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2022 Annual Planning Outlook

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Welcome and Introduction

- This engagement is conducted according to the [IESO Engagement Principles](#)
- Today's session will be recorded and available for viewing online
- All documents associated with this engagement can be found on the [Annual Planning Outlook webpage](#)

Participation

- For questions and comments click on the “raise hand” icon (hand symbol) at the top of the application window. This will indicate to the host you would like to speak
- To unmute audio, click on the microphone icon at the top of the application window
- Audio should be muted when not asking a question
- If experiencing connection issues contact engagement@ieso.ca or Microsoft Office Support

Today's Discussion

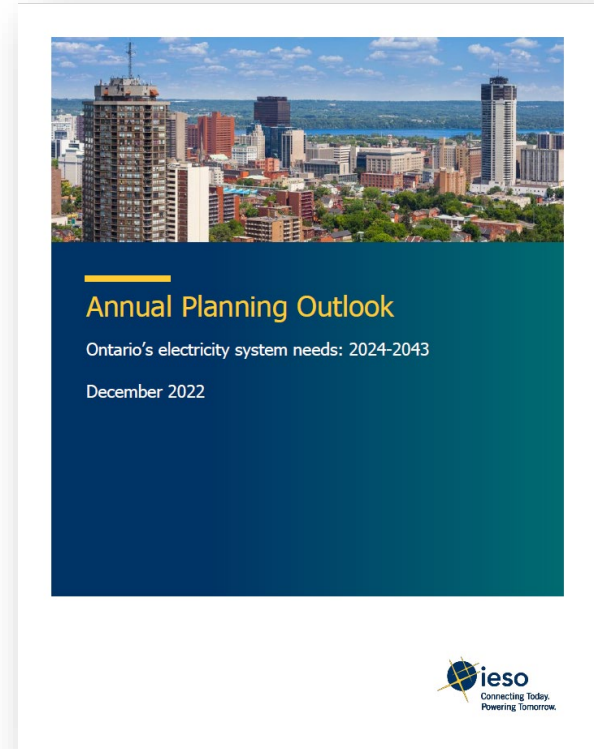
- Information session to provide a high-level overview of the 2022 Annual Planning Outlook (APO) and key considerations as we begin planning for Ontario's Energy Transition

Agenda

- Overview of 2022 Annual Planning Outlook
 - Demand Forecast
 - Supply Outlook
 - Resource Adequacy Outlook
 - Transmission Outlook
- Preparing for Decarbonization
- Preparation for the 2023 Annual Acquisition Report
- Next Steps for Engagement Opportunities

Annual Planning Outlook (APO)

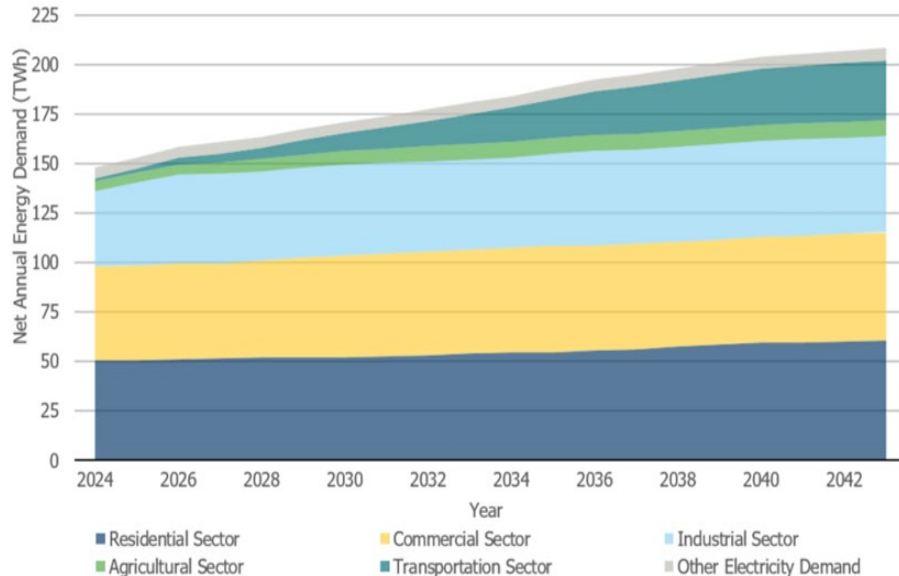
- 20-year outlook, published annually
- Key components include:
 - Demand forecast
 - Supply outlook
 - Transmission outlook
 - Resource adequacy assessment (capacity, energy)
 - Transmission constraints, local capacity requirements and Schedule of Planning Activities
 - Other (imports/exports, emissions, marginal costs, system costs)
- The APO also informs planned actions in the [Annual Acquisition Report](#)



Key Messages

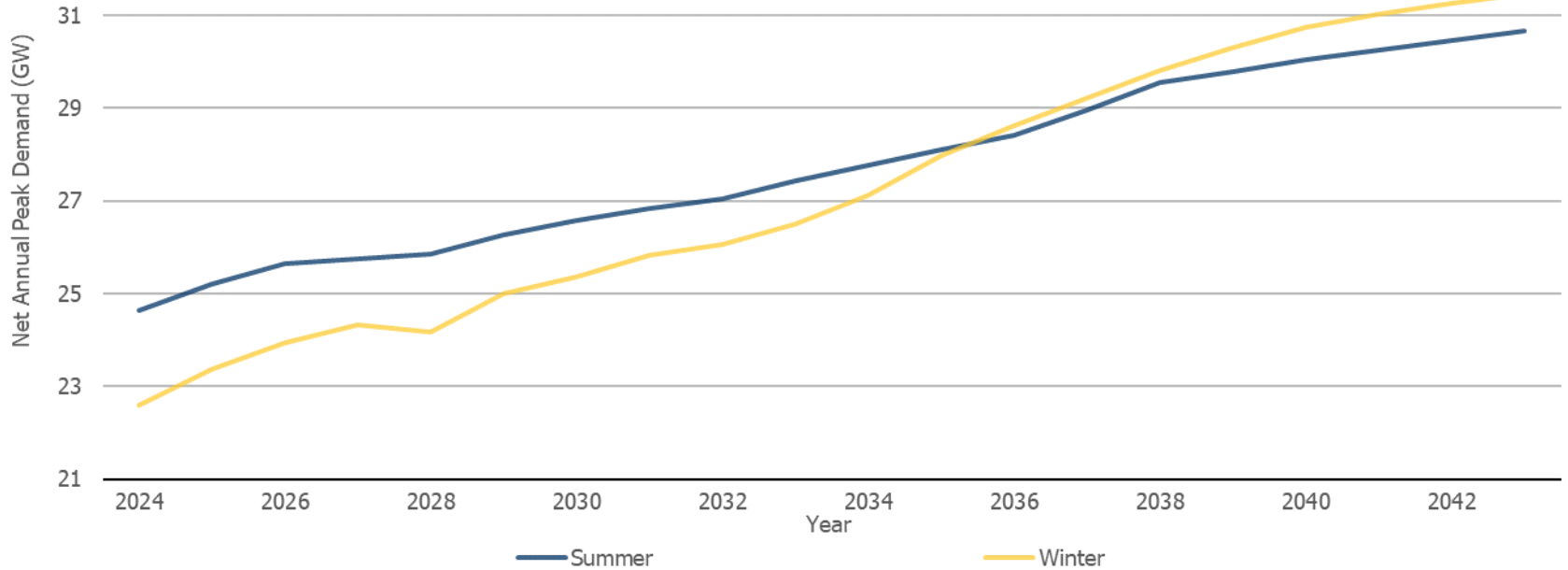
- The 2022 APO forecasts both **energy** and **peak demand** to grow steadily over the outlook period, with energy and winter peak demand slightly more than the 2021 APO Reference Scenario forecast
- **Capacity needs** emerge in 2026 and grow over the forecast horizon
- **Energy needs** also emerge in the mid-2020s, and grow sharply beginning in 2029
 - Most of these needs could be met by existing resources, as long as they continue to participate in Ontario's energy markets
- **Transmission system constraints** have been identified and triaged for action or further study

Demand Forecast Highlights

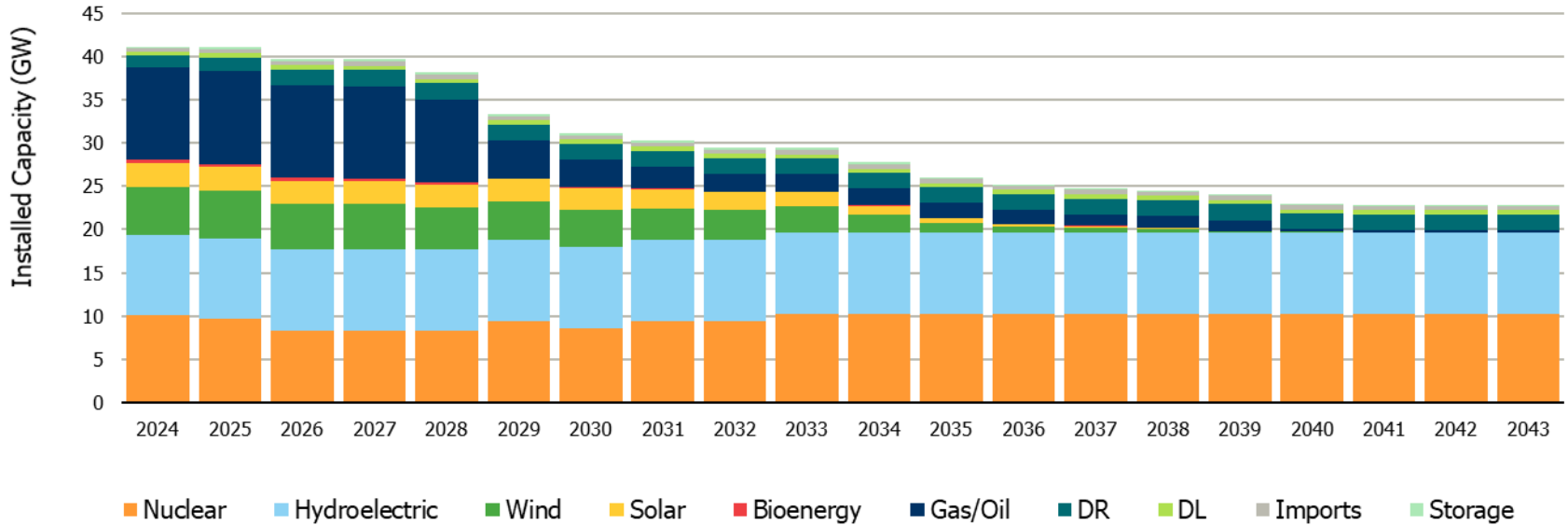


- Demand is expected to grow over the 2024-2043 outlook period, annual energy at an average annual rate of 1.9%, summer and winter seasonal peaks grow at 1.2% and 1.8% respectively
- By 2043, annual energy is forecasted to be 208 TWh and annual peak is 31.5 GW
- System becomes winter peaking by 2036
- Key drivers of demand growth include Population growth, Electric vehicle adoption, Industrial sector growth either electrifying or supporting electrification

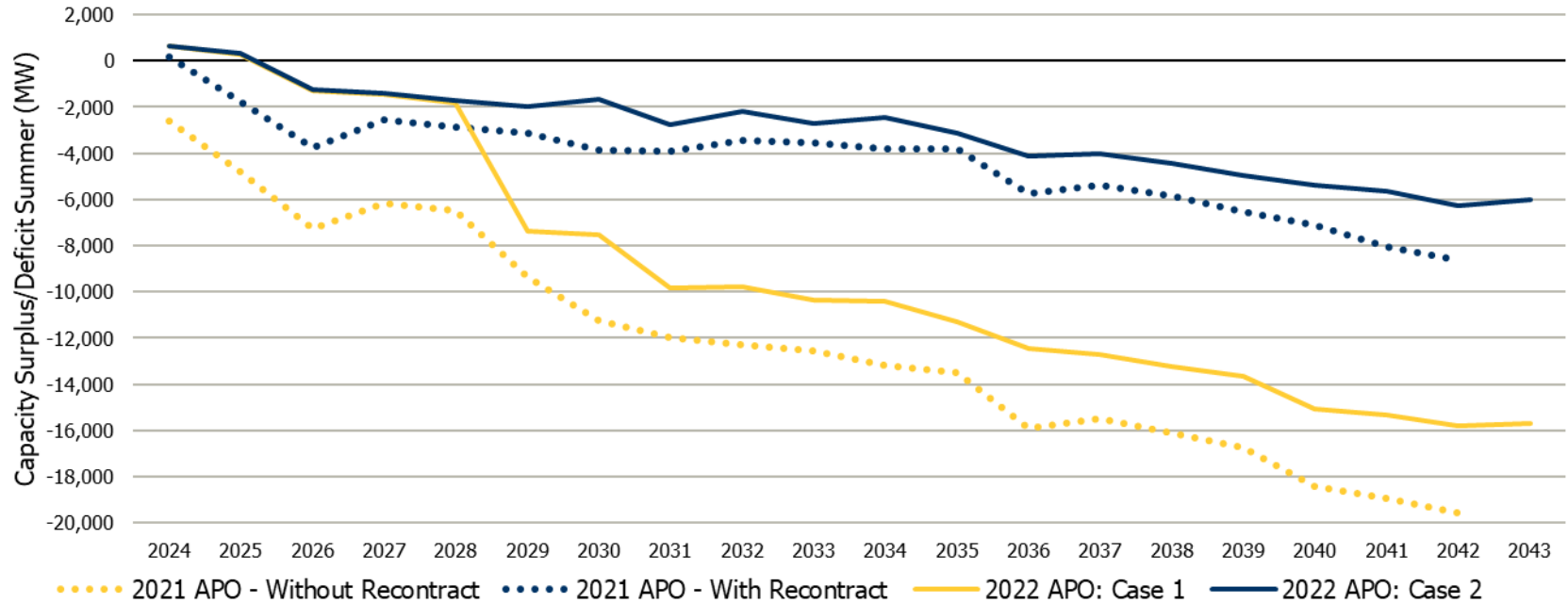
Demand Forecast – Peak Demand



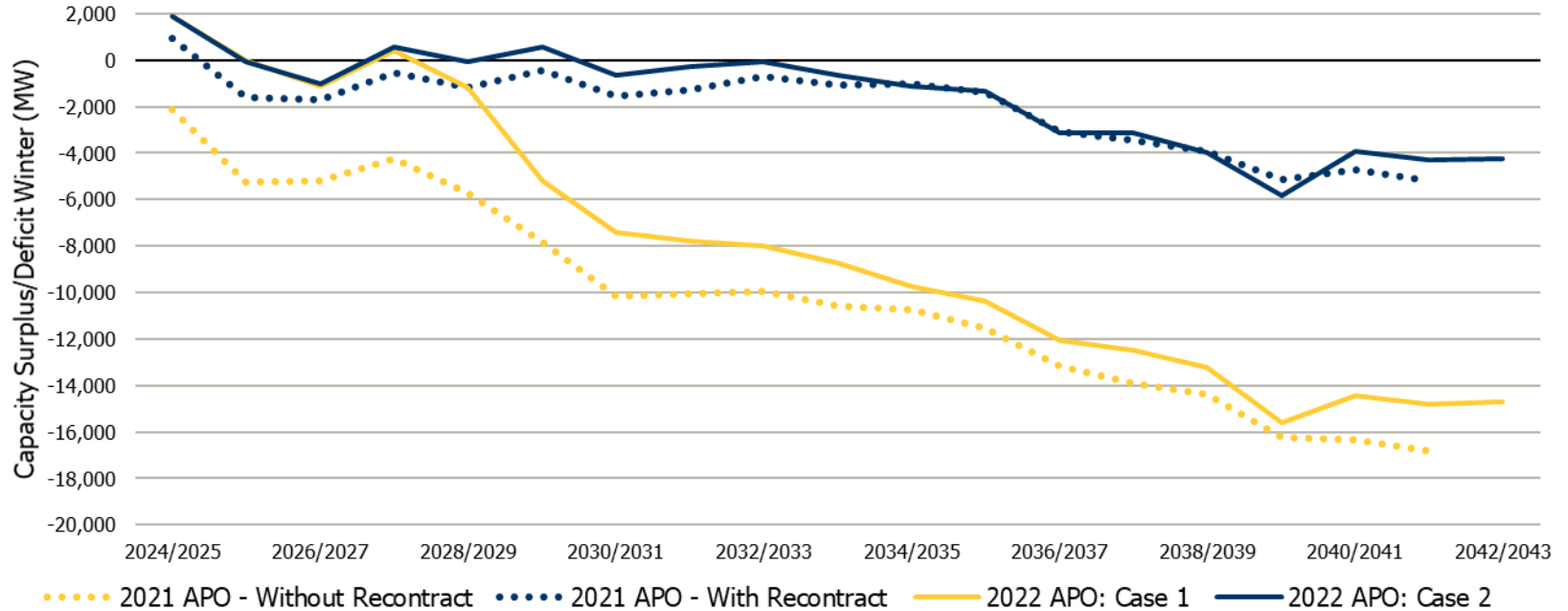
Supply Outlook – Case 1 Installed Capacity



Capacity Outlook - Summer



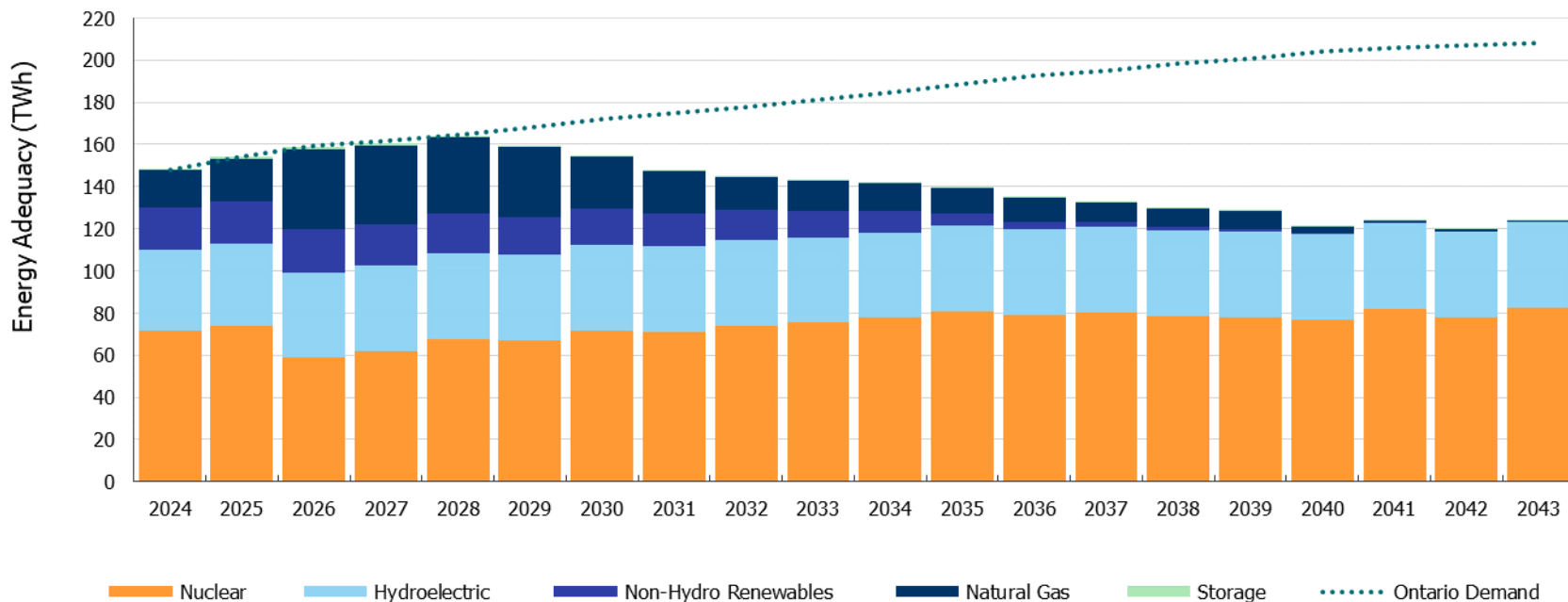
Capacity Outlook - Winter



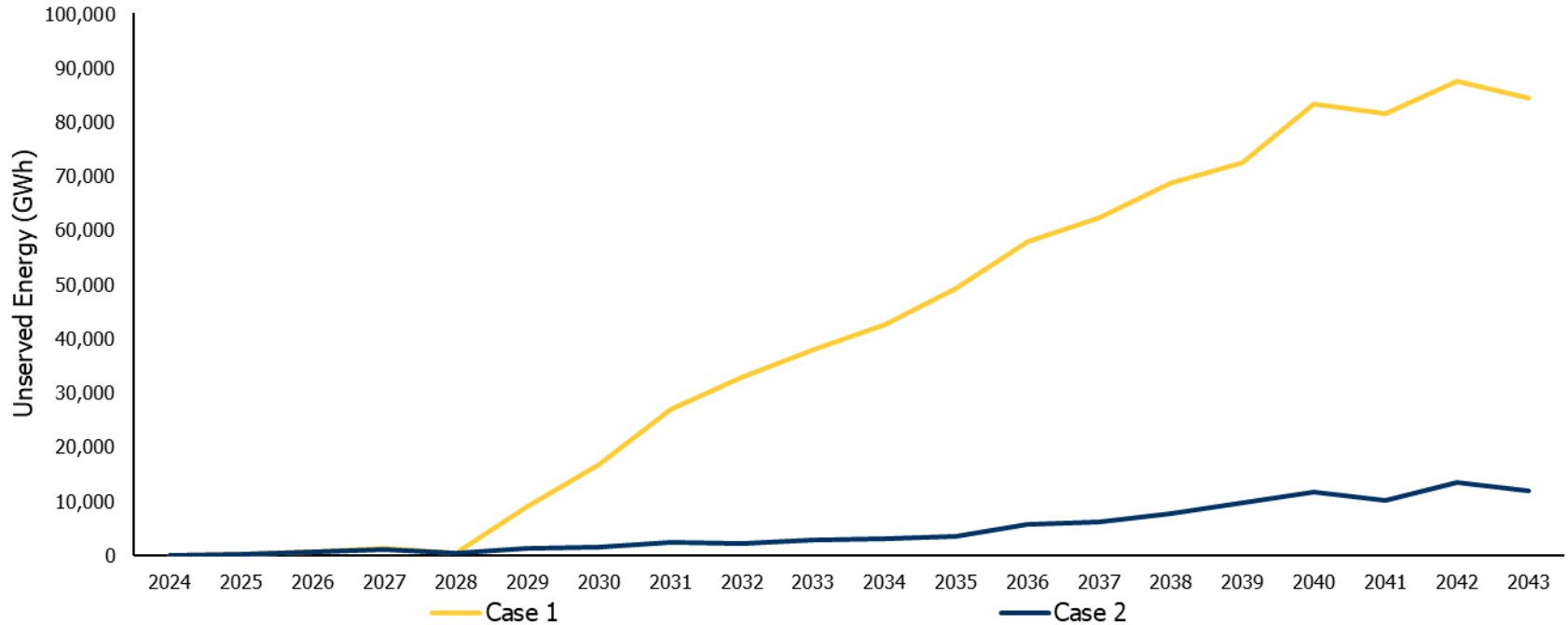
Supply Uncertainties

| New Generation | Existing Generation |
|----------------------------------|--|
| In service delays | Market Exit |
| Supply chain | Nuclear refurbishments and retirements |
| Policy uncertainties | |
| Extreme events | |
| Poorer-than-expected performance | |
| Management of planned outages | |
| Fuel availability | |

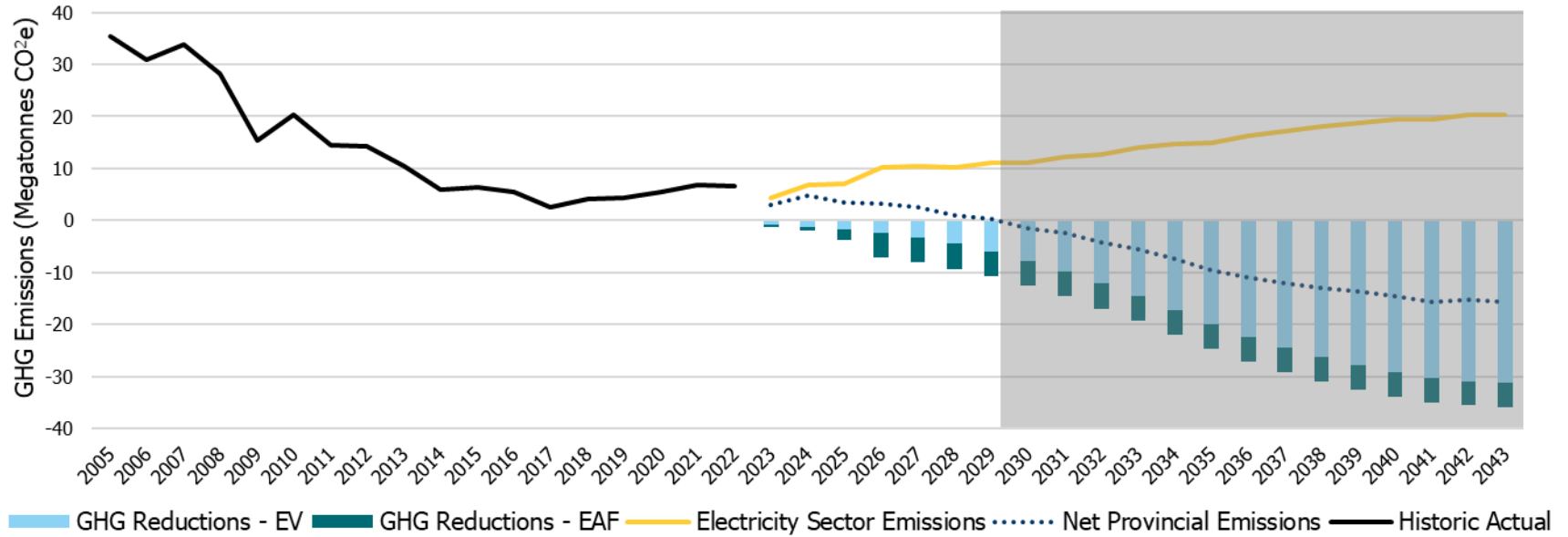
Energy Adequacy Outlook – Case 1



Potentially Unserved energy



Emissions



Ontario's Transmission System

- The capability of the transmission system is a critical input to reliability assessments because limits on the transport of power from one part of the province to another can contribute to demand-supply imbalances at specific locations in the province
- The 20-year transmission study carried out for the APO informs both locational capacity requirements for the Annual Acquisition Report as well as the bulk system planning studies anticipated over the next few years
- These anticipated bulk studies are documented in the APO for the first time in a Schedule of Planning Activities

Transmission System Projects – Planned or Underway



The APO lists the transmission system reinforcements that are currently being implemented

The transmission issues identified in the APO are after having accounted for the long-term benefits of these projects

Transmission Constraints Highlighted in the APO

- The transmission facilities that deliver bulk power supply in the Greater Toronto Area are reaching their limits starting in 2027
- Transmission lines between Pickering and Clarington are reaching limits by 2032
- Transmission lines near Barrie are reaching their limits in 2032
- Transmission facilities between Napanee and Cornwall are reaching end-of-life
- Network reinforcements may be needed in the East of London to Hamilton area
- High voltages in Northern Ontario are expected once new lines come into service
- Facilities on the Ontario-Manitoba interconnection are reaching end-of-life

Locational Capacity Needs

- The APO summarizes where local capacity is needed to address transmission constraints
- Compared to the 2021 APO, recently published transmission plans for the northeast and Gatineau addressed some of local capacity needs
- The quantities in the table below will be re-assessed following the LT1-RFP

| Location | Start of Need | Total Capacity Requirement (assuming contracts are not renewed) |
|-----------------|---------------|--|
| West of Chatham | 2030 | 550 MW by 2035 |
| West of London | 2031 | 1,425 MW by 2035 |
| East of FETT | 2029 | 9,000 MW by 2042 |

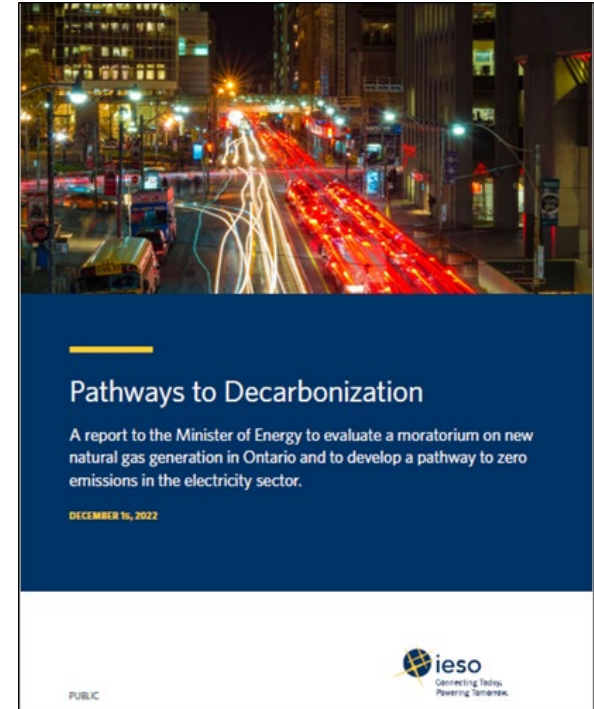
Schedule of Planning Activities

- The APO lays out a proposed schedule for the IESO's bulk system planning activities to evaluate solutions to the forecasted transmission issues that will not be addressed by acquiring capacity in specific areas

| PLANNING ACTIVITIES | TARGET INITIATION YEAR |
|--|------------------------|
| Northeast Ontario Voltage Study | 2022 (already started) |
| GTA Bulk Transmission Supply Study | 2023 |
| Lennox – St. Lawrence Area Study | 2023 |
| Ontario – Manitoba Interconnection Study | 2023 |
| Essa TS Area, Flow North/Flow South Interface Study | 2024 |
| Central – West Ontario Bulk Study | 2024 |
| Northern Ontario Hydroelectric Interconnection Study | TBD |

IESO Pathways to Decarbonization Report

- Ontario's electricity sector can support broad, economy-wide decarbonization
- This is a complex, long-term undertaking involving many parties
- A moratorium on new gas generation is possible by 2027 if new resources are in place
- Decarbonization by 2050 would require a system twice its current size with a diverse zero-emissions supply mix
- Will require significant investments in capital, resources and labour. Estimated costs are ~\$400B over 23 years



Opportunity

- Accelerate current efforts to acquire new non-emitting supply, including expanded energy-efficiency programs
- Begin planning, siting and environmental assessments for new nuclear, storage, hydro and transmission facilities to allow for faster implementation
- Further work and investment to determine if low-carbon fuels, such as hydrogen or renewable natural gas, can replace some of the flexibility of natural gas
- Ensure regulatory, approval and permitting processes are ready to manage future investment at scale
- Galvanize collaboration amongst stakeholders and Indigenous communities
- Establish open, transparent and traceable process to measure progress and demonstrate results of decisions and actions taken along the way

The 2023 AAR in the Planning and Procurement Cycle

Process

1. Identify Needs and Opportunities



Vehicle

APO, quarterly Reliability Outlooks, Transmission Plans, P2D, DER Market Vision

2. Identify and Assess Potential Solutions*

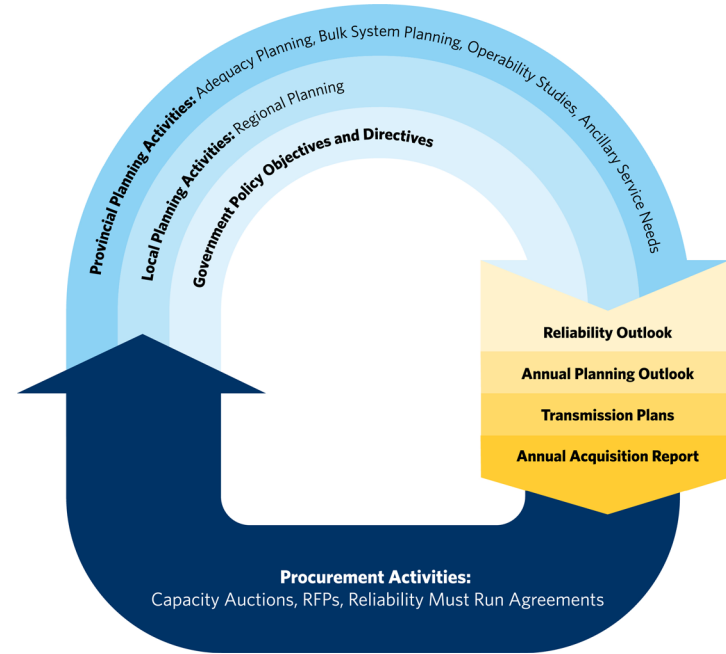


Annual Acquisition Report (AAR)

3. Implement Solutions*



Procurement Engagement and Documents



Engagement on the 2023 AAR to begin in February

*The Resource Adequacy Framework provides a suite of tools that can be leveraged to address needs

Summary

- Ontario has growing needs for capacity, energy and transmission
- Growth rate will depend on the pace of the energy transition
- This growth creates an opportunity to evolve the electricity sector
- The AAR will discuss how to meet Ontario's needs - you are encouraged to participate in the upcoming engagement

Request for Feedback

- The IESO will consider all input on this session please contact engagement@ieso.ca if you have comments or questions following this session

Thank You

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