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# Northern York Region Electricity Supply Study

## Exhibit A:

# Consultation Report

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**Prepared for**

Ontario Power Authority

**Prepared by**



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September 31, 2005

Mr. Amir Shalaby  
VP, Power System Planning  
Ontario Power Authority  
175 Bloor Street East  
North Tower, Suite 606  
Toronto, Ontario M4W 3R8

Dear Mr. Shalaby,

Enclosed is the York Region Electricity Supply Consultation Report. This report presents results of a consultation process with the public, a diverse working group and elected officials from York Region. It contains important issues that the York Region residents, municipalities, school boards and business community have raised with respect to addressing the electricity supply needs and developing an integrated solution for Northern York Region.

At this time I would like to recognize the York Region Electricity Supply working group representatives and advisors, the Elected Officials' Forum representatives, as well as those that made written and verbal contributions during the consultation. Their direct input is reflected in this effort. We are grateful for the knowledge and experience that these individuals and organizations have shared with us.

Sincerely,

A handwritten signature in black ink, appearing to read "Armen Kulidjian", with a long horizontal flourish extending to the right.

Armen Kulidjian, P.Eng.  
President

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## 1. INTRODUCTION

On March 1, 2005 the Ontario Power Authority received a letter from the Minister of Energy. The Minister requested that the OPA identify and assess possible solutions to address local reliability issues in York Region. The solution options considered would be broadly based and not confined solely to a consideration of transmission. The Minister requested that the OPA present its findings to the Ontario Energy Board so that they may consider them in their determination of the appropriate regulatory treatment of the issue.

The OPA was asked to prepare evidence to assess the need and recommend a preferred option to meet the need in York Region. The OPA goal is to recommend a solution that is technically feasible, timely, and cost effective while considering community impacts. The OPA chose to directly involve the affected communities and local utilities into the entire process to accelerate the collection of data, to receive detailed and constructive advice and feedback with respect to the identification, definition and evaluation of electricity supply and demand response options, encourage discussions of issues with various stakeholders with diverse viewpoints, facilitate a mutual understanding of differing viewpoints, and allow the interested public to participate in the deliberation process used for the OPA to produce a report to the Ontario Energy Board.

In March 2005, GRID Management Consulting Inc. was retained by the Ontario Power Authority to conduct a public consultation related to addressing the electricity supply needs of Northern York Region.

On July 25, 2005 the OPA received a letter of direction from the OEB in accordance with section 21 of the Ontario Energy Board Act which authorizes the OEB to direct parties to file evidence to assist the OEB in its determination of an issue. The OEB asked that the OPA provide an opinion on the need for new supply in York Region including a timeline on when new supply would be required. In addition, the OEB asked that the OPA provide an opinion on which of four predetermined options or another OPA generated option is the optimal way to serve this demand in the region. The OEB asked that this evidence be filed by September 30, 2005.

## 2. CONSULTANT QUALIFICATIONS

Armen Kulidjian has provided management consulting services to the energy sector for the past 9 years, initially with Cap Gemini Ernst & Young's Energy Group in Toronto and later with GRID Management Consulting Inc., a company he founded in May 2000.

GRID Management Consulting Inc. is a premier consulting firm focused exclusively on the competitive energy industry. It was founded with the knowledge that the energy industry was faced with incredible opportunities and new challenges. Today, the firm has grown in its network of associates, the markets it has served (e.g. Ontario, Northwestern United States, Midwest United States and New Brunswick), and the types of clients it serves (e.g. market operators, planning authorities, transmitters, distributors, generators and industrial customers).

Armen Kulidjian has extensive electricity industry knowledge in both business and operational processes and experience managing large projects in the areas of electricity deregulation, stakeholder consultation, process design, system implementation, strategic analysis and cost reduction.

The following is a list of a few relevant projects that Armen has been involved in:

- Lead an Ontario Energy Board industry consultation process with respect to implementing "smart" meters across the Province of Ontario
- Facilitated working sessions with Ontario Power Generation to design their Commercial Operations Business Unit
- Facilitated working sessions with PacifiCorp to prepare them for the business process and system changes required for Oregon's market opening

### 3. APPROACH

The consultation process was designed to ensure that those that were interested in the electricity supply issues in the region would have a reasonable opportunity to provide their thoughts, comments and suggestions. The consultation process used a variety of ways to solicit feedback and advice from interested stakeholders, industry and the general public.

These were:

a. Planning Meetings with Key Stakeholder Groups

Starting in March 2005, the OPA conducted meetings and conference calls with key staff and elected officials in the municipalities in York Region and Bradford West Gwillimbury, public interest groups and the utility industry to explain the mandate of the OPA in this planning exercise, find ways to coordinate communications, solicit feedback with respect to the scope and process for the consultation.

b. Public Meetings

In May 2005, the OPA organized two large forum public meetings to solicit feedback on the scope and process of the consultation as well as to raise awareness of the issues facing York Region and OPA's mandate with respect to meeting the electricity supply needs for the region. On May 4, 2005 the first public meeting was held in Richmond Hill with more than 700 people in attendance. On May 26, 2005 a second public meeting was held in Newmarket with approximately 80 people in attendance. Notice for the public meetings was placed in many of the community newspapers including Italian and Chinese language newspapers and the Toronto Star. The meetings consisted of two short presentations followed by question and answer periods. The questions asked and issues raised in these meetings have been captured in Appendix A-2.

c. Working Group

In June 2005 a working group was formed consisting of municipal government staff, residents, school board representatives, business community representatives, public interest group representatives. In addition a group of advisors were also identified from the utility industry and from governmental ministries to be involved in the deliberations. Five full day working group sessions were conducted which provided the group with information about the different aspects of the planning process, the needs assessment, and options identification and evaluation. The working group and advisors were able to provide the OPA with valuable feedback into their planning process. The OPA wishes to thank all participants in the working group sessions for their contributions in time, experience and insight. Appendix A-2 contains the questions asked and issues raised in these meetings, Appendix A-4 contains a list of organizations and individuals represented and Appendix A-5 is the terms of reference for the group.

d. Elected Officials' Forum

Through consulting with elected officials, the OPA identified a need to keep elected officials informed in a more formal forum. The OPA requested that each municipality send two elected officials to represent each community in periodic meetings. M.P.Ps from the region were also invited to attend forums. Three forums were conducted which updated elected officials about working group deliberations and provided an opportunity to solicit their feedback about issues that were important to them. Appendix A-2 contains the questions asked and issues raised in these meetings.

e. Media

Media were invited to attend consultation meetings in order to raise awareness of OPA's involvement in the York Region initiative and to engage the community in the consultation. There was extensive media coverage at different stages of the consultation process where OPA staff and consultants were interviewed.

f. Observers

In order to ensure that the consultation was as open and transparent as possible, the general public was invited to all working group and elected officials' forum meetings as observers. Observers were given an opportunity at specific times during the meeting to ask questions and provide comments. Observers' comments were recorded in meeting summaries along with comments from participants.

g. Website and Written Comments

A project webpage was setup early on in the consultation to allow for documents to be posted relating to the consultation. This provided an opportunity for the broader public to be kept informed of the progress of the planning exercise and provide written comments. Questions from the public were responded to by the OPA. The link to the consultation webpage is: <http://www.powerauthority.on.ca/index.taf?pid=3&sp=2&pr=1&ss=1&p=1>

h. Briefings and Public Open House on OPA's Draft Recommendation

On September 9, 2005 the OPA provided briefings to the working group, elected officials and the media on their draft recommendation. A two week comment period was provided until September 23, 2005 for all interested stakeholders to provide comments on the draft recommendation.

On September 14, the OPA organized a public open house in Newmarket to give an opportunity for the general public to ask questions and provide comments which the OPA considered in revising the recommendation to the Ontario Energy Board.

## 4. SUMMARY OF COMMENTS ON OPA RECOMMENDATION

Stakeholder reaction and comment was obtained both verbally and in writing from stakeholders during the September 9<sup>th</sup> briefings, the September 14<sup>th</sup> Open House and throughout the comment period ending September 23<sup>rd</sup>, 2005. Individual comments from stakeholders are posted on OPA's project webpage.

In general, there was strong support for OPA's integrated solution for electricity supply to Northern York Region. Many stakeholders commented that the solution was well thought out and the consultation process provided interested stakeholders with a good understanding of the constraints, potential solutions and various issues both locally and in a broader context related to this matter, an open forum to provide advice and input into the planning process. Many expressed their appreciation for the opportunity to be part of the process. The following is a summary of written comments received on the draft recommendation.

### Town of Newmarket

The Town of Newmarket held a council meeting on September 19<sup>th</sup>, 2005 and voted to support OPA's integrated solution subject to the following:

- that the immediate transformation requirements be addressed as a top priority
- that the conservation demand management component of the recommendations include support from the Province including such items as new requirements in the Ontario Building Code to require energy efficiencies, incentives, and governance reform as necessary to provide new tools to municipalities to encourage further energy efficiencies in new building construction and renovations
- and that all site designs for new electricity related infrastructure include mitigating measures to minimize impact within the host community

The Town asked that the OPA and OEB include a process to monitor the timing and effectiveness of the phased implementation of the recommendations to determine if additional measures, including the contingency plan, are required to be implemented to meet the needs of the region. As part of the process they asked that the municipalities and other stakeholders be kept informed and updated throughout the implementation process. In addition, the Town advised the OPA that it supports aggressive conservation demand management and will continue to expand its efforts in that area.

### Town of Aurora

The Town of Aurora held a council meeting on September 20<sup>th</sup>, 2005 and voted to support OPA's integrated solution subject to the following:

- the location of any of the transformer facilities be in accordance with the Town of Aurora regulations including but not limited to zoning, site plan, building and safety regulations
- the second transformer station proposed in Aurora be limited to 150 MW
- the transformer station not be constructed unless a local generation plant is constructed in advance
- any new 230 kV lines be underground through any urban designated lands
- the existing single circuit 115 kV system be replaced as soon as possible



- the Town receive quarterly reports from the appropriate agency showing power consumption and extrapolations required to determine the need for the second transformer station
- OPA fund with significant amounts of money for the necessary research and development of methods to reduce the cost of placing transmission lines underground

In addition the Town committed to strive to be a leader by example of energy conservation, pursuing opportunities to share conservation projects with its residents, businesses and other governments and agencies. It requested the Province of Ontario to enact the appropriate legislation to facilitate and require energy conservation in new construction.

#### Township of King

The township of King held a council meeting on September 19<sup>th</sup>, 2005 and voted to recommend that the township of King:

- Work with Hydro One in its quest to find a suitable location for a transformer station, if one is required in the Township to ensure that mitigation measures are addressed
- Any transformer station shall be limited to 150 MW
- Endorse aggressive conservation and demand management programs
- Recommend that quantitative and qualitative factors be incorporated into the monitoring and evaluation of any CDM program to target 20MW by 2011
- All elected officials in the identified study area meet annually for the purpose of having the OPA update the municipalities on how the energy conservation target is being achieved
- The OPA fund with significant amounts of money for the necessary research and development of methods to reduce the cost of placing lines underground, and any new feeder lines in the Township shall be underground
- Any new feeder lines shall be installed at no cost to the Township of King residents
- The location of any of the facilities shall be in accordance with the Township of King regulations including but not limited to, zoning, site plan, building and safety regulations
- The OPA be advised that the Township opposes any generation facility proposals within the Township of King; and
- The Township of King maintains its position in opposing any new transmission lines traversing its municipality.

#### Town of Markham

The town of Markham held a council meeting on September 20<sup>th</sup>, 2005 and voted to support OPA's integrated solution of demand reduction, new transformer capacity in Northern York Region and local generation in Northern York Region. The town also commented again through its staff representative on the working group stating that they were opposed to the transmission contingency plan.

Town of Bradford West Gwillimbury

The Town of Bradford West Gwillimbury was appreciative for the opportunity to participate in the consultation and felt that the discussions were enlightening, inclusive and productive. They had concerns with the proposed solution because it did not provide certainty in satisfying the forecasted demand. They felt that CDM should be encouraged and pursued but its success was untested and unknown. Similarly, relying on local power generation ignores growing public intolerance of such facilities, as evidenced by the recent abandonment of generation projects in Newmarket, Vaughan and Mississauga. The council stated that it supported OPA's contingency plan of transmission from the Buttonville transmission station because it will bring certainty to the supply solution.

City of Vaughan

The City of Vaughan held a council meeting on September 26<sup>th</sup>, 2005 and voted to not have any objections to OPA's integrated solution. In the city manager's report to council, it was noted that although there are no immediate impacts on the City of Vaughan, the town did see some broader implications of the approach being suggested by the OPA. OPA supports the concept of locally generated power to address the needs of an immediate area, particularly for meeting demand in peak periods. That said the town stated that municipalities may have to deal more frequently with proposals for power plants within their boundaries and appropriate locations will need to be found to minimize impacts on adjacent land uses.

York Region

York Region provided comments supporting OPA's efforts and solution. They referenced council decisions made in their December 16, 2004 meeting which stated that the Region of York supports Newmarket Hydro and the Town of Newmarket's initiative to provide local hydro distribution through a proposed 300-megawatt gas-fired peaking facility as a solution to additional electricity demands.

Working Group Representatives

There was general agreement among working group representatives that they were in support of OPA's integrated solution. Many during the September 9<sup>th</sup> briefing verbally communicated this message and a number of representatives followed this up with written comments of support. A few representatives encouraged the OPA to research ways to reduce the cost of undergrounding transmission lines and were concerned about the Buttonville to Gormley transmission line contingency plan. Specific concerns included what process would be used to trigger the contingency plan and how socio-economic concerns would be mitigated, if triggered.

### Ontario Clean Air Alliance

Jack Gibbons, the chair of the Ontario Clean Air Alliance and a working group representative, expressed his support for the OPA's proposal and submitted the following to the Town of Newmarket.

"We believe that this proposal is in the best interest of the people of Newmarket and Ontario for the following reasons.

- It will lead to a net reduction in air pollution in Ontario and Newmarket by facilitating the phase-out of Ontario's dirty coal-fired power plants.
- It will dramatically reduce the probability of an electricity brownout or blackout in Newmarket
- It is a lower cost option to meet Newmarket's electricity needs than importing electricity from outside of York Region by a new or upgraded electricity transmission line."

### York Catholic District School Board

At a recent board meeting, the York Catholic District School Board passed a motion to formally endorse and support the draft recommendation that was released on the September 9<sup>th</sup> briefing. They were pleased with the consultation process as implemented and followed by the OPA over the summer months. In addition to this letter, another letter was received that stated that the school board was in support of the integrated solution but was strongly opposed to the transmission contingency plan because it would affect its school enrolment at St. Monica's in Markham.

### STOP Transmission Lines Over People (STOP)

STOP is a public interest group which advocates stopping construction of high EMF emitting hydro towers and lines in close proximity to residents, schools and businesses. They support the OPA recommendation subject to the following:

- All of the initiatives included in the plan undergo proper environmental review
- An energy conservation plan be developed as part of Phase 1 to achieve and hopefully surpass provincial conservation goals
- The need for Phase 2 measures be thoroughly and publicly assessed after Phase 1 steps have been taken, but that in any event the recommendation for expanding transmission, if the procurement of local generation fails, be removed from the Plan; and
- That a more coordinated approach be established to integrate energy and development planning in the Region to ensure that necessary services are, or will be in place to support development before it is approved.

### Ontario Nature - Federation of Ontario Naturalists

Ontario Nature has a mandate to protect and restore nature through research, education and conservation action. One method by which they carry out this mandate is through the purchase of properties that are added to their nature reserve system. Their property at 18462 Bathurst Street, Newmarket is the 108-hectare Cawthra Mulock Nature Reserve that Holland Junction is located on, is managed for nature conservation purposes. There are many outstanding natural features on the property, including extensive mixed and deciduous forests, wetland complexes, old field habitats, and creeks. The property has been identified as part of the Regional Greenlands System under the York Region Greening Strategy. Their primary concern along with other area landowners was that they were not contacted to participate in the working group

deliberations. In addition, they are concerned about the impact of the proposed transformer construction on the ecological health of this area and whether the proposed construction at Holland Junction may encourage even further expansion of the electricity distribution system in the area.

#### Newmarket Residents

Dozens of emails were forwarded on to the OPA from the Town of Newmarket that were received by councillors related to the Northland Power Plant's agreement with the town to purchase property on Steven Court to site a natural gas simple cycle generator. The residents expressed concerns about the location of the site being close to a residential neighbourhood, recreational facilities and schools. Suggestions were made to site a generator in an industrial area away from neighbourhoods to avoid negative impacts on property values and health. Residents who commented on OPA's integrated solution were in support of it.

#### Concerned Citizens of King Township

Concerned Citizens of King Township (CCKT) is the largest citizens group in King. They are concerned with the visual impact that feeder lines running along side roadways will have the rural beauty of the area around Holland Junction. They are suggesting that if King must contribute by accommodating a new transformer station, that any additional feeder lines running along the roadsides through King Township be buried. They are also very concerned about having a generating plant located in King as a result of the transformer station being located there. They strongly support load reduction and deferral options and would like to see a greater focus on developing clean, safe, climate-friendly green energy. They agree with the recommendation for new / enhancements to infrastructure in the eastern portion of York Region, where the vast majority of growth is currently and will continue to occur.

#### Markham Residents

The OPA received dozens of emails from Market residents that communicated that they were in support of OPA's integrated solution but were strongly opposed to the transmission contingency plan because it did not address the socio-economic and environmental concerns raised by the public. Undergrounding was proposed as appropriate mitigation if the contingency plan was required to be triggered.

#### Newmarket Hydro

Newmarket Hydro actively supports demand reduction efforts but wants to make it clear that it can not be a substitute for building a transformer station immediately. They support the Holland Junction TS proposal but have some concerns with regard to implementation of a Holland Junction TS:

- Timing for implementation appears unrealistic given 2003 plans that to date still have not been able to be put in place
- No land has been secured at Holland Junction whereas with previous plans there was already land secured but construction could not commence even two years later
- Challenge of road access to and from Holland Junction TS to support transportation of heavy power transformers for maintenance purposes

In the event, that Holland Junction can not be implemented in a timely manner, OPA is urged to consider build the Aurora TS first. Newmarket Hydro has similar concerns with respect to the

certainty of generation and suggests that the decision between generation and transmission (contingency plan) be made by the end of 2008.

PowerStream and Aurora Hydro

PowerStream and Aurora Hydro provided editorial comments and observations to the draft. One main item that was mentioned by both utilities was that the report does not deal with the ramifications of the integrated solution to the southern York Region utility if the transmission line is not built. Some impacts would be larger capital costs to build future transformer stations, higher losses as well as possible congestion issues.

## APPENDIX A-1: DRAFT OPA RECOMMENDATION

This Appendix contains the briefing presentation used to the working group, elected officials and media and at the September 14<sup>th</sup> open house. The public was provided a two week comment period to provide feedback to the OPA that would be taken into consideration when finalizing the recommendation.



### York Region Electricity Supply Recommendation

September 14, 2005

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### Broad Community Involvement

#### Consulted with:

- Public
- Community groups
- Municipal governments
- Elected Officials
- Provincial Ministries



#### Worked with:

- Community representatives



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### York Region Quick Overview

#### York Region is:

- Approximately 1700 sq. km.
- Population
  - 2005: 0.9 million
  - 2026: 1.3 million
- Composed of 9 regional municipalities
- Load is 1700MW, supplied by 4 LDCs



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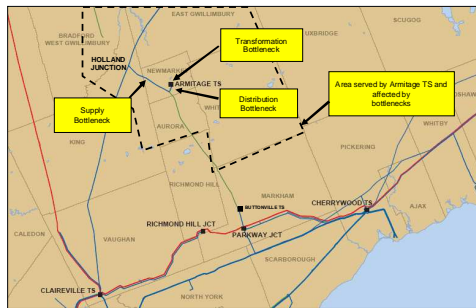
### Area Affected by Supply Shortage

- Reliability risk is to the northern communities
  - 6 out of 9 York Region municipalities and Bradford West Gwillimbury in Simcoe County
  - Newmarket and Aurora are the largest load pockets in the area
- Infrastructure to the northern communities is limited to one 230 kV double-circuit line and Armitage Transformer Station (TS)
- Peak demand reached about 375 MW this summer
- Load growth estimated to be 3.25% / year or about 140 MW of additional demand by 2015



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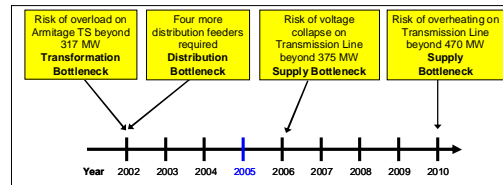
## Bottlenecks



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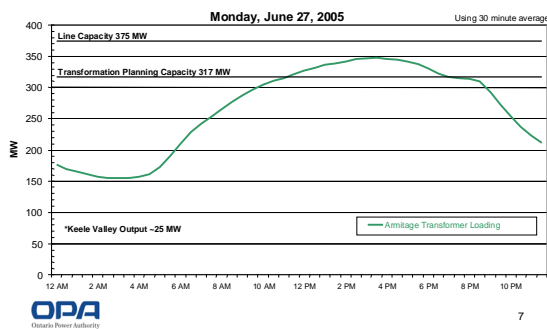
## When These Bottlenecks Become Critical



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## Illustration of Transformation Bottleneck



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## Integrated Solution

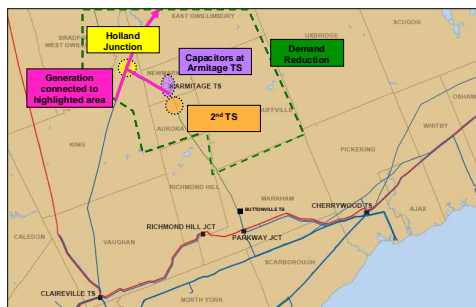
### Solution Components:

- 1) **Demand Reduction**
    - Targeted Demand Response
    - Conservation and efficiency improvement
  - 2) **Transformation**
    - Holland Junction TS + Capacitors & Feeders
    - 2<sup>nd</sup> Transformer Station
  - 3) **Additional Supply**
    - Generation
- Doubles the load meeting capability of the area
  - Expected to meet demand until 2025

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## Integrated Solution



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## Demand Reduction

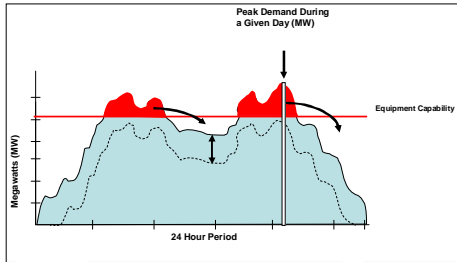
- Pursue as much economic demand reduction in the area as possible
- OPA's demand reduction efforts will supplement and extend those of the local electricity utilities
- OPA will initially target measures that provide peak reduction or peak shifting capabilities



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## Demand Reduction



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## Demand Reduction

### Targeted Demand Response

- RFP to target 20 MW by 2011, but as much as possible by summer 2006
- Load control programs through aggregators
- Distributed energy and standby generator programs

### Ongoing Conservation measures in conjunction with LDCs

- Air conditioner upgrade and appliance exchange programs
- Efficiency improvement programs for low income housing and institutional buildings
- The Energy Star program for new homes
- Explore a customized conservation program modelled after the "20/20" program in California

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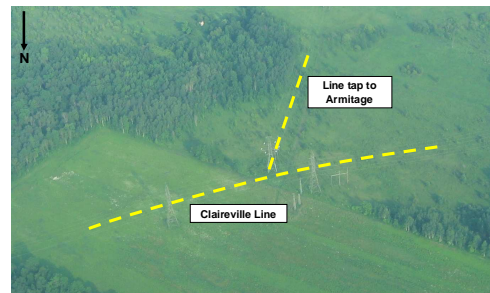
## Transformation: Holland Junction TS

- Build a transformer station in the vicinity of Holland Junction
- Close to the supply area, reducing distribution costs and losses
- Alleviates overloading of Armitage line tap
- Capacitors at Armitage TS and Holland Junction TS support the voltage
- Shortest lead time as no new transmission lines are required
- Load meeting capability increased by 150 MW

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## Holland Junction



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14

## Example: Brown Hill TS



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## Transformation: 2<sup>nd</sup> Station

- Required if Armitage and Holland Junction TS reach capacity
- Preferably in northern Aurora
- Provides capacity to serve electricity demand in Aurora and Newmarket

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## Supply: Generation

- Generation in northern York Region preferred over transmission plus generation elsewhere
- Enhances the security of supply to Northern York Region by providing another source of supply to the area
- Some relief to the overloading of the Claireville TS autotransformers
- Lower cost option



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## Supply: Generation

- Needs of northern York Region best met by a natural gas-fuelled simple-cycle generating plant
  - rapid start and synchronous condensor operation for voltage support
  - Can be configured in multiple small units to mitigate for transmission line contingencies
  - Expected to operate as a peaking and load following plant



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## Supply: Generation

- Evidence will be submitted to the OEB on Sept 30<sup>th</sup>
- OPA will start procurement process early next year
- OEB approvals for generation procurement will be required
- Generation proponent will be required to secure all necessary approvals, including Environmental Assessment Approval



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## Supply: Contingency Plan

- If a generation contract cannot be secured in the area, then transmission would become the long-term supply solution
- Preferred transmission option is Buttonville TS to Gormley TS
- In this case, the preferred location of the 2<sup>nd</sup> TS will be at Gormley rather than in northern Aurora



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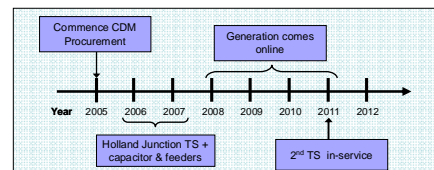
## Planning Timeline

- |                          |  |
|--------------------------|--|
| ✓ May                    | Public Meetings (Launch) in Two Locations                                |
| ✓ May – August           | Technical Analysis   |
| ✓ Late May               | Receive RFI responses  |
| ✓ Mid June – End of July | Working Group Sessions   |
| ✓ July 25, 2005          | Letter of Direction from Ontario Energy Board                            |
| ✓ July – August          | Elected Officials Forums   |
| • September 9            | Briefing Working Group, Elected Officials, Media on draft recommendation |
| • September 9 – 23       | Period for public comment on draft recommendation                        |
| • September 14           | Public Open House  |
| • September 30           | Submit final report to OEB   |
| • Fall 2005              | OEB Process  |



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## Implementation Timeline



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## **APPENDIX A-2: CONSULTATION SUMMARY**

This Appendix contains clarifying questions and answers, issues raised, and recommendations that were discussed during the consultation meetings conducted with the working group, elected officials and general public. It has been categorized from individual meeting summaries that were prepared and have been posted on the OPA project webpage.

The appendix has been organized by topic:

- OPA's Role, Scope of Analysis, Consultation and Decision Making Process
- Time Horizon for Analysis
- Load Meeting Capability of Existing Infrastructure
- Load Forecast Review
- Conservation and Demand Management Review of Existing Programs
- York Region Need
- OPA RFI Process and Received Responses for Generation and Demand Response
- Evaluation Factors
- EA Requirements for Electricity Projects
- Alternatives to Meet Need
- Conservation Demand Management for York Region
- Distribution Options
- Transmission Options
- Environmental and Health Considerations
- Generation Options
- Methodology to Compare Transmission to Generation
- Rate Impacts – Who Pays?
- Parking Lot Items

## **OPA's Role, Scope of Analysis, Consultation and Decision Making Process**

### **a) Discussed Materials**

The material discussed includes the slides that have been included in Appendix A-6 under the "OPA's Role, Scope of Analysis, Consultation and Decision Making Process" section and the OEB Letter of Direction which is available on the OEB website. This was discussed in the Public Consultation Launch meetings as well as in Working Group Session #5.

### **b) Clarifying Questions and Discussion**

What is the OEB's role with respect to generation and CDM?

***The OEB approves OPA contracts signed with generation and CDM proponents.***

What is the OEB's role with respect to transmission and distribution?

***The OEB can only issue leave to construct for transmission not distribution, but for both transmission and distribution, the OEB can direct parties to build.***

At what point would the OPA want formal comments from the municipalities with respect to options?

***This can be done in this forum or through written comments at any time.***

Who is involved at the OPA with respect to the technical analysis for this initiative?

***Acres International and another independent consultant have been hired to conduct the technical analysis and a transmission expert hired by OPA.***

Can the OPA identify other possible options beyond the ones enumerated in the OEB letter of direction?

***Yes.***

Does the OEB Letter of Direction, impact the OPA's mandate or the Working Group's terms of reference?

***No. The letter is consistent with OPA's understanding of its mandate in York Region.***

Who at the OPA will make the final recommendation?

***OPA senior management will make the recommendation. Their biographies are all available on the OPA website.***

## **c) Issues Raised**

### ***Recording meeting minutes***

*(Source: Public Consultation Launch Summary)*

There was strong sentiment that it was incumbent upon the OPA to provide “evidence” that the OPA had in fact accurately heard the opinions presented (e.g. by providing an official transcript or minutes of the meeting). The OPA decided instead of providing verbatim minutes to meetings, it will be providing meeting summaries that will reflect OPA’s best attempt to capture the issues discussed. In the working group process meeting summaries will be reviewed by working group participants and will be posted on the OPA website after participants agree that it represents an accurate representation of their viewpoints.

### ***Municipal government representation***

*(Source: Public Consultation Launch Summary)*

Individuals inquired about whether staff or elected officials would represent municipal governments in the working group. The OPA stated that their preference would be that staff be involved in the working group. The OPA later acknowledged the need to have both elected officials and staff contribute. This was done by creating an elected officials’ forum that would meet periodically to review the progress of the working group and provide feedback.

### ***Concerns that issues exist that are not being made known publicly***

*(Source: Public Consultation Launch Summary)*

Some residents expressed concern that possible solutions were known by the OPA, but were being withheld from the public. A suggestion was made that a more effective process might involve the OPA bringing forward solutions, and the public either accepting or dismissing such solutions. Amir Shalaby indicated that the OPA was not aware of particular solutions at this time, and that the purpose of public consultation was to include the community in the development of solutions.

### ***Concern about location of meeting being held in southern York Region***

*(Source: Public Consultation Launch Summary, letter from Julie Munro, MPP)*

Concerns were expressed at the May 4th public meeting that the location of the meeting in southern York region excluded community members from northern York Region. A suggestion was made that an additional consultation launch meeting be held in the north. During the meeting, a show of hands indicated that approximately 15% of the meeting attendees were from the north. OPA agreed to have another meeting in the north. OPA continues to believe that conducting the public consultation in a single forum will facilitate mutual understanding of viewpoints, a key to eventually developing a high quality solution. To increase the awareness of issues in the north and engage the communities, the OPA conducted the duplicate consultation launch meeting at the Newmarket Community Center on May 26th. Meeting notification was made through newspaper ads placed in Newmarket and Aurora and through OPA’s email distribution list.

***Weight of OPA's recommendation to Ontario Energy Board***

*(Source: Public Consultation Launch Summary)*

Residents questioned how much weight the OPA would in fact have at the OEB. Amir Shalaby responded that the OEB process is like a court of law, each party will present evidence but judgment ultimately rests with the OEB. OPA's expertise, mandate and breadth would be taken into consideration in the OEB process.

***Issue escalation for complaints about OPA***

*(Source: Public Consultation Launch Summary)*

Residents asked who they could report to if they were unhappy with this process. Amir Shalaby stated that the OPA reports to the Ministry of Energy.

***OPA's association to Hydro One***

*(Source: Public Consultation Launch Summary)*

Residents stressed that OPA's independence from Hydro One was absolutely key. OPA stated that they do not have any association with Hydro One. The two organizations have separate board of directors.

***Role of independent consultants***

*(Source: Public Consultation Launch Summary)*

Attendees asked whether independent experts and consultants would be brought to the table, particularly relates to the interpretation of data. They mentioned at in the previous process, a "war of experts" ensued, where expert opinion on one side of debate would simply be counteracted by the opinion of two experts on the other side of debate. The credibility of data also was said to be suspect under the previous process, when Hydro One was asked for details of its cost determination methodology / inputs and residents were told that there was "no data available". The OPA assured residents that independent technical consultants would be included in the working group process and there would be full disclosure of data used in analysis.

***Concerns over repetition of process***

*(Source: Public Consultation Launch Summary)*

Residents wanted assurance that the OPA consultation process would not simply be a repeat of the former Hydro One process. Amir Shalaby gave his promise that he would seek a best and honest solution.

***Consultation timeline***

*(Source: Public Consultation Launch Summary)*

Strong objections were raised regarding the timeline of the consultations, in particular that the process was being held over the summer, when many residents would be unable to participate. Members of the community questioned where the urgency stemmed from, and indicated a perception that urgency was a result of population growth arising from suburban development. Some questioned why the analysis was being rushed when the Minister of Energy had stated that it would take 10 months to complete. Others from northern York Region were of the view that the process should be expedited to ensure that the need is addressed in the North to avoid service interruptions. OPA agreed that conducting a public consultation in the summer months is not ideal, but required because of the urgency of the situation. To accommodate the concerns of the

public, OPA would not schedule any consultation meetings in the month of August and would ensure that meetings that are scheduled in the summer months will not fall on a Monday or Friday, when possible, to accommodate those that would extend their weekends. OPA is in the process of developing 5 modules that will cover the scope of consultation. The required commitment of working group representatives is anticipated to be between 2 – 5 full day sessions.

***Slides available prior to meeting***

*(Source: Public Consultation Launch Summary)*

There was dissatisfaction that the OPA had not posted the meeting materials on its website prior to the meeting. OPA will do its best to post presentation materials prior to each public meeting. OPA also notes that written comments can always be sent on presentation material after a meeting. These comments will be given equal attention.

***Working Group representative deadline to submit names***

*(Source: Public Consultation Launch Summary)*

A request was made to extend the deadline for people to express interest in participating in the working group. OPA has decided to have another launch meeting in the Newmarket area and as a result has extended the deadline for people to submit their names for working group participation from May 13th to June 2nd.

***Public consultation on OPA recommendation to Ontario Energy Board***

*(Source: Public Consultation Launch Summary)*

Residents asked whether the public would be consulted on OPA recommendations to the Ontario Energy Board. Armen Kulidjian explained that the draft recommendation would be posted on the OPA website and stakeholders would be given time to comment on the draft. The OPA would review the comments, make any changes and finalize the recommendation that would go to the Ontario Energy Board.

***Medical and other experts on working group***

*(Source: Public Consultation Launch Summary)*

It was suggested that an independent medical expert be included on the working group. Amir Shalaby indicated that the OPA has no objections to this and that the inclusion of a medical expert would be considered. Others suggested that companies like Suncorp and perhaps European utilities should be included on the list of technical advisors. It was also suggested that a solicitor be there to answer any questions about the legal system in Ontario. OPA is in the process of structuring the agendas of working group sessions. As these agendas are structured and working sessions commence, we will obtain the advice of working group members as to what experts will be required at what session based on the scope covered.

***Hydro One's involvement on Working Group***

*(Source: Public Consultation Launch Summary)*

Indication was made that the key flaw in the previous process was that Hydro One had already made up its mind with respect to its preferred transmission solution. OPA was asked for its opinion on the Hydro One process. Amir Shalaby indicated that the difference between this and the former process is that the OPA has the mandate to consider a broader scope of options than

solely transmission. The community was very concerned that the OPA let the public know of any lobbying attempts made by Hydro One. Amir Shalaby explained that Hydro One would have a similar role to any of the technical advisors indicated in the presentation, and would not be granted special status.

OPA decided that Hydro One's involvement will only be as a technical advisor of the working group and not as a member of the working group. There will be instances where as the province's transmission company, they will be asked to comment on feasibility of solutions (even generation options that are discussed will need to include how transmission will be impacted).

### ***Concerns over community antagonism***

*(Source: Public Consultation Launch Summary)*

Residents indicated that it was unacceptable for communities to be pitted against one another. OPA indicated that the goal to have a single forum for discussions was to facilitate a mutual understanding of viewpoints among the different communities impacted.

### ***Ministry representatives on working group***

*(Source: Public Consultation Launch Summary)*

There was a general feeling that key provincial ministers, such as Ministers of Energy, Environment, Municipal Affairs and Transportation should have been at the meeting. There was a perception that by delegating the issue completely to OPA, ministers were indicating the degree of prioritization they placed on the issues facing York Region. There was a suggestion that the Ministry of Transportation should be on the working group, as transmission solutions going along highways should be considered. OPA has been keeping ministry staff updated on issues to date. The OPA will extend an invitation to ministries to be observers at working group sessions.

### ***Ordering of Approvals***

*(Source: Public Consultation Launch Summary)*

Questions were raised as to why health and environment impacts were not included at the beginning of the approval process, rather than at the end in the form of the Environmental Assessment process. Amir Shalaby indicated that the Environmental Assessment Act requires that need, urgency, all options, and reasons for recommendations all be presented under the EA process. In order to satisfy these requirements, a full analysis of all options must first be developed. Additionally, the OPA does not have control over the legislated institutional processes governing the relationships among the OPA, OEB and Environmental Assessment process.

***Distributor involvement in the OEB Process***

*(Source: Public Consultation Launch Summary)*

It was noted that PowerStream would not be the only distributor that would be a party to the OEB process as indicated in one of the presentation slides. Amir Shalaby agreed that all distributors in the region could be asked to participate. OPA has since changed the slide to reflect this and has posted it on the OPA website.

***Working Group should assume that the Aurora Hydro sale to PowerStream will go ahead***

*(Source: Working Group Session 5 Meeting Summary)*

The Aurora municipal representative made a comment that since Aurora was in the process of selling Aurora Hydro to PowerStream, the OPA or the working group should not have providing comments about the sale in its scope. The OEB letter states this as well. The working group agreed to this.



## ***Time Horizon for Analysis***

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Time Horizon for Analysis” section. This material was discussed primarily in Working Group Session 1 and the Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

What was taken into account in deciding on 10 year horizon?

***Load forecast uncertainty; nature of array of options available in contributing to solution; time horizon to implement certain solutions***

When a line goes down and the load is shifted to another line, is that dangerous?

***As long as the capacity of the line is not exceeded, there is no danger with shifting load.***

What is the source of growth forecasts in LDC load forecasts?

***LDCs use community forecasts and make projections. Hemson Consulting forecasts are used by some utilities. Acknowledgement by group that Hemson has adjusted load forecasts to take into account constraints in other services (water, sewer, gas) that may restrict forecasted growth in Official Plan. Actual growth may deviate from Official Plan forecasts in the near term (5 years) but will likely be accurate in the mid-term (10 years). As constraints in other services are removed,***

How are uncertainties in forecasts going further out reflected in the planning horizon?

***Uncertainties in forecasts are a risk in planning. This is why using up all short-term gaps because a bigger solution would take too long to build will leave with you with few short term options if forecasts are underestimated.***

Are short term solutions typically local options? Can long-term solutions potentially be local?

***Short-term solutions are typically local but not necessarily. Long-term solutions can be either local or integrated?***

How does the York Region process apply to the larger OPA mandate for an Integrated System Plan?

***There are no plans in the foreseeable future for a new transmission corridor through York Region; With the time required to complete provincial plan, wouldn't want to hold up what's needed now pending an overall provincial plan***

## **c) Issues Raised**

### ***Concerns about shortage of power in Northern York Region***

*(Source: Public Consultation Launch Summary)*

A number of residents and politicians expressed concerns about the risks of having power outages in the area. Issues with hospitals, senior citizens, traffic issues etc. were noted. There was concern about the timeframe of the analysis and approvals, before something is able to be constructed. Amir Shalaby explained that this was OPA's highest priority and work was being completed on it as quickly as possible.

### ***Time horizon for need assessment***

*(Source: Public Consultation Launch Summary)*

Concern was communicated that the assessment should not only address needs for a few years. Amir Shalaby agreed that the time horizon should be out 10-15 years but that the OPA was open to feedback on this in the working group process.

### ***Alignment with Provincial Plan***

*(Source: Working Group Session 1 Meeting Summary)*

Ensure that any plan will align with upcoming Provincial Plan. Dovetail short-term, medium term and long-term planning horizons into one recommendation. Given that York Region is running out of land, planning should be conducted beyond 10 yrs for siting purposes, identifying potential needs, land or sites needed to maintain options for the future. There may need to be actions taken today for longer term planning.

### ***Three -Tiered Planning***

*(Source: Working Group Session 1 Meeting Summary)*

Special attention must be placed on short-term needs and ensuring that needs are satisfied to alleviate bottlenecks before their forecasted occurrence. There need to be a 10 year horizon for planning for implementation and a 20 yrs horizon for planning for future options. This will allow for citing of longer term options and providing information to new residents of the use of potential corridors.

### ***Ensuring that the short-term need is not delayed by longer-term decisions***

*(Source: Working Group Session 1 Meeting Summary)*

Many in the group agreed that the need in Northern York Region was critical. They were concerned that the short-term fixes could be bogged down if coupled with the longer-term decisions. It was recommended that short term decisions be separated away from the longer term fix and addressed expeditiously to ensure that the affected area was not negatively impacted. Amir Shalaby agreed but also stated that it was important to ensure that any short-term solutions would work well with longer-term plans.

**d) Working Group Recommendations**

*(Source: Working Group Session 1 Meeting Summary)*

The working group agreed that planning should take into consideration short-term, mid-term and long-term considerations:

- Short-term (up to 2010): Special attention to ensure that solutions meet urgent needs by required timelines
- Mid-term (up to 2015): Develop solutions and plan for implementation
- Long-term (up to 2020+): Alignment with Provincial plan, attention to siting considerations for long-term plans

**e) Working Group Dissenting Opinions**

*(Source: Working Group Session 1 Meeting Summary)*

The Town of Markham representative expressed the opinion that this exercise should focus on immediate solutions to meet the near term needs of Northern York Region, in particular local distribution and local generation options, and that major overhead transmission options should only be considered as part of the larger scale Integrated System Plan to be undertaken by the OPA.

## ***Load Meeting Capability of Existing Infrastructure***

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Load Meeting Capability of Existing Infrastructure” section. This was discussed primarily in Working Group Session 1 and Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

1. Is the existing 115 kV line from Buttonville to Armitage in use?

***The northern section of the line moves power from Newmarket to Whitchurch-Stouffville.***

2. Who is responsible for the care and custody of Armitage TS?

***Hydro One.***

### **c) Issues Raised**

#### ***Benefits of Reinforcement outside of Currently Bottlenecked Area***

*(Source: Working Group Session 1 Meeting Summary)*

A strong reinforcement to the region of focus would provide added benefit to other areas such as Vaughan who could tap into B82V B83V.

### **d) Working Group Recommendations**

*Source: Working Group Session 1 Meeting Summary)*

The working group was comfortable with the content of this section and did not have any issues with how the existing load meeting capability was represented.

## ***Load Forecast Review***

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Load Forecast Review” section. This material was discussed primarily in Working Group Session 1 and the Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

*1. How was Oak Ridges Moraine issue addressed in the growth forecast?*

**The Oak Ridges Moraine would be reflected in the individual municipality’s official plan which the LDCs use as an input in their forecasts.**

*2. In the load consumption charts, a downturn is noted in 2002 / 2003. What was the cause of this downturn?*

**The dip was caused by a relatively cool summer.**

*3. Is material / design efficiency to reduce line losses evolved substantially to impact trending from historical load forecasts?*

**Likely no. Better transmission line conductor materials let you put more power through same size of line, but the real limitation is distance of transporting power. To reduce losses, power must be delivered at the highest voltage possible, closest to the load pockets.**

*4. Will the implementation of SMART meters allow for load shedding that could, in turn, reduce peak load forecast?*

**The impact of smart meters would be included in the Provincial target of 5% reduction in demand.**

*5. How is Aurora Hydro’s forecast calculated?*

**Several criteria used to determine load growth: population forecast based on Hemson report done for Aurora in May 2004; correlation of past peaks and population; historical trend, peaks and linear regression, takes into consideration peaks and valleys (weather normalization), adjusted for declines in peaks from blackout, cool summer; end-use forecast looking at Hemson report for new residential units, industry standard for consumption/house, DM, industrial/commercial, available acreage, correlated sq. ft. to total acreage and watts/sq. ft. factored in DM, natural intensification, summed for projection forecast.**

## **c) Issues Raised**

### ***Objections to pattern of suburban development***

*(Source: Public Consultation Launch Summary)*

Residents questioned how demand could be reduced if suburban development was to continue at historical levels. It was mentioned that the provincial “Places to Grow” did not address the issues facing York Region. A suggestion was made that the province levy development charges, a practice that had been in place in previous decades. Questions were raised as to why standards related to suburban growth were low, and why the OPA is not mandating that all new developments have solar panels or other conservation/distributed generation features.

### ***The Effect of Prices on Load Forecasts***

*(Source: Working Group Session 1 Meeting Summary)*

Changes in price or cost of electricity do not always result in a corresponding change in demand. Just because the price is raised or lowered 10% doesn’t necessarily mean demand will change 10%. There is a price effect. A 30% increase in price can drop demand by 10% (or slightly less), but it depends on the maturity of demand management programs etc.

### ***Employment Growth***

*(Source: Working Group Session 1 Meeting Summary)*

Employment growth in York Region is growing at a faster pace, on a percentage basis, compared to residential growth. Assuming business and residents contribute 50/50 to load, growth in employment plays a more pivotal role in electricity demand.

### ***Reliable Supply to Industrial Customers***

*(Source: Working Group Session 1 Meeting Summary)*

There appears to be a growing demand for electricity in York Region by businesses that use heavy equipment. A constant reliable supply is critical to these businesses.

### ***Constraints on Growth from other Services***

*(Source: Working Group Session 1 Meeting Summary)*

Growth forecasts should take into other services (water, sewer, gas) giving consideration as to whether or not these services would restrict / delay growth.

### ***Hydro One Forecast***

*(Source: Working Group Session 1 Meeting Summary)*

If Hydro One’s forecasts are based on past growth, they may be underestimating the growth. Many rural areas are on the cusp of major development. For example, East and West Gwillimbury anticipate a surge in growth in 2007.

***Impact of York Durham Sewer System (YDSS) imposed Population Caps***

*(Source: Working Group Session 1 Meeting Summary)*

The region has released population caps by municipality due to YDSS and Hemson forecasts were completed prior to caps being imposed. Forecasts should reflect these caps. The Aurora and Newmarket projections are below the cap therefore not being impacted. When YDSS problem is resolved, growth will surge.

***Forecasts impacted by co-generation initiatives***

*(Source: Working Group Session 1 Meeting Summary)*

There are a number of co-generation initiatives along with distributed generation and the load forecasts should take into account localized distributed generation (this is a negative load contribution), possibly funded by OPA outside the York Region program. Other thought that these projects would tend to find their way into the options rather than the forecast; the effects of distributed generation would be very specific feeder by feeder, so better considered as options since each provides a unique advantage.

***Forecast Adjustment for Extreme Weather (comment by observer)***

*(Source: Working Group Session 1 Meeting Summary)*

Slide 40 of the presentation states that forecasts could fluctuate up to 12% from the “average” forecast due to extreme weather. The observer stated that weather variation is based on a variation from a weather normalized base and that the peak loads at Armitage TS shown in Slide 39 of the presentation line is not weather normalized so this would be possibly double counting the weather effect.

**d) Working Group Recommendations**

*(Source: Working Group Session 1 Meeting Summary)*

In general, the group felt that the load forecasts were adequate for this planning exercise because identified bottlenecks were only a few years away (forecast error in the next 5 years would likely be small). There were some comments that these forecasts would need to be revisited if long-term planning were to be done with them. With respect to adjusting the load forecasts for extreme weather, the group agreed with the above issue raised in Issue #8.

## ***Conservation & Demand Management Review of Existing Programs***

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Conservation and Demand Management Review of Existing Programs” section. This material was discussed primarily in Working Group Session 1 and the Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

*Can demand be reduced through controlling customer usage by shedding loads?*

**Yes. This is one of the options that are being proposed in the Demand Response RFI.**

*What is the return on investment of conservation / demand management versus capital investment in transmission / distribution infrastructure?*

**Each conservation / demand management proposal has different costs, different benefits and a different payback. There is a very wide range among projects. This can’t be answered accurately without looking at specific proposals.**

### **c) Issues Raised**

#### ***Conservation initiatives by OPA***

*(Source: Public Consultation Launch Summary)*

OPA was asked what conservation initiatives that they had initiated since their inception. Amir Shalaby explained that the OPA had recently appointed their Chief Conservation Officer and had already released an RFI for conservation initiatives.

#### ***Experience in Other Jurisdictions***

*(Source: Working Group Session 1 Meeting Summary)*

Conservation policies and practices in other jurisdictions should be evaluated and possibly applied to York Region, depending on how successful they were in the other jurisdictions. To gauge the success of conservation measures there is a need for monitoring and testing.

#### ***Provincial 5% Target for Reduction in Demand***

*(Source: Working Group Session 1 Meeting Summary)*

A 5% reduction in demand by conservation is not significant. Targets should be higher to have a more substantial impact. 5% conservation simply provides a short-term cushion but doesn’t provide an on-going solution.



***CDM initiatives adjusting LDC forecasts***

*(Source: Working Group Session 1 Meeting Summary)*

CDM slows down the rate of growth, but doesn't fully solve the problem. OPA consultants mentioned that CDM was not properly reflected in forecasts and therefore adjusted Armitage forecast to reflect Provincial target of 5% by 2007.

***On-Site Generation***

*(Source: Working Group Session 1 Meeting Summary)*

Is "behind the meter" generation been considered in the suite of load deferral options? The Demand Response RFI includes this type of project.

***Reduction in per capita land use***

*(Source: Working Group Session 1 Meeting Summary)*

If area use per capita comes down, demand goes down accordingly. Because the living space per individual goes down and accordingly costs such as air conditioning go down. Others in the group had a differing view that building smaller houses did not necessarily mean that on average the same number of people were living in them. If smaller houses typically had fewer occupants, therefore you would need more houses which could mean no reduction in electricity usage.

Therefore, population was a better driver of consumption than per capita because there may be more dwelling units per area, but few persons per unit.

***Greater Emphasis on CDM***

*(Source: Working Group Session 1 Meeting Summary)*

Must have a very strong mandate in the CDM area as it impacts everything else (forecast, needs). There is more that can be done than what the utilities are doing. Need to raise the consciousness level of CDM and put more energy into it. If capacity is always expanded, human nature is to use it, so need to focus more on CDM than expansion. Continue to provide, annually, a portion of the local distribution companies' budget to energy management initiatives and customer education in reducing / scheduling energy usage.

**d) Working Group Recommendations**

In general there was consensus that a greater emphasis on CDM was necessary. Relying on the provincial 5% target was not sufficient for York Region and supplemental programs would have to happen to have greater reductions particularly in the affected area.

## **York Region Need**

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “York Region Need” section. This material was discussed primarily in Working Group Session 1 and the Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

When a line goes down and the load is shifted to another line, is that dangerous?

*As long as the capacity of the line is not exceeded, there is no danger with shifting load.*

How frequently do contingencies occur?

*Not very frequently. But it is prudent to have back-up plans (redundancy). It is the standard used in the province.*

If a line goes down and there is insufficient capacity on the backup line, what area will be taken out of service to ensure that the backup line is not overloaded? Will one area be affected more than another?

*This depends on what line goes down. If the line is designed to reduce load automatically, an area will be pre-defined. When a contingency happens and that pre-determined area is affected, typically the operator will start rotating the area affected to reduce the impact on any one area.*

What are the problems with bottleneck 1 based on?

*The bottleneck is forecasted to occur on the years specified based on the load forecasts.*

Are all the required new feeders local utility feeders?

*Yes.*

If we need four feeders now but they are not there what is happening now?

*As more load is place on existing feeders, the risk increases and the amount of losses also increases.*

If we need four feeders now but they are not there what is happening now?

*As more load is place on existing feeders, the risk increases and the amount of losses also increases.*

Will CDM within Markham and Vaughan do anything to relieve the affected area?

*No. Only areas within the affected area can help relieve the issue.*

## **Overview of RFI Process and Received Responses for Generation and Demand Response**

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Overview of RFI Process and Received Responses for Generation and Demand Response” section. This material was discussed primarily in Working Group Session 2 and the Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

Do RFI responses include diesel fuel generators?

***Diesel was included.***

Did the RFI have a preference for cleaner fuels such as gas?

***No. Only coal was excluded***

Does the OPA have the option to pick something other than the lowest cost option?

***The OPA is not bound to choosing the lowest cost option.***

Does a generator approval need to go through the OEB?

***The OEB would issue generator licenses and would also approve OPA’s contracting with the generator. Other approvals such as municipal approvals may exist.***

Would some projects need to go through an Individual EA vs. Class EA?

***There are different requirements based on fuel type, size and nature of project.***

Is there a possibility that another public process have the potential to undermine this OPA process?

***OPA’s upfront planning is only part of the approval process. Then the proponent would have to comply with other required approvals.***

Should the OPA’s recommendation not have some assurance that all other approvals will be received?

***There is no guarantee of this happening. Given the urgency of the need, the uncertainty of future approvals should be taken into consideration in the evaluation factors.***

Aren’t LDC options the easiest and quickest, followed by local generation and with bigger hurdles with major transmission corridors?

***This is a fair generalization, but there are exceptions to this. The more sizable the solution, the greater the likelihood that it will have more approvals, but sometimes small solutions can take as long in the approvals process as larger ones.***

The RFI has been completed. What are the next steps? RFP?

***No decision has been made about next steps. OPA has the right to all options at this point. The RFI does not restrict it. OPA will not go to an RFP which will be expensive for proponents before knowing exactly what we want.***

The RFI for Demand Response refers to on-site generation from clean fuels. Is “clean fuels” defined?

***No. Only coal is precluded.***

Is there a possibility that another public process have the potential to undermine this OPA process?

***OPA’s upfront planning is only part of the approval process. Then the proponent would have to comply with other required approvals. A diesel option could be considered if there was an indication that it will be acceptable to the Ministry of Environment.***

Is there a requirement that Demand Response technology be proven?

***We’re open to new technologies but where there are competing bids this will become a factor.***

Is there a possibility that another public process have the potential to undermine this OPA process?

***OPA’s upfront planning is only part of the approval process. Then the proponent would have to comply with other required approvals.***

Would a “one stop shop” for an alternative be given preference?

***Some pieces of an alternative (such as transmission and distribution equipment) are owned by monopoly service providers (such as Hydro One or Local Distribution Companies) which would not be able to be provided by others.***

Why were 60 MW (generator connected to 44kV) and 140 MW (generator connected to 230 kV) determined to be the minimum for the RFI?

***These values were determined to be the minimum to meet the midterm forecast.***

Did the OPA look at responses that were lower than 60 MW and 140 MW?

***Yes.***

I suspect that very few proponents could meet the Dec 1, 2006 deadline. If that deadline was not stipulated, would other proponents have responded? Were any RFI responses discarded because they couldn’t meet the deadline?

***Many of the respondents stated that they would be able to meet the 2006 deadline. No responses were discarded.***

Is there anything that restricts proponents from starting the EA process independently?

***No. They can start it at any time.***

## **c) Issues Raised**

### ***OPA, Local Distribution Utilities and Municipalities should work together to deliver on CDM targets.***

*(Source: Elected Officials' Forum 1 Summary)*

Many of the participants felt that municipalities had a lot to contribute to the CDM programs. As a strong influencer in the community they would be key to ensuring that the 5% provincial demand reduction target as well as supplemental targets be met. This can be done by either providing funding to municipalities or working with them.

### ***What amount of the need can be met by CDM?***

*(Source: Working Group Session 2 Meeting Summary)*

There was active discussion about how much of the need could be met by CDM. Some stated that all of the need for a new transmission line and more transformation could be met by aggressive CDM programs. The need for new feeders out of Armitage would not be able to be met because of new load pockets in the region that would require separate feeders running to those areas. Discussion about traditional supply not being the least cost option. It was recommended that the OPA analyze the costs and benefits of a CDM strategy to completely eliminate the need for a new transmission line and to partly eliminate the need for new transformer capacity. Others identified challenges that are discussed in issues below.

### ***Performance Based Standards for Use of Fuels***

*(Source: Working Group Session 2 Meeting Summary)*

A working group representative stated that fuel used by itself is insufficient as a screening method. There are fuels that can be burned dirty. The screening method should be a maximum level of emissions.

### ***Greater Push for Attracting Participants into IESO's Transitional Demand Response Program***

*(Source: Working Group Session 2 Meeting Summary)*

IESO stated that they have been actively promoting this program – visiting with wholesale customers, etc. One aggregator is in the program (Milton Hydro). Some felt that they should go the next step and promote the program to municipalities and school boards as aggregators. School board is the largest aggregated non-residential consumer in York Region. IESO should consider reopening the program to new participants. IESO is presently looking at this—program is a good step towards Demand Management, but the program is voluntary (no guarantees that load will reduce when needed).

### ***Demand Response Should be Aggressively Pursued – with Financial Incentives***

*(Source: Working Group Session 2 Meeting Summary)*

People should be told that the OPA will pay people to reduce load on peak days the same price as supplying power. Some stated that this would be the cheapest way to solve the problem and lower the price of electricity for all in Ontario.

***Must choose options that have a high certainty of acceptability***

*(Source: Working Group Session 2 Meeting Summary)*

An example of a generator that has local level support was cited as an example of the type of certainty of acceptability. It was stated that acceptability should be a filter not a criterion.

***Should OPA take a direct role in CDM as opposed to contracting with proponents?***

*(Source: Working Group Session 2 Meeting Summary)*

A strong position was stated by public interest representative that OPA has the mandate to do this and should provide leadership to the province. Conservation industry is in its infancy and will only get started if OPA takes leadership role.

***Challenges of CDM implementation***

*(Source: Working Group Session 2 Meeting Summary)*

A number of challenges were identified during the discussion. Immediate replacement of older appliances is more expensive than replacing them on at the end of their useful life. Companies have capital constraints on energy conservation projects because they compete with other capital projects for funding. This results in payback for conservation projects to be just as short as other capital projects. Heat and power technology is suitable in some applications but not all. Co-generation projects require a heat load of 7.4 for the whole year. In most cases electricity use is year-round but space heating is only during the winter. Others disagreed with the challenges stated.

**d) Working Group Recommendations**

*Source: Working Group Session 2 Meeting Summary)*

There was a strong tendency towards a greater emphasis on CDM programs to meet some of the need. The group was not satisfied to see CDM lumped together as one category and wanted the OPA to be more specific about the initiatives they would be leading in York Region.

## **Evaluation Factors**

### **a) Discussed Materials**

The material discussed has been included in Appendix A-3 under the “Evaluation Factors” section. This material was discussed and developed primarily in Working Group Session 2 and Elected Officials’ Forum 1.

### **b) Clarifying Questions and Discussion**

How will the issue of EMF standards be looked at considering that long-term decisions would be made and EMF standards are currently being revisited in other jurisdictions?

***Appropriate EMF standards should be looked at in another forum. This is outside of OPA’s mandate. It is in the scope of the Environmental Assessment process.***

Are there options that will have fewer requirements for approvals than others?

***Yes. The level of approvals has been captured in the Certainty category of the evaluation factors.***

### **c) Issues Raised**

***Economic threat of not having power is too great***

*(Source: Working Group Session 2 Meeting Summary)*

Need to ensure all solutions meet timelines. Companies and residents are always making decisions on whether to locate in York Region or not. The region can’t allow them to have the sense that York Region does not have reliable power. It would put the region at a disadvantage.

***Social, Economical and Environmental Factors should be analyzed by a consultant specializing in this field.***

*(Source: Elected Officials’ Forum 1 Summary)*

It was stated that Acres should not be the one looking at Socio-economic and environmental factors. Another consultant should be brought in with this specific skill set. The OPA mentioned that the terms of reference stated that detailed socio-economic and environmental factors would not be conducted. Nonetheless OPA would consider contracting with a consultant specializing in this field, time permitting.

***Changes to Evaluation Factors***

*(Source: Working Group Session 2 Meeting Summary, Elected Officials’ Forum 1 Summary)*

A number of changes were proposed to the wording of the evaluation factors. The OPA agreed with these changes and has incorporated them into the latest version of the evaluation factors.

***Weighting of Evaluation Factors***

*(Source: Working Group Session 2 Meeting Summary)*

A discussion about weighting resulted in a realization that some factors were quantifiable and others (some being more important) were not able to be quantified. Therefore the evaluation would be a blend of art and science, balancing the difference of results of options.

***It is prudent to ensure that the options decided on are safe***

*(Source: Elected Officials' Forum 1 Summary)*

It was stated that the government has the responsibility to ensure that infrastructure implemented is safe for the public. Amir Shalaby agreed that the public should not be responsible to ensure that options are safe.

***Evaluation Factors should be considered in looking at even short-term solutions***

*(Source: Elected Officials' Forum 1 Summary)*

Even though the group felt that decision to meet the short term need should not be allowed to be delayed in any way, it was stated that even for the short-term, evaluation factors should be considered.

**d) Working Group Recommendations**

*(Source: Working Group Session 2 Meeting Summary)*

The working group felt that the revised evaluation factors captured all of the important factors that need to be considered when evaluating the different options while staying within the scope of the terms of reference.



## ***Environmental Assessment Requirements for Electricity Projects***

### **a) Discussed Materials**

Excerpts of the “Guide to Environmental Assessment Requirements for Electricity Projects” published by the Ministry of Environment were used for discussion. This material was discussed in Working Group Session 3 and 4.

### **b) Clarifying Questions and Discussion**

Responses to questions were provided by the Ministry of Environment advisor on the working group.

How does the Oak Ridges Moraine / Green Belt legislation relate to the MOE requirements for EA for Electricity Projects? If proposals fall within the Moraine, does this trigger an individual EA automatically?

***The Oak Ridges Moraine Conservation Act (ORMCA) and the Green Belt Act (GBA) need to be taken into consideration by a proponent when planning a project. Consultation with regional and local planning authorities can assist a proponent in identifying requirements under the ORMCA and/or the GBA and how these relate to the specific project proposed. Section 41 of the Oak Ridges Moraine Conservation Plan indicates that utilities, such as power transmission lines and transformer stations can be considered in any area of the Oak Ridges Moraine if "the need for the project has been demonstrated and there is no reasonable alternative," and the proposal design will minimize any adverse effects on the ecological integrity of the Plan area.***

***The Environmental Screening Process for Electricity Projects requires a proponent to gather information on the local environment (natural and socio-economic) and complete a screening checklist to identify potential environmental effects of the project. The screening checklist, included on page 69 of the Guide, asks questions such as “Will the project:***

***Be inconsistent with the Provincial Policy Statement, provincial land use or resource management plans?***

***Be inconsistent with municipal land use policies, plans and zoning by-laws?***

***Cause negative effects on protected natural areas such as Areas of Natural and Scientific Interest (ANSIs), Environmentally Sensitive Areas (ESAs) or other significant natural areas?***

***Have negative effects on locally important or valued ecosystems or vegetation?***

***Where there is a potential for negative environmental effects, this does not automatically trigger an Individual EA. The proponent must provide additional information and analysis in the Screening/Review Report to describe those effects, identify mitigation or impact management measures to prevent or reduce the effects, and assess the significance of any remaining net effects.***

***Mandatory public and agency review of the Screening/Review Report is an opportunity for stakeholders to ensure the proponent has adequately addressed any issues or concerns. If there are outstanding issues or concerns during the public review period, the public or agencies can request that the project be elevated to a more rigorous level of review up to and including an Individual EA.***

The chart for transmission suggests that if any alternatives are over 50km, this would trigger individual EA instead of a class EA. If one option is greater than 50 km, would that trigger an individual EA or could the proponent argue that because the preferred alternative is less than 50 km it can be classed?

***Ontario Regulation 116/01, the Electricity Projects Regulation, should be relied on to determine EA requirements for a specific electricity generation and/or transmission project. Under the Environmental Assessment Act (EAA) proponents are not permitted to proceed with an undertaking that is subject to the Act unless they have either the approval of the Minister, or are proceeding with the undertaking in accordance with the Class EA where the Class EA applies to that undertaking. It is the undertaking that will be proceeding which will need to have followed the appropriate process for that undertaking.***

***In the present case alternatives could be considered which would not fit within the undertakings that are subject to the Class EA, however the undertaking which will ultimately be proceeding will need to have followed the correct process (be that Class EA or individual EA as the case may be).***

For an existing transmission line, what type of modifications would trigger an Individual EA? ***Generally speaking, an individual EA would be required for a modification to an existing transmission line if it is a significant modification as defined in O. Reg. 116/01 and not otherwise covered by the Class EA for Minor Transmission Facilities.***

***O. Reg. 116/01 defines a significant modification with respect to a transmission line that is designed to operate at a nominal voltage of 115 kV or more as:***

***Any expansion of or change in a line that would include,***

- ***The replacement of a pole or tower, or***
- ***A change in a right-of-way for the line,***

***if, after the expansion of or change in the line, it would still be designed to operate at a nominal voltage of 115 kV or more.***

It appears as though the class EA was revised every few years until 1992. Shouldn't this be reviewed every 5 yrs? E.g. it states typical tower and ROW for 230 kV circuits, but it doesn't go into actual sizes. It also states maximum electric field strength, but refers to a usual magnetic field.

***The Hydro One Class EA for Minor Transmission Facilities is currently being updated. When O. Reg. 116/01 was made, the Ministry of the Environment requested that Hydro One revise the Class EA to reflect the roles and responsibilities of participants in the restructured electricity market. Hydro One has prepared a Terms of Reference for a new parent Class EA document. The Terms of Reference was approved by the Minister in February 2004. Hydro One is currently preparing a draft Class EA document. This new parent Class EA document will include requirements for monitoring and reporting and a process for making amendments to the Class EA document.***

***The purpose of the Class EA document is to outline a planning process that must be followed for the class of projects defined. Specific technical information is included in the existing Hydro One Class EA for information purposes only. Any additional technical information required by stakeholders could be requested from the proponent of a transmission project as part of the Class EA process.***

How does the parent Class EA document get reviewed and approved?

***The parent Class EA document would go through a government review process and must be approved by the Minister and Cabinet.***

What determines the category of EA? Is it the set of alternatives or the chosen alternative?

***The final undertaking is what must be approved through the appropriate process. Can consider a range of alternative, but when comes to proceeding to them, must consider the definition for what is being built.***

### **c) Issues Raised**

*Standards should be established for minimum ROW widths*

*(Source: Working Group Session 4 Meeting Summary)*

It was stated that ROW width standards should be set for a given type of transmission line. This standard should have fixed values. Some stated that this should be placed in the Class EA document for Minor Transmission. The Ministry of Environment advisor stated that the Class EA document is to establish the planning process and technical information is in addition to the planning process but is not the main purpose.

## ***Alternatives to Meet Need***

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Alternatives to Meet Need” section and in Appendix A-3 in the “Alternatives Identified” section. This material was discussed primarily in Working Group Session 3 and 4 and the Elected Officials’ Forum 2.

### **b) Clarifying Questions and Discussion**

Do options alleviate bottlenecks?

***Options will be bundled together to make alternatives. Alternatives will need to meet the need for at least 10 years while being able to alleviate all short-term bottlenecks in time.***

Can overhead and underground transmission be treated as separate options?

***Yes, the options will be separated into 3 (all overhead, all underground and partial underground).***

If Ontario still needs more power, why not put a generator locally in York Region to save the losses?

***That depends on what generation proposals are received and how they compare with the preferred transmission option.***

### **c) Issues Raised**

#### ***Rewording of Alternative 1***

*(Source: Working Group Session 5 Meeting Summary)*

Suggestion to reword Alternative 1 to “Initiate aggressive CDM programs targeting to eliminate the need for a new transmission line and to partially reduce the need for new transformer capacity.” The alternative specifically did not eliminate the need for Holland Junction because CDM plans would not provide immediate results and Holland Junction with capacitors at Armitage would give enough time for CDM to indefinitely eliminate the need for a transmission line. Generation was specifically excluded from the wording because heat and power projects could play a part in this alternative. It was also stated that all supply side options pollute more than CDM options.

#### ***Longevity of Holland Junction and Capacitors***

*(Source: Working Group Session 5 Meeting Summary)*

A representative questioned that putting in Holland Junction TS and capacitors would meet the need in Northern York Region only until 2011. It was discussed that it may meet the need for a longer period of time.

***Paradigm Shift to Undergrounding Transmission Lines***

*(Source: Working Group Session 5 Meeting Summary)*

Discussion around the OPA doing an independent study of undergrounding costs to verify how much more expensive it is. If there was a way to make undergrounding more affordable, there should be a new standard. This policy would ensure that communities were being built where people would like to live.

***CDM Funding and Scope***

*(Source: Working Group Session 5 Meeting Summary)*

CDM funding requires incorporation into the provincial budget if aggressive CDM is to be pursued. If the provincial government and opposition are unwilling to fund or only to modestly fund, this will have an impact on the magnitude of CDM projects in the region. It is distressing that more is not being done to mandate improved energy efficiency in building codes. This is a significant opportunity lost. In addition, the province should mandate improved energy efficiency standards for new major appliances – most importantly, new A/C units, pool pumps and all commercial equipment.

**d) Working Group Recommendations*****Structuring Alternatives***

*(Source: Working Group Session 3 Meeting Summary)*

The working group structured 3 Alternatives to be considered for the solution to meet the need of the 10 year time horizon:

1. CDM, Transformer Station (for immediate transformation capacity shortfall relief and feeder positions)
2. CDM, Transformer Station, Local Generation
3. CDM, Transformer Station, Transmission Line

***Convergence of all alternatives***

*(Source: Working Group Session 5 Meeting Summary)*

The working group came to a consensus that the alternatives converge as one alternative with decision points. The group agreed that a new transformer and capacitors and the development of aggressive CDM programs would be the initial step. The OPA/IESO should continuously monitor demand in York Region and extrapolate demand to determine when a decision point has been reached to trigger a major development project. This would be a motivator for the region to reduce demand through CDM to either defer or avoid the need for a transmission line. With respect to trigger points, these trigger points would have to take into consideration the lead times of different development projects.

## **Conservation Demand Management in York Region**

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Conservation Demand Management in York Region” section. This material was discussed in all Working Group sessions and Elected Officials’ forums.

### **b) Clarifying Questions and Discussion**

Is province prepared to provide incentives to builders to make these upgrades so builders don’t have to spend billions on this?

***They must work together to get best value, but can’t shift burden to one area.***

What about free water-conserving showerheads and light bulbs?

**Some utilities are already doing this.**

The Ontario RFP was for 2500 MW of large-scale generation. Will the government do an RFP strictly for conservation?

***There is a procurement process specifically for CDM specifically in York Region.***

What is the timing for Smart Meters?

***The OEB is still working with to develop implementation plan, possibly this fall; a few utilities have pilots.***

Is there any incentive for LDCs to push CDM?

***For all the LDCs, their profits are linked to how successful their conservation programs are in reducing their customer’s bills (they get 5% back which goes to owners, usually municipalities)***

Given the Enbridge incentives, why are they funneled through Enbridge? Isn’t this a conflict?

***There has been a development of these DSM programs, and programs are working well and a model for electricity utilities. Enbridge is essentially an LDC; they used to be in the business of selling as much gas as possible, but now are concerned with efficient use of gas. The utility is no longer just a monthly biller; it has become a service-oriented organization making gas use cost effective. As a result, Enbridge is moving out of the appliance selling business.***

Municipalities and the Province working together is great but isn’t the key for the Province to change the building code?

***Municipalities could provide permit fast-tracking for projects that have a higher standard of CDM.***

## **c) Issues Raised**

### ***Impact of Smart Meters***

*(Source: Working Group Session 4 Meeting Summary)*

A comment was made that as soon as the LDC gets Smart Meters out there, people will use less electricity.

### ***Presentation in Elected Officials' Forum states that LDCs have "reasonable comprehensive plans"***

*(Source: Working Group Session 3 Meeting Summary)*

This was a reflection of Acres' review presented in session 1—based on OEB funding to LDCs, they had structured programs with different CDM initiatives within those programs. LDCs have comprehensive plans that reflect the intent of the OEB. The OPA will reword the slide to indicate that this is based upon OEB funding. At least one working group member did not agree that the LDCs have comprehensive CDM plans.

### ***Add New CDM Option***

*(Source: Working Group Session 3 Meeting Summary)*

The OPA will add an option identified by the working group showing that the need for a new transmission line and some transformer capacity can be avoided by CDM.

### ***Enbridge as Model for CDM Implementation***

*(Source: Working Group Session 4 Meeting Summary)*

Comment that Enbridge is a forerunner of energy conservation programs, and under old rules profits were linked to gas sales, but a few years ago OEB linked profits to bill-reductions for customers so it made customers more energy efficient and is now promoting conservation, and as the most profitable action for Enbridge they do so aggressively.

### ***CDM Implemented yourself vs. an Energy Management Firm***

*(Source: Working Group Session 4 Meeting Summary)*

A comment was made that if can borrow the money and implement savings yourself, you should do so yourself instead of energy management firms.

### ***Working with the Building Industry***

*(Source: Working Group Session 4 Meeting Summary)*

It was stated that just as the province has done well with action with certain appliances, it needs to move into building industry and pass costs to homeowner who can benefit in the longer term.

## ***Distribution Options***

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Distribution Options” section. This material was discussed primarily in Working Group Session 3 and 4 and the Elected Officials’ Forum 2.

### **b) Clarifying Questions and Discussion**

Why is there a difference between the load serving capability of the Buttonville station vs. the Holland Junction station?

***A station at Buttonville is at a strong 230 kV source, as opposed to Holland Junction which is on the existing Claireville line.***

If Buttonville TS is chosen, would the 115kV line currently acting as a distribution feeder still be necessary?

***Yes. It would likely still be used for distribution in that area.***

Question: In the earlier process, was a site ever identified on the existing ROW for a new transformer station?

***Hydro One Response: A number of potential sites were identified but nothing was selection. No option was taken out on the land.***

What is the cost of a new transmission station?

***It is in the order of \$20M/station. A smaller station with a lesser capacity could be installed, and might be a little cheaper.***

In discussion of the distribution options, (e.g. capacitors at Armitage and Holland Junction TS with feeder relocation), if this is entirely within Hydro One jurisdiction and things that they could have proceeded with for immediate problem over last few years—why didn’t they identify this possible solution

***Hydro One’s Response: One of the reasons is that the joint study with utilities identified a preferred station that was not Holland Junction, but rather south of Armitage along the corridor, so the decision was to go with a line first because you couldn’t load up a new station to any degree without more supply. As well, at the time of the study capacitors weren’t part of an immediate problem, but if EA had been finished would have happened.***

Is there a price differential between Buttonville as compared to the existing Armitage TS?

***Yes, there would be some difference in terms of price.***

Can the added capacity at Buttonville be used with a feeder line to remove load from Armitage?

***Yes, this is the objective of the Buttonville station.***



Given that the spare capacity at Buttonville is 28 kV, and the service in the area is 44 kV, could Whitchurch-Stouffville be converted?

***Yes, but this would be a major undertaking.***

What are the critical steps and risks in the timeline for building a transformer station?

***The critical items are the station construction, the long distribution feeder lines, and the municipal approvals.***

Is there a risk of public opposition to the Buttonville plan?

***There is likely no EA requirement to expand Buttonville. Holland Junction may require a class EA and is situated on the Greenbelt. However, it could be built mostly on the existing ROW and would therefore likely draw less opposition.***

Why is the undergrounding cost for distribution so much lower than for transmission lines?

***Transmission lines are at a higher voltage and are therefore more expensive to underground.***

Who pays for the different options? All of Ontario or are certain local areas paying certain costs?

***There will be an explanation of how costs are allocated and an opportunity to document some of the concerns about this topic when we reach that part of the discussion.***

Was there a clear consensus by the LDCs that the Holland Junction option is preferable to the Buttonville Option?

***Yes.***

How many years of supply would the Holland Junction option provide?

***It would supply until 2014 or 2011 depending on whether the Keele Valley Generator is providing supply during peak hours. The bottleneck will then be the Claireville line.***

Does reconductoring the tap line from Holland Junction to Armitage TS alleviate bottleneck #1?

***Reconductoring only assists with more load at the end of the tap, (bottleneck 1b—overheating), but does not assist with voltage collapse (bottleneck 1a).***

Is there anything that can be done at Armitage TS with capacitors to solve the immediate need?

***Yes. This is common to all alternatives. There is no debate about the need to do something with the existing line right now, including adding capacitors.***

Can Buttonville be tapped for Whitchurch-Stouffville?

***Buttonville is already nearing capacity at peak, and considering Armitage is already short 3 feeders, plus technical issues involving longer feeders, as well as added reliability risk, this is a sub-optimal solution.***

Can a new line from Durham be tapped?

***This is unknown at this time. This would buy time to better plan what happens in Northern York Region—but generally speaking, at this stage we're so far behind the curve that LDCs have been exploiting lots of short term options, and probably all already tapped out, in any case, not available on a meaningful scale. It is noteworthy that some demand (approx 25 MW) can be tapped elsewhere to buy a little more time.***

Is it fair to say this holds a lot of promise?

***Yes, this is something the OPA is looking at, but it is also collecting data on what else is out there and doing its own assessment.***

How much are capacitor banks?

***Approximately M\$1.5-2 for both transformer stations. This is the cost of upgrading them to a higher value.***

Does a new transformer station require a new transmission line?

***Not necessarily; it depends where the TS goes.***

Does Gormley offer more flexibility because it's a new site and not limited in development space?

***Yes. Its other advantages include an additional supply for PowerStream south if there is continued growth in that area.***

Are there any non-socialized costs here?

***We should work through to the best solution and then decide who pays. If we constrain solutions based on ratepayer, then we are taking positions defeating the optimum solution. A distinction exists between network investments, and connection investments that are paid for by the customer benefited.***

Would Gormley offer a longer term solution because other sites are limited by development issues?

***There is an added benefit to Gormley of increased flexibility because it is a new site.***

Under Social/Environmental, why is Holland Junction labeled as "high"?

***Because the location is in an existing right of way on land that is not agricultural.***

Would the Holland Junction station be self-contained? What are the repercussions of building this station?

***None. This would not encourage new transmission lines—it would only be taking power from existing lines.***

## **c) Issues Raised**

### ***Transformer efficiency can not be improved***

*(Source: Working Group Session 2 Meeting Summary)*

In response to a working group representative's proposal of power factor correction, an OPA consultant stated that all distribution options that OPA developed already assumed installation of additional 44 kV capacitors to enhance voltage control (Bottleneck #1) and to optimize utilization of the 230/44 kV transformers (Bottleneck #2) resulting in power factor higher than 90%. He also indicated that there is ceiling to this power factor correction measure, which is commonly used by power utility industry throughout the world, due to technical considerations (e.g. magnitude of voltage changes and switching transients) and site restriction at the existing Armitage TS. The new distribution options (e.g. Holland Junction TS, Newmarket TS or Aurora TS) will have more 44 kV capacitors than the existing and new capacitors at Armitage TS.

### ***Making Phase 1 Decisions without Knowing Phase 2***

*(Source: Working Group Session 4 Meeting Summary)*

Concern was voiced as to whether it was prudent to move forward on the phase I solution without knowing the phase II solution. OPA consultants stated that Holland Junction is good idea for LDCs because it's robust in that it fits with both transmission and generation options, and is neutral to CDM, so that makes it a preferred 1<sup>st</sup> step according to LDCs. It also has the advantage of avoiding the tap line upgrade.

### ***Will a Transformer Station at Holland Junction Attract Generation Projects to the Same Area?***

*(Source: Working Group Session 4 Meeting Summary)*

Concern was expressed that the socioeconomic and environmental acceptability should be medium in Holland Junction because of unknown long term effects of having a transformer station in King Township. A comment was then made that Newmarket already has a TS.

### ***Aesthetics vs. Concerns with EMF***

*(Source: Working Group Session 4 Meeting Summary)*

A comment was made that aesthetics should be lower on priorities as compared to environmental effects and technical feasibility.

### ***Gormley Option***

*(Source: Working Group Session 3 Meeting Summary)*

Gormley needs new transmission and provides a diverse alternative. It would be able to serve lots of load pockets. It can be eliminated as the short term solution, but not in the long term; possibly a stage 2 solution. This would take longer to build.

### ***Generation near Transformer Station***

*(Source: Working Group Session 3 Meeting Summary)*

If you build a generator near the transformer station, you can minimize the amount of required transmission.

## **Transmission Options**

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Transmission Options” section. This material was discussed primarily in Working Group Session 4 & 5 and the Elected Officials’ Forum 2.

### **b) Clarifying Questions and Discussion**

Why was the Woodbine Corridor ROW not considered?

*There is no corridor there and there is a higher density residential area with heritage issues with Victoria Square.*

How mature is the technology proposed by 3M?

*Field trials have been conducted from 2001 to present. The longest line has been up for 4-5 years, for 12-15 years cumulatively. The research has been going on for decades.*

Can the 3M technology be used underground? How does it operating in winter conditions?

*Yes, but is not at the right price point to use as underground. It works and has been tested in Fargo, North Dakota in -40 degree temperature and in Arizona heat.*

What highways are under the jurisdiction of the Ministry of Transportation?

*Anything within 400 m of a 400-series highway requires a permit from the Ministry of Transportation. This does not apply to non-400 routes such as Hwy 9, which is a regional road.*

Is ROW #6 under the jurisdiction of the Ministry of Transportation?

*As for proposal for ROW #6, although there is no Bradford bypass extension yet, MTO is protecting the corridor as it is designated for future use.*

Can lines be buried along highway corridors?

*Yes, but they would have to meet the Ministry’s setback requirements, and the highway cannot be shut down to maintain the equipment.*

What about cost?

*For utilities to parallel a 400-series highway, they would need to work out a cost-sharing agreement with the MTO so the Ministry is not bearing the cost.*

If the Ministry of Transportation does not allow paralleling on a 400 series highway, how come Hwy 407 has infrastructure parallel to it? What about in Southwestern Ontario?

***The lands there were acquired specifically for the two corridors. Land outside other 400-series highways is generally owned by others and would need to be expropriated. There must be 29m between the highway and towers that is sterilized for the entire corridor. In Southwestern Ontario, it is a different region with different policies. Down near the QEW where hydro corridors run parallel that would have been pre-planned.***

What are the setback requirements for highways?

***There must be a 29m setback from the ultimate property line. All buildings must be a minimum of 14m back from the corridor boundary. If there are widening plans, then the widening width plus 14m. Any space for hydro towers would be in addition to this.***

Are there any new north-south highways now in the planning stage?

***Yes, the Bradford bypass, 404 and 427 extensions. They are at the EA stage.***

What about running the towers at the edge of the ROW instead of centered?

***You can't have high masts at the edges of the highways because these would interfere in interchanges. To run the towers along the edge, they must comply with Ministry setbacks.***

What does the Provincial Policy statement have to say about the use of existing Right of Way vs. new Right of Ways?

***All applications "shall be consistent with PPS", starting from March 1, 2005—authority comes from Ontario Planning Act. Section 1.6.6 covers Transportation and Infrastructure Corridors. The documents allows for corridor use for infrastructure. Along Green Belt and Oak Ridges Moraine—provincial plans must be looked at together but clear in Green Belt language that the PPS takes precedence in infrastructure development. The plan does allow to create corridors where needed***

Do Oak Ridges Moraine and Greenbelt Acts preclude having corridors through them? ***No, not necessarily. It is permitted through protected countryside, subject to other factors, e.g. water, environmental. The PPS does not disallow it.***

The previous process stated a provincial policy to use existing hydro corridors. Is this in the PPS?

***The PPS does not preclude new or existing corridors, subject to other considerations.***

Is it possible to put trees along the ROW to distract visually from the towers? This has been done in Mississauga where a ROW is landscaped with low brush.

***This is not typically done for transmission lines, but coniferous trees are sometimes used to hide transformer stations.***

Is the 5-10 x price for undergrounding based on transmission or distribution?

***Transmission.***

What are the maintenance costs and timelines of overhead and underground lines?

***Many overhead lines live 40-60 yrs with little or no maintenance, at which time they are refurbished. A bigger consideration is vegetation management. Underground cables are very reliable—the maintenance cost of underground is possibly less, but in terms of reliability, overhead is slightly less reliable than cables, but can be fixed in an afternoon, whereas underground lines can take months to fix.***

In the Quebec ice storm, did all the towers come down the way they were supposed to?

***Can't speak with authority on this because didn't see them all. In Eastern Ontario, towers tended to corkscrew. Another factor to consider is that those towers were an older design.***

What is the failure modes for steel poles – do they also have a weak point half-way?

***Not sure about steel.***

Does the decision on Holland Junction impact the decision on Gormley vs. running up to Armitage?

***No, not particularly. North Aurora is probably closer to load growth, but Gormley is pretty close.***

What is FACTS? Does this use existing towers?

***This helps with bottleneck 1a, but requires building a FACTS infrastructure. This is unrelated to the towers, but reconductoring may impact the tower.***

With multiple circuit cancellation, is there a configuration where they augment one another instead of canceling with one another?

***Not generally, theoretically there could be but this would be an extremely bizarre setup. Ordinary construction is always designed for optimal cancellation.***

Up until now we have been discussing magnetic fields--what about the electric field?

***Generally transmission lines have low electric fields because of the distance between the line and the ground, and the electric field is much more easily mitigated than the magnetic one.***

Has anyone considered making a single large tunnel for all the utilities? If all those services are going from same point to same point, would be sensible, but beyond the capability of this particular exercise.

***This is something to be looked at.***

Does the Ontario Power Authority have access to long term highway plans?

***All MTO information is published and put out for review.***

How far ahead are proposed plans for new corridors?

***About 20-50 yrs.***

## **c) Issues Raised**

### ***Cost of Undergrounding should be Validated***

*(Source: Working Group Session 5 Meeting Summary)*

Several people in the working group and observers questioned the 5 to 1 cost increase between overhead transmission lines and undergrounding. Several comments were made about the cost of boring and citing examples in other industries. An observer mentioned that 1" boring for water pipes cost < \$45 / m.

Another reference was the proposal for HVDC light by ABB, which found that it was cost comparative for underground cabling through boring. It was recommended that OPA should undertake a study to reduce the cost of undergrounding by identifying the major cost components to determine methods to reduce costs.

### ***EMF levels to be reduced over the next 10 years on existing ROW***

*(Source: Working Group Session 5 Meeting Summary)*

OPA in the evaluation matrix had stated that EMF levels on the Buttonville to Armitage ROW would be reduced for at least the next 10 years if the existing towers were replaced with 230kV lines assuming only one TS was attached to the new line section. There was considerable discussion about this statement with some working group representatives and observers disagreeing with the statement. A study completed by David Richmond was cited as possible contracting evidence. OPA consultants explained that the two EMF studies would likely have comparable measures for EMF but likely had different assumptions on load on the line and modeling of the existing and future lines.

### ***Incremental Distribution Cost Savings***

*(Source: Working Group Session 5 Meeting Summary)*

The advisor from PowerStream stated that except for Option 9 and 12 (Parkway to Armitage options), all other transmission options would result in incremental distribution costs ranging from \$10 million to \$20 million. PowerStream subsequently clarified to OPA that the stated incremental costs should be treated as possible indirect incremental costs to PowerStream.

### ***Underground instead of Building a Bypass***

*(Source: Working Group Session 5 Meeting Summary)*

It was suggested that it may be more cost effective to underground lines instead of building a bypass for lines to build an upgraded line in the same ROW. OPA consultants stated that creating a bypass for a line will roughly increase the cost by 2 times and undergrounding increases the cost by 5 times. Therefore it is still more cost effective to build a bypass.

### ***Routing of Line from 404 corridor to Armitage***

There are challenges traveling east-west at both the top and bottom ends of the 404 corridor if the ROW was able to be used.

***Highway Corridors may not be available***

*(Source: Working Group Session 2 Meeting Summary)*

It was indicated by an advisor that the Ministry of Transportation had indicated that ROWs on highway corridors would not be available for electricity infrastructure. Follow-up required with the Ministry of Transportation.

***Underground through all or Urban areas only***

*(Source: Working Group Session 3 Meeting Summary)*

*Some felt that given the cost tradeoffs, it could not be justified to go underground through rural areas. Others commented that rural areas suffer as much as urban areas.*

***OPA should look longer term to identify new corridors that may be proposed in the future***

There are other electricity options recently identified by the Ministry of Energy such as the Ontario / Manitoba interconnection, Ontario/Quebec interconnection; Ontario/Quebec new Churchill Falls development etc. that may require additional reinforcements in the region.

***Should the Overhead Standard Continue to be the Standard?***

*(Source: Working Group Session 4 Meeting Summary)*

Comment that simply because overhead is the standard doesn't mean it has to continue to be the standard. The OPA should think outside of the box. Others commented that reliability is higher for undergrounding vs. overhead. For example, a line can sag and hit a tree, but this is not an issue for underground cables. It was also stated that when 3-phase power is perfectly balanced in the ideal situation there is no EMF. In practice overhead conductors must be spaced and EMFs are generated by this spacing. With undergrounding the cables are insulated so they can be closer together and the fields can be decreased. OPA consultants discussed the barriers to having all lines in the province undergrounded, because wires act like capacitors and power system can only tolerate a finite amount of capacitance.

***Cost of Undergrounding is Insignificant if Spread Across Province***

*(Source: Working Group Session 4 Meeting Summary)*

Comment that BDR report prepared for the Town of Markham showed incremental cost of undergrounding 12km along Buttonville corridor is very insignificant if spread across the entire province—\$8.9M or 0.7% over the base-case for Hydro One revenue requirement.

7.6cents/month/household. Rossi looked at other projects likely to be undertaken up to 2014, and calculated another 80 km where there would be demand in urban areas for undergrounding, impacting the base-case 2% for upgrades or new lines through urban areas.

***Designing Communities that People Want to Live In***

*(Source: Working Group Session 4 Meeting Summary)*

A comment was made that long term planning must incorporate that people want communities that are desirable to live in. This is not about specifics of EMF, esthetics, but about making livable healthy communities with more mitigation.



***Undergrounding Has Benefits that People May be Willing to Pay For***

*(Source: Working Group Session 4 Meeting Summary)*

Some stated that as a York Region group, we must ask why are we not looking at the benefits to York Region—King Township residents may be willing to pay extra money to underground in Markham provided that other municipalities are willing to ensure Claireville line is not irresponsibly expanded. York Region has a responsibility to make this paradigm shift so that no new intrusive lines or stations are built. Comment that this view does not necessarily represent all ratepayers in that township.

***Not In My Backyard***

*(Source: Working Group Session 4 Meeting Summary)*

Comment was made that undergrounding in Markham is very site specific. There are lots of circular arguments about NIMBY. It must be discussed how to collectively ensure nobody has this in their backyard.

***Who is Benefiting?***

*(Source: Working Group Session 4 Meeting Summary)*

Questions about what the definition of benefiting party is? Comment that benefit goes to Northern York Region, which gets the power from the line. We cannot say that because the line goes through a certain area those living adjacent to the ROW are the ones benefiting—we must look at where the need is. Another commented that a process must be established that fairly and equitably deals with the balance of what a community wants and what a community is willing to pay for. Newmarket stated that they have trouble promoting undergrounding of a line and still leaving a significant number of their residents with towers in their backyards faced with the same concerns e.g. EMF, visuals, property values—for the various options—who benefits, who pays, should be defined.

***Some Examples Where Undergrounding has Occurred and Spread Across Province***

*(Source: Working Group Session 4 Meeting Summary)*

A comment is made that elsewhere in the province where undergrounding has occurred, it has never been localized costs—always part of provincial cost. Others stated that a provincial policy is needed so residents are treated equitably. There must be a vision laid out for it, especially considering *Places to Grow Act*.

***Protecting ROWs***

*(Source: Working Group Session 4 Meeting Summary)*

A comment was made that investments near a ROW should be considered in light of the proximity to the ROW, which should be defended and protected against encroachment. Others stated that the Ontario Realty Corp is consulting with municipalities and doing a land use study to see what land uses are acceptable near or on rights-of-way.

***Discussion of Evaluation Table***

*(Source: Working Group Session 5 Meeting Summary)*

A significant amount of time was spent discussing options in 3 categories (all overhead, partial underground, fully underground). In each category options were discussed and relative scores were placed on options with respect to evaluation factors. The feedback and changes made to the evaluation table have been reflected in an updated version of the table.

***Defending Existing ROWs and Identifying Mitigation Measures***

*(Source: Working Group Session 5 Meeting Summary)*

More needs to be done with respect to existing ROWs to defend them for the future but also to identify mitigation measures – tree management on the sides, tower appearance, line arrangement to minimize EMF, etc. Existing ROWs which are devoid of anything except towers and lines do negatively impact the goal of having planning and building healthy and desirable communities that people want to live in.

## ***Environmental and Health Considerations***

### **a) Discussed Materials**

The following issues were raised during general discussion as well as during the presentation of the EMF Study prepared by Acres International. A summary of the content of the study has been included in Appendix 5 under the “EMF Study Results” section.

### **b) Clarifying Questions and Discussion**

What is the conversion for mG (milliGauss) and  $\mu$ T (microTesla)?

***10 mG = 1  $\mu$ T***

In Graph 2 of the report, are all 4 circuits of the 44kV feeder carrying the same load (i.e. is this the assumption used for determining the amount of field cancellation)?

***Yes. If they had different loads, you would have less balance and less cancellation; however, in the area they tends to have roughly balanced loads.***

If the consensus of the group is a transmission option with undergrounding, could the OPA advance the recommendation to the OEB?

***Yes, the OPA could but other factors play in as well. The notion of who pays for what must be submitted as a companion to the choice of overhead vs. underground.***

With regard to slides on ROW widths what is the source?

***Class EA for Minor Transmission Facilities.***

What normally happens where width is less than 120 ft?

***The structures would be designed to the limitations of the ROW—structure and transmission line would be designed in accordance with the actual ROW.***

How does a pole-type alternative change the necessary ROW width?

***Design is based on available width. Here we're looking at options, not specific tower designs.***

If the ROW were narrow enough, could the appropriate design be underground?

***Yes, the document specifies the width for undergrounding. A comment was made that worst case is 15m.***

If currents running in the opposite direction cancel out, in the case of the Hydro One proposal, is all the current going in the same direction?

***The answer is more complicated than initially explained. In 3-phase power there are three wires, and if sending power and providing a return path as required by the laws of physics, AC waves are displaced in time in such a way that is equivalent to two wires running in opposite directions.***

Does the EMF stay high when going long-distances through a low populated area such as King?  
***No. EMF is dependent on the amount of current passing through the line. In a low populated area, the EMF on the line would be low because there would be little load on the line.***

Why was 150MW chosen as the load on the 230kV line?

***This is the load that a fully loaded TS can handle. Assuming a transmission line going from Buttonville to Gormley with a transformer station at Gormley, the load on the transmission line would be max. 150 MW. If a second TS was put on the same line, the EMFs would be double.***

Do the EMF calculations in the study take into account line sag?

***Yes, they do.***

What assumptions were used for the different modeled lines?

***For wood poles, conventional design in Ontario is used. For 230 kV double circuit, steel pole construction is assumed with conductors 10 ft from the pole. The old 115 line is based on physical measurements of those towers which have 15 ft between conductors. The key assumption is how much current is running through the line which is stated on each graph.***

### **c) Issues Raised**

***EMFs for underground lines is significantly less within the ROW***

*(Source: Working Group Session 5 Meeting Summary)*

It was stated that underground lines assuming 600Amps per phase, a burial depth of 2 meters, 14 m from centerline has EMF values that are below 1mG.

***EMF on Feeder lines vs. Transmission Lines***

*(Source: Working Group Session 5 Meeting Summary)*

It was noted that when comparing options that involve feeder lines vs. transmission lines, it should be recognized that the transmission lines are generally in the centre of a corridor (usually a corridor of a minimum of 100 ft width) whereas on a roadway the hydro lines are located within the boulevard which for Regional roads could be as close as 3 meters from the edge of the right-of-way. It was also noted that graph 7 and 8 are somewhat misleading as all of the options have been shown as starting 50 feet from the centre line. To accurately compare the distribution options making use of road allowances, the graph should start at 10 ft as that would typically represent the distance to the edge of the ROW for feeders. This would compare directly to corridors for transmission starting at 50 feet from the edge of a ROW. This would provide a more accurate comparison if one were looking to determine the approximate EMF levels at the edge of a residential property or at the residential unit.

***Impacts of EMF***

*(Source: Public Consultation Launch Summary)*

Residents indicated that thousands of articles have argued that the health impacts of EMF are minimal. Other residents countered that just as many articles argue that the health impacts are significant.

***Undergrounding of transmission lines***

*(Source: Public Consultation Launch Summary)*

A resident stated that undergrounding should be considered because it is technically feasible and it is only a matter of cost. Amir Shalaby agreed that the option was feasible but disagreed over the trivialization of cost.

***Distinction between “acceptable to the community” and “complying with the Environmental Assessment Act”***

*(Source: Public Consultation Launch Summary)*

A resident requested acknowledgement that “acceptable to the community” and “complying with the Environmental Assessment Act”, two phrases with which Amir repeatedly said any solution would comply, were distinct. The EA Act requires public consultation, but not that public be satisfied with the results of that consultation. Amir conceded that he in fact means that any solution will comply with the Environmental Assessment Act.

***Environmental screening prior to economic screening***

*(Source: Public Consultation Launch Summary)*

Residents stated that the EA process was at the root of public’s concerns. That options should be screened based on EA first and then choose an economically viable option from within that set of options. Amir Shalaby explained that OPA’s assessment of identifying need, defining options and evaluating options were the first few steps that would need to take place in the EA process as well as the economic process.

***Regulatory and tax treatment of environmentally sensitive solutions***

*(Source: Public Consultation Launch Summary)*

A resident suggested that OPA work with government to change the regulatory and tax environment so that the best environmental-health alternative is the most economically viable. Amir Shalaby explained that various agencies would have to work together on this type of an issue. The OPA would come forth with these types of suggestions to improve the system but currently is too young of an organization to make such a suggestion.

***Where does the onus lie on proving safety of a solution?***

*(Source: Public Consultation Launch Summary)*

Residents asked where the onus lies on proving the safety of a solution. Amir Shalaby explained that the onus lies on the proponent / developer of a project. The proponent must prove compliance with EA Act.

## **Generation Options**

### **a) Submitted Materials**

The material discussed has been included in Appendix A-6 under the “Generation Options” section. A presentation by Jake Brooks from Association of Power Producers of Ontario was also discussed. The presentation can be found in the OPA website. This material was discussed primarily in Working Group Session 4 & 5 and the Elected Officials’ Forum 2.

### **b) Clarifying Questions and Discussion**

How many generation projects are underway within York Region or the GTA?

*Advanced projects of reasonably large size are listed on IESO website because of applications for connection assessments—but there is no authoritative public domain source for that information.*

Is there a natural gas line in the vicinity of where local generation is proposed?

*Proponents would choose a location that had what was required.*

Why isn’t there a lot interest in building new generation in Ontario?

*There are financial and regulatory barriers to getting new generators built. It is hard to raise capital for new generation projects because you must convince institutional investors. The wholesale market prices have been too low to entice generators into the market so long term contracts are necessary to entice generators and project financing. OPA has a mandate to address issues to encourage generation in the province. There are lots of generators that are willing to supply if they have a long-term contract.*

Where are there existing gas generators in/near York Region? What impact do they have?

*Markham District Energy is not a large scale generator (5 MW), but is highly efficient, modern, heating & power plant in downtown Markham. It serves 1 million sq. ft. of office space. It is an IBM and Motorola joint development. The idea is that all new development in the new downtown will be served by this facility.*

Is the 45% figure quoted the optimal unit efficiency? What is a representative average for typical plant?

*Yes, this is best case. This depends on design—but most generators would usually run up to their efficient points, run, and then run down. The 45% figure is what that generator is capable of running at peak efficiency, i.e. 45% of the gas can be turned into electricity. Many other factors need to be considered in order to convert this to an annualized value.*

What’s the maximum efficiency of a combined heat and power unit?

*Around 70-80%, but this requires another user of heat such as a steam or hot water load, or it can make use of industrial waste heat.*

What is the approximate cost per kWh for simple cycle and combined cycle?

***The generator must make its living in the Ontario electricity market, not York Region, and this is dependant on the technology of the individual project.***

Is there a hybrid between simple cycle and combined cycle?

***Yes, combined cycle can be started up as a simple cycle without the steam unit, but most units prefer not to run that way since the steam generator is a large capital investment. This arrangement could be used as a backup in an emergency.***

Are NO<sub>x</sub> emissions in the form of NO or NO<sub>2</sub>?

***Was not known whether emissions were NO or NO<sub>2</sub> form as emitted, only that NO will convert to NO<sub>2</sub> in the atmosphere.***

Given a simple cycle generator with 6 units—if must be running ahead of its need—can one unit be on ahead of the need and subsequent ones fired as the need arises?

***Yes, it can start individual generators as needed. In any case, it must run economically. It can also synchronously condense to provide voltage support.***

Assuming a combined cycle at 50% of output, how quickly could it ramp up to 100%?

***It would depend on the specific of the machine. Generally the gas portion starts quickly.***

When capital is being raised for new generation, what kind of interest rates are paid?

***Naturally want to reduce the interest rate through long-term debt; generally debt is comparable to the going rates for a mortgage. A minimum amount of equity is also required. Typically construction debt is about 4%. Then it gets rolled into long term debt financed over 20 yrs at around 7-7.5%.***

Is natural gas a good choice for base load generation?

***Gas fired generation is excellent for peaking purposes, but as far as baseload natural gas is concerned, there should be other fuel sources as well because total reliance on natural gas will drive up the price of gas over the long term. This summer for example has been hot and has put pressure on natural gas prices which will impact other uses of gas.***

## **c) Issues Raised**

### ***Local cogeneration projects***

*(Source: Written comments from working group representative)*

The Newmarket resident representative is stating that local cogeneration programs should be pursued where they make sense. The high efficiencies of cogeneration support its implementation. Localized emissions dispersion still needs to be considered but due to the size of these types of projects, the risk is very small.

***Provincial look to see if generation or transmission makes sense in York Region***

*(Source: Written comments from working group representative)*

New power generation and transmission projects must be considered with respect to the entire provincial plan and if any of the proposals for York Region are advantageous with respect to the larger provincial plan then these power generation or transmission options should be considered.

***Air Quality Issues***

*(Source: Written comments from working group representative)*

It is important that new power generation facilities are sited with considerable care as the dynamics of smog formation (formation of NO<sub>2</sub>) are complex on a local basis and not well understood. Air quality is a known major impact on human health and premature mortality. Give the recent passed US EPA Clean Air Interstate Rule, there is not much chance of a significant reduction in US coal fueled power plant emissions in PA, OH, MI, IN, etc. until 2015. By 2015, the EPA rule requires significant reductions of 60-80% in Sox and NO<sub>x</sub>. This is likely to result in reduced emissions transport to Ontario.

***Risk of Simple Cycle Running Too Often Because of Provincial Generation Shortages***

*(Source: Working Group Session 4 Meeting Summary)*

If there is a proposal for a 300 MW backup generator in Newmarket, there is a risk that a simple cycle would come online early and produce power due to provincial demand. The 500-1000 hr a year run estimate would be exceeded (running at lower efficiency). While a combined cycle plant would need to run for 3000 hrs a yr (but at better efficiency).

***Distributed generation and net metering***

*(Source: Public Consultation Launch Summary)*

A resident asked whether the OPA was supportive of business owners that create their own electricity if they create surplus and sell it back to the province. Amir Shalaby explained that the province and OPA in general are supportive of this. OPA would work with others in the industry to facilitate distributed generation and net metering.

***Flexibility of Simple Cycle Generation***

*(Source: Working Group Session 4 Meeting Summary)*

Simple cycle generation is comprised of multiple units so you can control the number of units brought up to match the demand. As well, a simple cycle plant can run in synchronous condensing more ready to provide VAR support without dispatch and have 10 minute support.

***Micro-generation considered***

*(Source: Public Consultation Launch Summary)*

A resident questioned whether small-scale distributed generation options (for instance, residential solar panels) were being considered in the planning process, and whether any thought was being given to the implementation of Advanced Renewable Tariffs. Concern was expressed that connecting small-scale generation to the grid was difficult. Amir Shalaby indicated that to the extent that residential power generation is a conservation/demand reduction measure, it will be considered. He also indicated that progress has been made on reducing barriers to implementing distributed generation projects (for instance, through the work of the OEB's



Distributed Generation Task Force). Pricing options such as Advanced Renewable Tariffs fall outside the mandate and authority of the OPA.

***Alternative energy***

*(Source: Public Consultation Launch Summary)*

A representative of the Global Clean Air Concern expressed an interest in alternative energy and felt that the flat roofs of big box stores should be harvested for solar power. Amir Shalaby requested that developers bring this type of proposal forward in responding to the RFI that is posted on the OPA's website.

***CNR diesel engines to produce power***

*(Source: Public Consultation Launch Summary)*

One resident suggested the use of CNR diesel engines to provide grid-tied generation in Newmarket.

***Distributed generation and net metering***

*(Source: Public Consultation Launch Summary)*

A resident asked whether the OPA was supportive of business owners that create their own electricity if they create surplus and sell it back to the province. Amir Shalaby explained that the province and OPA in general are supportive of this. OPA would work with others in the industry to facilitate distributed generation and net metering.

***Disagreement that Combined Cycle Generation meets the need as well as Simple Cycle***

*(Source: Working Group Session 3 Meeting Summary)*

There was disagreement that combined cycle meets the needs as well as simple cycle. It was stated that having worked with Newmarket Hydro, it appears the need is post-contingency voltage support, where speed is essential. OPA disagreed stating that voltage collapse is an instantaneous problem so the requirement is that the generator is running pre-contingency, during the peak period that the single line cannot carry the entire load, and can only be shut down after that period. There is no requirement to start the generator after a contingency.

***Look at Generation from a Provincial Perspective***

The process must take the broader perspective of the electrical system, including base, intermediate, and peaking capability. Local generation provides insurance if a contingency occurs.

***Differences between Simple Cycle and Combined Cycle Generation***

*(Source: Working Group Session 3 Meeting Summary)*

The features of a simple cycle generator include:

- Quick Start—full speed in 10 minutes
- Must be able to provide support with largest unit out of service
- More units provide more reliability when solving a transmission issue
- With cogeneration or combined cycle, take out the turbine, and lose capacity

Generation provides not just local, but also provincial benefits. A combined cycle unit earns its money on energy whereas a peaking plant earns money through operational reserve.

Gas is relatively clean, but cogeneration provides the most energy out for energy supplied, then combined cycle, finally simple cycle. A baseload cogeneration plant requires 8700 hours to be economic, a combined cycle 3400, and a peaker 500-1000. Therefore a cogeneration plant pollutes more than a combined cycle, which pollutes more than a peaker in absolute terms. Permitting requires that the generator cannot increase the noise level in the community.

## **Methodology to Compare Transmission to Generation**

### **a) Discussed Materials**

A presentation by Paula Zarnett (Barker, Dunn and Rossi) called “Approach to Analysis of Alternatives in York Region” can be found in the OPA website. This material was discussed primarily in Working Group Session 5 and the Elected Officials’ Forum 2.

### **b) Clarifying Questions and Discussion**

Does the evaluation model consider coal shutdown?

*The model as is uses two years of historic market prices, but may adjust model to account for certain generation facilities being out of service and gas being on the margin more often which would change the market price, and re-determine the number of hours that gas generators would operate. The tool is there to do this.*

What progress has been made on the analysis?

*The exercise is underway. We must look at scenarios and ensure they make sense and then run scenarios.*

At what price point will a single cycle generator run vs. a combined cycle? New facilities might run more often in a market with limited capacity, so what is the cost differential / kWh for a single cycle to be profitable vs. a combined cycle generator?

*We will not answer this so as to not prejudice a project that’s going to bid. It depends on how often a plant wants to run.*

Are there any cost estimates available related to generation?

*There are results from government RFP in cents per kWh.*

What is the price of imports? Is importing more expensive than domestic power?

*The price of imports is on the IESO website. Generally the price is higher. On peak imports are expensive, but power is also imported off peak when prices are lower across the border. The cost of imports gets reflected into one of the wholesale bill items. The OPA will provide information on the cost of imports to the working group.*

How is the wholesale price (HOEP) set?

*The highest bidder who gets dispatched sets the market price and all dispatched generators are paid that price.*

What assumptions will be made as to whether a generator is running pre/post contingency?

What assumptions will be made as to whether the generator is being used for peak shaving or as base load to replace coal generation that will be shut down? (observer)

*Generators will be assumed to be running pre-contingency. Whereas combined cycle generators must be operating for some time prior to their need, the simple cycle generator has a quick start and if necessary could have one unit running just prior to the need. The OPA*

***consultants will provide those parameters and have sample cost profiles on both types of generators to be inputted into the models. We will compare both and with advice will decide which fits better with the needs of the total system and York Region.***

You only have HOEP prices reflected in the presentation to be considered for generator revenues. How will your evaluation model consider operating reserve revenue streams? (observer)

***This is within the model's capability, but we would need to ensure assumptions underlying this are fair. Peaker generators that derive operating reserve revenues would have that included in their revenues.***

Is the value of transmission deferral to be factored into the comparison? (observer)

***All costs will be factored into the comparison. In any year customers will be paying for generation and may or may not be paying for transmission depending on what is built.***

Do you factor in reduced line losses for local generation over generation elsewhere? (observer)

***This has not been built into the model.***

Will all transmission costs be captured including indirect costs? (observer)

***Overhead and salaries will be considered. We will use total cost that anticipate that H1 will include in their ratebase (includes indirect). There are some indirect costs that would not be captured. For example, H1 will have a board of directors whether a line is built or not.***

How is implementation cost risk factored into the evaluation comparing generation and transmission?

***Risk is not in the financial analysis but we can put parameters around costs. This should take risk balance into consideration.***

Are environmental/social costs included in the analysis?

***No, because if some possibilities are far more expensive than others, don't have to further question them. Must do further analysis on those which appear to be economic.***

## **c) Issues Raised**

### ***Defining diversity of supply***

*(Source: Working Group Session 5 Meeting Summary)*

Transmission options that connect from the south have been identified as having diversity of supply. Observer questioned whether this provided diversity of supply since having half the area served by one side and half served by another does not improve reliability with the exception of having a network connection from Buttonville to Armitage. The observer contrasted this with generation which brings a new source of supply into the area.

OPA Response: OPA consultants disagreed stating that there was some degree of diversity associated with having half the supply on one line and half on another because it reduces the amount of load connected to a given source.

### ***Costing of a transmission solution should include generation elsewhere in the province***

*(Source: Working Group Session 5 Meeting Summary)*

When interpreting impacts on costs, must acknowledge that transmission solutions incorporate generation elsewhere in the province—e.g. air pollution impact of siting generation locally is the delta from siting locally vs. elsewhere

### ***Losses on generation should be considered***

*(Source: Working Group Session 5 Meeting Summary)*

The difference in losses should be considered when comparing bringing power into York Region vs. generating within York Region. These losses should be on-peak losses considering generation would be used to supply during on-peak hours.

### ***Why are other fuels other than gas not being considered in the analysis?***

*(Source: Working Group Session 5 Meeting Summary)*

Some questioned why diesel that was part of some proposals was not included in the generation analysis. OPA responded by saying that diesel generators were included in the CDM proposals. Other asked why renewable sourced generation was not being proposed. An observer answered that this was because York Region needed to ensure that supply was available during peak hours. This would mean that dispatchable generators would be required. Renewable sourced generation such as wind can not be relied on to be available during times of need. It was noted that gas is probably the most environmentally conscious generation that you can be sure to be there when needed.

### ***Consider Distributed Generation in other parts of York Region prior to choosing the Transmission Line upgrade***

Representatives from Markham felt that distributed generation should be considered in communities other than Newmarket (including Markham) prior to deciding to upgrade the line from Parkway TS to Armitage TS. OPA consultant stated that the generation would need to be connected within a specified area to be able to alleviate need in the north.

***How will the public be able to independently validate the choice between transmission and generation if bids are not public?***

*(Source: Working Group Session 5 Meeting Summary)*

There was discussion about what would be able to be made public for the public to understand the choice between generation and transmission. It was repeated that all generation proponent bid information would not be made public because of its commercially sensitive nature. The OEB will review any contracts that OPA goes into and will consider the contracts and how the costs manifest themselves either through rate recovery for transmission or for contracted amounts for demand management or generation. There was concern that the public would not be able to verify that the less expensive option was being chosen. It was stated that this could be done by looking at typical costs. The estimates being used in the analysis would become public evidence with the Ontario Energy Board.

## **Rate Impacts – Who Pays?**

### **a) Discussed Materials**

The material discussed has been included in Appendix A-6 under the “Rate Impacts – Who Pays?” section. This material was discussed in Working Group Session 5 and the Elected Officials’ Forum 2.

### **b) Clarifying Questions and Discussion**

If the Ontario Energy Board or Environmental Assessment Board requires undergrounding, then who pays?

*Assuming that a connection asset is being built, the LDC(s) receiving the power must pay for the whole cost of the line including the undergrounding. This cost will get passed onto the LDCs customers. If it is a network asset, then the cost is spread across all provincial rate payers.*

From a distributor perspective, would they rather that a 3<sup>rd</sup> party request undergrounding?

*Yes. If a 3<sup>rd</sup> party requests undergrounding, then that party would pay for the incremental cost.*

If the OEB / EA orders undergrounding of feeders, who pays?

*If feeders are underground by OEB/EA order, then those receiving the power share in the cost.*

If the “loop is closed” (i.e. Buttonville to Armitage line connected to existing Armitage TS) and it becomes a provincial cost, what would the impact of undergrounding be for this?

*In general, if the OEB/EA ordered undergrounding, then it would be paid by all provincial rate payers. If a 3<sup>rd</sup> party requested it, then it would be paid for by the requester. For more specific cases, the OEB would have the final decision on who pays.*

If LDCs request undergrounding, could they then pass that on to their ratepayer?

*Yes. As long as the cost is ‘fair and reasonable’ they can pass the cost on to their customers.*

## **c) Issues Raised**

### ***Who pays for a solution?***

*(Source: Public Consultation Launch Summary)*

A resident expressed that since Newmarket had grown without proper planning that the town should pay for a solution that was acceptable to other communities.

### ***Generation Advantageous from Rates Perspective***

*(Source: Working Group Session 5 Meeting Summary)*

It was noted that generation was more advantageous vs. transmission from a rates perspective because generation would be paid for by the province and transmission would be paid by the LDC in the region if the line was a connection. OEB would not accept making a network asset simply to allocate the cost provincially. There would have to be a proven need. Another comment was made that we need to buy time with other options and defer transmission because you can not predict what the OEB will say with respect to undergrounding and how the cost gets divided.

### ***Rate Impact should be calculated***

*(Source: Working Group Session 5 Meeting Summary)*

The OPA should do calculations on cost increase of the chosen option since if significant, it will have an impact on companies that will either leave or avoid building in York Region.

### ***Issues with Closing the Loop (Connecting Buttonville to Armitage)***

*(Source: Working Group Session 5 Meeting Summary)*

There was some discussion about making a network connection (Buttonville to Armitage) in order to offset costs of requesting partial undergrounding. It was noted that the Ontario Energy Board will likely not approve a plan if it is only being done to make sure that the cost is allocated to the province. The IESO commented that there may be technical issues with closing the loop that may not make it feasible. There may be an impact on Claireville TS.



## ***Parking Lot Items***

### **a) Issues Raised**

#### ***Energy Efficiency and the Ontario Building Code***

*(Source: Working Group Session 1 Meeting Summary)*

Building codes should increase the minimum requirements for energy efficiency. It was suggested to increase to R2000 standard.

#### ***Alignment of Municipal Planning and Electricity Planning***

*(Source: Working Group Session 1 Meeting Summary)*

There should be a stronger link between municipal development and electricity system planning so that when subdivisions are made there is available supply. Except for large industry, development has not been turned down due to insufficient power.

#### ***Lack of response from other government agencies and ministries***

*(Source: Public Consultation Launch Summary)*

There was frustration from the lack of specific guidelines with respect to acceptable EMF levels, ROW widths, growth without securing electricity, socio-economic criteria incorporated within planning standards and in general the lack of responsiveness of the provincial government, Health Canada and ministries with respect to meeting requests and inquiries. OPA decided to document through the working group process, issues that have been encountered during the York Region process that should be passed on for consideration by the parties responsible. OPA will communicate these issues as a follow-up from the consultation process.

#### ***Land use Adjacent to ROWs***

*(Source: Elected Officials' Forum 1 Summary)*

It was suggested that policies related to land use adjacent to a right of way should be created to ensure that homes are not built too close to transmission lines.

## APPENDIX A-3: WORKING GROUP DELIVERABLES

This Appendix contains the key deliverables that were prepared by the working group. The first is a set of evaluation factors that were used in the ranking exercise of different options. The second is a number of alternatives that were developed to meet Northern York Region’s need for at least 10 years. The third is a full list of options that were identified and analyzed by the working group. The fourth is the ranking of options by the working group along with the associated notes that documents the rationale for the rankings.

### ***Evaluation Factors***

#### ***Social, Economic and Environmental Factors***

- Possible effects on property value
- EMF levels and public concern of health effects
- Community character and aesthetics
- Compatibility with existing development
- Air pollution impacts (e.g. SO<sub>2</sub> CO<sub>2</sub>)
- Effect on the natural environment
- Disruption to community facilities and services
- Disruption to residents – use and enjoyment of property; sell property and leave community

#### ***Feasibility***

- Ability to alleviate bottlenecks
- Ability for implementation timelines to meet short-term needs
- Ability to meet load forecasts until at least 2015

#### ***Cost***

- Upfront capital cost
- Operating cost
- Level of losses
- Cost / MWh (levelized unit cost)
- Efficiency in land and infrastructure use
- Avoided costs (i.e. with respect to conservation)
- Who pays (socialized vs. localized)

#### ***Reliability***

- Meets reliability standards of “first contingency loss criteria”
- Diversity of supply

***Risk / Uncertainty Management***

- Risk of proponent business continuity
- Risk of implementation not successful
- Risk of implementation not on time
- Likelihood of not being approved (nature and complexity of approvals)
- Ability to manage risk of load forecast deviations
- Sustainability of an option

***Alignment with Other Regulations***

- Consistency with Provincial Government Direction (e.g. off-coal strategy, CDM efforts)
- Consistency with zoning, bylaws, official plan

***Alignment with Longer Term Planning***

- Additional benefits outside of affected area
- Flexibility provided for long-term plans
- Displacement opportunity for expansion, adjacent land uses

***Alternatives Identified******Alternative 1:***

- Initiate aggressive CDM programs targeting to eliminate the need for a new transmission line and to partially reduce the need for new transformer capacity.

***Alternative 2:***

- Build new TS and install capacitors at Armitage TS as soon as possible to meet urgent needs
- Initiate aggressive CDM programs with a goal to allow infrastructure to meet the need for as long as possible
- Trigger construction of a generator either immediately or with sufficient lead time to ensure that CDM adjusted load forecasts will be met

***Alternative 3:***

- Build new TS and install capacitors at Armitage TS as soon as possible to meet urgent needs
- Initiate aggressive CDM programs with a goal to allow infrastructure to meet the need for as long as possible
- Trigger construction of a transmission line and new TS with sufficient lead time to ensure that CDM adjusted load forecasts will be met

## ***Options Identified and Analyzed***

### **CDM and Distribution Options**

<b>Option</b>	<b>Option Name</b>	<b>Source</b>	<b>Notes</b>
1	Conservation Demand Management (CDM)	OPA RFI	Limited by CDM industry development
1a	CDM to alleviate need for a new transmission line and some transformer capacity	Jack Gibbons	See submission for details
1b	Claireville TS to Minden TS Load Relief	Markham K1	Options would be included in OPA RFI
2	Armitage TS3 + Caps	OPA / Audie Chan	Building new TS near Armitage TS. Increased capability by 130 MW
3	Holland Junction TS + Caps	OPA	Increased capability by 140 MW
4	Buttonville TS	OPA	Build new Buttonville TS 2 at existing site.
5	New TS (located at line ends of options 7,8 or 9)	OPA	Likely location in Gormley or North Aurora. Limited to 160 MW.

### **Transmission Options**

#	Transmission Option Name	Major Facility	Source of Option	ROW
6	230 kV Lines from Buttonville to Armitage	24 km of overhead and/or underground lines	OPA	ROW #3 Existing
7	115 kV lines from Buttonville to Armitage	24 km of overhead and/or underground lines	OPA	ROW #3 Existing
8	230 kV lines from Buttonville to Gormley	10 km of overhead and/or underground lines	OPA	ROW #3 Existing
9	Existing Corridor O/H Parkway to Armitage	25 km of overhead lines	Markham A1	ROW #3 Existing
10	Existing Corridor O/H and Underground Parkway to Armitage	25 km of overhead and Underground lines	Markham A2	ROW #3 Existing
11	Existing Corridor AC/DC Parkway to Armitage	25 km of AC/DC multi-cct overhead lines and AC/DC converter stations	Markham A3	ROW #3 Existing
12	404 Corridor Parkway to Armitage	30 km of overhead and underground lines	Markham B1	ROW #2 New
13	Existing Corridor Claireville to Armitage	44 km of overhead lines next to existing Claireville-Armitage line	Markham C1	ROW #1 Existing
14	Existing Corridor Claireville to Armitage with FACTS	Reconductor 44 km of lines with high capacity conductors and install Flexible AC Transmission System (FACTS)	Markham C2	ROW #1 Existing

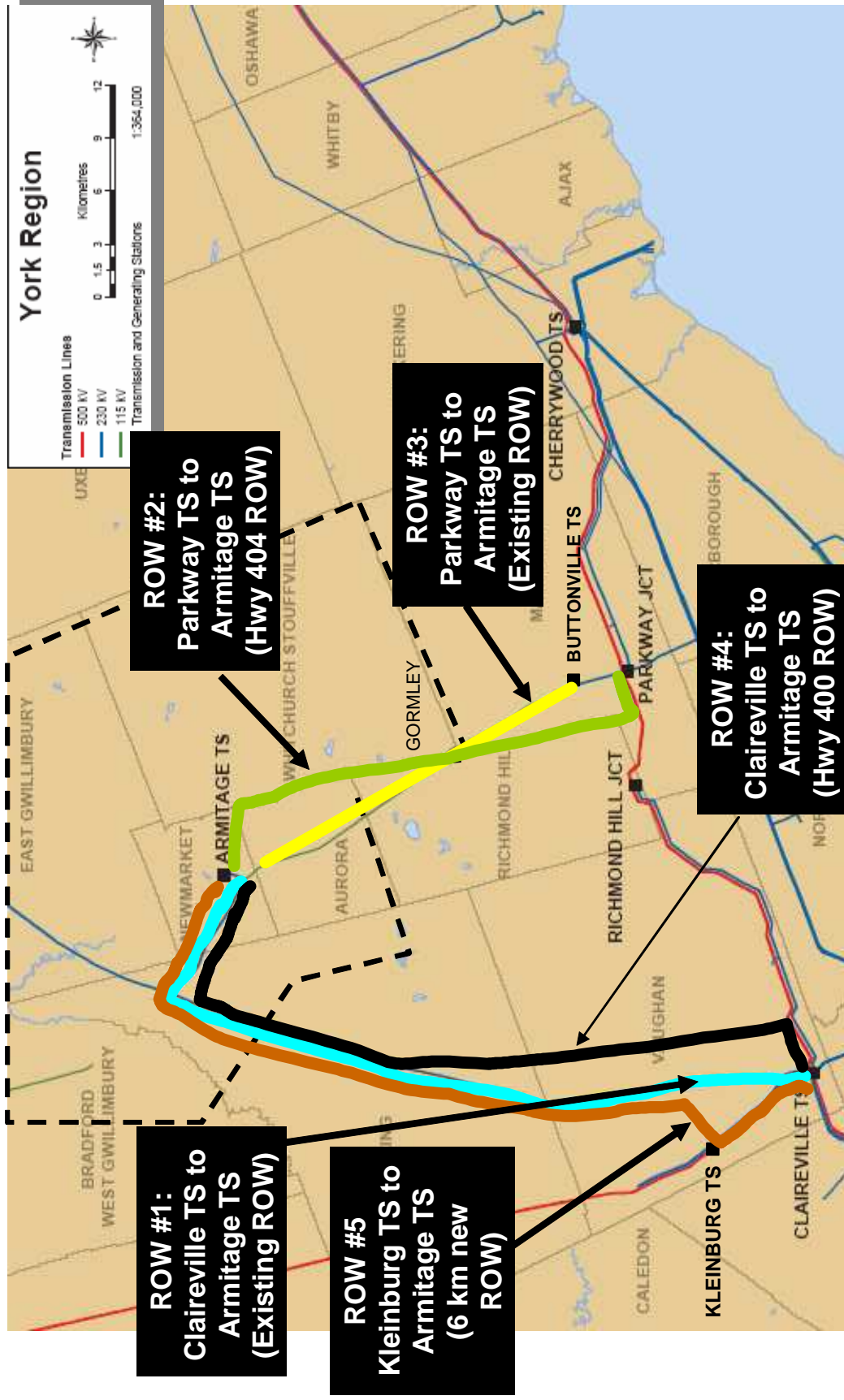
**Transmission Options – Continued**

#	Transmission Option Name	Major Facility	Source of Option	ROW
15	400 Corridor Claireville to Armitage	49 km of overhead and underground lines	Markham D1	ROW #4 New
16	427 Corridor Claireville to Armitage	46 km of overhead and underground lines	Markham E1	ROW #7 New
17	115 kV Corridor Essa to Armitage	55 km of overhead lines 230 kV facilities at Essa	Markham F1	? New
18	Corridor #2 (Go Transit) Essa to Armitage	62 km of overhead lines 230 kV facilities at Essa	Markham G1	ROW #6 New
19	Corridor #3 Essa to Armitage	55 km of overhead lines New 500/230 kV station	Markham H1	? New
20	Claireville to Kleinberg to Armitage	48 km of overhead lines	Markham I1	ROW #5 New
21	Cherrywood to Armitage	37 km of overhead lines	Markham J1	? New
22	230 kV Tap Upgrade and Extension	<ul style="list-style-type: none"> <li>Reconductor Tap from Holland Marsh Junction to Armitage TS.</li> <li>Extend line if Armitage TS3 is built</li> </ul>	OPA	ROW #1 Existing
23	Long Term GTA Bypass	Multi-stages, 500/230 Lines and a new 500/230 kV station	Markham L1	ROW #8 New

**Transmission Options – Continued**

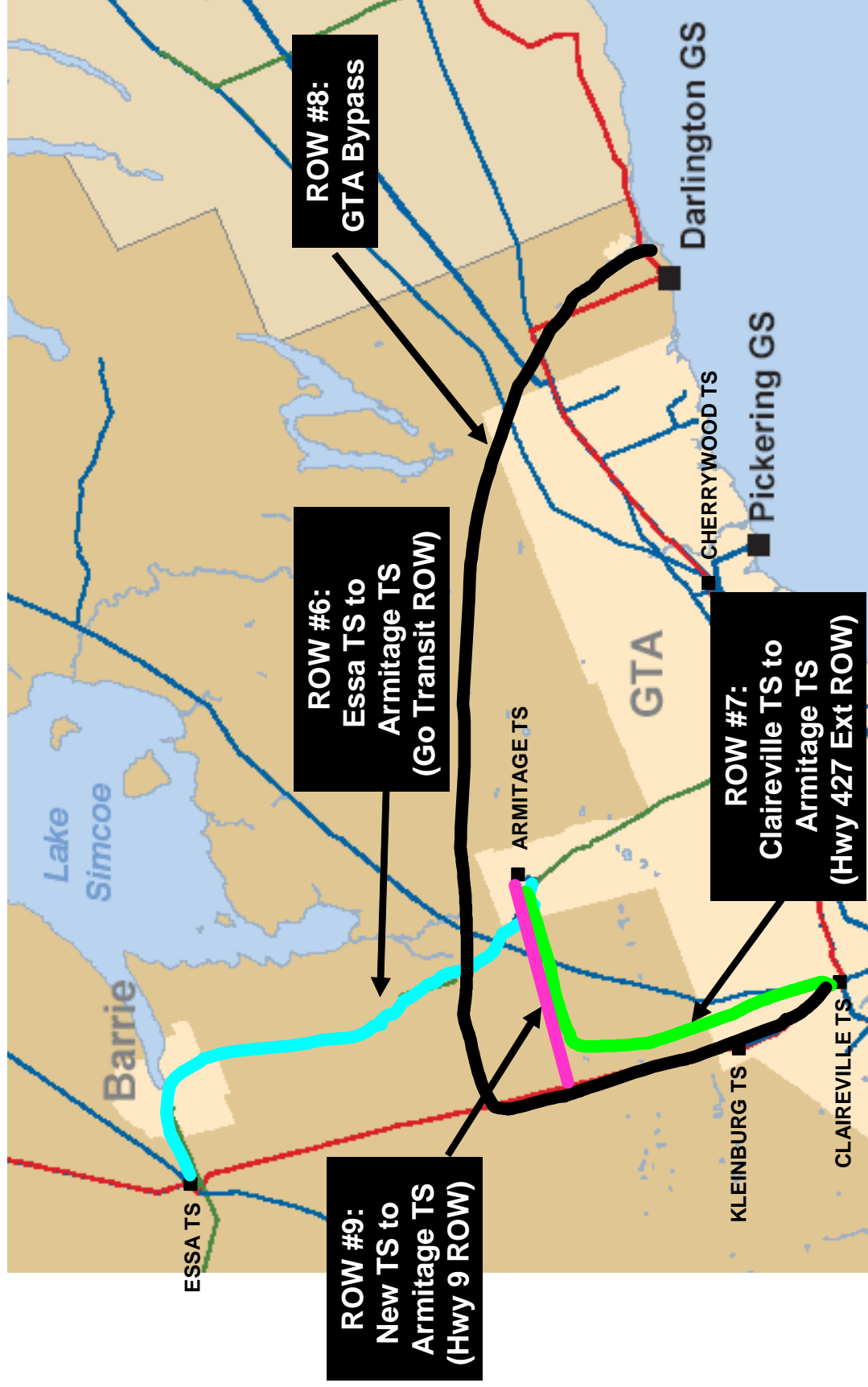
#	Transmission Option Name	Major Facility	Source of Option	New ROW
24	Highway 9 New TS to Armitage and existing 115 kV Buttonville Line	<ul style="list-style-type: none"><li>•New 500/230 kV TS</li><li>•27 km of 230 kV overhead line to Armitage</li></ul> Short term relief: <ul style="list-style-type: none"><li>•Refurbishing existing Buttonville line</li><li>•230/115 kV Auto</li><li>•115/44 kV 20 MVA transformer</li></ul>	Robert Jones	ROW #9 New

## Proposed Transmission Right-of-Way Options





## Proposed Transmission Right-of-Way Options - Continued



**Generation Options**

#	Generation Option Name	Source of Option
25	Generic 44 kV Simple Cycle	OPA RFI
26	Generic 230 kV Simple Cycle	OPA RFI
27	Generic 230 kV Combined Cycle	OPA RFI

## ***Relative Ranking of Options***

The following are the general notes associated with ranking of options:

- Ranking of transmission options are within categories (i.e. ranking has not been done across categories)
  - All underground
  - All overhead
  - Partial underground
- Options ranked from 1 to 3. Rank of 1 being the best among the options being compared and 3 being the worst among the options compared for a given evaluation factor
- Ranking do not provide any indication of an options evaluation in absolute terms.
- A number of transmission options were screened out by the working group either because they were similar to other options or through an exercise that asked the working group representatives to rank their top 5 choices. These options have been “greyed out” in the table and associated notes table. Transmission options screened out include Option 10, 11, 15, 16, 17, 18, 19, 21, 23 and 24.
- Option 22 in the transmission options was not ranked against other overhead transmission options because it was not serving the same purpose as the other transmission options
- Comments in CDM row are general in nature and require proposal specific information from procurement process to evaluate specifics. Some of the general issues have been captured in the Notes Table.
- Assumption for partial undergrounding of transmission options is to underground residential, urban and rural estate, not industrial, rural and undeveloped areas, in addition to any other undergrounding that would take place based on current practices

	Ranking: 1=Best 3 =Worst	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
<b>Distribution</b>								
2	Armitage TS3 + Caps (Newmarket/Aurora)	2	2	1	1	2	1	1
3	Holland Marsh TS + Caps	1	1	1	1	3	1	1
4	Buttonville TS	3	2	3	3	1	1	1
5	Gormley TS	1	3	2	2	2	1	1
<b>Transmission Underground</b>								
6b	230 kV Lines from Buttonville to Armitage	1	1	3	1	1	1	1
8b	230 kV lines from Buttonville to Gormley	1	1	2	1	1	1	2
<b>Transmission Overhead</b>								
6a	230 kV lines from Buttonville to Armitage	3	1	2	1	3	1	1
7a	115 kV lines from Buttonville to Armitage	3	2	2	2	3	1	3
8a	230 kV lines from Buttonville to Gormley	3	1	1	1	3	1	1
13a	Existing Corridor Claireville to Armitage	3	3	3	3	3	1	3
14a	Existing Corridor Claireville to Armitage w/FACTS	3	3	3	3	2	1	3
20a	Claireville to Kleinberg to Armitage	3	3	3	1	3	2	2
<b>Transmission Partial Underground</b>								
6c	230 kV Lines from Buttonville to Armitage	1	1	2	1	1	1	1
8c	230 kV lines from Buttonville to Gormley	1	1	1	1	1	1	1
12c	404 Corridor Parkway to Armitage	1	2	3	1	2	2	1
<b>Transmission Options (Screened out)</b>								
15	400 Corridor Claireville to Armitage							
16	427 Corridor Claireville to Armitage							
17	115 kV Corridor Essa to Armitage							
18	Corridor #2 (Go Transit) Essa to Armitage							
19	Corridor #3 Essa to Armitage							
21	Cherrywood to Armitage							
23	Long Term GTA Bypass							
24	Hwy 9 New TS to Armitage & existing 115 kV B-ville Line							

NOTE: RANKINGS ARE RELATIVE TO OTHER OPTIONS WITHIN THE SAME CATEGORY (NOT ACROSS CATEGORIES)

Notes on High Level Analysis and Ranking of Options

#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Conservation Demand Management									
1	Conservation Demand Management (CDM) a – CDM to alleviate need for a new transmission line and some transformer capacity b – Claireville TS to Minden TS Load relief	Requires proposal specific information from procurement process to evaluate	Requires proposal specific information from procurement process to evaluate  <b>Emissions:</b> <ul style="list-style-type: none"><li>- "Behind the meter" generators have emissions impacts to be evaluated</li><li>- Combined heat and power has lower emissions than those from conventional supply sources</li><li>- Defers importing electricity from outside of region saving transmission and distribution losses</li></ul> <b>Social / Economic Impact:</b> <ul style="list-style-type: none"><li>- Social benefit of putting control in the hands of consumers</li><li>- Possible economic impact to workers being sent home during load curtailling arrangements</li><li>- Possible social impact with respect to disruption to family—excessive shifting can cause social issues</li><li>- Usually lost hours are recouped when power is cheaper—production occurs, but at a cheaper time. Social impact is if that cheaper time is at night.</li><li>- Demand Response encourages load shifting form peak to off-peak, not about reducing output—could involve rescheduling shifts, but not about reducing economic productivity</li><li>- Lowers customer's bills</li><li>- Increases Ontario's productivity of industry, creates jobs, raises GDP</li></ul>	<b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Can partially or fully alleviate bottleneck 1b and 2</li></ul>	Requires proposal specific information from procurement process to evaluate <ul style="list-style-type: none"><li>- Other jurisdictions have found that CDM is a lower cost option than supply alternatives (Source: Funding and Savings for Energy Efficiency Programs for Program Years 2000 to 2004, California Energy Commission)</li></ul>	<ul style="list-style-type: none"><li>- Risk of behaviour altering CDM programs not being about to be sustained (requires investment in education</li><li>- Mandated programs or non-behavioural CDM programs have more sustainability</li><li>- Must convince people that they are making a contribution in order to develop support for a/c control programs and then program lasts longer</li><li>- Options recommended to OEB likely will not rely upon behavioural change—should focus on CDM which may be recommended such as more efficient AC, fridges, combined heat &amp; power</li><li>- Option is decentralized and diverse so it has less impact than a large generator going down on a peak day</li><li>- Load control provides a way to reduce demand in an emergency situation</li><li>- A balanced portfolio of CDM measures may be a more reliable option than conventional supply</li></ul>	Requires proposal specific information from procurement process to evaluate  <b>Implementation Risk:</b> <ul style="list-style-type: none"><li>- Risk that targets are not achieved</li><li>- Risk that results are not sustained</li><li>- Uncertainty related to when targets will be achievable</li><li>- Diversified and decentralized, thus minimizing risk.</li><li>- building a transmission line makes area depending on generators outside of the area, which</li><li>- CDM uncertainty not dependant on weakness of generation portfolio</li></ul>	Requires proposal specific information from procurement process to evaluate  <b>Government Policy:</b> <ul style="list-style-type: none"><li>- Consistent with Provincial government direction</li><li>- Does not align with provincial direction for building codes</li></ul>	<ul style="list-style-type: none"><li>- Success in Northern York Region CDM programs could be viewed as an example for other areas of Ontario resulting in benefits outside of the affected area</li></ul>

#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Distribution (TS & Distribution Feeders)									
2	Armitage TS3 (Newmarket/ Aurora) + Caps	Fit with Alternative: <ul style="list-style-type: none"><li>- Require Tap line upgrade (Option #22)</li></ul>	Location: <ul style="list-style-type: none"><li>- Located in industrial areas</li></ul>	Lead Time: <ul style="list-style-type: none"><li>- &gt;1.5 years</li><li>- probably about 3 yrs</li></ul> Bottleneck Elimination: <ul style="list-style-type: none"><li>- Partially alleviates bottleneck 2, 3 (till 2010)</li><li>- Line tap must be upgraded from Holland Junction to Armitage TS resulting in additional work and longer lead time</li></ul>	Capital Cost: <ul style="list-style-type: none"><li>- \$15M for TS</li><li>- \$13 - 16M for feeders (due to short feeder lengths)</li><li>- Tap line upgrade cost additional</li></ul> Level of Losses: <ul style="list-style-type: none"><li>- Lowest due to feeder lengths</li></ul>	<ul style="list-style-type: none"><li>- Close to load pockets</li><li>- Relies on tap line upgrade and therefore requires upgrade</li></ul>	Risk of Approvals: <ul style="list-style-type: none"><li>- Little risk with respect to approvals</li></ul> Risk of Site Availability: <ul style="list-style-type: none"><li>- Location not as certain as Buttonville site</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>
3	Holland Junction TS + Caps	Fit with Alternative: <ul style="list-style-type: none"><li>- Does not require Tap line upgrade (Option #22)</li></ul>	Location: <ul style="list-style-type: none"><li>- On existing ROW in rural areas and far enough away from land used for crops</li></ul> Visual Impact: <ul style="list-style-type: none"><li>- Least length of distribution feeders (less visual impact)</li></ul>	Lead Time: <ul style="list-style-type: none"><li>- &gt;1.5 years</li></ul> Bottleneck Elimination: <ul style="list-style-type: none"><li>- Partially alleviates bottleneck 2, 3 (till 2011)</li><li>- Would push out bottleneck 1a until 2011 or 2014 assuming on whether Keele Valley NUG is in service (NUG is tied into only 1 feeder)</li></ul>	Capital Cost: <ul style="list-style-type: none"><li>- \$15M for TS</li><li>- \$14M for feeders (due to short feeder lengths)</li><li>- No tap line upgrade required</li></ul> Level of Losses: <ul style="list-style-type: none"><li>- Lowest due to feeder lengths</li></ul>	<ul style="list-style-type: none"><li>- Close to load pockets</li><li>- Does not rely on Tap line upgrade</li></ul>	Risk of Approvals: <ul style="list-style-type: none"><li>- Little risk with respect to approvals</li></ul> Risk of Site Availability: <ul style="list-style-type: none"><li>- Location not as certain as Buttonville site</li><li>- Has a joint easement that may require more time for rights acquisitions</li><li>- Joint easement by Ontario Federation of Naturalists—what takes precedence hydro easement or conservation easement? A legal matter that poses project risk</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>
4	Buttonville TS	Fit with Alternative: <ul style="list-style-type: none"><li>- Requires long feeders going north to affected area</li></ul>	Location: <ul style="list-style-type: none"><li>- Located close to dense urban residential areas</li></ul>	Lead Time: <ul style="list-style-type: none"><li>- &gt;2 years</li></ul> Bottleneck Elimination: <ul style="list-style-type: none"><li>- Partially alleviates bottleneck 2, 3 (till 2012)</li><li>- no need for transmission line</li><li>- feeder routing and length is longest past</li></ul>	Capital Cost: <ul style="list-style-type: none"><li>- \$15M for TS</li><li>- \$47 – 57M for feeders (due to long feeder lengths)</li></ul> Level of Losses: <ul style="list-style-type: none"><li>- Highest due to feeder lengths</li></ul>	<ul style="list-style-type: none"><li>- Farthest from load pockets</li></ul>	Risk of Approvals: <ul style="list-style-type: none"><li>- Little risk with respect to approvals</li></ul> Risk of Site Availability: <ul style="list-style-type: none"><li>- Availability of site confirmed</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>
5	Gormley TS	Fit with Alternative: <ul style="list-style-type: none"><li>- Requires a transmission line from Buttonville</li></ul>	Location: <ul style="list-style-type: none"><li>- Located in rural area</li></ul>	Lead Time: <ul style="list-style-type: none"><li>- &gt;1.5 years (TS build time only)</li><li>- is 4 yrs if including Tx line construction time</li></ul> Bottleneck Elimination: <ul style="list-style-type: none"><li>- Partially alleviates bottleneck 2, 3 (till 2012)</li><li>- if don't build Tx line, Gormley TS of no use</li></ul>	Capital Cost: <ul style="list-style-type: none"><li>- \$15M for TS</li><li>- \$22M for feeders (due to medium length feeders)</li><li>- Require transmission line from Buttonville</li></ul> Level of Losses: <ul style="list-style-type: none"><li>- Medium due to feeder lengths</li></ul>	<ul style="list-style-type: none"><li>- Medium distance from load pockets</li></ul>	Risk of Approvals: <ul style="list-style-type: none"><li>- Little risk with respect to approvals</li></ul> Risk of Site Availability: <ul style="list-style-type: none"><li>- Location not as certain as Buttonville site</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>	<ul style="list-style-type: none"><li>- At par with other distribution options</li></ul>

#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Transmission									
6	230 kV Lines from Buttonville to Armitage a – Overhead b – Underground c – Partial Underground	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Would have to include Armitage TS3</li><li>- Would not require Parkway to Buttonville Upgrade</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- 2 km industrial and commercial areas</li><li>- 7 km of residential areas</li><li>- 8 km of rural / agricultural areas</li><li>- 5 km of parks, recreational and environmental areas</li></ul> <b>EMF Levels:</b> <ul style="list-style-type: none"><li>- EMF levels lower in the next 10 years (overhead) based on Acres study due to relatively high EMF levels being generated from 44-kV feeder on existing 115-kV towers</li><li>- EMF levels will be higher if a second TS is attached to the line and more current goes through the line</li></ul> <b>Social Impact:</b> <ul style="list-style-type: none"><li>- Typical ROW is 120' , existing ROW is 100-120' resulting in further concerns with EMF impacts</li><li>- Would have an impact on St. Monica's School—comment that parents may move their children elsewhere which could have an impact on the school and on a relocation decision</li></ul> Concern that ROW does not have sufficient width to accommodate a 140' tower in the event of a tower collapse	<b>Lead Time:</b> <ul style="list-style-type: none"><li>- 5 years</li></ul> <b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1, 2, 3</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- 22 km total</li></ul> <b>Capital Cost All Overhead:</b> <ul style="list-style-type: none"><li>- \$50M overhead (includes moving feeders, dismantling existing structures, build line)</li><li>- \$15M TS</li><li>- \$15M Feeders</li><li>- TOTAL COST: \$80M</li></ul> <b>Capital Cost Partial Underground:</b> <ul style="list-style-type: none"><li>- 14 km @ \$4.2M incremental cost = \$59M</li><li>- TOTAL COST: \$139M</li></ul>	<ul style="list-style-type: none"><li>- Diversity of supply</li><li>- provides partial diversity of supply for Gormley, but going all the way to Armitage may provide full diversity of supply</li></ul>	<b>Risk of Approvals</b> <ul style="list-style-type: none"><li>- History of issue (many requests to bump-up to individual EA)</li><li>- Risk of being delayed or not approved because of strong public and municipal government opposition</li></ul>	<ul style="list-style-type: none"><li>- Consistency issues with municipal planning</li></ul>	<b>Benefits Outside of Area:</b> <ul style="list-style-type: none"><li>- Has the potential for connecting and closing loop with Tap line increasing reliability in all of York Region</li><li>- Capability to add 3<sup>rd</sup> TS in the future by upgrading Parkway to Buttonville line section (~year 2030)</li></ul>
7	115 kV lines from Buttonville to Armitage a – Overhead b – Underground c – Partial Underground	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Requires new TS</li></ul> <b>Assumptions:</b> <ul style="list-style-type: none"><li>- Remove existing towers and replace with new ones</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- Existing ROW</li></ul> <b>EMF Levels:</b> <ul style="list-style-type: none"><li>- Higher EMF than 230kV lines</li></ul> <b>Visual Impact:</b> <ul style="list-style-type: none"><li>- Lower tower height than 230kV (less visual impact)</li></ul>	<b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1, 2, 3</li><li>- Requires autotransformers at Buttonville TS resulting in additional time and complexity (a 230/115, and then 115 / distribution)</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- Same as Option 6</li></ul> <b>Capital Cost All Overhead:</b> <ul style="list-style-type: none"><li>- \$45M overhead (includes moving feeders, dismantling existing structures, build line)</li><li>- \$15M TS</li><li>- \$15M Feeders</li><li>- TOTAL COST: \$75M</li></ul> <b>Capital Cost Partial Underground:</b> <ul style="list-style-type: none"><li>- 14 km @ \$3.3M incremental cost = \$46M</li><li>- TOTAL COST: \$121M</li></ul> <b>Level of Losses:</b> <ul style="list-style-type: none"><li>- Higher Tx losses than 230kV option with similar distance</li></ul>	<ul style="list-style-type: none"><li>- Diversity of supply</li></ul>	<ul style="list-style-type: none"><li>- Same as Option 6</li></ul>	<ul style="list-style-type: none"><li>- No issues identified</li></ul>	<b>Benefits Outside of Area:</b> <ul style="list-style-type: none"><li>- No potential to add future third TS (~year 2030)</li><li>- Uses up geography at Buttonville</li><li>- Would not have capacity for another TS</li><li>-</li></ul>



#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
	Transmission - Continued								
8	230 kV lines from Buttonville to Gormley a – Overhead b – Underground c – Partial Underground	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Would have to include Gormley TS</li><li>- Would not required Parkway to Buttonville Upgrade</li></ul> <b>Assumptions:</b> <ul style="list-style-type: none"><li>- Would only change the line between Buttonville and Gormley</li><li>- North of Gormley would stay as is</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- Existing ROW</li></ul> <b>EMF Levels:</b> <ul style="list-style-type: none"><li>- EMF levels lower in the next 10 years</li></ul> <b>Visual Impact:</b> <ul style="list-style-type: none"><li>- Less distance than Option 6 therefore less visual impact</li></ul>	<b>Lead Time:</b> <ul style="list-style-type: none"><li>- 4 years</li></ul> <b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1, 2, 3</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- 10 km total</li><li>- 5 km through urban areas</li></ul> <b>Capital Cost all Overhead:</b> <ul style="list-style-type: none"><li>- \$23 M Overhead</li><li>- \$15 M TS</li><li>- \$22 M Feeders</li></ul> <b>TOTAL COST:</b> \$60M	- Diversity of supply	- Same as Option 6	- No issues identified	<b>Benefits Outside of Area:</b> <ul style="list-style-type: none"><li>- Capability to add 3rd TS in the future by upgrading Parkway to Buttonville line (~year 2030)</li><li>- Could close the loop up to Armitage TS in the future</li><li>- Would serve Stouffville, Aurora and some of Newmarket (lifts some load off of Armitage TS)</li></ul>
9	Existing Corridor Parkway to Armitage a – Overhead	<b>Assumptions:</b> <ul style="list-style-type: none"><li>- Same as Option #6a</li><li>- Only required if a second transformer station is needed from the Buttonville line</li></ul>							
10	Existing Corridor Parkway to Armitage c – Partial Underground								
11	Existing Corridor AC/DC Parkway to Armitage								
12	404 Corridor Parkway to Armitage c – Partial Underground	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Would have to include Armitage TS3</li></ul> <b>Questions:</b> <ul style="list-style-type: none"><li>- Use highway ROW or obtain land adjacent to highway?</li></ul> <b>Assumptions:</b> <ul style="list-style-type: none"><li>- In addition to partial undergrounding for all options the airport and sections of ROW getting to 404 would have to be undergrounded</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- Either on or adjacent to Highway 404</li><li>- 8 km of industrial and commercial areas</li><li>- 5 km of residential areas</li><li>- 10 km of rural / agricultural areas</li><li>- 4 km of parks, recreational and environmental areas</li></ul>	<b>Lead Time:</b> <ul style="list-style-type: none"><li>- &gt; 6 years</li></ul> <b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1, 2, 3</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- 27 km total</li></ul> <b>Overhead Capital Cost:</b> <ul style="list-style-type: none"><li>- \$115M</li><li>- Needs land acquisition (additional cost)</li><li>- Requiring a new ROW would take longer to negotiate</li><li>- If within highway corridor would have to lease land, if adjacent, would have to acquire land</li></ul>	- Diversity of supply	- Horizontal lines to connect with TS are uncertain (may require undergrounding) <ul style="list-style-type: none"><li>- Issue with using up a piece of the Parkway west to 404 corridor which has room for a 4th line to satisfy E-W flow (would be using up one remaining location)</li></ul>	- High uncertainty because of MOT policies	
1n3	Existing Corridor Claireville to Armitage a – Overhead	<b>Assumptions:</b> <ul style="list-style-type: none"><li>- Additional set of towers in parallel with existing towers or bypass, disassembly and reconstruction of new 4-circuit towers</li><li>- If existing ROW is not large enough to accommodate two sets of lines, new 4 circuit towers would need to be built</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- 3 km of industrial and commercial areas</li><li>- 7 km of residential areas</li><li>- 24 km of rural / agricultural areas</li><li>- 10 km of parks, recreational and environmental areas</li></ul> <b>EMF Levels:</b> <ul style="list-style-type: none"><li>- EMF levels go up on one side of the ROW</li></ul> <b>Visual Impact:</b> <ul style="list-style-type: none"><li>- 44 km long (more impact)</li></ul>	<b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1, 2, 3</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- 44 km total</li></ul> <b>Capital Cost:</b> <ul style="list-style-type: none"><li>- \$80M Line</li><li>- \$15M TS</li><li>- \$15M Distribution feeders</li><li>- need an extra 80M for the line for a total of \$190M</li></ul>	- No diversity of supply	- Similar opposition anticipated as Option 6 except with different communities	- No issues identified	



#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Transmission - Continued									
14	Existing Corridor Claireville to Armitage with FACTS (Flexible AC Transmission) a – Overhead	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Requires that the second TS be somewhere on the Tap line and therefore would require Tap Line upgrade</li></ul> <b>Assumptions:</b> <ul style="list-style-type: none"><li>- Requires line upgrade from Claireville to Armitage</li><li>- FACTS station site similar size as a transformer station</li><li>- Towers need to be upgraded</li><li>- To upgrade structures, need to build bypass lines to modify structures</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- Existing ROW</li></ul> <b>Visual Impact:</b> <ul style="list-style-type: none"><li>- Higher visual impact due to tower upgrade</li></ul> <b>EMF Levels:</b> <ul style="list-style-type: none"><li>- EMF levels go up</li></ul>	<b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1a (maybe)</li><li>- OPA technical advisors have concerns with this solution with respect to reliability performance</li><li>- FACTS not a common technology in Ontario which introduces extra complexities</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- Same as Option 13</li></ul> <b>Capital Cost:</b> <ul style="list-style-type: none"><li>- \$20M for FACTS</li><li>- \$40 M for main line upgrade</li><li>- \$15M TS</li><li>- \$15M Feeders</li><li>- Plus extra \$40M for upgrade bypass = \$130M</li></ul>	<ul style="list-style-type: none"><li>- Reliability of this Tx option is lowest among all Tx options considered.</li><li>- Reliance on the performance of the FACTS device</li><li>- Another component in the transmission system that could cause failure to the supply of Armitage and several other stations upstream.</li></ul>	<ul style="list-style-type: none"><li>- Similar opposition anticipated as Option 6 except with different communities</li></ul>	<ul style="list-style-type: none"><li>- No issues identified</li></ul>	
15	400 Corridor Claireville to Armitage c – Partial Underground				<b>Distance:</b> <ul style="list-style-type: none"><li>- 49 km total</li></ul>				
16	427 Corridor Claireville to Armitage c – Partial Underground				<b>Distance:</b> <ul style="list-style-type: none"><li>- 46 km total</li></ul>				
17	115 kV Corridor Essa to Armitage a – Overhead b – Underground c – Partial Underground				<b>Distance:</b> <ul style="list-style-type: none"><li>- 55 km total</li></ul>				
18	Corridor #2 (Go Transit) Essa to Armitage a – Overhead				<b>Distance:</b> <ul style="list-style-type: none"><li>- 62 km total</li></ul>				
19	Corridor #3 Essa to Armitage a – Overhead				<b>Distance:</b> <ul style="list-style-type: none"><li>- 55 km total</li></ul>				
20	Claireville to Kleinberg to Armitage a – Overhead	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Less residential but doesn't necessarily make it less impactful</li></ul>	<b>Location:</b> <ul style="list-style-type: none"><li>- 5 km of industrial and commercial areas</li><li>- 3 km of residential areas</li><li>- 31 km of rural / agricultural areas</li><li>- 9 km of parks, recreational and environmental areas</li></ul>	<b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1, 2, 3</li></ul>	<b>Distance:</b> <ul style="list-style-type: none"><li>- 48 km total</li></ul> <b>Overhead Capital Cost:</b> <ul style="list-style-type: none"><li>- \$150M</li><li>- 6 km of new ROW acquisition costs</li><li>- Also need extended ROW up to Holland Junction</li></ul>		<ul style="list-style-type: none"><li>- Requires new ROW which may conflict with zoning, official plans, etc.</li></ul>		
21	Cherrywood to Armitage a – Overhead				<b>Distance:</b> <ul style="list-style-type: none"><li>- 37 km total</li></ul>				

#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Transmission - Continued									
22	230 kV Tap Upgrade and Extension a – Overhead b – Underground c – Partial Underground	<p><b>Fit with Alternative:</b></p> <ul style="list-style-type: none"><li>- Only necessary if TS connected to Tap line</li><li>- Holland Junction TS would not require this upgrade</li></ul> <p><b>Assumptions:</b></p> <ul style="list-style-type: none"><li>- With partial underground, might want to underground 3.5 kms, can go above ground in areas with no houses</li></ul> <p><b>Questions:</b></p> <ul style="list-style-type: none"><li>- Added complexity with undergrounding where existing towers as to whether need to bypass to underground where the towers are now</li></ul>	<p><b>Location:</b></p> <ul style="list-style-type: none"><li>- Golf course, undeveloped land, some sections in residential but houses not in parallel, under 1 km of houses in parallel</li></ul> <p><b>EMF Level:</b></p> <ul style="list-style-type: none"><li>- More EMF because of higher current</li></ul>	<p><b>Lead Time:</b></p> <ul style="list-style-type: none"><li>- &lt;2 yrs</li></ul> <p><b>Bottleneck Elimination:</b></p> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1b</li></ul>	<p><b>Distance:</b></p> <ul style="list-style-type: none"><li>- 8 km total</li></ul> <p><b>Capital Cost:</b></p> <ul style="list-style-type: none"><li>- \$ 6.4M (conductors only</li><li>- \$ 24M (if tower replacements and temporary bypasses are required)</li><li>- Assumes full 8 km distance</li></ul>	<ul style="list-style-type: none"><li>- Same as today</li></ul>		<ul style="list-style-type: none"><li>- No issues identified</li></ul>	
23	Long Term GTA Bypass a – Overhead				<p><b>Distance:</b></p> <ul style="list-style-type: none"><li>- Over 100 km total</li></ul>				
24	Hwy 9 New TS to Armitage & existing 115 kV Buttonville Line a – Overhead				<p><b>Distance:</b></p> <ul style="list-style-type: none"><li>- 27 km total</li></ul> <p><b>Capital Cost:</b></p> <ul style="list-style-type: none"><li>- \$110M (500/230kV TS)</li><li>- \$40M (TS)</li><li>- \$15M (Feeders)</li><li>- Land acquisition costs</li></ul>				

#	Option	Fit with Alternative / Option Assumptions / Outstanding Questions	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Generation									
25 & 26	Simple Cycle Generator 25 – connected to 44 kV 26 – connected to 230 kV	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Would still require Transformer station and capacitors</li><li>- Would alleviate need for transmission line</li></ul>	<ul style="list-style-type: none"><li>- Smaller sized facility</li></ul> <b>Emissions:</b> <ul style="list-style-type: none"><li>- Likely less number of operating hours per year compared to combined cycle</li><li>- Likely higher emissions per MWh compared to combined cycle</li></ul>	<b>Lead Time:</b> <ul style="list-style-type: none"><li>- Possibly 1 - 2 years</li></ul> <b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1</li></ul>	<ul style="list-style-type: none"><li>- Possibly able to receive a smaller portion of its revenues from the Ontario Energy market compared to Combined Cycle Plant.</li></ul>			<ul style="list-style-type: none"><li>- No issues identified</li></ul>	<b>Benefits Outside of Area:</b> <ul style="list-style-type: none"><li>- Assists with Provincial need for more generation (not as much as combined cycle)</li></ul>
27	Combined Cycle Generator	<b>Fit with Alternative:</b> <ul style="list-style-type: none"><li>- Would still require Transformer station and capacitors</li><li>- Would alleviate need for transmission line</li></ul>	<ul style="list-style-type: none"><li>- Larger sized facility</li></ul> <b>Emissions:</b> <ul style="list-style-type: none"><li>- Likely more number of operating hours per year compared to combined cycle</li><li>- Typically lower emissions per MWh because of higher efficiency compared to simple</li></ul>	<b>Lead Time:</b> <ul style="list-style-type: none"><li>- Possibly 2 years</li></ul> <b>Bottleneck Elimination:</b> <ul style="list-style-type: none"><li>- Alleviates bottleneck 1</li></ul>	<ul style="list-style-type: none"><li>- Possibly able to receive a large portion of its revenues from the Ontario Energy market compared to Simple Cycle Plant.</li></ul>			<ul style="list-style-type: none"><li>- No issues identified</li></ul>	<b>Benefits Outside of Area:</b> <ul style="list-style-type: none"><li>- Assists with Provincial need for more generation</li></ul>

## APPENDIX A-4: YORK REGION WORKING GROUP

This Appendix outlines the organizations and individuals that were involved in the working group sessions as representatives, advisors or presenters and participants in the Elected Officials forums.

### Representatives

Name	Organization
Kevin Brown / Louis-Arthur Langlois	Newmarket resident
Ian Munro	Aurora resident
Robert Jones	Whitchurch-Stouffville resident
Deborah Weiss	King Township resident
Audie Chan	Markham resident
Carlo Stefanutti / Jessica Annis	Fieldgate Homes
Zenon Petriw / Glenn Taylor	Magna International
Margaret Brevik	York Region Public School Board
Bryce Eldridge	York Region Catholic School Board
Jack Gibbons	Ontario Clean Air Alliance
Jack Boonstra	Town of Whitchurch-Stouffville
Steven Kitchen / Jennifer Best / Gaspere Ritacca	Township of King
Roy McQuillin / Karen Antonio-Hadcock	City of Vaughan
Geoff McKnight / Tami Kitay	Town of Brandford West Gwillimbury
Wayne Hunt / Mark Stone	Town of East Gwillimbury
Paul Belton	York Region
Jim Baird	Town of Markham
John Rogers / Sue Seibert	Town of Aurora
Bob Shelton	Town of Newmarket

**Advisors**

Name	Organization
Dave Akers / Paul Ferguson	Newmarket Hydro
Irv Klajman / John Sanderson	Aurora Hydro
Ted Wojcinski	PowerStream
Gary Schneider / Brian McCormick	Hydro One Networks
Barbara Constantinescu	Independent Electricity System Operator
Shahan Deirmenjian / Shawn Parry	Ministry of Municipal Affairs
Marie LeGrow	Ministry of Environment
Carey Reike / Eugene Marshall	Ministry of Transportation

**OPA Team Presenters**

Name	Organization
Amir Shalaby	Ontario Power Authority
Peter Love	Ontario Power Authority
Armen Kulidjian	GRID Management Consulting Inc.
Doug Urban	Acres International Ltd.
Chris Mak	Maxlin Inc.
Clark Smith	Acres International Ltd.
Fiaz Chaudhry	Acres International Ltd.
Mike Agrell	Acres International Ltd.
Adam Chamberlain	Aird & Berlis LLP
Denis Chamberland	Aird & Berlis LLP
Paula Zarnett	Barker, Dunn and Rossi
Bruce Bacon	Elenchus Research Associates

**Other Presenters**

Name	Organization
Jake Brooks	Association of Power Producers of Ontario
Mario Chiarelli	Association of Energy Engineers

**Elected Officials' Forum Participants**

Name	Elected Office
Frank Klees, MPP	Oak Ridges Riding
Suzanne Bolton	Representing Frank Klees, MPP
Lorenzo Catuzza	Representing Greg Sorbara, MPP
Tony Wong, MPP	Markham Riding
Christine Matthews	Representing Tony Wong, MPP
Mayor Frank Jonkman	Town of Bradford West Gwillimbury
Councillor Del Crake	Town of Bradford West Gwillimbury
Mayor Michael Di Biase	City of Vaughan
Mayor Tom Taylor	Town of Newmarket
Councillor Chris Emanuel	Town of Newmarket
Councillor Chad McCleave	Town of Newmarket
Mayor Tim Jones	Town of Aurora
Deputy Mayor Phyllis Morris	Town of Aurora
Councillor Wendy Geartner	Town of Aurora
Regional Councillor Jack Heath	Town of Markham
Councillor Dan Horchik	Town of Markham
Deputy Mayor Frank Scarpitti	Town of Markham
Mayor James Young	East Gwillimbury
Mayor Sue Sherban	Whitchurch-Stouffville
Mayor Margaret Black	Township of King
Councillor Elio Di Iorio	Richmond Hill

## APPENDIX A-5: TERMS OF REFERENCE

This Appendix contains the terms of reference that was developed by the Ontario Power Authority for the consultation. It was reviewed and accepted by the working group participants in the first working group session.

### Objectives:

The objectives of the working group are as follows:

- To provide detailed and constructive feedback and comment with respect to the identification, definition and evaluation of electricity supply and demand response options in York Region to the Ontario Power Authority
- To encourage discussions of issues with various stakeholders with diverse viewpoints
- To facilitate a mutual understanding of differing viewpoints, and
- To allow the interested public to understand the deliberation process used for the OPA to produce a report to the Ontario Energy Board

### Role of Participants:

- Working group representatives will be asked to comment on material presented, make submissions, ask questions and identify issues for the OPA's consideration.
- The working group is not a decision making group and positions of the working group may not necessarily represent those of the OPA.
- The working group findings will be recorded and reflected in the OPA report to the Ontario Energy Board
- Technical advisors will provide advice and comments to the working group when requested by the facilitator
- Observers may watch the sessions and can provide comments and ask questions during the designated period at the end of each session.
- Comments of working group members will be accepted as informed personal opinion not as policy statements unless otherwise requested
- Written comments from working group members and observers submitted up to three days after the last formal working group meeting will be accepted and considered for inclusion

### Scope Definition:

- Review and obtain feedback on:
  - the assessed magnitude, type, location and timing of electricity supply and demand response needs in York Region (including Bradford West Gwillimbury)
  - Options brought forward by OPA technical consultants, working group members and technical advisors
  - Evaluation factors applied to evaluating options
  - Evaluation of options

- Submit new options to the working group through a written submission (consisting of a description of option, facilities required, rough idea of costing, location of facilities) by June 28<sup>th</sup>.
- Comment on feasibility, reliability, power quality and cost of options
- Take into consideration mitigation measures that may be required, and the impact that such mitigation measures may have on in-service dates and project costs
- Identify public concerns / reaction with respect to options
- When there are differing opinions within the group, drill down on the issues to understand them fully

**Not Included in Scope:**

- Generation and demand response solutions that have not been submitted into the RFI process will not be considered
- Environmental analysis of options and the determination of appropriate mitigation measures are not within the scope of the working group.
- Discussion about the pricing of generation and demand response RFI proposals are not in scope. Pricing data from RFI submissions cannot be disclosed to the working group, but typical costs for type of project will be provided for discussion purposes.
- Voting on positions; this is a discussion forum

**Issue Resolution:**

- When the group cannot reach consensus on an issue, all viewpoints will be understood and recorded
- OPA from time to time will provide process direction to the working group when issues are identified that would hinder the deliberations of the group if not addressed in a timely manner

**Deliverables:**

- The group will assist in developing a consultation summary document that will reflect the issues discussed and the viewpoints of working group members, technical advisors and observers. The final deliverable will not be completed and posted on the website until working group representatives agree that it adequately reflects the range of their stated views

**Timeframe:**

- The consultation summary report is targeted for completion by the end of July.



## **APPENDIX A-6: SLIDES USED IN PUBLIC CONSULTATION**

This Appendix contains a list of the key slides that were used during the consultation process. The slides have been organized by topic. A full list of presentation slides used during meetings can be found on the OPA website.



### OPA's Role, Scope of Analysis, Consultation and Decision Making Process



### The Role of the Ontario Power Authority

- The Ontario Power Authority was formed in December 2004
- One of the reasons it was formed is to fill a gap in electricity planning
- OPA's mandate is to:
  - Address supply adequacy by preparing plans
  - Contract for new generation and conservation if required
  - Oversee the development of conservation programs in Ontario



### OPA's Contribution in York Region

- The OPA will identify a broader range of options and evaluate them – generation, distribution, transmission and conservation
- The OPA will consult with you, complete its own analysis, and ultimately make recommendations to the Ontario Energy Board
- The OPA does not have a vested interest in any particular solution; have not yet reached specific conclusions, but we are determined to recommend a solution

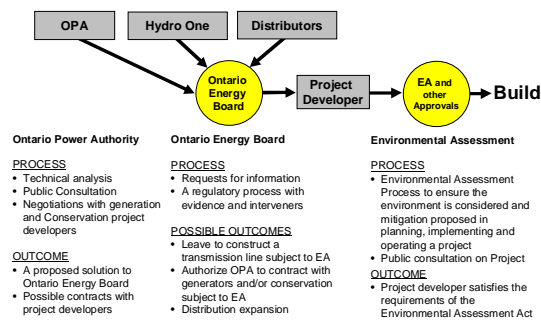


### We Are Aware of Some of Your Concerns - Health, Environment and Property Values -

- Here is what OPA can do
  - Expand options by contracting for generation and conservation
  - Participate in OEB process providing evidence and recommendations
  - Hold an effective / transparent / comprehensive consultation process
  - Recognize that there are costs, not all known in advance, associated with legislative requirements including the Environmental Assessment Act
  - Capture this cost uncertainty in planning
- OPA can't do what is outside of their mandate
- The Environmental Assessment Process is where the project developer will be required to address issues raised by the community (such as health, environmental and property values)



### Where are Decisions Made?



### What will the Public Consultation Cover?

- Receive advice related to:
  - Defining feasible options
  - Evaluation criteria
  - Evaluating options
  - Focusing on recommendations



#### 4 Ways to Contribute

1. Email us your comments
2. Participate in public meetings
3. Join the working group
4. Observe working group sessions

Northern York Region Electricity Supply Study - 7 - Exhibit A: Consultation Report



#### Here's what the Working Group will do

- Provide advice as OPA conducts its assessment on:
  - Defining feasible options to meet need
  - Evaluation criteria
  - Evaluating options
  - Arriving to recommendations
- Listen to all viewpoints
- Develop a summary consultation report which captures all viewpoints (including dissenting opinions)

Northern York Region Electricity Supply Study - 9 - Exhibit A: Consultation Report



#### Proposed Makeup of the Working Group

##### York Community

- Markham Resident
- Aurora Resident
- Newmarket Resident
- Richmond Hill Resident
- Vaughan Resident
- King Township Resident
- Whitchurch-Stouffville Resident
- East Gwillimbury Resident
- Catholic School Board
- Public School Board
- Environmental Interest Group

##### York Business

- Real Estate Developer
- Large Commercial or Industrial Customer
- Small Business / Chamber of Commerce

##### York Regional Government

- York Region Planning Department

##### Municipal Government Officials

- Town of Richmond Hill
- Town of Newmarket
- City of Vaughan
- Town of Aurora
- Town of Markham
- Township of King
- Town of Whitchurch Stouffville
- Town of Georgina
- Town of East Gwillimbury

##### Technical Advisors to Working Group

- OPA technical consultants
- PowerStream Inc.
- Aurora Hydro
- Newmarket Hydro
- Hydro One
- Independent Electricity System Operator
- Others with specific expertise in generation and conservation options

Northern York Region Electricity Supply Study - 8 - Exhibit A: Consultation Report



#### Major Milestones for York Region Initiative Dates are Tentative and Are Subject to Change

May	<b>Public Meetings (Launch) in Two Locations</b>
Late May	<b>Receive RFI responses</b>
Mid June – End of July	<b>Working Group Sessions</b>
Early July	<b>Procedural Order from Ontario Energy Board</b>
July 8	<b>Municipal Review Forum (Preliminary Findings)</b>
July	<b>Decision for next steps on Generation and DR RFI</b>
August 17	<b>Municipal Review Forum (Working Group Summary)</b>
Late August	<b>Draft OPA Report released for comment</b>
Early September	<b>Public Meeting – Consultation Summary</b>
Mid-September	<b>Finalize OPA Report and submit to OEB</b>

Northern York Region Electricity Supply Study - 10 - Exhibit A: Consultation Report



### Time Horizon for Analysis



### Issues to Consider with Respect to Choosing Time Horizon

- Options have different time horizons
- Progressively higher uncertainties in forecast load growth and system changes beyond 10 years
- Minimum lead times to install practical facilities range from 1 to 5 years



### OPA Recommended Time Horizon

- Alternatives (comprised of one or more options) should serve York Region's needs for a minimum of 10 years
- Capabilities beyond the 10 year horizon should be considered as an additional attribute along with other attributes



### Time Horizon for Analysis Working Group Recommendation

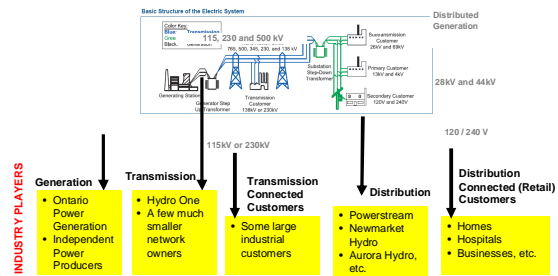
- Planning should take into consideration short-term, mid-term and long-term considerations
  - Short-term (up to 2010): Special attention to ensure that solutions meet urgent needs by required timelines
  - Mid-term (up to 2015): Develop solutions and plan for implementation
  - Long-term (up to 2020+): Alignment with Provincial plan, attention to siting considerations for long-term plans

**OPA is in agreement with the Working Group's Recommendations**

## Electricity Supply Primer

## Overview of Electricity System

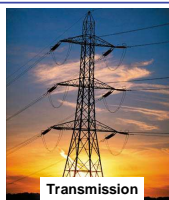
(Source: US / Canada Task Force Final Report on August 14, 2009 Blackout)



Northern York Region Electricity Supply Study - 15 - Exhibit A: Consultation Report

Northern York Region Electricity Supply Study - 16 - Exhibit A: Consultation Report

## What is the Difference in Use Between Transmission and Distribution Lines?


**Transmission**

Approx. 100 km

115, 230 and 500 kV

Approx. 100s MW

Approx. 2% over 100 km

Max Distance to Transport Electricity

Operating Voltage

Load Meeting Capability

Losses


**Distribution**

Approx. 20 km

28 and 44 kV

Approx. 20 MW

Approx. 5% over 20 km

Northern York Region Electricity Supply Study - 17 - Exhibit A: Consultation Report

Northern York Region Electricity Supply Study - 18 - Exhibit A: Consultation Report

## The Importance of Voltage Stability and Reactive Power

- We need to maintain voltage because:
  - Low voltage can cause system instability and collapse
  - High voltage can exceed the insulation capabilities of equipment and cause equipment damage
- The way to maintain voltage is to supply reactive power to support the voltage where it is needed
- Sources of reactive power include: capacitor banks and some generators

## Capability of Lines and Transformers

- When transmission lines are overloaded they will sag below a safe level
- Transformers are critical equipment that can be easily damaged by overloading (overheating)
- Damaged transformers must be replaced (this can take weeks)



Northern York Region Electricity Supply Study - 19 - Exhibit A: Consultation Report

Northern York Region Electricity Supply Study - 20 - Exhibit A: Consultation Report

## What Causes Lines to Go Down

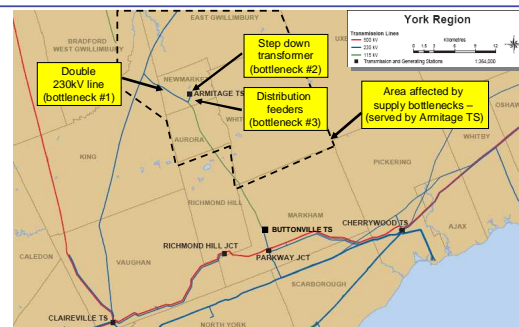


- Fires
- Ice Storms
- Car accidents
- Vandalism
- Tree Branches
- Lightning
- Squirrels & raccoons



Northern York Region Electricity Supply Study - 21 - Exhibit A: Consultation Report

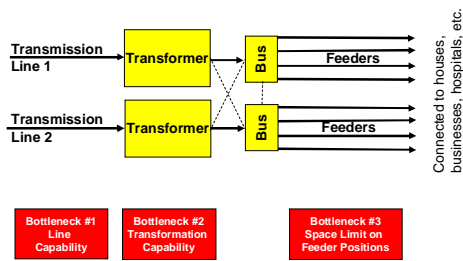
## Overview of York Region System



Northern York Region Electricity Supply Study - 22 - Exhibit A: Consultation Report



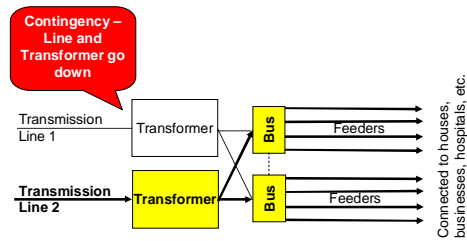
### Reliability through Redundancy Typical Design of Transformer Station



Northern York Region Electricity Supply Study - 23 - Exhibit A: Consultation Report



### Reliability through Redundancy Contingency Occurs

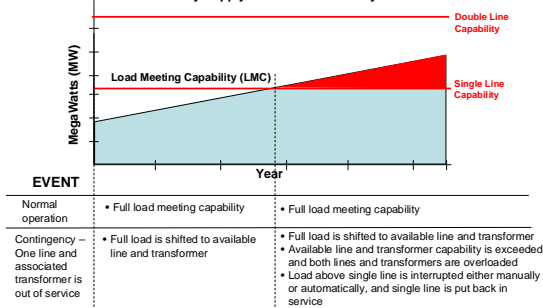


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### Reliability through Redundancy

Peak Demand of Electricity Supply into Area Served by Transformer Station



Northern York Region Electricity Supply Study - 25 - Exhibit A: Consultation Report



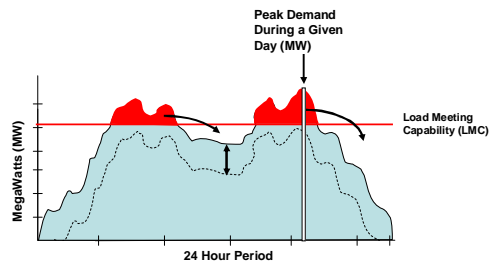
### How Does Local Generation Help?

- Reduces the amount of power that needs to be brought into the area through transmission lines
- Takes the pressure off lines that are operating near capacity
- Provides better contingency response when loss of all transmission supply

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### How Does Demand Response and Conservation Help?



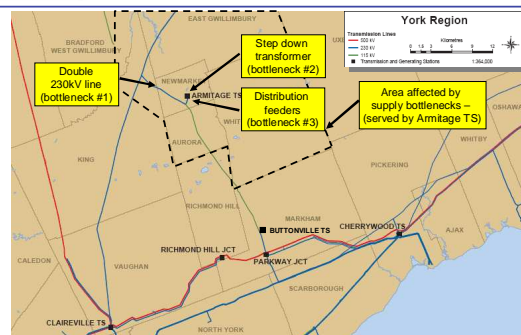
Demand Response: Shifts load from peak to off-peak hours  
Conservation: Encourages reduction of usage in general

Northern York Region Electricity Supply Study - 27 - Exhibit A: Consultation Report

### Load Meeting Capability of Existing Infrastructure

- Transmission line capability
- Transformation capacity
- Distribution feeder capacity and geographic coverage

### Location of Supply Facilities



### Transmission Capability Event: One line (B82V or B83V) out of service

- Thermal (overheating) capability of main lines will not be a problem in near future
- but “line taps” to Armitage TS in Newmarket are only good for 470MW from an overheating point of view
- and lines have voltage problems and can supply only 375 MW to Armitage TS

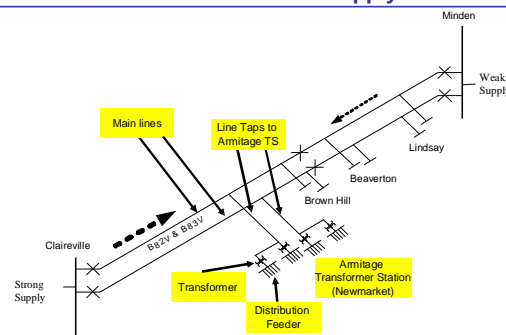
**Bottleneck #1: Current Load Meeting Capability of Lines going into Armitage TS is 375 MW**

### Transmission Capability Event: One line (B82V or B83V) out of service

- Thermal (overheating) capability of main lines will not be a problem in near future
- but “line taps” to Armitage TS in Newmarket are only good for 470MW from an overheating point of view
- and lines have voltage problems and can supply only 375 MW to Armitage TS

**Bottleneck #1: Current Load Meeting Capability of Lines going into Armitage TS is 375 MW**

### Existing Supply Facilities Claireville-Minden Supply Corridor



### Transmission Capability Event: One line (B82V or B83V) out of service

- The 2003 Armitage TS summer peak load was 358 MW (of which 30 MW is supplied from the Keele Valley NUG) compared to the 375 MW voltage problem limit – with NUG running an additional 47 MW could have been carried at the summer 2003 peak
- The consequence of exceeding a 375MW peak load at Armitage TS may be that a certain amount of load will have to be interrupted to avoid voltage collapse

**Bottleneck #1: Existing transmission capability will be inadequate if summer peak increases**

### Transformer Capacity Event: One line (B82V or B83V) out of service

- One line outage will cause one pair of transformers to be out of service
- Firm capacity of the remaining pair of transformers before thermal overloading (overheating) is 317 MW
- The 2003 Armitage TS summer peak load was 358 MW (328 MW with NUG in operation), both in excess of the 317 MW overheating limit

**Bottleneck #2: Transformer Capacity at Armitage TS is already exceeded**



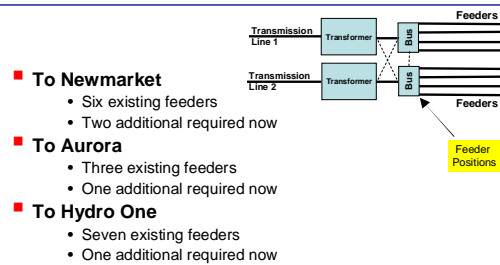
### Transformer Capacity Event: One line (B82V or B83V) out of service

#### Bottleneck #2: ACTION TO BE TAKEN NOW

- To protect transformers from damage or burnout, load will have to be reduced through local rotating blackouts during single line outages in peak load conditions



### Distribution Feeders Capacity & Geographic Coverage



**Bottleneck #3: Feeder positions at Armitage TS have all been used up (4 new feeder positions required now)**



### Distribution Feeders Capacity & Geographic Coverage

- Space limitation does not allow future expansion of feeders from Armitage TS
- Limited transformer capability makes the supply of additional feeders from Armitage TS impractical
- Armitage TS is distant from several high load growth areas

**Bottleneck #3: Expanding Armitage TS to alleviate Bottleneck is impractical**



### Capability of Existing Supply Status Quo Summary

- **Bottleneck #1:** Transmission line voltage collapse problems are imminent if load exceeds 375 MW – some customers will have to be interrupted
- **Bottleneck #2:** Transformation capacity is exceeded now
- **Bottleneck #3:** Distribution feeder capacity and geographic coverage requirements are not met now

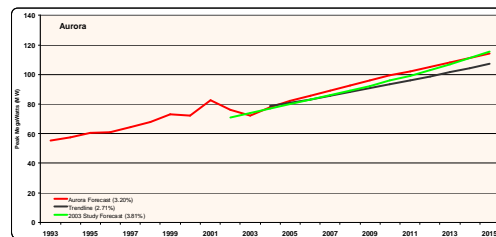
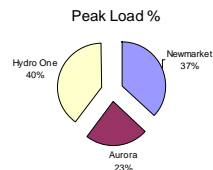


## Load Forecast Review

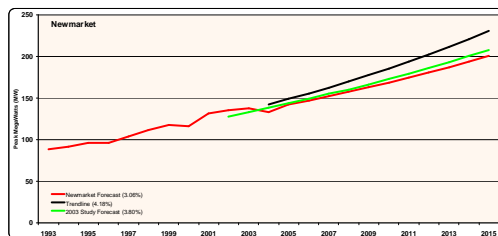
- Economic activity
- Demographic growth
- Electricity prices
- Conservation related policies
- Weather

- Trend Analysis
- End-Use Analysis
- Macro-Economic Analysis

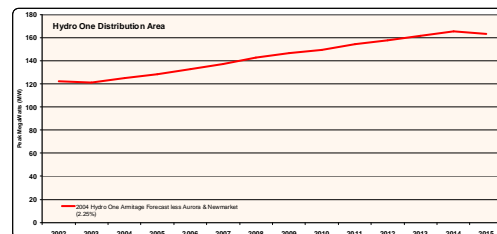
- Conservation/Demand Management (CDM)
  - Some difficulty in incorporating impact of new programs into forecasts
  - Uncertain impact of new programs represents a risk in forecasting demand
  - Probable downward pressure on demand
- Effects of future energy pricing
  - Not included in existing forecasts
  - Future electricity prices unknown
  - Probable downward pressure on demand
- Weather (temperature) Variations
  - Not included in existing forecasts
  - Addresses fluctuations that affect demand
  - Represent a risk during weather extremes



Load growth in Aurora could be up to 3% per year



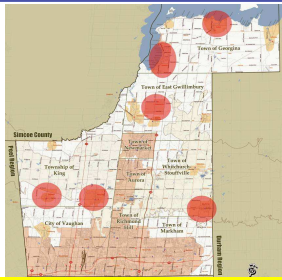
Load growth in Newmarket could be up to 3.5% per year



Load growth in Hydro One Distribution serviced areas could be up to 2% per year



## Hydro One Growth Areas



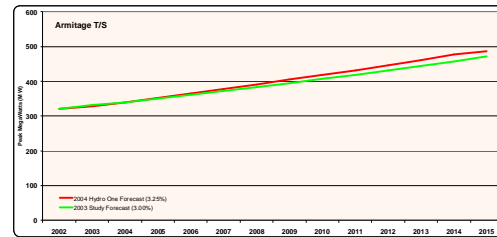
Growth is occurring in pockets throughout the York Region. Facilities must be designed to get power to new pockets efficiently

Northern York Region Electricity Supply Study - 48 -

Exhibit A: Consultation Report



## Available Armitage Forecasts



Load growth in the Armitage TS service area could be up to 3% per year

Northern York Region Electricity Supply Study - 49 -

Exhibit A: Consultation Report



## Weather Impacts on Forecast

- Trend Analysis assumes "averaged" weather patterns
- Extreme or prolonged heat will increase load requirements above historic trend
- Independent Electricity System Operator data shows increases of up to +12% in summer peaks for the province based on weather

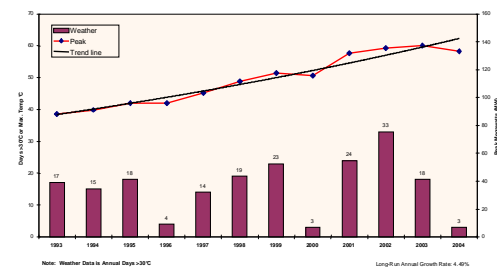
Forecasts could fluctuate up to 12% from the "average" forecast due to extreme weather – this could increase the urgency of a need by several years

Northern York Region Electricity Supply Study - 50 -

Exhibit A: Consultation Report



## Correlation of Weather to Peak Demand in Newmarket



As temperature increases peak load goes up

Northern York Region Electricity Supply Study - 51 -

Exhibit A: Consultation Report



## Weather Impacts - Summary

- To avoid distortion of the average long term picture, weather effects are generally not embedded in forecasts
- The increased demand resulting from hot weather should be taken into account when evaluating the gap between supply capability and demand. It can change need dates by a number of years

Northern York Region Electricity Supply Study - 52 -

Exhibit A: Consultation Report



## Conservation/Demand Management (CDM) Impacts on Forecast

### Conservation / Demand Management Review of Existing Programs

- The Ontario Energy Board has recently approved a set of CDM initiatives being executed by Distributors aimed at producing significant reductions in electricity demand

Northern York Region Electricity Supply Study - 53 - Exhibit A: Consultation Report



## CDM Is New to the Region

- Driven by province-wide potential shortfall in generation resources
- 2 key initiatives
  - 5% reduction in peak demand by 2007 through conservation and demand management programs
  - Smart meters

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## Distribution Companies Have Support

### Building on:

- A good base of federal programs
- An established CDM industrial infrastructure
- Experience elsewhere (Canada and abroad)

Local Distribution Companies have reasonably comprehensive plans

Northern York Region Electricity Supply Study - 55 - Exhibit A: Consultation Report



## Distribution Company Programs Residential and Small Commercial

Program Type	PowerStream	Aurora	Newmarket	HydroOne
Co-branded mass market program (education and promotion)	Program	Program	Program	Program
Smart meter	Pilot	Pilot	Program	Program
Interval Metering				Pilot
Design advisory (audits/retrofit)	Program		Program	
Load control	Program		Pilot (gateway-complete)	Program
Socialism income assistance	Program	Program	Program	Program
ML upgrade		Pilot		
Residential real time monitoring				Program

Northern York Region Electricity Supply Study - 57 - Exhibit A: Consultation Report

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## Distribution Company Programs Commercial, Industrial and Institutional

Program Type	PowerStream	Aurora	Newmarket	HydroOne
SMART meters	Program		Program	Program
Interval Metering				Pilot
Time-of-Use				Pilot
Energy audits and retrofits	Program		Program (Ecosystem)	
Leveraging conservation and LM programs	Program			
Demand response	Program			
Design advisory	Program	Program		
Big Box retailer retrofit		Pilot		
AC conditioner upgrade		Pilot		
Manufacturing energy upgrade		Pilot		
Power factor corrections		Program		
Institutional		Program	Program	
Festive lights		Pilot		
Load Control/Management			Program (Ecosystem)	Program
Farm Energy efficiency				Program
Distributed Energy	Program			
Standby Generators	Pilot			

Northern York Region Electricity Supply Study - 58 - Exhibit A: Consultation Report



## But There Are Issues ...

- Initial funding is limited, and short term
- Longer term support is not clear
- Smart meter plan is not yet approved by government

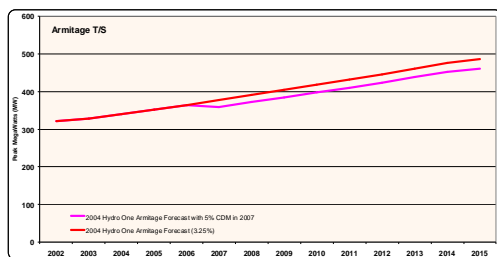


## CDM Programs Impact on Forecast - Summary

- Based on the assumption that the provincial government goal of a 5% reduction in demand by 2007 will be achieved, that reduction will be shown in the forecast
- Given that there is some risk of not achieving the goal, that risk must be recognized when using the forecast



## Adjusted Armitage Forecast

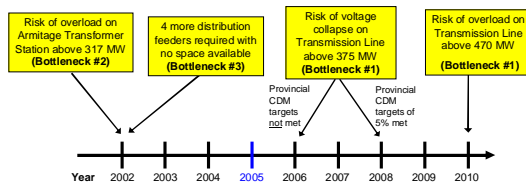


Overall forecasts have been reduced to reflect the targets for Conservation Demand Management programs of 5% by 2007

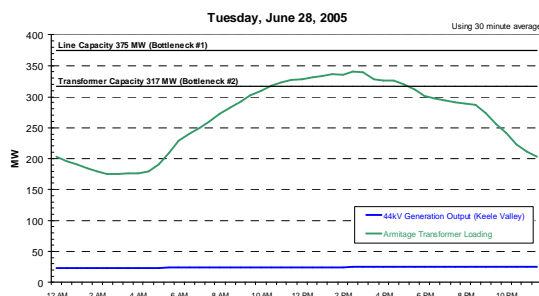
### York Region Need

- The high voltage lines, transformer station, and low voltage feeders supplying Newmarket, Aurora, and northern York Region are operating near to or beyond capacity, and can not cope with future load growth

### Timeline of Bottlenecks in Existing System



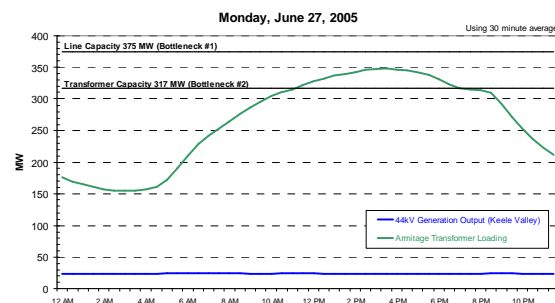
### 230 kV Line & Transformer Loading at Armitage



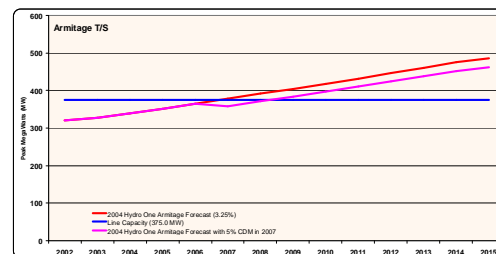
### Transmission Line Capability Gap Event: One line (B82V or B83V) out of service

- Line capability exceeded in 2006, or 2008 if CDM effective
- Increased risk of local blackouts unless remedial actions taken
- Up to 50% of load might be shed in the event of a line outage

### 230 kV Line & Transformer Loading at Armitage

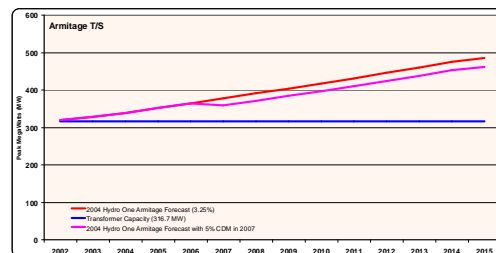


### Transmission Line Capability Gap Event: One line (B82V or B83V) out of service



Bottleneck #1: A gap in transmission line capability will exist in 2008 based on average weather

### Armitage Transformers Gap Event: One line (B82V or B83V) out of service



Bottleneck #2: A gap in Transformer capability exists today



### Armitage Transformers Gap Event: One line (B82V or B83V) out of service

- Transformers are subject to overloading now
- Consequence may be rotational blackouts to parts of York Region in the event of a line outage



### Feeder Adequacy Gap (existing)

- Hydro One needs one new feeder
- Aurora needs two new feeders
- Newmarket needs one new feeder

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### Feeder Adequacy Gap

- Some feeders are required now
- At least 8 new feeders will be required over the next 10 years
- Station (source) locations must be close to load growth areas to reduce losses

Northern York Region Electricity Supply Study - 71 - Exhibit A: Consultation Report



### Timing Issues

- Hot weather may create higher peak demands than average forecasts suggest
- Transmission projects require a 3 to 5 year lead time and
- Transformer station projects require a 1 to 5 year lead time

Northern York Region Electricity Supply Study - 72 - Exhibit A: Consultation Report



### Load Supply Standards for Armitage Area

- Infrastructure to maintain reliable supply even if a contingency occurs
  - e.g. the loss of a key 230 kV transmission line and the connected transformers
  - This supply criterion is commonly known as "first contingency loss criterion" and is adopted by all power utilities in well developed countries worldwide
  - Electricity flow in the remaining 230 kV transmission line and the connected transformers must not cause overload (overheating).
  - Maintain voltages after contingency to protect system integrity and continuous load supply.

Solutions must allow for the single largest contingency to occur without service interruption.

Northern York Region Electricity Supply Study - 74 - Exhibit A: Consultation Report

### Overview of RFI Process and Received Responses for Generation and Demand Response

### Overview of Process

- Two RFI (request for information) letters were issued on May 2, 2005
- Purpose to sound out market, determine level of interest, collect information
- RFI not a solicitation
- All of OPA's options are still open
- Response deadline was at the end of May
- OPA is holding off on making a decision about next steps until working group provides its input
- OPA legally obligated to treat the information received from respondents as confidential (nothing can be said that will compromise the respondents' market or competitive position)
- Contract will be based on Clean Energy Supply Contract

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Northern York Region Electricity Supply Study - 76 - Exhibit A: Consultation Report

### Minimum Requirements for Generation

- Firm capacity required
  - Means largest generating unit unavailable and still able to meet minimum requirement
  - Minimum 60 MW if connected to 44 kV
  - Minimum 140 MW if connected to 230 kV
- Connection requirements
  - Can connect to 230 kV or 44 kV
  - Must connect to existing 230 kV line outlined in yellow on next slide
  - New line taps are acceptable but should not exceed 15 km
  - Must adhere to existing standards
  - Cost of new taps and connections is the responsibility of the operator
- Must participate in IESO-administered market to derive the majority of its revenues

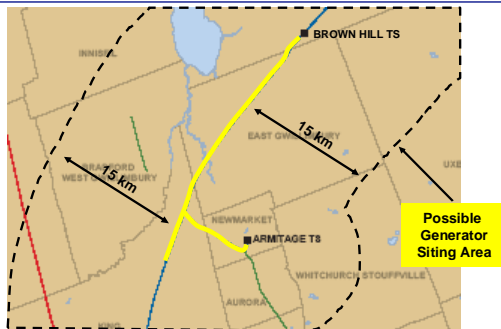
Northern York Region Electricity Supply Study - 77 - Exhibit A: Consultation Report

### Minimum Requirements for Generation

- Reliability
  - 230kV connected generation must be connected to both lines so that if one line goes out of service – generation remains available
  - 44kV connected generation must demonstrate they have firm capacity considering possible feeder outages
- Fuel Type
  - Can not be coal
- In-Service Date
  - December 1, 2006 or earlier (preference)
- Regulatory Requirements
  - Environmental Assessment and Approvals
  - Connection Assessment and Approval
  - Customer Impact Assessments
  - Municipal Approvals
  - Connection Code requirements

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### Possible Generation Location



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### Minimum Requirements for Demand Response

- Capacity requirements
  - Over 1 MW
  - Must be during summer and winter peak load periods in Armitage TS service area
- Existing Local Distribution Company programs do not qualify
- Reductions must be verifiable through random audits
- Must be able to respond to high prices and operational directives by the Independent Electricity System Operator

Northern York Region Electricity Supply Study - 80 - Exhibit A: Consultation Report



#### Minimum Requirements for Demand Response

- Must compete with generation and transmission options – therefore must derive a significant portion of its revenues from the consumers benefiting from the reductions
- Types of projects
  - Load shifting
  - Load interruptions
  - On-site generation from clean fuels
- In service date of December 1, 2006 or earlier (preference)

Northern York Region Electricity Supply Study - 81 -

Exhibit A: Consultation Report



#### Overview of Generation RFI Responses

- Eight respondents (major participants in the energy sector with proven track records)
- Fuels - diesel, biogas and natural gas.
- Range of project sizes including potential facilities well under the 140 MW level and several hundred MWs above 140 MW level
- All proposed credible / commercially available technologies
- Pricing not in scope and not received
- Responses indicated - December 2006 is achievable
- Respondents indicated flexibility in connection possibilities

Northern York Region Electricity Supply Study - 82 -

Exhibit A: Consultation Report



#### Overview of Demand Response RFI Responses

- Nine respondents (participants in various aspects of the “demand reduction” sector in North America)
- Broad range of alternatives was discussed in the different responses - greater degree of specificity would be required in the procurement process should the OPA decide to move the process further
- The responses to the RFI contemplate the use of various technologies of varying levels of development and acceptance in the sector
- Pricing not in scope and not received
- Responses indicated - December 2006 is achievable

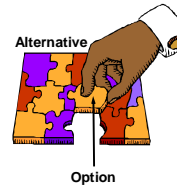
Northern York Region Electricity Supply Study - 83 -

Exhibit A: Consultation Report



## Alternatives to Meet Need

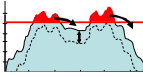
## Definition of Alternatives and Options



- An “alternative” is capable of reliably meeting the forecast load demand to at least 2015
- An “option” is a component of an alternative, since some individual options are only capable of relieving some bottlenecks
- While some options compete with one another, most are complementary

## Categories of Identified Options

- Conservation & Demand Management (CDM)



- Distribution



- Transmission



- Generation



## Proposed Alternatives

### Alternative 1:

- Initiate aggressive CDM programs targeting to eliminate the need for a new transmission line and to partially reduce the need for new transformer capacity.

### Alternative 2:

- Build new TS and install capacitors at Armitage TS as soon as possible to meet urgent needs
- Initiate aggressive CDM programs with a goal to allow infrastructure to meet the need for as long as possible
- Trigger construction of a generator with sufficient lead time (2 years) to ensure that CDM adjusted load forecasts will be met

## Proposed Alternatives

### Alternative 3:

- Build new TS and install capacitors at Armitage TS as soon as possible to meet urgent needs
- Initiate aggressive CDM programs with a goal to allow infrastructure to meet the need for as long as possible
- Trigger construction of a transmission line and new TS with sufficient lead time (3 - 5 years) to ensure that CDM adjusted load forecasts will be met

#### Key working group recommendations:

- Common need in all alternatives for a new TS, capacitors at Armitage TS and aggressive CDM
- Monitor CDM results to defer or eliminate the need for major reinforcement projects



### CDM in York Region



### York Region Characteristics

- Will need about 130 MW of new capacity in the next 10 years
- Approx. 30-35% of capacity from new housing
- On average 10,700 new housing starts per year from 2001 to 2011 – actual and forecasts
- The peak 10% of the demand typically lasts about 5% of the time in the summer or about 100 hours
- Environmentally conscious culture as demonstrated through Oak Ridges Moraine and Greenbelt Acts

York Region is an ideal area to use as the incubator for CDM within Ontario

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Northern York Region Electricity Supply Study - 90 - Exhibit A: Consultation Report



### OPA will Partner with Others to Achieve Results

- Private Sector
- Local Distribution Companies
- Municipalities
- Ministries / Regulatory Agencies



### OPA Partnering with Private Sector

- Province-wide procurement process for Combined Heat and Power Projects
- Procurement Process for CDM for York Region
- OPA looking at developing an expanded demand response program for Ontario

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Northern York Region Electricity Supply Study - 92 - Exhibit A: Consultation Report



### OPA Partnering with Municipalities through Building Permits

- Ontario Building Code - Part 9 – New Residential
  - Energy Star for New Homes
  - GOAL: 1000 kWh savings per year per house
- Ontario Building Code - Part 3 – Commercial
  - Commercial Building Incentive Program
  - GOAL: 25% better than OBC
- Ontario Building Code - Part 11 - Renovations
  - Set energy efficiency targets for improvements

Municipalities within York Region are encouraged to be the first in Ontario to implement these programs for all projects and enforce through permitting



### OPA Partnering with LDCs - Additional Potential CDM Programs -

- Air Conditioner Exchange
  - Toronto Hydro / Home Depot
- Refrigerator Exchange
  - Ottawa Hydro
- Cool Shops
  - Power Stream / Markham District Energy Office
  - Other Locations
- Air Conditioner Control
- Energy Star for New Homes

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Northern York Region Electricity Supply Study - 94 - Exhibit A: Consultation Report



#### OPA Partnering with Ministry of Energy and Ontario Energy Board

- Work with the Ministry of Energy and Ontario Energy Board to ensure long-term funding of CDM through LDCs



#### Objective of OPA's CDM Program for Northern York Region

- As much economic conservation and demand management as possible
- Should achieve a demand reduction of at least 20MW from current projected base level by 2011
- Achievements beyond this level that are economic will be aggressively pursued
- OPA will either pursue itself through contracting or partner with LDCs to supplement their CDM programs

Northern York Region Electricity Supply Study - 95 - Exhibit A: Consultation Report



#### OPA Efforts for Northern York Region

- Load control programs through aggregators (e.g. A/C cycling program)
- AC upgrade and appliance exchange programs
- Low income housing and institutional buildings electricity efficiency improvement programs (funding of audits)
- Distributed energy and standby generator programs
- Energy Star program for new homes
- Conservation program modelled after the "20/20" program in California under consideration (customized for Northern York Region)



#### Timing of CDM Programs for Northern York Region

- As soon as possible
- Desirable to have some demand response / control programs in place before the summer of 2006
- Consideration to phasing in new types of CDM programs to ensure proven technology, customer acceptance and proven administration
- Program achievements will be tracked at least annually to allow for adjustments to demand forecasts

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Northern York Region Electricity Supply Study - 98 - Exhibit A: Consultation Report



## Distribution Options

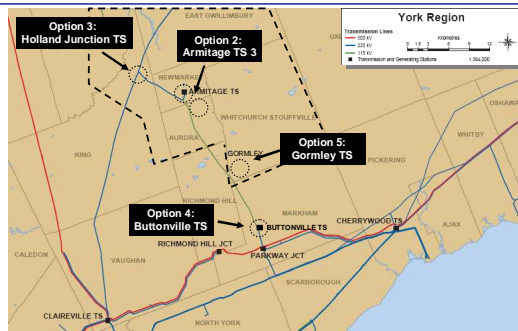


## Summary of Identified Options CDM and Distribution

Option	Option Name	Source	Notes
2	Armitage TS3 + Caps (Newmarket / Aurora)	OPA / Aashle Chan	Building new TS near Armitage TS. Increased capability by 130 MW.
3	Holland Junction TS + Caps	OPA	Increased capability by 140 MW.
4	Buttonville TS	OPA	Build new Buttonville TS 2 at existing site.
5	Gormley TS	OPA	Limited to 160 MW.



## Distribution Options



## Collective LDC Submission to the Ontario Energy Board Comparison of Buttonville TS vs. Holland Junction TS

Attribute	Buttonville TS (Southern Most Location)	Holland Junction TS (Northern Most Location)
Average feeder lengths	20-25 km	10 km (typical)
Reliability of supply	Lower by about 250% (due to longer feeder lengths)	Typical
Lead time required	>2 years	>1.5 year
Load serving capability (With and without Keele Valley NUG)	2015, 2012	2014, 2011
Estimated feeders and associated equipment costs	\$47M to \$57 M (depending on ROWs, O/H and U/G)	\$14 M
Incremental distribution peak losses	9 MW	-
Estimated annual cost of incremental distribution losses	\$1 M/year	-

(Based on the Report from the three LDCs to OEB dated June 27, 2005)



## Collective LDC Submission to the Ontario Energy Board Comparison of Northern Distribution Options

Attribute	Holland Junction	New Market	Aurora	Gormley
Reliability of supply	typical	Typical	typical	Lower by about 100% (due to longer feeder lengths)
Lead time	>1.5 year	>1.5 year	>1.5 year	>1.5 year
Estimated feeder and associated equipment costs	\$14 M	\$13 - \$15 M	\$16 - \$18 M	\$22 M
Load serving capability (with and without NUG)	2011, 2014	2010, 2013	2010, 2013	2012, 2015
Incremental peak losses	-	-	-	5-6 MW (\$500K/year)

(Based on preliminary information from the three LDCs)



## Summary of Comments on Distribution Option Evaluation from Working Group

Ranking: 1=best, 3=worst	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Capacity (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Distribution							
Armitage TS3 + Caps (Newmarket/Aurora)	2	2	2	2	2	2	2
Holland Junction TS + Caps	1	1	1	1	1	1	1
Buttonville TS	3	3	3	3	3	3	3
Gormley TS	3	3	3	3	3	3	3

### Highlights of Holland Junction TS:

#### Social, Economic and Environmental Impacts (Rank =1):

- Away from high-density areas;
- Unlikely to cause concern with public with respect to EMFs
- Concern about visual impact that may be able to be mitigated
- Likely On existing ROW and far enough away from land used for crops

#### Feasibility (Rank = 1):

- Able to alleviate bottlenecks #2 and #3, close to new load pockets
- Does not require the upgrade / new transmission lines

#### Affordability (Rank = 1):

- Least cost option along with Newmarket (\$14M)



### Summary of Comments on Distribution Option Evaluation from Working Group

Ranking: 1=Best 3= Worst	Social, Economic & Environmental Accessibility	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Armitage TS & Tap Line to Armitage	2	2	2	2	2	2	2
Holland Junction TS & Tap Line	2	2	2	2	2	2	2
Buttonville TS	2	2	2	2	2	2	2
Scarboro TS	2	2	2	2	2	2	2

#### Highlights of Holland Junction TS - continued:

##### Reliability (Rank = 1):

- Does not rely on Tap Line to Armitage
- Close to new loads allowing for short feeder lengths

##### Certainty (Rank = 3):

- Not as certain as Buttonville site
- Some uncertainty with respect to joint easement by Ontario Federation of Naturalists

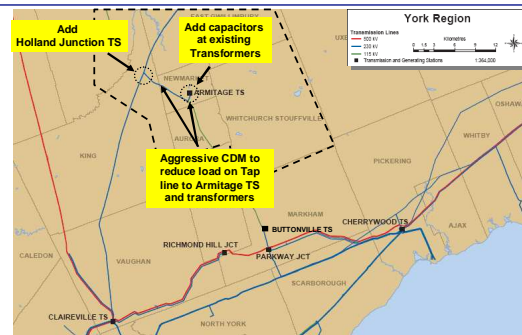
##### Alignment with Other Regulations / Long-Term Planning (Rank = 1):

- At par with other options

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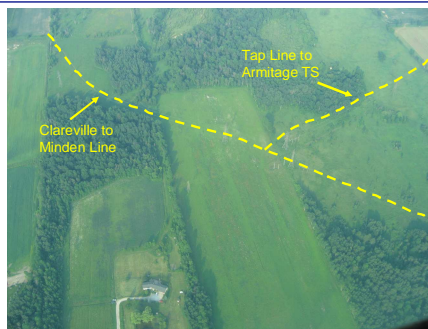
### Soliciting Feedback for Phase 1 Resolution



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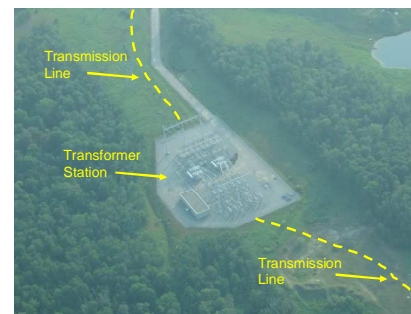
### Holland Junction Where is Holland Junction?



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### Brown Hill TS An Example of how Holland Junction TS might look



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## Transmission Options

## Summary of Identified Options Transmission Options

#	Transmission Option Name	Major Facility	Source of Option	ROW
6	230 kV Lines from Buttonville to Armitage	24 km of overhead and/or underground lines	OPA	ROW #3 Existing
7	115 kV lines from Buttonville to Armitage	24 km of overhead and/or underground lines	OPA	ROW #3 Existing
8	230 kV lines from Buttonville to Gormley	10 km of overhead and/or underground lines	OPA	ROW #3 Existing
9	Existing Corridor O/H Parkway to Armitage	25 km of overhead lines	Markham A1	ROW #3 Existing
10	Existing Corridor O/H and Underground Parkway to Armitage	25 km of overhead and Underground lines	Markham A2	ROW #3 Existing
11	Existing Corridor AC/DC Parkway to Armitage	25 km of AC/DC multi-cct overhead lines and AC/DC converter stations	Markham A3	ROW #3 Existing
12	404 Corridor Parkway to Armitage	30 km of overhead and underground lines	Markham B1	ROW #2 New
13	Existing Corridor Chaireville to Armitage	44 km of overhead lines next to existing Chaireville-Armitage line	Markham C1	ROW #1 Existing
14	Existing Corridor Chaireville to Armitage with FACTS	Reconductor 44 km of lines with high capacity conductors and install Flexible AC Transmission System (FACTS)	Markham C2	ROW #1 Existing

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## Summary of Identified Options Transmission Options

#	Transmission Option Name	Major Facility	Source of Option	ROW
15	400 Corridor Chaireville to Armitage	49 km of overhead and underground lines	Markham D1	ROW #4 New
16	427 Corridor Chaireville to Armitage	46 km of overhead and underground lines	Markham E1	ROW #7 New
17	115 kV Corridor Essa to Armitage	55 km of overhead lines 230 kV facilities at Essa	Markham F1	? New
18	Corridor #2 (Go Transit) Essa to Armitage	62 km of overhead lines 230 kV facilities at Essa	Markham G1	ROW #6 New
19	Corridor #3 Essa to Armitage	55 km of overhead lines New 500/230 kV station	Markham H1	? New
20	Chaireville to Kleinburg to Armitage	48 km of overhead lines	Markham I1	ROW #5 New
21	Cherrywood to Armitage	37 km of overhead lines	Markham J1	? New
22	230 kV Tap Upgrade and Extension	•Reconductor Tap from Holland Marsh Junction to Armitage TS. •Extend line if Armitage TS3 is built	OPA	ROW #1 Existing
23	Long Term GTA Bypass	Multi-stages, 500/230 Lines and a new 500/230 kV station	Markham L1	ROW #8 New

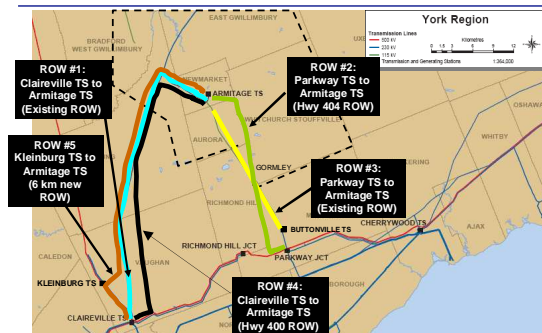
## Summary of Identified Options Options Combine Together to Make Alternatives

#	Transmission Option Name	Major Facility	Source of Option	New ROW
24	Highway 9 New TS to Armitage and existing 115 kV Buttonville Line	•New 500/230 kV TS •27 km of 230 kV overhead line to Armitage  Short-term relief: •Refurbishing existing Buttonville line •230/115 kV Auto •115/44 kV 20 MVA transformer	Robert Jones	ROW #9 New

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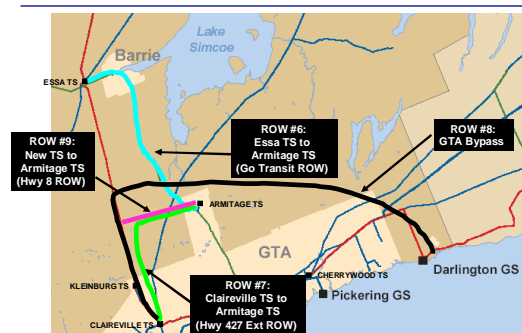
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## Proposed Transmission ROW Options



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## Proposed Transmission ROW Options



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## Ministry of Transportation Comment on 400 Series Highway ROWs

- ROWs are sized for highway use only (kept for future expansions)
- Maintenance of transmission lines will create otherwise unnecessary work zones (safety and traffic congestion issues)
- Danger of falling ice if lines run close to highways
- Property owners adjacent to MTO highway corridors have the same concerns as property owners elsewhere

Some representatives of working group felt that there was still a small chance that the use of such a corridor would be approved through a political decision

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## Typical Costs for Transmission Lines

- 115 kV 2-circuit line = \$0.9 M to \$1.2 M/km
- 230 kV 2-circuit line = \$1.2 M to \$1.6 M/km
- 230 kV 2-circuit cable = \$6 M/km
- 500 kV 2-circuit line = \$1.8M to \$2.5 M/km
- 230 kV AC/DC multi-circuit line = \$1.6 M to \$2 M/km
- Re-conductor with high capacity conductor = \$0.7 M to \$0.9 M/km

(Suitable only for use in high level comparison of the transmission options, ROW costs, engineering and design, contingencies not included, +/- 40% accuracy)

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### Typical Costs for Transmission Lines

#### For Option 3:

- Two 230/115 kV transformers = \$9 M

#### For Option 11:

- Two AC/DC converter stations (160 MW each) = \$100 M

#### For Option 14:

- Flexible AC Transmission System (Series capacitor) = \$20 M

#### For Options 23 and 24:

- 500/230 kV Transformer Station = \$110 M

#### For Option 24:

- One 230/115 kV transformer = \$4.5 M

(Suitable only for use in high level comparison of the transmission options, ROW costs, engineering and design, contingencies not included, +/- 40% accuracy)

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### Summary Feedback from Working Group Representatives

When asked to identify their **Top 5 Preferred Transmission Options**, working group representatives provided the following suggestions:

- Existing ROWs chosen most often
- Highway ROWs chosen by some - 404 chosen most often, Highway 9 next
- Claireville to Armitage via Kleinburg suggested by some
- Partial underground suggested by some through urban areas
- Underground costs attributed to benefiting party
- Tap Upgrade from Holland Junction to Armitage almost always chosen
- Reconductoring Claireville to Armitage (FACTS) chosen often
- Eliminate any option for new corridor >40km

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### Options Most Often Chosen from Representatives and Advisors

- Option 22 – 230 kV Tap Upgrade and Extension
- Option 6 – 230 kV Lines from Buttonville to Armitage
- Option 8 – 230 kV Lines from Buttonville to Gormley
- Option 14 – Claireville to Armitage with FACTS
- Next Four Chosen equally often
  - Options 7 – 115 kV lines from Buttonville to Armitage
  - Option 9 – O/H Parkway TS to Armitage TS
  - Option 13 – Claireville to Armitage
  - Option 12 – 404 Corridor – Parkway to Armitage

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### Decision Tree for Transmission Options

- Two key unknown decision points that must be taken into consideration in deciding on best transmission options
  - EA's Decision on Appropriate Mitigation (Underground / Overhead)
  - Ministry of Transportation's / Other's Decision approval to use ROWs
- We are seeking your input on best option at each "branch" of decision tree as well as feedback on decision points

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### Process Used for Evaluation

- Inventory options (OPA and working group generated)
- Look into feasibility of ROW use (MOT) and rough costing (OPA)
- Ask the working group to choose their top 5 options to screen out "dogs"
- Divide options into 3 categories (all underground, all overhead, partial underground)
- Evaluate each category separately to determine best option(s) in each category

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### Summary Feedback from Working Group Advisors

When asked to identify their **Top 5 Preferred Transmission Options**, working group advisors (excluding OPA's technical advisors) provided the following suggestions:

- Existing ROW preferred
- Eliminate MOT options based on feedback from ministry
- Buttonville to Armitage financially and technically optimal solution
- 115kV option is sub-optimal (surrounded by 230kV lines)
- FACTS option higher cost but chosen
- AC/DC too expensive – not chosen
- 500/230 kV transformer option super expensive

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### Screened out Transmission Options

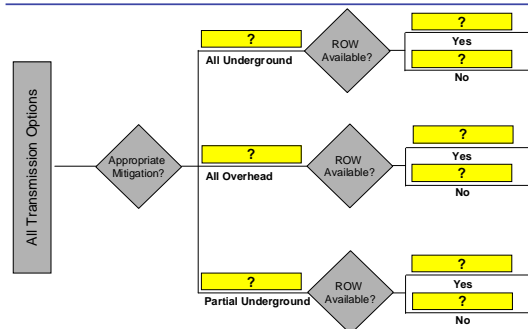
Option 15	400 Corridor Claireville to Armitage
Option 16	427 Corridor Claireville to Armitage
Option 17	115 kV Corridor Essa to Armitage
Option 18	Corridor #2 (Go Transit) Essa to Armitage
Option 19	Corridor #3 Essa to Armitage
Option 21	Cherrywood to Armitage
Option 23	Long Tern GTA Bypass
Option 24	Hwy 9 New TS with Transmission Line to Armitage

The screened out options were either not chosen or least chosen by the working group when asked to identify their top 5 choices

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### What is the Best Option for Each Branch?



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### Pros and Cons of Options Fully Underground Transmission

Ranking: 1=best, 3=worst	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Transmission Underground							
115 kV Lines from Buttonville to Armitage	1	1	2	1	1	1	1
115 kV Lines from Buttonville to Gormley	1	1	2	1	1	1	1

With lines fully underground, only the shortest options that provided diversity of supply were considered

Buttonville to Gormley is roughly half the length (and cost) of Buttonville to Armitage

Option 6 has capability of closing the loop to increase reliability for the whole region

The working group felt that Option 8 would be the best option in this category

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### Pros and Cons of Options Partially Underground Transmission

Ranking: 1=best, 3=worst	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Transmission Partial Underground							
115 kV Lines from Buttonville to Armitage	1	1	2	1	1	1	1
115 kV Lines from Buttonville to Gormley	1	1	2	1	1	1	1
404 Corridor from Buttonville to Armitage	1	1	2	1	1	1	1

#### General Observations:

- 404 Corridor option had uncertainty with respect to horizontal lines to connect with TS coupled with uncertainty with ROW approvals from Ministry of Transportation

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### Transmission Line Design Practices in Ontario Technical Exceptions

- Underground to deliver power under bodies of water too wide for overhead lines
- Underground on industrial sites to avoid hazards and obstacles
- To permit crossing of transmission lines with other transmission lines using short cable sections

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### Pros and Cons of Options Overhead Transmission

Ranking: 1=best, 3=worst	Social, Economic & Environmental Acceptability	Feasibility	Affordability	Reliability	Certainty (Minimization of Risk)	Alignment with Other Regulations	Alignment with Longer Term Planning
Transmission Overhead							
115 kV Lines from Buttonville to Armitage	1	1	2	1	1	1	1
115 kV Lines from Buttonville to Gormley	1	1	2	1	1	1	1
115 kV Lines from Buttonville to Armitage	1	1	2	1	1	1	1
404 Corridor from Buttonville to Armitage	1	1	2	1	1	1	1
404 Corridor from Buttonville to Armitage	1	1	2	1	1	1	1
404 Corridor from Buttonville to Armitage	1	1	2	1	1	1	1

#### General Observations:

- Claireville to Armitage ROW options had similar social concerns but at the same time were inferior options from a technical and cost perspective
- 115 kV option from Buttonville to Armitage had similar social concerns but at the same time was inferior from a technical perspective

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### Transmission Line Design Practices in Ontario Current & Past Practice

- All transmission lines in Ontario are built overhead unless a specific reason makes underground construction necessary
- The current transmission tariffs are designed to recover the costs of building and maintaining an overhead transmission system
- The cost of underground construction is five to ten times the cost of overhead depending on the specific circumstances

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### Transmission Line Design Practices in Ontario "Mitigation" Exceptions

- Underground where homes and businesses in built up areas would have to be displaced to provide land for overhead lines
- Underground to avoid placing transmission lines on arrival and departure flight paths for airports
- Underground for wide highway crossings where overhead lines would put vehicles at risk
- Underground to avoid congestion on city streets

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### Transmission Line Design Practices in Ontario "Mitigation" Exceptions

- "Improved Appearance" towers (steel poles) in built up areas instead of lattice towers
- Extra tall towers and extra long spans to avoid clearing vegetation in environmentally sensitive areas



### Transmission Line Design Practices in Ontario Current Process

- Established reasons for deviating from ordinary overhead are generally considered and built into new designs
- Any new reasons for mitigation would have to be directed by those accountable and qualified during an EA process
- OPA can communicate the views of the Working Group on matters of concern such as the health effects of EMF

Northern York Region Electricity Supply Study - 131 -

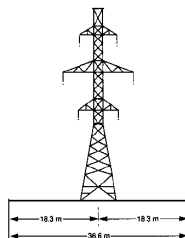
Exhibit A: Consultation Report

Northern York Region Electricity Supply Study - 132 -

Exhibit A: Consultation Report



### Right of Way Requirements Source: Class EA for Minor Transmission Facilities



Typical right-of-way Width for a 230 kV Two-circuit Transmission Line (Narrow-base Single Footing Towers May be Used in Cultivated Fields of Prime Farm Land)

- Typical ROW widths are 36.6 m or 120 ft
- Actual widths required for specific ROW vary because of such things as:
  - Span length
  - Conductor size and sag
  - The location of danger trees
  - The need for helicopter patrol
  - Fall-free spacing
- Buttonville to Armitage ROW ranges from 100 - 120 ft

Northern York Region Electricity Supply Study - 133 -

Exhibit A: Consultation Report

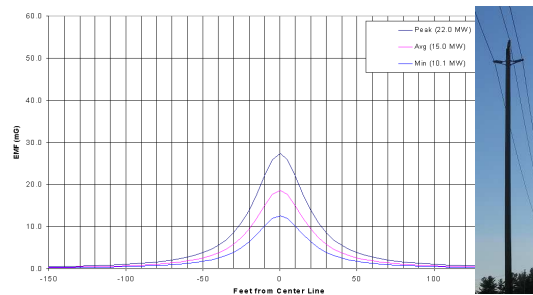
## EMF Study Results

## EMF Study Results Apparent Anomalies

- One circuit Pole line has a higher EMF than four circuit pole line.  
Reason: Fields cancel each other when there are more feeders on pole line
- Existing 115-kV line used at 44-kV has higher EMF than 44-kV feeder  
Reason: Wider spacing of wires reduces cancellation
- 230-kV line supplying a fully loaded transformer station has less EMF than existing Buttonville to Armitage line  
Reason: Current to deliver 150 MW of power at 230 kV is small, wires higher in the area, double circuit results in cancellation
- 115-kV line will produce higher EMF levels than 230-kV line for the same power delivered  
Reason: Current twice as high at 115-kV for the same megawatts, and conductors closer to the ground

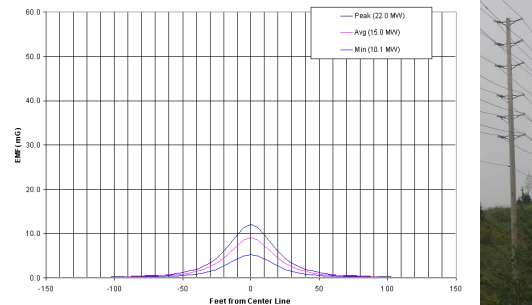
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## EMF Study Results One Circuit 44kV Pole Line (22MW)



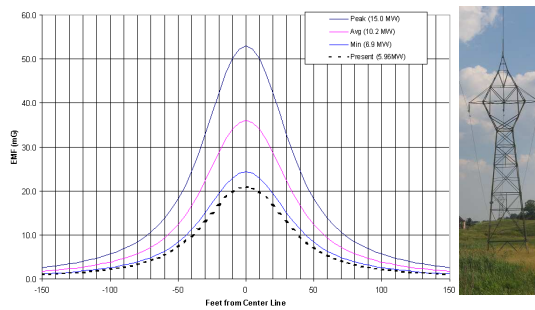
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## EMF Study Results Four Circuit 44kV Pole Line (22MW per circuit)



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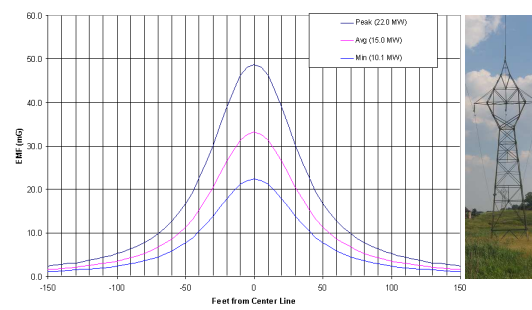
## EMF Study Results 28kV Feeder on Existing 115kV Towers



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Northern York Region Electricity Supply Study - 137 - Exhibit A: Consultation Report

## EMF Study Results 44kV Feeder on Existing 115kV Towers

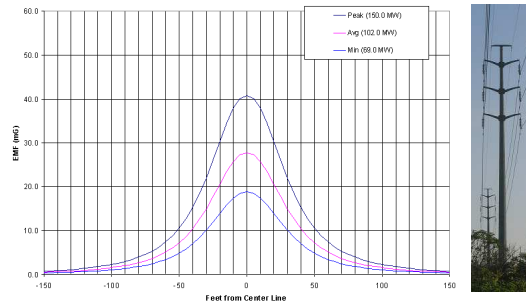


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### EMF Study Results

Typical Double Circuit 115kV Line (150 MW)

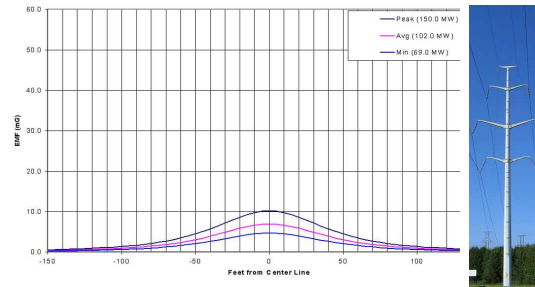


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### EMF Study Results

Typical Double Circuit 230kV Line (150 MW)

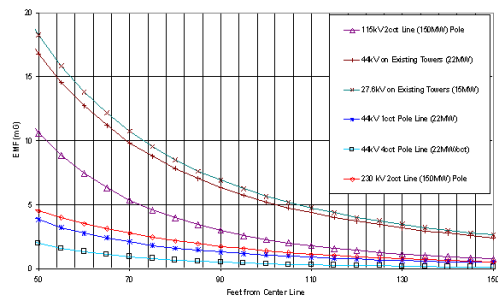


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### EMF Study Results

Comparison Graph (Peak MW)



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## Generation Options

### Summary of Identified Options Generation Options

#	Generation Option Name	Source of Option
25	Generic 44 kV Simple Cycle	OPARFI
26	Generic 230 kV Simple Cycle	OPARFI
27	Generic 230 kV Combined Cycle	OPARFI

### Simple Cycle Option - Typical

#### 120 MW Simple Cycle – 3 X GTG



- Gas Turbine Generators
- Step-up Transformers
- HV Switchyard

### Simple Cycle Option - Typical

#### 120 MW Simple Cycle – 3 X GTG



- Gas Turbine Generators
- Step-up Transformers
- HV Switchyard

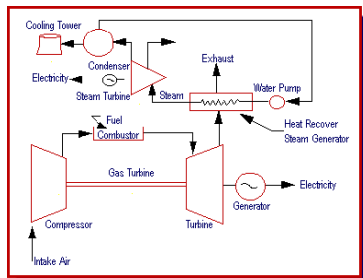
### Simple Cycle Option Typical Simple Cycle Plant Applications

- Temporary power
- Peaking capacity
- System power factor correction and voltage support

### Combined Cycle Option (#27)

- Gas turbines and steam turbines working together for increased efficiency.
- Waste heat from the gas turbine exhaust is used to convert water into steam in a “steam generator” for the steam turbine. The steam turbine is connected to a electric generator that produces electric power.
- Combined-cycle units are made up of one or more gas turbines, each with a waste heat steam generator, arranged to supply steam to a single steam turbine.

### Combined Cycle Option



Combined Cycle generation is approximately 50 to 60% efficient.

### Combined Cycle Option-Typical

#### 640 MW Combined Cycle – 2 X GTG, 1XSTG



- Gas Turbine Generator(s)
- Waste Heat Steam Generator(s)
- Steam Turbine Generator
- Condenser (for steam exhausted from steam turbine)
- Heat Rejection System (Cooling Towers or cooling system using lake water)
- Step-up Transformers
- HV Switchyard



### Combined Cycle Typical Combined Cycle Plant Applications

- Base load plants
- Can provide peaking capacity
- System power factor correction and voltage support



### Generation Options - Functional Requirements

- Generator must be running while both 230-kV lines are in service and while load exceeds single line capability
- Generator must run continuously and reliably until loads no longer exceed single line capability
- If generator is not in service as required and one line fails, voltage collapse will be immediate and a local blackout will occur

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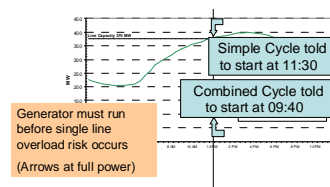
### Generation Options – Functional Requirements

- A generator that is already running due to provincial economic dispatch will also meet local requirements during peak periods
- Any requirement to run can be determined well in advance based on peak load forecasts so rapid start is not a requirement
- Simple Cycle (10 min start) and Combined Cycle plants (2 hrs start) both meet startup time requirements



### Example – Future Generation Option Needs

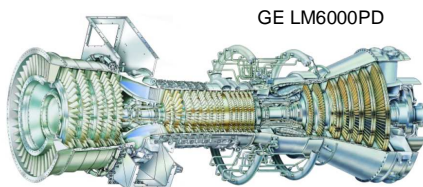
Actual June 27 Armitage TS load with an additional 50 Megawatts added to simulate loads on a 2009 summer peak day



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### Aeroderivative Gas Turbine



- Adapted from jet aircraft engines.
- Lightweight and thermally efficient
- Rapid loading capability – 10 minutes from start to full power
- Range in outputs from 3 MW to approximately 45 MW in capacity.
- Approaching 45% simple-cycle efficiencies



### Industrial Gas Turbines



Siemens W501F  
Power: 170 MW

- Stationary power generation
- 1 to 250 MW capacity range
- Less expensive, more rugged, operate longer between overhauls, and best suited to continuous base-load operation
- Simple-cycle efficiencies of 40%

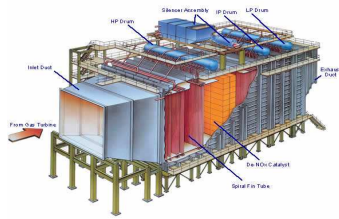
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Northern York Region Electricity Supply Study - 156 - Exhibit A: Consultation Report



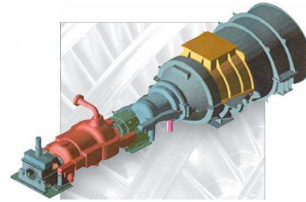
### Heat Recovery Steam Generators

Function: Captures waste heat in the exhaust stream of the gas turbine to generate steam.



### Steam Turbine

Function: Converts steam energy to mechanical energy (shaft power) to drive an electric generator



(Generator not shown)

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Northern York Region Electricity Supply Study - 158 - Exhibit A: Consultation Report



### Air Emissions

- Many gas turbines burning natural gas feature lean premixed burners (also called dry low-NOx combustors) emit less than 25 ppm of NOx, with laboratory performance down to 9 ppm, and simultaneous low CO emissions acceptable to regulators in the 50 to 100 ppm range.
- Further reductions in NOx can be achieved by use of selective catalytic reduction (SCR) or catalytic combustion. Many gas turbines sited in locales with extremely stringent emission regulations use SCR after-treatment to achieve single-digit (below 9 ppm) NOx emissions.
- In Ontario, plants must meet MOE standards for ground level concentrations of pollutants. Stack dispersion modeling is used to determine stack heights. Simple cycle and combined cycle plants are subject to the same environmental regulations and stack heights are not necessarily affected by the type of plant.



### Noise Emissions

- Both aeroderivatives and industrial turbines are inherently noisy. Equipment suppliers package the turbines in acoustically treated noise enclosures to reduce noise emitted to the surroundings to acceptable levels.
- Near field noise levels quoted are in the 85 to 90 dBA range
- Exhaust noise is attenuated via silencers (mufflers) located in the exhaust stacks.
- Noise at the exhaust stack exit is usually attenuated to meet far field noise criteria. Noise studies are used to define the far field noise criteria for the specific plant location.

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### Rate Impacts – Who Pays?

### Transmission Tariff Overview

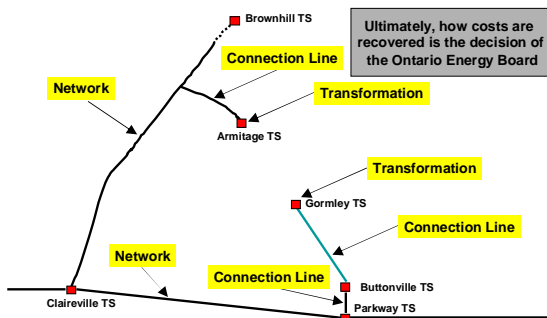
Transmission Tariff Pool	Description	Allocation Method	Monthly Rate (\$ per kW) *
Network	<ul style="list-style-type: none"> <li>&gt;50kV</li> <li>Serves all customers</li> <li>Can flow in both directions</li> </ul>	All provincial electricity rate payers	\$2.83
Line Connection	<ul style="list-style-type: none"> <li>&gt;50kV</li> <li>Serves one or a group of customers</li> <li>Typically flow in one direction</li> </ul>	<ul style="list-style-type: none"> <li>LDC customers (divided among LDCs by usage)</li> <li>Customers that are directly connected to transmission</li> </ul>	\$0.82
Transformation	Transformer stations (>50kV on high side and <50kV on low side)	LDC customers (divided among LDCs by usage)	\$1.50

\* Rates specified are applicable to transmission customers. Retail transmission rates vary by customer class

Northern York Region Electricity Supply Study - 161 - Exhibit A: Consultation Report

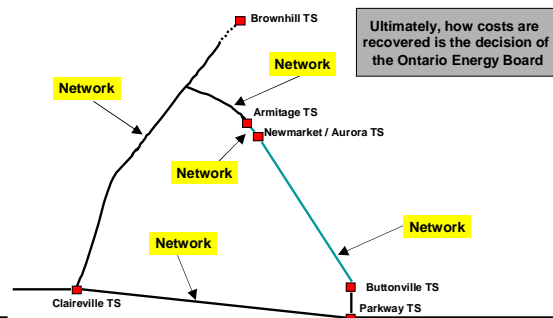
Northern York Region Electricity Supply Study - 162 - Exhibit A: Consultation Report

### Application to York Region Illustrative Examples



Northern York Region Electricity Supply Study - 163 - Exhibit A: Consultation Report

### Application to York Region Illustrative Examples



Northern York Region Electricity Supply Study - 164 - Exhibit A: Consultation Report

### Capital Contributions Source: Transmission System Code – Appendix 4 & 5

- Capital contributions are collected where the Discounted Cash Flow calculation shows that a project's revenues will not cover its costs over the time horizon chosen for the project (typically 25 years)
- Capital contributions are not typically collected for network assets just connection assets
- Capital contributions would be collected from LDCs or a Customer if directly connected to the transmission line

Capital Contributions Ensure that the Transmission Tariff Pools are Held Harmless

Northern York Region Electricity Supply Study - 165 - Exhibit A: Consultation Report

### How Might Undergrounding Work?

- If undergrounding is required by the Ontario Energy Board or the Environmental Assessment, the costs would be added to the project and the benefiting LDCs (based on power usage) would be allocated the full cost of the project – capital contributions might result if revenues did not cover costs
- If underground is requested by a third party, likely a benefiting party (benefiting from the undergrounding) would need to provide a capital contribution for the additional cost of undergrounding

The ultimate decision on cost allocation is with the OEB

Northern York Region Electricity Supply Study - 166 - Exhibit A: Consultation Report



### Distribution Recovery Issues

- Feeders coming off of a Transformer Station are paid for by LDCs
- If distribution feeders out of a Transformer Station are being shared among a number of LDCs, the cost will be shared based on usage



### Generation Issues

- A generator receives payment through the wholesale market administered by the Independent Electricity System Operator
- Energy and operating reserve costs are allocated to rate payers across the province
- If OPA provides support payments to a generator this would likely be recovered through the Global Adjustment Charge (ie. would be allocated to rate payers across the province)
- OPA contracts with generators would have to obtain approval from the Ontario Energy Board

Northern York Region Electricity Supply Study - 167 -

Exhibit A: Consultation Report

Northern York Region Electricity Supply Study - 168 -

Exhibit A: Consultation Report



### Conservation Demand Management

- Existing LDC Conservation Demand Management programs that have been approved by the OEB will be recovered from LDC customers
  - PowerStream \$6.4M
  - Newmarket \$1.2M
  - Aurora \$820K
  - Hydro One \$39.5M (across their entire network)
- Initiatives above and beyond the existing projects could be funded by the OPA or the LDC (the method of recovery of these funds have not yet been determined)

Northern York Region Electricity Supply Study - 169 -

Exhibit A: Consultation Report