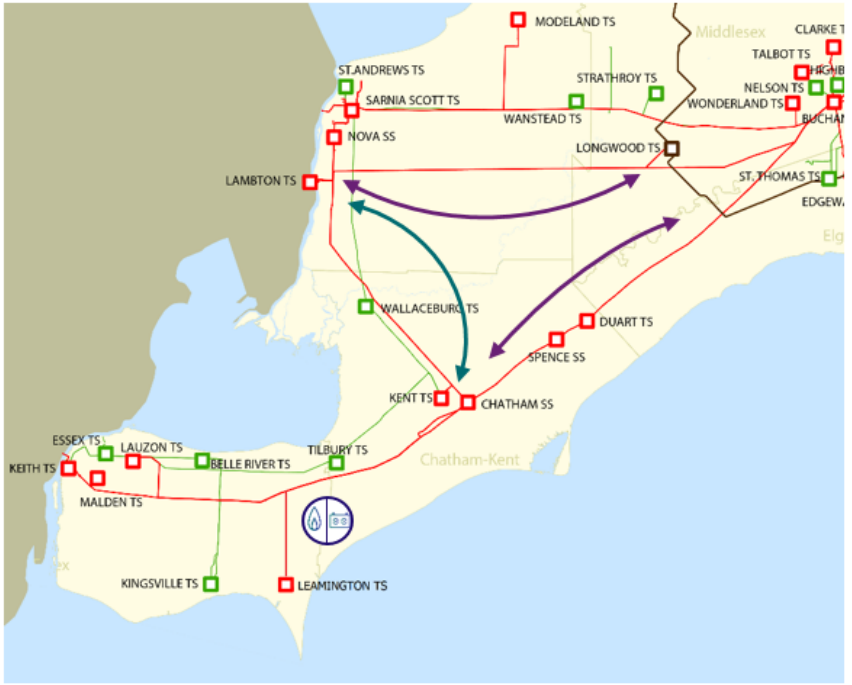
Short-Listed Options

Main alternatives to address Stage 1:

- Reinforce the Lambton x Chatham corridor
- Local 650 MW generation/storage west of Chatham

Main alternatives to address Stage 2:

- Reinforce Chatham x Longwood corridor
- Reinforce Lambton x Longwood corridor
- Separate generation/storage option



ieso
Connecting Today. Powering Tomorrow.

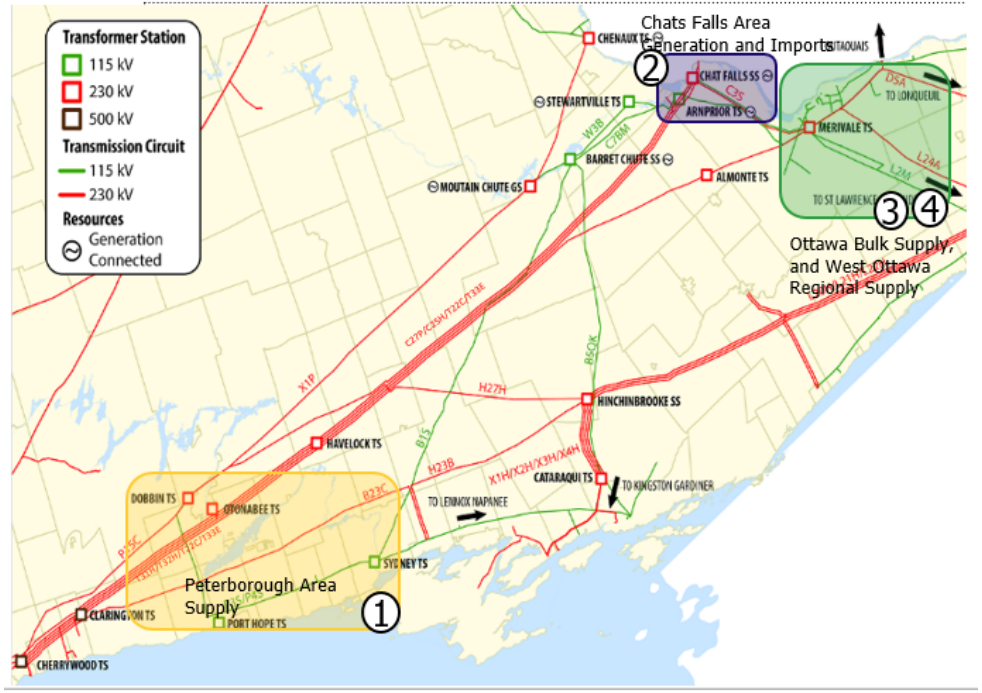
Upcoming Engagement and Deliverables

- A detailed update on the West of London bulk study will be provided on November 26 as part of the Southwest webinar
- Final bulk study report will be published in late Q1 2021

Gatineau Corridor End-of-Life Study

Background

- This study was triggered by mid-term end-of-life ("EOL") needs for 230 kV circuits on the Gatineau Corridor from Cherrywood TS to Chats Falls SS.
- These circuits provide or support bulk supply to Ottawa, regional supply to west Ottawa and Peterborough, and connection of Chats Falls area generation and imports from Quebec.
- The study assesses the scope of refurbishment for the EOL facilities in coordination with reliability needs.



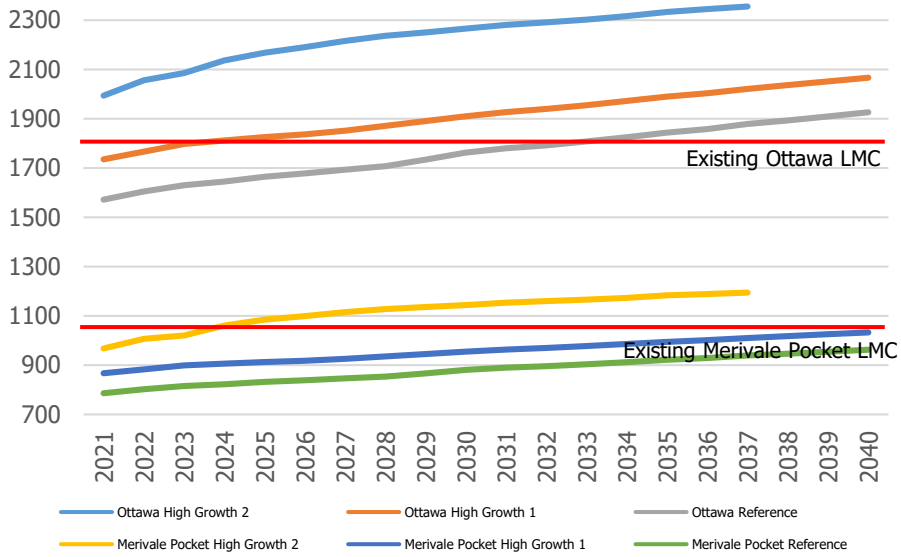
ieso
Connecting Today. Powering Tomorrow.

Need Summary

- Reliability needs are forecast for the Peterborough and Ottawa areas over the next 20 years, most critically:
  - The load meeting capability (LMC) for the Ottawa area is forecast to be exceeded in 2030
  - Reinforcement to the Peterborough area is required to meet planning criteria
- Without refurbishment of the existing circuits these needs worsen/advance and additional needs arise

Sensitivity to Ottawa Forecasts

- Need arises in the early 2030's for reference forecast
- Ottawa demand hovers close (above and below) the system capability
- Historical demand has fluctuated year to year, considerably impacting forecasts, causing need dates to shift based on the forecast used
- As such, it's important to consider the sensitivity of solutions to different growth scenarios when recommending investments



**Forecasts shown are represented as grid demand at normal weather conditions, extreme weather is approximately 6-8% higher*

Options Development

- Two packages of solutions were compared:
  - A full refurbishment option, where existing circuits requiring replacement are either simply refurbished or are upgraded (preferred, lower cost option, meets needs based on reference forecast)
  - A partial refurbishment option, where T22C and T33E are decommissioned and the remaining circuits are simply refurbished or upgraded and additional new facilities (namely a new line from St Lawrence to Merivale) are required

Additional Considerations

- While the full refurbishment package does not address the high-growth scenario, it allows for the deferment of a double circuit 230 kV line from St Lawrence to Merivale, that could be triggered based on load growth in the Ottawa area
- Options exist to mitigate the risk to the bulk system of a high-growth scenario developing
- A critical aspect of engagement will be to inform the tradeoff of deferral benefit versus load forecast risk for the Ottawa area
- The feedback will be used to inform a final recommendation

Next Steps

- Additional external engagement into Q1 2021 to help inform final recommendation; focus on risk associated with variability in Ottawa forecast
- Finalize recommendation regarding the refurbishment of the Gatineau circuits and provide to Hydro One
- Integrate outcomes with ongoing Ottawa and Peterborough/Kingston regional planning work
- Final report targeted for end of Q2 2021

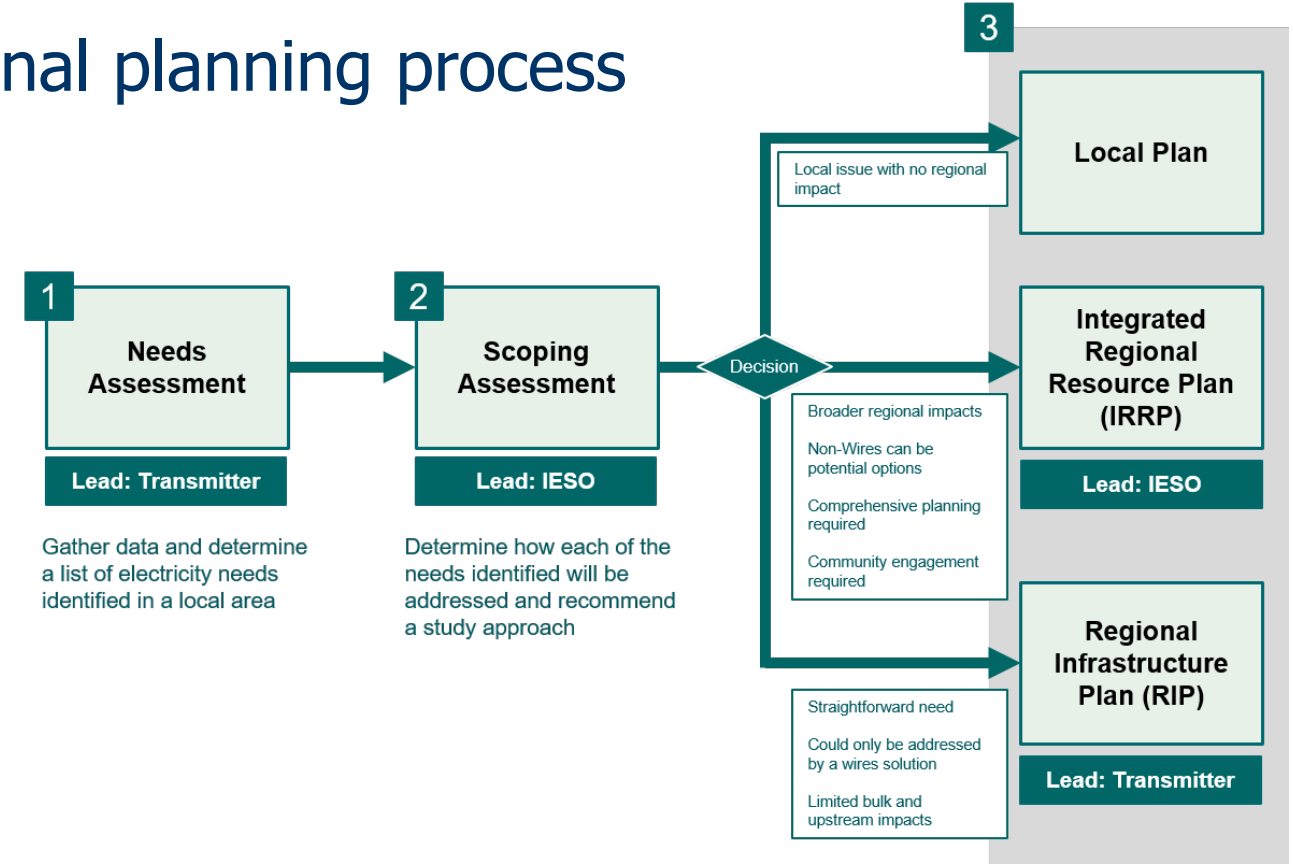
Part III: Regional Planning Activities and Community Engagement

- North Ontario and GTA/Central regions
- Southwest and East Ontario regions
- Community Engagement

21 Electricity Regional Planning Regions

- Based on electricity infrastructure boundaries
- Allows for planning based on each region's unique needs and characteristics
- Each region goes through a formal planning process at least once every 5 years; currently in second cycle
- We will discuss the status and outlook of planning in these regions

Regional planning process



North Ontario & GTA/Central regions

North & GTA and Central Updates

Northwest

- Northwest

Northeast

- East Lake Superior
- North / East of Sudbury
- North of Moosonee
- Sudbury/Algoma

GTA/Central

- South Georgian Bay/Muskoka
- GTA North
- GTA East
- GTA West
- Toronto

Northwest – Status of Plans

- Previous bulk and regional plans in the Northwest have resulted in a number of transmission projects that have been completed, are underway or planned:
  - Waasigan Transmission Line (Thunder Bay to Dryden)
  - East-West Tie
  - Wataynikaneyap Transmission Project
  - Replacement / refurbishment of end-of-life equipment
- Second cycle of regional planning is underway
  - Scoping Assessment expected to be completed in Q1 2021

Northwest – Key Themes

- The second cycle of regional planning will focus on:
  - Load growth and available supply capacity in the areas of Thunder Bay, Marathon and Dryden
  - Mining and other industrial developments in the Northwest
  - Local reliability and performance, particularly on radial transmission lines

Northeast – Status of Plans

- First cycle of regional planning in the northeast found no needs requiring regional coordination
- Second cycle of regional planning has begun:
  - IRRP is underway for East Lake Superior with an expected completion in early Q2 2021
  - A Needs Assessment was completed in August 2020 for Sudbury Algoma and found no needs requiring regional coordination
  - Needs Assessments for North/East of Sudbury and North of Moosonee are expected to begin in 2021

Northeast – Key Themes

- The second cycle of regional planning in East Lake Superior focuses on:
  - Reliable and adequate supply to existing and future customers in the northeast
  - Potential large industrial growth and commercial development
  - Potential load impacts from electrification and local greenhouse gas reduction plans
  - Equipment reaching end-of-life
- As noted, the second cycle of planning in North/East of Sudbury and North of Moosonee will begin in 2021

GTA and Central – Status of Plans

- First cycle of regional planning resulted in at least one IRRP for each of the regions
- Resulted in a number of infrastructure-based recommendations to address growth; most projects are in-service or being built
- Second cycle of regional planning is underway:
  - Toronto and GTA North IRRPs were published in August 2019 and February 2020 respectively; an addendum was recently initiated for Toronto in the Richview South area to reflect new information with respect to energy efficiency options

GTA and Central – Status of Plans

- A Needs Assessment was completed in February 2020 for GTA East and found no needs requiring regional coordination
- IRRP is underway for GTA West with a planned completion in Q2 2021

GTA and Central – Key Themes

- The second cycle of regional planning focuses on:
  - Continued growth via community expansion and intensification
  - Signaling medium to longer-term needs that will need to be addressed in the next round of regional planning
  - Call to action to communities to develop non-wires alternatives to defer need for infrastructure
  - Equipment reaching end-of-life

Southwest and East Ontario regions

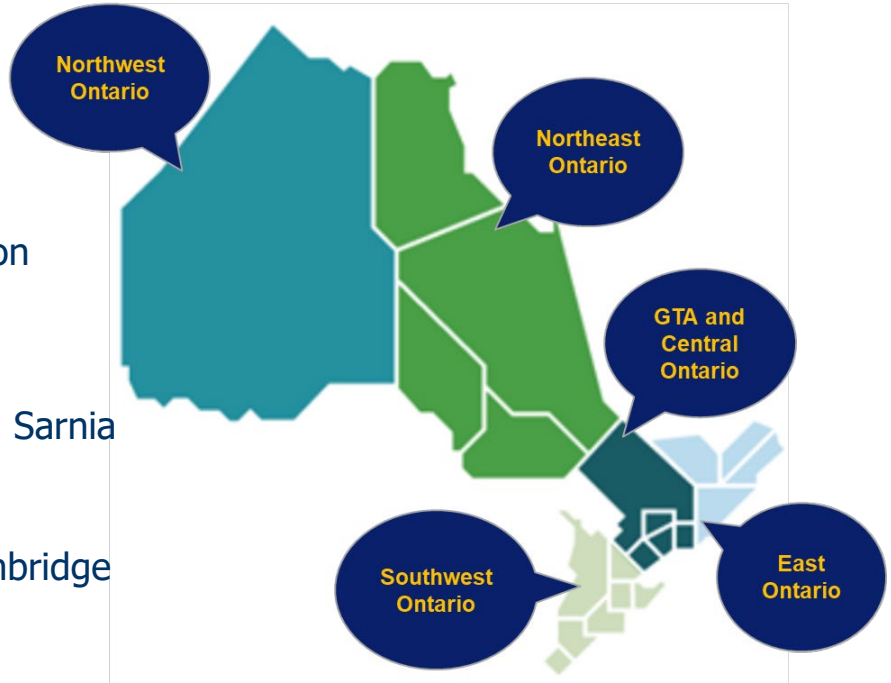
Southwest + East Updates

East

- Greater Ottawa
- St Lawrence
- Renfrew
- Peterborough to Kingston

Southwest

- Windsor-Essex
- Chatham-Kent/Lambton Sarnia
- Greater Bruce Huron
- London
- Kitchener Waterloo Cambridge Guelph
- Burlington to Nanticoke
- Niagara



East – Status of Plans

- The first cycle of regional planning resulted in an IRRP only for the Ottawa sub-region (April 2015)
- The second cycle of regional planning is underway:
  - New Ottawa sub-region IRRP was published in February 2020
  - Peterborough to Kingston IRRP currently in the needs identification stage; due to be published November 2021
- Hydro One's Needs Assessments for Renfrew and St Lawrence are expected in late Q2 2021

East – Key Themes

- Regional planning for the Ottawa sub-region has focused on:
  - Recommending infrastructure to meet growing demand, primarily in west Ottawa
  - Working with the community to clarify needs and options; particularly interest in, and the potential for, non-wires solutions
- Throughout the rest of the east area, a number of assets are reaching end of life, which is a key consideration for both regional and bulk plans for the area, including the ongoing Peterborough to Kingston IRRP

Southwest – Status of Plans

- The first cycle of regional planning resulted in IRRPs for:
  - The Windsor-Essex region (April 2015)
  - The KWCG region (April 2015)
  - The Greater London sub-region (January 2017)
  - Multiple sub-regions of Burlington to Nanticoke (Brant – April 2015 and Bronte – June 2016)
- Resulted in several infrastructure-based recommendations to address growth; most projects are in-service

Southwest – Status of Plans

- The second cycle of regional planning is underway:
  - IRRP for the Hamilton sub-region (Burlington to Nanticoke) published in February 2019
  - New IRRP for Windsor-Essex published in September 2019
  - IRRPs for KWCG region and the Southern Huron Perth sub-region (Greater Bruce Huron) are in the options analysis stage; anticipated to be published late Q1 and Q2 2021, respectively
- Hydro One's Needs Assessments for Niagara and Chatham-Kent/Lambton/Sarnia expected in Q2 and Q3 2021, respectively

Southwest – Key Themes

- Regional planning in Windsor-Essex has focused on addressing growth in the agriculture sector; this should continue and may also be a driver for upcoming plans in Chatham-Kent/Lambton/Sarnia and Niagara
  - Due to the magnitude of load growth forecast over short time frames, significant investments will be required, including bulk system reinforcements
- Communities are increasingly interested in exploring non-wires or community-based solutions to meeting incremental growth needs in the mid- and long-term

Community Engagement

Community Engagement

Regional planning engagement - priorities

- Define scope of engagement
- Identify stakeholders and community representatives to provide opportunities for input
- Provide information/background to support meaningful engagement
- Provide more tools to enable broader engagement

Aligning municipal and electricity planning

Ensure future development goals and priorities are considered in planning to meet your region's electricity needs

Understand the electricity landscape to better inform your official and secondary plans – i.e., community growth, infrastructure and/or energy plans

Learn about new, innovative initiatives underway in neighbouring communities

Contribute to planning a reliable, cost-effective electricity system

Who should participate?

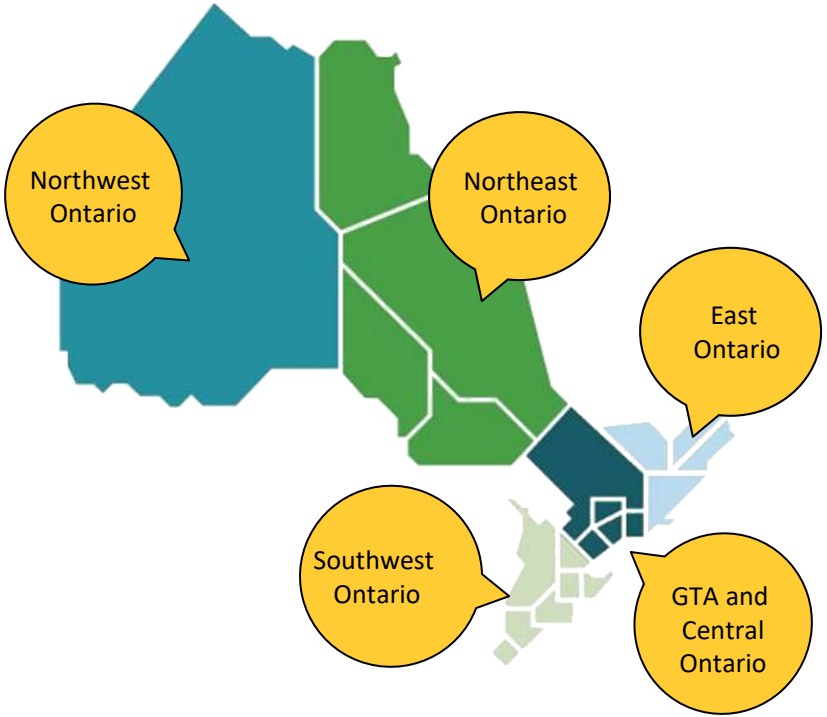
- Municipalities
- Chambers of Commerce/Boards of Trade
- Large energy users
- Community groups and associations (e.g. community/resident associations, Business Improvement Areas, home builders associations, etc.)
- Academia and research organizations
- Energy service providers

How engagement shapes decisions … and opportunities

- **York Region Demonstration Pilot:** Urban growth in York region identified a need to explore alternatives solutions now to meet future needs
- **Windsor-Essex:** Rapid growth in the greenhouse sector identified opportunities to explore alternative solutions beyond electricity infrastructure:
  - Greenhouse pilots awarded through Grid Innovation Fund
  - Save on Energy LED incentive program to address regional needs

Regional Electricity Networks

- Promote dialogue between and among network members and the IESO
- Build understanding and awareness
- Share local priorities and perspectives
- Shape future discussions
- Provide an opportunity for meaningful engagement in IESO decision-making



Online engagement … coming soon

- Broaden IESO’s engagement efforts
- Provide an additional opportunity for network members to offer focussed input in a quick, easy way… when, where and how they choose
- Create an online community
- Support IESO's efforts to better understand needs of communities, consider priorities in IESO initiatives
- Inform future discussion topics

How to get involved

- Subscribe to receive updates on regional electricity planning: www.ieso.ca/subscribe
- Join an ongoing dialogue through one of five regional electricity networks: www.ieso.ca/regionalelectricitynetwork
- Watch this video to learn about the value of community engagement https://youtu.be/Nt8q8cBG_BI
- Contact communityengagement@ieso.ca

Thank You

ieso.ca

1.888.448.7777

customer.relations@ieso.ca

engagement@ieso.ca

@IESO_Tweets

facebook.com/OntarioIESO

linkedin.com/company/IESO

ieso
Connecting Today. Powering Tomorrow.