CITY OF VAUGHAN

EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 16, 2017

Item 3, Report No. 19, of the Committee of the Whole (Working Session), which was adopted without amendment by the Council of the City of Vaughan on May 16, 2017.

3 REGIONAL ELECTRICITY SYSTEM NEEDS AND COMMUNITY-BASED ENERGY SOLUTIONS FILE #22.30.1

The Committee of the Whole (Working Session) recommends:

1) That the recommendation contained in the following report of the Deputy City Manager Planning and Growth Management and the Director of Policy Planning and Environmental Sustainability, dated May 8, 2017, be approved; and

2) That the presentation by Ms. Bernice Chan, IESO (Independent Electricity System Operator), and Ms. Neetika Sathe, Alectra Utilities, and Communication C3, presentation material titled "Electricity Planning in York Region", dated May 8, 2017, be received.

Recommendation

The Deputy City Manager Planning and Growth Management and the Director of Policy Planning and Environmental Sustainability recommend:

1. THAT the presentation from the Independent Electricity System Operator (IESO) and Alectra providing an update on regional electricity system needs in Vaughan be received;

2. THAT staff continue to work with stakeholders to promote conservation and reduction measures, and to better understand energy corridor options and the feasibility of community-based energy solutions in the City and York Region; and

3. THAT energy planning described in this report and City input into Provincial and Federal energy and infrastructure projects inform the Growth Management Strategy update, the Municipal Comprehensive Review and the Vaughan Official Plan 2010 update.

Contribution to Sustainability

The Vaughan Municipal Energy Plan (MEP), which was approved by Council in 2016, identifies actions to reduce greenhouse gas (GHG) emissions to 2031 in support of the Province's Climate Change Action Plan. As part of implementing the MEP, it is important to understand the emerging regional electricity system requirements in relation to urban growth in Vaughan, recognizing that the City will be planning for a new round of growth to 2041. This also provides the opportunity to identify opportunities for community-based energy solutions that the City may play a role in to better manage demand and control greenhouse gas emissions. The MEP is consistent with the following priorities previously set by Council in *Green Directions Vaughan*, the Community Sustainability and Environmental Master Plan:

- Goal 1, Objective 1.2: To reduce greenhouse gas emissions through actions such as working with the community to implement the local action plan and undertaking energy conservation initiatives.

- Goal 2, Objective 2.3: To create a City with sustainable built form by considering recommendations outlined in the local action plan to integrate smart energy planning in new developments and retrofit opportunities.

…/2

Economic Impact

There are no budget implications resulting from the review of the presentation. The presentation by IESO and Alectra broadly discusses the longer-term electricity infrastructure requirements in York Region and potential opportunities to defer electricity infrastructure investment in York Region by using community-based energy solutions.

Communications Plan

N/A

Purpose

The purpose of the report and presentation is to update Council on the potential need for a new electricity infrastructure corridor in the Kleinburg area around the mid-2020s and potential methods to defer this infrastructure requirement to a later date. The presentation by the Independent Electricity System Operator (IESO) and Alectra (the utility entity following the merger of PowerStream and several other utilities) provides an overview of the Integrated Regional Resource Plan (IRRP) process and an update on the electricity planning activities in York Region. This is a useful strategic planning exercise. It provides an opportunity for the City to understand electricity planning issues of relevance to the City's Growth Management Strategy Update to 2041 (VOP 2010, Green Directions Vaughan and other Master Plans), including:

- Opportunities to improve the alignment of energy planning with land use and infrastructure planning;
- Identification of municipal policy tools to support energy conservation and greenhouse gas (GHG) emission reductions that can be incorporated into an updated VOP 2010, Green Directions and the Municipal Energy Plan;
- Identifying alternative energy and/or distributed energy technologies for possible evaluation and potential incorporation into City assets and to inform community planning;
- Where necessary, reinforcing the benefits of consolidating linear infrastructure in single unified corridors;
- Reflecting the implications of energy planning in the Municipal Comprehensive Review by minimizing the impact of electricity infrastructure on the City's land budget, as it affects future Employment Areas.

Background - Analysis and Options

Executive Summary

A new electricity infrastructure corridor is projected to be required in the Kleinburg area of Vaughan around the mid-2020s. This is a result of electricity demand growth being expected to exceed the capability of the regional electricity system supplying Northern York Region/Vaughan, despite ongoing energy conservation efforts and near-term infrastructure actions (e.g. Transformer Station #4 in Kleinburg is expected to come into service in 2017). Furthermore, the recently released Climate Change Action Plan and potential shift to a low carbon economy could further increase the electricity demand in York Region.

More assertive action on the part of local municipal governments in the areas of energy conservation, alternative energy and distributed energy has the potential to defer this infrastructure upgrade. Community-based energy solutions (e.g., small scale solutions that help the community manage and supply their electricity needs) can defer this longer-term need for a few years while contributing to the Province's goal of creating low carbon communities.

Opportunities to co-locate infrastructure and rationalize setbacks will be important to minimize impacts and limit land requirements. Electricity system and infrastructure requirements will need to be considered in the City's Municipal Comprehensive Review process and the Master Plan updates.

York Region Regional Electricity Planning and Community Engagement

A regional electricity planning Working Group for York Region, consisting of the Independent Electricity System Operator (IESO), Newmarket-Tay Power Distribution Ltd., PowerStream Inc. and Hydro One Networks Inc., has been active since 2011. In 2013, the planning process was restructured to conform to the timelines and requirements of the Ontario Energy Board's (OEB) formalized Regional Planning Process. In April 2015 the IESO released an Integrated Regional Resource Plan (IRRP) for York Region, documenting a 20 year plan developed by the Working Group. This plan provided forecasts of electricity demand growth in the region, identified electricity needs and priorities, discussed potential solutions, recommended near-term actions, including a new transformer station serving the City (Transformer Station #4 in Kleinburg is expected to come into service in 2017) and laid out longer-term supply and demand outlooks for the region.

Even with the near-term actions and on-going energy conservation efforts identified in the 2015 York Region IRRP, electricity demand growth is expected to exceed the capability of the regional electricity system supplying Northern York Region/Vaughan around the mid-2020s. Furthermore, the recently released Climate Change Action Plan (e.g., electrification) and potential shift to a low carbon economy could further increase the electricity demand in York Region. Reinforcement of the electricity system may eventually be required given the magnitude of the growth. A number of system reinforcement options are being considered to address the longer-term electricity needs in Vaughan and Northern York Region, including new electricity infrastructure in the Kleinburg area/GTA West Corridor. Details related to these options will need to be examined. Since the need is not expected to arise within the next 10 years, there may be an opportunity to use community-based energy solutions (e.g., small scale solutions that help the community manage and supply their electricity needs) to defer this longer-term need for a few years.

To better understand the extent to which community-based solutions can defer the longer-term needs and to align the local planning assumptions (e.g., population, land use) with York Region electricity planning activities and infrastructure development, the IESO initiated a community engagement process for York Region in September 2015 by forming a Local Advisory Committee. The Local Advisory Committee consists of 16 volunteers from community and municipalities, including a representative from the City of Vaughan. The discussion and feedback at the Local Advisory Committee and community engagements will be an important input into the next iteration of York Region Electricity Plan, which will be initiated at the end of 2017.

Action on the part of local municipal governments in the areas of energy conservation, alternative energy and distributed energy has the potential to defer this infrastructure upgrade. Electricity system and infrastructure requirements will need to be considered in the City's Growth Management Strategy Update to 2041 and Municipal Comprehensive Review process.

Provincial Energy Planning Context

In parallel, energy planning is also underway at the provincial level. The Long Term Energy Plan (LTEP) is the Province's road map setting out the direction for Ontario's energy future for the next 20 years. In starting the revision of the 2013 LTEP, the IESO issued the Ontario Planning Outlook (IESO 2016) examining the province's future electricity needs and how they might be met while the Ministry of Energy released the Fuels Technical Report examining the supply and demand projections for oil, gasoline, propane and natural gas in Ontario.

The facts and analyses in these two reports will help guide the consultation process in the development of the next LTEP. Both reports take into account other government commitments made in the Climate Change Action Plan, the *Climate Change Mitigation and Low-Carbon Economy Act, 2016* and the *Vancouver Declaration* (the Pan-Canadian Framework on Clean Growth and Climate Change). The Ministry of Energy intends to publish the next LTEP in 2017. Care needs to be taken to ensure that these provincial priorities and directions are considered and reflected in our local and regional energy planning activities. For example, as noted in the Ontario Planning Outlook regarding the impact of climate change policy and electrification on electricity demand growth; the following is relevant to Vaughan and will need to be considered:

> *While the impact of electrification in space heating, water heating and transportation will increase electricity requirements across the province, the impact would be the most prominent in urban centres, with implications for regional transmission systems that will need to be considered as part of the regional planning processes*.

IESO and PowerStream Presentation Outline

The presentation by the IESO and Alectra is made up of two parts. The first part of the presentation sets the context in terms of the policy background and IRRP process, including a discussion of integrating energy planning into land use planning. The electricity infrastructure requirements are broadly discussed in relation to the energy load forecast.

The second part of the presentation will address community-based energy solutions, such as articulated as “demand response resources” and “distributed energy resources”. This includes a more detailed discussion of the findings of PowerStream’s “Power.House” project, which is an example of distributed energy generation that can be harnessed as a micro grid (a miniature version of the main grid).

Relationship to Term of Council Service Excellence Strategy Map (2014-2018)

This report is consistent with the Term of Council priority to continue to cultivate an environmentally sustainable city as demonstrated by the previously approved Municipal Energy Plan. The Vaughan MEP was based on goals identified in the Community Climate Action Plan that work toward energy security, supporting local economic development, fostering a culture of social responsibility and sustainability, and identifying actions to reduce the community’s energy consumption and GHG emissions.

Regional Implications

This report and presentation is consistent with the York Region Official Plan (ROP 2010), which requires the development of Community Energy Plans at the following geographic scales:

- A municipal-wide Community Energy Plan (ROP 2010 policies 4.1.14 and 5.2.13);
- For each Regional Centre (ROP 2010 policy 5.2.24); and
- For each New Community Area (ROP 2010 policy 5.6.10).

Conclusion

The generation, transmission and distribution of electricity collectively constitute one of the main drivers of a sustainable society. It has largely been taken for granted in land use planning for the last half of the 20th Century. Over time, land use, development and energy planning has become increasing linked due to matters such as cost, climate change and pollution mitigation and the consumption/visual effects of the infrastructure on communities. Understanding the opportunities and constraints will need to become a bigger part of both our land use planning process and municipal operations. This presentation will provide some of the background the City will need consider in conducting its planning processes.

In terms of direct City actions, there may be opportunities for community-based energy solutions to play a role in addressing longer-term electricity needs at both the regional and the provincial level. Currently, the IESO is working closely with community and local utilities to explore opportunities to defer the need for new electricity infrastructure in Northern York Region/Vaughan using community-based energy solutions.

At the same time, provincial energy planning is underway. As noted in the IESO's 2016 Ontario Planning Outlook, community-based energy solutions can be part of the solution in addressing demand growth under higher demand outlooks and in enhancing the security of supply and resiliency:

> *In the IESO's higher demand outlook, electrification of end-uses in support of climate change actions could be met in a variety of ways. While Ontario would require additional electricity resources to meet the associated higher levels of demand growth, it has a variety of options available, including distributed energy resources and enhanced conservation. Higher demands could be served in ways that sustain recent reductions in electricity sector emissions while significantly reducing carbon emissions in the broader economy, including through the greater substitution of electricity for fossil fuels in residential and commercial space and water heating, light duty vehicles, public transit and in some industrial applications.*

The City will need to stay apprised of, and help to create the opportunities for, community-based energy solutions to mitigate the City's energy costs and contribute to the fulfillment of the Province's climate change goals.

Attachments

1. Presentation by IESO and Alectra

Report prepared by:

Tony Iacobelli, Manager of Environmental Sustainability, ext. 8630

(A copy of the attachments referred to in the foregoing have been forwarded to each Member of Council and a copy thereof is also on file in the office of the City Clerk.)

Electricity Planning in York Region

City of Vaughan - Committee of the Whole (Working Session)

May 8, 2017

ieso
Connecting Today.
Powering Tomorrow.

ATTACHMENT 1

Objectives

Provide an overview of the regional electricity planning process and electricity infrastructure

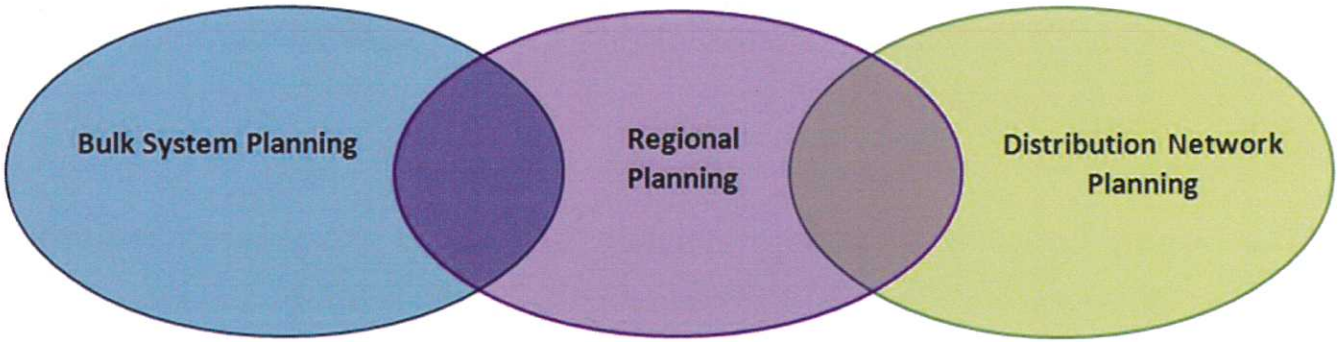
Discuss the longer-term electricity needs and options in Vaughan-Northern York Region

Discuss how community-based energy solutions are being considered in regional electricity planning and on-going initiatives/pilots

PART 1

ELECTRICITY PLANNING ACTIVITIES IN YORK REGION

Types of Electricity Planning



Addresses provincial electricity system needs and policy directions	**Integrates** local electricity priorities with provincial policy directions & system needs	**Examines** local electricity needs and priorities at the community-level
Ministry of Energy	IESO	
IESO	Transmitters	Local Distribution Companies
Asset Owners (e.g. Transmitter, Large Generators)	Local Distribution Companies	

First Nations, Métis, municipalities and industry stakeholders

Key Participants

ieso
Connecting Today.
Powering Tomorrow.

Scope of Regional Electricity Planning

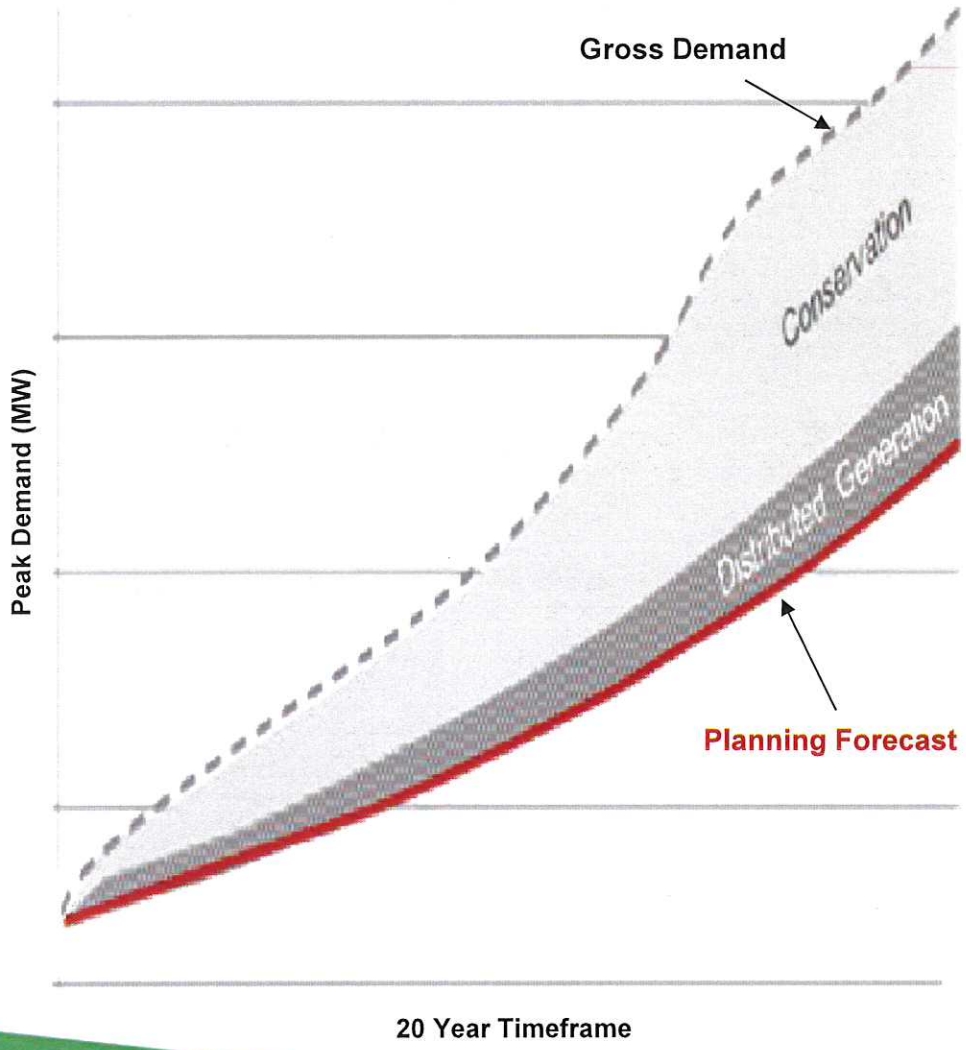
- A process for identifying and meeting electricity needs for a region
  - Carried out by local utilities, transmitter and the IESO ("Technical Working Group")
  - Revisit at a minimum every five years

- Key Outcomes - A 20-Year Electricity Plan
  - Work with communities to understand the electricity needs and local priorities
  - Identify need for infrastructure, generation, conservation programs and/or innovative solutions
  - Layout a near-term implementation plan and long-term roadmap

- Project-related considerations are beyond the scope of regional planning. Projects identified in the plan will still need to consider, as part of the development process:
  - Project details/specifications and siting/routing
  - Approval processes (e.g. environmental assessment, regulatory approval)
  - Project-Level Stakeholder and Community Engagement
  - Consultation with Indigenous peoples
  - Project Funding and Cost-Allocation

- Connection assessment of generation resources for procurement programs, such as the Feed-in-Tariff and, the Large Renewable Procurement, are beyond the scope of regional planning.
  - Generation projects participating in procurement programs will be assessed according the rules and specifications of the procurement programs.

Planning Forecast Assumptions



1. Gross Peak Demand Forecast (MW)
(Provided by local distribution companies and transmission connected customers based on local economic development and growth assumptions outlined in municipal plans)

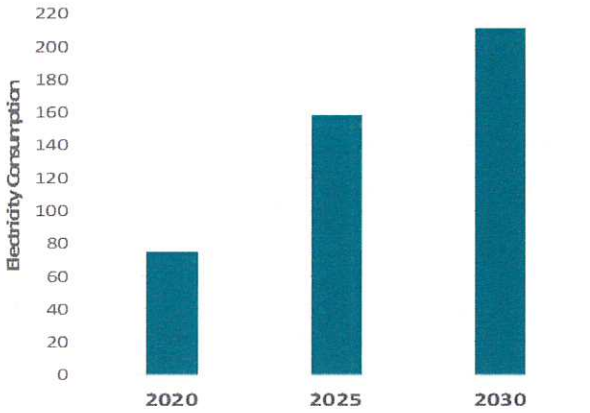
2. Expected Peak Demand Savings from Provincial Energy Conservation Targets
(Includes impact of new codes and standards and programs/pilots outlined in local utilities' conservation plan)

3. Expected Peak Demand Contribution from Existing and Contracted Distributed Energy Resources
(Future distributed energy resources uptake is instead considered as an option for meeting identified needs)

Planning Forecast - *Used to assess the electricity needs over the 20 –year period*

(Take into consideration the gross demand forecast scenarios, estimated peak demand savings from provincial energy conservation targets, and existing and contracted DG)

Identify electricity needs



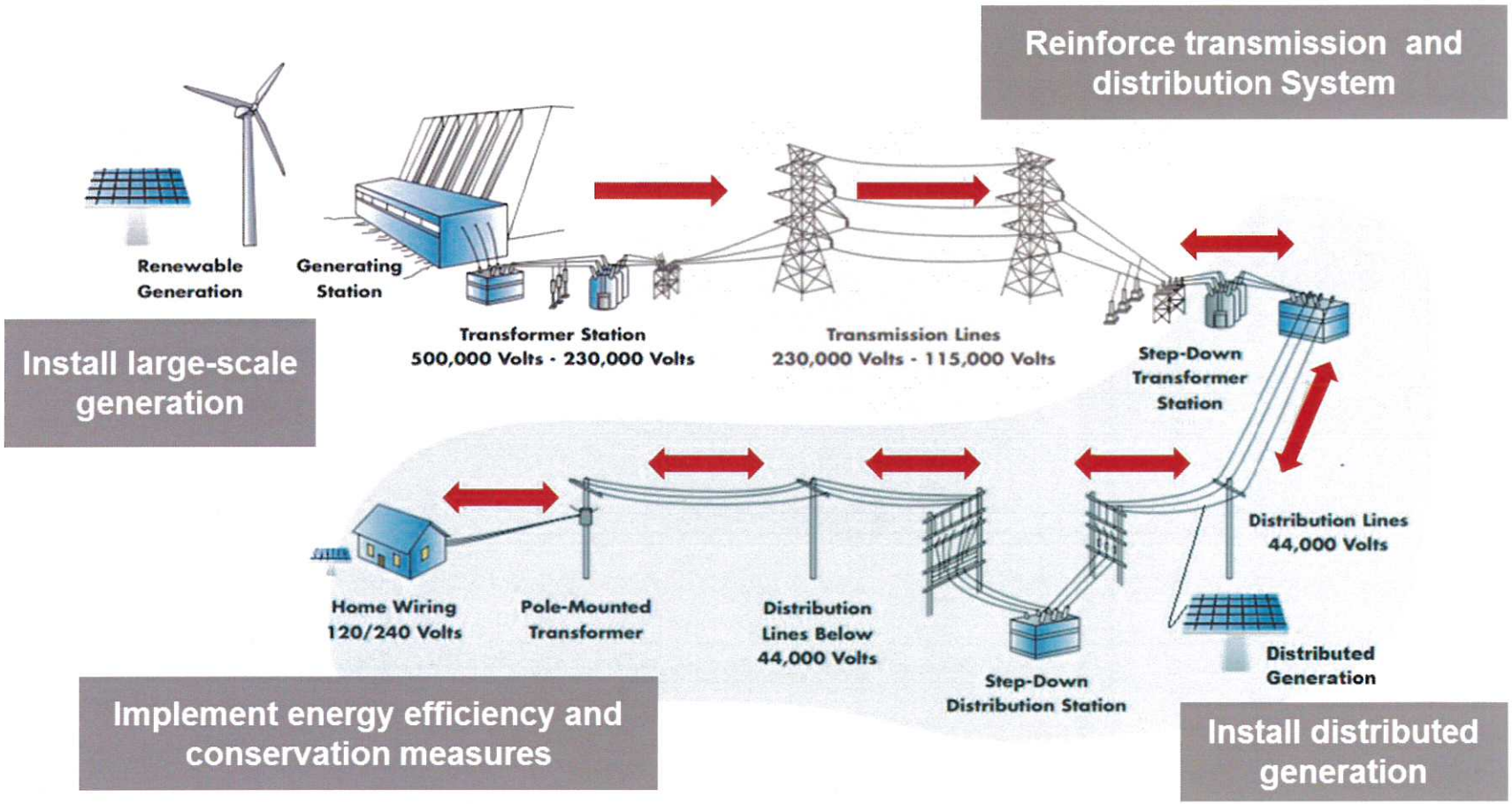
Provide a Safe, Reliable Source of Electricity to Support Growth

Minimize Impact of Power Outages

Replace Aging Infrastructure

ieso
Connecting Today.
Powering Tomorrow.

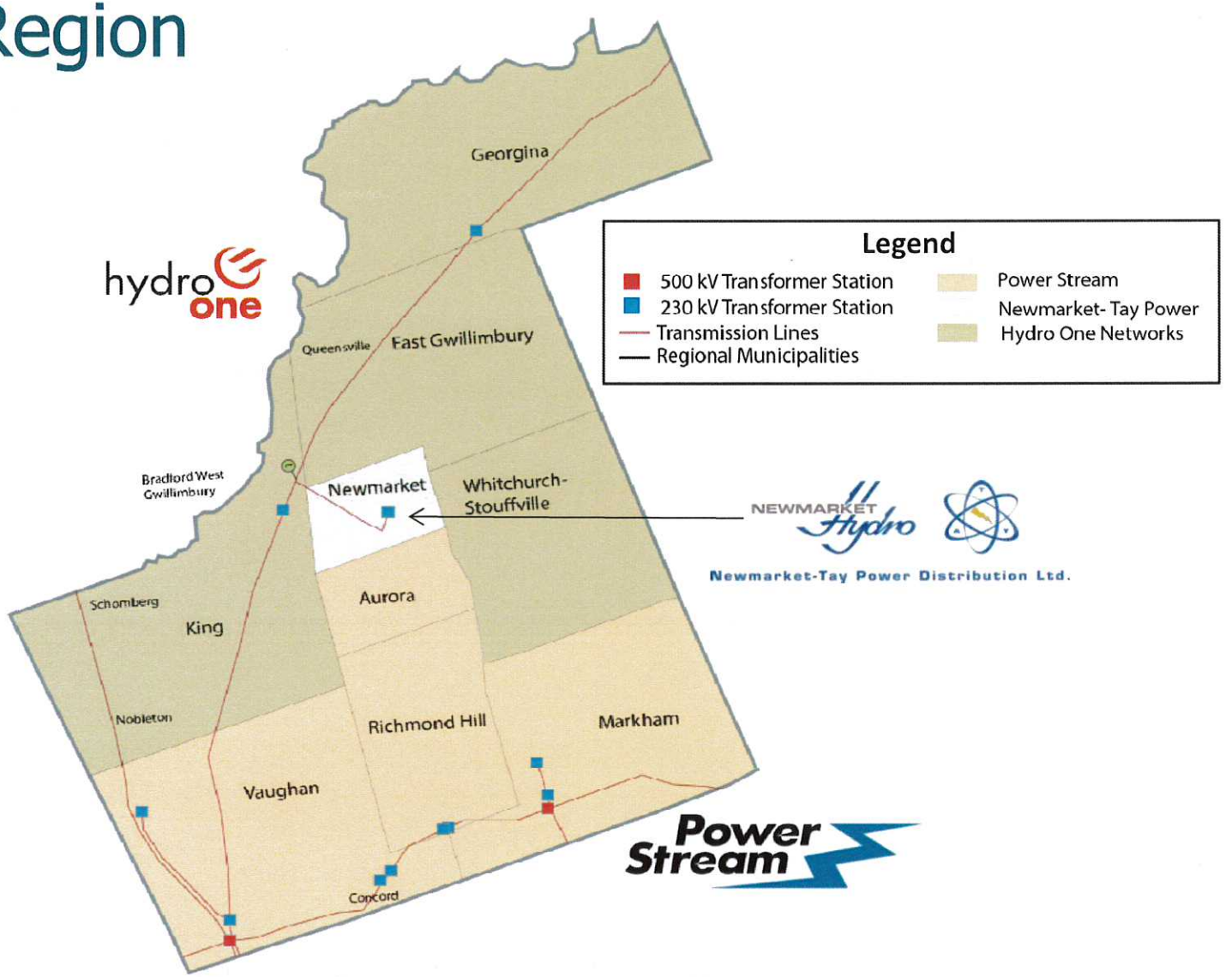
Different approaches to address electricity needs



The electricity plan typically includes a combination of the different types of approaches

ieso
Connecting Today.
Powering Tomorrow.

York Region



ieso
Connecting Today.
Powering Tomorrow.

Planning Activities Since 2005

2005 Northern York Region Study

Implemented recommended actions

- York Energy Centre
- Holland Station
- Demand Response
- On-going Conservation efforts

2015 York Region Integrated Regional Resources Plan

Implementing near-term plan

- Conservation efforts
- New station in Vaughan
- Switching facilities at Holland
- Switching facilities along Parkway/407 Hwy
- System reinforcements to support growth in Markham-Richmond Hill

Identified longer-term needs

- Growth will exceed the Vaughan-Northern York Region's electricity system's capability.

Inform

Seek input from Local Advisory Committee and affected communities

Lessons learned from pilots and studies

Next iteration of the York Region Integrated Regional Resources Plan

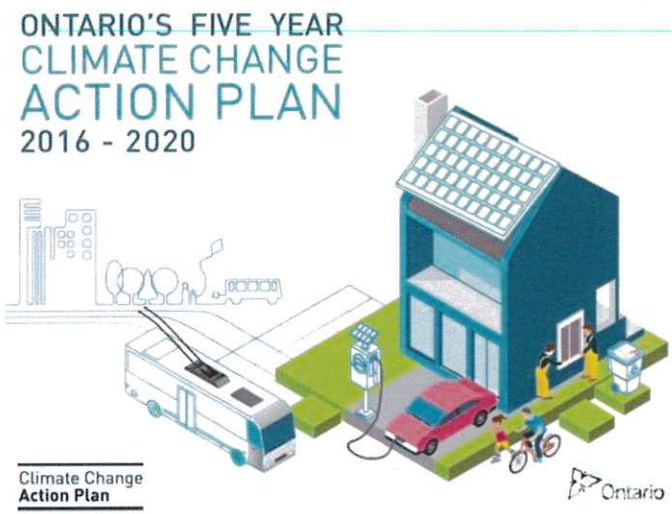
Incorporate input from LAC and affected communities

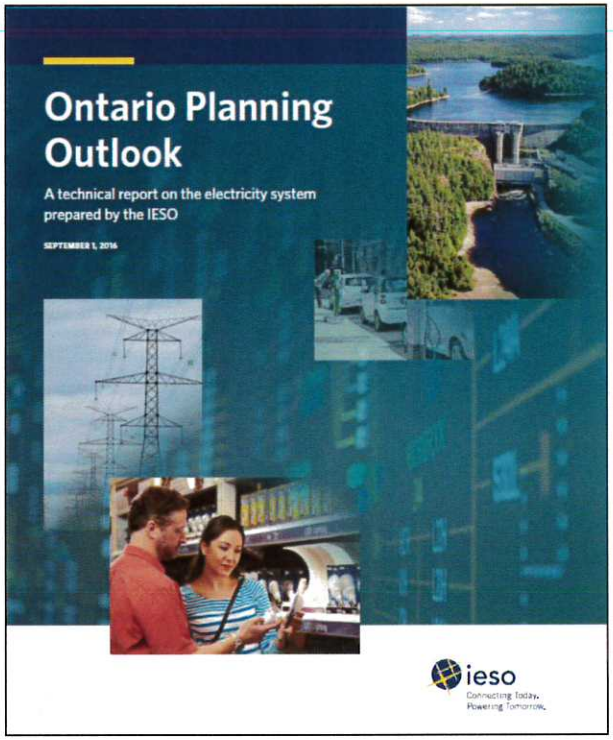
- Solutions required to support growth in Vaughan-Northern York Region

Require input from the local community

2005 2015 2017

Outlook: Trends and Policy Directions





PLACES TO GROW

BETTER CHOICES. BRIGHTER FUTURE.

ieso
Connecting Today.
Powering Tomorrow.

Community Energy Planning (CEP)

- Many communities are currently in the process of developing community energy plans
  - Newmarket and Vaughan have Council-approved Municipal Energy Plans
  - Vaughan's MEP is a collection of GHG emission reduction actions and is not an integrated energy plan that identifies community-based energy solutions (E.g., Renewable generations)

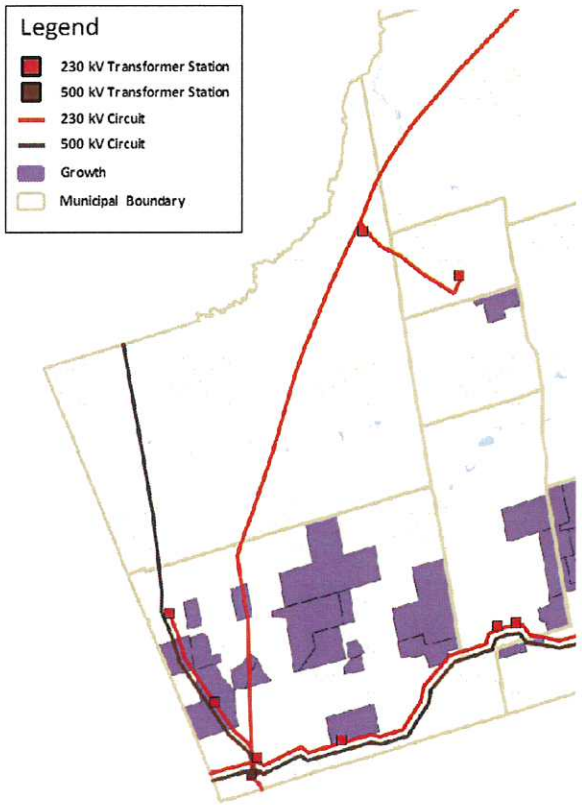
- While regional planning focuses on maintaining adequacy of electricity supply, CEP process takes a broader perspective.
  - CEP includes all fuels, such as transportation, natural gas and electricity, and has different goals, including net zero energy, electrification, greenhouse gas reduction and reducing emissions

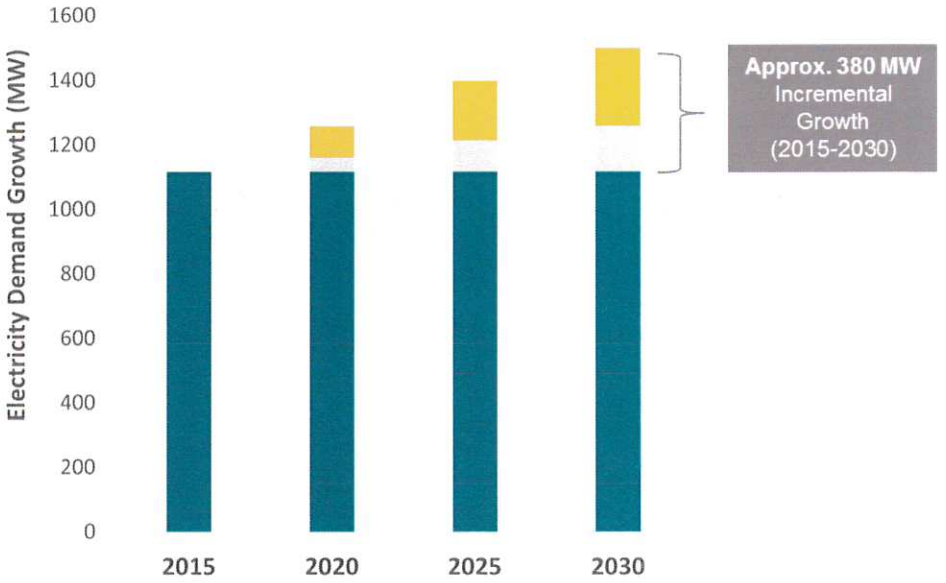
- Energy conservation assumptions are consistent in both CEP and regional planning
  - Includes impact of new codes and standards and programs/pilots outlined in local utilities' conservation plan

- Coordination between CEP and regional planning processes can benefit regional plans by providing local input on opportunities to develop community-based solutions.
  - Local perspectives help provincial system planners to identify these opportunities

Vaughan and Northern York Region Electricity Demand Growth

Continued growth in Vaughan and Northern York Region over the next 20 years.





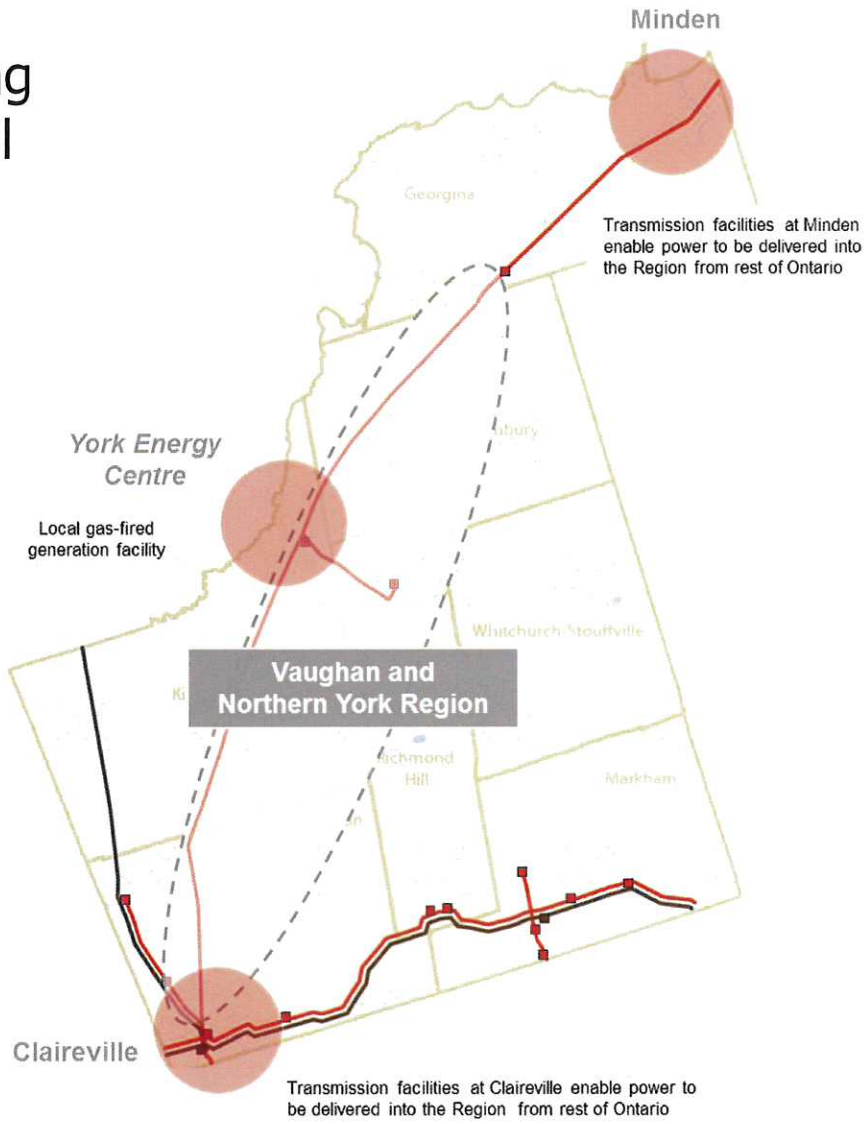
Source: 2015 York Region Integrated Regional Resource Plan (IRRP)

Note: The incremental growth shown already accounts for the demand savings from on-going conservation efforts

ieso
Connecting Today.
Powering Tomorrow.

Even with on-going conservation efforts, all three main sources supplying Vaughan and Northern York Region will reach their capacity by mid 2020s.

Sources of electricity supply (At Capacity) by mid 2020s



Vaughan and Northern York Region

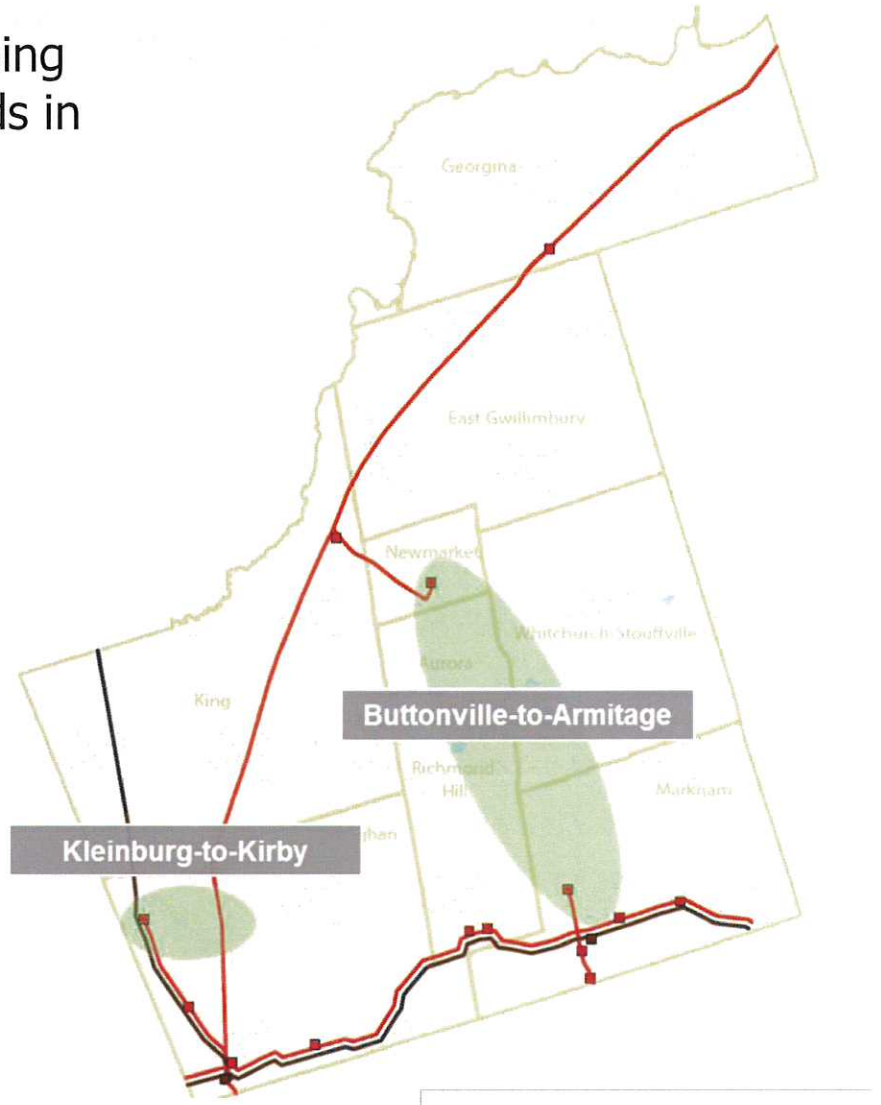
Options Development

- Given the timing, communities may explore opportunities to defer the need for a few years using community-based solutions.
  - Require input from communities to determine the potential and feasibility

- Reinforcement of the electricity system may eventually be required given the magnitude of the growth.
  - Options to reinforce the system should be examined and considered
  - A system reinforcement plan for this area will need to be included in the next iteration of York Region IRRP, which is expected to be initiated in 2017

Two system reinforcement options are being considered to address the electricity needs in Vaughan and Northern York region

- Both options will require 2 transformer stations and a combination of transmission and distribution lines
- Options are being developed in consideration of existing (e.g. Buttonville-Armitage) and future infrastructure corridors (e.g. West GTA Corridor)
- Details related to these options will need to be examined
- Technical Working Group will continue to discuss these options with the LAC and affected communities in future meetings



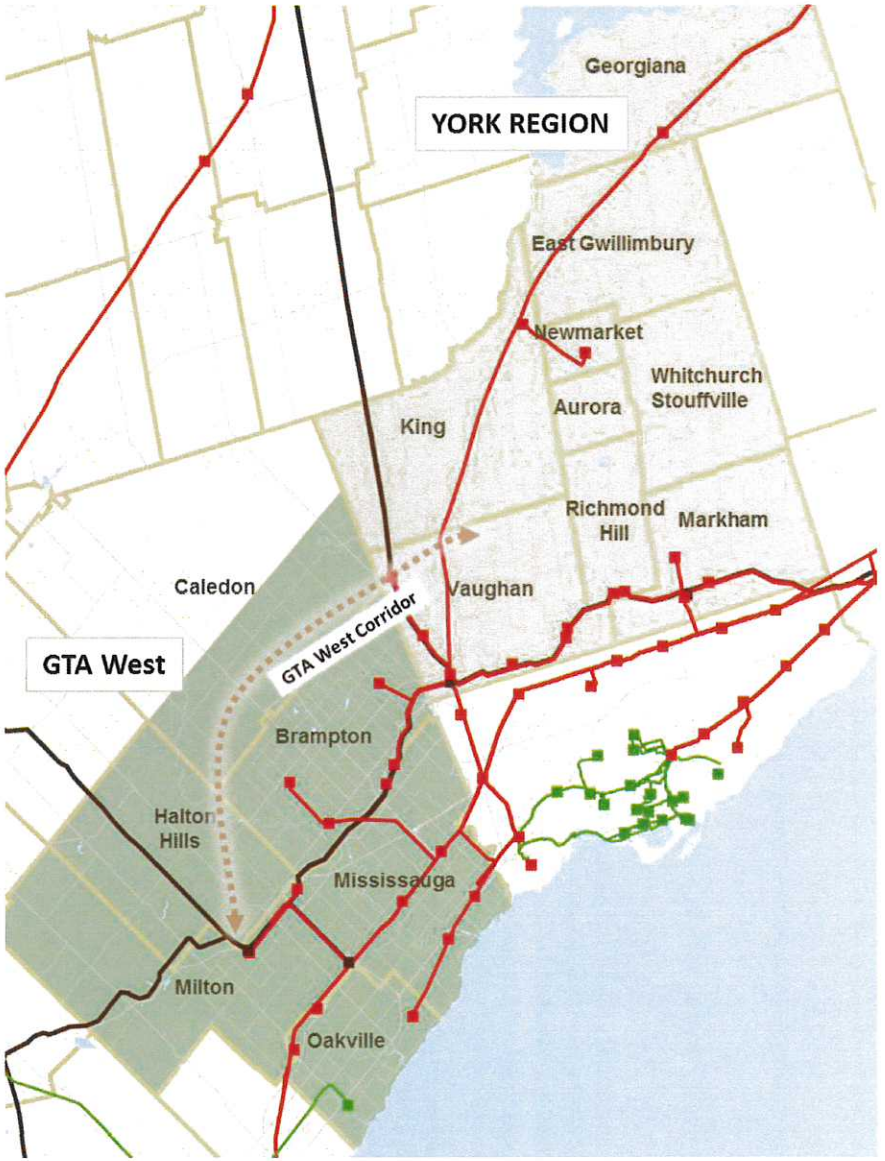
GTA West Corridor

- Proposed new transportation corridor, intended to link Vaughan with Milton. Process has been paused since December 2015 pending review.

- Transmission system reinforcements along the GTA West corridor/Kleinburg area can potentially address both Northwest GTA and Vaughan-Northern York Region needs.

- Needs in Northwest GTA:
  - Provide additional capacity to supply two new stations in North Brampton and South Caledon within the 20 years
  - Minimize the impact of supply interruptions in the Kleinburg area

The needs and options for York Region and Northwest GTA will be examined in a coordinated manner.



Next Steps

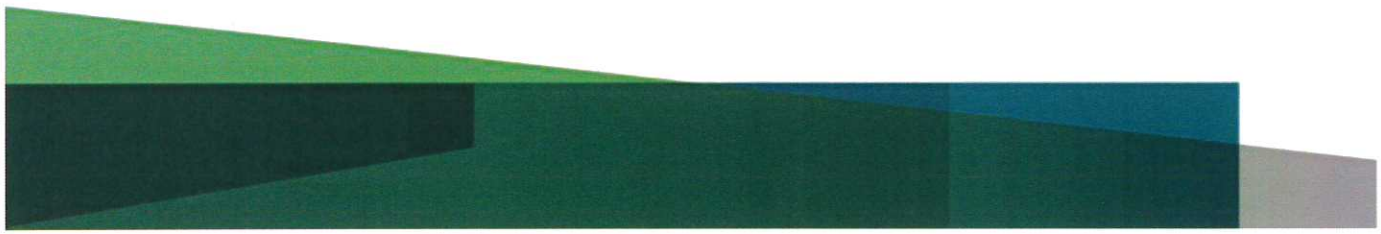
- Working Group will work with the Local Advisory Committee and affected communities to identify opportunities to defer the longer-term needs using community-based solutions.
  - The development of community-based solutions will be the focus of future LAC meetings.

- The Working Group will also continue to discuss potential system reinforcements options with the LAC and affected communities.
  - The needs and options for Vaughan-Northern York Region and Northwest GTA will be examined in a coordinated manner.

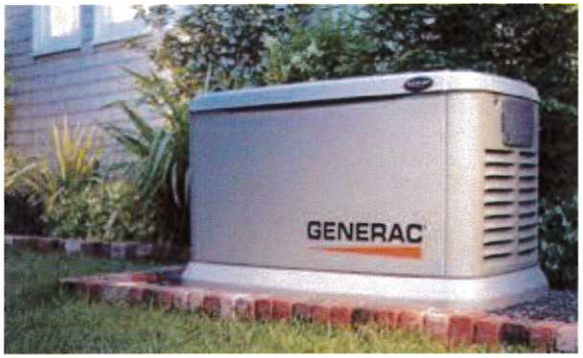
- Input from LAC and affected communities will be incorporated into the next iteration of York Region IRRP, which is expected to be initiated in 2017.

PART 2

COMMUNITY-BASED ENERGY SOLUTIONS AND REGIONAL PLANNING

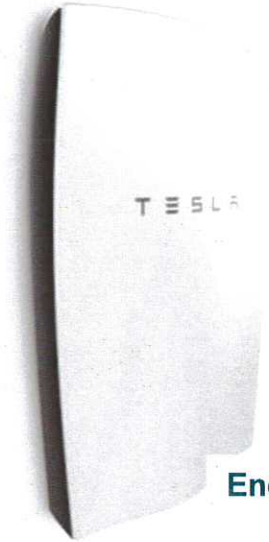


Community-Based Energy Solutions / Distributed Energy Resources (DERs) – Examples



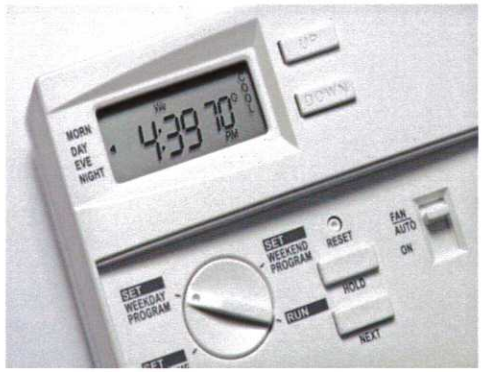
Gas-fired Generators

Microgrids



Energy Storage

Combined Heat & Power



Residential Demand Response

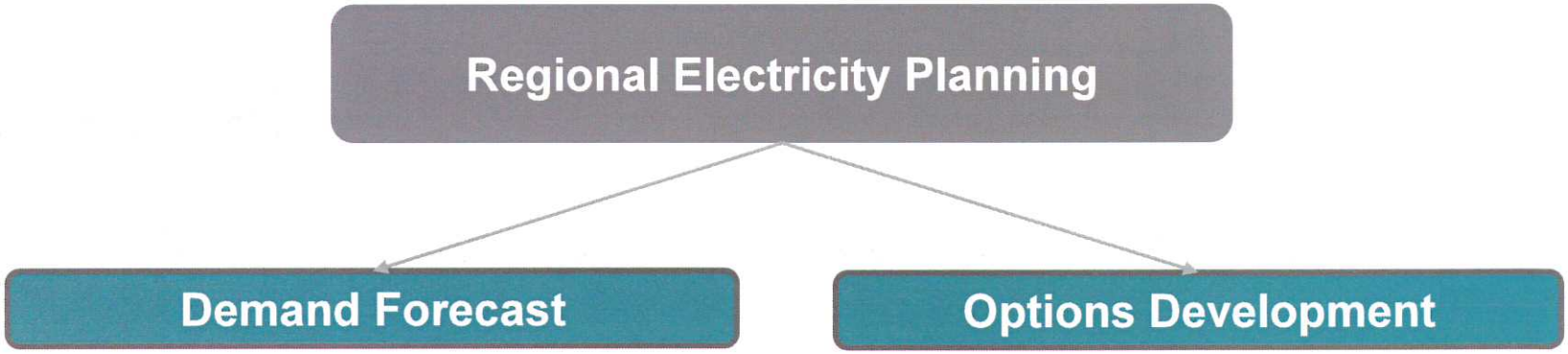
Renewable Generation

Current Technology Characteristics

Technology	Characteristics						
	Capacity	Energy	Operating Reserve	Load Following	Frequency Regulation	Contribution to Provincial Winter Peak	Contribution to Provincial Summer Peak
Conservation	Yes	Yes	No	No	No	Depends on Measure	Depends on Measure
Demand Response	Yes	No	Yes	Yes	Limited	60-70%	80-85%
Solar PV	Limited	Yes	No	Limited	No	3-5%	20-35%
Wind	Limited	Yes	No	Limited	No	20-30%	11%
Bioenergy	Yes	Yes	Yes	Limited	No	85-90%	85-90%
Storage	Yes	No	Yes	Yes	Yes	Depends on technology/ application	Depends on technology/ application
Waterpower	Yes	Yes	Yes	Yes	Yes	67-75%	63-71%
Natural Gas	Yes	Yes	Yes	Yes	Yes	95%	89%

Source: 2016 Ontario Planning Outlook

How do we consider DERs in Regional Electricity Planning?



- ✓ Demand savings from Provincial Energy Conservation Targets
- ✓ Existing and contracted DERs
- ✓ Community Energy Plans (e.g., Energy Efficiency Targets, district energy, CHPs)

- ✓ As an alternative to transmission and distribution solutions, DERs can provide a local source of supply for communities
- ✓ Options are evaluated based on a number of factors:
  - Needs (Energy, Capacity, End of Life, Resilience)
  - Technical feasibility
  - Cost-benefits
  - Regulatory and implementation considerations
  - Land-use considerations and community input

DERs and Regional Planning: Opportunities & Challenges

Opportunities

- Decline in cost of technology
- Increased customer choice and engagement
- Electrification and Climate Change Policies
- Community Energy Plans
- Extreme Events and System Resilience

Challenges

- Limited information on the cost and feasibility of implementing DER in a specific local area
- Limited tools/processes to assess the impact of DERs on transmission and distribution system
- No mechanism to target DER projects to areas where they are needed
- No clear regulations on cost responsibility for DER options to meet regional needs
- No provincial need for additional energy or capacity in the near-term
- Care must be taken to ensure that DER solutions do not result in stranded assets or higher costs

In partnership with local utilities, the IESO is engaging in a number of pilots and studies to better understand costs and feasibility of developing distributed energy resources in a local area

Residential Solar-Storage Pilot and Feasibility Study:

York Region

- The IESO and Alectra Utilities conducted a study looking at the feasibility and cost of implementing residential solar-storage technology in Markham, Richmond Hill and Vaughan.

- Results from the study will help us:
  - Better understand to what extent community-based solutions could defer the need for electricity infrastructure in York Region
  - Facilitate future discussions with LAC and affected communities on community-based solutions

- Refer to Alectra's presentation for more details

alectra

Discover the possibilities

POWER.HOUSE UPDATE

May 8, 2017

MICROGRID - Residential Scale

POWER.HOUSE

alectra
Discover the possibilities

POWER HOUSE

SAVE Money

PROTECT Against Outages

GENERATE Your Own Power

Power Stream

Introducing
POWER.HOUSE.

Power your home with solar...
even after the sun goes down!

Program Details:

- 20 homes pilot in Markham, Richmond Hill, Vaughan, Barrie
- Customer pays $3500 upfront costs and $20 monthly service fee
- Costs and benefits to be shared between customer and utility
- Offering, first time in Ontario, Net Metering on Time-of -Use
- No-worry system; owned, operated and maintained by PowerStream
- Installation over 2-3 days
- System commissioned and dispatch model programmed by PowerStream

www.PowerStream.ca/PowerHouse

SAVE Money

PROTECT Against Outages

GENERATE Your Own Power

POWER. HOUSE.

Solar Integrated System (SIS)

Hybrid Inverter

Solar Charge Controller

Gateway Computer

Protection & Isolation

Battery + BMS

NEMA Enclosure

Other Installed Components

Solar Integrated System (SIS)

Battery Disconnect Switch

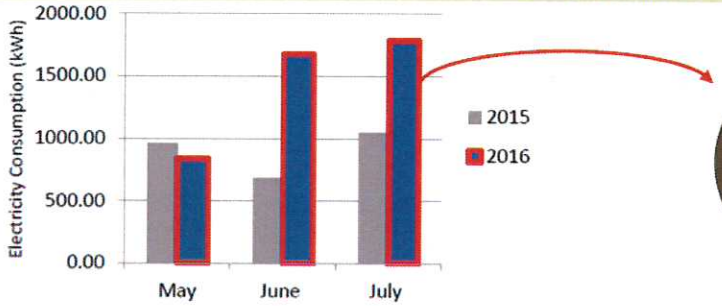
Arc Fault Circuit Interrupter (2 string)

PV Disconnect Switch

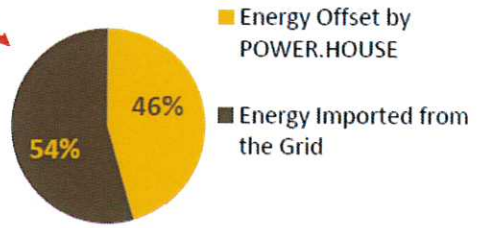
Rooftop Solar

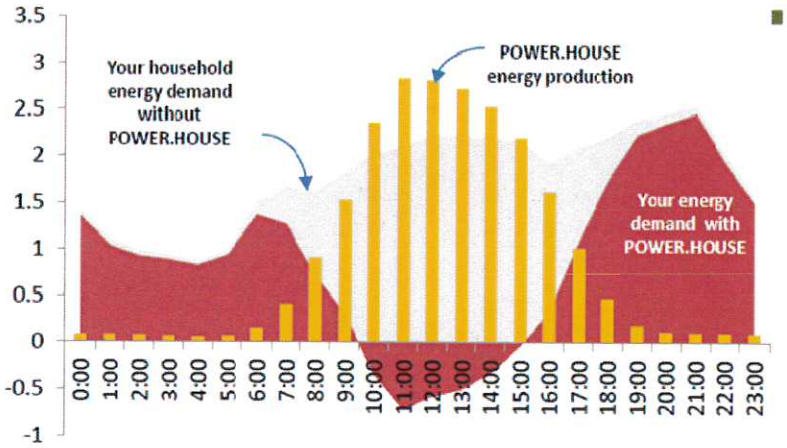
Actual Savings for a POWER.HOUSE Customer
May to July 2016

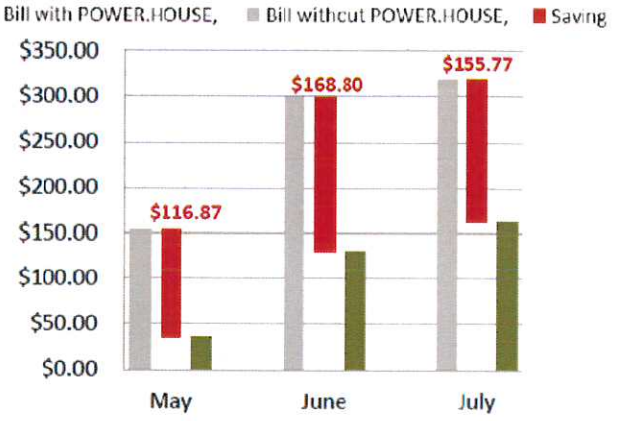
This graph compares your household consumption pattern for the same quarter last year (2015).



This graph breaks down your household consumption into what is imported from the utility grid vs. what was offset by your POWER.HOUSE unit.



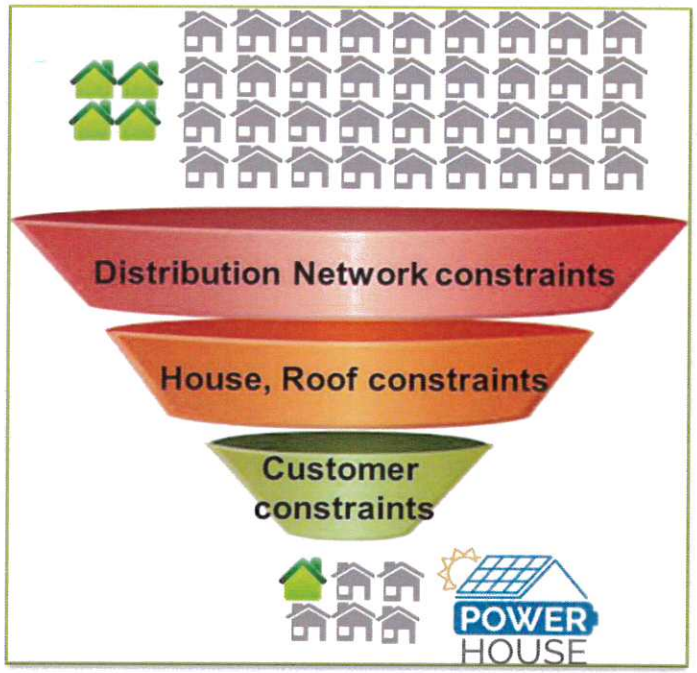




Your total saving in this quarter = 441.44 $ (57.3 %)

This quarter, POWER.HOUSE Program participants enjoyed a total of 20.87 hours of power outage protection. *

POWER.HOUSE Feasibility Study



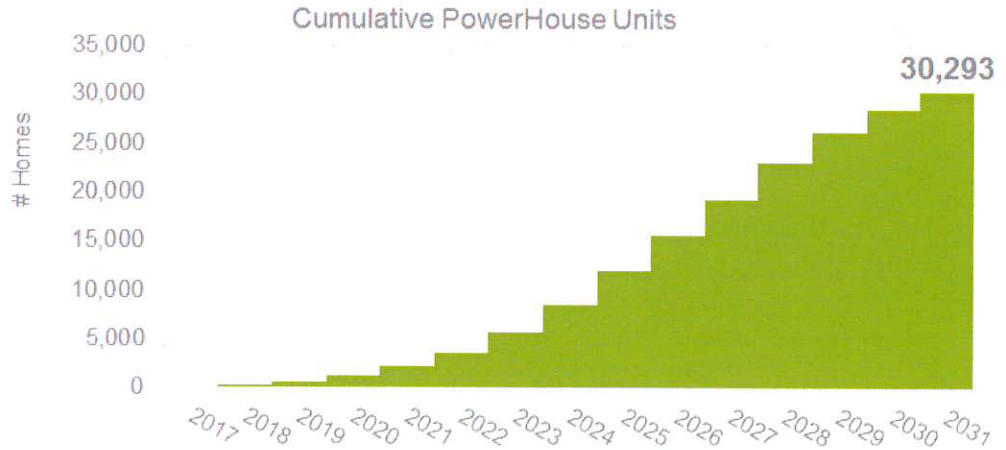
POWER.HOUSE Feasibility Study (PowerStream, IESO)

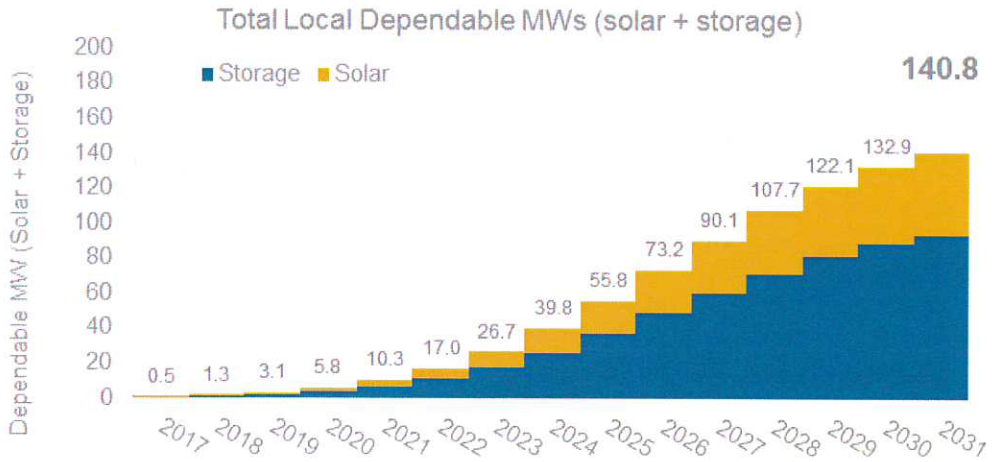
- In partnership with IESO
- Utility owned Residential Solar, Storage solution with VPP capabilities
- Specific to York Region- Markham, Richmond Hill and Vaughan
- Time frame for adoption: 15 years

Study Highlights

- ✓ High degree of involvement and collaboration with IESO, PowerStream, and other supporting staff
- ✓ POWER.HOUSE can feasibly reach meaningful uptake within the study period (2016-2031) - **30,000 units and 140 local dependable MW**
- ✓ POWER.HOUSE can defer at least 2 years of local transmission/distribution investment in late 2020 timeframe
- ✓ Team worked with IESO to understand technical needs and demonstrated the technical capabilities and customer value
- ✓ Team worked with IESO to understand the "societal" business case and demonstrated positive results
- ✓ Identified barriers and catalysts required to support widespread adoption

Program Structure and Uptake





Program Offer:

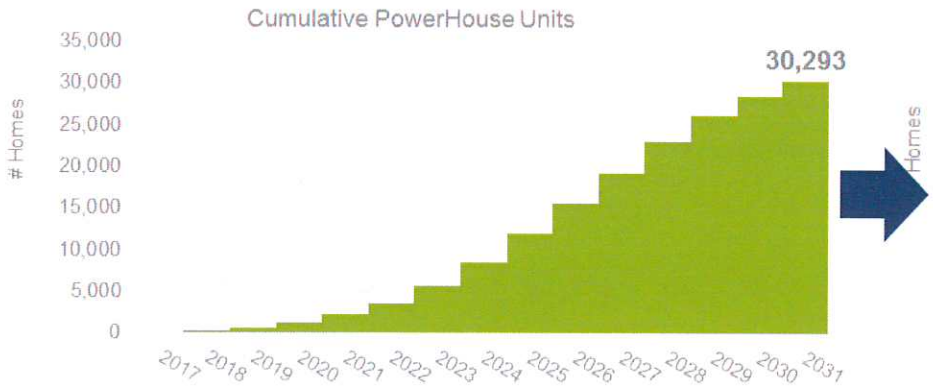
Single Family Home

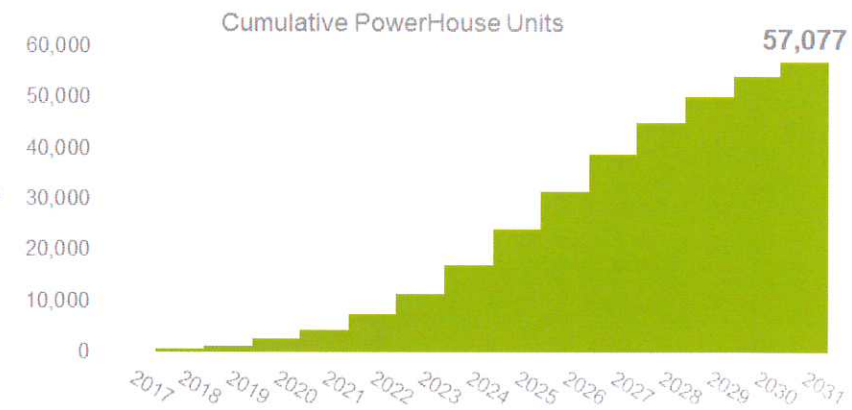
- 5 kW Solar/11.64 kWh battery
- 8 – 10 MWh average annual load
- $4,500 up front
- $80/month for 10 years
- Average nominal bill savings + reliability benefit of $1,800/year
- Payback between 4 and 5 years

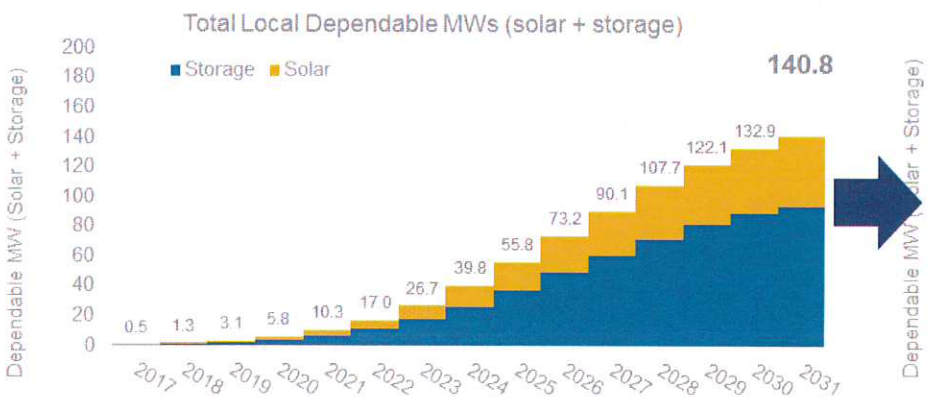
Semi/Row Home

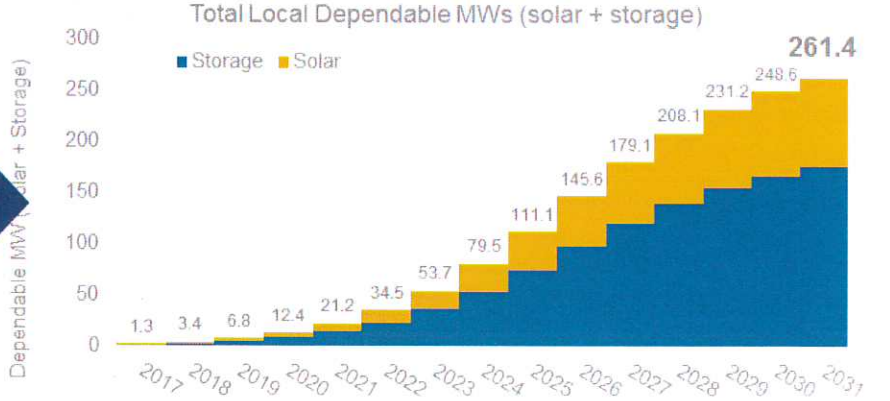
- 3 kW Solar/7.7 kWh battery
- 4 – 6 MWh average annual load
- $3,500 up front
- $55/month for 10 years
- Average nominal bill savings of $1,100/year
- Payback between 5 and 6 years

Program Structure and Uptake









Aligned with IESO OPO

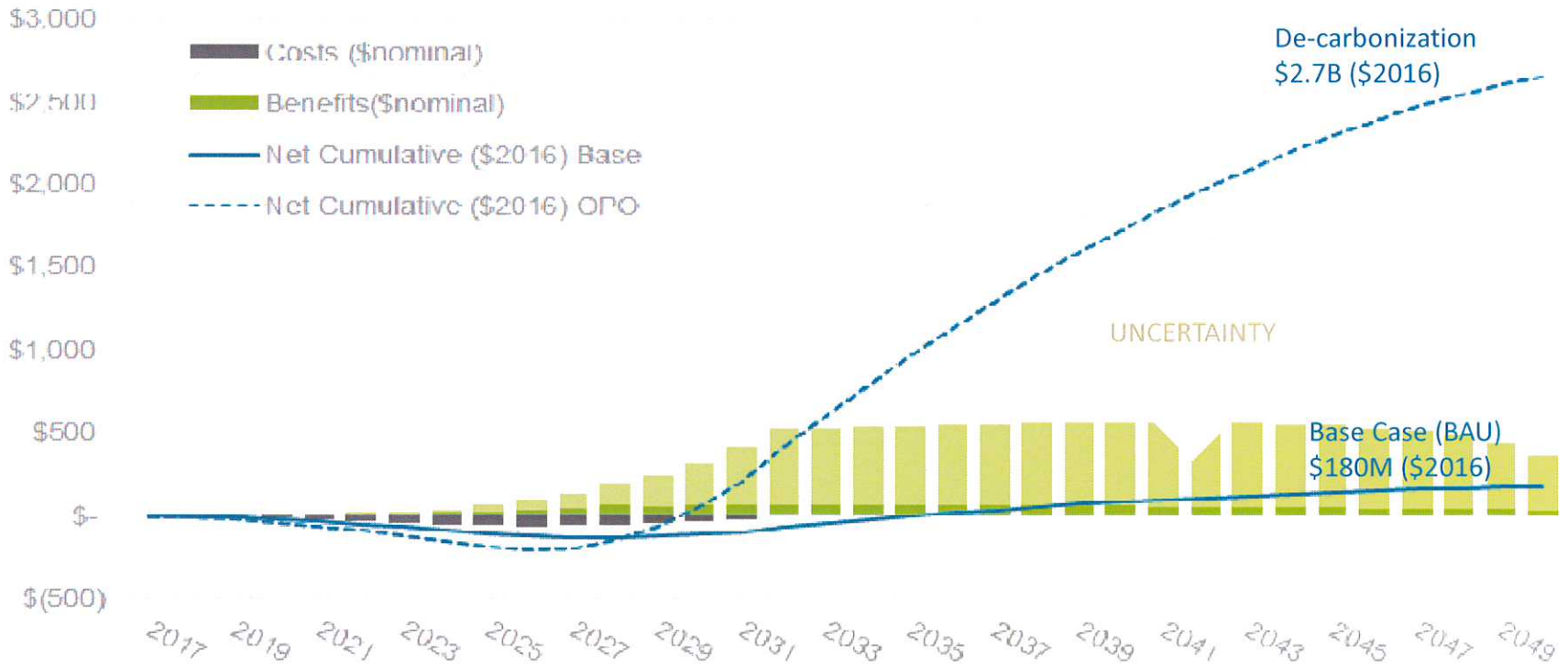
Scenario B

Scenario D4

Program Uptake Increases under OPO Deep De-carbonization Scenario (D4)

NPV- LTEP (Societal) Perspective

- **When considering all units installed, there is a positive NPV from a societal perspective**



New units installed
Costs decline over time

Accruing benefits over life of the units

alectra

Discover the possibilities

Open Discussions

May 8, 2017

Local Achievable Potential Study

Toronto, Barrie-Innisfil, Parry Sound-Muskoka area

- Local achievable potential studies are currently underway or will be initiated for Toronto, Barrie-Innisfil, and Parry Sound-Muskoka
  - These studies are funded by the IESO Conservation Fund, but are led by the local utilities
- The results from these studies will help the IESO and LDCs to:
  - Better understand the achievable conservation and demand management potential in these local areas
  - Inform the development of solutions and planning scenarios
- The study will be tailored to the specific characteristics of the local area and will examine a wide range of options, including:
  - Incentive adders to existing conservation programs
  - New conservation programs
  - New Demand Response program
  - Behind the Meter Generation
  - Energy Storage

Local Demand Response Pilot

County of Brant and the City of Brantford

- In 2016, the IESO, with input from the Brant area Local Distribution Companies, initiated the development of the Brant Local Demand Response (DR) Pilot

- The pilot is intended to help the IESO and LDCs:
  - Test the use of DR to assist with local capacity needs
  - Provide interim capacity relief, if needed, until additional capacity provided by transmission reinforcements are in place in 2019 in the Brant area

Potential Areas for Coordination: Community Energy Planning and Regional Planning Activities

- A number of communities across the province are in the process of developing community energy plans

- The IESO is currently participating in the community energy planning process in multiple municipalities, including Region of Waterloo, York Region (e.g., Markham, Vaughan), Oakville and Durham

- Potential areas for greater coordination include:
  - Right-of-Way/services and transportation corridor planning
  - Infrastructure siting
  - Housing energy efficiency standards
  - Community-level cogeneration or district energy based conservation
  - Funding/cost-sharing issues

Other Initiatives

- Energy storage pilot project in Newmarket
- Penetanguishene Microgrid Project
- Residential solar storage pilots (e.g., Oshawa PUC, Veridian Connections)
- Opportunities for targeted conservation programs
- Other Initiatives

York Region Electricity Plan – Next Steps:

DER Options to Address Longer-Term Needs in York Region

Needs:

- By the mid 2020s, growth in Northern York Region/Vaughan will exceed the electricity system's capability

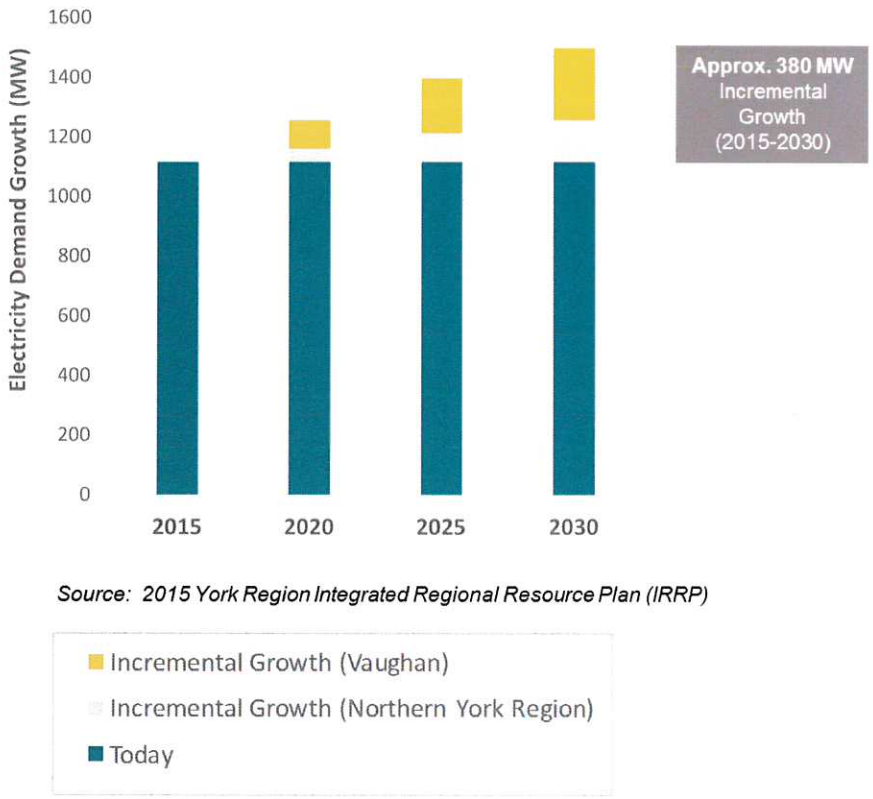
Options Evaluation:

- To what extent can community-based energy solutions be a cost-effective and reliable option to defer the longer-term needs?

Next Steps for the Working Group & LAC members:

- Examine the cost and feasibility of implementing "*specific* " initiatives in York Region:
  - Power.House Feasibility Study
  - York-Specific Pilots (e.g., CHP, targeted conservation, demand response) and local achievable potential study

- Incorporate input from the communities
  - Community Energy Plans
  - Community-based solutions and Initiatives



Source: 2015 York Region Integrated Regional Resource Plan (IRRP)

ieso
Connecting Today.
Powering Tomorrow.

REGIONAL ELECTRICITY SYSTEM NEEDS AND COMMUNITY-BASED ENERGY SOLUTIONS
FILE #22.30.1

Recommendation

The Deputy City Manager Planning and Growth Management and the Director of Policy Planning and Environmental Sustainability recommend:

1. THAT the presentation from the Independent Electricity System Operator (IESO) and Alectra providing an update on regional electricity system needs in Vaughan be received;

2. THAT staff continue to work with stakeholders to promote conservation and reduction measures, and to better understand energy corridor options and the feasibility of community-based energy solutions in the City and York Region; and

3. THAT energy planning described in this report and City input into Provincial and Federal energy and infrastructure projects inform the Growth Management Strategy update, the Municipal Comprehensive Review and the Vaughan Official Plan 2010 update.

Contribution to Sustainability

The Vaughan Municipal Energy Plan (MEP), which was approved by Council in 2016, identifies actions to reduce greenhouse gas (GHG) emissions to 2031 in support of the Province's Climate Change Action Plan. As part of implementing the MEP, it is important to understand the emerging regional electricity system requirements in relation to urban growth in Vaughan, recognizing that the City will be planning for a new round of growth to 2041. This also provides the opportunity to identify opportunities for community-based energy solutions that the City may play a role in to better manage demand and control greenhouse gas emissions. The MEP is consistent with the following priorities previously set by Council in *Green Directions Vaughan*, the Community Sustainability and Environmental Master Plan:

- Goal 1, Objective 1.2: To reduce greenhouse gas emissions through actions such as working with the community to implement the local action plan and undertaking energy conservation initiatives.

- Goal 2, Objective 2.3: To create a City with sustainable built form by considering recommendations outlined in the local action plan to integrate smart energy planning in new developments and retrofit opportunities.

Economic Impact

There are no budget implications resulting from the review of the presentation. The presentation by IESO and Alectra broadly discusses the longer-term electricity infrastructure requirements in York Region and potential opportunities to defer electricity infrastructure investment in York Region by using community-based energy solutions.

Communications Plan

N/A

Purpose

The purpose of the report and presentation is to update Council on the potential need for a new electricity infrastructure corridor in the Kleinburg area around the mid-2020s and potential

methods to defer this infrastructure requirement to a later date. The presentation by the Independent Electricity System Operator (IESO) and Alectra (the utility entity following the merger of PowerStream and several other utilities) provides an overview of the Integrated Regional Resource Plan (IRRP) process and an update on the electricity planning activities in York Region. This is a useful strategic planning exercise. It provides an opportunity for the City to understand electricity planning issues of relevance to the City's Growth Management Strategy Update to 2041 (VOP 2010, Green Directions Vaughan and other Master Plans), including:

- Opportunities to improve the alignment of energy planning with land use and infrastructure planning;
- Identification of municipal policy tools to support energy conservation and greenhouse gas (GHG) emission reductions that can be incorporated into an updated VOP 2010, Green Directions and the Municipal Energy Plan;
- Identifying alternative energy and/or distributed energy technologies for possible evaluation and potential incorporation into City assets and to inform community planning;
- Where necessary, reinforcing the benefits of consolidating linear infrastructure in single unified corridors;
- Reflecting the implications of energy planning in the Municipal Comprehensive Review by minimizing the impact of electricity infrastructure on the City's land budget, as it affects future Employment Areas.

Background - Analysis and Options

Executive Summary

A new electricity infrastructure corridor is projected to be required in the Kleinburg area of Vaughan around the mid-2020s. This is a result of electricity demand growth being expected to exceed the capability of the regional electricity system supplying Northern York Region/Vaughan, despite ongoing energy conservation efforts and near-term infrastructure actions (e.g. Transformer Station #4 in Kleinburg is expected to come into service in 2017). Furthermore, the recently released Climate Change Action Plan and potential shift to a low carbon economy could further increase the electricity demand in York Region.

More assertive action on the part of local municipal governments in the areas of energy conservation, alternative energy and distributed energy has the potential to defer this infrastructure upgrade. Community-based energy solutions (e.g., small scale solutions that help the community manage and supply their electricity needs) can defer this longer-term need for a few years while contributing to the Province's goal of creating low carbon communities. Opportunities to co-locate infrastructure and rationalize setbacks will be important to minimize impacts and limit land requirements. Electricity system and infrastructure requirements will need to be considered in the City's Municipal Comprehensive Review process and the Master Plan updates.

York Region Regional Electricity Planning and Community Engagement

A regional electricity planning Working Group for York Region, consisting of the Independent Electricity System Operator (IESO), Newmarket-Tay Power Distribution Ltd., PowerStream Inc. and Hydro One Networks Inc., has been active since 2011. In 2013, the planning process was restructured to conform to the timelines and requirements of the Ontario Energy Board's (OEB) formalized Regional Planning Process. In April 2015 the IESO released an Integrated Regional Resource Plan (IRRP) for York Region, documenting a 20 year plan developed by the Working Group. This plan provided forecasts of electricity demand growth in the region, identified electricity needs and priorities, discussed potential solutions, recommended near-term actions, including a new transformer station serving the City (Transformer Station #4 in Kleinburg is expected to come into service in 2017) and laid out longer-term supply and demand outlooks for the region.

Even with the near-term actions and on-going energy conservation efforts identified in the 2015 York Region IRRP, electricity demand growth is expected to exceed the capability of the regional electricity system supplying Northern York Region/Vaughan around the mid-2020s. Furthermore, the recently released Climate Change Action Plan (e.g., electrification) and potential shift to a low carbon economy could further increase the electricity demand in York Region. Reinforcement of the electricity system may eventually be required given the magnitude of the growth. A number of system reinforcement options are being considered to address the longer-term electricity needs in Vaughan and Northern York Region, including new electricity infrastructure in the Kleinburg area/GTA West Corridor. Details related to these options will need to be examined. Since the need is not expected to arise within the next 10 years, there may be an opportunity to use community-based energy solutions (e.g., small scale solutions that help the community manage and supply their electricity needs) to defer this longer-term need for a few years.

To better understand the extent to which community-based solutions can defer the longer-term needs and to align the local planning assumptions (e.g., population, land use) with York Region electricity planning activities and infrastructure development, the IESO initiated a community engagement process for York Region in September 2015 by forming a Local Advisory Committee. The Local Advisory Committee consists of 16 volunteers from community and municipalities, including a representative from the City of Vaughan. The discussion and feedback at the Local Advisory Committee and community engagements will be an important input into the next iteration of York Region Electricity Plan, which will be initiated at the end of 2017.

Action on the part of local municipal governments in the areas of energy conservation, alternative energy and distributed energy has the potential to defer this infrastructure upgrade. Electricity system and infrastructure requirements will need to be considered in the City's Growth Management Strategy Update to 2041 and Municipal Comprehensive Review process.

Provincial Energy Planning Context

In parallel, energy planning is also underway at the provincial level. The Long Term Energy Plan (LTEP) is the Province's road map setting out the direction for Ontario's energy future for the next 20 years. In starting the revision of the 2013 LTEP, the IESO issued the Ontario Planning Outlook (IESO 2016) examining the province's future electricity needs and how they might be met while the Ministry of Energy released the Fuels Technical Report examining the supply and demand projections for oil, gasoline, propane and natural gas in Ontario.

The facts and analyses in these two reports will help guide the consultation process in the development of the next LTEP. Both reports take into account other government commitments made in the Climate Change Action Plan, the *Climate Change Mitigation and Low-Carbon Economy Act, 2016* and the *Vancouver Declaration* (the Pan-Canadian Framework on Clean Growth and Climate Change). The Ministry of Energy intends to publish the next LTEP in 2017. Care needs to be taken to ensure that these provincial priorities and directions are considered and reflected in our local and regional energy planning activities. For example, as noted in the Ontario Planning Outlook regarding the impact of climate change policy and electrification on electricity demand growth; the following is relevant to Vaughan and will need to be considered:

> *While the impact of electrification in space heating, water heating and transportation will increase electricity requirements across the province, the impact would be the most prominent in urban centres, with implications for regional transmission systems that will need to be considered as part of the regional planning processes*.

IESO and PowerStream Presentation Outline

The presentation by the IESO and Alectra is made up of two parts. The first part of the presentation sets the context in terms of the policy background and IRRP process, including a

discussion of integrating energy planning into land use planning. The electricity infrastructure requirements are broadly discussed in relation to the energy load forecast.

The second part of the presentation will address community-based energy solutions, such as articulated as "demand response resources" and "distributed energy resources". This includes a more detailed discussion of the findings of PowerStream's "Power.House" project, which is an example of distributed energy generation that can be harnessed as a micro grid (a miniature version of the main grid).

Relationship to Term of Council Service Excellence Strategy Map (2014-2018)

This report is consistent with the Term of Council priority to continue to cultivate an environmentally sustainable city as demonstrated by the previously approved Municipal Energy Plan. The Vaughan MEP was based on goals identified in the Community Climate Action Plan that work toward energy security, supporting local economic development, fostering a culture of social responsibility and sustainability, and identifying actions to reduce the community's energy consumption and GHG emissions.

Regional Implications

This report and presentation is consistent with the York Region Official Plan (ROP 2010), which requires the development of Community Energy Plans at the following geographic scales:

- A municipal-wide Community Energy Plan (ROP 2010 policies 4.1.14 and 5.2.13);
- For each Regional Centre (ROP 2010 policy 5.2.24); and
- For each New Community Area (ROP 2010 policy 5.6.10).

Conclusion

The generation, transmission and distribution of electricity collectively constitute one of the main drivers of a sustainable society. It has largely been taken for granted in land use planning for the last half of the 20th Century. Over time, land use, development and energy planning has become increasing linked due to matters such as cost, climate change and pollution mitigation and the consumption/visual effects of the infrastructure on communities. Understanding the opportunities and constraints will need to become a bigger part of both our land use planning process and municipal operations. This presentation will provide some of the background the City will need consider in conducting its planning processes.

In terms of direct City actions, there may be opportunities for community-based energy solutions to play a role in addressing longer-term electricity needs at both the regional and the provincial level. Currently, the IESO is working closely with community and local utilities to explore opportunities to defer the need for new electricity infrastructure in Northern York Region/Vaughan using community-based energy solutions.

At the same time, provincial energy planning is underway. As noted in the IESO's 2016 Ontario Planning Outlook, community-based energy solutions can be part of the solution in addressing demand growth under higher demand outlooks and in enhancing the security of supply and resiliency:

> *In the IESO's higher demand outlook, electrification of end-uses in support of climate change actions could be met in a variety of ways. While Ontario would require additional electricity resources to meet the associated higher levels of demand growth, it has a variety of options available, including distributed energy resources and enhanced conservation. Higher demands could be served in ways that sustain recent reductions in electricity sector emissions while significantly reducing carbon emissions in the broader economy, including through the greater substitution of electricity for fossil fuels in*

residential and commercial space and water heating, light duty vehicles, public transit and in some industrial applications.

The City will need to stay apprised of, and help to create the opportunities for, community-based energy solutions to mitigate the City's energy costs and contribute to the fulfillment of the Province's climate change goals.

Attachments

1. Presentation by IESO and Alectra

Report prepared by:

Tony Iacobelli, Manager of Environmental Sustainability, ext. 8630

Respectfully submitted,

JOHN MACKENZIE
Deputy City Manager,
Planning and Growth Management

ROY MCQUILLIN
Director of Policy Planning and
Environmental Sustainability

/lm

Electricity Planning in York Region

City of Vaughan - Committee of the Whole (Working Session)

May 8, 2017

ieso
Connecting Today.
Powering Tomorrow.

ATTACHMENT 1

Objectives

Provide an overview of the regional electricity planning process and electricity infrastructure

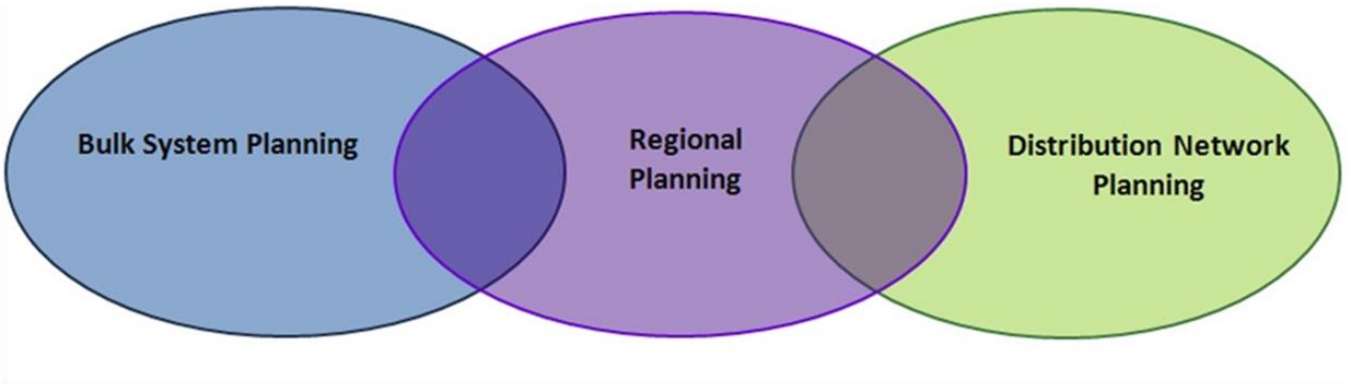
Discuss the longer-term electricity needs and options in Vaughan-Northern York Region

Discuss how community-based energy solutions are being considered in regional electricity planning and on-going initiatives/pilots

PART 1

ELECTRICITY PLANNING ACTIVITIES IN YORK REGION

Types of Electricity Planning



Addresses provincial electricity system needs and policy directions

- Ministry of Energy
- IESO
- Asset Owners (e.g. Transmitter, Large Generators)

Integrates local electricity priorities with provincial policy directions & system needs

- IESO
- Transmitters
- Local Distribution Companies

Examines local electricity needs and priorities at the community-level

- Local Distribution Companies

First Nations, Métis, municipalities and industry stakeholders

Key Participants

Scope of Regional Electricity Planning

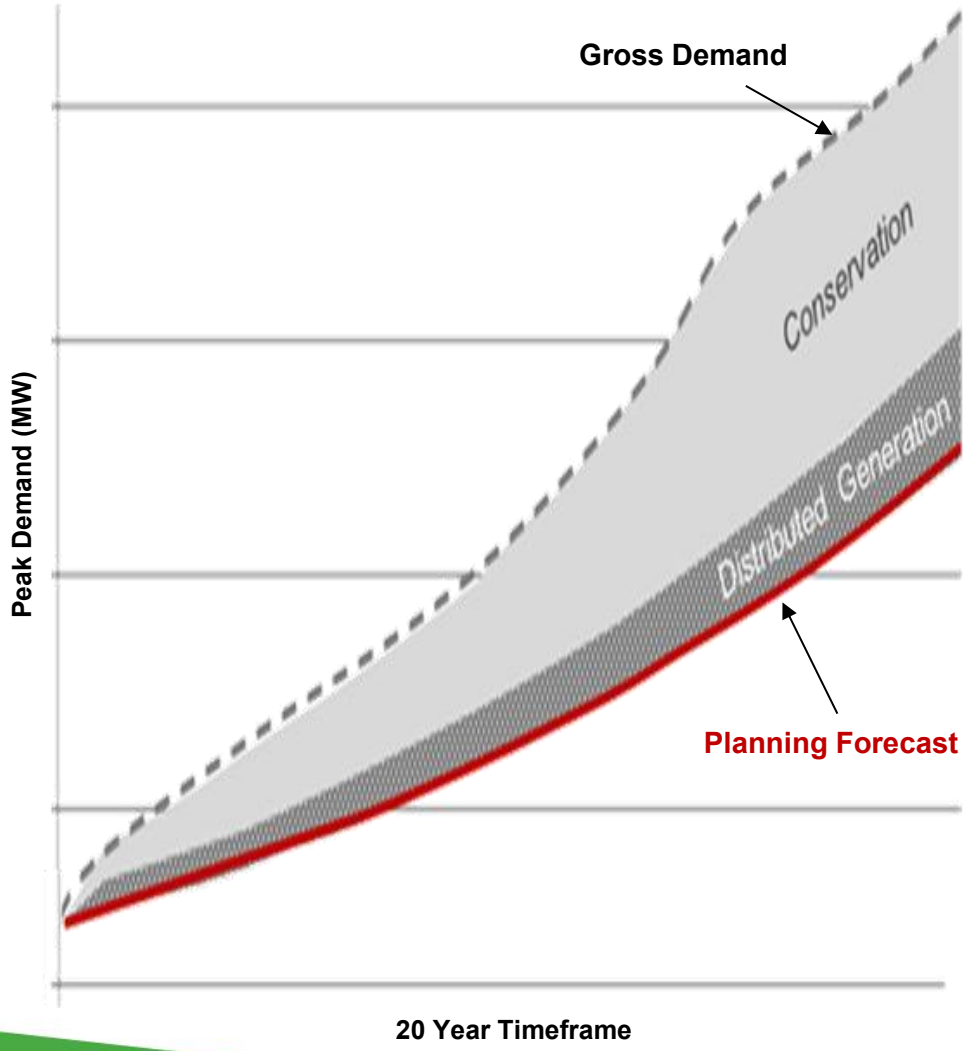
- A process for identifying and meeting electricity needs for a region
  - Carried out by local utilities, transmitter and the IESO ("Technical Working Group")
  - Revisit at a minimum every five years

- Key Outcomes - A 20-Year Electricity Plan
  - Work with communities to understand the electricity needs and local priorities
  - Identify need for infrastructure, generation, conservation programs and/or innovative solutions
  - Layout a near-term implementation plan and long-term roadmap

- Project-related considerations are beyond the scope of regional planning. Projects identified in the plan will still need to consider, as part of the development process:
  - Project details/specifications and siting/routing
  - Approval processes (e.g. environmental assessment, regulatory approval)
  - Project-Level Stakeholder and Community Engagement
  - Consultation with Indigenous peoples
  - Project Funding and Cost-Allocation

- Connection assessment of generation resources for procurement programs, such as the Feed-in-Tariff and, the Large Renewable Procurement, are beyond the scope of regional planning.
  - Generation projects participating in procurement programs will be assessed according the rules and specifications of the procurement programs.

Planning Forecast Assumptions



1. **Gross Peak Demand Forecast (MW)**
(Provided by local distribution companies and transmission connected customers based on local economic development and growth assumptions outlined in municipal plans)

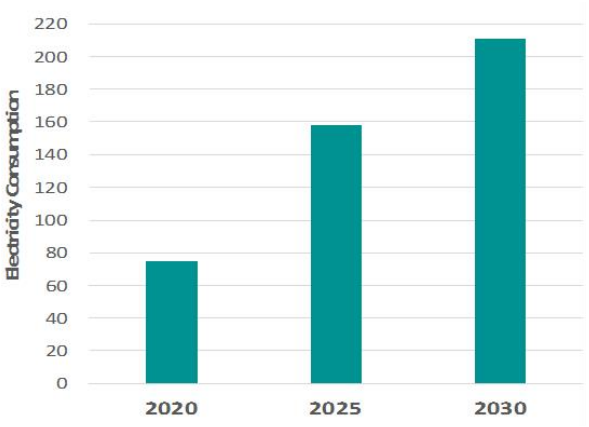
2. **Expected Peak Demand Savings from Provincial Energy Conservation Targets**
(Includes impact of new codes and standards and programs/pilots outlined in local utilities' conservation plan)

3. **Expected Peak Demand Contribution from Existing and Contracted Distributed Energy Resources**
(Future distributed energy resources uptake is instead considered as an option for meeting identified needs)

Planning Forecast - *Used to assess the electricity needs over the 20 –year period*

(Take into consideration the gross demand forecast scenarios, estimated peak demand savings from provincial energy conservation targets, and existing and contracted DG)

Identify electricity needs



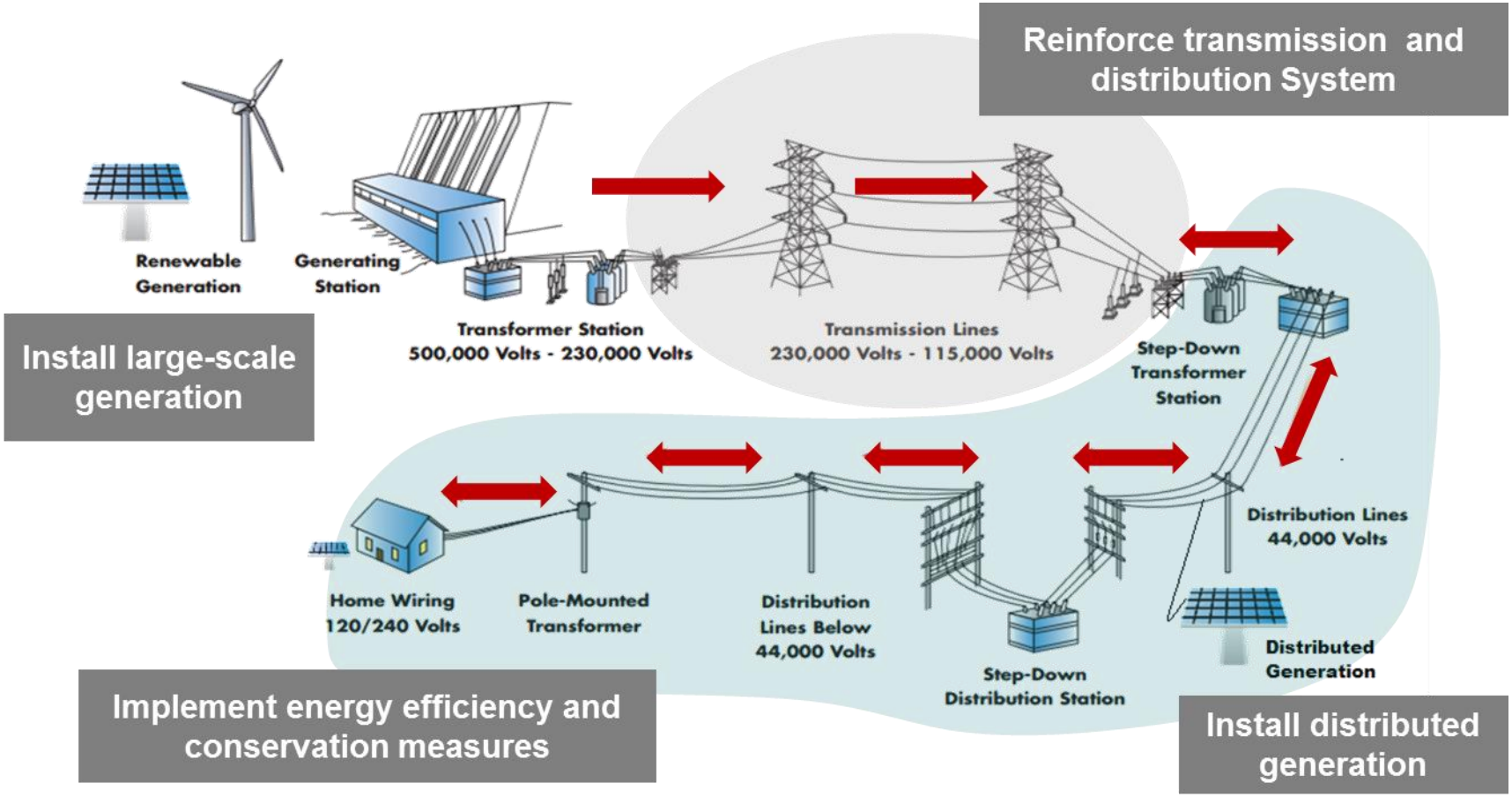
Provide a Safe, Reliable Source of Electricity to Support Growth

Minimize Impact of Power Outages

Replace Aging Infrastructure

ieso
Connecting Today.
Powering Tomorrow.

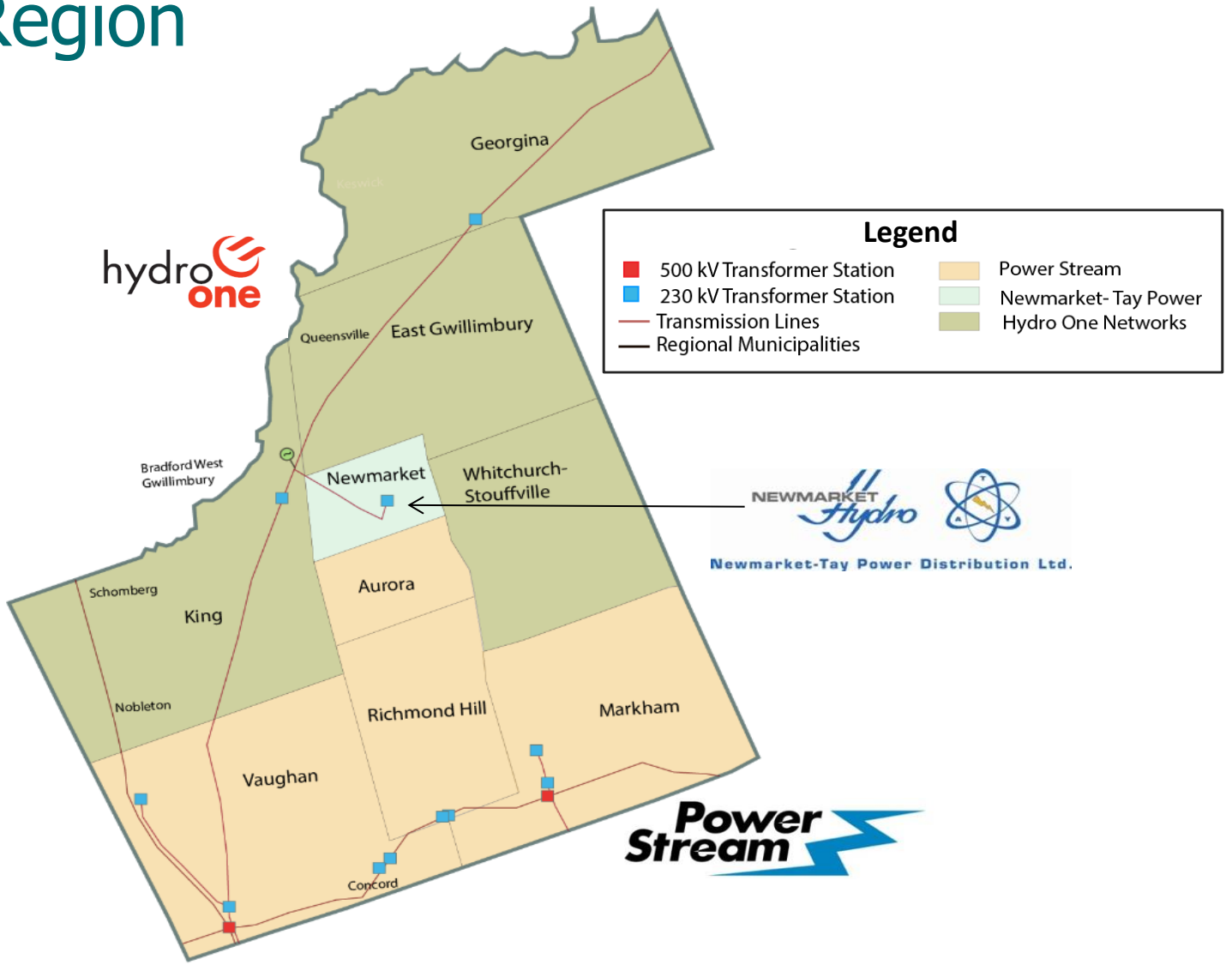
Different approaches to address electricity needs



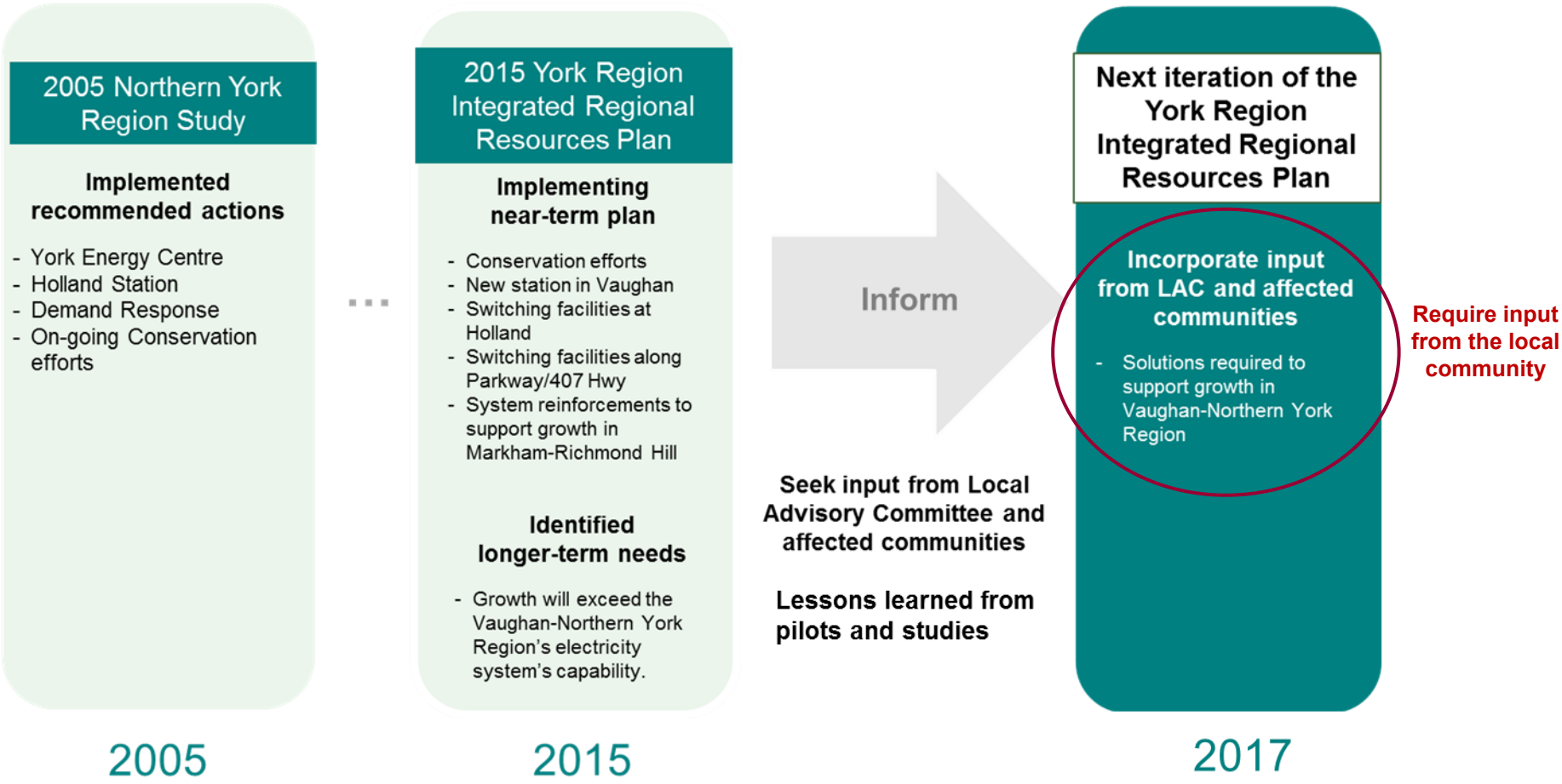
The electricity plan typically includes a combination of the different types of approaches

ieso
Connecting Today.
Powering Tomorrow.

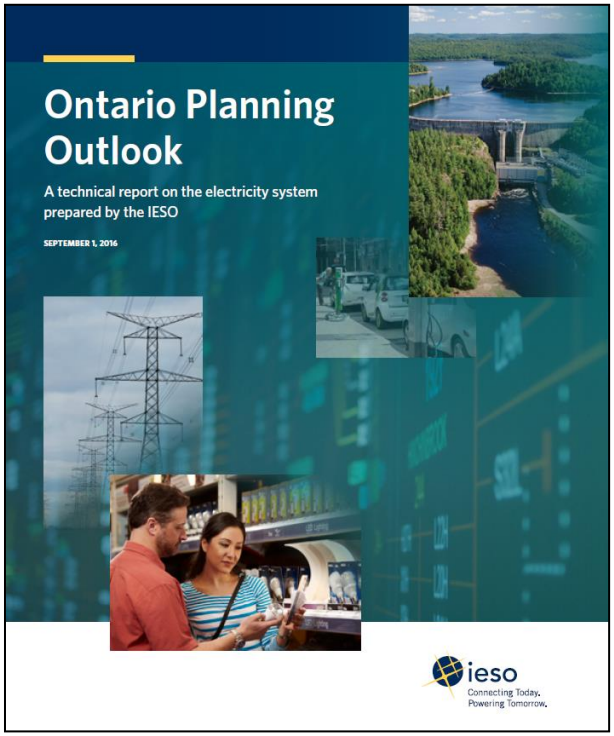
York Region


Georgina
Keswick
Queensville
East Gwillimbury
Bradford West Gwillimbury
Newmarket
Whitchurch-Stouffville
Aurora
Schomberg
King
Nobleton
Richmond Hill
Markham
Vaughan
Concord
Legend
500 kV Transformer Station
230 kV Transformer Station
Transmission Lines
Regional Municipalities
Power Stream
Newmarket- Tay Power
Hydro One Networks
hydro one
NEWMARKET Hydro
Newmarket-Tay Power Distribution Ltd.
Power Stream

Planning Activities Since 2005



Outlook: Trends and Policy Directions



PLACES TO GROW

BETTER CHOICES. BRIGHTER FUTURE.

ieso
Connecting Today.
Powering Tomorrow.

Community Energy Planning (CEP)

- Many communities are currently in the process of developing community energy plans
  - Newmarket and Vaughan have Council-approved Municipal Energy Plans
  - Vaughan's MEP is a collection of GHG emission reduction actions and is not an integrated energy plan that identifies community-based energy solutions (E.g., Renewable generations)

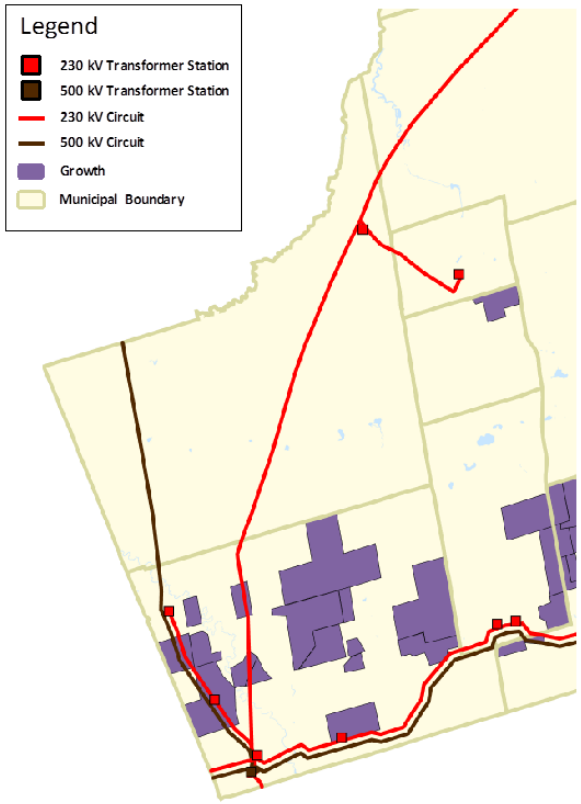
- While regional planning focuses on maintaining adequacy of electricity supply, CEP process takes a broader perspective.
  - CEP includes all fuels, such as transportation, natural gas and electricity, and has different goals, including net zero energy, electrification, greenhouse gas reduction and reducing emissions

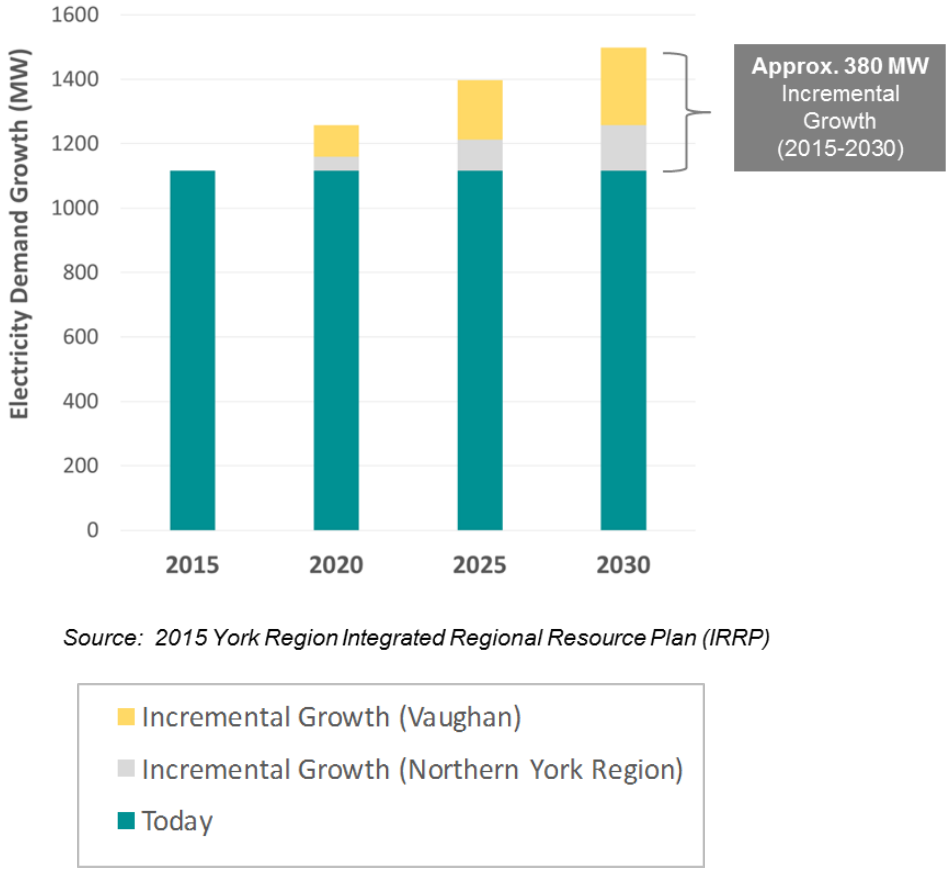
- Energy conservation assumptions are consistent in both CEP and regional planning
  - Includes impact of new codes and standards and programs/pilots outlined in local utilities' conservation plan

- Coordination between CEP and regional planning processes can benefit regional plans by providing local input on opportunities to develop community-based solutions.
  - Local perspectives help provincial system planners to identify these opportunities

Vaughan and Northern York Region Electricity Demand Growth

Continued growth in Vaughan and Northern York Region over the next 20 years.



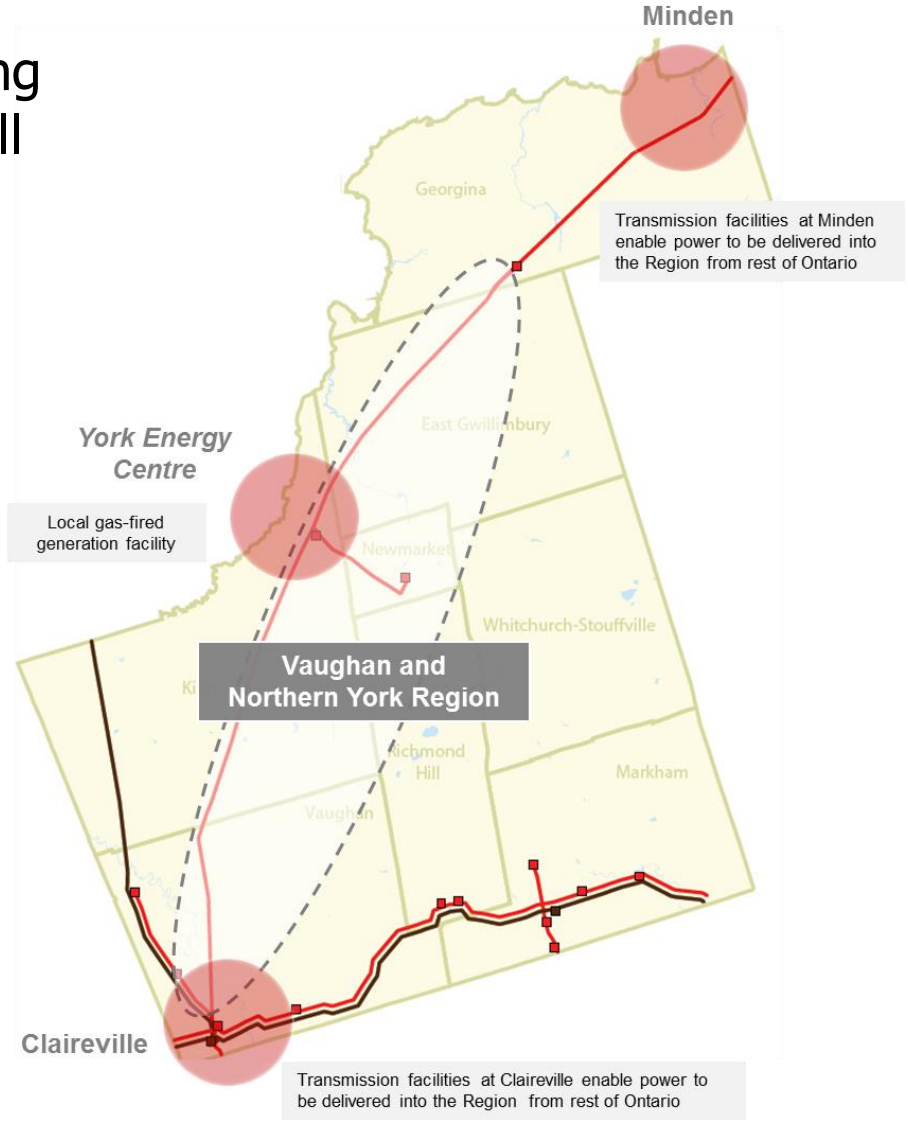


Source: 2015 York Region Integrated Regional Resource Plan (IRRP)

Note: The incremental growth shown already accounts for the demand savings from on-going conservation efforts

Even with on-going conservation efforts, all three main sources supplying Vaughan and Northern York Region will reach their capacity by mid 2020s.

Sources of electricity supply (At Capacity) by mid 2020s



Vaughan and Northern York Region

Options Development

- Given the timing, communities may explore opportunities to defer the need for a few years using community-based solutions.
  - Require input from communities to determine the potential and feasibility

- Reinforcement of the electricity system may eventually be required given the magnitude of the growth.
  - Options to reinforce the system should be examined and considered
  - A system reinforcement plan for this area will need to be included in the next iteration of York Region IRRP, which is expected to be initiated in 2017

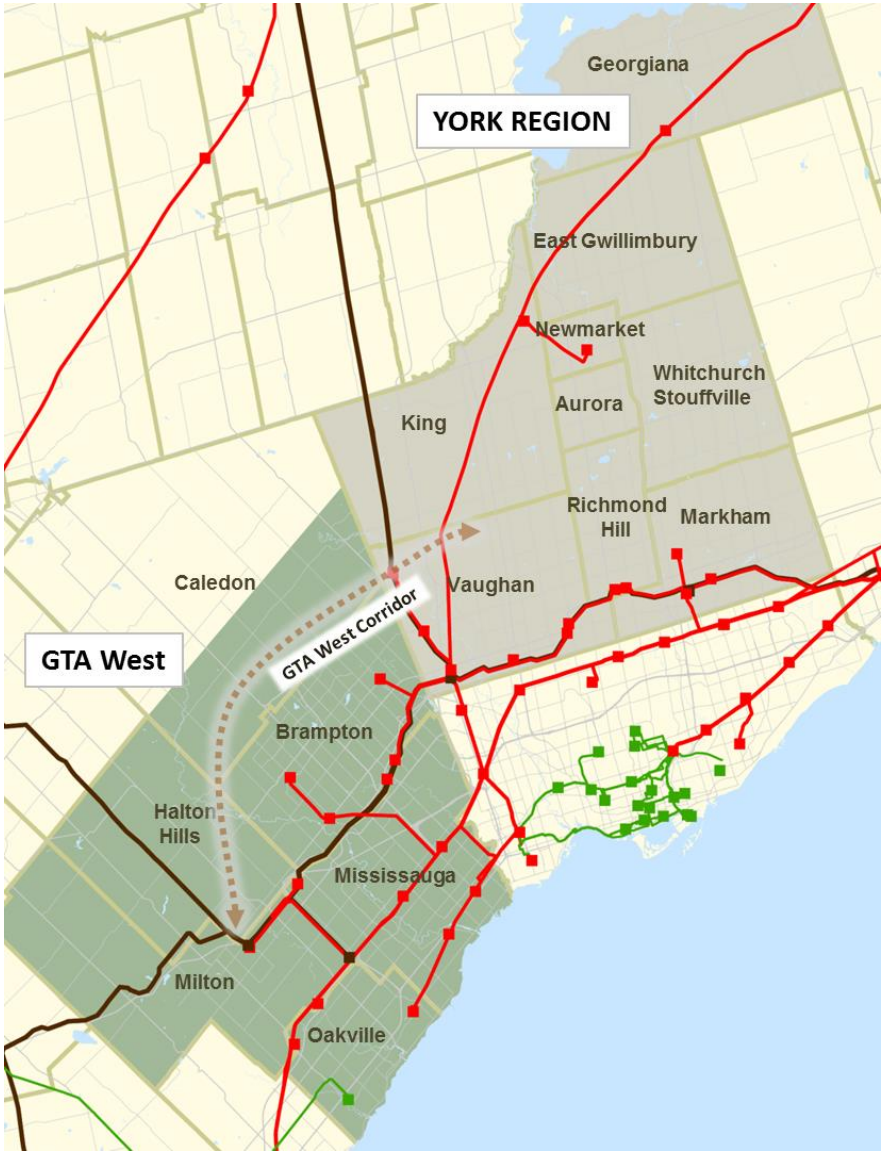
Two system reinforcement options are being considered to address the electricity needs in Vaughan and Northern York region

- Both options will require 2 transformer stations and a combination of transmission and distribution lines
- Options are being developed in consideration of existing (e.g. Buttonville-Armitage) and future infrastructure corridors (e.g. West GTA Corridor)
- Details related to these options will need to be examined
- Technical Working Group will continue to discuss these options with the LAC and affected communities in future meetings

GTA West Corridor

- Proposed new transportation corridor, intended to link Vaughan with Milton. Process has been paused since December 2015 pending review.
- Transmission system reinforcements along the GTA West corridor/Kleinburg area can potentially address both Northwest GTA and Vaughan-Northern York Region needs.
- Needs in Northwest GTA:
  - Provide additional capacity to supply two new stations in North Brampton and South Caledon within the 20 years
  - Minimize the impact of supply interruptions in the Kleinburg area

The needs and options for York Region and Northwest GTA will be examined in a coordinated manner.



Next Steps

- Working Group will work with the Local Advisory Committee and affected communities to identify opportunities to defer the longer-term needs using community-based solutions.
  - The development of community-based solutions will be the focus of future LAC meetings.

- The Working Group will also continue to discuss potential system reinforcements options with the LAC and affected communities.
  - The needs and options for Vaughan-Northern York Region and Northwest GTA will be examined in a coordinated manner.

- Input from LAC and affected communities will be incorporated into the next iteration of York Region IRRP, which is expected to be initiated in 2017.

PART 2

COMMUNITY-BASED ENERGY SOLUTIONS AND REGIONAL PLANNING

Community-Based Energy Solutions / Distributed Energy Resources (DERs) – Examples

Gas-fired Generators

Microgrids

Energy Storage

Combined Heat & Power

Residential Demand Response

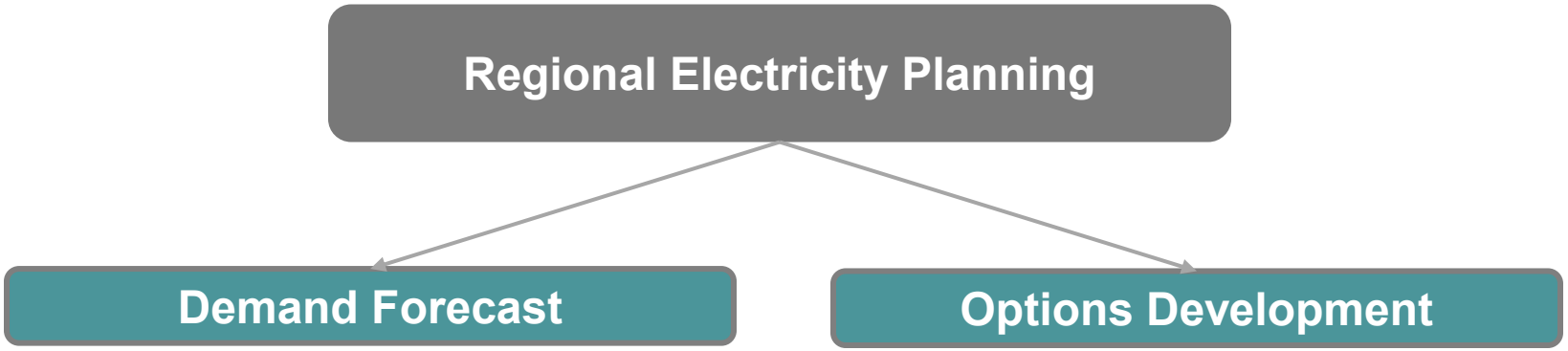
Renewable Generation

Current Technology Characteristics

Technology	Characteristics						
	Capacity	Energy	Operating Reserve	Load Following	Frequency Regulation	Contribution to Provincial Winter Peak	Contribution to Provincial Summer Peak
Conservation	Yes	Yes	No	No	No	Depends on Measure	Depends on Measure
Demand Response	Yes	No	Yes	Yes	Limited	60-70%	80-85%
Solar PV	Limited	Yes	No	Limited	No	3-5%	20-35%
Wind	Limited	Yes	No	Limited	No	20-30%	11%
Bioenergy	Yes	Yes	Yes	Limited	No	85-90%	85-90%
Storage	Yes	No	Yes	Yes	Yes	Depends on technology/ application	Depends on technology/ application
Waterpower	Yes	Yes	Yes	Yes	Yes	67-75%	63-71%
Natural Gas	Yes	Yes	Yes	Yes	Yes	95%	89%

Source: 2016 Ontario Planning Outlook

How do we consider DERs in Regional Electricity Planning?



- ✓ Demand savings from Provincial Energy Conservation Targets
- ✓ Existing and contracted DERs
- ✓ Community Energy Plans (e.g., Energy Efficiency Targets, district energy, CHPs)

- ✓ As an alternative to transmission and distribution solutions, DERs can provide a local source of supply for communities
- ✓ Options are evaluated based on a number of factors:
  - Needs (Energy, Capacity, End of Life, Resilience)
  - Technical feasibility
  - Cost-benefits
  - Regulatory and implementation considerations
  - Land-use considerations and community input

DERs and Regional Planning: Opportunities & Challenges

Opportunities

- Decline in cost of technology
- Increased customer choice and engagement
- Electrification and Climate Change Policies
- Community Energy Plans
- Extreme Events and System Resilience

Challenges

- Limited information on the cost and feasibility of implementing DER in a specific local area
- Limited tools/processes to assess the impact of DERs on transmission and distribution system
- No mechanism to target DER projects to areas where they are needed
- No clear regulations on cost responsibility for DER options to meet regional needs
- No provincial need for additional energy or capacity in the near-term
- Care must be taken to ensure that DER solutions do not result in stranded assets or higher costs

In partnership with local utilities, the IESO is engaging in a number of pilots and studies to better understand costs and feasibility of developing distributed energy resources in a local area

Residential Solar-Storage Pilot and Feasibility Study:

York Region

- The IESO and Alectra Utilities conducted a study looking at the feasibility and cost of implementing residential solar-storage technology in Markham, Richmond Hill and Vaughan.

- Results from the study will help us:
  - Better understand to what extent community-based solutions could defer the need for electricity infrastructure in York Region
  - Facilitate future discussions with LAC and affected communities on community-based solutions

- Refer to Alectra's presentation for more details

alectra

Discover the possibilities

POWER.HOUSE UPDATE

May 8, 2017

MICROGRID - Residential Scale

POWER.HOUSE

alectra
Discover the possibilities

POWER HOUSE

SAVE Money

PROTECT Against Outages

GENERATE Your Own Power

Power Stream

Introducing
POWER.HOUSE.

Power your home with solar…
even after the sun goes down!

Program Details:

- 20 homes pilot in Markham, Richmond Hill, Vaughan, Barrie
- Customer pays $3500 upfront costs and $20 monthly service fee
- Costs and benefits to be shared between customer and utility
- Offering, first time in Ontario, Net Metering on Time-of -Use
- No-worry system; owned, operated and maintained by PowerStream
- Installation over 2-3 days
- System commissioned and dispatch model programmed by PowerStream

www.PowerStream.ca/PowerHouse

SAVE Money

PROTECT Against Outages

GENERATE Your Own Power

POWER. HOUSE.

Solar Integrated System (SIS)

- Hybrid Inverter
- Solar Charge Controller
- Gateway Computer
- Protection & Isolation
- Battery + BMS
- NEMA Enclosure

Other Installed Components

Solar Integrated System (SIS)

Battery Disconnect Switch

Arc Fault Circuit Interrupter (2 string)

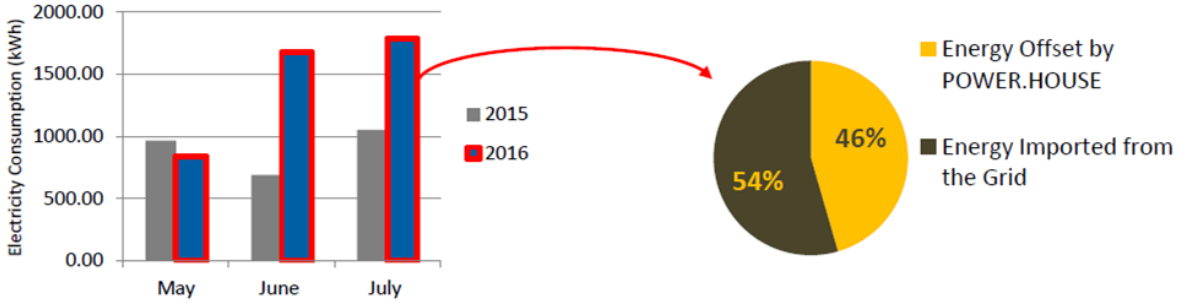
PV Disconnect Switch

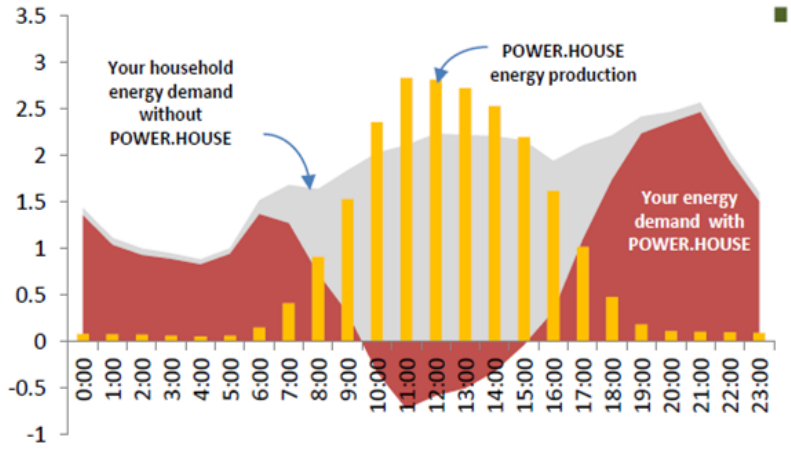
Rooftop Solar

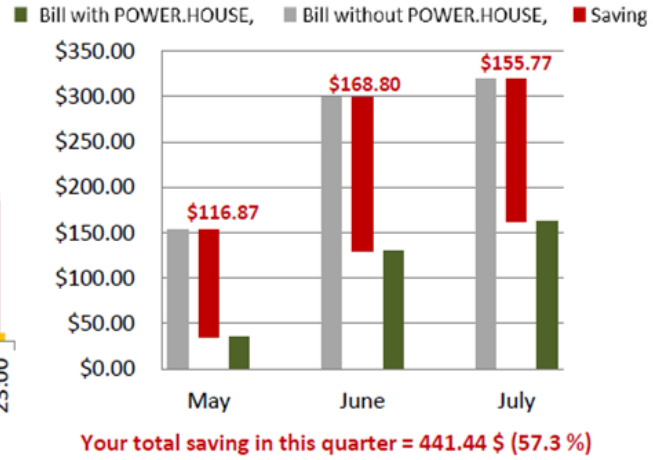
Actual Savings for a POWER.HOUSE Customer
May to July 2016

This graph compares your household consumption pattern for the same quarter last year (2015).

This graph breaks down your household consumption into what is imported from the utility grid vs. what was offset by your POWER.HOUSE unit.



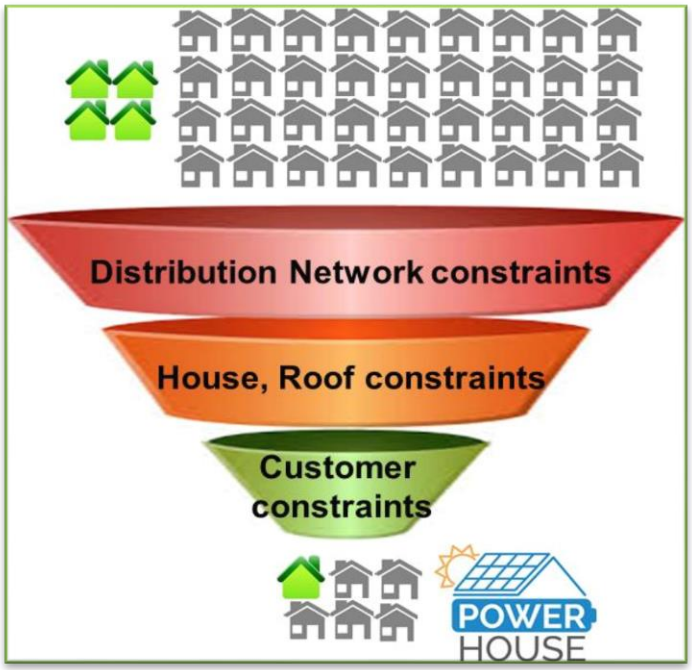




Your total saving in this quarter = 441.44 $ (57.3 %)

This quarter, POWER.HOUSE Program participants enjoyed a total of 20.87 hours of power outage protection. *

POWER.HOUSE Feasibility Study



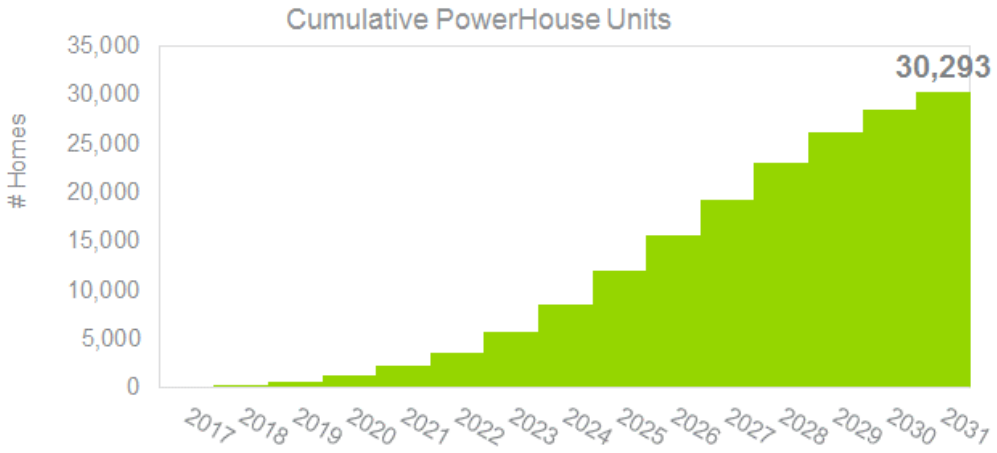
POWER.HOUSE Feasibility Study (PowerStream, IESO)

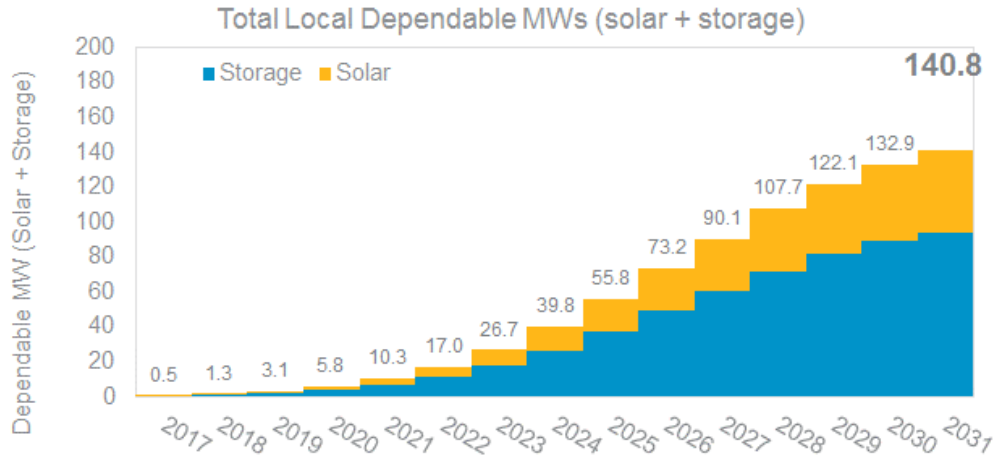
- In partnership with IESO
- Utility owned Residential Solar, Storage solution with VPP capabilities
- Specific to York Region- Markham, Richmond Hill and Vaughan
- Time frame for adoption: 15 years

Study Highlights

✓	High degree of involvement and collaboration with IESO, PowerStream, and other supporting staff
✓	POWER.HOUSE can feasibly reach meaningful uptake within the study period (2016-2031) - **30,000 units and 140 local dependable MW**
✓	POWER.HOUSE can defer at least 2 years of local transmission/distribution investment in late 2020 timeframe
✓	Team worked with IESO to understand technical needs and demonstrated the technical capabilities and customer value
✓	Team worked with IESO to understand the “societal” business case and demonstrated positive results
✓	Identified barriers and catalysts required to support widespread adoption

Program Structure and Uptake





Program Offer:

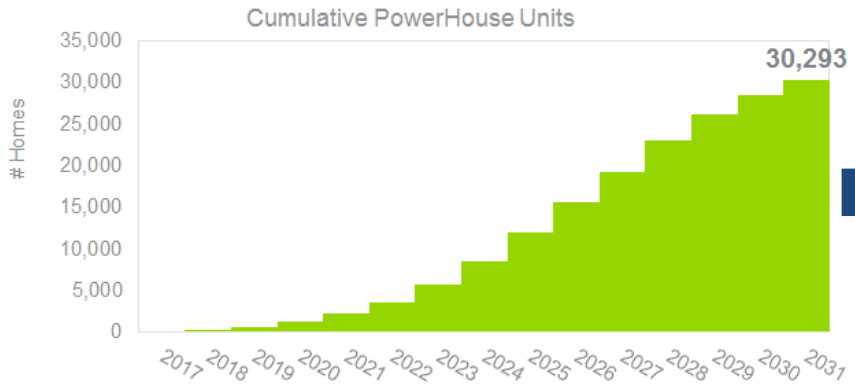
Single Family Home

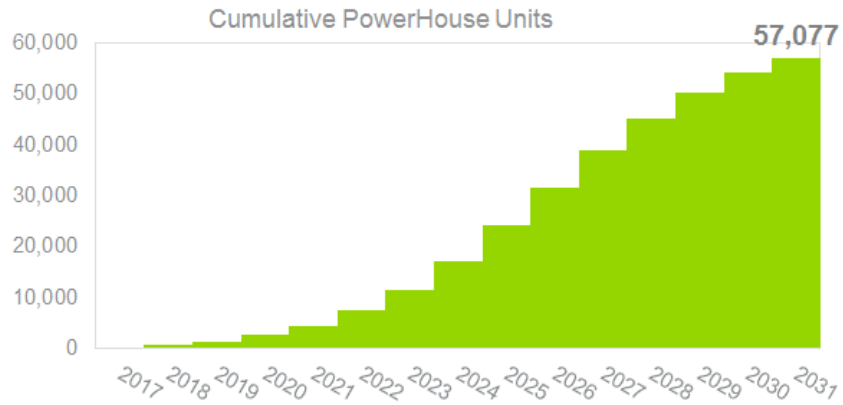
- 5 kW Solar/11.64 kWh battery
- 8 – 10 MWh average annual load
- $4,500 up front
- $80/month for 10 years
- Average nominal bill savings + reliability benefit of $1,800/year
- Payback between 4 and 5 years

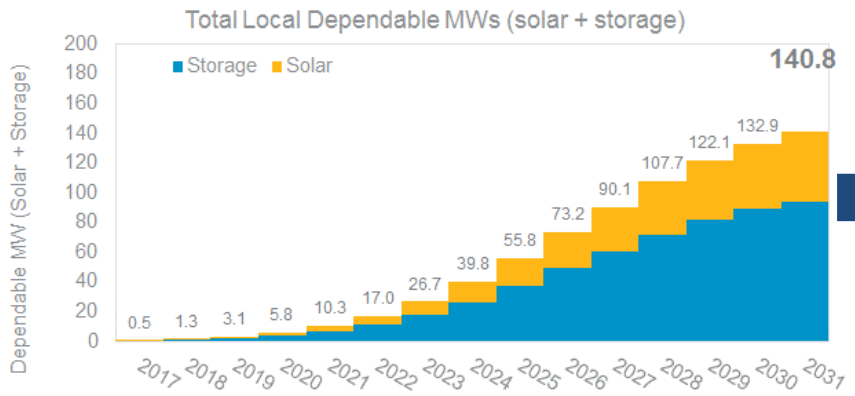
Semi/Row Home

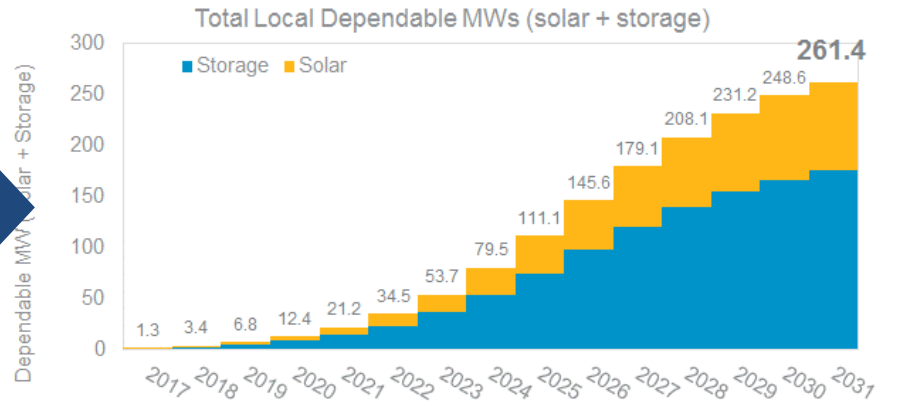
- 3 kW Solar/7.7 kWh battery
- 4 – 6 MWh average annual load
- $3,500 up front
- $55/month for 10 years
- Average nominal bill savings of $1,100/year
- Payback between 5 and 6 years

Program Structure and Uptake









Aligned with IESO OPO

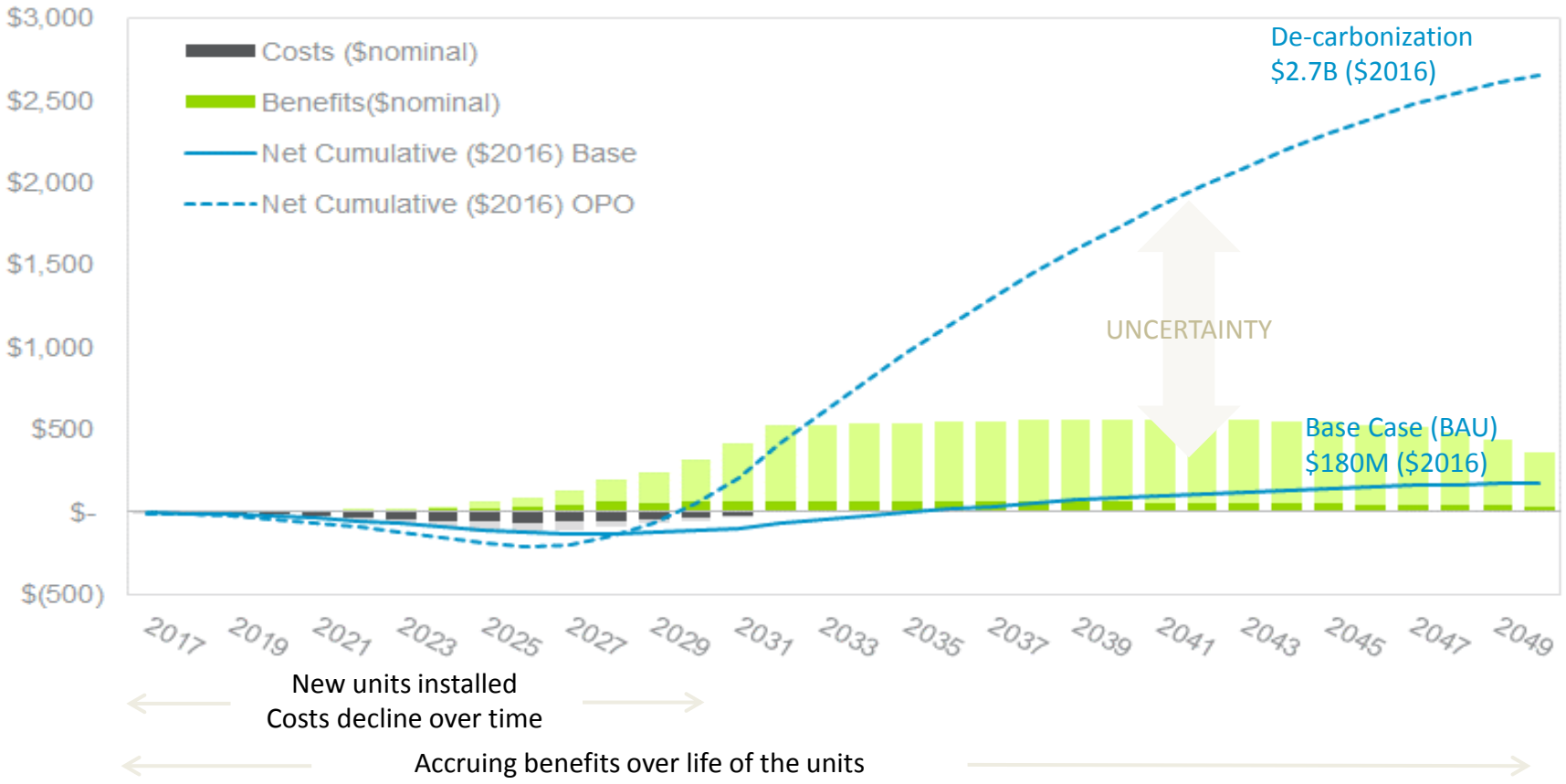
Scenario B

Scenario D4

Program Uptake Increases under OPO Deep De-carbonization Scenario (D4)

NPV- LTEP (Societal) Perspective

- **When considering all units installed, there is a positive NPV from a societal perspective**



alectra

Discover the possibilities

Open Discussions

May 8, 2017

Local Achievable Potential Study

Toronto, Barrie-Innisfil, Parry Sound-Muskoka area

- Local achievable potential studies are currently underway or will be initiated for Toronto, Barrie-Innisfil, and Parry Sound-Muskoka
  - These studies are funded by the IESO Conservation Fund, but are led by the local utilities

- The results from these studies will help the IESO and LDCs to:
  - Better understand the achievable conservation and demand management potential in these local areas
  - Inform the development of solutions and planning scenarios

- The study will be tailored to the specific characteristics of the local area and will examine a wide range of options, including:
  - Incentive adders to existing conservation programs
  - New conservation programs
  - New Demand Response program
  - Behind the Meter Generation
  - Energy Storage

Local Demand Response Pilot

County of Brant and the City of Brantford

- In 2016, the IESO, with input from the Brant area Local Distribution Companies, initiated the development of the Brant Local Demand Response (DR) Pilot

- The pilot is intended to help the IESO and LDCs:
  - Test the use of DR to assist with local capacity needs
  - Provide interim capacity relief, if needed, until additional capacity provided by transmission reinforcements are in place in 2019 in the Brant area

Potential Areas for Coordination: Community Energy Planning and Regional Planning Activities

- A number of communities across the province are in the process of developing community energy plans

- The IESO is currently participating in the community energy planning process in multiple municipalities, including Region of Waterloo, York Region (e.g., Markham, Vaughan), Oakville and Durham

- Potential areas for greater coordination include:
  - Right-of-Way/services and transportation corridor planning
  - Infrastructure siting
  - Housing energy efficiency standards
  - Community-level cogeneration or district energy based conservation
  - Funding/cost-sharing issues

Other Initiatives

- Energy storage pilot project in Newmarket
- Penetanguishene Microgrid Project
- Residential solar storage pilots (e.g., Oshawa PUC, Veridian Connections)
- Opportunities for targeted conservation programs
- Other Initiatives

York Region Electricity Plan – Next Steps:

DER Options to Address Longer-Term Needs in York Region

Needs:

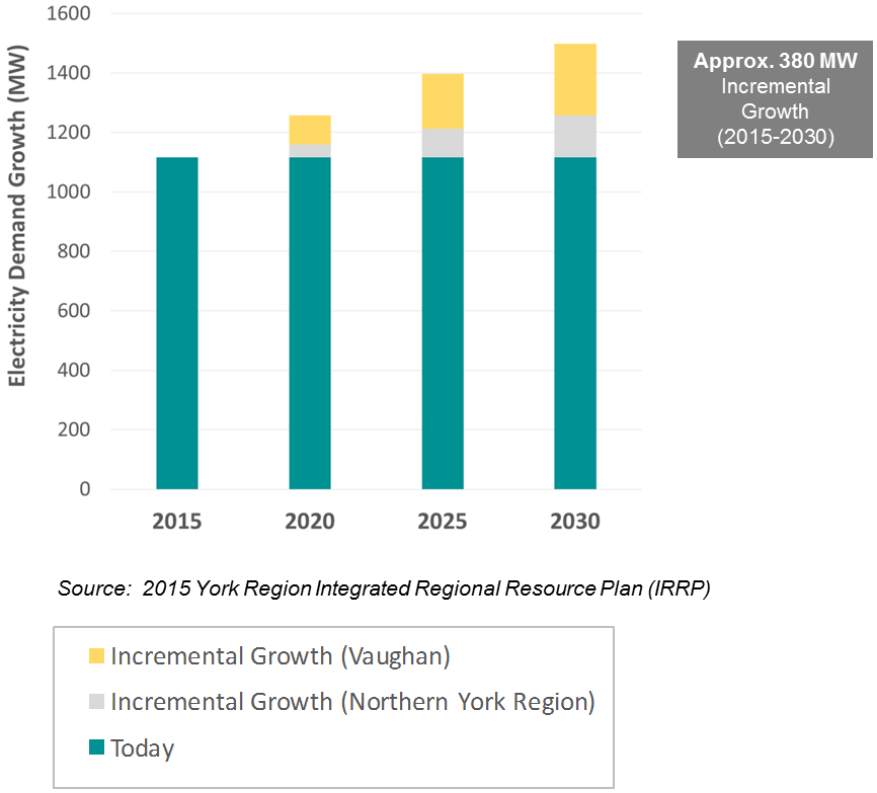
- By the mid 2020s, growth in Northern York Region/Vaughan will exceed the electricity system's capability

Options Evaluation:

- To what extent can community-based energy solutions be a cost-effective and reliable option to defer the longer-term needs?

Next Steps for the Working Group & LAC members:

- Examine the cost and feasibility of implementing "*specific* " initiatives in York Region:
  - Power.House Feasibility Study
  - York-Specific Pilots (e.g., CHP, targeted conservation, demand response) and local achievable potential study
- Incorporate input from the communities
  - Community Energy Plans
  - Community-based solutions and Initiatives



Source: 2015 York Region Integrated Regional Resource Plan (IRRP)