



Appendix 2

Stakeholder Engagement and Communications

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2

Stakeholder Engagement and Communications

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2
STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS
TABLE OF CONTENTS

APPENDIX 2A: STAKEHOLDER ENGAGEMENT AND COMMUNICATION	1
1. STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS	1
1.4. <i>Overview of Engagement Methodology</i>	2
2. STAKEHOLDER ENGAGEMENT HIGHLIGHTS TO DATE	3
2.1. <i>Non-Government Stakeholder List and Study Database</i>	3
2.2. <i>Electrification Study Website</i>	3
2.3. <i>Stakeholder Workshop # 1</i>	4
2.4. <i>Metrolinx Planning and Transportation Leaders Forum</i>	4
2.5. <i>GO Transit Customer Service Advisory Committee Meeting</i>	4
2.6. <i>Update Meeting (Georgetown Corridor)</i>	4
2.7. <i>Municipal Transit Leaders Briefing</i>	4
2.8. <i>Government Agency Consultations</i>	4
2.9. <i>Stakeholder Workshop # 2</i>	5
2.10. <i>Community Advisory Committee Update Meeting</i>	5
2.11. <i>Stakeholder Workshop #3</i>	5
2.13. <i>Community Advisory Committee Update Meeting</i>	5
2.14. <i>Stakeholder Workshop #4</i>	5
2.15. <i>Media Briefing</i>	6
2.16. <i>Technical Working Sessions</i>	6
3. HIGHLIGHTS OF STAKEHOLDER FEEDBACK	7
APPENDIX 2 B: STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS PLAN	1
1. INTRODUCTION	1
1.1. <i>Backdrop – The Electrification Study</i>	1
1.2. <i>Overview of the Stakeholder Engagement and Communications Plan</i>	1
2. GUIDING PRINCIPLES AND OBJECTIVES	3
2.1. <i>Guiding Principles</i>	3
2.2. <i>Objectives</i>	3
3. KEY STAKEHOLDER AUDIENCES FOR ENGAGEMENT	4
3.1. <i>Stakeholder Engagement – A Key Part of the Study</i>	5
3.2. <i>Outreach and Engagement Methods</i>	5
4. ENGAGEMENT MECHANISMS BY AUDIENCE	6
4.1. <i>Engaged Non-Government Stakeholders</i>	6
4.2. <i>Government Stakeholders And Industry Service Providers</i>	7

4.3. <i>Users/Commuters</i>	8
4.4. <i>General Public</i>	8
4.5. <i>First Nations</i>	8
5. COMMUNICATIONS TACTICS TO SUPPORT ENGAGEMENT	9
6. ENGAGEMENT AND COMMUNICATIONS BY STUDY PHASE	11
7. NEXT STEPS – EARLY IMPLEMENTATION OF THE PLAN	14
APPENDIX 2C: STAKEHOLDER WORKSHOP #1 SUMMARY REPORT	1
1. ABOUT STAKEHOLDER WORKSHOP #1	1
2. FORMAT OF THE WORKSHOP	2
3. PRESENTATION HIGHLIGHTS	3
3.1. <i>Welcome and Overview</i>	3
3.2. <i>Electrification Of The Go Transit Rail Network</i>	3
4. WORKING SESSIONS.....	7
4.1. <i>Overview</i>	7
4.2. <i>Working Session 1: Study Approach</i>	7
4.3. <i>Working Session 2: Study Objectives</i>	8
4.4. <i>Feedback on Priority Objectives</i>	9
5. NEXT STEPS	11
APPENDIX 2C-1: “ELECTRIFICATION OF THE GO TRANSIT RAIL NETWORK” POWERPOINT PRESENTATION	13
APPENDIX 2C-2: SAMPLE WORKSHEET	15
APPENDIX 2C-3: SUBMITTED GROUP WORKSHEETS	19
APPENDIX 2C-4: SUBMITTED INDIVIDUAL WORKSHEETS	27
APPENDIX 2D: UPDATE MEETING GEORGETOWN CORRIDOR SUMMARY REPORT	1
1. ABOUT THE ELECTRIFICATION STUDY UPDATE MEETING – GEORGETOWN CORRIDOR.....	1
1.1. <i>Purpose</i>	1
1.2. <i>Attendance</i>	1
1.3. <i>Format</i>	1
2. SUMMARY OF COMMENTS RECEIVED	2
2.1. <i>Study Approach</i>	2
2.2. <i>Technology Alternatives Screening Process</i>	2
2.3. <i>Air-Rail Link (ARL)</i>	3
2.4. <i>Air Quality</i>	4
3. NEXT STEPS	5
APPENDIX 2D-1: UPDATE MEETING INVITATION	7

APPENDIX 2D-2: ELECTRIFICATION STUDY BACKGROUNDER	11
APPENDIX 2D-3: “ELECTRIFICATION STUDY UPDATE MEETING” POWERPOINT PRESENTATION	13
APPENDIX 2D-4: QUESTION & ANSWER PERIOD	15
APPENDIX 2E: MUNICIPAL TRANSIT LEADERS BRIEFING SUMMARY NOTES	1
APPENDIX 2F: STAKEHOLDER WORKSHOP #2 SUMMARY REPORT	1
1. ABOUT STAKEHOLDER WORKSHOP #2	1
1.1. Purpose	1
1.2. Attendance	1
1.3. Format	1
2. SUMMARY OF COMMENTS RECEIVED	3
2.1. Study Approach	3
2.2. Rolling Stock Technology Assessment and Network Options	3
2.3. Proposed Approach for Further Assessment of Options	4
2.4. General Comments	4
3. NEXT STEPS	5
APPENDIX 2F-1: WORKSHOP PRESENTATION	7
APPENDIX 2F-2: QUESTION AND ANSWER PERIOD	9
APPENDIX 2F-3: SAMPLE WORKSHEET	17
APPENDIX 2F-4: SUBMITTED GROUP WORKSHEETS	21
APPENDIX 2F-5: SUBMITTED INDIVIDUAL WORKSHEETS	25
APPENDIX 2F-6: WORKSHOP INVITATION AND ATTENDANCE LIST	31
APPENDIX 2F-7: FORMER COMMUNITY ADVISORY COMMITTEE UPDATE REPORT	35
APPENDIX 2G: STAKEHOLDER WORKSHOP #3 SUMMARY REPORT	1
1. ABOUT STAKEHOLDER WORKSHOP #3	1
1.1. GO Transit Electrification Study	1
1.2. Stakeholder Workshop #3	1
2. WORKSHOP PRESENTATION DISCUSSION	3
3. SUMMARY OF COMMENTS RECEIVED	6
3.1. Study Approach	6
3.2. Rolling Stock Technology Options	6
3.3. Network Options	6
3.4. Proposed Approach for Detailed Assessment of Options	6
3.5. Parallel Studies and Projects	7
3.6. General Comments	8
4. NEXT STEPS	8

APPENDIX 2G-1: WORKSHOP POWERPOINT PRESENTATION.....	9
APPENDIX 2G-2: SAMPLE WORKSHEET.....	11
APPENDIX 2G-3: SUBMITTED GROUP WORKSHEETS.....	15
APPENDIX 2G-4: SUBMITTED INDIVIDUAL WORKSHEETS.....	21
APPENDIX 2G-5: WORKSHOP INVITATION AND ATTENDANCE LIST	27
APPENDIX 2H: FORMER COMMUNITY ADVISORY COMMITTEE MEETING	1
APPENDIX 2I: STAKEHOLDER WORKSHOP #4	1
1. ABOUT STAKEHOLDER WORKSHOP #4	1
1.1. <i>GO Transit Electrification Study</i>	1
1.2. <i>Stakeholder Workshop #4</i>	1
2. SUMMARY OF COMMENTS RECEIVED	2
2.1. <i>ARL</i>	2
2.2. <i>Tier 4</i>	3
2.3. <i>Union Station</i>	3
2.4. <i>Air Quality, Health, and Community Impacts</i>	3
2.5. <i>Noise Impacts</i>	4
2.6. <i>Capital and Operations/Maintenance Costs</i>	4
2.7. <i>Implementation</i>	4
2.8. <i>General Comments</i>	5
3. NEXT STEPS	5
APPENDIX 2I-1: WORKSHOP POWERPOINT PRESENTATION	7
APPENDIX 2I-2: QUESTION AND ANSWER DISCUSSION SUMMARY	9
APPENDIX 2I-3: SAMPLE WORKSHEET	21
APPENDIX 2I-4: SUBMITTED INDIVIDUAL WORKSHEETS	25
APPENDIX 2I-5: WORKSHOP INVITATION AND ATTENDANCE LIST	37
APPENDIX 2J: ISSUES/RESPONSE TABLE	1



Appendix 2A

Stakeholder Engagement and Communications

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2A

Stakeholder Engagement and Communications

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2A: STAKEHOLDER ENGAGEMENT AND COMMUNICATION

1. STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS

1.1. Introduction

Determining how GO Transit Trains will be powered in the future is an important decision – one that requires an examination of benefits and costs of the various technology options, as well as consideration of community values and priorities. Metrolinx recognized the importance of engaging stakeholders as part of the Electrification Study process. Prior to the commencement of the Electrification Study, Metrolinx formed a multidisciplinary, geographically diverse Community Advisory Committee (CAC) that assisted in the preparation of the study Terms of Reference. These Terms of Reference called for the development of a comprehensive “proactive stakeholder engagement and communication plan” as well as implementation of a stakeholder engagement process that would “consider, document and consolidate feedback by impacted GO Transit stakeholders.”

1.2. Stakeholder Engagement Strategy

Building on the direction in the study Terms of Reference, the study team worked with Metrolinx staff to develop a comprehensive Stakeholder Engagement and Communications Plan for the Electrification Study. This plan outlined how Metrolinx and the study team would reach out to and engage GTHA stakeholders during the development of the study in order to:

- Educate stakeholders about the study process and electrification options, such that they can provide informed feedback during the study; and
- Facilitate input from stakeholders throughout the study process, in order to inform decision-making and study conclusions.

The stakeholder plan was specifically developed to address the key principles – objective, comprehensive, inclusive and evidence based – that were established for the study by Metrolinx, in consultation with the CAC. The plan was also designed to ensure that GTHA stakeholders are provided with the opportunity to contribute focused feedback on key outputs identified by Metrolinx and the CAC for the study.

1.3. Guiding Principles for Stakeholder Engagement

The Stakeholder Engagement and Communications Plan included a set of principles – based on those developed by Metrolinx and the CAC – to guide engagement activities throughout the Electrification Study process:

- **Objectivity:** The study (and associated engagement and communications program) will be conducted through a transparent, step-by-step process, such that study outcomes are traceable and readily understood by stakeholders.
- **Comprehensiveness:** Multiple opportunities for stakeholder participation – including face-to-face meetings and web-based consultation – will be provided during the study, backed by a multi-faced communications program, designed to generate broad awareness of the study and electrification issues and options.

- **Inclusiveness:** The study will strive to engage a broad spectrum of stakeholders – reflecting the ethno-culturally diverse and complex stakeholder environment in the Greater Toronto and Hamilton area – throughout the study process.
- **Evidence-Based:** The study team will provide stakeholders with robust and credible information on electrification options – based on the most up-to-date research and methods – to enable informed participation in the study process.
- **Traceability:** The results of the stakeholder engagement program will be clearly documented and the impact of participant input on decision-making will be demonstrated.

1.4. Overview of Engagement Methodology

The Stakeholder Engagement and Communications Plan included a variety of face-to-face and web-based approaches to reach out to and engage community and industry groups, GO Transit rail users, and the general public in the Electrification Study, as summarized in Table 1.

Table 1: Stakeholder Outreach and Engagement Methods

Stakeholder Group	Outreach & Engagement Methods
Former Community Advisory Committee	Update Meetings
Non-Government Stakeholders from across GHTA: environment/health, community, land use, social planning, transportation, commuter groups, business, economic, development, academic	Workshop Series
Rail System Users	Meetings with GO’s Customer Service Advisory Committee (CSAC) – made up of rail system users
General Public	Web-based Consultation, Media Briefings
Government Agencies – Municipal, Provincial, Federal	Meetings and Briefings
Technical – including Rail (CN/CP/VIA) and Electrical (e.g., OPA, OPG, Hydro One, Local Distributors)	Technical Working Meetings

To view a copy of the full Stakeholder Engagement and Communications plan, please refer to Appendix 2B.

2. STAKEHOLDER ENGAGEMENT HIGHLIGHTS TO DATE

The following sections outline the key engagement and communications activities that were conducted throughout the completion of the Electrification Study.

2.1. Non-Government Stakeholder List and Study Database

At the start of the Electrification Study, a list of approximately 100 non-government organization contacts was created, representing the broad geographic scope of the study and the diverse study topic areas. Those identified on this list were invited to participate at the Electrification Study Stakeholder Workshops and have received regular email updates from the study team¹.

The study team also created and maintained a database of interested individuals, stakeholders, agencies, businesses and organizations that it used for communication purposes. The stakeholder database currently contains approximately 500 contacts, including:

- Members of the former Community Advisory Committee (CAC);
- The list of Non-Governmental Organizations invited to participate at the Electrification Study Workshops;
- Municipal Planning and Transportation Officials, and Transit Service Providers;
- Provincial and Federal Agencies with a potential interest in the study;
- Technical (rail and electrical organizations);
- GTHA residents and contacts who request to be added to the study contact list through the project website; and
- Municipal, Provincial and Federal politicians with constituencies in the study area.

2.2. Electrification Study Website

In early April 2010, Metrolinx and the study team activated the enhanced Electrification Study website, with a more user friendly interface where stakeholders could obtain up-to-date project information, electrification fact sheets and case studies, background reports, previous electrification studies, and learn how to participate in the Electrification Study process. Integrated into this website was the opportunity for stakeholders to communicate with the study team via a dedicated study email address, and to provide comments on key project reports. Website visitors were invited to comment on several foundational study reports, including the High Level Decision-Making Framework, Rolling Stock Technology Assessment, Baseline Report, Power Supply and Distribution Systems Technology Assessment, Network Options Report and the Progress Report.

The study website can be accessed through the home page of both the Metrolinx and GO Transit websites.

¹ Workshop invitation lists are available in Appendix 2C.

2.3. Stakeholder Workshop # 1

The first non-government stakeholder workshop for the Electrification Study took place on Wednesday, March 31, 2010. The workshop introduced representatives from non-governmental organizations to the study and obtained early feedback on the study approach and objectives. In addition, the workshop provided the study team with an opportunity to interact with organizations from across the GTHA, enabling increased understanding of stakeholder values and goals related to the Electrification Study. In total, twenty-five representatives of non-governmental organizations attended the first workshop. A full report on Workshop #1 is included in Appendix 2C.

2.4. Metrolinx Planning and Transportation Leaders Forum

The Electrification Study team was invited to provide an introduction to the study to the Metrolinx Planning and Transportation Leaders Forum on April 15th, 2010. The meeting provided an opportunity for the study team to answer questions and obtain feedback from municipal planning and transportation leaders across the GTHA on the study objectives, process and approach.

2.5. GO Transit Customer Service Advisory Committee Meeting

On May 3, 2010, the Electrification Study team was invited to attend the GO Transit Customer Service Advisory Committee quarterly meeting to discuss the study progress and the stakeholder engagement and communications strategy. The results of the meeting reaffirmed the study team's engagement approach and highlighted the anticipated interest from the broader stakeholder community once a short list of the options is developed in the Fall of 2010.

2.6. Update Meeting (Georgetown Corridor)

On May 27th, 2010, the Electrification Study team hosted an Update Meeting for communities located along the Georgetown South Corridor. The meeting provided participants with an opportunity to review the work completed to date and ask questions and provide comments to the Electrification Study Team. An estimated 100 individuals attended the Update Meeting, with 84 participants opting to sign in prior to the meeting. The meeting offered the study team an opportunity to hear the specific concerns of the communities along Georgetown South Corridor and obtain preliminary feedback on the proposed rolling stock and network options. A full report on the Update Meeting is included in Appendix 2D.

2.7. Municipal Transit Leaders Briefing

In order to gain input from municipal transit operators across the GTHA, the Electrification Study team organized a Transit Leaders Briefing on June 15th, 2010. The meeting, held via conference call, introduced participants to the Electrification Study and provided an opportunity for the participants to ask questions and provide comments related to municipal transit operations. To review the highlights of the briefing please refer to Appendix 2E.

2.8. Government Agency Consultations

In addition to the municipal meetings described above, study team members met with Provincial government agencies – including the Ontario Ministry of Transportation, Ontario Power Authority and Hydro One - to discuss the study process and related considerations.

2.9. Stakeholder Workshop # 2

The second non-government stakeholder workshop was held on June 15th, 2010 and engaged eleven representatives from non-governmental organizations. The workshop presented and invited feedback on the rolling stock technology and network options developed for the GO Transit network. In addition, participants engaged in an interactive discussion about the proposed approach for the further assessment of options. A full report on Workshop #2 is included in Appendix 2F.

2.10. Community Advisory Committee Update Meeting

On July 7th, 2010, the Electrification Study team met with members of the former CAC to obtain feedback on the study team's progress. The results of the meeting reaffirmed the study teams approach and highlighted the importance of calculating the community, land use, and environmental impacts of the various rolling stock technology and network options. A full report on the meeting is included in Appendix 2G.

2.11. Stakeholder Workshop #3

The third non-government stakeholder workshop for the Electrification Study took place on Wednesday, September 22nd, 2010. The workshop provided stakeholders with an opportunity to provide feedback on the high level evaluation used to identify a 'short-list' of six network options for the potential electrification of the GO Transit network. In addition, it provided non-governmental organizations with an opportunity discuss the various study outputs posted to the Electrification Study website and provide feedback on the work completed to date. In total, eighteen representatives of non-governmental organizations attended the third workshop. A full report on Workshop #3 is included in Appendix 2H.

2.12. Media Briefing

To facilitate an understanding of Electrification Study progress, on September 28, 2010 the study team and Metrolinx staff organized a one-hour update session for various media representatives. The session provided the media with an opportunity to learn more about the work completed by the study team in an effort to help them understand how the GO Transit rail network could be powered in the future. During the briefing participants were given the opportunity to ask Metrolinx staff questions pertaining to the ongoing progress of the Electrification Study.

2.13. Community Advisory Committee Update Meeting

On November 24th, 2010, the Electrification Study team met with members of the former CAC to update the group of the study team's progress and present key preliminary findings and the results of the detailed assessment of the network options. The meeting highlighted the diverse factors that will need to be considered during the decision making process following the completion of the Electrification Study. To view the Community Advisory Committee meeting notes on please refer to Appendix 2I.

2.14. Stakeholder Workshop #4

The fourth and final non-government stakeholder workshop for the Electrification Study took place on Wednesday, December 1st, 2010. The workshop presented key preliminary findings and the results of the detailed assessment of network options. The workshop also provided stakeholders with an opportunity to provide input into the preliminary findings through asking questions and providing

comments to the Electrification Study team. In total, nineteen representatives of non-governmental organizations attended the fourth workshop. A full report on Workshop #4 is included in Appendix 2J.

2.15. Media Briefing

On December 15, 2010, Metrolinx staff hosted a one-hour media briefing for representatives who attended the previous session in November. The purpose of the briefing was to present the key preliminary findings and the results of the detailed assessment. The session provided participants with an update on the progress of the Electrification Study. Further, it provided media the opportunity to discuss the Electrification Study process with Metrolinx staff during the final stages of the study.

2.16. Technical Working Sessions

In order to understand the broad factors required to electrify the GO Transit network, the study team met with a number of train operators and service providers. The results of these technical working sessions, which included meetings with Canadian National Railway (CN), Canadian Pacific Railway (CP), Hydro One, Ontario Power Authority (OPA) and the Greater Toronto Airport Authority (GTAA), highlighted the level of complexity required to electrify the GO Transit network.

In addition, the study team has met with representatives of Agence Métropolitaine de Transport (AMT), who are currently undertaking a similar Electrification Study, to discuss their experience and the study team's progress. The meeting affirmed the study team's approach and provided an opportunity to dialogue with AMT on lessons learned and best practices for electrification.

3. HIGHLIGHTS OF STAKEHOLDER FEEDBACK

Throughout the year long Electrification Study, several key issues emerged as areas of interest and concern for stakeholders. A more complete listing of issues/comments, along with study team responses, is provided in Appendix 2K of this report. In summary, the major issues identified to date and the corresponding study team response (italicised) are listed below:

- Many stakeholders emphasized the need to **integrate the Airport Rail Link (ARL) into the Electrification Study** and stressed the importance of considering electrification in implementing the ARL. Further, several stakeholders suggested that the ARL should be a starting point for electrification.

In July, 2010, Metrolinx was asked by the Ontario government to build, own, and operate the ARL. The ARL was included in the Terms of Reference of the Electrification Study and has been fully integrated in the Electrification Study. The ARL, which will be situated in the Georgetown Corridor, has been included in the study team's assessment of the technology and network options.

- Further **details on when Metrolinx's Board of Directors will make decisions and act upon the findings and conclusions** of the Electrification Study are requested.

The Electrification Study will be completed by late December 2010. It is anticipated that the Metrolinx Board will consider the study findings and conclusions at the Board meeting in February 2011.

- Some members of the public have expressed concern about the potential to bias the study findings in favour of Tier 4 technology. The study team should **include the costs of converting existing locomotives to Tier 4 technology** as part of comparing costs during the study.

The study team considered the increased costs of Tier 4 locomotives and did not assume the fleet is in place. This cost was used for comparing diesel and electric operations in an objective manner.

- There are **several ongoing studies currently underway that will have an impact on the electrification of the GO Transit rail network**. Specifically, the Union Station Capacity Study and Union 2031 Demand/Opportunity Study need to be incorporated into the study findings and addressed in the Electrification Study. A number of stakeholders have recognized that Union Station is a key factor in where and how electrification can be implemented.

The study team has met with the consultants engaged in these studies and have made every effort to integrate the findings and conclusions of the ongoing Metrolinx studies (e.g. Union Station Capacity Study, Union 2031 Demand/ Opportunity Study) that are available into the Electrification Study.

- **Electrify the Georgetown South Corridor on a priority basis**. A number of communities surrounding the Georgetown South Corridor have expressed significant concerns about the environmental, air quality, noise, and community impacts of existing operations and planned service expansion within their communities.

The Electrification Study is an objective and comprehensive assessment of the electrification technology and network options available to GO Transit. The study's findings and conclusions will be used by the Metrolinx Board to make a recommendation(s) to the Province of Ontario.

- The study team should **ensure the Reference Case is an accurate operating/service plan for the medium term in the GTHA**. A number of stakeholders highlighted that the service levels outlined in the Electrification Study are lower than those outlined in 'GO 2020' and 'The Big Move' and expressed concerns that the Reference Case does not accurately depict the operating environment in the medium term.

The Reference Case is consistent with GO 2020 which bridges the service levels forecasted in The Big Move. All corridors evolve differently, however demand is consistently higher for the Lakeshore line.

- **Do not overstate the costs for electrifying the GO Transit network**. Several initiatives are currently underway are ensuring new rail infrastructure is compatible with electrified rail operations. The study team should ensure they do a thorough assessment of the cost for electrifying the GO Transit network to ensure it is not inflated.

The study examined the additional costs of providing an electrified railway to meet the service requirements of the Reference Case.

- **Human and environmental health, quality of life, and social impacts** need to be reviewed and given priority when screening the technology and network options. Many stakeholders emphasized the particular importance of understanding the impacts of greenhouse gas emissions, local air quality, and noise on communities surrounding GO Transit rail lines.

Human and environmental health, quality of life, and other community impacts were important components of the detailed assessment of the available technology and network options for GO Transit. For the purposes of the study, credible and recognized guidelines for environmental and human health standards (such as those outlined by the World Health Organization and Ontario Ministry of the Environment) were used to understand human, environmental, and community impacts of the various technology and network options.



Appendix 2B

Stakeholder Engagement and Communications Plan

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2B

Stakeholder Engagement and Communications Plan

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2 B: STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS PLAN

1. INTRODUCTION

1.1. Backdrop – The Electrification Study

The Greater Toronto and Hamilton Area (GTHA) is Canada’s largest urban region comprising the single-tier municipalities of Toronto and Hamilton, and four regional municipalities. With rapid growth, the region’s population is expected to expand by nearly 50% to 8.6 million residents in 2031. Metrolinx was created in 2006 to develop and implement an integrated and comprehensive multi-modal transportation plan to solve the region’s transportation challenges.

In late 2008, Metrolinx published a Regional Transportation Plan, “The Big Move”, a multimodal vision for regional transportation to strengthen the economic, social and environmental sustainability of the GTHA. GO Transit, the inter-regional transportation service for the GTHA, has played a key role in serving the GTHA commuter market. The evolution and development of the GO rail system is a major component in the realization of the vision in “The Big Move” in terms of the reduction of car trips, increased accessibility to the transit network and the achievement of ambitious environmental targets.

GO Transit currently uses diesel-electric locomotives in push-pull operations with bi-level passenger coach and cab cars. In early January 2010, Metrolinx initiated an Electrification Study to examine the economic, social, environmental, operational, health and technological costs and benefit factors for conventional and future diesel and electric technologies. The study will assess future technology options; review the viability of these options in various corridor environments as well as at the network level, and assist Metrolinx in developing a business case for meeting its vision of an integrated multimodal transportation system for the GTHA region.

The Electrification Study is being undertaken for Metrolinx by a joint venture of Delcan and Arup, with support from several sub-consultants. Lura Consulting is the study team lead for stakeholder engagement and communications.

1.2. Overview of the Stakeholder Engagement and Communications Plan

This Stakeholder Engagement and Communications Plan for the Electrification Study outlines how Metrolinx and the consultant study team will reach out to and engage GTHA stakeholders during the development of the Electrification Study, which is expected to be completed in a year – by the end of 2010.

The Plan has been specifically developed to address the key principles – objective, comprehensive, inclusive and evidence based – that were established for the Electrification Study by Metrolinx, in consultation with a Community Advisory Committee (CAC) which provided substantive guidance to Metrolinx on the terms of reference for the study. The Plan is also designed to ensure that GTHA stakeholders are provided with the opportunity to contribute focused feedback on key outputs identified by Metrolinx and the CAC for the study, including a comprehensive and detailed analysis of the net costs and benefits for each technology option including:

- Capacity and service impacts, including reliability of service;
- Environmental and health impacts;
- Community and land use impacts;

- Economic impacts; and
- System costs, funding, financing and delivery.

Following this Introduction, the Stakeholder Engagement and Communications Plan consists of seven key sections:

- Section 2: Guiding Principles and Objectives;
- Section 3: Key Stakeholder Audiences for Engagement;
- Section 4: Engagement Mechanisms by Audience;
- Section 5: Communication Tactics to Support Engagement;
- Section 6: Engagement and Communications Tactics by Study Phase; and
- Section 7: Next Steps – Early Implementation of the Plan

2. GUIDING PRINCIPLES AND OBJECTIVES

The following principles and objectives are based on those developed by Metrolinx and the CAC for the Electrification Study. They are proposed to guide development and implementation of the Stakeholder Engagement and Communications Plan, and to provide a basis for ongoing monitoring and evaluation as the Plan is implemented.

2.1. Guiding Principles

- **Objectivity:** The study (and associated engagement and communications program) will be conducted through a transparent, step-by-step process, such that study outcomes are traceable and readily understood by stakeholders.
- **Comprehensiveness:** Multiple opportunities for stakeholder participation – including face-to-face meetings and web-based consultation – will be provided during the study, backed by a multi-faced communications program, designed to generate broad awareness of the study and electrification issues and options.
- **Inclusiveness:** The study will strive to engage a broad spectrum of stakeholders – reflecting the ethno-culturally diverse and complex stakeholder environment in the Greater Toronto and Hamilton area – throughout the study process.
- **Evidence-Based:** The study team will provide stakeholders with robust and credible information on electrification options – based on the most up-to-date research and methods – to enable informed participation in the study process.
- **Traceability:** The results of the stakeholder engagement program will be clearly documented and the impact of participant input on decision-making will be demonstrated.

2.2. Objectives

- **To educate stakeholders** about the study process and electrification options, such that they can provide informed feedback during the study.
- **To generate broad awareness** of the study and opportunities for participation throughout the study process.
- **To facilitate constructive input** from stakeholders during the key phases of the study process, in order to inform decision-making and study conclusions.
- **To document feedback** received through the engagement process and to demonstrate the impact of stakeholder engagement on decision-making and study conclusions.

3. KEY STAKEHOLDER AUDIENCES FOR ENGAGEMENT

The Stakeholder Engagement and Communications Plan includes mechanisms to reach out to and engage a wide range of stakeholders who may be interested in or affected by the Electrification Study. Key stakeholder audiences for engagement in the study include:

- **Former Community Advisory Committee (CAC) Members** – Although the CAC has fulfilled its initial mandate, the 16 members will be invited to continue their participation through stakeholder working groups (see Section 4.0) and other engagement channels.
- Engaged non-government stakeholders, including:
 - Environment and health groups (e.g., Canadian Environment Defence Fund)
 - Community groups (e.g. Ratepayer groups; Community-based or GO corridor-based advocacy groups)
 - Land use and social planning groups (e.g. People Plan Toronto; Ontario Professional Planners Institute)
 - Transportation advocacy and commuter groups (e.g., Transport 2000; Clean Train Coalition; transit advocates)
 - Business and economic groups (e.g., Boards of Trade; Chambers of Commerce, development industry)
 - Academics
- Government stakeholders, including:
 - Municipalities
 - Municipal associations
 - Regional and area municipal staff
 - Regional and area councillors
 - Provincial government
 - Ontario Ministry of Transportation (lead ministry)
 - Provincial ministry staff with a related interest or mandate (e.g., MTO; OMHLTC; MEI; MOE; MMAH; MF)
 - MPPs
 - Federal government
 - Federal ministry/agency staff with a related interest or mandate (e.g., TC, Infrastructure Canada)
 - MPs
- Industry Service Providers
 - Rail (GO Transit; VIA; CN; CP; Union Station)
 - Electrical Infrastructure and Supply (Toronto Hydro; OPA; OPG; Hydro One)
- **Users/commuters** – riders of the GO system
- **General public** – residents of Greater Toronto and Hamilton Area (GTHA) and communities served by the GO system
 - Youth – future users of the GO system

- **First Nations** – First nation organizations that must be contacted/consulted under the provincial “duty to consult”

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system as a future alternative to diesel trains now in service. This comprehensive study will consider all potential benefits and costs associated with replacing diesel with electric propulsion for GO trains in the future. A joint venture of Delcan Corporation and Arup Group Inc. is leading the study, which is expected to be completed in a year – by the end of 2010.

3.1. Stakeholder Engagement – A Key Part of the Study

Metrolinx and its consultant study team recognize the importance of reaching out to and engaging stakeholders as part of the electrification study process. Lura Consulting – the study team lead for stakeholder engagement and communications – has developed a plan to:

- Educate stakeholders about the study process and electrification options, such that they can provide informed feedback during the study; and
- Facilitate input from stakeholders during throughout the study process, in order to inform decision-making and study conclusions.

The plan has been specifically developed to address the key principles – objective, comprehensive, inclusive and evidence based – that were established for the study by Metrolinx, in consultation with a Community Advisory Committee (CAC) which provided substantive guidance to Metrolinx on the study terms of reference.

3.2. Outreach and Engagement Methods

The stakeholder engagement and communications program includes a variety of face-to-face and web-based approaches to reach out to and engage community and industry groups, GO Transit rail system users, the general public and First Nations in the electrification study. Engagement methods are expected to include:

- Formation of an Electrification Study Stakeholder Working Group;
- Briefings for municipal, provincial and federal government agencies;
- Technical working groups for industry service providers;
- School-based consultation with youth – future users of the GO system;
- Interaction with GO’s Customer Service Advisory Committee – made up of rail system users; and
- Innovative community engagement sessions and web-based e-consultation for the broader public.

Information about the study and electrification options will be communicated broadly through an interactive study website, email updates and newsletters, and the use of existing Metrolinx and GO Transit networks and communications channels. A dedicated email address and study contact will be established to ensure “one-window” access to the study team and prompt responses to all feedback and inquiries.

4. ENGAGEMENT MECHANISMS BY AUDIENCE

Specific mechanisms are proposed to engage the above listed key stakeholder audiences in the five phases set out by the consultant team work plan include:

1. “Setting Tracks for the Future” – project initiation, study approach (including engagement and communications plan), high level decision-making framework
2. “Today’s Tracks” – Objectives, baseline conditions, pre-screening criteria for technology options
3. “Transforming Tracks for the Future” – Alternative technology options and network scenarios
4. “Setting Tracks for the Future” – Screening of technology options and network scenarios, short-list of options/scenarios
5. “Tracks for the Future” – Assessment of short-list, study conclusions (including phasing and business case)

4.1. Engaged Non-Government Stakeholders

Electrification Stakeholder Working Group – A series of up to 4 workshops/working meetings with engaged non-government stakeholders is proposed during Phase II – V of the study.

- Participation would be by invitation, based on Metrolinx’s existing stakeholder list (approximately 75 stakeholders) and membership of the CAC; and a “gap analysis” of the Metrolinx stakeholder list (75) based on the following “sectors” to ensure a representative cross-section of participants and from each of the GO corridors:
 - Environment and health groups (e.g., Pollution Probe; Clean Air Partnership)
 - Community groups (e.g. Ratepayer groups; Community-based advocacy groups)
 - Land use and social planning groups (e.g. People Plan Toronto; Ontario Professional Planners Institute)
 - Transportation advocacy and commuter groups (e.g., Transport 2000; Clean Train Coalition)
 - Business and economic groups (e.g., Boards of Trade; Chambers of Commerce)
 - Academics
- It is anticipated that each workshop/working meeting will begin with a plenary session (introductions, study team presentations) followed by topic-based breakouts/working sessions that are based on mirror the key outputs (and decision-making categories) for the study:
 - Capacity and service impacts
 - Environment and health
 - Community and land use
 - Economic impacts
 - System costs, funding and financing and delivery
- It is also anticipated that select government stakeholders and industry service providers will be invited to participate in the above topic-based workshop breakouts, along with non-government stakeholders

- Proposed meeting schedule and topics:
 - Meeting #1 (Early in Study – Phase II): Orientation on study; Provide feedback on study approach, objectives and pre-screening criteria
 - Meeting #2 – to be confirmed (Phase III): Provide feedback on development of alternative technology options and network scenarios
 - Meeting #3 (Mid-Study – likely Phase IV): Provide feedback on short-list of options/scenarios
 - Meeting #4 (Late-Study – Phase V): Provide feedback on assessment of short-list and study conclusions
- Suggested mandate for Electrification Stakeholder Workshops:
 - Act as a sounding board for the study team to share and discuss ideas and findings
 - Provide feedback, critiques and suggestions on proposed study approaches, concepts and materials
 - Participate in discussions on electrification options, including the criteria to be used to evaluate options, the identification of short-listed scenarios, and study conclusions
 - Provide a sense of the broader community’s expectations and potential reactions to the study, as well as how these might be addressed
- Need to prepare TOR for Electrification Stakeholder Workshops

4.2. Government Stakeholders And Industry Service Providers

Municipal Engagement – A two-pronged approach for municipal engagement is envisioned:

- **Electrification Study Briefing:** Metrolinx is convening a meeting of senior GTA municipal planning and transportation leaders. This meeting would be held in Phase II, and provide an opportunity to introduce the study and study plan to senior municipal staff.
- **Technical Working Groups:** Following the initial briefing, municipal staff will be invited to participate in the Technical Working Group process (see below)

Technical (Government and Service Provider) Engagement – As with municipalities, a two-pronged approach is proposed for government and service provider engagement:

- **Electrification Study Briefing:** A briefing session (orientation to the study) is proposed for the following “technical” stakeholders in Phase II:
 - Provincial ministries – MTO, MHLTC, MEI, MOE, MMAH, MF
 - Provincial agencies – OPA, OPG, IO, GO Transit
 - Municipal staff – staff from the GTHA regional governments and/or local municipalities who cannot attend the Municipal Briefing (described above) or who will participate at the request of senior staff following the Municipal Briefing
 - Railways – VIA, CN, CP
 - Federal agencies – TC, Infrastructure Canada
 - Electrical Infrastructure and supply – Toronto Hydro, OPG, Hydro One
 - Other – Union Station, GTAA, Railway Association of Canada
- **Technical Working Groups:** It is envisioned that ad hoc technical working groups and/or one-on-one meetings will be needed between the study team and specific government and service provider stakeholders to discuss and resolve issue-specific technical matters.

- It is also anticipated that select government and service provide stakeholders may participate in the Electrification Stakeholder Working Group process (described above)

4.3. Users/Commuters

Meetings with GO's Customer Service Advisory Committee – The proposal is to meet with GO's existing CSAC (which includes representatives from the 7 GO corridors and customer interests) to brief them on the study and seek feedback. Meetings with the CSAC will likely occur early in the study (Phase II) and late in the study (Phase IV or V), and be arranged to coincide with regularly scheduled CSAC meetings, which are held quarterly.

4.4. General Public

Web-based Consultation – Online consultation and/or surveys will be available to the general public through the project website. Online questions/surveys will mirror the technical work being done in each study phase and seek feedback from e-consultation participants:

- Phase II: Feedback on study approach, objectives and pre-screening criteria
- Phase III: Feedback on alternative technology options and network scenarios
- Phase IV: Feedback on short-list of options/scenarios
- Phase V: Feedback on assessment of short-list and study conclusions

Community Engagement Sessions (to be confirmed) – Near the end of the study (likely Phase IV – short-list of options/scenarios), it is envisioned that one or more community engagement sessions will be convened to enable broader community feedback on electrification options and scenarios. These sessions may take the form of creative technology option demonstrations using models or computer simulations or actual electric train technology, with an opportunity for community feedback. Alternatively, more traditional town hall meetings may be held, likely with visual aids like models or computer simulations. The need for and format of these sessions will be considered once the study team has begun to develop technology options and network scenarios.

Community Panel (to be confirmed) – The Community Panel would involve a recurring survey of up to 1,000 randomly selected and demographically/ethno-culturally reflective residents from throughout the 7 GO corridors.

- The proposal is to survey the panel twice:
 - Survey #1 (Phase II) – objectives, values and screening considerations
 - Survey #2 (Phase IV) – feedback on short-list considerations

Youth Consultation – Elementary and secondary school-based consultations are proposed with youth, as future users of the GO system. It is envisioned that 1 school per GO corridor will be selected to participate in interactive discussions on the study.

4.5. First Nations

Relevant First Nations organizations will be sent a notification letter that the study is commencing and (potentially) an offer to meet to discuss the study and their involvement.

5. COMMUNICATIONS TACTICS TO SUPPORT ENGAGEMENT

A substantial education/communications effort is needed to provide clear and accurate information about electrification of rail systems in general and the Metrolinx Electrification Study in particular. Key topics for the study's communications/education component include:

- The Electrification Study, its scope, process (technical and engagement), timeframe and expected outputs
- The current state of GO's system
- How electrification has been applied in other countries/rail systems
- What electrification may mean in the context of GO's system
- Electrification options and scenarios
- How electrification options will be evaluated
- Short-list of options and scenarios
- Study conclusions and next steps

A number of communications tactics and materials are proposed to support the objective to “educate stakeholders about the study process and electrification options, such that they can provide informed feedback during the study.”

- **Study Website** – a “micro” website for the study will be established as part of the overall Metrolinx website. The website will build on the existing GO electrification webpage, provide information about the electrification study and feature an interactive section to enable e-consultation on discussion topics during Phases II – V of the study.
- **One-Window Customer Service Portal** – includes dedicated email address and contact information for use on website and all communications materials; and protocol for receiving, responding to and documenting all study inquiries.
- **Email “Blasts” to Stakeholders/Mailing List** – to publicize the launch of the study, and provide ongoing study updates and information.
- **Updates to Municipal Councillors, MPPs and MPs** – to keep politicians informed about the study process, engagement plans and meetings, and outcomes.

- **Supporting Communications Materials** – to communicate study progress and findings and address electrification issues and options. Materials could be posted on the project website and made available at study consultation meetings (and potentially consultation meetings for other related Metrolinx studies). Options include:
 - Project brochure
 - Frequently asked Q&As
 - Standalone display
 - Project newsletters (circulated via email to project stakeholders and others)
 - Series of “Did You Know” information/fact sheets that can be posted on the website, available at consultation meetings, or distributed by email “blast”. Topics could include:
 - What is the electrification study?
 - What do we mean by electrification?
 - How is electricity used to move trains in other countries?
 - What might electrification mean for GO’s system?
 - What are the options for electrification?
 - How will electrification options be evaluated?
 - What is the short list of electrification options/network scenarios?
 - What are the study conclusions and next steps?
- **Use of social media (to be confirmed)** – The potential to use Twitter and Facebook to publicize the study and engagement opportunities (particularly e-consultation will be explored).
- **Project communications in GO stations/trains (to be confirmed)** – The potential to use GO stations and trains as locations/vehicles to publicize the project and feedback opportunities will be explored, including:
 - Use of pixel signs in stations and on trains
 - Distribution of project brochures at GO stations

6. ENGAGEMENT AND COMMUNICATIONS BY STUDY PHASE

The following charts provide a summary of key stakeholder engagement and communications tactics by study phase:

Phase I: Setting Tracks for the Study (January)	
Focus: Project initiation	
Engagement	Communications
<ul style="list-style-type: none"> • Develop engagement and communications plan • Identify and begin recruiting consultation participants • Establish online consultation mechanisms as part of project website • Begin preparations for initial canvassing of Community Panel (to be confirmed) • Develop Terms of Reference for Electrification Study Stakeholder Group and Technical Working Groups • Establish dates and venues for Phase II consultation meetings 	<ul style="list-style-type: none"> • Begin establishing project website and “one window” customer service portal (dedicated email, etc.) • Begin developing project communications materials (website copy, brochure, information sheets, etc.) • Confirm approach to use of social marketing (Twitter, etc.) • Consider potential use of communications approaches at GO stations and on trains

Phase II: Today’s Tracks (late January – late March)	
Focus: Communicate and obtain feedback on study plan; study objectives; baseline conditions, and pre-screening criteria for technology options	
Engagement	Communications
<ul style="list-style-type: none"> • Municipal Briefing • Government and Industry Service Provider Briefing • Electrification Study Stakeholder Group Meeting #1 • Technical Working Group Meetings (ad hoc) • Community Panel survey #1 (objectives and values for study – to be confirmed) • Meeting with CSAC • Online e-consultation through project website 	<ul style="list-style-type: none"> • Commence communications with external stakeholders – notice of study “commencement” and invitations to stakeholder and working group meetings; First Nations contact letter • Councillor, MPP, MP information update • Project website up and running, with one window customer service portal established • Communication materials prepared and ready for use on website and at stakeholder meetings

Phase III: Transforming Tracks for the Future (late March – late June)	
Focus: Communicate and obtain feedback on alternative technology options and network scenarios	
Engagement	Communications
<ul style="list-style-type: none"> • Electrification Study Stakeholder Group Meeting #2 (to be confirmed) • Technical Working Group Meetings (ad hoc) • Youth consultation through schools • Online e-consultation through project website 	<ul style="list-style-type: none"> • Website updates and posting on meeting reports/records from Phase II • Meeting notices/invitations • Continuing email blasts and circulation/use of materials (display, brochure, information sheets) • Councillor, MPP, MP information update

Phase IV: Setting Tracks for the Future (mid June – mid September)	
Focus: Communicate and obtain feedback “short-listed” options/scenarios	
Engagement	Communications
<ul style="list-style-type: none"> • Electrification Study Stakeholder Group Meeting #3 • Technical Working Group Meetings (ad hoc) • Community Panel #2 (considerations relating to options/scenarios – to be confirmed) • Meeting with CSAC • Online e-consultation through project website • Community Engagement Sessions (to be confirmed) 	<ul style="list-style-type: none"> • Website updates and posting of meeting reports/records from Phase III • Meeting notices/invitations • Councillor, MPP, MP information update • Continuing email blasts and circulation/use of materials (display, brochure, information sheets)

Phase V: Tracks for the Future (mid October – late December)	
Engagement Topics: Communicate and obtain feedback on study conclusions/recommendations	
Engagement Tactics	Communications
<ul style="list-style-type: none"> • Electrification Study Stakeholder Group Meeting #4 • Technical Working Group Meetings (ad hoc) • Online e-consultation through project website 	<ul style="list-style-type: none"> • Website updates and posting of meeting reports/records from Phase IV • Email blasts to stakeholders and public to communicate availability of study conclusions either online or in face-to-face meetings • Meeting notices/invitations • Councillor, MPP, MP information update • Report on stakeholder engagement results

7. NEXT STEPS – EARLY IMPLEMENTATION OF THE PLAN

Following are initial steps to begin implementation of the Stakeholder Engagement and Communications Plan, along with suggested roles and responsibilities:

1. Obtain Metrolinx approval to proceed with plan/implementation [KP].
2. Map out tentative meeting dates/timeframes for Phase I and II meetings and key communications activities [DD, KP, RW].
3. Provide list of other related Metrolinx projects and associated public consultation and communications activities, in order to identify potential synergies with stakeholder engagement and communications for the Electrification Study [VP, KP].
4. Draft initial copy for website [DD, KP/VP/RW review]. Initial copy to include: introduction to study and project team; overview of study scope; study process and engagement opportunities (high level); contact for more information.
5. Develop generic contact points (email address, etc.) for website and communications materials [VP].
6. Identify more specific lists of stakeholders (names of organizations) to be contacted – NGOs, government, industry service providers – and categorize by topic area for purposes of Electrification Study Stakeholder Group [VP, DP, KP, RW].
7. Build database of stakeholder contacts based on #6 above (including contact names, up to date emails, etc.) for all categories of stakeholder to be contacted [VP, KP, DD, RW].
8. Determine need for ad hoc working group meetings/one-on-ones and who these would be with [Roger, Karen].
9. Contact Greg Ashbee to determine Metrolinx approach/protocol for First Nations contact [DD].
10. Determine website needs and capabilities (including: forwarding of input to Lura for “processing”; how to establish interactive e-consultation capability; etc.) [VP, DD].
11. Prepare letters of invitation to various Phase II meetings [DD, KP/RW/VP review].
12. Develop TOR for Electrification Study Stakeholder Group and Technical Working Groups [DD, KP/RW/VP review].



Appendix 2C

Stakeholder Workshop #1 Summary Report

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2C

Stakeholder Workshop #1 Summary Report

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2C: STAKEHOLDER WORKSHOP #1 SUMMARY REPORT

1. ABOUT STAKEHOLDER WORKSHOP #1

The first stakeholder workshop for the GO Transit Electrification Study took place on Wednesday, March 31, 2010 from 6:00 – 9:00 p.m. at the International Living Learning Centre at Ryerson University, Toronto, Ontario. In total, 34 representatives of non-governmental organizations registered for the workshop, with 25 attending the March 31st session. As can be seen from the invitation list, effort was made to include a wide range of stakeholder organizations from across the Greater Toronto and Hamilton Area (GTHA) in the workshop, including organizations with an interest in land use and social planning, transportation, business and economics, environment and health, community, as well as academia.

The workshop was convened by Metrolinx with assistance from Lura Consulting who managed and facilitated the evening's events. The purpose of the workshop was to introduce the Electrification Study to non-governmental stakeholders and obtain their feedback on the study approach and objectives. In addition, the workshop provided the study team with an opportunity to engage in dialogue with stakeholder representatives from across the GTHA, enabling an increased understanding of stakeholder values and goals related to the Electrification Study.

Section 2 of this report provides an overview of the meeting format. Section 3 summarizes the presentations made at the workshop. Section 4 presents the feedback received throughout the meeting, and the project's next steps are summarized in Section 5. The appendices contain the workshop PowerPoint presentations, a sample worksheet used to elicit feedback, submitted breakout group worksheets, submitted individual worksheets, and the workshop invitation and attendance list.

2. FORMAT OF THE WORKSHOP

The workshop was facilitated by Mr. Dave Dilks of Lura Consulting. The session began with opening remarks from Leslie Woo, Vice President of Policy and Planning, Metrolinx, who outlined the context for the Electrification Study. A presentation by the Electrification Study Team then provided stakeholders with an overview of the study approach and objectives. The presentation was supplemented with PowerPoint slides that can be found in Appendix 2C-1. After the presentation, meeting attendees were invited to ask questions regarding the proposed study approach and objectives.

Following the presentation, the workshop attendees were divided into breakout groups to discuss the study approach (Working Session 1) and the proposed study objectives (Working Session 2). In their breakout groups, participants were asked to discuss the questions outlined on the workshop worksheet (see Appendix 2C-2 for sample worksheet). The breakout groups were encouraged to capture their ideas in writing so that they could be accurately recorded and included in this workshop report. The groups were given 40 minutes to discuss the questions for each working session, and then share their feedback with the other workshop participants, the Electrification Study Team, and Metrolinx staff.

Workshop attendees were encouraged to share their ideas and comments throughout the evening by asking questions following the workshop presentation, participating in the breakout session discussions, speaking with study team members directly, and submitting their individual worksheets at the conclusion of the evening.

3. PRESENTATION HIGHLIGHTS

3.1. Welcome and Overview

Mr. Dave Dilks opened the evening by welcoming workshop participants and introducing the members of the project team including Metrolinx staff and key members of the Delcan+Arup JV Study Team. This was followed by an outline of the evening's agenda and the introduction of Lura Consulting as the third party facilitators for the project. Mr. Dilks then discussed the importance of stakeholder feedback and confirmed that the purpose of the workshop was to introduce attendees to the study and to seek early feedback from representatives on the study approach and objectives. Workshop participants were invited to introduce themselves to the group, stating their name and organization which they represented.

3.2. Electrification Of The Go Transit Rail Network

The PowerPoint presentation was delivered by representatives from Metrolinx and the Delcan+Arup JV Study Team. The presentation informed workshop participants about 'The Big Move' (the regional transportation plan developed by Metrolinx), the context for the Electrification Study, and the study approach and objectives. To view the presentation slides please refer to Appendix 2C-1.

The following is a summary of the main points made during the presentation:

Context for Electrification

Ms. Leslie Woo, Vice President of Policy and Planning, Metrolinx

- The former Study Community Advisory Committee (CAC) played a critical role in the study process by contributing to the development of the study's Terms of Reference;
- This study is of significant importance for Metrolinx and the Ontario Ministry of Transportation in that it will examine technology options for powering GO Transit's rail network on a system wide basis;
- The Big Move outlines a number of rail projects that could benefit from electrification to meet future growth requirements in the region;
- There is strong community interest in looking at new technology options – including electrification – as we move forward in order to address issues including air quality and climate change;
- For this study, emphasis has been placed on the importance of conducting a comprehensive analysis and looking at all potential options before any decisions are made;
- This is the first electrification study for the GO Transit rail network; and,
- Unlike former studies that were corridor specific, this is the first system wide, multi-variant study examining electrification of the entire GO Transit rail network.

Current Electrification Study

Ms. Karen Pitre, Study Project Director, Metrolinx

- The CAC was formed to help develop the study terms of reference and Metrolinx is grateful for the valuable role they have played in the process;
- There are two studies currently underway that will inform the study process: a study examining track capacity at Union Station and a demand and opportunity study examining options for shifting passengers at key interceptor points;
- GO Transit is planning to expand service levels throughout the rail system through a series of infrastructure investments throughout the rail network; for the purposes of this study the project team will assume that these will be implemented in the future;
- The current width of the existing rail corridors in the GTHA is a constraint to both system expansion and to the option of electrification;
- The study team will develop a baseline case in order to understand the network limitations and different technologies that are available for the existing network;
- A sensitivity analysis will be conducted to understand the implications of various technology options for the future network;
- The study team has attempted to create a bottom up approach to the study and stakeholder feedback on the study approach and objectives will be used to develop the decision-making criteria;
- Further engagement with stakeholders will occur in June to discuss the evaluative/screening criteria and the preliminary technology options for the existing network; and,
- This is a complex project because the study is examining the entire GO Transit rail network.

Study Approach and Objectives

Mr. Roger Wood, Study Project Manager, Delcan+Arup JV

- As the representative from Arup, Mr. Roger Wood brings over 30 years of international engineering and transportation infrastructure development experience;
- Marcela Diaz-Ruiz from Delcan is a major supporting team member;
- In response to the request for proposal (RFP) Delcan + Arup JV put together a comprehensive team of local and international experts including Delcan, Arup, SDG, LTK, Lura, CANAC, RWDI, DPRA, EDR Group, InterVISTAS, Golder Associates, and LGL;
- The RFP outlined that the study team, and the electrification study, is required to be objective, comprehensive, inclusive, and evidence based;
- The goal of the study team is for all disciplines to have a voice at the table during the study;
- At the onset of the study, the study team needs to develop a comprehensive understanding of the existing rail network and study potential technology options available for the GTHA;
- To date, the team has prepared the baseline conditions for the study;

- The team is developing a list of various technology options and will begin to examine which technologies can be applied to the existing GO Transit rail network;
- The team is committed to engaging stakeholders throughout the study and as a result future stakeholder workshops will be undertaken at key points in the study;
- The team will also convene geographically based workshops in order to receive input from local community stakeholders;
- An interactive web based engagement process is also being initiated for the study;
- Meetings with representatives from all levels of government and “technical” organizations (e.g. VIA, CN, OPA, etc.) are underway and further communication between the study team and these organizations will continue throughout the study;
- The objectives for the study were confirmed by the Metrolinx board and derived from the terms of reference developed by the CAC;
- The underlying principles of the study seek to address the goals of the GO 2020 plan, The Big Move, and the Places to Grow Act; and,
- The study team would like workshop participants to consider the study approach and objectives and would welcome any feedback.

Questions and Answers

Question 1: Where does the air rail link connect to this study?

Answer: This study is looking at the whole system, including the Georgetown Line. We will have a better sense of how the study fits with the airport line once we get further into our methodology.

Question 2: Are there risks that you might not deliver by the December 31st deadline? Are there penalties in the contract if the year-end deadline is not met?

Answer: There are no penalties in the contract but we are fully committed to that deadline. However, meeting the deadline is contingent on us getting the right data in time in order to prepare and write the report. The expectation from GO Transit and Metrolinx is that decisions will be made in a timely fashion so we can continue to move forward. As well, we have weekly team meetings in order to assess the project schedule and ensure we meet our incremental deadlines.

Question 3: With respect to ridership projection data, have these data been refined over the past year since The Big Move was released?

Answer: Metrolinx is constantly updating the information and data that we use. With that said, I can say that the numbers for ridership have not changed but the detail behind the numbers is changing. We will share this information in future since we are still in process of refining these numbers.

Question 4: Ridership will affect expansion of Union Station, and you noted that it will expand regardless of which technology you choose, but will technology options affect how you can expand?

Answer: Yes, that is true. It is one of the key considerations.

Question 5: On slide 12 it mentioned that electric and diesel alternatives require more track lowering etc. That is happening now for diesel, why are grade separations also going to occur with electric trains on the GO network?

Answer: We still have a requirement to accommodate freight trains that may be double stacked containers; we need to accommodate others who will use the corridor. An overhead wire system will need to be thought out so wires don't get caught. Safety is a big issue.

Question 6: On slide 18 you have a flower diagram where you refer to cost benefit analysis. How broad will that be? What do you intent to include?

Answer: A benefit-cost analysis will be carried out. In addition we will consider impacts associated with other criteria such as social community, environment, health, etc, but we will not say one is more important than another. In addition, we will do an economic evaluation in terms of what the fiscal benefits will be.

Question 7: Regardless of how many stations you have to relieve Union, it will always be the key hub. What influence do you have on the TTC plans for Union, since what they are currently doing is inadequate?

Answer: Union Station is indeed the nexus of the GO Transit Rail network. We continue to work collaboratively with the City of Toronto to coordinate our efforts to ensure seamless customer service at Union Station.

Question 8: Why do you not commit to producing any recommendations? Unlike previous studies that were shelved, will this study be implemented?

Answer: The study findings and conclusions will inform the Metrolinx Board recommendations to the Province. A big part of our findings will relate to how and when we think technologies can be implemented. Electrification is very complicated and we need to phase it in over time and implement it in a way to make it successful.

4. WORKING SESSIONS

4.1. Overview

At the conclusion of the presentation, workshop participants broke into small groups and discussed the questions presented in the worksheet (see Appendix 2C-2). The groups were given 40 minutes to complete each working session. After each working session, the breakout groups shared their responses with the study team and each other.

4.2. Working Session 1: Study Approach

During the first working session, the workshop breakout groups were asked to discuss the study approach and consider the following two questions:

1. What feedback do you have on the proposed study approach?
2. Have we missed anything?

Common Themes presented by the Breakout Groups

The following section provides a summary of the responses and questions raised by breakout groups for the two questions listed above. More detailed notes and responses from the breakout groups are included in Appendix 2C-3.

Stakeholder Engagement:

- The number of stakeholder workshops should be increased; add another stakeholder workshop closer to the end of the study between phases three and four
- The study team should provide stakeholders with progress reports or study “products” electronically in between meetings to avoid information overload at stakeholder workshops
- Study team attendance at the workshops should be broadened to include other sub-consultants so they can answer questions related to their specialized role in the project
- The study team should report back to the stakeholders regarding how their concerns were integrated into the study
- Stakeholders would like to be consulted well before decisions are made (e.g., screening out of technology options) by the study team
- Stakeholders are interested in opportunities to interact with the Metrolinx Board as the study progresses and reaches conclusions

Decision Making Framework:

- Health and environmental factors should be quantified where possible and included in the study’s cost-benefit analysis
- The decision-making framework must be flexible and be able to adapt to changing conditions (e.g., availability of new data) in the region as required
- A sensitivity analysis should be conducted during the study in order to ensure that changes to network conditions are reflected in the assessment of various technology options

- Stakeholders emphasized the importance of using accurate, up-to-date data when assessing baseline conditions for the study (e.g. updated transit ridership data)

Parallel Studies

- The proposed Airport Rail Link should be included in the Electrification Study; it should be considered for one of the first electrification projects
- The findings and conclusions of ongoing Metrolinx studies should be integrated into the Electrification Study (e.g. Union Station capacity study)

Study Outcomes

- Stakeholders want affirmation that the Electrification Study will lead to meaningful results that can be implemented; concerns were raised that previous electrification studies have “sat on the shelf”

4.3. Working Session 2: Study Objectives

The following six categories of objectives are proposed by the study team to guide the Electrification Study process (to review the detailed list of the study objectives within each category please refer to the workshop presentation in Appendix 2C-1):

1. User Benefits
2. Environment and Health
3. Social Community
4. Economic
5. Financial
6. Deliverability

During the second working session, participants were asked to discuss the following two questions:

1. What feedback do you have on the proposed objectives?
2. Have we missed any objectives?

Common Themes presented by the Breakout Groups:

Varied feedback was obtained related to the study objectives from workshop participants – feedback that is both relevant to the Electrification Study and other GO Transit and Metrolinx studies or initiatives. The following provides a summary of the responses and questions raised by breakout groups.

User Benefits:

- Increase and improve both local and regional public transit in the GTHA
- Examine the entire GO Transit rail network
- Ensure that the future rail system is accessible for all users (e.g. family friendly and wheelchair accessible)

- Increase local stops and connections to local transit networks

Environment and Health:

- Prioritize increasing the use of renewable sources of energy, rather than the proposed objective to decrease the use of non-renewable sources of energy
- Conclusions made related to human health implications should be evidence based rather than general statements
- Address the health implications that various technology options have for vulnerable groups in society (e.g. elderly, pregnant women, children, and chronically ill)

Social Community:

- Ensure there is a safe interface between the public and proposed rail networks (e.g. safe railway crossings)
- Examine both the hard and soft social and health costs associated with proposed technology options (e.g. sleep interference due to noise, overall quality of life, etc.)

Economic:

- Social and health implications should be incorporated into the financial assessment of various train technology options
- Priority should be placed on local job creation
- Preference should be given to technology options that increase regional infrastructure investment and transit oriented development around rail stations and tracks
- Examine the impact that various train technologies will have on community development and other associated benefits for neighbourhoods and communities in the GTHA (e.g. increases to land market values)

Deliverability:

- Train technologies must be able to operate in extreme climates

Other:

- Integrate the results of ongoing environmental assessments in the electrification study
- Focus on the feasibility of electrifying the entire GO Transit system not just the Georgetown South line

4.4. Feedback on Priority Objectives

At the conclusion of the breakout discussion, stakeholders were given an opportunity to indicate the most important objectives for the study. Each participant was given six dots and invited to post them on wall-sized charts listing the objectives proposed by the study team. A full list of proposed objectives for the study can be found in the workshop presentation in Appendix 2C-1.

The following is a list of the most important objectives identified in the “dotmocracy” exercise in order of importance according to the workshop participants:

- Implemented in a manner that encourages transit-supportive densities, visionary community developments and enhanced community facilities (e.g. bike paths) (21)
- Improved connection and service within the GTHA (16)
- Provide appropriate land development opportunities (13)
- Net improvement to human health in adjacent communities (12)
- Minimize adverse community/social impact including aesthetic impacts and impacts from noise and vibration (12)
- Contribute to improved air quality (11)
- Facilitate faster, more frequent and less crowded transit (8)
- Significant contribution to the achievement of transportation related GHG reduction targets of GO Green: Ontario's Action Plan for Climate Change (7)
- Improved transit reliability (6)
- Decrease the use of non-renewable resources (6)
- Encourage environmentally sustainable operations (4)
- Optimize opportunities to provide positive economic benefits to local, regional, and national economies (4)
- Cost-effective financing solutions (4)
- Provide value associated with all relevant and material hard and soft system capital costs, operating costs, and lifecycle maintenance costs (3)
- Proven in comparable climatic setting (3)
- Minimize adverse heritage and archaeological impacts (2)

5. NEXT STEPS

The next steps for the project were presented by Metrolinx Project Director Ms. Karen Pitre, and include:

- Fine-tuning the study approach and objectives based on input received by stakeholders;
- Updating the project website and obtaining feedback from the broader public through e-consultation;
- Continuing to develop technology options and preparing for the second stakeholder workshop in late June or early July 2010.

Ms. Pitre thanked participants for their participation and feedback and noted that a report on the workshop results would be prepared by Lura and circulated to stakeholders following the meeting.

APPENDIX 2C-1: “Electrification of the GO Transit Rail Network” PowerPoint Presentation



METROLINX

Electrification of the GO Transit Rail Network

Stakeholder Workshop # 1



Metrolinx is an agency of the Government of Ontario

Workshop Purpose

- Introduce stakeholder group representatives to the study
- Seek early feedback on study approach & objectives



Stakeholder Workshop Agenda

- Welcome
- Opening Remarks (Metrolinx)
- Presentation: Study Approach & Objectives (Delcan+Arup JV)
- Working Session #1: Study Approach (Lura)
- *Break*
- Working Session #2: Proposed Study Objectives (Lura)
- Closing Remarks and Next Steps (Metrolinx)
- Adjourn



Opening Remarks



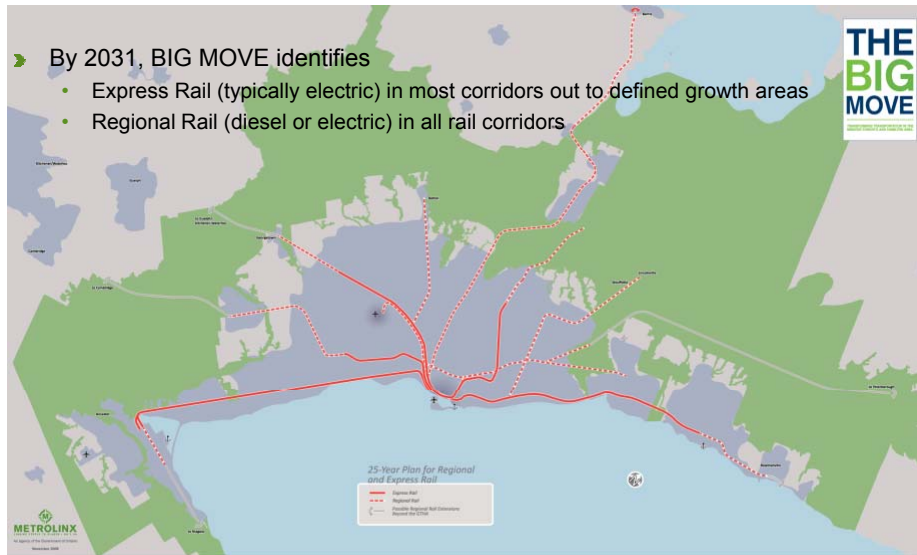
The Context

- The Big Move calls for Express Rail and Regional Rail to achieve the “triple bottom line” (Social, Environmental and Economic)
- Heightened community interest in alternate energy sources for rail
- Global interest in climate change and cleaner technologies
- GO Electrification Study announced May 2009



Regional Transportation Plan

- By 2031, BIG MOVE identifies
 - Express Rail (typically electric) in most corridors out to defined growth areas
 - Regional Rail (diesel or electric) in all rail corridors



Previous GO Studies

- GO has previously undertaken studies of electrification
- Studies were undertaken due to:
 - Rising fuel costs
 - Availability of fuel
 - Improved performance
 - (acceleration/deceleration)
 - Improved reliability
- Electrification was not pursued
 - Benefits did not match investment
 - Same amount of money spent on current system – “better bang for the buck”



Current Study

Karen Pitre
Study Project Director
Metrolinx



Current Electrification Study

- **Community Advisory Committee named to assist with Terms of Reference**
- **First Electrification Study to consider entire GO network**
- **Comprehensive:**
 - Capacity and Service Impacts, including reliability of service;
 - Environment and Health Impacts;
 - Community and Land Use Impacts;
 - Economic Impacts; and
 - System Costs, Funding, Financing and Delivery.
- **Delcan+Arup JV successful proponents**
- **Project start-up January 2010, completed December 2010**



Parallel Metrolinx Studies

› Union Station Capacity Study

- February to October 2010



› Proposed Demand and Opportunity (Interceptor) Study

- April to December 2010



Short term

Mid term

Long term

Business
Today

Have to Do
REGARDLESS

- UNION STATION EXPANSION
- SIGNALS
- MORE TRACK
- BRIDGE WIDENINGS
- MORE SERVICE

STUDY ASSUMPTIONS

STUDY FOCUS

Have to Do for
ELECTRIC & ALTERNATIVES

- ROLLING STOCK
- SIGNALS
- ADD CATENARY
- ADD SUB STATIONS
- MORE GRADE SEPARATIONS
- BRIDGE RAISINGS OR TRACK LOWERINGS

T4 Locomotives

Have to Do for
BIG MOVE 2031

- RE-VISIT CN/CP/VIA SHARING
- EXPROPRIATION
- TUNNELLING OR ELEVATING
- LOCAL TRANSIT EXPANSION
- IMPLEMENT:
 - ❖ INTEGRATED FARE STRUCTURE
 - ❖ TDM PROGRAMMES
 - ❖ ACTIVE TRANSPORTATION INFRA
 - ❖ INTELLIGENT TRANSPO SYSTEMS
 - ❖ AUTO TECHNOLOGY & FUEL ADVANCE
 - ❖ URBAN FREIGHT RATIONALIZATION



Study Approach

Roger Wood
Study Project Manager
Delcan+ARUP JV



Delcan



ARUP



Delcan+Arup JV Team

Delcan	project management, quality oversight, infrastructure scoping, operations and maintenance costing, funding and financing
ARUP	project management, infrastructure scoping, capital cost estimating
SDG	decision-making framework, modeling
LTK	technology assessment, energy modeling
Lura	stakeholder engagement & consultation
CANAC operational	modeling
RWDI	noise and air quality assessment
DPRA social	community assessment
EDR Group economic	impact assessment
InterVISTAS	risk assessment
Golder Associates	contamination and geotechnical
LGL natural	environment assessment

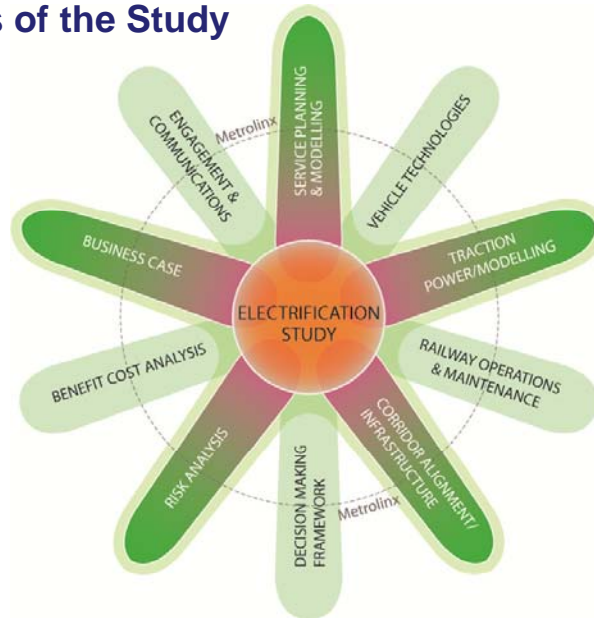


Electrification Study Principles

- Objective
- Comprehensive
- Inclusive
- Evidence Based



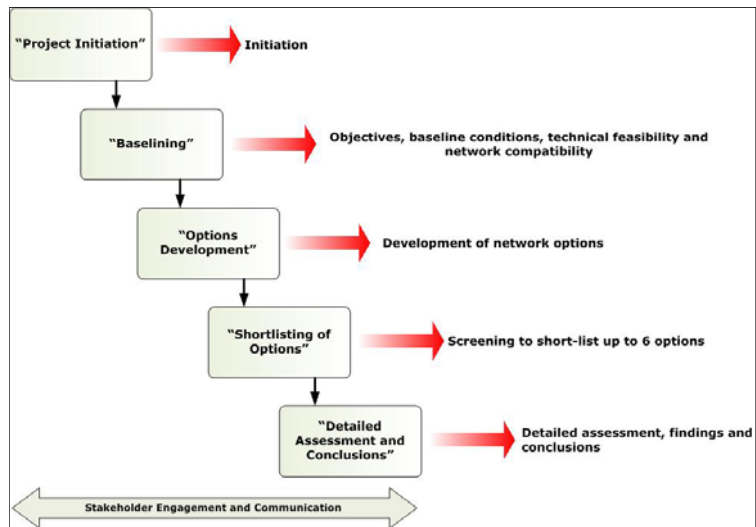
Elements of the Study







Study Approach Overview



Study Timeline

Study Phase	Timeline											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phase 1 - Project Initiation	■	■										
Phase 2 - Baselineing	■	■	■	■	■	■	■					
Phase 3 - Options Development				■	■	■	■	■				
Phase 4 - Shortlisting of Options							■	■	■			
Phase 5 - Detailed Assessment, Findings and Conclusions									■	■	■	■

★ Stakeholder Workshop



Engagement

- Key Stakeholders
 - Former CAC members
 - Representatives from across GTHA: environment/health, community, land use and social planning, transportation, commuter groups, business, economic, development, academic
 - Stakeholder workshops (March, June, October)
 - Geographically-based workshops
- General Public
 - Web based consultation
 - E-newsletter
- Government
 - Municipal, Provincial, Federal
- Technical
 - Rail (CN/CP/Via)
 - Electrical – supply and distribution organizations (e.g. OPA, OPG, Hydro One, Local Distributors)



Study Objectives



Terms of Reference

Study must address...

1. Technology, Capacity and Transit Service Impacts
2. Environment and Health
3. Community and Land Use
4. Economic
5. System Costs, Funding, Financing and Delivery



User Benefits

(Technology, Capacity and Transit Service Impacts)

- Facilitate faster, more frequent and less crowded transit
- Improve transit reliability
- Improved connections and service within the GTHA



Environment and Health

- Net improvement to human health in adjacent communities
- Contribute to improved air quality
- Significant contribution to the achievement of transportation related GHG reduction targets of GO Green: Ontario's Action Plan for Climate Change
- Minimize negative impacts on agricultural and natural systems
- Decrease the use of non-renewable resources
- Encourage environmentally sustainable operations



Social Community

(Community and Land Use)

- Implemented in a manner that encourages transit-supportive densities, visionary community developments and enhanced community facilities (e.g. bike paths)
- Minimize the need to acquire property to accommodate associated infrastructure
- Minimize adverse community/social impacts including aesthetic impacts and impacts from noise and vibration
- Minimize adverse heritage and archaeological impacts



Economic

- Optimize opportunities to provide positive economic benefits to the local, regional and national economies
- Provide appropriate land development opportunities



Financial

(System Costs, Funding, Financing and Delivery)

- Cost-effective financing solutions
- Provide value associated with all relevant and material hard and soft system capital costs, operating costs, and lifecycle maintenance costs



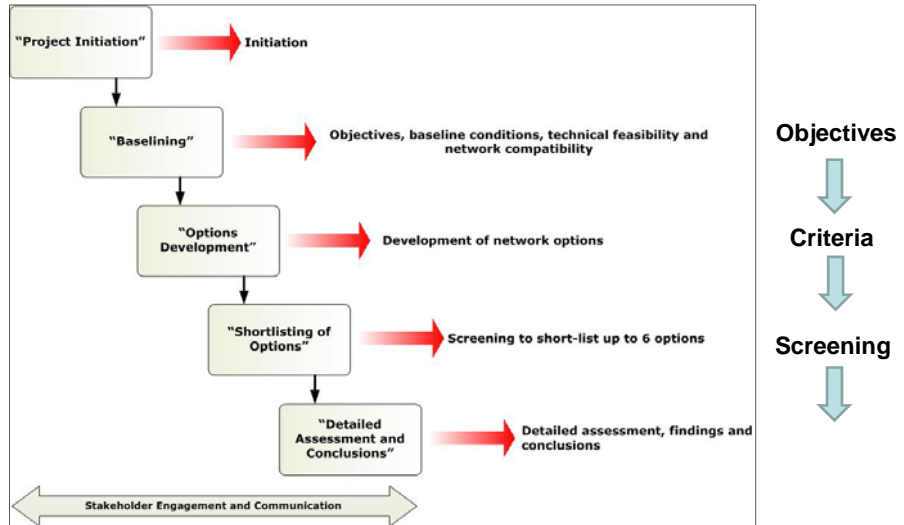
Deliverability

(System Costs, Funding, Financing and Delivery)

- Proven in a comparable climatic setting.
- Minimize impact on other rail services (e.g. CN/CP/VIA)



Study Approach Overview



Working Session # 1

Study Approach



Study Approach Discussion

- What feedback do you have on the proposed study approach?
- Have we missed anything?



Break



Working Session # 2

Study Objectives



Study Objectives Discussion

- Looking at each category of objectives
 - What are the most important objectives in each category?
 - Have we missed any?



Closing Remarks



Next Steps

- Next Stakeholder Workshop - end of June early July



Thank you!

Contact us at:

estudy@metrolinx.com

Website

<http://www.metrolinx.com/electrification/default.aspx>



APPENDIX 2C-2: Sample Worksheet



**GO Transit Electrification Study
Stakeholder Workshop #1**

WORKSHEET

Please Print

Name (optional)

Email (optional)

Address (optional)

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

2. Have we missed anything?



Working Session 2: Proposed Study Objectives

1. What feedback do you have on the proposed objectives?

2. Have we missed any objectives?

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

APPENDIX 2C-3: Submitted Group Worksheets

Group 1 - Breakout Discussion Worksheet

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Concern - this has been done before and "shelved".
- Misgivings re: lack of assurance of implementation on timely basis.
- Misgivings re: Metrolinx alone being "gatekeeper" of results.
- Misgivings re: need for transparency - how much will be public?
- Misgivings re: results will affect MILLIONS - are our rates being well used?
- How and by whom will decisions be made?
- Land use as key variable.
- What system is basis of analysis? Today's?
- Guelph/KW/Niagara.
- Role of airport link - electrify? If not, why not?

2. Have we missed anything?

- Compatibility to local transit.
- Union Station capacity/transfer/pedestrian pass-thru problems
- How will stakeholder concerns be reflected in study process?

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Airport link must be in "the system".
- Seamless network with ARL a must.

2. Have we missed any objectives?

- Urban footprint & intensification.
- Noise & vibration.
- Energy source(s).
- Safety.
- Local employment & urban [illegible].
- Parking.
- Different sizes & widths of loads & trains.
- Hybrid option.
- User costs.
- Stageability.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Group 2 - Breakout Discussion Worksheet

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Economies of health and environment should clearly be part of the cost-benefit analysis
- Increase the number of stakeholder meetings
- Community advisory committees involvement at some stage
- Take the approach of how to shift away from diesel in a phased replacement
- Include a focus on Air Rail Link to take advantage

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- User benefits: increase access to network with technological ability to start and stop quickly
- Environment & health: decrease use of non-renewable resources and increase use on a renewable resource (i.e., tap into green infrastructure)
- FIT: feed-in tariffs
- Implement safe interface with public
- Social community: divide: objective of adverse community/social impacts and noise & vibration
- Economic: create possibility for local job opportunities

2. Have we missed any objectives?

N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Group 3 - Breakout Discussion Worksheet

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Importance of DPRA to be engaged in stakeholder meetings; not present at this meeting
- Significant input required throughout process
- Website updates; feedback mechanism; in ADDITION to meaningful stakeholder input
- Moratorium on current construction through neighbourhoods - with no consultation
- Serve Bloor St on all lines
- Team Values - study team take public transit for all study business... whether "convenient" to them or not

2. Have we missed anything?

- See 1 above!
- Include service scenario/demand model as part of study
- Commit to non-partisan, cross-jurisdictional dialogue (vs. City meeting on Trains = Transit City funding pulled days later)

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

User benefit:

- Transit in both directions
- Stops at Bloor; Exhibition Place; other
- Define users - recreational - Niagara Falls, Muskoka, weekends to malls/fishing/hiking etc.
- Local connections; not huge car parks
- "Local transit expansion"

Health & Environment:

- Quantify/cost health costs; enjoyment of property; noise (key)
- This "is" the point
- Address overlapping EAs, not separate (e.g., Georgetown and Barrie lines)

Social Community:

- KEY e.g.: grade separations; dividing neighbourhoods

2. Have we missed any objectives?

Economic:

- Needs to be studied very closely with social/community
- Optics: investing in soon-to-be obsolete technology

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Group 4 - Breakout Discussion Worksheet

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- (i) Presenting the vision/imagining of the future case (Big Move, 20/20) in the study context
- (ii) How are the decisions between the options development and the short listing going to be made?

2. Have we missed anything?

- Recommend to have a stakeholder feedback session between options development and short listing, in case missed (i) option; (ii) objective, baseline condition, etc.
- How does this approach coincide with the Union Station study?

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

2. Have we missed any objectives?

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Group 5 - Breakout Discussion Worksheet

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Is Union (Station) capacity part of this study? Why not? How will results of other studies blend with these results?
- Weighting of factors not specified in presentation
- How will the consultant shortlist the options?
- No obvious consulting with municipalities and their transit and transportation systems
- Integrating electrification of GO with other transit systems (i.e., Pearson link)
- Ensure consultation with Via/CN/CP

2. Have we missed anything?

- Make sure that most up-to-date transit ridership is used as part of analysis
- study approach needs to be flexible and adjustable if new conditions or new data come forward halfway through the study
- Who on team will examine the land development opportunities?
- Non-public wiki for input/project report/progress/status updates

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Land development opportunities should be done in conjunction with infrastructure changes
- Use private developers to pay for part of costs in exchange for benefit of denser developments in corridor
- Should be separate category entitled "feasibility"; make it explicit, not implied
- Integrated fare systems & connections with local transit
- How transit oriented development can be captured in evaluation of alternatives
- Try to quantify how the choice of motive power (technology) affects the land development type and livability of location

2. Have we missed any objectives?

- Human health objectives need to be clarified and be more specific and accurate; supported by evidence rather than broader general statements about human and environmental health effects
- Will need baseline to compare health benefits
- Understand overall framework for energy/electricity production
- Don't let the impact on other rail services affect the decision on technology
- Don't underestimate the climatic conditions! We get some pretty heavy ice & snow storms from the east
- Will service be sustainable during off-peak times; opportunities for trips that are not just work-based

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

APPENDIX 2C-4: Submitted Individual Worksheets

*** Note: Personal information submitted on worksheets was removed***

Individual Worksheet 1

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Study principles are good, but objectivity might be compromised if Metrolinx is the gatekeeper of info (website, final report, etc.)
- Transparency should be added as a principle
- We need a clear definition of the same case. What are we talking about? Does it include the ARL?

2. Have we missed anything?

- There should be more steps after the detailed findings
- What happens next? What are the timelines?
- Stakeholders should engage at some point, directly with the board and other decision-makers

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Add accessibility to user benefits
- Add possibilities for local economic development and employment

2. Have we missed any objectives?

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- The Clean Train Coalition has serious reservations about the value of this study if it does not include the ARL and if it will not produce results that could shape the plans for the Georgetown corridor

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 2

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Community Adv. Committee should be re-established and given responsibility to renew and shape final report
- A track of the study should include review of electrification of ARL as a Quick Start project by 2015 to take advantage of intergovernmental alignment on PANAM transit
- Financial should include the shift of resources from current plan for diesel system into electrification, i.e., selling Tier 2 diesels rather than upgrading them

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Economic development; potential to build local/regional electric transit manufacturing & service sector
- Opportunity to create local employment in green jobs

2. Have we missed any objectives?

N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 3

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

-How will freight demands be balanced with competing demands of regional rail or express rail where the corridor is narrow and traffic volumes are high?

(E.g. CP is abandoning its chalk river corridor, which routes all traffic for CP through Toronto)

2. Have we missed anything?

-Impact of variable of high-speed rail in Quebec-Windsor corridor at Union Station

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

-Emphasis on land use integration during capital infrastructure expansion to share some costs with private sector, and opportunities for transformative benefits to areas along/near the infrastructure

2. Have we missed any objectives?

-More local stops to encourage higher volumes of shorter trips, particularly in the off-peak and reverse-peak services, and improving local service connections to GO

-Wane GO's reliance on parking, replace (although no eliminate parking) with community developments & transit-oriented development

-Use land developments as a revenue generating tool for Metrolinx (as landlord?)

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

-Can the fleet be harmonized to any degree through the transition?

-Seriously compare EMUs to other loco-hauled options and operating impacts

-Improve existing connections between local services & GO where problems are known if high frequencies of service will be operated by GO at that connection

Individual Worksheet 4

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- New environmental category: human health objectives
- Localized pollution examination: geomedical data is particularly relevant to Dundas West/Bloor terminus & parks such as Sorauren/MacGregor
- Concerns about diesel buffer zones around stations
- Film on TEDMED: Google it
- Geomedical input: case studies and data from new discipline considering cumulative impact on air quality at transfer points and whether this enables transit-oriented development
- Does this data support electrification immediately due to density of population and terminus?

2. Have we missed anything?

- Participatory persistent input process: not funnelled through Metrolinx
- A non-public Wiki where participants can continue discussions and upload information: it is called "Base Camp", and costs ~ \$50/month

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

N/A

2. Have we missed any objectives?

N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 5

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Generally seems comprehensive, reasonably set-up
- Consultation okay, could be further expanded

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Appears to be Toronto-centric - what about the Region? Think about Regional City. Assess impact on new communities, development at edges where most new development is happening!
- Make sure you address properly land use/development value in assessment and you have appropriate team members try to capture "marketability"
- Assess/measure increase in "liveability"; increase in quality of life; marketability of transit: "Regional City"
- Key element/objective to play major role in a comprehensive transportation/transit system including regional/local systems & two-way/complex system

2. Have we missed any objectives?

- Not really, just more nuances, details
- Future relationship with high speed rail?

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Great initiative; never too late...

Individual Worksheet 6

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- A value needs to be placed on health and environmental impacts, not just on the economy
- Air rail link could be a great pilot of non-diesel technology
- Future scenarios and modelling should be looked at what are the costs of not electrifying now? How much will it cost in 20 years?
- How are the other consultants that are involved approach this study?

2. Have we missed anything?

- Assurance that the study will be paid attention to, even if the costs to electrify cost too much money

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Is there baseline data related to human health to measure improvement?
- Pilot solar or wind powered electric trains
- Take advantage of F.I.T to finance electrification

2. Have we missed any objectives?

- Disingenuous to frame electrification vs. diesel as a train vs. Car argument. It is wrong to transfer pollution from one community to another.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Electrification will be more expensive so we also need to address to fund it. This needs to include road tolls and congestion taxes.

Individual Worksheet 7

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

-DPRA

-Involvement in options development partway through another stakeholder meeting during short listing

-Need to know input has been addressed

-Question about numbers of trains on the Georgetown need sound scenario include in consultation when it happens

-Sensitivity to demand frequency fuel/energy costs

-Energy costs in construction

-Operational scenarios for express regional rail

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

-What users – reverse commuting, other destinations, tourist use

-Will need local transit expansion

-Continuity of capacity

-Cost of health impacts

-Include noise effects – differentiate between technology

-Need to look at rush hour of noise/emission impacts

-EAs need to look at comprehensive

-Grade separations and frequency of service

-Avoid creating barriers through communities

-Need to look at impacts from local perspective

2. Have we missed any objectives?

N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 8

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Baseline is key
- Concern about short list – how things get removed from the list
- Hard to understand
- Consultation with public and stakeholders is key
- Baseline should include vision

2. Have we missed anything?

- Add feedback after options development and before short listing options
- Then tell us the short list options – consultation
- More consultation / keep us informed
- Get proper material out to people ahead of time
- One page summary of Big Move
- Improve consultation = informed feedback
- Sell the idea

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- User benefits – more family friendly, accessible (strollers, wheelchairs)
- Not just a commuter system –open for tourists, needs to be appropriate for all users
- Prospective users not just current users
- Service to PANAM Games and one day Olympics
- Ease of use – scheduling is not appropriate, no evening trains, weekend and holidays
- Make it easy for people to get out of their cars
- Other hubs apart from Union Station
- Economic → electric with infrastructure = stores, restaurants, etc.

2. Have we missed any objectives?

What is the difference between financial and deliverability

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 9

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

-Implementation POV is good

-Who other than Metrolinx will know the options?

2. Have we missed anything?

-Consulting each municipality and their transit system and planning departments (land use)

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

-N/A

2. Have we missed any objectives?

What is the difference between financial and deliverability

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 10

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- The way that options are formulated and then eliminated or retained is critical, but not clear
- more detail on this aspect of the approach is a good idea

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- The objectives on human health need to be very much clarified and made more accurate
- In many respects you will not be able to measure or predict a net improvement to human health because the epidemiological data you would need to do this do not exist. Rather you may be able to make predictions about human exposure, or to quantify potential health risks when toxicological data are available.
- Also, with respect to improving air quality it will be critical to distinguish between targets that are compliance-based and reference levels that are specifically or exclusively health-based

2. Have we missed any objectives?

N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Comment Sheet 11**Working Session 1: Study Approach**

1. What feedback do you have on the proposed study approach?

- Give a context to the outsider of Vision 2020 and Big Move before making the presentations
- Be clear about the boundaries for discussion for the economy

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- User Benefits: a public system for all – not a commuter system; better system integration between municipalities; more family friendly system – buggies; more accessible for disabled and the elderly
- Health: sensitivity receptors – pregnant women, infants, children, chronically ill, elderly
- Economic: build destinations and hubs to encourage new economic infrastructure – shops, recreation

2. Have we missed any objectives?

- Deliverability – engage with CN and VIA

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Comment Sheet 12**Working Session 1: Study Approach****1. What feedback do you have on the proposed study approach?**

- Base case needs to be clearly defined geographic service limits, ARL, etc.
- Report must be made public is a transparent process
- Clearly state the assumptions on which each of the 6 final options are based

2. Have we missed anything?

- Transparency
- How will conclusions be used and by whom
- Metrolinx Board should be engaged with stakeholders
- Ensure that the external costs for environment and health are taken into account for both scenario (electrified and not electrified)
- Note that no electricity in this province need to be generated by hydrocarbon fuels and that dispatchable hydro –electricity can be used – if any doubts contact me as this is my area of research at Ryerson

Working Session 2: Study Objectives**1. What feedback do you have on the proposed objectives?**

- Social -parking can be reduced by better connections with other modes; eliminate level crossing with grade separations
- Economic – encourage higher density near stations; local job opportunities; use hubs for developing economic infrastructure
- User Benefits: accessibility; two-way service; how does choice of technology affect development
- Environment: Decrease noise and less vibration; consider energy source; safe interface with public (grade crossing, etc.)
- Financial: need long term financing; are you consider PPPs?
- Deliverability: construct in stages, one line at time, feasibility assessment?

2. Have we missed any objectives?

- See points in other sections

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Whom do I contact at the Union Station Capacity study to pass on my ideas?

Individual Worksheet 13

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Needs to actually be implemented at end instead of being shelved like all others
- More transparency throughout study and afterwards – stakeholders must feel their efforts are of use and will be used by Metrolinx
- If study being done has no recommendations for Metrolinx to implement, then what is the purpose of spending \$4 million dollars, the study can be discounted, shelved.

2. Have we missed anything?

- The Air Rail Link is a key component in the discussion but is never mentioned; where does it fit in? will this study impact the ARL or only GO?; ARL is new infrastructure and should be given weight in discussion as it has a deadline for implementation

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Thank you for including heritage in discussion

2. Have we missed any objectives?

- How all of this connects with TTC and the objectives of Transit City if at all
- Creation of hubs, links between systems, etc.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Please ensure that this study will reflect the ARL as it is a key component in the discussion and a major driving force behind why we are here. GO trains are just one piece of this puzzle.

Individual Worksheet 14

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Evaluate all projects (not just this one but all Metrolinx) based on identical objective indicators to easily compare. E.g. cost per ton of GHG across all transportation projects
- Link to QC-ON high speed rail study -could electrification be cost shared?
- Add steps to show decision-making process after conclusions shown – recommendations – investment decisions
- Separate transit planning from operations to show more objectivity.

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

- Consider challenging FRA compliance requirements to reduce cost and increase flexibility
- Look at potential for reducing dependence on non-Ontario energy sources
- Consider impact on sprawl and achievement of letter and spirit of growth plan
- Look at phasing in certain lines with dual modes locomotives (electric and diesel)
- With faster trains and faster acceleration consider more station, including stations for intense development and other with parking but minimize stations that try to do both
- Seriously analyze cost of continuing to invest and a dead-end technology, e.g. High tech diesel locomotives when ultimately we will go to electric
- Show different fuel price escalation scenario
- Include well-to-wheel impact analysis of all fuel sources
- Really examine impact of technology on developability -build in close proximity to rail

2. Have we missed any objectives?

- How all of this connects with TTC and the objectives of Transit City if at all
- Creation of hubs, links between systems, etc.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Please ensure that this study will reflect the ARL as it is a key component in the discussion and a major driving force behind why we are here. GO trains are just one piece of this puzzle.

Individual Worksheet 15

Working Session 1: Study Approach

1. What feedback do you have on the proposed study approach?

- Many electrification studies have already been done (up to five years ago)
- Misgivings about the assurance of action – multiple studies
- Metrolinx is the gate keeper
- Using our taxes to create something that will affect us all
- How are the decision to be made?
- Clarify if ARL is IN or OUT
- Long term uses needed
- Compatibility to local regional transit
- Land use implications

*Note: Some comments in this worksheet were omitted because they were not legible

2. Have we missed anything?

N/A

Working Session 2: Study Objectives

1. What feedback do you have on the proposed objectives?

N/A

2. Have we missed any objectives?

N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A



Appendix 2D

Update Meeting Georgetown Corridor Summary Report

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2D

Update Meeting Georgetown Corridor Summary Report

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2D: UPDATE MEETING GEORGETOWN CORRIDOR SUMMARY REPORT

1. ABOUT THE ELECTRIFICATION STUDY UPDATE MEETING – GEORGETOWN CORRIDOR

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system – all seven corridors – as a future alternative to diesel trains now in service. This comprehensive study will consider all potential benefits and costs for various propulsion technologies including diesel technology and electric propulsion for GO trains in the future. A joint venture of Delcan Corporation and Arup Group Inc. is leading the study, which is expected to be completed by the end of 2010.

On Thursday, May 27th, 2010 the Electrification Study Team hosted an update meeting for communities located along the GO Transit Georgetown rail corridor. The meeting took place between 7:00 – 9:30 p.m. at the Lithuanian House, Toronto. For a copy of the meeting invitation, please see Appendix 2D-1.

1.1. Purpose

The purpose of the Update Meeting was to provide participants with an opportunity to review the work completed to date by the Electrification Study Team. In addition, meeting attendees were able to contribute to the study process by asking questions and providing comments following the Study Team's presentation.

1.2. Attendance

An estimated 100 individuals attended the Update Meeting, with 84 participants opting to sign in prior to the meeting.

1.3. Format

The meeting was facilitated by Mr. Jim Faught of Lura Consulting. Upon arrival, attendees were asked to sign-in and were provided with a copy of the Electrification Study Backgrounder. A copy of the Electrification Study Backgrounder is available in Appendix 2D-2. At 7:00 p.m., Mr. Faught welcomed the participants to the Update Meeting, described the meeting's purpose, and introduced key representatives from Metrolinx and the Delcan+Arup JV Study Team.

The meeting began with opening remarks from Ms. Karen Pitre, Study Project Director from Metrolinx, who outlined the policy context for the Electrification Study and provided a brief summary of the work completed to date. Next, Mr. Roger Wood, Study Project Manager, Delcan+Arup JV study team, provided stakeholders with an overview of the study approach, objectives, and technology alternatives available for the GO Transit rail network. The presentation was supplemented with PowerPoint slides that can be found in Appendix 2D-3. After the presentation, meeting attendees were invited to ask questions and provide comments regarding the presentation and progress on the Electrification Study to date.

During the Update Meeting, participants were invited to provide any additional comments via email following the event. In addition, Lura staff recorded the questions and answers as they arose throughout the meeting. For a detailed summary of question and answer period, please see Appendix 2D-4.

2. SUMMARY OF COMMENTS RECEIVED

At the conclusion of the presentation, meeting participants were given an opportunity to ask questions and provide comments. The following section provides a summary of the comments received from meeting participants. A more detailed account of the questions and comments from the meeting can be found in Appendix 2D-4.

2.1. Study Approach

General Comments

- Ensure that the study is objective and will consider all potential technology alternatives equally
- An epidemiologist should be part of the study team to evaluate the human health implications of proposed technology alternatives
- Metrolinx should electrify the Georgetown South corridor immediately
- The study team should examine other electrification studies from around the world in order to better understand electrification best practices
- The electrification study should establish a prioritized list of areas along the rail corridors that have specific health and environmental concerns

Decision-making Framework

- The study process should be open and flexible to ensure that all assumptions made can be tested and modified, if required
- The public should be informed of when the Metrolinx Board of Directors will make decisions and act upon the findings and conclusions of the electrification study

Stakeholder Consultation

- Stakeholders should be given the opportunity to review and provide input on all study outputs
- The study team must stay committed to the study's guiding principles to ensure positive relationships with the community can be fostered
- Many residents in the Georgetown community are not web savvy and as a result notification of future meetings should include advertisements in local newspapers and community mailings

2.2. Technology Alternatives Screening Process

Screening Criteria and Comparison of Alternative Technologies:

- Lifecycle costing should be used to fully understand the implications of adopting each technology alternative
- What criteria will be used to screen the technology alternatives (e.g. pass/fail system, indices)?

- The study team needs to ensure that they are not loading the case against electrification (e.g., unnecessarily adding grade separations to the costs for electrification)
- What are the details of the cost-benefit analysis for human health implications?
- Fine particulate matter should be examined when evaluating the impacts of various technology alternatives on human health
- The costs associated with converting existing Tier 2 locomotives to Tier 4 technology should be factored into the cost of continuing to operate diesel technology on the GO network
- Include energy efficiency as a criterion used to assess the technology alternatives and conduct sensitivity analysis to account for changing energy prices
- The electrification study should examine the implications that various technology alternatives may have on existing and future land use opportunities along the corridors
- Chemical interaction / pollution combinations should be examined when assessing the impacts of various technology alternatives on human health along the rail corridors
- Population density should be considered when assessing the impacts of technology alternatives on local communities

Supplementary Comments:

- Examine emerging research regarding on the impacts of fine particulate matter on human health
- Tier 4 Diesel Technology is neither proven or commercially available in North America
- Bridges within the rail network are required to be retrofitted for electrification during reconstruction, thus the costs for converting bridges should not be included in the costs for electrification
- GO passenger vehicles were originally designed in the 1970s to allow for electrification
- Is the cost of the constructing the 22 foot high sound barrier accounted for in the costs of continuing to operate diesel technology within the Georgetown corridor?

2.3. Air-Rail Link (ARL)

Comments related to the Electrification Study:

- The ARL can accommodate different technology alternatives than the rest of the GO Transit rail network and thus should be evaluated separately from the rest of the system
- Due to the tight timeline for the Pan American Games, the electrification study process should not delay or hinder the opportunity for the ARL to be an electrified line
- The electrification study should account for the lost revenue resulting from renting out the ARL corridor to private contractors for \$1 per year
- An electrification implementation plan for the ARL should be included in the study outputs

Other Comments:

- Information related to the ARL contract negotiations should be made public
- A representative from the ARL project should attend future public meetings in the community and provide opportunities for the public to dialogue with the ARL team

2.4. Air Quality

- Air quality concerns should be prioritized higher than over the financial costs for electrification
- Who is responsible for monitoring and regulating air quality emission standards for GO Train vehicles?
- Metrolinx should establish air quality monitoring stations in the downtown core to understand the air quality emissions within communities adjacent to the railway tracks
- Is Metrolinx currently doing everything possible to reduce air quality emissions within communities (e.g., using low sulphur diesel)?
- Air quality monitoring data within the Georgetown corridor should be shared with the community

3. NEXT STEPS

The next steps for the study, as presented by Mr. Roger Wood of the Delcan+Arup JV Study Team, include:

- Continued evaluation of technology alternatives and their suitability within the GO Transit rail network
- Further refining of the technology alternatives screening process
- Additional consultation with stakeholders at the upcoming stakeholder and geographic-based workshops
- Obtaining feedback from the broader public through e-consultation in the near future

Mr. Faught thanked participants for their participation and feedback and noted that the Study Team would be available after the meeting for continued discussion.

APPENDIX 2D-1: Update Meeting Invitation



20 Bay Street, Suite 901
Toronto, Ontario M5J 2N8
Phone: 416.874.5900
Fax: 416.874.5901
www.metrolinx.com

May 13, 2010

An Invitation to Attend Electrification Study Update Meeting – Georgetown Corridor

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system – all seven corridors – as a future alternative to diesel trains now in service. This comprehensive study will consider all potential benefits and costs for various propulsion technologies including diesel technology and electric propulsion for GO trains in the future. A joint venture of Delcan Corporation and Arup Group Inc. is leading the study, which is expected to be completed by the end of 2010.

The update meeting will be held **Thursday, May 27th 2010 from 7:00 – 9:30 p.m. at the Lithuanian House, 1573 Bloor Street West**. The purpose of the meeting is to provide an update on the Electrification Study progress to date. The meeting format will consist of a presentation by the Electrification Study Team, followed by an opportunity for participants to ask questions and offer feedback on the work completed to date.

If you wish to attend the meeting, please RSVP **by Tuesday, May 24th** to estudy@metrolinx.com – so we can ensure we do not exceed capacity. I would also ask that you circulate this invitation to others in your community who might be interested in attending the Update Meeting.

In the meantime, I invite you to visit the updated Electrification Study website for more information about the study: www.gotransit.com/estudy.

Sincerely,



Karen Pitre
Project Director
Electrification Study
Karen.Pitre@metrolinx.com
416- 874-5910

Metrolinx is an agency of the Government of Ontario

APPENDIX 2D-2: Electrification Study Backgrounder

GO Electrification Study

BACKGROUND

What is the Electrification Study about?

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system as a future alternative to diesel trains now in service. Over the past 20 years there have been many previous electrification studies but this is the first time that electrification of the entire GO rail system – all 7 corridors – has ever been studied.

The Electrification Study will consider the potential benefits and costs associated with replacing diesel with electric propulsion for GO trains in the future. The study will examine and compare a full range of technology options, including future diesel, electric and alternative technologies. Important factors to be considered in comparing technologies include reliability and service, environmental and health impacts, community and land use impacts, economic and system-wide impacts, such as funding and financing.

The study will be guided by the Electrification Study Terms of Reference, which were developed with advice from a multi-stakeholder Community Advisory Committee and approved by the Metrolinx Board of Directors. A joint venture study team of Delcan Corporation and Arup Group Inc. is leading the study, which is expected to be completed by the end of 2010.

The Electrification Study is an important first step towards possible electrification of GO's rail system. When complete, it will provide Metrolinx's Board of Directors with the information needed to decide how GO trains will be powered in the future – using electricity, future diesel technology or other means.

Why do this study now?

In late 2008, Metrolinx published a Regional Transportation Plan – “The Big Move” – a multimodal vision for regional transportation to strengthen the economic, social and environmental sustainability of the Greater Toronto and Hamilton Area. “The Big Move” sets out a fast, frequent and expanded regional rapid transit network as a key element of the plan. The plan includes establishing Express Rail and Regional Rail services at speeds and frequencies that could be enhanced by system electrification.

The Electrification Study will examine how the future GO services will be powered – using electricity, future diesel technology or other means – when these services are implemented in the future. It is important to make this decision soon, as significant lead times will be needed to complete the necessary Environmental Assessments, manufacture and purchase new equipment, and design and build infrastructure to support a move towards electrification (e.g., overhead wires, power substations, maintenance facilities, signaling systems, etc.)

What is the study approach?

Guiding Principles

The Electrification Study is guided by 4 key principles that were developed by Metrolinx and its Community Advisory Committee:

- **Objective:** The study (and associated stakeholder engagement and communications program) will be conducted through a transparent, step-by-step process, so that study results are traceable and readily understood.
- **Comprehensive:** The study will look at a full range of potential technologies – electric, diesel and others – to power GO trains in the future. The economic, social, environmental, operational and health benefits and impacts of the various technologies will be studied.
- **Inclusive:** The study team will strive to engage a broad spectrum of stakeholders throughout the study process.
- **Evidence-Based:** The study team will provide stakeholders with robust and credible information on technology options – based on the most up-to-date research and methods – to enable informed participation in the study process.

Study Process and Schedule

The Electrification Study will follow a comprehensive 5-phase process to provide Metrolinx's Board of Directors with the information needed to decide on how GO trains will be powered in the future:

1. **Initiation** (January 2010) – study approach, stakeholder engagement plan, and decision-making framework.
2. **Baselining** (January - March) – Objectives, baseline conditions, technical feasibility and network compatibility.
3. **Options Development** (March - June) – Development of network options.
4. **Shortlisting of Options** (June - September) – Screening to shortlist up to 6 options.
5. **Detailed Assessment and Conclusions** (September - December) – Detailed assessment findings and conclusions.

How are stakeholders being engaged?

The stakeholder engagement and communications program includes a variety of web-based and face-to-face approaches to reach out to and engage stakeholders in the study. For more detail on the engagement plan, please visit the study website.


What is the point of contact for the study?

Electrification Study email – estudy@metrolinx.com

Electrification Study website – www.gotransit.com/estudy

APPENDIX 2D-3: “Electrification Study Update Meeting” PowerPoint Presentation




METROLINX
Electrification Study
Update Meeting

May 27th, 2010

2

Metrolinx is an agency of the Government of Ontario

Meeting Purpose

- ▶ Provide an update on the GO Transit Electrification Study progress to date



3

Metrolinx is an agency of the Government of Ontario

Agenda

- 7:00 - Welcome/Introduction
- 7:10 - Opening Remarks
- 7:20 - Presentation – GO Transit Electrification Study
- 8:00 - Questions and Answers
- 9:20 - Closing Remarks/Next Steps
- 9:30 - Adjourn

4

Metrolinx is an agency of the Government of Ontario

Current Study

Karen Pitre
Study Project Director
Metrolinx



5

Metrolinx is an agency of the Government of Ontario



Previous GO Studies

- GO has previously undertaken studies of electrification
- Studies were undertaken due to:
 - Rising fuel costs
 - Availability of fuel
 - Improved performance
 - (acceleration/deceleration)
 - Improved reliability
- Electrification was not pursued
 - Benefits did not match investment
 - Same amount of money spent on current system – “better bang for the buck”



6

Metrolinx is an agency of the Government of Ontario



Current Electrification Study

- Community Advisory Committee named to assist with Terms of Reference
- First Electrification Study to consider entire GO rail network including the Airport Rail Link (ARL)
- Comprehensive:
 - Capacity and Service Impacts;
 - Environment and Health Impacts;
 - Community and Land Use Impacts;
 - Economic Impacts; and
 - System Costs, Funding, Financing and Delivery.
- Delcan+Arup JV successful proponents
- Project start-up January 2010, completed December 2010

7

Metrolinx is an agency of the Government of Ontario



8

Metrolinx is an agency of the Government of Ontario



ARUP



13

Metrolinx is an agency of the Government of Ontario



Delcan+Arup JV Team

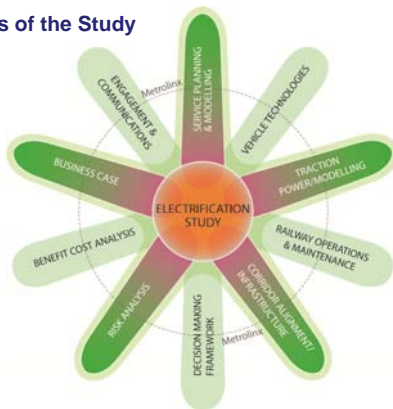
Delcan	project management, quality oversight, infrastructure scoping, operations and maintenance costing, funding and financing
ARUP	project management, infrastructure scoping, capital cost estimating
SDG	decision-making framework, modeling
LTK	technology assessment, energy modeling
LURA	stakeholder engagement & consultation
CANAC	operational modeling
RWDI	noise and air quality assessment
DPRA	social community assessment
EDR Group	economic impact assessment
InterVISTAS	risk assessment
Golder Associates	contamination and geotechnical
LGL	natural environment assessment

14

Metrolinx is an agency of the Government of Ontario



Elements of the Study



15

Metrolinx is an agency of the Government of Ontario



Electrification Study Principles

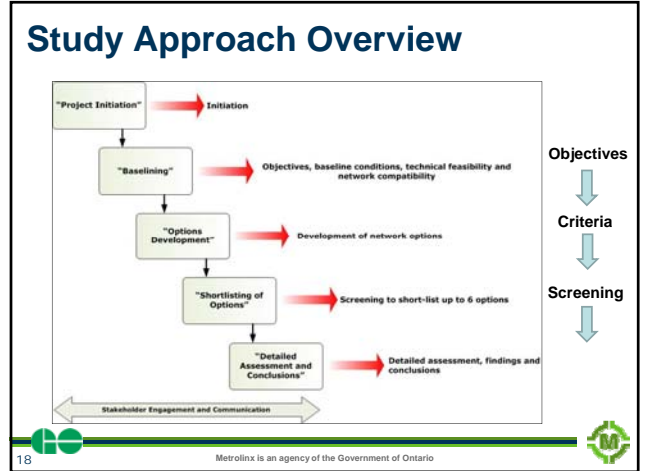
- Objective
- Comprehensive
- Inclusive
- Evidence Based



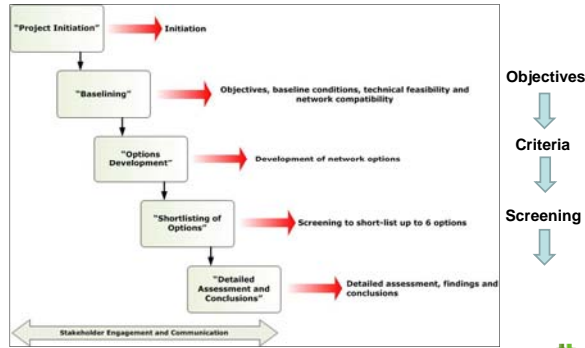
16

Metrolinx is an agency of the Government of Ontario





Study Approach Overview



21

Metrolinx is an agency of the Government of Ontario

Technology Alternatives



22

Metrolinx is an agency of the Government of Ontario

Diesel

- Diesel LHC – Tier 4
 - Used in GO Reference Case
 - 10- and 12-car trains
 - Baseline for all technology comparisons



23

Metrolinx is an agency of the Government of Ontario

Diesel

- Diesel Multiple Unit
 - Performance constant across consist lengths
 - Can split or combine trains
 - Single level - does not meet GO capacity requirements
 - Bi-level – technology not proven; limited commercial viability



24

Metrolinx is an agency of the Government of Ontario

Electric

➤ Electric Locomotive

- Compatible with current GO coaches
- Hauls 10- and 12-car trains
- Requires high-voltage overhead catenary



Electric

➤ Electric Multiple Unit

- Performance constant across consist lengths
- Can split or combine trains
- Bi-Level - up to 16-car consists, meeting capacity
- Single-Level – does not meet GO capacity requirements



Dual Mode

➤ Dual-Mode provides “one-seat ride” through electrified and non-electrified territory

- Dual-Mode Loco
 - In development
- Dual-Mode Multiple Unit
 - Bi-level does not exist



Examples of Power Supply



Alternate Fuel

- Biodiesel
 - Renewable fuel blendable with petro-diesel
 - Compatible with diesel options (LHC, DMU, Dual-mode) with little or no modifications to equipment
 - To date, several preliminary studies in locomotives
 - Engine warrantee coverage only with $\leq 20\%$ biodiesel
 - Not guaranteed to reduce emissions or carbon footprint
 - Can gel in cold winter temperatures



29

Metrolinx is an agency of the Government of Ontario



Alternate Fuel

- Natural Gas (Compressed and Liquid)
 - Short range
 - Containment hazards
 - Mixed emissions
- Hydrogen Fuel
 - Difficult to produce and store
 - Significant danger during collision
 - Inefficient



30

Metrolinx is an agency of the Government of Ontario



Hybrid Drive

- Experimental
- Expensive
- Beneficial for start-stop service



31

Metrolinx is an agency of the Government of Ontario



Magnetic Concepts

- Maglev
- Inductive Power Transfer
- Ground-level Power Transfer
- Not compatible with existing infrastructure (track)



32

Metrolinx is an agency of the Government of Ontario



Technology Alternatives Comparison

Type	Proven Tech.	Comm. Viable	Compatible with Ref Case Infrastructure	Compatible with Ref Case Service Levels
Diesel LHC	Yes	Yes	Yes	Yes
DMU – bi-level	Limited	Limited	Yes	Yes
Electric LHC	Yes	Yes	Yes	Yes
EMU – bi-level	Yes	Yes	Yes	Yes
Dual Mode LHC	In Dev	Limited	Yes	Yes
Dual Mode MU – bi-level	No	No	Yes	Yes
Biodiesel/ Natural Gas/ Hydrogen Fuel	Limited	No	Yes	Yes
Hybrid	No	No	Yes	Yes
Magnetic Concepts	No	No	No	No

33

Metrolinx is an agency of the Government of Ontario

Next Steps in the Study

- Power Systems Alternatives
 - Overhead Catenary System / Third rail
- Infrastructure
- Impacts along corridors
 - Noise, vibration, health, environment,
- Financial implications
 - Capital and Operating

34

Metrolinx is an agency of the Government of Ontario

Next Steps in the Stakeholder Engagement

- Key Stakeholders
 - Stakeholder workshops - Organizations from across the GTHA: environment/health, community, land use and social planning, transportation, commuter groups, business, economic, development, academic and Former Community Advisory Committee members
 - Geographically-based workshops
- General Public
 - Web-based consultation
 - E-newsletter
- Government
 - Municipal, Provincial, Federal
- Technical
 - Rail (CN/CP/Via)
 - Electrical – Supply and distribution organizations (e.g., OPA, OPG, Hydro One, Local Distributors)

35

Metrolinx is an agency of the Government of Ontario

Now for your questions...

36

Metrolinx is an agency of the Government of Ontario

Thank you!

Contact us at:
estudy@metrolinx.com

Electrification Study Website:
www.gotransit.com/estudy



APPENDIX 2D-4: Question & Answer Period

GO Transit Electrification Study, Update Meeting – Georgetown Corridor

May 27, 2010

Detailed Notes from Question & Answer Session

Following welcoming remarks and the Study Team presentation, meeting attendees were given the opportunity to ask questions and provide comments (indicated by a 'Q' and 'C'). Answers, where provided, are indicated by an 'A'. Please note, questions are grouped by topic and do not appear in the order they were discussed.

Study Approach:

Q1a: *Our communities include many seniors, immigrants, and non-English speakers, considering our community members are particularly interested and engaged in this study we would like to see some traditional mailings and public notices for future meetings.*

A1a: That is a good point. We will take that into consideration for future meeting notices.

Q2a: *In order for this process to be truly transparent, we need to be provided with more study outputs.*

A2a: They are coming. We will post the Rolling Stock Technology Assessment report on the website soon. We will make study outputs available as soon as possible.

Q3a: *On one of your slides you talk about the short-term, mid-term, and long-term. In particular, you talked about selecting a point in time so that you could compare the costs of electrification to the other alternatives. What point of time did you pick and what is the rationale for picking that point in time?*

A3a: There is always the short term which is the business as usual or the long term, which is 2031. What we tried to do was pick a time between the two. We decided to look at 2021 as our medium term date because there is a lot of planning work that GO has already done with respect to service levels and other areas that they want to deliver on. We wanted to use a point where we could see the increased benefit of higher service levels for electrification but also have a plan that you could actually implement knowing that certain things within the corridor are restrictive. We tried to find a balance between the longer term vision and the business as usual scenario.

Q3b: *Are you suggesting that even if electrification turned out to be the best cost alternative for health impacts, etc. that nothing would be electrified until 2020? Or, will electrification start in two years or five years if it turned out to be the best option?*

A3b: The idea is to choose a period of time when we can compare the two technologies so that we have a better base case. What our plan is, and the Delcan+Arup team is working on this, is that we know that we can't electrify overnight. If there is a compelling reason to electrify we want to make sure that we have done enough work to be able to show that there is an implementation and phasing strategy that starts moving us in that direction. One of the problems with some of the other electrification studies is that there isn't an implementation plan. They often say things like, assuming that you don't have to

operate with CN or CP, or assuming that you can make it work at Union Station, but if you actually want to move this forward we have to look at addressing those challenges.

Q4a: *You mentioned the comprehensiveness of this study, but the benefit case analyses recently conducted by Metrolinx are so pro-electric that I don't think you needed to go into this much depth here. What is important to people in this community is addressing the health issues surrounding the ARL that is going to be delivered by 2015. This study is only going to make findings and conclusions. When are we going to get results that are going to affect the people in this room?*

A4a: I agree with you. The task is great and there is no doubt about that. The timeline is ambitious, but I have great confidence that we have a team that will work towards understanding the decisions that will have to be made going forward. You mentioned that there is a benefit case analysis that says we should electrify but there is no next step that says how do you do it. We want to figure that out. I understand the frustration but until we figure out what the next steps are we will never get to electrification.

C4b: *Your study isn't even going to say if you should do it. You are going to make conclusions, not recommendations.*

A4b: We will, as part of our findings and conclusion, map out what approach makes the most sense. We have to make sure that there is an operating commuter rail system that we can still operate on and actually support the technologies if there is a change in the system. We are looking at doing that in a way that addresses the concerns of this community as well as the other communities across the GTHA. If we don't have an implementation plan then we will never move past the step that says electrification is a great benefit case analysis. We are trying to understand how you do it. It is not an easy question.

Q5a: *Do you have any methodological concerns with using a baseline technology that doesn't exist when you are trying to understand emission levels and financial costs?*

A5a: The vehicles for the Tier 4 technology are the MP40s which have to meet a particular emissions standard. We will use those emission standards to determine the emission levels of the Tier 4 locomotives in our analysis.

Q5b: *How do you know what vehicles will cost?*

A5b: The MP40 units will be changed and modified for the Tier 4 technology and we are looking to get an estimate for what that cost might be at the time we are doing the study. The Tier 4 is our baseline, it is not going to be ruled out, but something we will use to compare. To get the right number of trains to a level where it will work, whether it is a diesel service or an electric service, they may be a need to buy more locomotives. So the comparison is; do we need to buy ten Tier 4 diesel trains or do we need to buy ten electric trains?

Q6a: *One observation and question. The comment that is made about air quality monitoring stations is nice but that point about setting up air quality monitoring stations dates to the period when this was only about the Georgetown corridor. Now we are doing an electrification study of the network, not just the Georgetown corridor, and this includes the most densely populated area around Union Station. You*

really do need to set up some modelling stations at Union Station and not just horizontally but also vertically to pick up the effects of pollution concentration. The question I have ties in with the Union Station Capacity Study. My concern is that your study and the Union Station Capacity study are happening in parallel and depending at the speed in which you want to ramp up demand and service at Union Station that may trigger a new underground railway station. The point is that there may be an interaction between the Union Station Study and the electrification study, in that the Union Station study may change the time frame at which electrification is forced on the network. How are the timeframes working together and how do you propose to address that possibility?

A6a: Due to the fact that we are looking at the medium term, we are looking and forecasting within a shorter timeframe. If we wait to go underground at Union Station then electrification is a lot further off. We are looking at Union Station and trying to understand what impacts it has on the various technology options and the subsequent pros and cons for each of the different technologies.

Q7a: *Are you using life cycle costing as you look forward? Some of these things have fairly low initial cost and high maintenance costs.*

A7a: We have not looked at the life cycle costs yet but will at a later point in the study. We will look at the costs of various technologies and examine the life cycle costs of those technologies in our analysis.

Q8a: *Roger you mentioned that you pulled in RWDI because of experience within the Georgetown corridor already. Are they the same folks who said there were no problems related to environment and health impacts as part of the environmental assessment process?*

A8a: We used organizations that are beneficial for our team, and have the ability do air quality analysis. RWDI is a consulting firm with great knowledge and experience working within the Georgetown corridor and the rest of the GTHA. Since RWDI is part of the consulting team, we are not starting from scratch with the data and having to understand the local issues in the area.

Q8b: *Just a point about the process, there are talks about moving the conclusions to the board, what is the timeframe for that?*

A8b: We have been asked to finish this study by the end of the year (2010) and it will then be provided to the Metrolinx Board. We will update the Board and we will undertake to find a more definitive timeframe that we can talk to you about.

Q9a: *Will you be asking other cities for their electrification studies to better understand the issues at hand?*

A9a: We have gathered information on other studies in other parts of the world. For example, we know that the UK is only 40% electrified. There are whole series of unique configurations and options that we need to look at to ensure we compare the right situation. There are a number of benefits that can't be realized because of things like the Union Station capacity study.

C9b: *If I am interested in signing up for a medical study, I do so. I am concerned that governments will be testing this new technology on us without allowing us to provide input into the matter.*

Q10a: *My comment is that your guiding principles are awesome. The issue here is that we lack confidence. You have to deal with the fact that people are lacking trust between the community and Metrolinx. To resolve that I bring you back to your guiding principles for this study.*

Q11a: *One thing that concerns me is the quality of the analysis being undertaken. How many epidemiologists are going to review the data?*

A11a: There is no epidemiologist on consulting team or on the Metrolinx team.

Q11b: *I don't know how you can adequately understand the health implications without one. Are you going to release the data so that others can review it and judge the data?*

A11b: It will be very transparent. We will release the data so that others can review it.

Q12a: *You discussed changing out engines and changing catalytic converters, how long will that take and which line will go first?*

A12a: That is not something that we can't answer here tonight.

Q13a: *In some studies they use various frameworks to make a decision. Some considerations are pass fail and some more technical. Do you have pass fail criteria based on air quality contaminants? If so, what standards are they based on (Ministry of the Environment, Public Health)?*

A13a: We don't have answers to those questions, because we haven't done that part of the analysis yet. We will look to the MOE or Public Health for standards and assess how they could be used. We will make sure our framework and data are available once it is possible.

Q14a: *You make a lot of assumptions. Will you look at and test all of the assumptions that you are making?*

A14a: Part of the reason that we are having these meetings is to test these assumptions. The assumptions we make need to be valid. We are trying to validate those assumptions and if we made a wrong assumption we need to know what the concerns of the community are.

Q14b: *How prepared are you to modify your assumptions based on evidence that may arise?*

A14b: That is the purpose of exercises like this tonight. If we make the wrong assumption we will modify it.

Q15a: *What numbers will be used in the train operating assessment?*

A15a: We have taken the mid range numbers between 215 and 400 trains per day. For the purpose of our study, we assume that if we run two way all day service we would have in the order of 300 trains.

C16a: *We found the number of residences along the train tracks quite easily, simply use the Canada Post website and say you want to do a mass mailing. The data base shows how many residential units are within each area.*

Q17a: *How will your study deal with the fact that the Premier of Ontario has already decided where electrification will start? The Georgetown line should be first as we have four times as many trains in our community compared to any other.*

A17a: There has not been any indication that a decision has already been made. There is no push or priority given to one line.

C17b: *But you have no business case analysis.*

A17b: I think it is safe to say that this study is a new approach that has not been done before. No decisions have been made at this point and we are operating with a clean slate.

Technology Alternatives Screening Process

Q18a: *You talk about the costs of electrification and what you have included as a cost of not electrifying. One of the things worth thinking about, if you are assigning those costs, is that it is already a requirement that whenever we reconstruct a bridge you have to allow for electrification. Have you gone through and looked at the schedule for bridge reconstruction in Toronto and assigning all the ones that have to be done both in the short term and in the future regardless if you do electric?*

A18a: The short answer is yes. There actually have been discussions between City officials and Metrolinx. The bridge construction costs that we mentioned in our presentation related to electrification is for construction that is not already scheduled.

Q19a: *You indicate that you consider diesel to be proven and commercially available. Can you tell me who has proven and made Tier 4 diesel commercially available?*

A19a: There may perhaps need to be a change in the wording that is required here. You're right; it is not commercially available yet. However, for the purposes of the reference case we want to be clear that there has been a commitment by GO Transit to go to Tier 4 and the timeframe that we are looking at is what we call the medium term. There is a push in the United States to mandate the change to Tier 4 and a commitment from GO Transit to go to Tier 4, thus for the purpose of the reference case we will use that Tier 4 standard for comparison.

Q20a: *What is the cost of the Tier 4 and why is that not included in the base case?*

A20a: When we actually look at what is needed to get to Tier 4, the cost of conversion will be included and we are trying to get an estimate on that. There is work underway to develop a prototype and there is a market for Tier 4 locomotives. One of the questions that we have been asked to answer is what are the costs of retrofitting an existing GO locomotive to Tier 4 compared to buying new electric locomotives?

Q20b: *So it is not really a base case but a cost estimate base case?*

A20b: No, it is a base case. We want to ensure we truly understand the costs. We could have a discussion about what should be in and what should be out, but our goal is to give people the best information possible so they can make an informed decision going forward.

Q21a: *Electrifying the GO passenger cars is not on your list. Why is that? You probably don't know that they were actually designed for electrification back in the 1970s.*

A21a: The information that we received from GO at the moment did not give us that information, but we will find out more details about that possibility.

Q22a: *You mentioned that purchasing new rolling stock is a cost of switching to electric but not a cost for the "have to do regardless" scenario. I understood that GO's current plans are to go from 19 trains a day to 136 trains a day in the Georgetown corridor. Surely you will have to buy more rolling stock if you are planning to significantly increase the amount of trains running within the corridor? There are also more grade separations. I don't understand why you need grade separations for electric trains.*

A22a: The reference to increases in amount of rolling stock on the network is to get to the reference case operational levels. In some corridors, increased service levels will result in more trains running during off peak periods and may not necessarily result in significant increases to the amount of rolling stock on the network. More grade separations are there because that is something we will have to investigate. If we were to go to a third rail option for example there is a safety issue with having people cross at grade if there is third rail.

C22b: *We have heard people say it will cost billions of dollars, tens of billion actually from the chair of Metrolinx. So we are concerned that you are trying too hard to make this expensive that no one would ever do it. As you add rolling stock, more grade separations, and bridge reconstructions, as you suggest, it makes it look like you are already trying to make electrification look too expensive.*

A22d: These are necessary factors that have to look at when you are considering electrification. We are not going to add catenary if you put third rail down. We are not going to add grade separations if we put catenary up. You might not have to add a significant amount of rolling stock if we are only changing the locomotive and not the cars as well.

Q23a: *What is the cost benefit analysis around the health implication for parents of children along the tracks? What exactly are the costs of sacrificing people's health in order to make this line diesel in our community?*

A23a: We haven't started the environmental and health part of the analysis. We have initially focused on what the different technology options are. When we have another conversation in the fall we will have more information on how we developed that part of our analysis.

C24a: *I want to clarify that Tier 4 is clean diesel and to ensure that people know how they work. Converting a locomotive to Tier 4 requires adding a catalytic converter to the existing locomotive. It is not a new locomotive.*

A24a: It is a change in the engine of the MP40. When GO Transit gets to the point where they need to change it, it will be converted to the Tier 4 technology.

C24b: *I have studied the matter of Tier 4 diesel and the cost of fine particulate matter. I've heard that it is like smoking light cigarettes verse regular cigarettes, and I just want to point that out.*

A24b: I see your point, but that would be the comparison. We will compare that diesel technology to electric.

C24c: *Studies are now finding that the Tier 4 technology is actually worse for our health because of the ultra fine particulate matter. These are very serious issues and we are not already talking about these factors. Also, the fact that we are looking at hydrogen I find very disturbing.*

A24c: We have to ensure that due diligence is done so that any decision about changing technology in the network will have the best information possible. To do this, we had to put all available technologies on the table and then evaluate their compatibility with the GO network.

C25a: *There is emerging research coming out of the Harvard School of Public Health looking at the particulate matter size and the concentration of each size between Tier 4 and older existing technologies. It shows and supports the notion that Tier 4 is in fact worse for local health than existing technology.*

A25a: We haven't really done that research yet, as I have mentioned, but we will certainly look at that and make sure that it is part of our research.

Q26a: *I am a member of Transport Action Ontario. My questions are on the key issues of energy efficiency. You are talking about 3 trains an hour. The energy efficiency of an electrified line is 4 to 5 times the efficiency of Tier 4, Tier 3, Tier 2 or any other Tier because it is diesel versus electric power by sustainable electric sources. If you have a system that will use that electricity continuously, such as the ARL link, there is no way that any diesel power system will beat it and the worse thing about this is that energy prices are slated to rise in the next couple of years. There are good clues that the case is in for energy prices to begin to rise. So the issue is what is the base case for your calculating and operating cost? What is your base case for the price of energy? Do you have rolling energy prices?*

A26a: As part of the terms of reference, it is one of the requirements for the team to look at energy efficiency. We are going to look at energy efficiency for all of the models on the network and we are going to model the operations patterns on each of the corridors so that we can work out how much electricity would be used by each of the technologies that we are talking about. In terms of energy prices we will make some assumptions as to what happens to the price of energy over time. I can't say what those numbers are because we haven't done the work yet. We need to understand comparative operating costs when we get to our conclusions and findings.

Q27a: *Given the health impacts of the study, will you commit to measuring or studying the micro fine particulates as part of the study? You have said in the medium term, 2020, you are hoping to see electrification roll out but we've been told that investment strategies for 2013 will have to compete against other service expansion projects. If you are going to have an implementation plan, will you commit to have an electrification implementation plan within the Georgetown line between Pearson and Union for 2015 as one of the options for this study?*

A27a: In relation to the health impacts, we need to understand and perform due diligence to truly understand the issues. However, I will not make any commitments at this point. We will provide a report that will go to the Metrolinx Board that will then go to the Province of Ontario who will then make a decision. We are creating a blueprint that outlines the steps that will need to be made. The timeline for those decisions will not be ours. We can't make that commitment.

Q28a: *Is anyone looking at the new development along the rail lines as part of the diesel plan? Much of the new development is happening along rail lines in brownfields. Are the people in charge of development talking to the people in charge of the ARL?*

A28a: I don't want to talk on behalf of the City's planning department and people working on the ARL project. As part of our study, one issue we are looking to study is land use. We are looking up and down the corridor to understanding what development is planned for the various areas and how that will be impacted. That is part of our study.

Q28b: *It just seems that with the City Plan and Places to Grow Plan that they really want intensification and maybe it sounds like a good idea, but with diesel it doesn't seem like it fits?*

A28b: That is part of our Terms of Reference and part of the analysis that we are doing to understand how the land use changes will impact development within the area.

Q29a: *It seems that increasingly the Ontario Government is forcing us into a chute for diesel when there are lots of opportunities for electric and that is what the community wants. One factor is noise and vibration. In the plan there is a wall along ten kilometres of the tracks that is 22 feet high. Is the cost of installing the wall and/or the cost of dismantling the wall (which will not be necessary if the line converted to electric technology) being included in this study?*

A29a: All of the technology options would require the use of a sound barrier to dampen noise coming from the tracks. Most of the noise is not related to engine combustion but rather the clinking and

clacking of the trains along the tracks. Also, a lot of noise comes from the freight rail track operating within the corridor.

[Audience]: Electric motors are different than diesel motors.

A29a: Absolutely, but that is not why the sound barriers are created. It is that high pitched noise in most cases. The reason for having the walls from a noise standpoint would make very little difference whether we electrified or not. We are in the process of getting a noise vibration consultant on board to look at this and they will assess the situation further. One thing that we are doing as part of the ongoing construction is eliminating joints. This will make a big difference in reducing the amount of noise pollution in the surrounding community.

Q30a: *Will you study chemical combinations and interactions?*

A30a: I don't know if we are looking at the chemical interactions. I will look into that.

Q31a: *Should I sell my house now or after the report is finished in December 2010?*

Q32a: *I am from a parent council in Weston. I am a numbers guy. How many people are within 50 metres and 100 metres of the rail line? Can you add that to the study? Do you know or will you know many people live within that proximity to the rail lines?*

A32a: Understanding the development along the corridor is a challenging issue and we are getting a handle on that. We will be looking at land use in the future and are talking with various municipalities about how best to tackle this issue. We are sensitive to the fact that there are schools and playgrounds along the corridor so that we can understand the impact on the community. We have data from the Canadian Census. We are going to make estimates and understand what the population is at the time of our estimates so that we can understand the number of people along each corridor.

Q33a: *There are intense levels of pollution in our community, and in downtown Toronto it is even worse. Is your study going to highlight those that are the worst cases and then work to address those issues first?*

A33b: I think that is the approach we are looking at.

Air-Rail Link

Q35a: *You talk about taking this information and applying it to inform other issues, for example the environment and so on and so forth. Particularly in terms of some of your environment, noise, and health impacts, those are all things that accumulate across the corridor here. What are you assuming in terms of the health and noise, impacts on environment and on those along the corridor? Are you assuming that the air-rail link and other trains will share the same line?*

A35a: We are assuming that the air-rail link will be using Tier 4 technology. From what we understand it will be a two car diesel multiple unit, running every 15 minutes. So we will evaluate that in the reference case for the ARL compared to what that might look like if that car was electrified.

Q35b: *I didn't understand you. So are assuming Tier 4 or are you looking at two base cases, one for electrified and one for diesel?*

A35b: We are looking at a Tier 4 as our base case for the ARL as well. We are assuming it will be a two car, diesel unit, running every 15 minutes compared to if that was an electrified service running every 15 minutes.

Q35c: *If that is the case than some of the exclusions you have made here don't attain. The reason they were excluded was that you tried to figure out how you carry GO passenger volumes on a vehicle on a technology that is not available for GO capacity. Well the ARL is not composed of GO capacity vehicles.*

A35c: This table is a comparison of technologies that can replicate the capacity of the trains that GO currently runs at the moment. Trains that are going to run on the ARL are by a different operator and therefore may be provided with a different type of technology. What has just been described is that we have to make an assumption that the technology that might be running on the ARL will be a two car diesel multiple unit. As far as I am aware there is no intention of running a 12 car consists with an MP40 to the airport because I don't think that the spur connection can take it. So in that case you have two different technologies in that corridor but only one of them is run by GO.

Q36a: *I want mention the May 7, 2004 agreement between the Province of Ontario and the GTTA. Specifically I am looking at page 27 section C 5, I am wondering if the electrification study in terms of financial implications will make note of the loss of potential revenue from the ARL due to the fact that the ARL is using the public corridor for basically \$1 a year? That missed revenue could have gone into electrification or other aspects of the plan.*

A36a: The short answer is no. The reason it is, is that our study is comparing diesel to electric. That is not something that will be looked at in this study.

Q36b: *But it would be true if the ARL was in fact, unlike the 407 highway, paying rent to the taxpayer we would have more funds available to electrify the existing GO lines?*

A36b: The negotiations for that contract are underway; we are not part of them. I don't know the nature of that deal and it would be inappropriate to comment on that.

Q36c: *When will people have some information on this deal? When will we have some sense of what is involved? It says right here 1 dollar a year and I believe that someone said to me it would take 850 million years to pay that back. So to me that goes under operating costs because I am paying for it.*

A36c: As I said there is only so much we can do in this study in this timeframe. We are focused on trying to get to the answers about electrification. That conversation on the ARL is going on in a different place and we are not part of that conversation. We can pass along that information that you are giving to us, but we cannot add anything else to the electrification study at this stage.

Q37a: *Will there be a recommendation coming out of this study on what vehicles the ARL vehicles should be?*

A37a: No. What we are going to do is compare a diesel ARL vehicle with an electric ARL vehicle and what are the implications and cost to that.

Q37b: *So there will not be a decision made as a result of this study. There won't be a recommendation from this study?*

A37b: To be fair the TOR for this study are to come up with findings and conclusions which will then go to the board of Metrolinx who will then make recommendations. So it will go to the Board of Metrolinx for them to make recommendations based on our findings.

Q37c: *Who will make the decisions about the mode of power for ARL?*

A37c: Well presumably that will be a recommendation from the Board of Metrolinx or the Province of Ontario.

Q37d: *Will this study actually make that recommendation to somebody?*

A37d: No. As I mentioned, this study is not making recommendations. This study will come up with findings and conclusions which will then allow the Board to make recommendations.

Q38a: *Am I correct in understanding that as an outcome it could be that the ARL has a different technology than the GO lines?*

A38a: I think the answer is yes.

Q38b: *It seems that the ARL has a real deadline on it. Why is the ARL, which has a tight deadline comparatively speaking, wrapped up in this study?*

A38b: That is a good question. The Community Advisory Committee (CAC) struggled with this. It was in, and it was out. If it was out it wasn't getting dealt with anywhere and if it was in than it was part of this conversation.

Q39a: *I have been to a lot of meetings for earlier studies and one of the biggest concerns is that the people that are responsible for the ARL link are never in the room. Will you commit to having someone from the ARL group at the next workshop?*

A39a: I would like to say yes but I don't have the power to make that happen. We would certainly invite them.

Q39b: *Were they invited tonight?*

A39b: They are in negotiations and are not speaking with us nor are they speaking with you. I cannot guarantee they will be at the next meeting.

Air Quality

Q40a: *At a number of meetings they indicated that railways are self administering their own emission standards, so if you create a Tier 4 train who is going to be checking out the emission levels for that? Who will take responsibility to maintain that Tier 4 standard if and when you create it?*

A40a: I don't know, we will follow up and get an answer.

Q41a: *Will the pollution emission be tested with the speed of the trains? Where I live the emissions have gotten so bad that I have to close my doors and windows. Is someone going to test the air?*

A41a: As many of you know we are putting in three air quality monitoring stations but we are not putting one down in Union Station itself. There are three locations along the corridor running through Georgetown so there are areas with significant issues that we are concerned about. I think the good news is that within the next six or seven months we will have those stations up and running and have those results for you.

Q41b: *Why can't we put up an air quality monitoring station downtown in Union Station? Why can't we do something to understand the impacts that are being felt in the community?*

A41b: I can't make a commitment at this point, but I think as a minimum prudent approach we are going to look at the three monitoring stations to confirm, based on the modelling that was done, what the pollutants are.

Q42a: *When the air quality monitoring stations that are set up how do you use that information? Do you tell us not to go outside that day . . . I don't want to sound alarmists but are there actual conclusions that come once you measure air quality contaminants?*

A42a: I just want to be clear that the electrification study that we are doing does not consider monitoring stations as part of the analysis. We are looking at modelling work that has been done. In all likelihood, by the time we have the air quality monitoring stations up the study will be done. We have a team that is looking at modelling the emissions and there is work already underway that we will benefit from, but I don't want you to think that as part of this study we are actually using monitoring stations here or in other parts of the network.

C43a: *You should definitely do an air quality monitoring station, I mean go and walk and look at the roof of Union Station and take a look at what the emissions are doing to the concrete and steel. If that is happening to the steel think about what is happening to our lungs.*

Q44a: *This study is all about cost. What is going to cost more and what is the best technology for the network. We are all tax payers, how many of you are worried about the cost of electrification?*

A44b: I think that the CAC was very clear that the purpose of this study is not to do a straight forward cost assessment. That is why all of the other elements, such as environment and health, will be factored into this study.

C45a: *Why is there no wall around the subway in Rosedale but it is required in the Georgetown South community?*

A45a: I don't know the answer to your question.

Q45a: *I live across from both Milton and Georgetown South Line. First of all, to the gentleman's previous comments about the fact that there is no noise from the diesel trains is absolutely false. I can tell you that the lines are virtually silent until the engine goes by, you don't hear it until you hear the engine. There is a huge amount of noise coming from the diesel engines. My question is what is being done right now. Is GO Transit using low sulfur diesel? Is everything possible being done now that can be done to reduce air emissions?*

A45a: I am not saying that the trains are not silent. It is based on decibel levels. The answer about low sulfur fuels is yes; we are doing that now and were one of the first in Canada to do so.



Appendix 2E

Municipal Transit Leaders Briefing Summary Notes

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2E

Municipal Transit Leaders Briefing Summary Notes

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2E: MUNICIPAL TRANSIT LEADERS BRIEFING SUMMARY NOTES

Electrification Study Municipal Transit Leaders Briefing

Conference Call

Wednesday, June 23, 2010

10:30 – 11:30 p.m.

Briefing Highlights

The following provides a high level summary of feedback receiving from the Municipal Transit Leaders Briefing.

Invited participants: Invitations were sent to representatives from each transit operator in the GTHA

Attendance: 3 participants

Keith Ramdial – *Durham Region Transit*

George Kaveckas – *Barrie Transit*

Chris Tschirhart – *Brampton Transit*

Electrification of the GO Transit Rail Network presentation by:

Karen Pitre (*Metrolinx*)

Briefing Summary:

- Stakeholders confirmed their interested in the study findings and conclusions, particularly related to future service levels and expansion projects
- Participants were in favour of the conference call format and were eager to participate in another briefing in the fall
- Particular interest in whether freight/good movement could continue to operate within electrified rail corridors
- GO Transit/Metrolinx should work with municipal transit operators to assess the impacts of increased GO service on regional mobility (i.e. movement into and out of station stops)
 - The Bramalea GO Train Station is currently experiencing traffic flow problems and future growth will exacerbate the problem
 - When reconfiguring existing or building new station stops GO Transit/Metrolinx should work with local transit operators to ensure stations can accommodate future service targets



Appendix 2F

Stakeholder Workshop #2 Summary Report

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2F

Stakeholder Workshop #2 Summary Report

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2F: STAKEHOLDER WORKSHOP #2 SUMMARY REPORT

1. ABOUT STAKEHOLDER WORKSHOP #2

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system as a future alternative to diesel trains now in service. The electrification study is examining how the future GO rail services will be powered – using electricity, enhanced diesel technology or other means – when these services are implemented in the future. The study will assess the benefits and costs of a full range of technology options, including enhanced diesel, electric and alternative technologies. The study is considering the existing GO Transit network, proposed network expansions, as well as the future Pearson Air Rail Link.

On Thursday, May 27th, 2010 the Electrification Study Team hosted the second stakeholder workshop for organizations across the Greater Toronto and Hamilton Area (GTHA). The workshop took place between 6:30 – 9:00 p.m. at Metro Hall in downtown Toronto.

1.1. Purpose

The workshop was designed to provide participants with an update on the Electrification Study progress and obtain feedback on the work completed to date. Specifically, the session examined the rolling stock technology and network options for the GO network and the proposed approach for the further assessment of options.

1.2. Attendance

In total, 19 representatives of non-governmental organizations registered for the workshop, with 11 attending the June 15th session. A list of organizations invited to participate in the workshop, as well as those who attended the meeting, is included in Appendix 2F-6.

1.3. Format

The workshop was facilitated by Mr. Jim Faught of Lura Consulting. At 6:30 p.m., Mr. Faught welcomed the participants to the workshop, described the session's purpose, and introduced key representatives from Metrolinx and the Delcan+Arup JV Study Team.

The workshop began with opening remarks from Ms. Leslie Woo, Vice President of Policy and Planning, Metrolinx, who thanked participants for their interest and participation in the Electrification Study. Ms. Karen Pitre, Study Project Director, Metrolinx, then provided a recap of the previous stakeholder workshop and an update on progress completed since that meeting.

Next, Mr. Roger Wood, Study Project Manager, Delcan+Arup JV Study Team, provided stakeholders with an overview of the reference case used in the Electrification Study and the technology alternatives rolling stock available for the GO network. Mr. Wood then discussed the preliminary network options based on the alternative rolling stock technologies and the pre-screening criteria proposed for the further assessment of options. The presentation was supplemented with PowerPoint slides that can be found in Appendix 2F-1. After the presentation, meeting attendees were invited to ask questions and provide comments. A more detailed account of the questions and comments from the meeting can be found in Appendix 2F-2.

Following the question and answer period, workshop attendees engaged in a plenary discussion about rolling stock technology assessment and network options (Working Session #1). As a group, participants discussed the questions outlined on the workshop worksheet (see Appendix 2F-3 for a sample worksheet). Afterward, participants were divided into two breakout groups to discuss the proposed

approach for further assessment of options (Working Session #2). The breakout groups were encouraged to capture their ideas in writing so that they could be accurately recorded and included in this workshop report. The groups were given 30 minutes to discuss the question for Working Session #2 and then share their feedback with the other workshop participants and the Electrification Study Team.

2. SUMMARY OF COMMENTS RECEIVED

The following section provides a summary of the comments received from workshop participants. A more detailed account of the question and answer period can be found in Appendix 2F-2. In addition, comments received during the workshop discussion periods and from worksheets submitted following the session can be found in Appendix 2F-4 and 2F-5 respectively.

2.1. Study Approach

- Compliments were given to the Study Team for the quality of the draft rolling stock technology assessment distributed prior to the workshop and participants indicated that they were eager to obtain additional study outputs and reports
- Stakeholders requested that more information be provided about the decision-making framework for implementing the findings and conclusions of the Electrification Study
- The Georgetown line should be included in the reference case as a line with GO service on the half hour
- The study should look beyond 2021 when calculating the social, environmental, and financial costs and benefits associated with electrifying the GO network

2.2. Rolling Stock Technology Assessment and Network Options

Assessment of the Rolling Stock Technologies

- The cost of converting existing rolling stock to Tier 4 technology should be included in the assessment of rolling stock technology options
- What if a prototype for converting the existing rolling stock to Tier 4 technology (as well as cost information) is not available by the time the study is complete?
- The study should use both Tier 2 and Tier 4 technology as the starting points for comparing the rolling stock technology and network options
- Return on investment calculations done for the technology options should be extended past 2021
- Technology options must accommodate service expansion past 2021
- The Study Team should look at other options beyond running just 12 car consists on all lines at all times

Network Options

- The Study Team should examine the viability of a phased implementation plan for electrification (e.g. utilizing electrified lines to the outskirts of the city, then operating diesel technology to periphery stations)
- The study should consider the formation of other network hubs (e.g. Bloor Subway Line) that could reduce constraints associated with Union Station capacity
- Future station stops (e.g. Weston, Bloor) should be included in the analysis of available network options for 2021
- If more than one technology is used on the GO network, will additional storage and maintenance facilities need to be constructed?

2.3. Proposed Approach for Further Assessment of Options

Screening Approach

- Stakeholders requested that the assumptions used in the preliminary screening of rolling stock technology and network options be published for review and comment
- Details should be given to stakeholders about how the evaluation criteria will be weighted and prioritized during the screening process

Screening Criteria and Comparison

- The study team should examine the impacts that each technology option has on land use across the GTHA (e.g. encourage economic development and implement regional planning policies)
- Priority should be given to options that increase user benefits and result in positive social impacts (e.g. ability of technology options to encourage individual modal shifts, reduction of trip times)
- Sensitivity analysis should be conducted to account for rising energy costs past 2021
- Consider the health effects of each option on communities within the GTHA
- Include the health and environmental costs resulting from GHG emissions in the analysis of technology and network options
- Sustainable energy sources should be prioritized during the assessment of options
- Would an electrified network improve service levels and better enable GO transit to achieve service targets (e.g. reduced trip time, increased capacity, etc.)?

2.4. General Comments

Operations and Planning

- More reverse peak service is needed to encourage growth in suburban downtowns and employment centres
- The 'Big Move' needs to be revised so that Metrolinx can work toward achievable infrastructure targets

Air Rail Link (ARL)

- The Electrification Study Team needs more details about the ARL to ensure it is adequately addressed in this study
- The ARL project team should begin to dialogue with stakeholders
- The ARL must be electrified

3. NEXT STEPS

The next steps for the study, as presented by Mr. Roger Wood of the Delcan+Arup JV Study Team, include:

- Further refining of the technology and network options screening process
- Continued evaluation of the rolling stock technology and network options
- Additional consultation with stakeholders at the upcoming stakeholder and geographic-based workshops
- Obtaining feedback from the broader public through e-consultation in the near future

Mr. Faught thanked participants for their participation and feedback at the workshop. He also noted that the Electrification Study Website was updated prior to the second stakeholder workshop and encouraged stakeholders to visit the website for further information.

APPENDIX 2F-1: Workshop Presentation




METROLINX
**Electrification of the GO Transit
 Rail Network**


Stakeholder Workshop # 2

June 15th, 2010

2 Metrolinx is an agency of the Government of Ontario

Meeting Purpose

- Provide an update on the GO Transit Electrification Study progress to date
- Seek feedback on:
 - Rolling Stock Technology Assessment
 - Network Options
 - Proposed Approach for Further Assessment



3 Metrolinx is an agency of the Government of Ontario

Agenda

- Welcome
- Opening Remarks - Metrolinx
- **Presentation:** *Rolling Stock Technology, Assessment, Network Options, and Approach for further Assessment – Delcan+Arup JV Team*
- **Working Session #1:** *Rolling Stock & Network Options*
- Break
- **Working Session #2:** *Approach for further Assessment*
- Closing Remarks and Next Steps
- Adjourn

4 Metrolinx is an agency of the Government of Ontario

Karen Pitre
Study Project Director
Metrolinx



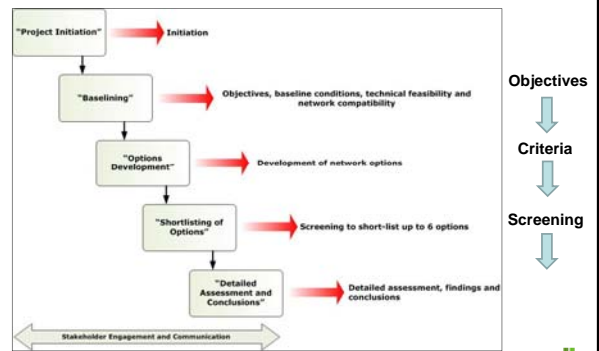
Stakeholder Workshop # 1 Review

- Study Approach
 - Objective
 - Comprehensive
 - Inclusive
 - Evidence Based
- Study Objectives
 - Study must address;
 - Technology, Capacity and Transit Service Impacts
 - Environment and Health
 - Community and Land Use
 - Economic
 - System Costs, Funding, Financing and Delivery

Update since last Stakeholder Workshop

- Stakeholder Consultation
 - Fall stakeholder workshop added
 - Reports have/will be circulated prior to workshops for review
 - Decision Making Framework
 - Draft 'Rolling Stock Technology Assessment' report
 - Baseline and Network Options reports
 - Early consultation (e.g. discussions on network options and study approach)
- Integrating Parallel Studies
 - Ongoing dialogue with study teams from the Interceptor Study, Georgetown South EA, and Union Station Capacity Study
- ARL is included in the Electrification Study

Study Approach Overview



Work Plan Overview

Phase	Time Period	Deliverable
Project Initiation	January	Work Plan Stakeholder Engagement and Communications Plan High Level Decision Making Framework
Baselining	January – June 2010	Evolving Baseline Report
Options Development	April – June 2010	Draft Rolling Stock Technology Report Draft Network Options Report
Short listing of options	July – September 2010	Draft Power Supply Technical Report Draft Interim Report
Detailed Assessment and Conclusions	September – December 2010	Final Report (December)



Metrolinx is an agency of the Government of Ontario



Roger Wood Study Project Manager Delcan+ARUP JV



10

Metrolinx is an agency of the Government of Ontario



Metrolinx is an agency of the Government of Ontario



Existing Trains on the Network



12

Metrolinx is an agency of the Government of Ontario



Reference Case Definition

- A scenario intended to represent:
 - Current rail service and rolling stock, *plus*
 - Committed schemes for which funding identified, *plus*
 - Other schemes advised by Metrolinx that might reasonably be expected to be implemented by 2021

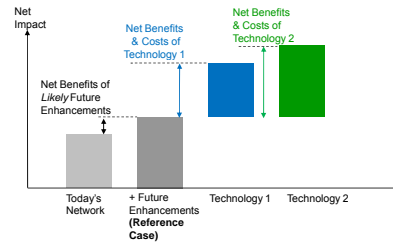
13

Metrolinx is an agency of the Government of Ontario



Reference Case

- Basis for comparison of options
- Evaluate the incremental impacts of each technology



14

Metrolinx is an agency of the Government of Ontario



Reference Case – Rolling Stock

- MP40 Loco (Tier 4), 12 bi-level coaches, 2400 passenger carrying capacity



15

Metrolinx is an agency of the Government of Ontario



Reference Case - Infrastructure



16

Metrolinx is an agency of the Government of Ontario



Reference Case - Service Level

- Significant growth in train services, primarily in the counter peak and off-peak periods
- Peak hour service levels are limited by the maximum number of trains that can be accommodated at Union Station
- Generally per corridor:

Time of Day	Direction	Reference Case
Peak Period	Peak	More trains per hour
Peak Period	Counter-peak	Adds Hourly Service*
Off-Peak Period	Both	Adds Hourly Service*

* Adds Half-hourly on Lakeshore Line

17

Metrolinx is an agency of the Government of Ontario

Technology Alternatives Rolling Stock



18

Metrolinx is an agency of the Government of Ontario

Diesel

- Diesel Locomotive
 - MP40 (Tier 4)
 - Baseline for all technology comparisons
 - Hauls up to 12-car passenger cars



19

Metrolinx is an agency of the Government of Ontario

Diesel

- Diesel Multiple Unit
 - Performance constant across consist lengths
 - Can split or combine trains
 - Single level - does not meet GO capacity requirements
 - Bi-level – technology not proven for required capacity, limited commercial technology



20

Metrolinx is an agency of the Government of Ontario

Electric

► Electric Locomotive

- Compatible with current GO coaches
- Hauls 12-car trains
- Requires high-voltage overhead catenary



21

Metrolinx is an agency of the Government of Ontario



Electric

► Electric Multiple Unit

- Performance constant across consist lengths
- Can split or combine trains
- Bi-Level - up to 16-car consists, meeting capacity
- Single-Level – does not meet GO capacity requirements



22

Metrolinx is an agency of the Government of Ontario



Dual Mode

► Dual-Mode provides “one-seat ride” through electrified and non-electrified territory

- Dual-Mode Loco
 - In development
- Dual-Mode Multiple Unit
 - Bi-level does not exist



23

Metrolinx is an agency of the Government of Ontario



Examples of Power Supply



24

Metrolinx is an agency of the Government of Ontario



Alternate Fuel

- Biodiesel
 - Renewable fuel blendable with petro-diesel
 - Compatible with diesel options (LHC, DMU, Dual-mode) with little or no modifications to equipment
 - To date, several preliminary studies in locomotives
 - Engine warrantee coverage only with $\leq 20\%$ biodiesel
 - Not guaranteed to reduce emissions or carbon footprint
 - Can gel in cold winter temperatures



25

Metrolinx is an agency of the Government of Ontario



Alternate Fuel

- Natural Gas (Compressed and Liquid)
 - Short range
 - Containment hazards
 - Mixed emissions
- Hydrogen Fuel
 - Difficult to produce and store
 - Significant danger during collision
 - Inefficient



26

Metrolinx is an agency of the Government of Ontario



Hybrid Drive

- Experimental
- Expensive
- Beneficial for start-stop service



27

Metrolinx is an agency of the Government of Ontario



Magnetic Concepts

- Maglev
- Inductive Power Transfer
- Ground-level Power Transfer
- Not compatible with existing infrastructure (track)



28

Metrolinx is an agency of the Government of Ontario



Rolling Stock Technology Alternatives Comparison

	Technology Type	Proven Technology	Commercially Viable	Compatible with Reference Case Infrastructure	Compatible with Reference Case Service Levels
Single-level	Diesel LHC	Yes	Yes	Yes	No
	DMU	Yes	Yes	Yes	No
	Electric LHC	Yes	Yes	Yes	No
	EMU	Yes	Yes	Yes	No
	Dual Mode LHC	In development	Limited	Yes	No
	Dual Mode MU	Yes	Limited	Yes	No
Bi-level	Diesel LHC	Yes	Yes	Yes	Yes
	DMU	Limited	Limited	Yes	No
	Electric LHC	Yes	Yes	Yes	Yes
	EMU	Yes	Yes	Yes	Yes
	Dual Mode LHC	In development	Limited	Yes	Yes
	Dual Mode MU	No	No	Yes	Yes
	Biodiesel/ Natural Gas/ Hydrogen Fuel	Limited	No	Yes	Yes
	Hybrid	No	No	Yes	Yes
	Magnetic Concepts	No	No	No	No

29

Metrolinx is an agency of the Government of Ontario

Rolling Stock Technology Alternatives Shortlist

- Diesel locomotive hauled trains
- Electric locomotive hauled trains
- Electric multiple unit trains
- Dual mode locomotive hauled trains

30

Metrolinx is an agency of the Government of Ontario

Network Option Development

- **Technology alternative** - shortlisted alternative rolling stock technologies

Diesel Loco



Electric Loco



Dual Mode Loco



Electric Multiple Unit



31

Metrolinx is an agency of the Government of Ontario

Network Option Development

- **Corridor alternative** – applies alternative rolling stock technology on any specific GO Transit line

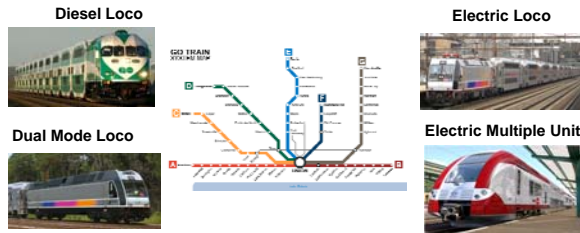


32

Metrolinx is an agency of the Government of Ontario

Network Option Development

- **Network option** - applying alternative rolling stock technology on one or more of the seven GO Transit lines



Preliminary Pre-Screening Criteria for Generating Network Options

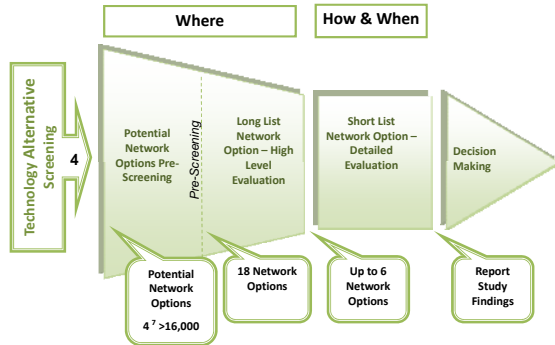
1. Electric Locomotive, Multiple Unit, and Dual Mode Loco are considered the same family of technologies
2. Lakeshore East and West to operate the same technology
3. Highest service/demand corridors

Applying Pre-Screening Criteria

Pre-Screening Criteria	Options Remaining
No pre-screening	16,384
1. Consider three technologies as a single family of electric trains at this stage	128
2. Lakeshore East and West to operate on the same technology	63
3. Prioritizing highest demand corridors	22
All pre-screening criteria combined	18



Option Progression



37

Metrolinx is an agency of the Government of Ontario



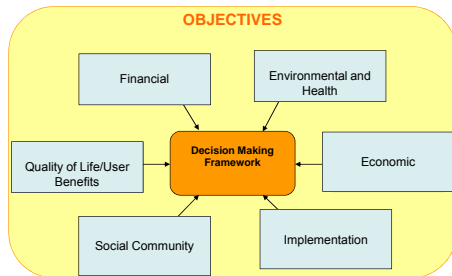
Further Assessment Of Options

38

Metrolinx is an agency of the Government of Ontario



Evaluation Categories

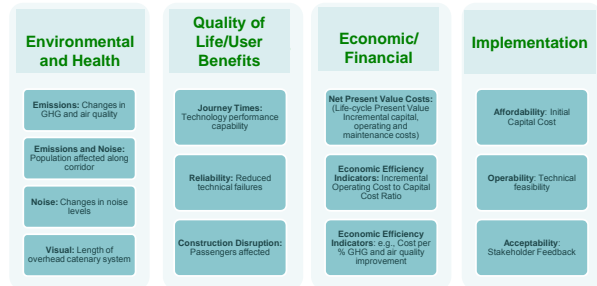


39

Metrolinx is an agency of the Government of Ontario



Next Steps – Option Evaluation



40

Metrolinx is an agency of the Government of Ontario



Next Steps in the Study

- Power Systems Alternatives
 - Overhead Catenary System / Third rail
- Infrastructure impacts
- Impacts along corridors
 - Health, noise, vibration, environment
- Financial implications
 - Capital and Operating

Study Timeline

Study Phase	Timeline											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phase 1 - Project Initiation	█											
Phase 2 - Baselineing	█			★	█							
Phase 3 - Options Development				█		★	█					
Phase 4 - Shortlisting of Options							█					
Phase 5 - Detailed Assessment, Findings and Conclusions									█	★	█	█

★ Stakeholder Workshop

Now time for discussion

Thank you!

Contact us at:
estudy@metrolinx.com

Electrification Study Website:
www.gotransit.com/estudy

APPENDIX 2F-2: Question and Answer Period

GO Transit Electrification Study Stakeholder Workshop #2

June 21, 2010

Detailed Notes from Question & Answer Session:

Following welcoming remarks and the Study Team presentation, workshop attendees were given the opportunity to ask questions and provide comments (indicated by a 'Q' and 'C'). Answers, where provided, are indicated by an 'A'. Please note, questions are grouped by topic and do not appear in the order they were discussed.

Study Approach:

Q1a: *You referred to the fact that Lakeshore would be the only line with half-hour service in 2021, however in the Georgetown South Environmental Assessment (EA) two of the three service scenarios showed the need for half-hour service in the Georgetown Line. The Georgetown line should also be included on your list of corridors with half hour GO service in 2021?*

A1a: The Electrification Study will only look at the medium term to understand the service levels for the purposes of this study. We are not looking past that. But, by looking at the levels for 2021 we will have a stable base for comparing the rolling stock technology options. The ARL is not part of the service case analysis for the purposes of this study because it will be managed by a different operator than GO Transit.

C2a: *If Metrolinx decided to build the new infrastructure required for electrification (e.g. substations, power supply systems, etc.) it should not be built to only meet the 2021 service levels. The system should be built to last for decades. As a result, the Electrification Study should look beyond 2021 to ensure it considers all necessary and relevant factors in the analysis and screening of technology and network options.*

A2a: One of the concerns with taking that long term approach for the purposes of this study is that the costs associated with electrifying the existing system will increase significantly. We are trying to find a balance between the long and short term. We wanted to ensure that we are comparing the technologies at a period in time that is reasonable, accounting for and addressing some of the existing service challenges of the network and accommodating for future growth.

C2b: *The infrastructure for an electrified system lasts for decades. In Pennsylvania an electrified system has been in operation for 70 years.*

A2b: One of our sub consultants, LTK, is based in the United States and knows that system well. As we mentioned previously, we are looking at the medium term. There is no question that the system needs to be adaptable so that it can be implemented in the short term and also be able to meet future service requirements.

Q3a: *All the other electrification studies have concluded that electrification is the best option for the future; however, the issue always comes down to money and political will. Are we looking at electrification seriously this time around?*

A3a: None of the previous studies addressed at the constraints and challenges related to CN, CP, and Union Station. Electrification is a proven technology, but putting it on an existing network is very challenging. The 'Rolling Stock Technology Assessment' report was a balanced and objective look at the technology options for the GO network. As the study progresses, we will continue to ensure that the findings and conclusions are evidence based and objective. Moreover, we will continue to have an open and transparent process where you have the opportunity to give us feedback.

Assessment of the Rolling Stock Technologies:

Q4a: *What do you think about the potential opportunity of integrating two technological options? For example, you haven't discussed the viability of using EMUs through the city and then connecting those consists to a diesel locomotive at the edge of the urban boundary.*

A4a: Utilizing that EMU option does pose some challenges for meeting existing passenger capacity requirements. Currently, GO runs consists with a capacity of 2400 passengers (seated and standing). The option you propose would also have to be discussed with the operators to fully understand the liability and safety issues that would need to be addressed for operating that type of system.

C5a: *GO should look beyond simply running 12 car consists on all lines at all times. There are examples around the world where cities have used different technologies to meet their service capacity.*

A5a: At this point we have not completed the operations portion of the study. We will look at various technologies to understand the most efficient way to meet service requirements across the network.

Q6a: *Aren't the present locomotives a diesel and electric combination? Why can't you just switch from one form of propulsion to another? Doesn't it just require pulling along a gas tank with you or is it more complicated than that?*

A6a: The existing locomotives operate via electric motors that are powered through diesel generators. The existing locomotives cannot be converted in that manner because it is not possible to put two separate engines in one car body. It would add too much weight to the locomotives. We have a report that will be circulated in the near future that will explain the power supply options for the technology options.

Q7a: *What evidence do you have that Tier 4 diesel technology will be available by 2021? Are there prototypes that have been developed?*

A7a: There is a commitment from GO that Tier 4 diesel technology will be used by 2021. Because Tier 4 will be a regulatory requirement in the United States, a number of companies are currently working on developing a prototype. We are currently in the process of obtaining further information related to costs and availability from a number of potential suppliers and will give you more information when it is available.

Q8a: *Considering the fact that GO currently operates Tier 2 technology, would it make sense to use Tier 2 locomotives as your base case?*

A8a: As mentioned previously, Tier 4 technology is planned to be implemented by 2021 across the GO network. The purpose for using Tier 4 technology in our reference case is that we want to get to a point where we can give Metrolinx enough information to do a thorough comparison of the technology options and make an informed decision. We will quantify the costs for changing the technology from Tier 2 to Tier 4 and include them in our analysis to ensure that balanced information is given to the Metrolinx Board.

Q9b: *What if a prototype or the costs related to changing the technology are not available by the time the study is complete?*

A9b: We have an ambitious timeline so if that information is not available by the time the study is complete than we will have to make some assumptions in our analysis. If that is required, we will ensure that those assumptions are available for you to review.

Network Options:

Q10a: *On the existing GO system map you referred to in your presentation some infrastructure proposed in long range planning documents such as the 'Big Move' are not included (e.g. Weston, Bloor, Bowmanville), why is this case?*

A10a: The map was used as a general representation of the infrastructure within the GO network. It is not intended to highlight all of the future stations in the GO network or what projects will be completed as part of the 'Big Move' plan.

Q10b: *In the future, the purpose for using this map should be made explicit to avoid confusion in the public. If you are going to outline future GO Transit projects on a map, ensure that all projects are included so that we can understand the implications of increased service and scheduling challenges related to future expansion in the network.*

A10b: We have made note of your comment. As I mentioned, the map was not intended to visually represent the future plans of GO Transit/Metrolinx. It was used to illustrate the fact that we are examining the infrastructure requirements within the network when comparing the impacts of the various rolling stock technology and network options.

Q11a: *The 2021 map in your presentation made no reference to a midtown connection to CP, was that intentional or something that was overlooked?*

A11a: That project is part of a long-term plan for the area and as a result is not part of our reference case.

Q10a: *There seems to be a lot of focus on whether a technology will be available in the future. However, there is a lower and upper bound number of trains per hour GO can operate with diesel technology. How does this relate to the study service levels on the various corridors?*

A10a: The system is constrained by the capacity of Union Station, not diesel technology. We need to address that reality first. This study is looking to highlight various opportunities and benefits related to the technology and network options presented here today.

Q14a: *If you operated a network with more than one technology on it (e.g. diesel and electric) how would you move electric trains to maintenance facilities located on a diesel line?*

A14a: That is an operational constraint. At the moment we don't know if all facilities can handle both diesel and electric or if new facilities will have to be built for electric trains.

Q14b: *In your presentation you mentioned that there would not be any trip time benefits associated with changing the rolling stock on the existing network. However, I have heard that GO could reduce trips on the Lakeshore line by nine minutes. If there are service level needs that cannot be met by diesel technology is GO obligated to adopt an alternative technology to address that issue?*

A14b: The reference case service levels are based on medium term planning projections so that we have a level playing field for comparing diesel and electric technology. As service levels increase more trains will be needed to meet demand. Understanding those dynamics is the next part of our analysis and when we have that information we will forward it along to you.

Screening Approach:

C15a: *It would be useful to publish your assumptions so that we can understand how you have narrowed down the various network options. If you change your assumptions it changes the viability of different network options and influences which corridors get upgrades first.*

A15a: Those assumptions will be coming shortly.

Screening Criteria and Comparison:

C16a: *It is important to note that the Study Team will not prepare formal recommendation and a business case for GO. This exercise is a study that will outline a number of models and case studies that will then be used by the Metrolinx Board. If the results are not what we are looking for or if the current political, economic, or social conditions change, we can rework what has been done. This is just one input into the decision making process.*

C17a: *Are you going to screen out and weight the objectives? Is that the next step of the study?*

A17a: As mentioned, this study will not make any recommendations. Consequently, we will provide the board of directors with objective, evidence based findings and conclusions so that they can make an informed decision.

Operations and Planning:

C18a: *If we don't achieve the level of service outlined in the 'Big Move' I am concerned about community backlash. The 'Big Move' needs to be reworked so that it references realistic infrastructure targets.*

A18a: The 'Big Move' looked at a snapshot in time. You may be correct that some adjustments should be made, especially considering the current economic climate. We are gathering a tremendous amount of information for the Electrification Study that will assist Metrolinx in understanding the viability of the targets outlined in the 'Big Move'.

APPENDIX 2F-3: Sample Worksheet



**GO Transit Electrification Study
Stakeholder Workshop #1**

WORKSHEET

Please Print

Name (optional)

Email (optional)

Phone Number (optional)

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. *What feedback do you have on the preliminary assessment of rolling stock technologies?*

2. *What feedback do you have on the preliminary network options presented by the Study Team?*



Working Session 2: Proposed Approach for Further Assessment of Options

1. *What feedback do you have on the Study Team’s proposed approach for further assessment of technologies and network options?*

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

For further information about this project, please contact:

Karen Pitre
Study Project Director
Electrification Study
Karen.Pitre@metrolinx.com

APPENDIX 2F-4: Submitted Group Worksheets

Group 1 - Breakout Discussion Worksheet

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

-phasing strategy – connect one technology with another at the edge of a network → e.g. electric to connect to diesel locomotives

2. What Feedback do you have on the preliminary network options presented by the Study Team?

-look at the viability of short line feeders → this may lower costs of extensions/improvements

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

-how do you power a full electric system?

-how will this study connect to city plans and policies and other social objectives/benefits?

-consider what will happen with additional stations in the system

-consider various health effects of each technology option = cost to health system of diesel vs. Electric (e.g. respiratory diseases)

-cost of GHG emissions

-How well integrated will this part of the study be with capacity at Union Station?

-consider long-term employment numbers

-renewable energy sources should be used to power this system

-how will the technology options effect land development?

-need counter-peak service to be higher to support different development and movement = employment in outlying areas should connect to city centres such as Markham.

-what is will be used to evaluate the costs associated with economics and health?

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

-Board members should attend these meetings

Group 2 - Breakout Discussion Worksheet

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

- Both Tier 2 and Tier 4 diesel technology should be included in the assessment of technology options
- Risk assessments should be conducted for Tier 2 and Tier 4 technology
- The ARL should be electrified immediately; the public needs answers and that process should become more transparent
- The public should have increased information regarding the ARL agreement to understand options that are currently being discussed
- The Electrification Study needs more information about the ARL to understand the impacts for electrification (i.e. are they protecting for future electrification)

2. What Feedback do you have on the preliminary network options presented by the Study Team?

- there was nothing to discuss, stakeholder need to know what assumptions have been made related to network options to screen the technologies
- the study team should examine the opportunity of through routing GO lines to increase efficiency
- examine the potential viability of having all lines going into Toronto stop at Bloor and integrate with transit operators
- look past 2021 for understanding cost recovery and service levels. If you only look to 2021 cost recovery will be too low. This approach contradicts the Province's approach on other investment initiatives. The roll out plan for electrification should look further ahead than 2021.

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

- user benefits will improve and build the case for electric vs. Diesel
- prioritize sustainable energy
- conduct sensitivity analysis for energy costs
- look at other case studies to examine the historical impact of electrification on other areas → i.e. look at land use implications

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

APPENDIX 2F-5: Submitted Individual Worksheets

*** Note: Personal information submitted on worksheets was removed***

Individual Worksheet 1

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

N/A

2. What Feedback do you have on the preliminary network options presented by the Study Team?

N/A

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

- When comparing the financial costs of the different options we need to make assumptions about cost of green house gas emissions, either in carbon tax or under the cap and trade system. Regardless of the pricing scheme, green house gas emissions are going to be an operating cost by 2021 or 2031.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 2

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

An EMU meeting a diesel locomotive at the end of the electrified part of the corridor. If the consists are longer than what the locomotive can pull, the diesel locomotive does not have to pull the whole consists as the capacity of 12 cars is not needed for the last couple of stations. This approach can reduce the costs of catenary infrastructure.

2. What Feedback do you have on the preliminary network options presented by the Study Team?

-What impacts does additional stations added to existing corridors, and how does it align with planning and growth policies.
-Do not evaluate corridors as all or nothing; it isn't necessarily a problem if Lisgar to Milton is diesel as long as Mississauga & Toronto are electric.

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

- Break up network info into two categories: Urban and Rural
-Break down options within single corridors
-More reverse peak service is needed to encourage growth in urban growth centres from an employment lens. Hourly service will not meet the growth objectives.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

-Do not believe everything GO Transit staff tell you. Look at how other operations work. Two great examples from Tokyo include Odakyu Electric Railway and Keikyu Electric Railway.

Individual Worksheet 3

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

N/A

2. What Feedback do you have on the preliminary network options presented by the Study Team?

N/A

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

- Not enough detail has been provided to date to provide proper feedback on the proposed approach. In particular, the decision-making framework has not been made public. Given that decision-making will be in the hands of the Metrolinx Board, it is particularly important to know if and how much guidance they will be given.

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

N/A

Individual Worksheet 4

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

N/A

2. What Feedback do you have on the preliminary network options presented by the Study Team?

N/A

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

- N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

-IF the ARL is a DMU all hell will break loose on the corridor all the way down to Union Station.

Individual Worksheet 5

Working Session 1: Rolling Stock Technology Assessment and Network Options

1. What feedback do you have on the preliminary assessment of rolling stock technologies?

N/A

2. What Feedback do you have on the preliminary network options presented by the Study Team?

N/A

Working Session 2: Proposed Approach for Further Assessment of Options

1. What feedback do you have on the Study Team's proposed approach for further assessment of technologies and network options?

- N/A

Do you have any additional comments or questions regarding the GO Transit Electrification Study?

-More transparency on the ARL please! Other than that, great workshop!

APPENDIX 2F-6: Workshop Invitation and Attendance List

**GO Transit Electrification Study
Stakeholder Workshop #2 Invitation and Attendance List
Tuesday, June 15, 2010**

* **Bolded Organizations Attended Stakeholder Workshop #2**

Environment & Health

Pollution Probe
Air and Waste Management Association
Toronto Board of Health
CommunityAIR
Ontario Agency for Health Protection and Promotion
Clinton Climate Initiative
Environmental Health Association
ESEI Solar Foundation
Clean Air Partnership
Rouge Park Alliance
Ontario Healthy Communities Coalition
Ontario Clean Air Alliance
Wellesley Institute
Pembina Institute
Ontario Lung Association
Evergreen
Green Communities Canada
Canadian Association of Physicians for the Environment
Conservation Council of Ontario
Friends of the Greenbelt Association
Ontario Public Health Association
Protect Our Water and Environmental Resources

Community

Toronto City Summit Alliance
Weston Village Residents' Association
Weston Community Coalition
Mount Dennis Community Association
Canadian Federation of Students (Ontario)
Lakeview Ratepayers Association
Metroland Media Group
Member of GO Transit Community Advisory Committee
Centre for Social Innovation
Active Living Alliance for Canadians with a Disability
Center for Information and Community Services of Ontario
Community Living Ontario
Housing Action Now
Ontario Community Support Association
Ontario Council of Agencies Serving Immigrants
Safe Kids Canada
Ontario Heritage
Metrolinx Seniors Advisory Committee
Ontario Undergraduate Student Alliance

APPENDIX 2F-7: Former Community Advisory Committee Update Report

Electrification Study Former Community Advisory Committee Meeting

Board Room, 6th Floor, Metrolinx Head Office

Tuesday, July 7, 2010

6:00 – 8:00 p.m.

MEETING HIGHLIGHTS

Attendance: 9 former CAC Members (15 individuals including staff and consulting team members)

Welcoming Remarks:

Ms. Leslie Woo (*Metrolinx*)

Mr. Gary McNeil (*Metrolinx*)

Electrification Study Update Presentation By:

Ms. Karen Pitre (*Metrolinx*)

Mr. Roger Wood (*Delcan+ARUP JV*)

Feedback on the Study Approach:

- Attendees inquired about the consultation approach and the feedback received to date from stakeholders
- Participants inquired about the integration of the ARL into the Electrification Study
- Will the Study Team examine the influence of urban intensification, investment in transportation modal shifts and traffic demand management on GO service levels and air quality?

Feedback on the Preliminary Rolling Stock Technology and Network Options:

- The Study Team should examine if different rolling stock technology options have an impact on land market values along the rail corridors
- Can changing the technology option decrease existing operational headways?
- Attendees inquired about the level of confidence the study team has for meeting the Tier 4 emission standards by 2020
- Participants asked if existing limitations at Union Station could be overcome by utilizing non FRA compliant trains in the future
- Could dedicated GO rail tracks increase existing service capacity across the network?

- How many Megawatts of energy would an electrified system use per year?

Feedback on the Detailed Assessment of Rolling Stock and Network Options:

- Attendees inquired about the methodology used to determine population densities along the rail corridors (e.g. determining the zone of influence and population density)
- The Study Team should use projected population densities outlined in policy documents like the *Growth Plan for the Greater Golden Horseshoe* and municipal Official Plans to understand future intensification surrounding rail corridors
- Socioeconomic factors should be included in the mapping exercises for population density and environment/health parameters to understand the impacts of the GO network on vulnerable populations
- The Study Team should examine the impacts of the rail network on land designated under the Greenbelt Plan (e.g. urban agriculture and parks/open space)
- The Study Team should examine the potential for prevailing winds to carry train emissions beyond the 400 metre 'zone of influence'

General Comments:

- Metrolinx should look at Strachan Avenue as a possible location for a satellite station and network hub
- Metrolinx should discuss with officials from Montreal about their experience collaborating and working with CN and CP



Appendix 2G

Stakeholder Workshop #3 Summary Report

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2G

Stakeholder Workshop #3 Summary Report

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2G: STAKEHOLDER WORKSHOP #3 SUMMARY REPORT

1. ABOUT STAKEHOLDER WORKSHOP #3

1.1. GO Transit Electrification Study

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system as a future alternative to diesel trains now in service, as well as the future Air Rail Link (ARL) between Union Station and Lester B. Pearson International Airport. The study is examining how GO and the ARL rail services will be powered in the future – using electricity, enhanced diesel technology or other means.

Over the past 20 years there have been many previous electrification studies but this is the first time that electrification of the entire GO rail system – all seven corridors – has ever been studied. The study is using an expanded and enhanced GO rail network from the network of today as the basis of comparison; this “reference case” network presumes that additional tracks and some of GO’s proposed line extensions (to St. Catharines, Kitchener, Barrie Waterfront, Bloomington Road, and Bowmanville) will be constructed in the coming years, resulting in increased train volumes.

1.2. Stakeholder Workshop #3

On Wednesday, September 22nd, 2010 the Electrification Study Team hosted the third stakeholder workshop for organizations across the Greater Toronto and Hamilton Area (GTHA). The workshop – the third in a series of four planned as part of the study – took place between 6:30 – 9:00 p.m. at Metro Central YMCA in downtown Toronto.

Purpose

The purpose of the workshop was to provide participants with an update on the Electrification Study progress and to obtain feedback on the high level evaluation used to identify a “short list” of six network options for the potential electrification of the GO network. Throughout the workshop, the Electrification Study Team obtained feedback from stakeholders on the work completed to date through a question and answer period and interactive breakout discussion sessions.

Attendance

In total, 20 representatives of non-governmental organizations registered for the workshop, with 18 attending the September 22th session. A list of organizations invited to participate in the workshop, as well as those who attended the meeting, is included in Appendix 2G-5.

Format

The workshop was facilitated by Mr. Jim Faught of Lura Consulting. At 6:30 p.m., Mr. Faught welcomed the participants to the workshop, described the session’s purpose, and introduced key representatives from Metrolinx and the Delcan+Arup JV Study Team.

The workshop began with opening remarks from Ms. Karen Pitre, Electrification Study Project Director, Metrolinx, who thanked participants for their interest and participation in the Electrification Study. Ms. Pitre provided a brief recap of the previous two stakeholder workshops and progress on the study to date.

Next, Mr. Roger Wood, Study Project Manager, Delcan+Arup JV Study Team, provided stakeholders with an overview of the reference case used in the Electrification Study and network options identified in the high level evaluation of potential network options. Mr. Wood then described the six network options resulting from the high level evaluation undertaken by the Study Team. Finally, Mr. Wood presented the proposed approach for the detailed assessment of the six “short listed” network options and walked stakeholders through a specific example of how the Study Team plans to conduct an analysis of land use and population density along the corridors in the GTHA, as part of the detailed assessment of options.

The presentation was supplemented with PowerPoint slides that can be found in Appendix 2G-1. After the presentation, meeting attendees were invited to ask questions and provide initial comments. A detailed account of the questions and comments following the presentation can be found in section two.

Following the question and answer period, workshop attendees engaged in facilitated breakout discussions about the network options and the proposed approach for the detailed assessment of the network options (see Appendix 2G-2 for a sample worksheet). The breakout groups were encouraged to capture their ideas in writing so that they could be accurately recorded and included in this workshop report. The groups were given one hour for discussion and then were asked to share their feedback with the other workshop participants and the Electrification Study Team. Stakeholders were also encouraged to provide the Study Team with written comments by filling out and submitting individual comment forms following the workshop.

2. WORKSHOP PRESENTATION DISCUSSION

Following the workshop presentation, attendees were given the opportunity to ask questions and provide initial comments (indicated by a 'Q' and 'C') to the Study Team. Answers, where provided, are indicated by an 'A'.

Question 1: Does the 200 metre zone of influence you mentioned refer to the entire width of the area or does it refer to the distance from the centre to the outer line?

Answer: The 200 metres refers to the distance on either side of the centre line. In some instances the zone could be smaller or larger depending on the factors examined.

Question 2: Why did you include the ARL with Georgetown South operations if it will be running a different technology on its own corridor?

Answer: As you know, the decision for who is building and managing the ARL has changed over the course of this study. As outlined in the study's terms of reference, we will examine both diesel and electric operations for the ARL in order to understand the potential benefits and costs of electrifying the Georgetown line. The ARL is coupled with the Georgetown line in this study because it will not be operating on a dedicated track. Similar to GO operations in the area, the ARL will be required to share track with GO Transit, CN, and CP. As a result, if the Province decided to electrify the ARL all of the tracks running from Union Station through the corridor would need to be electrified.

Question 3: I have been told that there are technology constraints for the ARL relating to axle loading and redevelopment efforts currently underway at Pearson International Airport. Have you heard anything about this, and if so can you provide us with any details that you might have?

Answer: We are not aware of any ARL technology constraints related to axle loading.

Question 4: I was wondering if you could clarify what parameters you used to measure the cost of each technology options. Did you find the cost per train set, and if so, did you calculate the cost of the smaller train sets required if GO Transit were to run EMU cars? Similarly, if you were to conduct your analysis with the assumption that half of the cars in the consists were powered EMUs while the other half were the existing bi-level passenger coaches used by GO Transit, wouldn't the costs of operating EMUs be reduced significantly?

Answer: We assumed that EMUs would not be able to utilize the current passenger cars running on the GO system due to platform heights at station stops. In addition, although traditional EMUs can offer journey time benefits when compared to electric locomotives, capacity constraints at Union Station prevent GO Transit from realizing those benefits.

Question 4b: Have you considered the fact that locomotives are currently required to do break tests when they turn around at Union Station? If turnaround times could be increased at Union, I think EMUs could offer significant benefits over electric locomotives. In addition, in the early stages of the study, Karen mentioned that EMUs could be used on the existing network.

Answer: First, I did not confirm that EMUs could be used on the existing network early in the study, because I did not know at that time what technology and network options were suitable for GO Transit. Also, there are a number of constraints that are currently impacting Union Station capacity. Brake inspections are a minor issue compared to some of the other challenges that need to be overcome at Union Station. Lastly, I should note that using current GO bi-level passenger cars in combination with EMUs is not viable. The Study Team has had several conversations with GO Transit, Bombardier, and other manufacturers to see if we could retrofit the passenger cars to make them suitable. Both parties confirmed that the cost of retrofitting the existing passenger cars is too high to make it a viable option.

Question 4c: Currently GO Transit has a turnaround time of 5-10 minutes and the TTC subway turnaround time is 2 minutes. That is a huge difference. I realize that during rush hour it takes time to get people off the train, but if you can shave off a few minutes that makes quite a difference for riders.

Answer: Those details are currently being studied by AECOM as part of the Union Station capacity study. We haven't considered all of those details because of the other capacity constraints getting into Union Station. The capacity study is looking at all of the factors impacting Union Station capacity.

Question 5: The Big Move identified that some lines would be electrified in the near future because customer demand would drive for the case for electrification. Is this true? If so, should your reference case or benefits reflect that thinking rather than use a time frame of 2020?

Answer: The Big Move was an ambitious plan that outlined a number of potential projects across the GO network, including a commuter express rail. Included in the study was the need for more rail track in the GTHA to meet increased demand. Although previous electrification studies have been completed, no study has moved beyond the first step that identifies the fact that electrification can offer a number of benefits to existing operations. In order to ensure that this study produced meaningful findings and conclusions, we are looking at the characteristics of the corridor in the medium term (reference case). As a result, the current study will not address long term projects like the commuter express rail outlined in the Big Move.

Comment 6: It is not clear to me why the ARL is not being studied on its own and why electrifying it would require the entire Georgetown Line to be electrified. Montreal has a central station with one electrified line running to it.

Answer: I cannot answer whether only one track or more are electrified in Montreal. Across the GTHA, train operators currently share tracks and work together to coordinate their individual schedule. As a result, trains move from one track to another to accommodate the different needs and users currently operating on the network. If that is how the rail operators continue to operate, electrifying GO operations would require all tracks within a corridor to have overhead catenary.

Question 7: Other than converting to either one electric operation or another, did you study the option of making major changes to how GO Transit is currently operating? Take a look at the *Réseau Express*

Régional (RER) in Paris where they have the trains running through their central station and ending at different locations. For me, I see that cost savings are only the tip of the iceberg for what GO Transit could accomplish. When will GO Transit look at this issue holistically and examine the viability of changing the system from a commuter rail system to a regional rail service?

Answer: I hear your point. The Study Team is struggling with how to address Union Station and the needs of both CN, CP, and Via/Amtrak operations. We want to address these challenges and look at what might be available if Union Station capacity was not an issue. However, we are caught in a conundrum of how to produce findings and conclusions that are both realistic and address the challenges associated with Union Station capacity. If our approach was to look past Union Station to a period of time when the capacity limitations were addressed, then everyone would complain that we were loading the case against electrification.

Question 8: I have a question related to noise and vibration levels that you mentioned in your presentation. How do you know what a Tier 4 diesel locomotive will sound like if they haven't been built yet? We don't even know what a Tier 2 locomotive is supposed to sound like because in the Georgetown EA it mentioned that GO trains were currently operating at a level comparable to Tier 0 technology.

Answer: It is important to note that this study will produce findings and conclusions that will be presented to the Metrolinx Board to make recommendations to the Ministry of Transportation. The Study Team will assess the noise and vibration impacts of the various technology and network options. This assessment will provide a relative comparison of the options in order to understand their impact on communities surrounding the rail corridors. In order to understand the noise levels for Tier 4 technology, we have obtained estimates from a number of train experts and manufacturers.

3. SUMMARY OF COMMENTS RECEIVED

The following section provides a summary of the comments received from workshop participants. A more detailed account of the question and answer period can be found in section two of this report. In addition, written comments compiled by the breakout groups and from individuals' worksheets submitted following the session can be found in Appendix 2G-3 and 2G-4 respectively.

3.1. Study Approach

- The Study Team has done an excellent job evaluating the available rolling stock and network options for electrification.
- The study's scope is limited and should have included an opportunity to examine the potential of transforming GO Transit operations from a commuter rail service to a true regional rail service.
- Tier 4 Diesel technology does not exist and thus should not be used as the reference case for electrification.
- A third-party assessment of the implementation timelines should be conducted following the completion of the Electrification Study.

3.2. Rolling Stock Technology Options

- Was reliability of rolling stock technology considered in the assessment of options?
- EMUs are a viable technology option if used in tandem with existing bi-level coaches.
- Stakeholders need more detailed information on impacts associated with operating Tier 4 diesel locomotives and dual-mode locomotives.

3.3. Network Options

- Stakeholders would like more information on how the six network options were selected.
- The Study Team should clarify what parameters were used to measure the cost of each network option.
- The Electrification Study should have explored the potential of also using EMUs to run smaller, more frequent consists with lengths that match off-peak service rather than continue to run locomotive hauled bi-level coaches.
- Where is the proposed Bolton line on the maps presented in the study reports and outputs?
- If electric locomotives are the preferred option for electrification, Metrolinx should begin to survey the used electric locomotive market.

3.4. Proposed Approach for Detailed Assessment of Options

Screening Approach

- The Study Team should use existing approaches to quantify GHG emissions already in use by the Province (e.g. OPA Feed-in Tariff program) to quantify GHG emissions as part of the Electrification Study.

- Why is the zone of influence 200 metres when greater distances have been used for other Metrolinx studies?
- The Study Team should address the impacts that air quality, noise, and vibration will have on clusters of vulnerable populations (i.e. hospitals, schools, retirement complexes).

Screening Criteria and Comparison

- The Study Team should examine the opportunity for energy saving through capitalizing on regenerative power.
- Will the impacts of GHG emissions be examined at a local level or regionally?
- Construction/implementation timing should be evaluated in the detailed assessment of the options (e.g. electrifying Lakeshore West would take longer than Georgetown South due to the number of bridges requiring improvement along the corridor).
- The costs of getting to the reference case should be included in the detailed assessment.
- Community impacts – such as human health, noise, and vibration – should be quantified so they can be fairly assessed against the capital costs of electrification.
- How will the Study Team accurately determine noise and vibration levels for Tier 4 diesel locomotives when prototypes do not currently exist?

3.5. Parallel Studies and Projects

Union Station

- Union Station is a major challenge for electrifying the GO network.
- The Electrification Study should inform the Union Station Capacity Study to ensure the potential benefits of operating an electrified service are included in the assessment of Union Station capacity.
- EMUs can reduce turnaround times at Union Station, leading to increased station capacity.
- The Study Team should examine the viability of Milton trains travelling across the top of the City to increase Union Station capacity.

ARL

- The ARL should be evaluated as a separate corridor, not part of Georgetown.
- The ARL evaluation should study offering both express and local service from Union Station to Pearson Airport.
- The Study Team needs to provide stakeholders with detailed information about the assessment of rolling stock technology options for the ARL.
- Study maps and figures need to be changed to illustrate that the ARL is included within the scope of the Electrification Study.
- The Study Team should examine the potential for future airport expansion as a result of electrifying the ARL.
- The ARL should be the first line that is electrified.

3.6. General Comments

Operations and Planning

- Metrolinx should begin negotiations with both federal and provincial agencies to ensure that potential electrification projects can go through an accelerated EA process.

4. NEXT STEPS

The next steps for the study, as presented by Mr. Roger Wood of the Delcan+Arup JV Study Team, include:

- Further refining of the approach used to conduct a detailed assessment of the network options;
- Conduct a multi-category evaluation of the six shortlisted network options;
- Conduct a comprehensive risk assessment on the issues which may affect the case for electrification;
- Additional consultation with stakeholders at the fourth stakeholder workshop;
- Obtain feedback from the broader public through e-consultation.

Mr. Faught thanked participants for their participation and feedback at the workshop. He also noted the opportunity for additional comments to be submitted to the Electrification Study Team via the study email address or online on the Electrification Study Website.

APPENDIX 2G-1: Workshop PowerPoint Presentation



METROLINX

**Electrification of the GO Transit
Rail Network
Stakeholder Workshop -
High Level Evaluation**

September 22, 2010



1

Metrolinx is an agency of the Government of Ontario

AGENDA

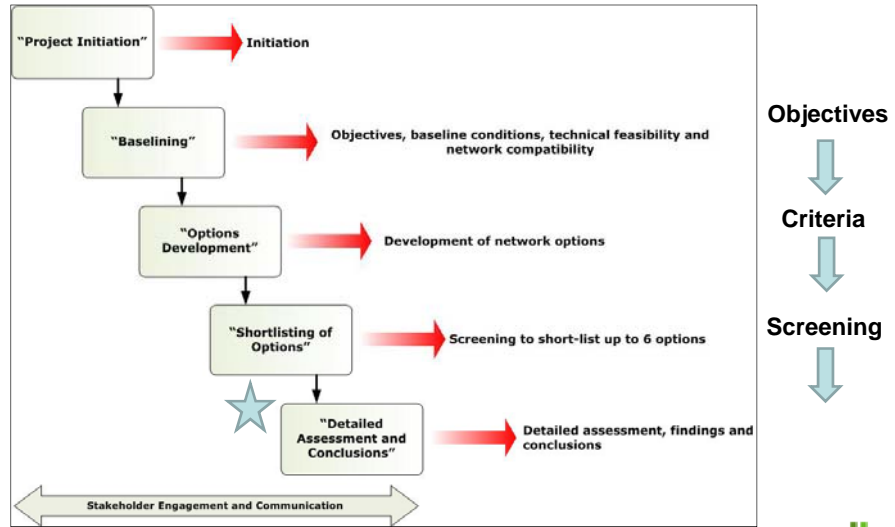
- Study Overview & Where We Are
- Re-cap:
 - Reference Case
 - Rolling Stock Technology Assessment
 - Power Supply
 - Option Progression
- High Level Evaluation
 - Technology Evaluation
 - Corridor Prioritization
- Next Steps
 - Detailed Assessment Overview
 - Land Use and Population Analysis
 - Multiple Category Evaluation (MCE)



2



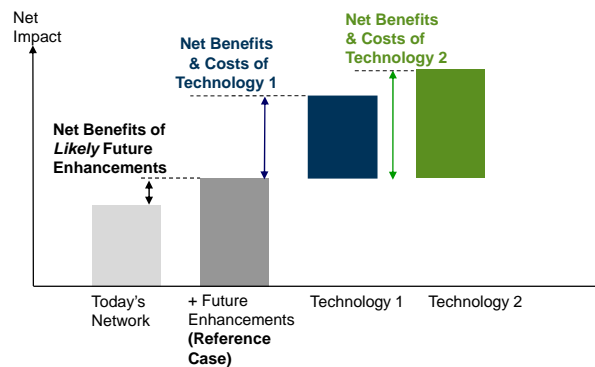
Study Overview & Where We Are



3

Reference Case

- Basis for comparison of options
- Evaluate the incremental impacts of each technology



4

Rolling Stock Technology Alternatives Shortlist

Diesel Loco



Electric Loco



Dual Mode Loco



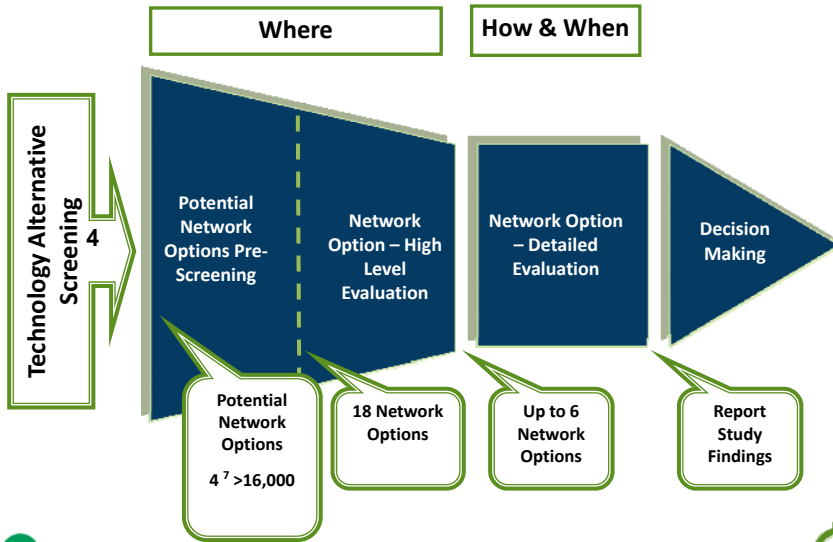
Electric Multiple Unit



Power Supply - 2 x 25 KV OCS



Option Progression



Applying Pre-Screening Criteria

Pre-Screening Criteria	Options Remaining
No pre-screening	16,384 (4^7)
1. Consider three technologies as a single family of electric trains at this stage	128 (2^7)
2. Lakeshore East and West to operate on the same technology	64 (2^6)
3. Prioritizing highest service/demand corridors	18 + Reference Case

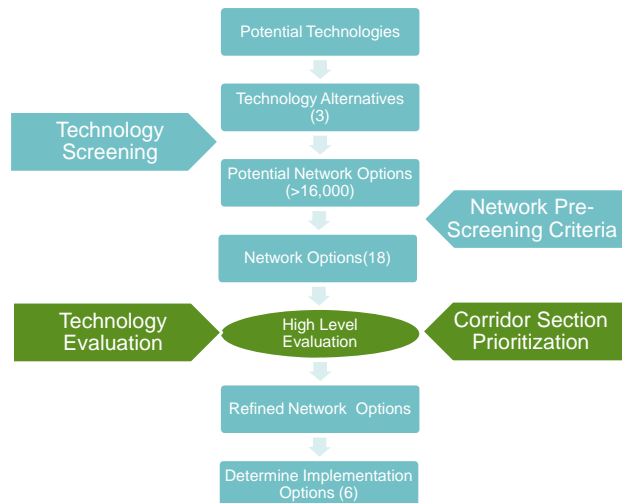
18 Network Options + Reference Case

Lakeshore West	Lakeshore East	Georgetown	Milton	Barrie	Richmond Hill	Stouffville
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓		✓
✓	✓	✓	✓	✓		
✓	✓	✓	✓		✓	✓
✓	✓	✓	✓		✓	
✓	✓	✓	✓			✓
✓	✓	✓	✓			
✓	✓	✓		✓	✓	✓
✓	✓	✓		✓	✓	
✓	✓	✓		✓		✓
✓	✓	✓		✓		
✓	✓	✓			✓	✓
✓	✓	✓			✓	
✓	✓	✓				✓
✓	✓	✓				
✓	✓	✓				
		✓				

✓ Indicates partial or full electrification of corridor

9

Option Evaluation & Progression



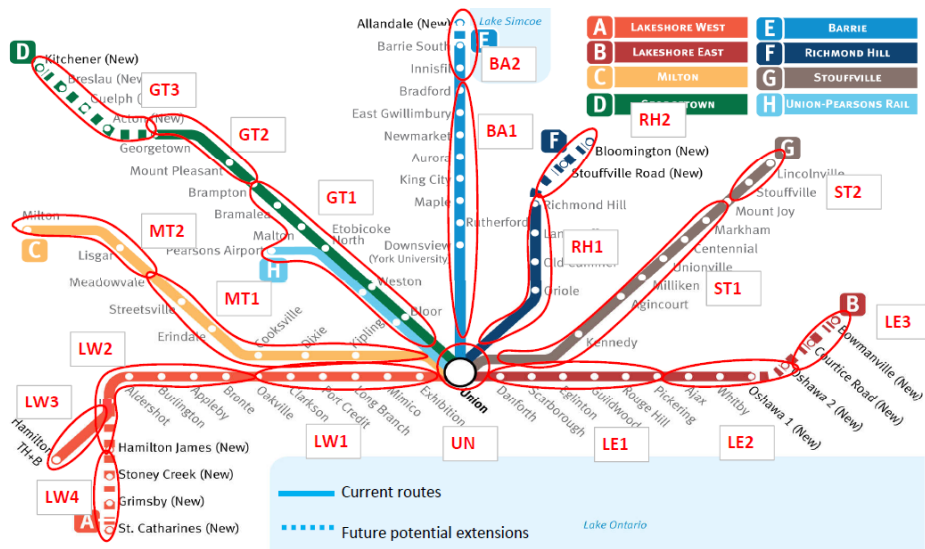
10

High Level Evaluation Principles

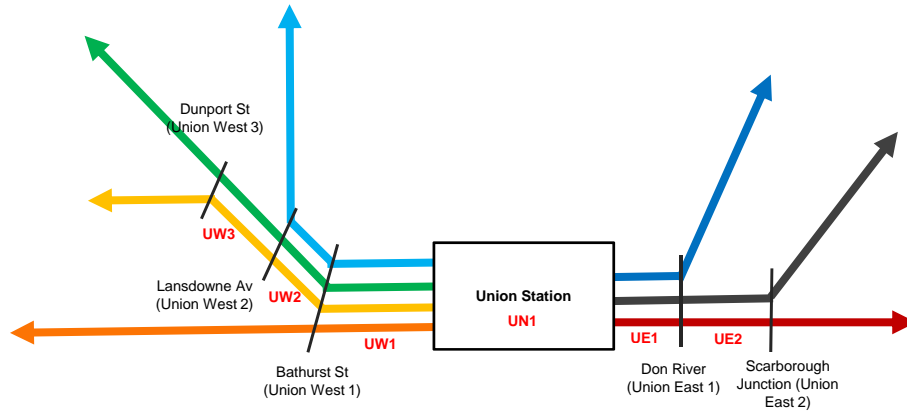
- Comparative assessment
- Assumes operationally feasible
- 19 service sections



Corridor Sections



Downtown Toronto Detailed Sections



13

Service Sections Electrified

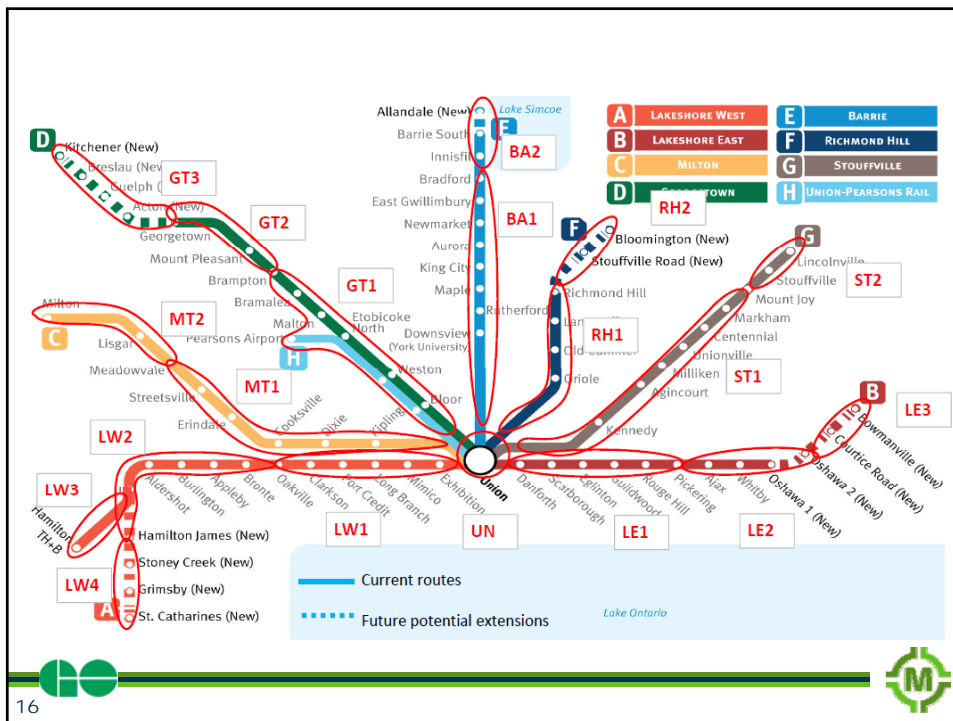
➤ Cumulative from Union outwards

Corridor	Service Section	Corridor Section(s)	Service Description
Lakeshore East	LE-a	UN1+UE1+UE2+LE1	Union to Pickering
	LE-b	UN1+UE1+UE2+LE1+LE2	Union to Oshawa
	LE-c	UN1+UE1+UE2+LE1+LE2+LE3	Union to Bowmanville
Lakeshore West	LW-a	UN1+UW1+LW1	Union to Oakville
	LW-b	UN1+UW1+LW1+LW2	Union to Hamilton James
	LW-c	UN1+UW1+LW1+LW2+LW3	Union to Hamilton James and Hamilton TH+B
	LW-d	UN1+UW1+LW1+LW2+LW4	Union to St Catharines
	LW-e	UN1+UW1+LW1+LW2+LW3+LW4	Union to Hamilton TH+B & St Catharines
Milton	MI-a	UN1+UW1+UW2+UW3+MI1	Union to Meadowvale
	MI-b	UN1+UW1+UW2+UW3+MI1+MI2	Union to Milton
Georgetown	GT-a	UN1+UW1+UW2+UW3+GT1	Union to Brampton
	GT-b	UN1+UW1+UW2+UW3+GT1+GT2	Union to Georgetown
	GT-c	UN1+UW1+UW2+UW3+GT1+GT2+GT3	Union to Kitchener
Barrie	BA-a	UN1+UW1+UW2+BA1	Union to Bradford
	BA-b	UN1+UW1+UW2+BA1+BA2	Union to Allandale
Richmond Hill	RH-a	UN1+UE1+RH1	Union to Richmond Hill
	RH-b	UN1+UE1+RH1+RH2	Union to Bloomington
Stouffville	ST-a	UN1+UE1+UE2+ST1	Union to Mount Joy
	ST-b	UN1+UE1+UE2+ST1+ST2	Union to Lincolnville

14

Technology scenarios per corridor

- Reference Case
 - Tier 4 Diesel
- Full Electrification
 - Electric Locomotive
 - EMU
- Partial Electrification
 - Electric Locomotive + T4 Diesel
 - Electric Locomotive + Dual Mode
 - EMU + T4 Diesel
 - EMU + Dual Mode



Getting to the 6 Network Options

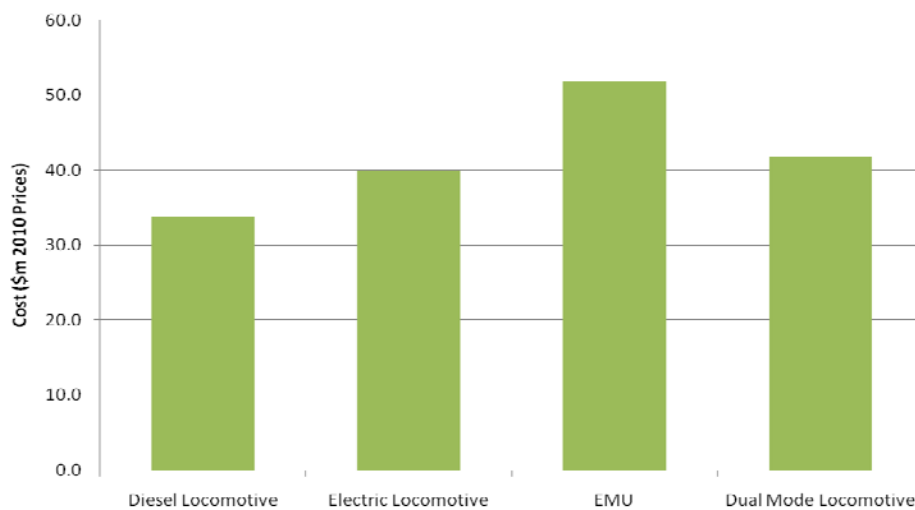
► Compilation of data for **comparative** analysis to rank sections

- Technology characteristics
 - Rolling stock capital and O&M costs
 - Journey time benefits
 - Environmental (CAC, GHG, noise, vibration)
- Corridor section characteristics
 - Infrastructure and OCS capital and O&M costs
 - Population within 200m zone of influence

17



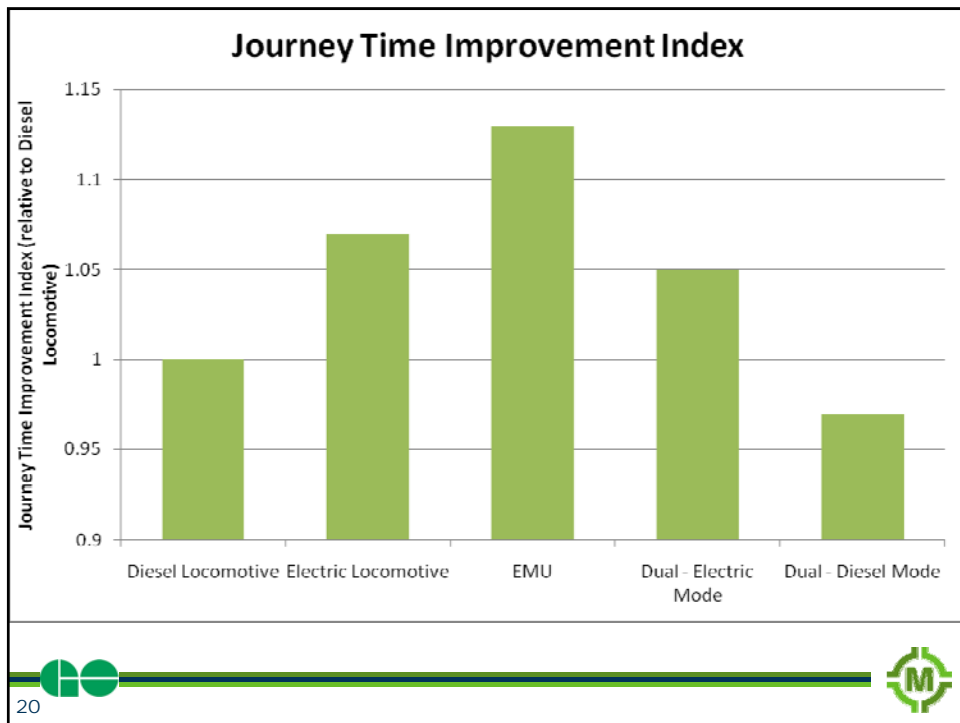
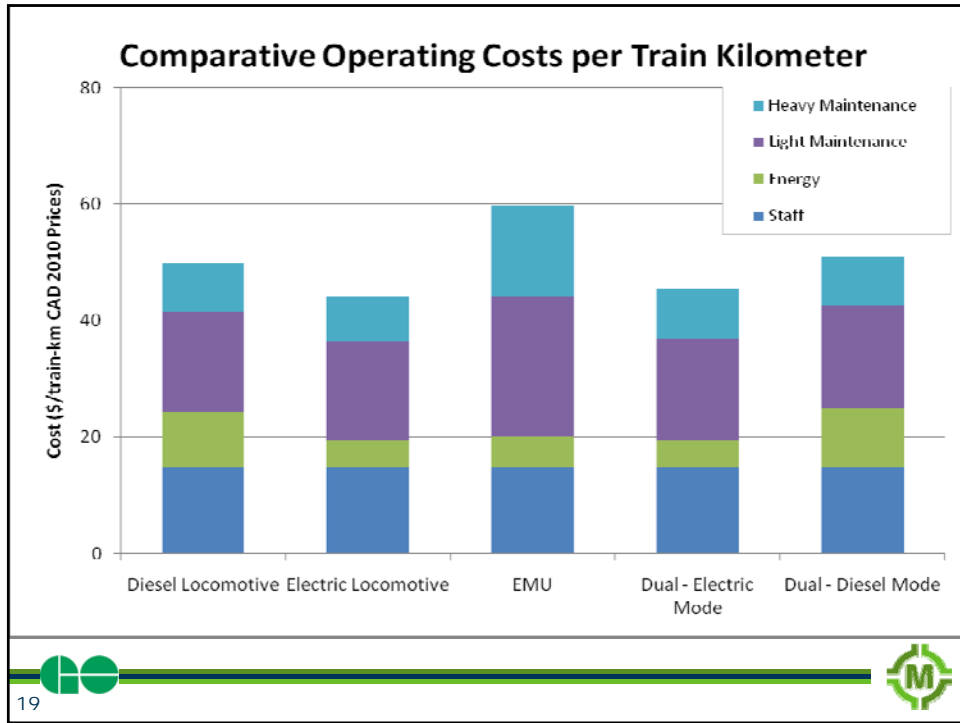
Capital Cost per Trainset



Locomotive = 10 passenger cars + 1 loco; EMU = 12 passenger cars

18





Environmental Considerations

➤ Criteria Air Contaminant (CAC) Emissions

- Electric trains reduce local CAC emissions compared to Diesel loco
- Impact depends on population density adjacent to corridor

➤ Greenhouse Gas Emissions

- EMU and Electric loco both reduce GHG compared to Diesel loco
- EMU's higher energy demand results in more GHG emissions compared Electric loco

➤ Noise and Vibration

- All electric technologies deliver a reduction in noise and vibration compared to Diesel loco

21



High Level Evaluation Measures

1. Transportation Efficiency

- Incremental Costs and Benefits
 - Capital costs – rolling stock, OCS, power supply, structures
 - O&M costs
 - User Benefits – journey time savings for users
 - Ridership x time savings + estimated benefits from demand uplift

22



High Level Evaluation Measures

1. Transportation Efficiency (con't)

- High level Transportation Efficiency Index (TEI) using comparative data [User Benefits/(Capital + O&M Cost)]
- Higher TEI equates to greater return in user benefits per \$ invested
- TEI does not include all impacts & should not be compared to Metrolinx BCA's



High Level Evaluation Measures

2. Environmental Efficiency

- Cost per % GO's GHG/CAC/noise/vibration impact reduced
 - Lower cost per % impact reduced, greater return in environmental benefits per \$ invested
- % Change in GO Transit's contributions to:
 - Regional GHG
 - Local CAC, noise, vibration (weighted by population)



High Level Evaluation Findings (1)

- Electric Loco taken forward to detailed evaluation
 - Elec Loco better transportation efficiency
 - EMU – 2.9x journey time savings but Life cycle cost 4.7x more
 - EMU – 4.7x more expensive so lower environmental efficiency
 - EMU - Higher technology risk, implementation and affordability considerations
 - Additional EMU transportation efficiencies could be realized with future modifications to the system.



High Level Evaluation Findings (2)

- With Electric Locomotives it is more cost effective to electrify the entire corridor
 - Elec Loco cost less than Dual Mode Loco
 - Elec Loco give O&M savings
 - Transportation and environmental benefits maximized

- Except:
 - Lakeshore West to Hamilton Th+B
 - Lakeshore West to St. Catharines



High Level Evaluation Findings (3)

- Diesel Loco trains for Hamilton TH+B and St. Catharines.



➤ Dual Modes

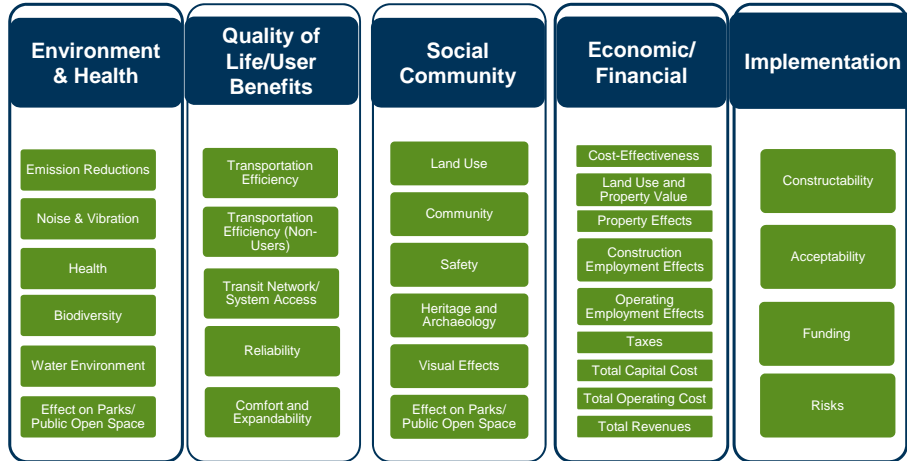
- Not worthwhile if only a small fleet required
- May be considered under implementation/ phasing strategy



6 Options for Detailed Evaluation

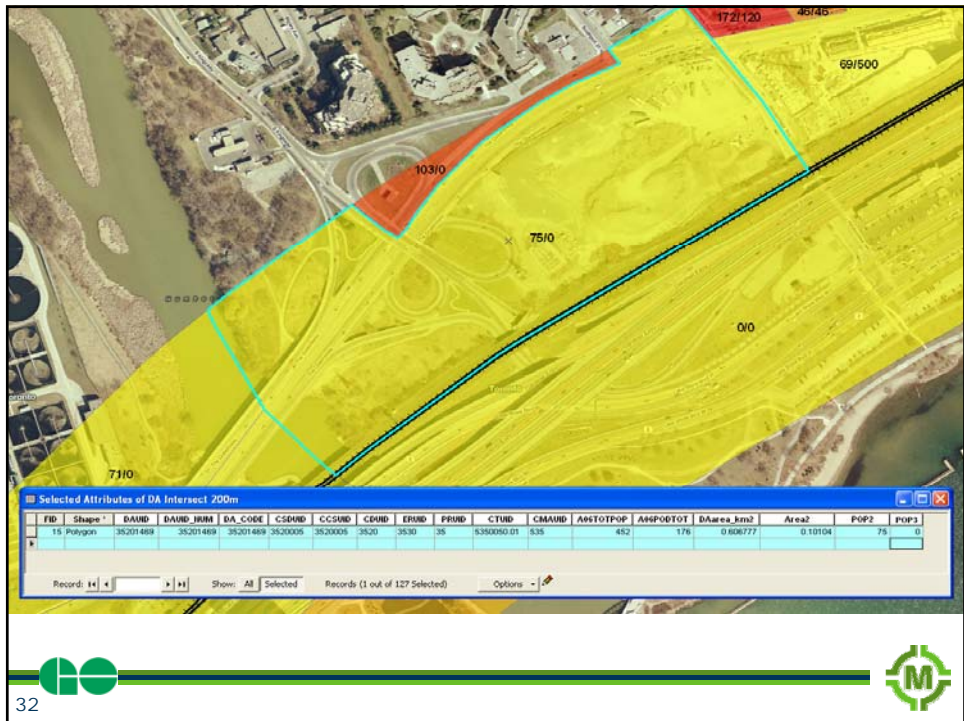


Multiple Category Evaluation

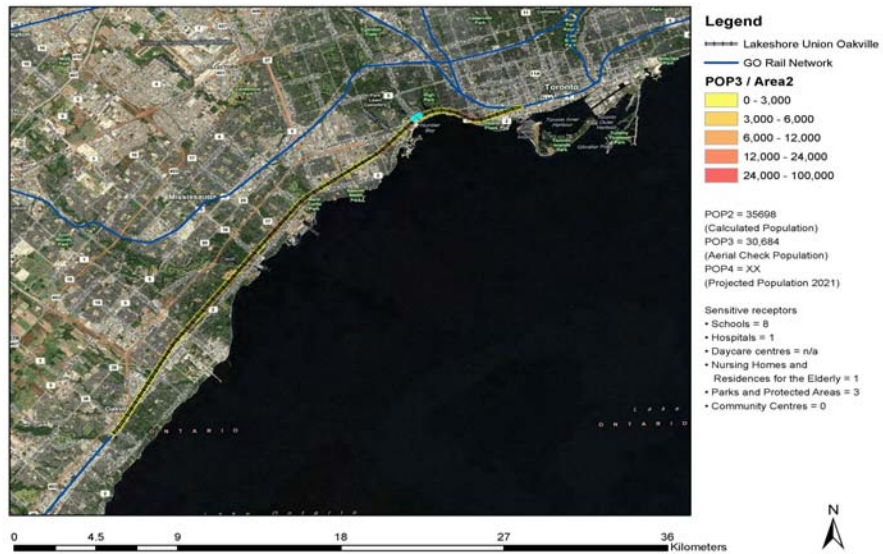


Land Use & Population Analysis





Union Station to Oakville - 200 Meter Buffer



Next Step - Detailed Evaluation

- ▶ Undertake the detailed MCE on the six shortlisted network options, including sensitivity and scenario testing (compare with the Reference Case)
- ▶ Undertake a detailed risk assessment on issues which may affect the case for electrification
- ▶ Consider wider constraints and opportunities and implications of other Metrolinx studies
- ▶ Determine key phasing and implementation considerations
- ▶ Continue to consult with the public and stakeholders and receive feedback

Questions and Comments



APPENDIX 2G-2: Sample Worksheet

**GO Transit Electrification Study
Stakeholder Workshop #3***WORKSHEET*

Please Print

Name (optional)

Email (optional)

Phone Number (optional)

1. *What feedback do you have on the key study background reports completed to date?*

2. *What feedback do you have on the proposed network options?*



3. *What feedback do you have on the proposed approach for the detailed assessment of the network options?*

4. *Do you have any additional comments or questions regarding the GO Transit Electrification Study?*

For further information about this project, please contact:

Karen Pitre
Project Director
Electrification Study
Karen.Pitre@metrolinx.com
416- 874-5910

APPENDIX 2G-3: Submitted Group Worksheets

Group 2 - Breakout Discussion Worksheet

1. What feedback do you have on the key study background reports completed to date?

- Consultants were not given enough leeway (i.e. scope was limited and did not look at other opportunities to transform the system. Did we consider Service Levels?
- Look beyond network paring and look at running GO in a different way

2. What feedback do you have on the proposed network options?

- A little more clarification on how the six options were selected
- Look at running smaller trains (reduce length of consists)
- Good strategy to single out the best options
- Electric loco is a good option, if approach is incremental steps / changes are going to be made to the system
- Where is the Bolton line on your maps?

3. What feedback do you have on the proposed approach for the detailed assessment of the network options?

- What are the construction time savings?
- How is the study team going to assess GHG emissions? Only local or including regional impacts?
- Ensure that monetary values are attached to social benefits so they can be fairly assessed against the costs/impacts
- Quantify CAC impacts to ensure they are adequately and fairly compared to capital costs
- Operating costs → Were losses due to transmissions considered?
- Review government programs and subsidies and incorporate them into the cost estimates for electric locomotives
- Include the cost of getting to the reference case in the detailed assessment

4. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Include the ARL in the assessment report – it is currently not included in the report figures
- Review or Look at a greater visions with respect to trip time and the impact to overall performance

Group 3 - Breakout Discussion Worksheet

1. What feedback do you have on the key study background reports completed to date?

- Air toxins are not included in air quality assessment
- How do you tailor train sizes to demand at different times of day with loco-hauled train?
- Why is heavy maintenance so high for EMU?
- What about quantified benefits for transfers between electric locomotives and diesel locomotives?
- There needs to be more risk assessments done
- Not even Tier 3 is developed yet, how can Tier 4, which doesn't even have a prototype be used as the reference case? Should be Tier 2 which is in operation now.
- 200 metres is too short, past studies used 300 metres (air pollution only)

2. What feedback do you have on the proposed network options?

- How would existing locomotives be used if both Lakeshore and Georgetown are electrified, giving GO more locomotives than they can use?
- Why would we do the ARL twice?
- When does GO change from a commuter options to regional rail operation?
- How do you get the operating dollars?

3. What feedback do you have on the proposed approach for the detailed assessment of the network options?

- Cost of going the whole line at once possible cost prohibitive?
- UPRL should be its own corridor, not as part of any line project
- The Team should study impacts of electrification on capacity at Union Station (Instead of the reverse)
- More detail on equipment assumptions and breakdown (esp. For EMUs) and risk of Tier 4 and Dual-Mode

4. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- If Tier 4 doesn't materialize, now what?
- Union Station capacity should be assessed in the Electrification Study
- Union Station Capacity Study should have been done earlier or as a direct component of this study (Not a parallel study)

Group 4 - Breakout Discussion Worksheet

1. What feedback do you have on the key study background reports completed to date?

-Accept at face value

2. What feedback do you have on the proposed network options?

-How did the study team evaluate the network options?

-Was the ARL evaluated – why was it not separated

-The ARL should operate both express and local service

-Milton trains could travel across the top of the city to increase Union Station capacity

-Niagara falls was not included

3. What feedback do you have on the proposed approach for the detailed assessment of the network options?

-Air quality – how was the 200 metre zone defined

-Residential – is 200 metres enough?

-Hospitals and schools not as much of them so how do they fit in factoring the impact of air, noise, and vibrations impacts on the community

-EMU's – should be examined in more detail

-Reliability and break down factors to ensure stakeholders can understand the impacts of the options on their community

-Metrolinx should use the quickest EA process to get this implemented

4. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

-Examine the opportunity to use regenerative power – set up a power station to make use of braking and regenerative power

APPENDIX 2G-4: Submitted Individual Worksheets

****Notes:**

- **Personal information submitted on worksheets was removed**
- **Where questions are missing no response was given**

Individual Worksheet 1*2. What feedback do you have on the proposed network options?*

-construction priorities

-measured impact on CN/CP/VIA → transferability of your findings to investigate electrification of freight in the future

-option for shorter (fewer cars) trains at off-peak hours would greatly improve the capacity and efficiency factor of the GO system

3. What feedback do you have on the proposed approach for the detailed assessment of the network options?

-has the conversion efficiency and transmission losses been included in the energy costs of the electrified options?

-corridor width of 200 metres: perhaps this width should be widened in proximity of stations due to idling

-evaluation of local air quality impacts should be expanded to look at regional impacts of electricity generation emissions. Trains running at peak hours will be incrementally powered by natural gas which has NOx and SOx emissions.

Individual Worksheet 2*2. What feedback do you have on the proposed network options?*

-the diagrams of the 18 options (pages 22-31) of the Sept 22 paper don't show the ARL even though I understand it is being studied

3. What feedback do you have on the proposed approach for the detailed assessment of the network options?

-no monetary value to the environmental benefits of electrification in terms of how the health care costs/life expectancy/GHG reduction will reduce the impact of the conclusions.

Individual Worksheet 3

1. *What feedback do you have on the key study background reports completed to date?*

- the 2 LTK reports are excellent
- process is now moving in the right direction

2. *What feedback do you have on the proposed network options?*

- seems to present a reasonable basis for further evaluation
- feeling that Union Station rail corridor is a major issues that needs to be assessed separately
- need greater explanation of requirement for electrification of the entire TTR/UPRL
- Impact of potential air rights development due to electrification

3. *What feedback do you have on the proposed approach for the detailed assessment of the network options?*

- Need more info on equipment-related options and risks associated with Tier 4 and Dual-Mode
- Need more info on physical constraints of ARL and impact on equipment choices

4. *Do you have any additional comments or questions regarding the GO Transit Electrification Study?*

- If Electric Loco and Bi-level option is emerging as the frontrunner, then the Study Team needs to survey used loco market (Amtrak, NJT, SEPTA, etc.)
- Construction/implementation time savings from loco and bi-level option? Cost savings?
- Need an outside assessment of implementation timelines, specially RE: PANAM Games deadline for ARL

Individual Worksheet 4

1. What feedback do you have on the key study background reports completed to date?

- electrification hook up at Willowbrook yards can be used for Union to Pearson and Georgetown as stage 1. To be followed by completion of Lakeshore as stage 2.
- It will take 5 years to do Georgetown, 10 years plus to do Lakeshore due to length and complexity. Do the fastest route first
- Electrification of UPRL – Please advise us further on the convertible D2EMU proposed for ARL. UPRL can be electrified starting next year not constrained by PANAM

2. What feedback do you have on the proposed network options?

- Accelerate UPRL electrification by doing a technical amendment to the existing EA to specify details of the technology being used. MOE order allows for alternative technologies that meet Tier 4 standards. Give MOE the detail on what the alternative is rather than going through a separate TPEA process for the entire route.

3. What feedback do you have on the proposed approach for the detailed assessment of the network options?

- Electrify UPRL by 2015. Fast track the EA by technical amendment, start implementation planning today!
- Convertibles will give the cushion in case it cannot be operational as electric for 2 weeks of PANAM
- EMUs are cheaper than D2EMUs; Build it right, built it electric!

4. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Concerns about November prioritization framework; Electrification “envelope” needs to be established
- Base Case must look at cost to convert to electric as transferring existing diesel resource plus whatever incremental add-on. Please do not add the cost of electrification on top of expanding services using diesel.

APPENDIX 2G-5: Workshop Invitation and Attendance List

GO Transit Electrification Study Stakeholder Workshop #3 Invitation and Attendance List Wednesday, September 22, 2010

* Bolded Organizations Attended Stakeholder Workshop #3

Environment & Health

Pollution Probe
Air and Waste Management Association
Toronto Board of Health
CommunityAIR
Ontario Agency for Health Protection and Promotion
Clinton Climate Initiative
Environmental Health Association
ESEI Solar Foundation
Clean Air Partnership
Rouge Park Alliance
Ontario Healthy Communities Coalition
Ontario Clean Air Alliance
Wellesley Institute
Pembina Institute
Ontario Lung Association
Evergreen
Green Communities Canada
Canadian Association of Physicians for the Environment
Conservation Council of Ontario
Friends of the Greenbelt Association
Ontario Public Health Association
Protect Our Water and Environmental Resources

Community

Toronto City Summit Alliance
Weston Village Residents' Association
Weston Community Coalition
Mount Dennis Community Association
Canadian Federation of Students (Ontario)
Unionville Ratepayers Association
Lakeview Ratepayers Association
Metroland Media Group
Member of GO Transit Community Advisory Committee
Centre for Social Innovation
Active Living Alliance for Canadians with a Disability
Center for Information and Community Services of Ontario
Community Living Ontario
Housing Action Now
Ontario Community Support Association
Ontario Council of Agencies Serving Immigrants
Safe Kids Canada
Ontario Heritage
Metrolinx Seniors Advisory Committee
Ontario Undergraduate Student Alliance

Land Use and Social Planning

People Plan Toronto
Sustainable Urban Development Association
Canadian Urban Institute
Ontario Smart Growth Network
Ontario Professional Planners' Institute
pAlliance
Ontario Association of Landscape Architects
Urban Land Institute
Building Industry and Land Development Association
Canadian Policy Research Networks
Ontario Association of Architects
Ontario Federation of Agriculture
Ontario Professional Engineers Association
Neptis Foundation

Transportation Advocacy and Commuter Groups

BA Group
Clean Train Coalition
Regional Transit Advocate
Transit Riders Advocacy Coalition (GTHA)
GO Transit Customer Service Advisory Committee
Healthy Transport Consulting
Canadian Automobile Association (CAA)
Ontario Public Transit Association
Canadian Urban Transit Association
Transport Action Ontario
Smart Commute
Centre for Sustainable Transportation
Ontario Good Roads Association
Disabled and Aged Regional Transit
Canadian Institute of Transportation Engineers

Business and Economic Development

Greater Toronto Airports Authority (GTAA)
FRAM Building Group
The Warren Group
Green Tourism Association
Ontario Agri Business Association
Ontario BIA Association
Ontario Environmental Industry Association
Ontario Restaurant, Hotel, Motel Association
Ontario Tourism & Ontario Tourism Marketing Partnership
Retail Council of Canada
C.D. Howe Institute
The Institute for Competitiveness & Prosperity
BOMA Canada
Ontario Chamber of Commerce
Small Business Association - Canada
Canadian Youth Business Foundation (CYBF)
Toronto Board of Trade
Toronto Association of BIAs
Canadian Federation of Independent Business
Ontario Home Builders Association
Ontario Real Estate Association
Canada Green Building Council, Greater Toronto Chapter

Academic

University of Toronto (2)
McMaster University
Humber College (School of Applied Technology)
Mohawk College of Applied Arts and Technology
Sheridan College Institute of Technology and Advanced Learning
Ryerson University, School of Urban & Regional Planning
Gage Occupational and Environmental Health Unit – University of
Toronto
Ontario College of Art & Design
Seneca College of Applied Arts and Technology
University of Ontario Institute of Technology
University of Toronto at Scarborough
York University



Appendix 2H

Former Community Advisory Committee Meeting

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2H

Former Community Advisory Committee Meeting

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2H: FORMER COMMUNITY ADVISORY COMMITTEE MEETING

Electrification Study Community Advisory Committee Meeting

Board Room, 6th Floor, Metrolinx Head Office

November 24, 2010

6:00 – 9:00 p.m.

MEETING HIGHLIGHTS

Attendance: 7 CAC Members (13 individuals including staff and consulting team members)

Electrification Study Update Presentation By:

Ms. Karen Pitre (*Metrolinx*)

Mr. Roger Wood (*Delcan+ARUP JV*)

Electrification Study Video:

- Is the purpose of the video to show stakeholders what catenary might look like?
- The study team should clarify if the sound coming from the trains is a diesel or electric locomotive.

Meeting Presentation and Question/Answer Period

Air Quality and Community Impacts

- Does ambient air quality levels presented include the reference case/GO operations?
- What are the Ministry of the Environment guidelines for air quality emissions?
- It appears from preliminary findings that GO operations have a minimal impact on regional air quality.
- Although GO's impact appears to be relatively low, it is important to recognize their impact on regional air quality and present absolute numbers and percentages so it is easy for stakeholders to understand.
- The Ontario Power Authority has recently produced a report looking at the potential for gas powered electric trains and it concluded that there would be an overall rise in GHG emissions.
- Are the major impacts to local communities the visual aesthetics of overhead catenary and substations?

Technology Options

- Is the ARL DMU convertible to EMU?

- Is there any risk that Tier 4 technology may not be available by 2015?
- The Study Team should clarify if they are referring to Tier 4 diesel locomotives when they reference 'diesel locomotives' in their presentation
- Why were dual-mode locomotives not considered on the short list of technology options for electrification?
- Have you calculated the total number of users that would experience journey time savings as a result of electrified operations?
- Do EMUs require more station stops to be a viable technology option?

Network Options

- Are the current numbers of trains on the GO system constrained by track speeds and Union Station capacity?
- Diesel operations could experience journey time savings if existing bottlenecks were removed and they were able to achieve maximum speed limits.

Operations and Maintenance

- Is there enough power available in the GTHA to power electrified GO rail operations?
- If the network was electrified, what would happen if there was a power outage across the region?
- Corridor ownership is a significant factor that will impact the implementation of the Electrification Study.
- Is there any opportunity to disentangle freight operations from transit service?
- Tier 4 locomotives will require ventilation systems at Union Station to mitigate air quality impacts.

Costs, Funding, and Financing

- There needs to be more information about the specific costs for diesel and electric operations.
- The Study Team should explore funding opportunities for the Electrification Study.

Next Steps

- Will the Former CAC have an opportunity to be briefed on the final report?
- The Study Team has done an impressive amount of work on the study that will set the benchmark for future studies.



Appendix 2I

Stakeholder Workshop #4 Summary Report

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2I

Stakeholder Workshop #4 Summary Report

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2I: STAKEHOLDER WORKSHOP #4

1. ABOUT STAKEHOLDER WORKSHOP #4

1.1. GO Transit Electrification Study

Metrolinx has initiated a study of the electrification of the entire GO Transit rail system as a future alternative to diesel trains now in service, as well as for the future Air Rail Link (ARL) between Union Station and Lester B. Pearson International Airport. The study is examining how GO and the ARL rail services will be powered in the future – using electricity, enhanced diesel technology or other means.

Over the past 20 years there have been many previous electrification studies but this is the first time that electrification of the entire GO rail system – all seven corridors – has ever been studied. The study is using an expanded and enhanced GO rail network from the network of today as the basis of comparison; this “reference case” network presumes that additional tracks and some of GO’s proposed line extensions (to St. Catharines, Kitchener, Barrie Waterfront, Bloomington Road, and Bowmanville) will be constructed in the coming years, resulting in increased train volumes.

1.2. Stakeholder Workshop #4

On Wednesday, December 1, 2010 the Electrification Study Team hosted the fourth stakeholder workshop for organizations across the Greater Toronto and Hamilton Area (GTHA). The workshop – the final in a series of four stakeholder workshops planned as part of the study – took place between 6:30 – 9:00 p.m. at Metro Central YMCA in downtown Toronto.

Purpose

The purpose of the workshop was to provide participants with an update on the Electrification Study progress and to obtain feedback on the key preliminary findings from the Study Team’s detailed assessment of network options.

Attendance

In total, 19 stakeholders registered for the workshop, with 15 attending the December 1st session. Two were new participants in the study workshop series. A list of organizations invited to participate in the workshop, as well as those who attended the meeting, is included in Appendix 2I-5.

Format

The workshop was facilitated by Mr. Jim Faught of Lura Consulting. At 6:30 p.m., Mr. Faught welcomed the participants to the workshop, described the session’s purpose, and introduced the key representatives from Metrolinx and the Delcan+Aurp JV Study Team.

The workshop began with opening remarks from Ms. Leslie Woo, Vice President of Policy and Planning at Metrolinx. Ms. Woo thanked the stakeholders who have been attending the series of workshops for their contributions to the study.

Following the opening remarks, Ms. Karen Pitre, Study Project Director, Metrolinx, presented a study overview and recap of progress to date. Ms. Pitre thanked the stakeholders for their feedback at the stakeholder workshops and through comments online via the Electrification Study website. Ms. Pitre also provided a brief overview of the high-level evaluation of alternative technology and network options.

Next, Mr. Roger Wood, Study Project Manager, Delcan+Arup JV Study Team, presented the methodology used and preliminary key findings from the multiple category evaluation undertaken of the six “short-listed” and reference case. Mr. Wood provided a detailed summary of the methodology and key findings for the following categories: environment and health; quality of life and user benefits; social and community considerations; and economic and financial considerations. The detailed analysis on environment and health included findings on greenhouse gases (GHG), air quality (both regional and local), electromagnetic fields, and noise and vibration. For quality of life and social/community considerations, Mr. Wood touched on findings related to journey time savings, visual impacts and nuisance effects. Next, economic and financial considerations were presented, including the capital cost methodology and estimated requirements for rolling stock, operating & maintenance, and infrastructure. The presentation was concluded with responses to frequently asked questions from stakeholders and next steps in the study.

The presentation was supplemented with PowerPoint slides that can be found in Appendix 2I-1. The workshop format was originally conceived as having a formal presentation component followed by a question and answer period and an interactive breakout session to gather further feedback. However, as the presentation progressed, workshop participants emphasized that they preferred to have their specific questions and comments addressed during the presentation. As a result, an open dialogue between workshop participants and Study Team members continued in plenary for the balance of the workshop. The comments, questions and answers raised and discussed throughout the workshop were captured and have been summarized in the following section. A detailed account of the questions and comments can be found in Appendix 2I-2.

During and after the event, stakeholders were encouraged to provide feedback through worksheets provided to all participants (see Appendix 2I-3 for a sample worksheet). An electronic copy of the worksheet was distributed to the stakeholders following the workshop for those who did not have enough time to complete them during the session. The individual worksheets submitted by stakeholders at or following the workshop can be found in Appendix 2I-4.

2. SUMMARY OF COMMENTS RECEIVED

The following section provides a summary of the questions and comments received from workshop participants. A more detailed account of the questions and comments – along with answers from the Study Team (where provided) – can be found in Appendix 2I-2. In addition, written comments received during and following the workshop via submitted worksheets can be found in Appendix 2I-4.

2.1. ARL

- The ARL should be considered as a separate line item in the analysis of network and technology options.
- The Study Team is overstating the length of time needed to electrify the ARL.
- How many locomotives are assumed by the Study Team to be purchased for the ARL? Does the total number of locomotives include spares?
- The Study Team should consider the risk of whether Tier 4 locomotives will be available in time for the PAN AM Games. New technology usually takes longer than anticipated to procure, build, and test.
- What is the cost of converting the ARL from diesel to electric? Is this cost included in the recent procurement contract?

- Who made the decision that the ARL could not be electrified by 2015?
- Political obstructions are preventing the ARL from being electrified right away. The ARL should be the starting point for a phased approach to electrify the Georgetown corridor.
- When will ARL construction begin?
- The cost to electrify the ARL would be substantially less if GO were to purchase EMUs first rather than convert DMUs to electric. This should be noted in the study costing analysis.
- Metrolinx should not rush to complete the ARL by 2015. The Province should pay the extra money and take the extra time to electrify the ARL.

2.2. Tier 4

- Tier 4 technology should not be the starting point for the reference case if the costs are currently unknown.
- Metrolinx should electrify the network now, rather than spend money on purchasing Tier 4 locomotives.
- Will the study integrate the costs of converting existing locomotives to meet Tier 4 emission standards as part of the cost to get to the reference case? How will those costs be adequately and fairly compared to the costs associated with electrifying the GO network?

2.3. Union Station

- The Study Team is overstating the constraints at Union Station. The speed at which a train operates has nothing to do with headway coming into and out of Union Station.

2.4. Air Quality, Health, and Community Impacts

- The study should determine the level of particulate matter in communities adjacent to the rail corridor.
- Regardless of the state of the science, the Study Team should use latest health research to determine best practices for assessing the impacts of ultra-fine and fine particulate matter on local communities.
- Has the Study Team conducted a cost-benefit analysis for health care costs attributed to emissions resulting from diesel operations?
- What are the total amounts of particulate matter and NO_x that will be emitted by the diesel locomotives?
- The Study Team should consult and include health authorities as part of the health component of this study.
- The Electrification Study has not adequately assessed neighbourhood quality of life and community impacts.
- Are there days in the year when GO's diesel operations could push air quality levels over the established emissions thresholds and contribute to an increase the amount of smog days in the region?

2.5. Noise Impacts

- Part of the noise that is generated from train consists comes from wheel noise of passing 12Car coaches as well as breaking. The Study Team's assessment only looked at manufacturing specifications for noise produced by locomotive engines.
- Will noise walls still be needed along the Georgetown Corridor if the corridor is electrified?
- The Study Team is grossly underestimating the levels of noise coming from the GO trains. The Study Team should conduct a more comprehensive noise impact analysis rather than relying on train manufacturing specifications.

2.6. Capital and Operations/Maintenance Costs

- The Study Team should not include costs to electrify CP tracks in their analysis of capital costs.
- Construction along the Georgetown corridor is already protecting for electrification. As a result, the Study Team should not include bridge reconstruction and grounding costs in their assessment of electrification costs.
- The price of diesel used in the study costing methodology is too low. Previous electrification studies conducted by GO have assumed higher diesel fuel prices than what is used in this study.
- The Study Team should do further research on what GO might actually have to pay for electricity if they electrified the entire GO rail network.
- Energy security should be considered as a factor in the Electrification Study. Ontario produces an abundance of hydroelectricity. In the long term, it will be cheaper to purchase electricity than continue to purchase diesel fuel.
- An electrified network presents an opportunity to realize further energy/cost savings and greater price flexibility through energy sharing and co-generation.
- Has the Study Team evaluated the economic benefits and potential land use changes that would result around stations if the GO network is electrified? The Study should consider the benefits that EMUs would offer if additional GO stations are added to the network.
- The Study Team is overstating the size of the fleet needed to provide an electric service. Increased train speed resulting from electrification will reduce trip times and enable a smaller fleet to provide the same levels of service. This will substantially reduce locomotive, operations, maintenance, and service costs for an electrified network.

2.7. Implementation

- A parallel study should have been done that focused on the detailed design of an electrified network.
- Will the study come up with various implementation strategies for electrification?
- The results of the study skew the need to electrify the Georgetown Line first. Previous Metrolinx studies and the Electrification Study all show Georgetown and Lakeshore have similar service levels, but with the addition of running the ARL through the community the benefits of electrifying Georgetown are much higher than those for Lakeshore.

2.8. General Comments

- It is evident that our priority should be to get cars off the road. Electrifying GO trains will not accomplish this.
- The consulting team has done a good job to this date and has outlined achievable strategies. In the end, the decision to electrify is political but the information you are presenting appears in favour of electrification.
- When will the final study report be made available to the public on the website?
- Metrolinx should be more transparent and share service plans with stakeholders so they can understand the context for and findings of the Electrification Study
- Will this study make a definitive conclusion/recommendation on whether to electrify the GO network?

3. NEXT STEPS

The next steps for the study, as presented by Mr. Roger Wood of the Delcan+Arup JV Study Team and Ms. Karen Pitre of Metrolinx, include:

- Completion of the final Electrification Study report;
- Completion of a Metrolinx staff report that addresses the findings and conclusions of the Electrification Study and integrates them into the organization's planning framework;
- Posting of the Final Electrification Study report to the Study website; and
- Presentation of the staff report and final Electrification Study report to the Board of Metrolinx in early 2011.

Mr. Faught thanked participants for their participation and feedback at the workshop. He also noted the opportunity for additional comments to be submitted to the Electrification Study Team via the workshop worksheets, study email address or online on the Electrification Study website.

APPENDIX 2I-1: Workshop PowerPoint Presentation

Electrification of the GO Transit Rail Network

Stakeholder Workshop #4 Detailed Assessment

Preliminary Key Findings

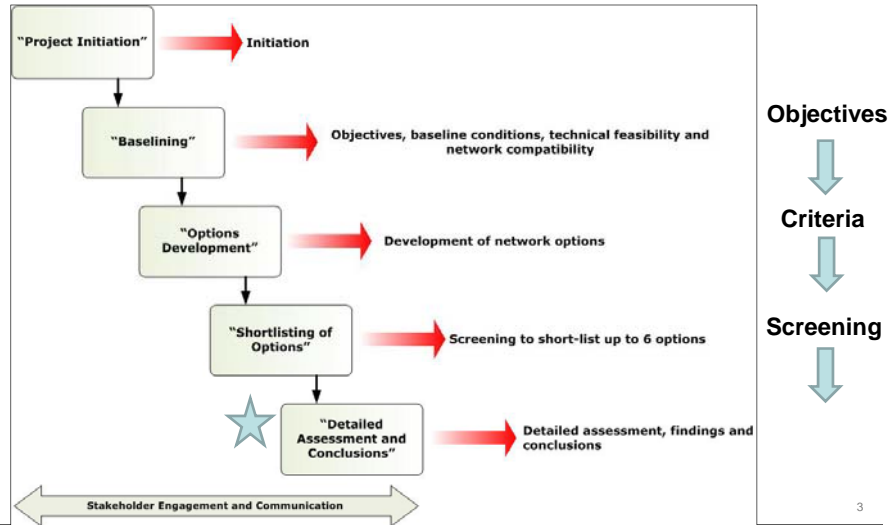
December 1st 2010

PRESENTATION OVERVIEW

1. Study Overview & Where We Are
2. Recap: The Reference Case and Getting to the 6 Options
3. Description of 6 Options
4. Key Findings of Multiple Category Evaluation
5. Answers to Frequently Asked Questions
6. Next Steps

2

Study Overview & Where We Are



Electrification Study

Study Approach and Objectives

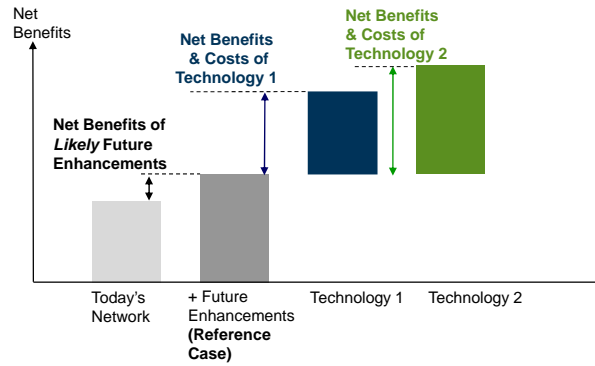
- Study Approach
 - Objective
 - Comprehensive
 - Inclusive
 - Evidence Based
- Study Objectives
 - Technology, Capacity and Transit Service Impacts
 - Environment and Health
 - Community and Land Use
 - Economic
 - System Costs, Funding, Financing and Delivery

4

Electrification Study

Reference Case

- Basis for comparison of options
- Evaluate the incremental impacts of each technology



5

Electrification Study

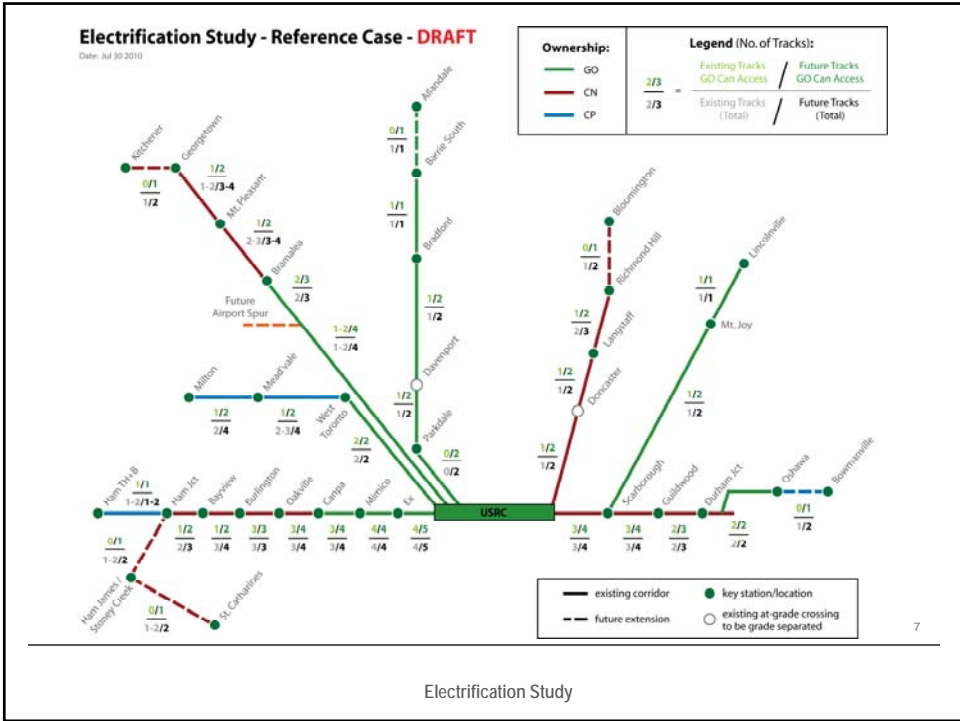
Reference Case – Rolling Stock

- MP40 Loco (Tier 4), 10 bi-level coaches



6

Electrification Study



Electrification Study

Reference Case - Service Level

Time of Day	Direction	Reference Case
Peak Period	Peak	More trains per hour
Peak Period	Counter-peak	Adds Hourly Service*
Off-Peak Period	Both	Adds Hourly Service*

* Adds half-hourly on Lakeshore Line

Union Station Capacity Study Preliminary Finding:
 Union Station, with track modifications, can accommodate the service levels in the Reference Case

8

Electrification Study

Technology Alternatives Rolling Stock



Hybrid Drive Loco



CNG-Fuelled Loco



Electric Loco



Dual Mode Loco



Diesel Loco



Maglev



Electric Multiple Unit



Electric Multiple Unit

Electrification Study

Rolling Stock Technology Alternatives Shortlist



Diesel Loco



Electric Loco



Dual Mode Loco



Electric Multiple Unit

10

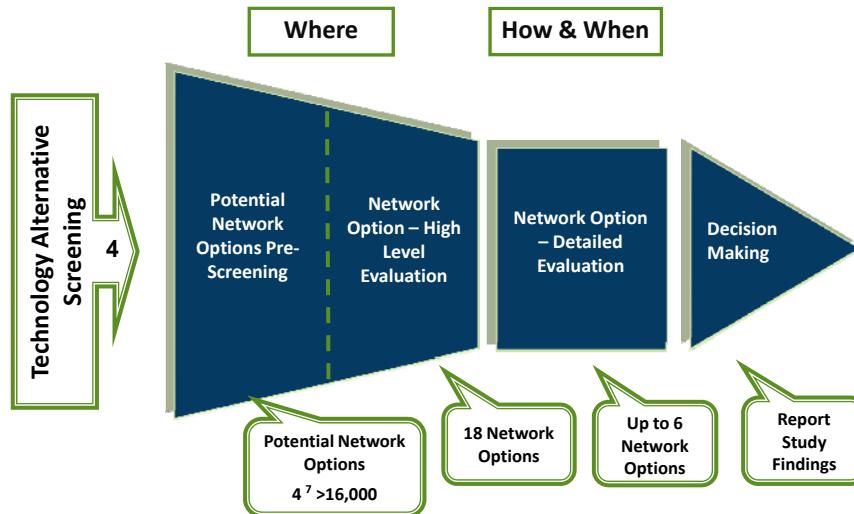
Electrification Study

Power Supply – OPA confirms sufficient power available in the grid



Electrification Study

Option Progression



Electrification Study

Preliminary Pre-Screening Criteria for Generating Network Options

1. Electric Locomotive, Multiple Unit, and Dual Mode Loco are considered the same family of technologies
2. Lakeshore East and West to operate the same technology
3. Highest service/demand corridors

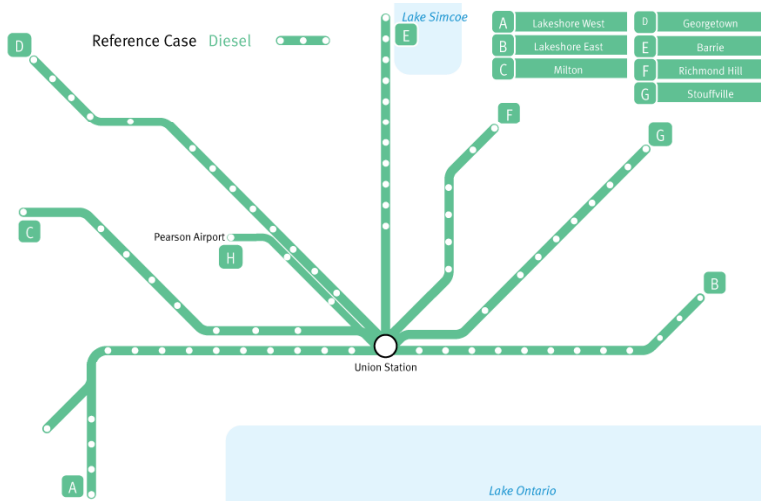
13

High Level Evaluation of Electrification Options

- Findings:
 - Electric Locomotive pulling 10 coaches most cost effective electric train to use for the comparison to the diesel option
 - Most value for money from electrifying entire corridor (except LW Ham) as final state
 - ARL: single level DMU conversion to single level EMU
 - 6 network options taken forward to compare with diesel option

14

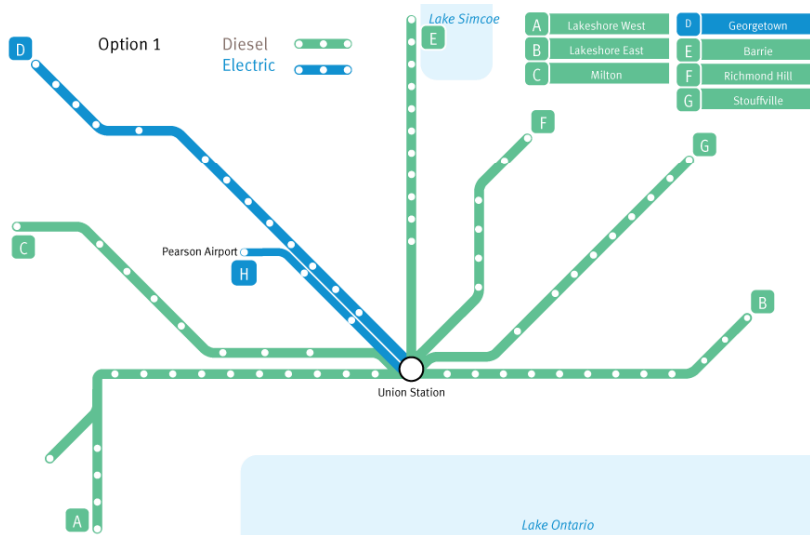
Reference Case



15

Electrification Study

Georgetown & ARL



16

Electrification Study

Georgetown & ARL - Key Stats

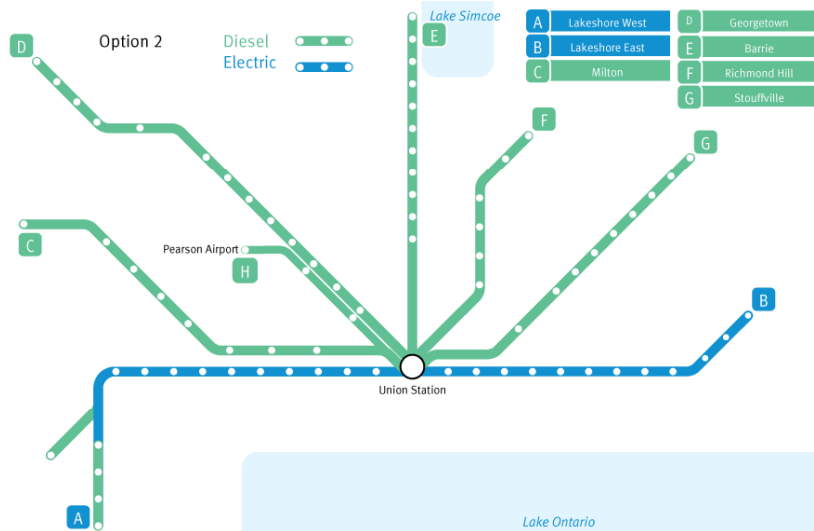
Item	Option 1	
GO Network Length	316.2 mi.	508.9 km
Electrified Length	64.6 mi.	104.0 km
Traction Power Substation	2	
Switching Stations	2	
Autotransformer Stations	3	
Bridges Replaced	0	
Bridges Reworked	8	
Total Bridges	8	
Locomotives		
Electric	17	
Diesel	91	

Plus 12 EMU's on the ARL

17

Electrification Study

Lakeshore



18

Electrification Study

Lakeshore - Key Stats

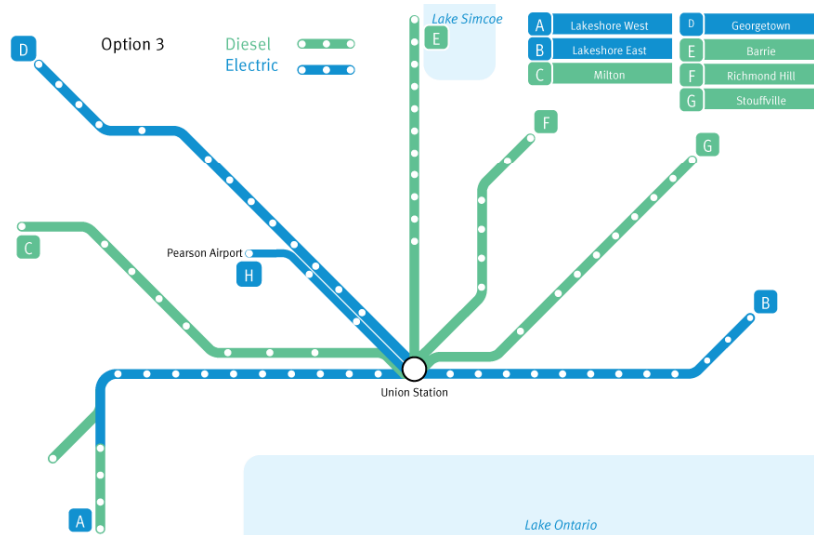
Item	Option 2
GO Network Length	316.2 mi. 508.9 km
Electrified Length	82.3 mi. 132.4 km
Traction Power Substation	4
Switching Stations	3
Autotransformer Stations	1
Bridges Replaced	4
Bridges Reworked	17
Total Bridges	21
Locomotives	
Electric	34
Diesel	74

Plus 12 DMU's on the ARL

19

Electrification Study

Georgetown & Lakeshore



20

Electrification Study

Georgetown & Lakeshore - Key Stats

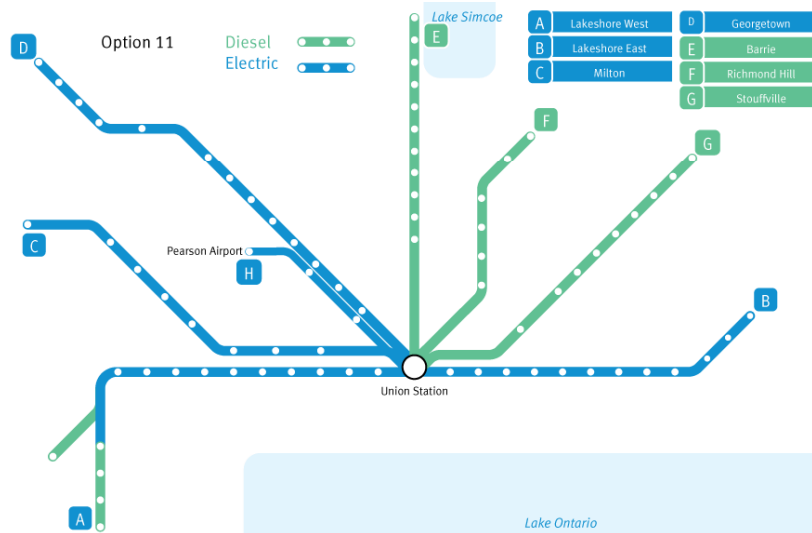
Item	Option 3	
GO Network Length	316.2 mi.	508.9 km
Electrified Length	147.7 mi.	237.7 km
Traction Power Substation	6	
Switching Stations	4	
Autotransformer Stations	4	
Bridges Replaced	4	
Bridges Reworked	25	
Total Bridges	29	
Locomotives		
Electric	50	
Diesel	57	

Plus 12 EMU's on the ARL

21

Electrification Study

Georgetown, Lakeshore & Milton



22

Electrification Study

Georgetown, Lakeshore & Milton Key Stats

Item	Option 11	
GO Network Length	316.2 mi.	508.9 km
Electrified Length	172.1 mi.	277.0 km
Traction Power Substation	6	
Switching Stations	4	
Autotransformer Stations	7	
Bridges Replaced	4	
Bridges Reworked	25	
Total Bridges	29	
Locomotives		
Electric	63	
Diesel	45	

Plus 12 EMU's on the ARL

23

Georgetown, Lakeshore, Milton & Barrie



24

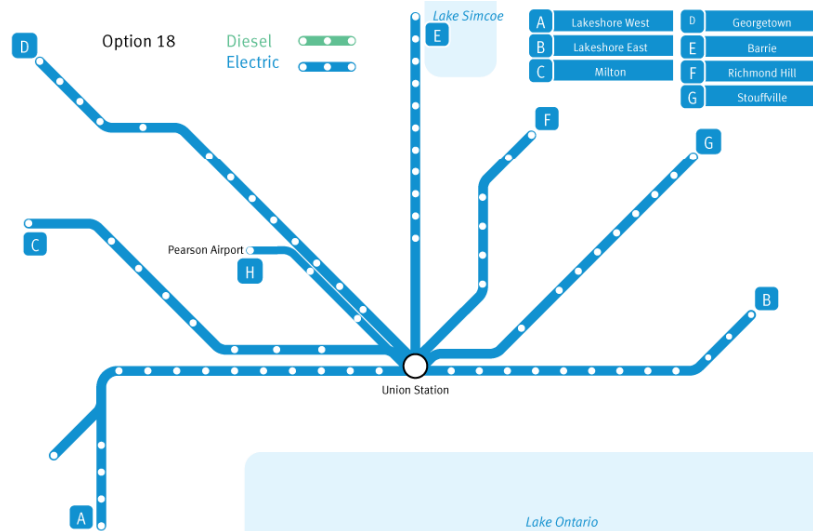
Georgetown, Lakeshore, Milton & Barrie Key Stats

Item	Option 15	
GO Network Length	316.2 mi.	508.9 km
Electrified Length	232.1 mi.	373.5 km
Traction Power Substation	7	
Switching Stations	4	
Autotransformer Stations	10	
Bridges Replaced	4	
Bridges Reworked	31	
Total Bridges	35	
Locomotives		
Electric	76	
Diesel	32	

Plus 12 EMU's on the ARL

25

Entire Network



26

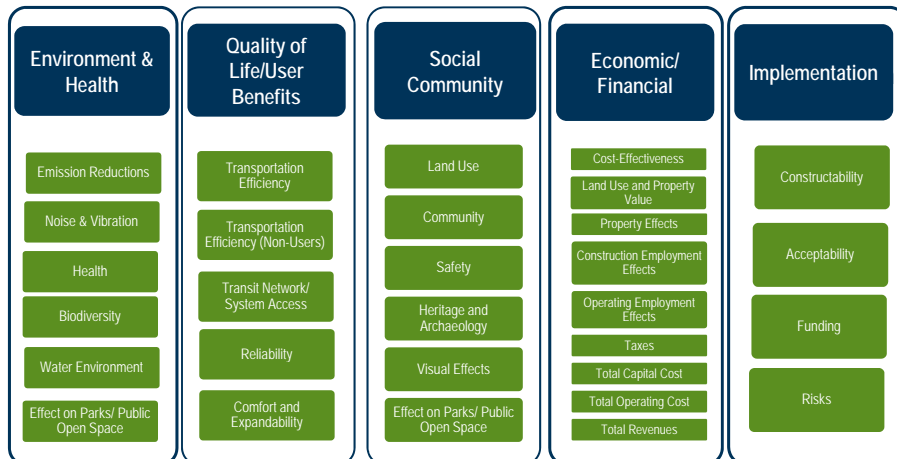
Entire Network - Key Stats

Item	Option 18
GO Network Length	316.2 mi. 508.9 km
Electrified Length	316.2 mi. 508.9 km
Traction Power Substation	7
Switching Stations	4
Autotransformer Stations	17
Bridges Replaced	12
Bridges Reworked	39
Total Bridges	51
Locomotives	
Electric	107
Diesel	0

Plus 12 EMU's on the ARL

27

Multiple Category Evaluation



28

Environment and Health

- Greenhouse Gases (GHG)
- Air Quality
 - Regional Air Quality
 - Local Air Quality
- Electromagnetic Fields
- Noise and Vibration

29

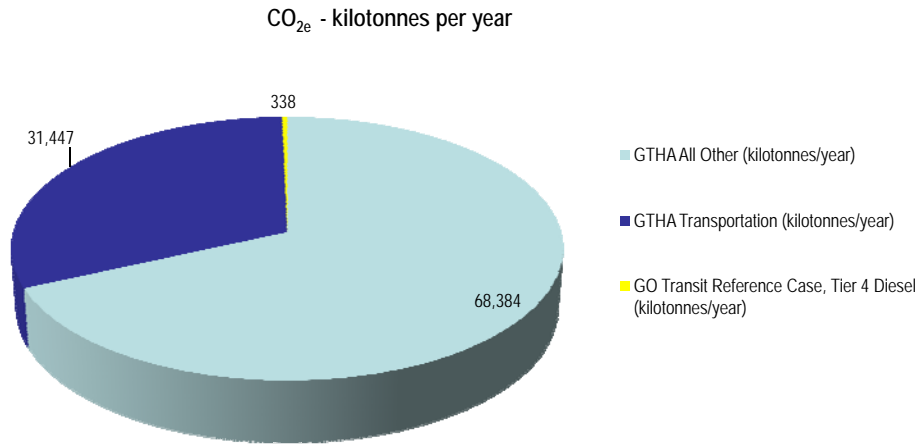
Environment and Health

Green House Gas (GHG) Emissions

- Diesel powered locomotives emit GHG emissions
- Electric Locomotives will also generate GHG emissions from power source
 - Ontario's electricity generation mix by 2025:
7% thermal, 93% nuclear/renewable [OPA, 2005]

30

Green House Gas Emissions in the GTHA



31

Electrification Study

Green House Gas Emissions Comparison

GTHA Total Emissions (tonnes/year) (based on 2007)	99,830,245
---	------------

Option	Emissions from GO Trains (tonnes/year)	(% of GTHA Total)
Reference Case (Tier 4; no electrification)	339,423	0.34%
Georgetown	289,508	0.29%
Lakeshore	199,660	0.20%
Georgetown & Lakeshore	150,744	0.15%
Georgetown, Lakeshore & Milton	120,795	0.12%
Georgetown, Lakeshore, Milton & Barrie	74,873	0.08%
Entire Network	18,968	0.02%

32

Electrification Study

Green House Gas Emissions Reductions from Reference Case due to Increased Ridership

Option	Auto Trips Removed (AM Peak Period)	Auto Trips Removed (Annual)	GHG Reduction (tonnes per year)	GHG Reduction (%)
Georgetown	400	320,000	1,700	0.002%
Lakeshore	900	710,000	5,400	0.005%
Georgetown & Lakeshore	1,300	1,030,000	7,100	0.007%
Georgetown, Lakeshore & Milton	1,600	1,260,000	8,400	0.008%
Georgetown, Lakeshore, Milton & Barrie	1,800	1,420,000	9,800	0.010%
Entire Network	2,000	1,580,000	11,100	0.011%

33

Electrification Study

Environment and Health

Green House Gas (GHG) Emissions

- **FINDING:** The reference case contributes approx:
 - 339,000 CO_{2E} emissions per year, or
 - 0.34% of the total GHG emissions in the GTHA

- **FINDING:** Fully electrified system contributes approx:
 - 19,000 CO_{2E} emissions per year, or
 - 0.02% of the total GHG emissions in the GTHA

- **FINDING:** Fully electrified system reduces the total CO_{2E} emissions in the GTHA by approx:
 - 320,000 per year, or
 - 0.32%

34

Electrification Study

Environment and Health

Regional Air Quality

- The most relevant pollutants with respect to regional smog are:
 - oxides of nitrogen (NO_x)
 - sulphur dioxide (SO₂)
 - fine particulate matter (PM_{2.5})
 - hydrocarbons

35

Environment and Health

Regional Air Quality

- **FINDING:** Electrification reduces emissions
- **FINDING:** All options, including the Reference Case, emit a fraction of 1% of the GTHA's overall regional emissions

Pollutant	GTHA Total Emissions (tonnes/year)	Reference Case	Full Electrification
		(% of GTHA Total)	
NO _x	239,291	0.2200%	0.0230%
CO	1,289,797	0.0460%	0.0011%
SO ₂	218,154	0.0013%	0.0003%
HC	2,207,246	0.0030%	0.0001%
PM _{2.5}	1,855,235	0.0006%	0.0001%

• GTHA totals based on Ontario's 2007 total from National Pollutant Release Inventory (NPRI), produced by Environment Canada scaled by population

36

Environment and Health

Local Air Quality

Methodology

- Defined a study area adjacent to corridor
- Width of study area depends on:
 - GO train and ARL traffic volumes
 - Rural versus urban land-use
- Study area used to determine the potential impact on the local community
- Considered the size of population and number of sensitive locations
 - Sensitive locations - schools, hospitals, daycares, parks, etc.

37

Environment and Health

Local Air Quality

Methodology (continued)

- Background air quality conditions were determined by reviewing historical air pollutant monitoring from stations throughout the GTHA
 - Downtown air sampling stations
 - West Toronto Diamond air sampling station
 - Average of all air sampling stations across the GTHA
- Considered the particulate emission data for:
 - Tier 4 diesel-electric locomotive and ARL diesel multiple unit
 - Electric locomotives and ARL electric multiple unit
- Reference Case service levels established trains per hour/per day and annually

38

Environment and Health

Local Air Quality

Methodology (continued)

Emissions from diesel engines:

- Criteria Air Contaminants (CAC's)
- Particulate Matter (PM)
- Volatile Organic Compounds (VOC's)
- Polycyclic Aromatic Hydrocarbons (PAH's)
- Heavy metals

39

Environment and Health

Local Air Quality

Methodology (continued)

CO
NO _x
SO _x
PM ₁₀
PM _{2.5}
Formaldehyde
Acetaldehyde
1,3-Butadiene
Benzene
Acrolein
B[a]p
Metals

GO/ MOE Consultation



SO_x (SO₂) contributions from GO + ARL found to be very small upon consideration of ultra-low sulphur diesel

40

Environment and Health

Local Air Quality

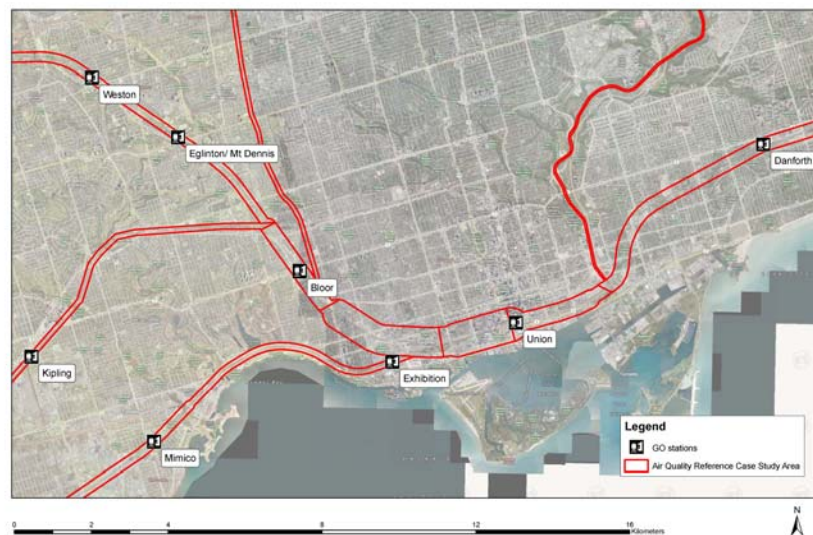
Methodology (continued)

- Computer dispersion modelling used to determine the contribution from diesel trains in the Reference Case
- For each option, looked at the change due to electrification
- These emissions plotted as a function of distance from the corridor
- Compared these emissions to the background
- These emissions are considered measurable if greater than 10% of background

41

Electrification Study

Air Quality Study Area (Reference Case)



42

Electrification Study

Environment and Health

Health – Guidelines to Assess Air Quality Impact:

- World Health Organization (WHO)
 - Air Quality Guidelines (AQG) updated in 2005
 - AQG designed to offer guidance for reducing the health impacts of air pollution
 - Updated AQG based on extensive body of scientific evidence relating to air pollution and its health consequences
 - AQG are based on:
 - sensitive indicators (such as physiological measures – e.g. changes in lung function, inflammation markers)
 - most critical population health indicators such as mortality and unscheduled hospitalizations

- Ontario Ministry of the Environment (MOE)
 - has Ambient Air Quality Criteria (AAQC's) for Ontario - effects-based levels in air, based on health and/or other effects, and used to assess potential for adverse effects

43

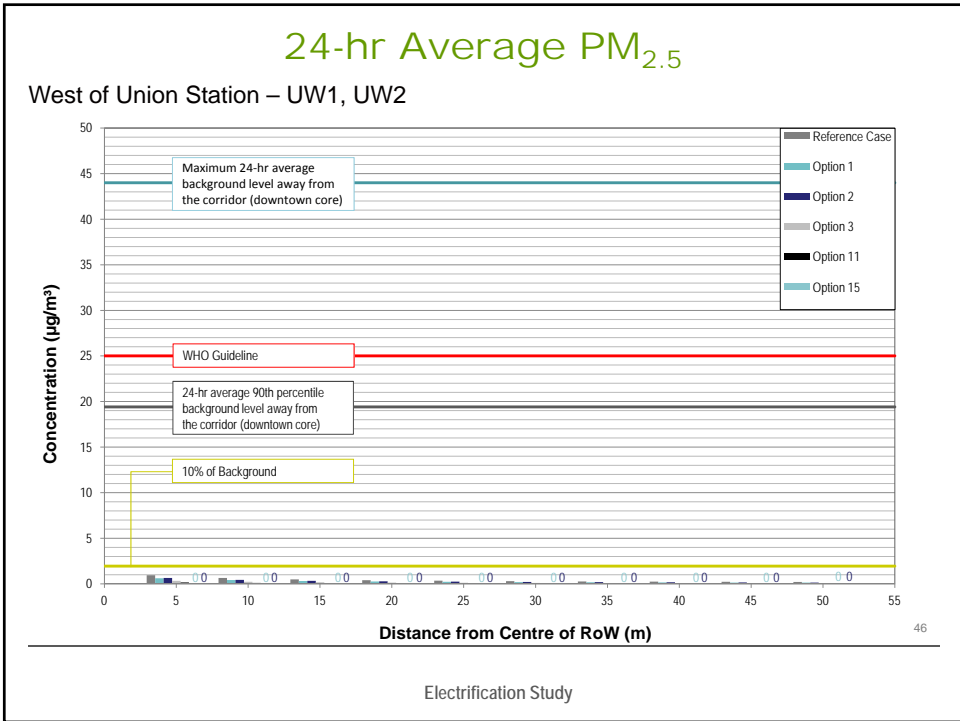
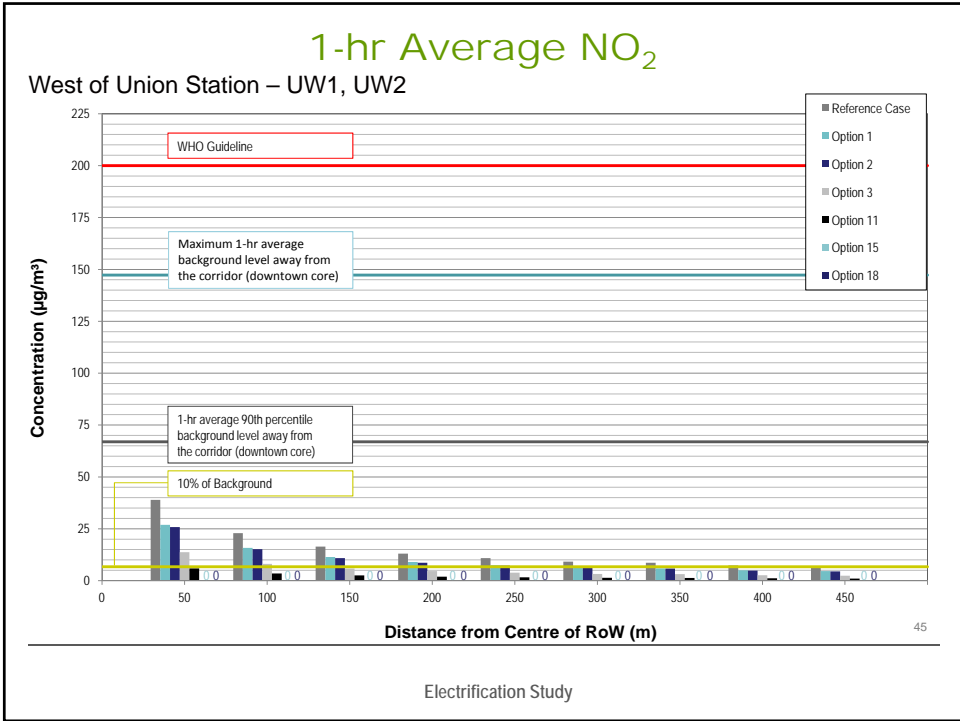
Environment and Health

Comparison of Air Quality Guideline Values

Pollutant	Averaging Time	WHO AQG (ug/m ³)	MOE AAQC (ug/m ³)
PM _{2.5}	1 year	10	n/a
	24 h	25 (99 th percentile)	50 (98 th percentile)*
PM ₁₀	1 year	20	n/a
	24 h	50 (99 th percentile)	50
Ozone, O ₃	8 h, daily max	100	n/a
	1 h		165
NO ₂	1 year	40	n/a
	24 h	n/a	200
	1 h	200	400
SO ₂	24 h	20	275
	10 min	500	n/a
	1 h		690
	annual		55

* Canada-Wide Standard

44



Environment and Health

Local Air Quality

- **FINDING:** Contribution of NO_x , $\text{PM}_{2.5}$, and other contaminants from the Reference Case number of trains (Tier 4 Diesel) is very small compared to background levels and WHO guidelines
- **FINDING:** The background monitors in the GTHA for the 1-hr and 24-hr NO_2 levels never exceed the WHO guideline or MOE AAQC's
- **FINDING:** For $\text{PM}_{2.5}$, the 90 percentile background level is below the WHO guideline at GTA monitoring stations
 - but the background level does exceed the guideline level ~ 4% of the time, and exceeds the CWS level 1 day/year [MOE, Air Quality in Ontario Report, 2008]

47

Environment and Health

Local Air Quality

- **FINDING:** Ultra Fine Particulate Matter – the air quality thresholds have not been established by the WHO
- **FINDING:** For 24-hr SO_2 , the 90th percentile background level is below the WHO guideline
 - but the background level does occasionally exceed the guideline. It never exceeds the MOE's AAQC [MOE, Air Quality in Ontario Report, 2008]

48

Environment and Health

Electromagnetic Fields (EMF)

- Consultants investigated the potential impact of electromagnetic fields (EMF)
- Numerous epidemiological studies on the topic have been conducted
- EMF measurements of electric and magnetic fields along an electrified railroad showed readings below the American Conference of Industrial Hygienists (ACGIH) and Institute of Electrical and Electronic Engineers (IEEE) limits
 - DOT/FRA/RDV-06/01, EMF Monitoring on Amtrak's Northeast Corridor: Post-Electrification Measurements and Analysis, October 2006
- **FINDING:** No consensus on the relationship between magnetic fields from an electrified rail corridor and health issues
- References:
 - National Cancer Institute (NCI) website www.cancer.gov
 - World Health Organization (WHO) website www.who.int

49

Environment and Health

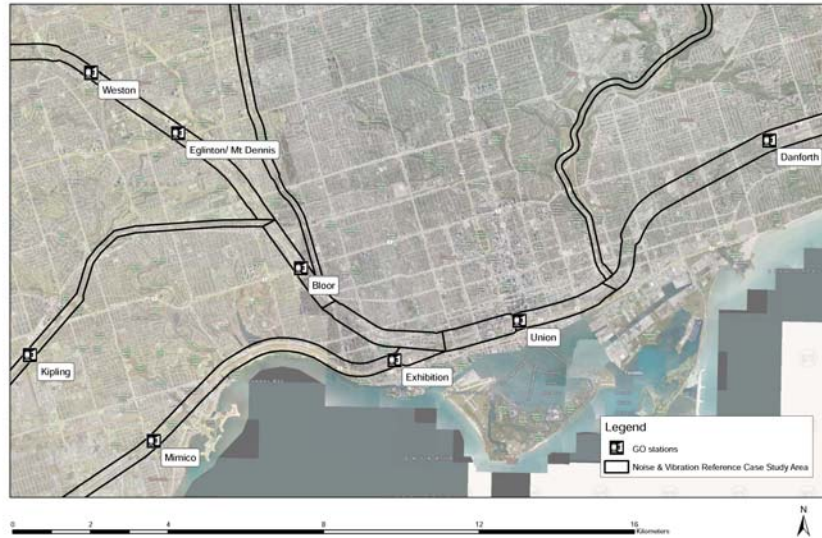
Noise and Vibration

Methodology

- Determine noise levels for each technology immediately adjacent to the corridor:
 - 82 decibels for bi-level EMU
 - 86 decibels for electric loco
 - 89 decibels for diesel loco
 - 82 decibels for ARL EMU
- Background defined for both daytime and nighttime periods:
 - Assumed daytime urban background noise level 55db
 - Assumed nighttime urban background noise level 50db
- Noise levels decrease as one moves further away from the rail corridor
- Noise level changes are discernible to the human ear at about 5db or greater
- The study area :
 - Defined by modeling
 - Defined as the area where the train noise would be heard
 - Based on max speed along that section

50

Noise & Vibration Study Area (Reference Case)



51

Electrification Study

Environment and Health

Noise and Vibration

- **FINDING:** The difference between diesel and electric loco's is 3 dB (89 vs. 86 dB), which would be barely perceptible by an average human
- **FINDING:** The difference between the diesel locomotive and 12 car EMU's is 7 dB (89 vs. 82 dB), which is perceptively quieter

52

Electrification Study

User Benefits / Quality of Life

Journey Time Savings

- An operating plan was developed using the Reference Case service levels
- Based on this scenario an estimate of journey times was modelled using the different locomotives
- Modelling was done to estimate the impact on auto users and estimate the increased ridership due to the time savings

53

Journey Time Savings Over Reference Case (min)

Route	Train Type	Service	Electric Loco-Hauled Cars	EMU Train
			Electric Loco + 10 Bi-level Cars	6 Bi-level Powered Cars + 6 Bi-level Unpowered Cars
LW: Hamilton – Union	Local	Inbound	7	17
	Local	Outbound	6	16
LE: Bowmanville – Union	Local	Inbound	6	16
	Local	Outbound	8	18
MT: Milton – Union	Local	Inbound	3	9
	Local	Outbound	4	9
GT: Kitchener – Union	Local	Inbound	7	14
	Local	Outbound	11	18
BA: Allandale – Union	Local	Inbound	4	12
	Local	Outbound	6	14
RH: Bloomington – Union	Local	Inbound	0	4
	Local	Outbound	1	5
ST: Lincolnville - Union	Local	Inbound	1	6
	Local	Outbound	3	8

54

User Benefits / Quality of Life

Journey Time Savings

- **FINDING:** There is approximately a 5% increase in ridership (depending on the option) due to transit time savings and these additional riders generate additional revenue
- **FINDING:** Electric locomotives produce journey time savings of approximately 7-9%
On the ARL, Barrie, Richmond Hill, Stouffville this is less - around 3%-5%
- **FINDING:** EMU's produce additional journey time savings compared with the diesel locomotives
- **FINDING:** Maximum benefits of electric locomotives cannot be achieved with existing speed limits and the bottlenecks getting into and out of Union Station

55

User Benefits / Quality of Life

Social and Community

- This is a qualitative assessment
- Includes impact on safety, visual impacts, and nuisance effects
 - **FINDING:** Electrified systems have safety issues due to the power supply but these can be mitigated by appropriate signage, protection and education
 - **FINDING:** Construction of overhead catenary system, substations and autotransformers has a negative visual impact; this would be addressed in an Environmental Assessment
 - **FINDING:** No significant difference in nuisance effects (noise, odour and dust)

56

Capital Cost Estimating Methodology

- Cost elements consistent with Benefits Case Analysis (BCA) framework
- Benchmarking against current practices
- Costs compiled by sections
 - 25 corridor sections
 - 37 cost sections: to account for varying numbers of tracks

57

Electrification Study

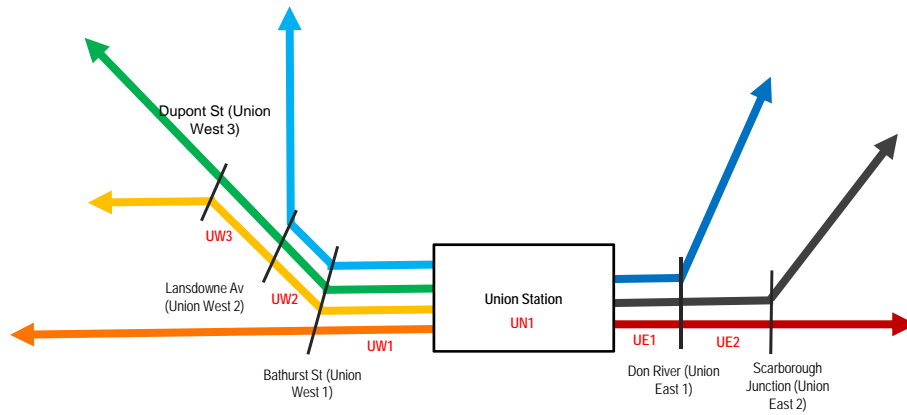
Corridor Sections



58

Electrification Study

Downtown Toronto Detailed Sections



59

Electrification Study

Infrastructure Capital Cost Elements

- Systems
 - Traction power supply
 - Traction power distribution (overhead catenary system , cross bonding, support)
 - Maintenance and layover facilities, maintenance vehicles
- Track and track elements
 - Overhead structures rework:
 - Jacking of bridges
 - Undercutting ballast
 - Replacement of bridges
 - Infrastructure rework:
 - Architectural/structural enhancements
 - Modifications of signal bridges
 - Rework at level crossings
 - Signalling modifications, USRC cabling
 - Control center

60

Electrification Study

Infrastructure Capital Cost Elements

- Site work and special conditions
 - Demolition/clearing/earthwork
 - Site utilities, utility relocation
 - Security fencing, retaining walls
 - Temporary facilities
 - Environmental mitigation
 - Bonding/grounding
- Professional services

61

Rolling Stock Capital Costs

- Capital costs for each vehicle type compiled by reviewing the industry for recent sales of comparable equipment
- Considered Metrolinx requirements as compared to the most recently awarded North American procurements
- In some cases, direct comparisons could be found. In others, extrapolations had to be made. Unique vehicle types include:
 - Diesel locomotive (Tier 4 compliant)
 - Electric locomotive
 - Single-level DMU
 - Single-level EMU

62

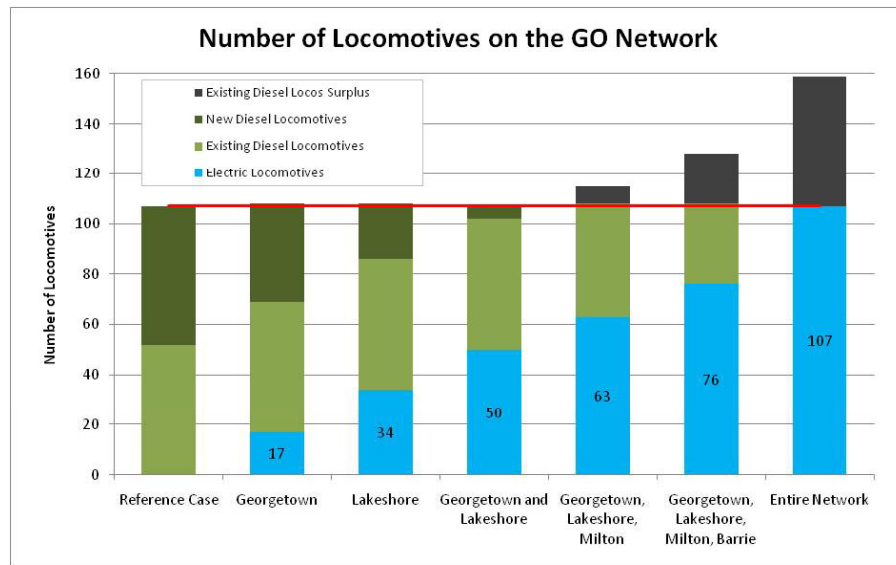
Rolling Stock Estimates

- Diesel Locomotive
 - based on GO Transit's purchase of Motive Power Industries (MPI) MP40PH-3C locomotives in 2008, plus an up-charge for Tier 4 compliant engine(s)
- Electric Locomotive
 - based on average of New Jersey Transit's (NJ Transit) purchase of Bombardier ALP-46A locomotives in 2008 and Amtrak's purchase of Siemens ACS64 locomotives in 2010
- DMU (ARL)
 - based on LTK engineering estimates for Denver Regional Transportation District (RTD), NJ Transit, and Sonoma Marin Area Rail Transit (SMART) in 2010
- EMU (ARL)
 - based on LTK engineering estimates and RTD's purchase of single-level EMUs in 2010

63

Electrification Study

Rolling Stock Requirements



Electrification Study

Operating & Maintenance Cost

Methodology

- Costs compiled by sections
- Three categories of costs included in the annual Operations and Maintenance estimates:
 - Rolling Stock
 - Wayside (Electrification Infrastructure)
 - Energy Costs
- Assumption that several annual maintenance costs are the same across technologies
 - Track maintenance for corridor infrastructure same regardless of technologies (excluding Overhead Catenary System)
 - Number of staff operating a vehicle is the same regardless of technology
 - Contract administration costs required for the operation of the reference case service is the same regardless of technology

65

Operating & Maintenance Costs

Rolling Stock

- Defined a comprehensive Life Cycle Maintenance (LCM) program
- The maintenance operation was broken down into the following categories:
 - Daily Maintenance and Inspection
 - Vehicle Cleaning
 - Scheduled Maintenance Program (also called Programmed LCM), which incorporates:
 - Running Repair and Corrective Maintenance
 - Heavy Repair
 - Mid-Life Overhaul
 - Unscheduled Maintenance

Wayside Maintenance

- Overhead catenary
- Power supply equipment (such as sub-stations)

66

Operating & Maintenance Costs

Energy Costs

- Diesel fuel was assumed to cost \$0.75/L, based on current 2010 costs paid by Metrolinx
- Electricity was assumed billed at an average rate of \$0.108/kWh, based on the electricity prices on the Hydro One website. No discounts or peak-use premiums were applied.
- Operation model produced total diesel fuel consumption per option
- Energy modeling, based on operating plan, produced total electricity consumption per option

67

Economic and Financial

- Major Financial Factors include:
 - Incremental rolling stock costs
 - Fuel v. electricity costs
 - Energy cost escalation
 - Capital cost and capital cost contingency
 - O&M cost savings
 - Demand levels
 - Inflation
 - Fare box revenue
- Economic Factors include:
 - Construction employment
 - Operating employment
 - Increased tax revenue

68

Responses to Frequently Asked Questions

- ARL incorporated throughout analysis?
- Costs of converting to Tier 4 included?
- Incremental costs of rolling stock considered?
- Full consideration of potential for EMUs?

69

Next Steps

- Completion of financial/ costing analysis; sensitivity analysis
- Completing risk assessment, example risks:
 - Corridor ownership
 - Clearances
- Phasing and implementation plan
 - assuming construction will be completed in shorter time blocks during the night to avoid the disruption in service
- Final report posted for public comments on study website (January)
- Board meeting to consider study findings (February 18)

Video

70

Discussion Questions for Small Groups

- What feedback do you have on the detailed assessment and key preliminary findings? Has anything been missed?
- In view of the key findings, what are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

APPENDIX 2I-2: Question and Answer Discussion Summary

GO Transit Electrification Study Stakeholder Workshop #4

December 1, 2010

Detailed Notes on the Comments, Questions & Answers:

Following welcoming remarks and the Study Team presentation, workshop attendees were given the opportunity to ask questions and provide comments (indicated by a 'Q' and 'C'). Answers, where provided, are indicated by an 'A'.

Q1a: *On page 3 of the slide deck, reference was made to the rolling stock as Tier 4 locomotives. However, the existing MP4s may only meet Tier 1 emission standards.*

A1a: GO Trains currently adhere to Tier 2 emission standards. Metrolinx has stated that their fleet of locomotives will meet Tier 4 emission standards. As a result, we are using Tier 4 locomotives as our starting point for the Electrification Study in order to compare the available technology and network options.

Q2a: *How can the Study Team use Tier 4 locomotives in the reference case if they don't know what the conversion costs will be?*

A2a: GO Transit is planning to implement Tier 4 technology across the network. Our consultants have estimated the cost of conversion. The purpose of using Tier 4 technology in our reference case is that we want to give Metrolinx enough information to do a thorough comparison of the technology options based on their current plans so that they can make an informed decision.

Q3a: *Why is ultra fine particulate matter not included on the list of Environment and Health indicators?*

A3a: The Study Team has used air quality guidelines outlined by the World Health Organization. NOx, SOx, and PM2.5 have been used as they are good indicators for overall air quality, they are easy to measure, and they can often act as indicators for other air contaminants. .

Q4a: *For clarification, in the tables on slide 33 you referenced a sequence of options (Georgetown, etc). Do those options correspond to the options seen in the graphs on slide 45? There is a big drop between the reference case and Georgetown, and then practically no changes.*

A4a: Yes, the options on slide 33 correspond to those on slide 45. The slides show that if you electrify Lakeshore after Georgetown there is only a slight drop in NO2 emissions.

Q5a: *Can you explain what is meant by the tags in the graphs on slide 45 (e.g. Background level away from the corridor)?*

A5a: In order to determine the background air quality levels we looked at different monitoring stations that exist in the GTHA area. The background referenced in slide 45 is from data collected at the two downtown sampling stations.

Q6a: *Is the background air quality not worse on the corridor than in the downtown core?*

A6a: Not necessarily.

Q7a: *What is the particulate matter 5 meters from the corridor (see slide 46)?*

A7a: This is not shown in the graphs, but the data does exist. The graphs show the readings at distances from the centre of the right-of-way to illustrate a general trend that could be used to compare the options.

Q8a: *In response to Roger's comment that air quality thresholds for ultra fine particulate matter have not been established by the WHO, could the Study Team not go to a school of public health and collaborate with local professors to ascertain appropriate thresholds air quality contaminants?*

A8a: Research on the impacts of ultra fine particulate matter is still preliminary and nothing has not been published or ratified by organization like the WHO. Until this happens, there is no universal threshold that has been recognized as appropriate to use.

Q8b: *So the Study Team is unable to use existing research because it is not a standard? Or, are you unable to determine what the threshold/standard might be?*

A8b: As we mentioned previously, we are using established and recognize air quality guidelines that have published by WHO.

Q9a: *What is the noise level for the ARL as a DMU? Is there a reason why it is not listed?*

A9a: The noise level for the ARL as a DMU should have been included in the presentation. The level of noise is in the range of 86-89 decibels.

Q10a: *What about noise generated by the wheels of a passing 12Car coach? Why has this not been included?*

A10a: The noise on the carriages is consistent for both alternatives in the calculations; the purpose of this exercise is to compare the relative differences of the options.

Q11a: *In terms of the impact of the additional service in the corridor, is there a distinction between the reference case versus electrification?*

A11a: The level of service is consistent, whether it is diesel or electric. This will be discussed further in the presentation.

Q12a: *Have you considered the need for sound walls previously proposed by Metrolinx along the Georgetown corridor? Metrolinx has stated that 20km of 10-foot high walls will be needed to mitigate noise impacts of diesel trains on the community. Would there not be a need for the walls if Metrolinx chose to electrify their operations?*

A12a: When looking at the noise levels coming from diesel and electric locomotives there is little differentiation between the technologies. As a result, the sound walls will still likely be needed.

Q13a: *Are you considering re-signalling the corridors? Other parts of the world have experienced increased capacity and journey time savings as a result of re-signalling. Are you considering this in your analysis of the alternatives?*

A13a: The benefits of re-signalling would be applied to both diesel and electric operations. Re-signalling would produce journey time benefits and it would be a viable option if there was infinite capacity at Union Station. However, we are not considering it in our analysis because it would take a significant amount of money to re-signal existing operations. It is important to note that with improvements to Union Station we can accommodate the reference case, but not much more than that.

Q14a: *Is the ARL not operating on a dedicated track to the airport?*

A14a: We are not privy to all of the ongoing conversations surrounding the ARL. For the purposes of the Electrification Study we have assumed it will operate on existing track in the Georgetown corridor and on a dedicated track into the airport.

Q15a: *(In reference to slide 59) To clarify, for UW3, between Lansdowne and DuPont, there are two separate lines at that point in the corridor? Why are they grouped?*

A15a: This is how it was handled in the analysis based on guidance from GO.

Q16a: *Are you going to electrify the CP tracks? I didn't think Bolton was being electrified.*

A16a: GO Transit operates in a mixed use corridor that accommodates both passenger and freight movement. As a result, should Metrolinx choose to electrify GO operations they will need to electrify all of the tracks along a rail corridor.

Q17a: *We have been told that the Georgetown corridor is being built to be electrification ready. Are you counting the costs of bridge reconstruction and grounding in your analysis? The infrastructure will be ready prior to electrification than those costs should not be included in your analysis.*

A17a: The bridges that are being rebuilt along the Georgetown corridor will accommodate electrified operations. Grounding has not been included nor are the foundations for catenary being built, but room has been made to accommodate them in the future.

Q18a: *Has anyone found out whether there are grounding issues at the airport?*

A18a: We have had conversations with the airport and have not been made aware that are any grounding issues at the airport. Around the world, there are many electrified train services that go into airports.

Q19a: *Is the ARL being examined as a separate and distinct piece of work?*

A19a: Yes, that is why we divided the corridors as we did.

Q20a: *There is no existing Tier 4 locomotive on the market. There aren't even Tier 3 locomotives on the market. Also, the existing locomotives that will be used are not Tier 4, they are Tier 2. All this should be made clear in your presentation.*

A20a: GO Transit has made a commitment to move to Tier 4 locomotives. This announcement corresponds with the United States EPA regulation that after 2015 all new locomotives will be required to meet Tier 4 emission standards. Currently, we know that GE is building a Tier 4 locomotive that should be ready for 2013. As a result, we are extremely confident that the technology will be available by 2015.

Q21a: *If Tier 4 locomotives will not be ready until 2013 would it not make sense to electrify GO operations first? China just completed 11 subway lines in 5 years. Why can we not convert GO operations prior to 2015?*

A21a: The design process with electrification could take up to 4 years, so it is not feasible to have it up and running by 2015 for the airport express. The example you provided is in Shanghai. I believe those subways were going in virgin territory without any need for reconstruction. If we are to maintain the commuter service we have here, we need to consider the local conditions. In Toronto, we will not be able to have significant periods of downtime like other jurisdictions.

Q22a: *Isn't most of the right of way wide enough to accommodate local construction? How are you planning to build three new tracks and not interrupt existing service levels? Also, we found studies from the early 90s which said it was one day of work to realign and lower the existing track. Can't you just build the new tracks much lower and electrify? How do we explain how the standards have changed? Due process is ridiculous, why do we need a new EA?*

A22a: Your comments are valid, but not necessarily relevant to electrification. There is due process that has to be considered when undertaking such a significant project. This process makes it likely impossible to electrify by 2015.

Q23a: *Do your fleet estimates include spare locomotives that are needed? How does the ARL fit into those calculations? The press says GO is buying 18 DMUs. Is that cost not part of the study?*

A23a: Metrolinx is buying 6 DMUs for the ARL, four for operations and two spares with an option to purchase 12 additional units if needed. Yes, the costs are part of the overall costs that are outlined in the study.

C24a: *As a point of clarification, the press release from Metrolinx says the procurement contract was to purchase up to 18 DMUs.*

Q25a: *For the people living along the corridor, the majority of trains passing through their community will be for the ARL. It's difficult to understand why you aren't including that in your analysis of service frequency and other factors.*

A25a: The ARL has been included in and accounted for in all parts of the Electrification Study.

Q26a: *If you're ordering vehicles for the ARL, what is the conversion cost and is it part of the existing contract?*

A26a: I can't comment on the contract, but the conversion cost has been taken into consideration in the study and will be clarified in the final report.

Q27a: *In previous electrification reports, they used higher prices for diesel than this study. Prices for oil are set to skyrocket by 2015. The figure you're using is making diesel locomotives a more lucrative option. What do you use as the price of diesel fuel in 2015?*

A27a: It is extremely difficult to speculate what fuel prices may be in the future. The price quoted is how much GO Transit is paying for diesel fuel today.

Q28a: *More debate is needed on the price of energy used in this study. With the loss of the electric bus in the early 90s, more research should have been done on what we will pay for electricity. Electricity will be easier than oil to purchase in the future.*

A28a: We felt it was appropriate to take something that is known at the moment and conduct a sensitivity analysis on that figure to understand the impacts of changing prices to both diesel fuel and electricity. We benchmarked our figures with other sources. The Study Team is looking to understand what the difference is between diesel and electric operations on the GO network.

C29a: *As long as the technology allows you to convert between two energy sources then the costs will keep in step. Electrification gives the advantage of using efficiency measures such as heat shaving and co-generation to reduce energy costs.*

A29a: We've captured your comment in our notes.

Q30a: *As exemplified in the 1970s oil crisis, geopolitical events can affect certain forms of energy more than others. We produce an abundance of hydroelectricity in Ontario which is much more stable than oil.*

A30a: The risk of consistency of supply was captured in our study. Your point is valid and we have taken it into account in the study.

Q31a: *What would happen if Tier 4 locomotives aren't available by 2015? Has the Study Team addressed this risk? What kind of train would you use?*

A31a: The specific knowledge of procurement agreements and strategies are not available to the Study Team. However, in our conversation with GO they are extremely confident that Tier 4 locomotives will be available. As mentioned previously, the EPA in the United States has passed legislation requiring all new locomotives to comply with Tier 4 emission standards by 2015.

Q32a: *There is a high risk that Tier 4 standards will not be met. Electrification has its own risk and operational constraints as well. If we were to look at studies done in the past and learn from them, wouldn't that be better than hoping that Tier 4 locomotives are available in time? People on corridors will be impacted if train specifications aren't met.*

A32a: As mentioned, GO Transit is fully confident that Tier 4 locomotives will be available. Tier 4 DMU's be operational along the ARL by 2015.

Q33a: *Why has there not been a parallel study for implementation and detailed design to move this process forward sooner?*

A33a: There has not been a decision to electrify. Without an understanding of what option(s) is preferred or if electrification is viable, GO Transit is not in a position to begin developing a design and implementation plan/study for electrification. There is a desire to have an answer and commitment from funding partners before taking that step. Decision makers need reliable, accurate, and up-to-date information to understand what the appropriate decision might be and what should happen next. The Electrification Study will address implementation phasing of the six options.

Q34a: *The community is unanimously in favour of electrification. If the government cared about communities they would recognize that. Who will be held accountable for wasting all this time and spending public money to complete a study that has told us findings that are self-evident?*

A34a: We need to get to a conclusive set of findings and give people enough information to make an informed decision about electrification.

Q35a: *When was the decision made that the ARL cannot be electrified in time for the PAN AM games?*

A35a: Construction scheduling does not permit the electrification of ARL in time for the PAN AM games. There are number of basic constraints, construction of the power supply is one that is significant. We have had several conversations with Hydro One and they have said that based on their previous experiences, completing the design, negotiating the contract and construction, the power supply system usually takes about four years to complete.

Q36a: *Why did the Study Team not consider electrifying the ARL first and then take a phased approach to electrify the rest of the network?*

A36a: As a part of the implementation and phasing, by section, one section could be the ARL, but you wouldn't build a substation just for one that leg. It would be part of the decision to electrify the Georgetown corridor.

Q37a: *It seems that political obstructions are preventing GO from electrifying the network. If needed, we could put substations on a tractor trailer. Many other places in the world have done that. We could electrify the ARL in time for the PAN AM Games if the Province really wanted to.*

A37a: The Study Team is not aware of any decisions that have been made and we are unaware of any political obstructions to electrification. Our intention is to move this process forward by completing a comprehensive and objective study for Metrolinx.

Q38a: *When will construction begin on the ARL?*

A38a: Metrolinx has said previously that shovels will be in the ground by 2012.

Q39a: *This is a liberal railroad; it will get shut down politically.*

A39a: I cannot speak to your comment.

Q40a: *How will the cost of converting to Tier 4 be included in the study? Will the final report show how much will be saved in conversion costs if GO chose to electrify the network prior to 2015?*

A40a: The staff report will take into account a series of issues to get to the 'reference case'. The cost for implementing the various options will identified in the final report. The time to electrify the whole network is quite significant. There has been considerable debate on the cost savings of beginning to electrify the network prior to 2015. There is no clear solution on how to deal with it. The reference case was developed to compare technologies. There will have to be a response to the report that makes the comparison at the point in time related to implementation. This report will capture that cost for incremental change from Tier 2 to Tier 4 compared to cost of electric locomotive.

Q41a: *Will the study not come up with various implementation strategies?*

A41a: There is an implementation and a phasing strategy as part of each option.

Q42a: *EMUs are stated as being much more expensive. Currently, GO Transit has approximately 50 coaches. If EMUs were purchased right away then there would not be a need to also purchase new coaches, and as a result EMUs might not be a that much more expensive of an option. What is the cost of the new coach? What's the cost of one EMU?*

A42a: We've been looking at the various costs that would be incurred to electrify the GO network and trying to understand if electrification is in fact a viable option from a costing and other perspectives.

Q43a: *Have you done an analysis on the economic benefit of electric locomotive as it relates to health care cost for addressing air quality contaminants? I am fairly certain that any new project that government undertakes has to go through a health care analysis to understand the projects impact on the health care system. Have you done this analysis?*

A43a: As mentioned previously, we are undertaking a social community and health impact analysis as part of the study. I am not aware of the requirement you mentioned. We showed you the emission levels and air quality impacts of the various options but have not quantified the health impacts.

Q44a: *You suggested that an additional cost to electrify the ARL is the cost of converting the vehicles to EMUs. Will you itemize that cost and present it in your final report? I understand that it is not your decision to purchase DMUs. Can you not at least footnote that it's the decision to purchase diesel trains that has increased the cost of conversion rather than buying electric from the beginning?*

A44a: We've taken into account of the fact that the ARL will need to be converted from diesel to electric. The final report will outline the cost for converting the ARL to EMU and the cost to purchase EMUs from the start.

Q45a: *Is there an approximate time in January when the final report will be posted to the Electrification Study website?*

A45a: Middle of January.

C46a: *There is another option to provide transportation services during the PAN AM Games - a high-quality bus service on dedicated lanes could be used during the two-weeks of the games rather than build the ARL in time for the games. Metrolinx should not rush the project and pay the extra costs to do the project the right way from the beginning.*

Q47a: *Could you e-mail us the worksheet?*

A47a: We will send you an electronic copy to fill out.

C48a: *(In reference to the video presented) In reality that train would be going by in far less time because it would be electric.*

Q49a: *Previous studies that have looked at the potential for electrification. They have not given a definite answer as to whether it is a good option for GO Transit. Will this study provide a definitive answer?*

A49a: The Metrolinx Board has committed to address the findings of this study and provide a recommendation to the Ministry of Transportation. It's up to the Board to make that decision.

Q50a: *What are the actual fleet requirements? In your presentation you mentioned that the fleet size would be the same for both diesel and electric operations. How can Caltrain, who also examined various rolling stock technology options, conclude that EMUs were better if they were looking at a system that is longer in length and has half the consist length? Why are EMUs not suitable for GO operations?*

A50a: We can come to the same conclusion, but it is apples and oranges. The constraint of Union Station doesn't allow the increased number of ins and outs.

Q51a: *The speed at which the train operates has nothing to do with the headway coming into Union Station. If the train can run more quickly, you don't need as many trains coming into Union. You are overstating the size of the fleet needed to provide the electric service. Union has nothing to do with the round trip time. The time needed to cover the outer parts of the system will reduce the fleet requirements and you're not accounting for this. Your problem is having 4 service plans that don't comment on where you hit the wall in various scenarios where constraints fit in. You are mixing and matching numbers that distort the outcome of your calculations. If you run trains faster you don't need as many of them.*

A51a: I agree that the length of time for a journey and the headways are related, but if a train runs faster and gets to Union Station earlier, it still needs to wait until its scheduled departure time.

Q52a: *Will the Metrolinx operating plan be effective?*

A52a: The reference case was not meant to be an operating plan. The purpose of the reference case was to provide a reasonable point in time to compare the different options for electrification.

Q53a: *Is the ARL also included in the implementation strategy?*

A53a: The ARL is absolutely included in everything we've done. It doesn't take up a station platform at Union, but operationally it has been included in the plan. I understand your frustration that there are a number of operating plans out there. We are not fine tuning an operating plan for GO Transit, but we realize there efficiencies that can be achieved. If there are flaws in the logic we want to identify them. We don't want to miss something that will fundamentally change the outcome of the study.

Q54a: *If you have fewer trains, it affects all of the other costs in the study. The constraints at Union Station affect how many trains can operate in an hour, but the speed affects the fleet size. That isn't been accounted for.*

A54a: We will take note of your comment and if we need to modify or adjust, we will do that.

Q55a: *As time goes on and stations are added, the benefits in increased travel time have been missed. They're included in Caltrain study, but not in this one.*

A55a: We have a section where we will talk about the many benefits that could be achieved as the system grows and evolves over time. Please pass your thoughts along that relate to this so we can add it into our report. We're trying to describe something that is achievable, but we would like to address some of the other elements as discussion points for consideration.

Q56a: *Shouldn't the costs of additional stations be put into the comparison?*

A56a: The Electrification Study is looking at costs in the medium term (reference case) to provide a realistic comparison of the options.

Q57a: *Exclusively looking at the short term you will need to consider the additional costs of EMUs that would result because you would need to replace the fleet and discard the other coaches. There is no EMU compatible with existing rolling stock. You will need to consider the political context to understand if such an overhaul in rolling stock might actually be feasible.*

A57a: The assumption is that there is no compatibility between the existing rolling stock and EMUs. Your comments are valid, but need to put it into an appropriate time frame. If you start considering much longer time frames, it gets more expensive and more difficult to achieve.

Q58a: *What are the raw numbers of particulates and NO_x that will be emitted by the vehicles? You only give percentages.*

A58a: We have those figures, but these numbers were given for the purpose of this presentation. The numbers will be provided when the report is published.

Q59a: *Wouldn't it be productive to have these conversations with the health authorities during this process?*

A59a: The Study Team has talked to health officials to make certain they understand our methodology and agree with our approach.

Q60a: *(In reference to Environment and Health indicators) What about 5 metres from the track, not 50 metres from the track? Are you over the WHO levels? I'm concerned about the assumption that we don't have to worry about emission levels closer than 50 metres to the track.*

A60a: We can find that out. It's not a matter of not taking it into account; it's a matter of how we've presented the data.

Q61a: *Are there days when the NO_x levels are so close to the emission threshold that the additional trains will push it beyond the threshold? As an example, communities would experience 30 smog alerts per year rather than 4 smog alerts per year.*

A61a: There are nine monitoring stations, and the ones presented are the ones closest to downtown. For everywhere else we've taken an average.

C62a: *If you take the impact of the trains as the width of the corridor, then Georgetown is the best option for electrification. However, the Premier has said that the Lakeshore will be first.*

A62a: The Study Team has not been told of any decision that has been made.

C63a: *At first I thought this was all window dressing, but I feel that the Study Team has done a great job. You've told us what is achievable. In the end it will wind up being a political decision. But I am seeing a lot of information presented as being pro-electrification*

APPENDIX 21-3: Sample Worksheet



2. *What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?*

3. *Do you have any additional comments or questions regarding the GO Transit Electrification Study?*

For further information about this project, please contact:

Karen Pitre
Project Director
Electrification Study
Karen.Pitre@metrolinx.com
416- 874-5910

APPENDIX 2I-4: Submitted Individual Worksheets

****Notes:**

- **Personal information submitted on worksheets was removed**
- **Where questions are missing no response was given**

Individual Worksheet 1*1. What feedback do you have on the detailed assessment and key preliminary findings?*

- We should not put a deadline on construction (i.e. Pan Am Games)
- I do not see a net benefit to the public of this project.
- We are only moving the problem of pollution into someone else's backyard.
- We need to take cars off the road – electrifying the Go train will not accomplish this.

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- I am fine with this. Please do not make an "artificial" deadline of 2015.

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- We should be focusing on taking cars off the roads. I do not believe electrification will do this.

Individual Worksheet 2*1. What feedback do you have on the detailed assessment and key preliminary findings?*

- You have not accounted for the cost of converting to Tier 4 from Tier 2, such that it becomes a clear comparison of converting to Electric from today's Tier 2.
- Noise factors of locos appear to be averaged out against noise of cars. What is the comparative just for the loco's as they pass the listener?
- Georgetown line currently on part day service. It makes more sense to electrify now according to Roger's analysis of the difficulty and complexities requiring shutting down rail services while key work occurs.
- Lakeshore study schedule demonstrates it takes under 40 months to go from design to operation including track elements and infrastructure rework. This work is already underway on GSSE, so why would electrifying ARL/Union to Pearson take so much longer if it is a shorter route? Vehicle selection is known, transformer location is known. (Willowbrooke areas), MSF will be needed regardless. This should be able to be integrated with GSSE with effective project management, dovetail on the prep work and get it done in time.
- Energy costs of diesel greatly understated. World Energy Congress identified exponential risk starting as of 2015 as current oil supplies are tapped out. As of 2015, price becomes dependant on oil yet to be discovered and hardest to reach deposits.

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- Implementation Planning dates should be stated

- UPRL is already ahead of the game with prep work. Design contract not yet specified for the spur – extend this design work to over all the way to Union.
- UPRL can be a first leg for Lakeshore West out to Willowbrooke, and a first let out to Brampton.

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- There has been NO consideration given to the health risk associated with Tier 4 technology beyond the modelling concentrated emissions and the micro fine particulate that still gets past. Beyond existing standards, what are the concerns that health science tells us are there?
- The risk factors of populations closest to the tracks is highest, there is a socio-economic equity issue here as enviro stress being added to their health burden.
- WHY HAS HEALTH DEPT NOT RECIEVED YOUR BACKGROUND STUDY FOR REVIEW?
- Is the visual on the thickness of the catenary lines as shown in the video accurate? The distortion makes the wires appear thicker than they will be.
- Cost of conversion of ARL Diesel to Electric should be clearly identified. Timing for this conversion should be clearly identified. Additional stations will add ridership.

Individual Worksheet 3

1. What feedback do you have on the detailed assessment and key preliminary findings?

- Not enough costing (capital) figures presented for what is supposed to...

Individual Worksheet 4

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- TOO SLOW!

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Result predetermined by artificial PA-G Dead Line.

Individual Worksheet 5

1. What feedback do you have on the detailed assessment and key preliminary findings?

- Large areas of statistical analysis entirely missing:
 1. Fine particulate matter and its affects are unknown, yet is a burgeoning area of concern internationally in relation to WHO guidelines (Reference: Dr. Murray Millemln, Harvard)
This is a major omission from air quality E.A. and is being currently being studies, so can be included.
 2. Minimal qualitative analysis or precautionary measures to protect quality of life in neighbourhoods, particularly noise, vibration and imposition of 5.5 metre, 10 km, Wall
 3. The nuisance of diesel trains is much higher through neighbourhoods. This has nto been assessed or considered. By qualitative assessment of urban planning the projects – travel and see difference between electric and diesel.

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- User-centered design is imperative. This should serve communities first. Greater consideration for residents along the corridor needs to be incorporated into this study and project implementation from the beginning.
- The impact of the noise and vibration on the immediate surrounding community cannot be underestimated – the built environment directly borders this rail corridor, often within meters, and is continuing to be built up. Note the area around Wallace, Sorluren Lofts, and parks: Macgregor, Sorluren, and West Toronto Collegiate.

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- There are false premises derived from information missing on fine PM 1.0 and lower, and the affect on west-end residents. If these concerns were included, it would be clear that diesel trains, and the subsequent phasing in of electric, would be unacceptable, and that EMUs for the ARL would be mandatory. These issues were flagged in the first workshop, and not included by the fourth.
- At least half of this \$4 M study should have been on consulting for best international practices for electrification.

Individual Worksheet 6

1. What feedback do you have on the detailed assessment and key preliminary findings?

- Why is there no consideration of negative visual impact until the EA process?
- Why was third rail option eliminated?

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- Localized air quality impacts should receive more attention.

Individual Worksheet 7

1. What feedback do you have on the detailed assessment and key preliminary findings?

- A large contingent of experienced, competent analysts have put a great deal of work into a heavily documented piece of analysis with no clear conclusion and action plan in view.
- This is not the fault of anyone working on the assignment. It is the fault of the political process, and of [], the lack of long-term funding []. A provincial election is 11 months away, and it seems all too likely that the Liberal party will be [] out or marginalized. (The same is likely at the federal level, and we are seeing the initial effects of a similar disaster at the municipal level). Therefore, this – and other working initiatives could well be headed (again) to oblivion.
- This (or something very similar) has been under the auspices of different governments, over the past 15-plus years. Millions have been spent with no end in sight. The PROCESS is still political and ineffective. Politics always prevails; common sense be damned.
- Sorry to be so sour. I've been around too long and have been disappointed too often.

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- Start doing it NOW, ARL/Georgetown first.
- ARL should operate as part of the rapid transit SUC, with 3 or 4 stations, and with premium fare (2x? 3x?) to airport. I for one don't see what tracks it runs on.
- Nearly every airport SUC. I've seen/read of/used operates like this – Sydney, Athens, London, etc. Etc.

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- I've said enough. More than enough.

Individual Worksheet 8

1. What feedback do you have on the detailed assessment and key preliminary findings?

- It is still unclear where the determinations of rail volumes comes from. No published report or study contains those volumes, yet they are being presented as fact.

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- I still believe the study is skewed away from implementation of the Georgetown corridor first, through doubling the volumes of GO trains on the Lakeshore Corridor relative to Georgetown, based on an unknown or unpublished work plan from GO for 2020. All Metrolinx and GO implementation plans so far publicised (GO 2020 and The Big Move), show Georgetown and Lakeshore lines having similar levels of GO service in 2020, while the ARL would be an additional burden to the Georgetown line. I also believe the study should evaluate implementations of electrification starting immediately. It appears the study is skewed towards implementations leading only to a 2020 date. There is no reason the implementation of, for example, the ARL service could not start immediately. As there was no discussion of possible implementation strategies at the workshop, I would recommend that another workshop be scheduled very soon to allow for feedback on proposed implementation strategies.

z

- I find the key players to be honest brokers of the work. However, I find the details of the study to be somewhat confusing. It is still unclear in the documentation whether the study is looking at short term solutions, as was mandated by the terms of reference, or only medium to long-term solutions, as is

evidenced by the 2020 time frame.

Individual Worksheet 9

1. What feedback do you have on the detailed assessment and key preliminary findings?

- The premise in the Reference Case is that GO has planned many improvements, notably in GO2020, that will be required whether electrification is implemented or not. Therefore the cost of these should not be charged to electrification per se. So far, so good.

What we do not have, however, is an estimate of the cost and phasing of getting to that reference case. While this is outside of the scope of your study, it is not outside of the wider context in which the study occurs, namely the limited funding for transit generally, and the competing demands for whatever will flow from the Metrolinx Investment Strategy.

Indeed, it is unclear to what degree the GO2020 work (and other rail improvements) are funded out of money that was funnelled into GO directly before the Metrolinx amalgamation as opposed to money that will have to appear in future Metrolinx budgets. Put another way, if The Big Move is \$50b (for the sake of argument), how much more is required to roll GO2020 into TBM, and is that level of spending actually "committed"?

With respect to electrification, let us assume for the sake of argument that GO2020 will cost \$10b in new money (plus ongoing operating costs). If electrification is another \$10b or more on top of this, then it is a substantial added cost. If, however, it is only, say, \$3b as a marginal cost, then we are in a range where discussions about tradeoffs, future operating savings, and other benefits of electrification need thorough airing.

Because we don't know the magnitude or possible timing of either of these, we are left with pronouncements from senior Metrolinx folks that the sky is in imminent danger of crashing down on Toronto if we even say the word "electrification" much less actually do anything about it. Such statements were irresponsible, and went directly contrary to the purpose of the study, namely to determine the economics of electrification. Prejudging the outcome is hardly a way to imply objectivity.

Next comes the question of service levels and demand estimates. There are at least four different service levels implied by various plans:

- GO2020
- The Reference Case (which does not explicitly list service levels, although I expect these will show up in the detailed operational studies)
- The Big Move 15 year plan
- The Big Move 25 year plan

It is worth noting that TBM's base year is 2008, and so the 15 year plan means 2023, and some may even read it as 2021 if we presume that the base year for projections was 2006.

We know that the Union Station Study, through documents released via another source, thinks that the demand growth will actually be about 3x. The Reference Case gets us to 2.4X, and there was a comment at the recent workshop that the Union Station folks think this is just at the edge of what they can handle. 3X is obviously more than 2.4X, and pushes us into difficult territory.

TBM's demand estimates driven out to the 25 year horizon imply at least 4X growth in peak demand at

Union, and the USS is dealing with the implications of such growth. The fact that the USS working papers are not public, unlike those of the electrification study itself, does not encourage confidence, especially when I see the diversity of opinion and options among various participants.

We badly need a definitive number on the capacity of Union Station both as measured by trains/hour and as measured by passenger movements to/from the platforms. An important related issue identified by the Union Station Study is the growth of counterpeak flow, an integral part of GO's future plans, and the effect this will have on vertical links within the station.

Operationally, the ARL presents a challenge through its use of the fence track at Union Station. The spur joins the corridor on the south/west side of the right-of-way, but the fence track is on the north side. This means that all ARL trains must at some point make their way across tracks that will be used by (at least) the Georgetown services. This conflict will place a limitation on the combined headway of both services unless a grade separation is provided somewhere. This has not been addressed by any of the corridor studies.

Metrolinx needs to be much more open about both its various studies and about achieving a consolidated, generally accepted view of its demand projections. One aspect of TBM is the premise that it will divert hordes of motorists onto transit thereby releasing capacity on roads and reducing future pollution growth. If that demand transfer is not actually achieved due to system capacity constraints, then the benefits claimed for TBM will not be achieved, or at least not to the degree advertised.

I find some of the proposals being advanced for capacity relief on the rail system almost laughable. They include a GO subway through downtown as an alternate corridor between Parkdale and Riverdale. Bilevels need a really big tunnel, and of course this would have interesting implications both for line hookups and for transfers between services going to Union and those in the new subway.

Similarly, schemes for using North Toronto Station would split services, and moreover would dump new demand on the Yonge Subway (or the University Line if at Dupont) at the peak point. In general, the idea that there is surplus subway capacity ignores the real world in which the TTC already operates.

Any new underground service, be it on Queen, or somewhere west of Union, will necessarily involve electrification.

One final note about Union Station: In my former role as a member of the City's Public Advisory Group for the Union Station Revitalization, I was told repeatedly in GO presentations that the new trainshed was designed to allow for electrification. This needs to be verified, again, given statements in the electrification workshop implying that this was still a net new cost. Similarly, we need to know the degree to which work already underway to reconfigure the track plant has included provision for future electrification, or if the whole thing has to be dug up again.

Train length (slide 6): There is an ongoing debate about how long trains will be. We know that GO has been expanding to 12Car trains, but the reference case assumes 10-car trains. That's a 1/6 loss of capacity (theoretical, probably less due to uneven car loadings). A related question is the ability of the MP40 Tier 4 locos to pull 12Car trains and their performance, noise and pollution, especially under heavy load uphill. None of the discussions has taken into account problems with the capabilities of these locos as seen already in service, let alone with a Tier 4 retrofit.

Train length is an important part of overall line capacity and of the headways needed to achieve riding estimates. If trains lengths can be longer and/or trains can be pulled faster with electric technologies, then one can achieve higher capacity with fewer trainsets. The 1:1 replacement ratio contemplated by the study misrepresents this important capability.

Moreover, it has been stated that you cannot save trains because of throughput constraints at Union.

This is absolute, utter, unmitigated hogwash (I am trying to be polite). The formula for the number of trainsets is quite straightforward.

If the design capacity of a train is C and the peak demand is D /hour, then one needs D/C trains per hour. The bigger C gets (through longer trains or bigger cars), the fewer trains one needs per hour.

The number of trains to serve a route is equal to the round trip time divided by the headway. This assumes a uniform headway over the entire route which, on GO, is unlikely because of the highly directional nature of the demand. However, the same consideration applies even to a unidirectional service. If the trip is T minutes long, and the trains run every H minutes, then you need T/H trainsets. Anything that reduces T such as the ability to make the trip faster also reduces the total number of trains.

The total train complement affects staffing because each train needs enginemen and on-board crew. If you need fewer trains, you need less staff to run them. Moreover, you also need less yard space and have lower maintenance costs.

Any study that compares technologies on a 1:1 basis omits all of the savings available through faster operation. This biases the results by overstating capital requirements for equipment and by overstating future operating costs thereby reducing savings that might otherwise be used to offset higher capital costs.

Rolling Stock Alternatives (slides 9 & 10): I hope that the sanity of rejecting hypothetical technologies such as hydrogen trains actually survives into the final report. Ontario has a long history of being far more interested in whiz-bang technology development as an "industrial strategy" than on providing the best technology and service.

Power Supply (slide 11): At the workshop, it was stated that the power requirement for GO represented a tiny fraction of provincial demand. For better context, this should be stated relative to the portion of the grid to which the electrification would apply. Available power in Thunder Bay is not much use to us in Toronto.

High Level Evaluation (slide 14): I have already commented on 10-car trains and the degree to which this may skew your results. Either you should produce a 12Car evaluation, or you should make a definitive statement about why such trains would not be used (despite them already being in service).

I do not agree with the premise that an entire corridor should be electrified from day 1. You yourself already accept that this will not occur for the Hamilton/Hunter and St. Catharines services. Similarly, there is no reason to burden the Georgetown corridor with electrification all the way to KW (and beyond to the storage yard) for a few peak-only trains. This is a basic question of staging.

Indeed at the workshop, there was discussion of electrifying only to Bramalea as a major turnback point in service on GO. You need to clarify the difference between the long term economics of full electrification in a corridor versus the short term considerations of a staged implementation.

Reference Case and Staging Options (slides 15-27): I come back here to the question of service levels. There are very significant differences between the scenarios contemplated in TBM (notably "Express Rail") and in GO2020 and, probably, the Reference Case. These need to be reconciled and explicitly stated so that corridor-specific calculations show the effect of various service levels on costs, infrastructure, fleets, yards, etc. Put another way, how does the infrastructure investment trade off against service levels? This is a generic question, although obviously there are special cases where heroic efforts are needed to electrify for the first train.

Environment and Health (slides 28-52): The presentation of emissions for GO as a fraction of the GTHA are on the verge of misleading. This is a not a question of inaccuracy, but of context. The people who will

be affected are those living beside the corridors, not an average smeared over the entire GTHA, nor on a 24-hour average.

I live right beside the DVP and I know that the noise and pollution I have to put up with is considerably different than at a quiet house in North Toronto. I choose to live here, and came after the DVP was built. Residents along rail corridors are not in the same position considering that many of the tracks needed to carry increased GO service don't even exist yet.

As mentioned earlier, the noise and (probably) emissions for MP40s is much more pronounced under load (hills, longer trains). This should be factored into the calculations. Note that higher noise levels may cause presumed "indistinguishable from background" conditions to no longer be valid.

User Benefits (slides 53-56): Hmmm. Here we have those pesky 12Car trains again. You cannot selectively use them, or not, as it suits your purpose.

You show a time saving of 16-17 minutes for trips between Hamilton and Union for EMUs. That's a half hour or better for the round trip. Since the headway on this service will easily be less than the time saving, there will be a corresponding saving of equipment. Even for the loco hauled service, the round trip saving is over 10 minutes, and this will save at least one train. Failure to include these savings in your fleet calculations, yard space, train manpower and operating costs will invalidate your conclusions.

As a personal editorial, I have been dealing with this kind of oversight in studies going back to comparisons of diesel buses and streetcars or trolley coaches on the TTC where the same sort of blatant bias was common. Maybe not bias, but if not, then a profound lack of professional accuracy, to put it delicately.

On a related note, it would be worth being explicit about the constraints that prevent better improvements from being attained on some lines. However, the biggest savings are also on the lines with the most projected service, generally, except for Richmond Hill. A round trip saving of 30 minutes is not to be sneezed at, especially on a 10 minute headway.

By the way, the statement that electric locos produce savings of 7-9% don't square with the claimed time savings. If you save 11 minutes outbound to KW (the largest of the savings, and understandable as it's uphill all the way), and this is, say, 8% of the total, then the one-way trip is about 2 hours and 20 minutes by diesel. Via gets all the way to Stratford in less time than this.

For clarity and accuracy, not to mention honesty, you need to show for each corridor the time taken by a diesel train, the time taken by an electric loc train, and the time taken by an EMU train. I think you will find the percentages are not as low as you claim they are.

Oh yes, one more thing. It is claimed that the constraint on time savings lies with the physical nature of the lines. If this were so, then there should be not much difference between locos and EMUs because the latter would labour within the constraints of the corridor. However, you show a considerably better performance for EMUs on Barrie than with locos. Obviously the EMUs are able to run faster than the locos. Why?

The degree to which you invent explanations for the constraints on electric operation are in contrast to the actual numbers you present. You don't seem to be able to keep your stories straight and this undermines your credibility.

Costing methodology: As previously noted, the number of trains is a function of service levels, round trip times and speeds. You have not taken this into account in your generic projections, and unless this is corrected, neither your capital nor operating costs will be credible.

2. What are your thoughts on the phasing and implementation of electrification on the GO rail network going forward?

- Given the service levels, it is evident that the Lakeshore and Georgetown corridors are the prime candidates for electrification. The phasing needs to be determined in conjunction with service improvements planned but not yet in operation, especially on Georgetown, where there will be a significantly better service from Bramalea east to Toronto.

It is absolutely essential that the infrastructure contract for the ARL spur provide electrification-ready structures including whatever is needed for overhead catenary, power supply, signalling, grounding, etc. If this is not built into the spur from day 1, there will be a tiny problem with credibility.

Full electrification of Lakeshore is not a pre-req to doing Bramalea first. At the workshop it was stated that only two tracks would be needed between Union and Willowbrook for service moves.

Conversely, if Lakeshore is done earlier, then the question becomes the future use of Willowbrook and the proposed new east maintenance facility. Given that Willowbrook is closer to Union and on the west side of the network, and that more potential electric territory lies to the west, it would make sense for Willowbrook to be the electric depot.

3. Do you have any additional comments or questions regarding the GO Transit Electrification Study?

- *You have tried harder than most to produce a fair and detailed study, notwithstanding my caveats above. The biggest problem is that this study is taking place more or less in public while related studies are not, and there will be inevitable inconsistencies thanks to the lack of a consolidated view. How all this will be digested and integrated in a manner that the Metrolinx Board can handle, let alone feed into the 2011 budget cycle and the coming election, is a mystery to me. It's quite a challenge for everyone, and the amount of detail may prevent proper understanding.*

Individual Worksheet 10

1. What feedback do you have on the detailed assessment and key preliminary findings?

- I started out with the idea of giving you my detailed appraisal of the last workshop. Why bother? The decision on electrification was made long ago at the political level and anything that comes from this study won't influence its pre-determined outcome.

My only concern about the study team is that you've constantly tailored the findings to fit the audience. Even when you present well-research arguments clearly in favour of electrification, you find ways to throw cold water on them. It's as if you're constantly second-guessing your own research because someone is looking over your shoulder.

Personally, I'm past the point of being irked by not receiving answers to questions I raise in the workshop sessions. It's like whistling into the wind.

At best, this exercise has merely updated data that has been available for decades. That's not new. Each GO study conducted since the first in 1980 only reploughed the same findings and reached the same conclusion: electric traction is superior to diesel.

At worst, this current study process is a another indictment of the current government and the unstoppable bureaucracy that inhabits our public agencies.

Any additional and factual data I could contribute from my 32-year professional involvement in the real world of railroading would be superfluous. I say all of this with no animosity directed at the study team. You're only doing a tough job in a politically-charged environment. I don't envy you.

APPENDIX 2I-5 Workshop Invitation and Attendance List

**GO Transit Electrification Study
Stakeholder Workshop #4 Invitation and Attendance List
Wednesday, December 1, 2010**

* Bolded Organizations Attended Stakeholder Workshop #4

Environment & Health

Pollution Probe

Air and Waste Management Association

Toronto Board of Health

CommunityAIR

Ontario Agency for Health Protection and Promotion

Clinton Climate Initiative

Environmental Health Association of Ontario

ESEI Solar Foundation

Clean Air Partnership

Rouge Park Alliance

Ontario Healthy Communities Coalition

Ontario Clean Air Alliance

Wellesley Institute

Pembina Institute

Ontario Lung Association

Evergreen

Green Communities Canada

Canadian Association of Physicians for the Environment

Conservation Council of Ontario

Friends of the Greenbelt Association

Ontario Public Health Association

Protect Our Water and Environmental Resources

Toronto Public Health

Community

Toronto City Summit Alliance

Weston Village Residents' Association

Weston Community Coalition

Mount Dennis Community Association

Canadian Federation of Students (Ontario)

Unionville Ratepayers Association

Lakeview Ratepayers Association

Metroland Media Group

Member of GO Transit Community Advisory Committee

Centre for Social Innovation

Active Living Alliance for Canadians with a Disability

Center for Information and Community Services of Ontario

Community Living Ontario

Housing Action Now

Ontario Community Support Association

Ontario Council of Agencies Serving Immigrants

Safe Kids Canada

Ontario Heritage

Metrolinx Seniors Advisory Committee

Ontario Undergraduate Student Alliance

Land Use and Social Planning

People Plan Toronto

Sustainable Urban Development Association

Canadian Urban Institute

Ontario Smart Growth Network

Ontario Professional Planners' Institute

pAlliance

Ontario Association of Landscape Architects

Urban Land Institute

Building Industry and Land Development Association

Canadian Policy Research Networks

Ontario Association of Architects

Ontario Federation of Agriculture

Ontario Professional Engineers Association

Neptis Foundation

Transportation Advocacy and Commuter Groups

BA Group

Clean Train Coalition

Regional Transit Advocate

Transit Riders Advocacy Coalition (GTHA)

GO Transit Customer Service Advisory Committee

Healthy Transport Consulting

Canadian Automobile Association (CAA)

Ontario Public Transit Association

Canadian Urban Transit Association

Transport Action Ontario

Smart Commute

Centre for Sustainable Transportation

Ontario Good Roads Association

Disabled and Aged Regional Transit

Canadian Institute of Transportation Engineers

Business and Economic Development

Greater Toronto Airports Authority (GTAA)

FRAM Building Group

The Warren Group

Green Tourism Association

Ontario Agri Business Association

Ontario BIA Association

Ontario Environmental Industry Association

Ontario Restaurant, Hotel, Motel Association

Ontario Tourism & Ontario Tourism Marketing Partnership

Retail Council of Canada

C.D. Howe Institute

The Institute for Competitiveness & Prosperity

BOMA Canada

Ontario Chamber of Commerce

Small Business Association - Canada

Canadian Youth Business Foundation (CYBF)

Toronto Board of Trade

Toronto Association of BIAs

Canadian Federation of Independent Business

Ontario Home Builders Association

Ontario Real Estate Association

Canada Green Building Council, Greater Toronto Chapter

Academic

University of Toronto (2)

McMaster University

Humber College (School of Applied Technology)

Mohawk College of Applied Arts and Technology

Sheridan College Institute of Technology and Advanced Learning

Ryerson University, School of Urban & Regional Planning

Gage Occupational and Environmental Health Unit – University of Toronto

Ontario College of Art & Design

Seneca College of Applied Arts and Technology

University of Ontario Institute of Technology

University of Toronto at Scarborough

York University



Appendix 2J

Issues/Response Table

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 2J

Issues/Response Table

December 2010

Prepared for:



20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:



In Association with:



APPENDIX 2J: ISSUES/RESPONSE TABLE

Electrification Study Issues/Response Table

Source Acronyms (in order of appearance):

- SW#1 Stakeholder Workshop #1
- Update Meeting Update Meeting (Georgetown Corridor)
- CSAC GO Customer Service Advisory Committee Meeting
- SW#2 Stakeholder Workshop #2
- CAC Community Advisory Committee Update Meetings
- Transit Briefing Municipal Transit Leaders Briefing

1. Study Approach			
<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>
Stakeholder Engagement Approach	Emails (1); SW#1; Update Meeting	The Study Team should increase the amount of stakeholder workshops and dialogue with stakeholders when planning study events.	The Study Team added a forth stakeholder workshop and continued to integrate stakeholder feedback into the design of consultation events (e.g. venue location, workshop dates, workshop format, meeting advertising).
	Emails (5)	Individuals from the Georgetown South Corridor requested to participate at the Electrification Study Workshops.	The stakeholder workshops are intended to receive feedback from a broad spectrum of non-governmental organizations from across the GTHA and from the study's diverse topic areas (e.g. Environmental & Health, Business & Economic Development). Several representatives from the communities along the Georgetown South corridor have been invited to participate at the stakeholder workshops.

	SW#1; SW#3	Sub-consultants should attend stakeholder workshops in order to answer questions related to their specialized role in the project.	The Study Team ensured that relevant team members attended stakeholder meetings to answer questions and provide feedback, depending on the workshop focus and topics being addressed.
	CSAC	Online Consultation is an effective way to engage those interested in the findings and conclusions of the study.	Agreed. The Study website includes an online comment option for feedback on key reports. Website users can also email the Study Team directly from the website.
	Emails (3); SW#1; Update Meeting	The Electrification Study Team should provide key study reports and outputs to stakeholders early for review and comment.	The Study Team is committed to an open and transparent study process. All study key outputs and reports are either circulated directly to stakeholders or posted on the study website.
	CSAC	The Electrification Study is extremely technical and as a result community engagement should occur later in the study process.	The Electrification Study Team committed to engaging stakeholders throughout the entire study process.
	SW #1	The Study Team should report back to stakeholders regarding how their concerns were integrated into the study.	Agreed. An update on how stakeholder feedback was integrated into the study was provided at Stakeholder Workshop #2, #3 and #4 (e.g. adding a forth stakeholder workshop, meeting planning suggestions). This issues/response table is also intended to illustrate how feedback has been addressed.
	SW #1	The Study Team should obtain feedback from the former CAC on the study progress.	Agreed. CAC members were invited to each stakeholder workshop. In addition, the Study team has met with the CAC twice formally to discuss the study's progress.

Study Time Frame	SW #2	The study should look beyond 2021 when considering financial costs and future GO service levels.	The Electrification Study looked at the medium term to understand the service levels for the purposes of this study. By looking at the levels for 2021 the Study Team had a stable base for comparing the rolling stock technology options.
Reference Case	Update Meeting; SW#2	The study should use Tier 2 technology as the starting point for comparing the rolling stock technology and network options.	GO Transit is planning to implement Tier 4 technology across the network by 2021. The purpose of using Tier 4 technology in our reference case is that we want to give Metrolinx enough information to do a thorough comparison of the technology options based on their current plans so that they can make an informed decision.
	SW#2; SW#3; Email	The reference case assumes that Electrification will not happen in the short or medium term.	The objective is to assess the impacts relative to the reference case while allowing for decision making in advance of major procurements. There is lead time required and therefore this approach will allow for informed decisions well in advance of the reference case timelines.
Screening Methodology	SW#1; Update Meeting; SW#2	The decision-making framework should be flexible and able to adapt to changing conditions (e.g. availability of new data, rising energy costs).	The Study Team continuously validated and tested the assumptions that were made. Stakeholder engagement played an important part in that. If a wrong assumption has been made the team will modify our approach. Any substantive new data will definitely be considered.
	Update Meeting	Ensure that the study is objective and will consider all potential technology alternatives equally.	The Study Team has been charged to conduct a study that is both objective and comprehensive.

	Update Meeting; SW#2	The Study Team should inform stakeholders what criteria were used to preliminarily screen technology alternatives.	Agreed. The Rolling Stock Technologies Paper lists the criteria and assumptions that were used.
Decision-making	SW#1; Email; Update Meeting; SW#2	Who and when will a decision be made whether or not to electrify the GO network?	At its February 2011 meeting, it is anticipated that the Metrolinx Board will make recommendations to the Ministry of Transportation on appropriate next steps. Once a formal recommendation is made the Electrification Study, or aspects of it, will become part of the project prioritization framework used to evaluate Metrolinx projects.
	SW#1; Update Meeting	Metrolinx should provide affirmation that the Electrification Study will not “sit on a shelf” but will lead to meaningful results that are ready for implementation.	The Electrification Study is an important first step required to understand how the GO network could be electrified. The study produced an implementation plan that moves us past simply saying electrification is the right way to go.
	Email; SW#4	It appears that the Electrification Study is intended to act as a potential infrastructure plan for reference case onward.	The final Electrification Study report outlines implementation plans for a potential staged approach to electrification. This approach will allow decision-makers to consider projects within the existing project prioritization framework for Metrolinx.

2. Capacity and Service Impacts, Including Reliability of Service

<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>
Train Speed	Email	Will the Electrification Study impact Via Train speeds around the Guelph Via Station?	Via trains speeds and operations are not within the scope of the Electrification Study.
Existing and Future Ridership	SW#1	Has Metrolinx updated their ridership data since the release of the Big Move?	Ridership projections was continuously updated as new information became available.
Service	CSAC;	If GO electrified their network	The system is constrained by the

	CAC; SW#2	would that improve service across the GTHA?	capacity of Union Station, not diesel technology. This study involved highlighting various opportunities and benefits related to the technology and network options presented.
	SW#3	The Big Move identified some GO rail lines that would be electrified in the future as a result of customer demand. The reference case should take this into account rather than re-evaluate service levels for 2020.	The Big Move was an ambitious plan that outlined a number of potential projects across the GO network, including a commuter express rail. In order to ensure that this study produced practical and meaningful findings and conclusions, we looked at the characteristics of the corridor in the medium term (2020).

3. Environment and Health Impacts

<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>
Air Quality	Email (3); SW#1; Update Meeting; SW#3	Emissions coming from diesel locomotives have a negative effect on human and environmental health.	Noted. The Electrification Study considered air quality and human health implications of various rolling stock technology options.
	Email; Update Meeting;	Air quality in downtown Toronto is extremely poor. The Study Team should set up air quality monitoring stations in the downtown to assess local air quality.	Understanding the impacts that rolling stock technology options have on air quality was part of the Electrification Study. However, establishing air quality monitoring stations and testing air quality levels is out of the scope of the study.
	Update Meeting	Fine particulate matter should be considered when evaluating the impacts of various technology alternatives on human health.	The Study Team used World Health Organization guidelines in the assessment of air quality impacts. The team also consulted with University of Toronto professors regarding particulate matter.
	Update Meeting	Chemical interaction / pollution combinations should be examined when assessing the	Health implications were assessed against human health standards issued by third-party organizations

		impacts of technology options along the rail corridors.	(e.g. World Health Organization and MOE).	
	SW#3	The Study Team should use existing approaches to quantify GHG emissions already in use by the Province (e.g. OPA Feed-in Tariff program) to quantify GHG emissions as part of the Electrification Study.	The Study Team has completed a relative comparison of the impacts that the network options have on air quality.	
	CAC; SW#3;	The Study Team should compare air quality guidelines outlined by the MOE and the WHO.	This was done.	
	CAC	It is important to present absolute numbers and percentages for air quality so it is understandable for stakeholders.	Noted.	
Human Impacts	Health	Update Meeting	The Study Team should establish a prioritized list of areas along the rail corridors that have significant health and environmental concerns.	The Study Team prepared a detailed catchment analysis of communities affected by GO operations in the GTHA.
		Update Meeting; CAC; SW#2	Population density should be considered when assessing the impacts of technology alternatives on local communities.	A detailed analysis of population density surrounding GO lines was undertaken as part of the study.
		SW#1; Update Meeting; Email	Human health implications should be evidence based rather than general statements. Examine indices used around the world to measure air quality and integrate them into the analysis of technology options.	Health implications were assessed against reputable human health standards (e.g. World Health Organization). All information pertaining to human health collected as part of the study is available for review.
		SW#1; Update Meeting	The Study Team should hire an epidemiologist to evaluate the health implications of technology options.	All information pertaining to air quality impacts is available for public review.
		Update Meeting;	Socioeconomic levels should be included when mapping	The Study Team examined who is impacted by the various

	CAC; SW#3	population density and environment/health impacts in order to understand the impacts of the GO operations on vulnerable populations.	technology options. This led to an understanding of vulnerable populations along the GO rail lines.
	CAC	The Study Team should examine the impacts of prevailing winds carrying train emissions beyond the study's 400 metre 'zone of influence'.	The air quality analysis took account of the track alignment relative to the prevailing wind direction to calculate the zone of influence.
Environment	SW#1; SW#2	Renewable energy sources should be used to power an electrified system.	The sources of energy for the GO Transit service area will be determined by the OPA energy supply mix. Energy efficiency of the rolling stock and network options were taken into consideration in the assessment of options
4. Community and Land Use Impacts			
<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>
Noise	Email; Update Meeting	GO operations are noisy and negatively impact households living along the train lines.	Noted. An assessment of the social community impacts (including noise) was undertaken as part of the Electrification Study.
	SW#1	The Study Team should examine both the hard and soft social and health costs (e.g. sleep interference due to noise, overall quality of life, etc.)	The study analyzed the social parameters, including the potential effects of noise and air quality impacts on quality of life.
	SW#3	The Study Team should clarify how they intend to evaluate noise and vibration levels for Tier 4 locomotives if they currently do not exist.	In order to understand the noise levels for Tier 4 technology, the Study Team obtained estimates from a number of train experts and used manufacturing specifications for Tier 4 locomotives.
Safety	SW#1; Update Meeting	The Study should prioritize a safe interface between the public and proposed rail networks.	Safety and the interface of public with the selected options was analyzed as part of the technology and network option assessment.

Land Use Impacts	SW#1; Update Meeting; CAC; SW#2	The study should examine the impacts that technology alternatives have on existing and future opportunities for urban intensification, land development, and transit oriented development.	Noted. The Study considered the impacts that various technology and network options have on land use and development opportunities.
User Benefits	SW#2	Priority should be given to options that increase user benefits and result in positive social impacts (e.g. ability of technology options to encourage individual modal shifts, reduction of trip times).	The Study Team undertook a comprehensive and objective study that considered a wide range of factors outlined in the study's ToR, including quality of life and user benefits.
	SW#1	Examine the entire GO Transit rail network.	All 7 lines of the GO Transit rail network and the ARL were examined by the study team.
	SW#1	Increase local stops and connections to local transit networks.	Determining new local stops and connections is not within the scope of the study.
	CAC	The Study Team should calculate the total number of users that would experience journey time savings as a result of electrified operations.	This was done.
Quality of Life	SW#1	Ensure that the future rail system is accessible.	GO Transit accessibility standards were an integral part of the technology, network and implementation assessment.
5. Economic Impacts			
<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>
Job Creation	SW#1	The Study should prioritize local job creation.	Analysis of the short list of options included an examination of the technology and network options that maximize local and Ontario job creation.
6. System Costs, Funding, Financing and Implementation			
<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>

Funding/Financing	CSAC	The Study Team should communicate how they expect to pay for new rolling stock technologies options. Those costs should not be passed on to GO customers.	The Study Team formulated findings and conclusions about the costs of various technology and network options. Determining project financing is outside the scope of the study.
	CAC	The Study Team should explore funding opportunities for the Electrification Study.	Noted.
System Costs	SW#1; Update Meeting; SW#2	The cost-benefit analysis should be comprehensive, including the quantification of health and environmental costs. Also, it should consider the lifecycle costs of adopting each technology alternative.	The Study Team looked at the life cycle costs of the technology options in the analysis. Social effects were assessed but were not monetized. Air quality impacts were assessed against health standards but were not monetized.
	Update Meeting	The Study Team should ensure that they are not loading the case against electrification by adding unnecessary costs.	The study looked at the additional costs of providing an electrified railway to meet the service requirements of the reference case, and considered the difference between the purchase price of the T4 Locomotives and each of the alternative locomotives.
	Update Meeting; SW#2	The costs associated with converting existing Tier 2 locomotives to Tier 4 technology should be factored into the cost of continuing to operate diesel technology on the GO network.	We included the increased costs of Tier 4 locomotives and did not assume the fleet is in place. This cost was used for comparison against the electric locomotive.
	Update Meeting; SW#1	Bridges within the rail network are required to be retrofitted for electrification during reconstruction. The costs for converting bridges should not be included in the costs for electrification.	GO Transit is required to accommodate others users who operate within the corridors (e.g. CN/CP). Overhead catenary for electrification may require more grade separations to ensure proper clearances at bridges.
	Update	Conduct sensitivity analysis to account for changing energy	Noted.

	Meeting	prices.	
	Email	The design of the new train shed at Union Station and track signals are suppose to be compatible with an electrified network and therefore those costs should not be included as a cost to electrify the GO network.	Noted. The Study Team is worked with representatives from Metrolinx, CN, and CP to gain a thorough understanding of what infrastructure costs would be required for an electrified system.
	Email SW#3; SW#4	The Study Team should not overstate the cost of EMUs. The cost does not reflect that fact that fewer train sets would be required to meet service demand because of increased operational speed and journey time benefits.	This has been addressed through a scenario analysis.
	SW#3	The Study Team should examine the opportunity for energy saving through capitalizing on regenerative power.	This was done.
	SW#3	The costs of getting to the reference case should be included in the detailed assessment of options.	Outside the scope of this study.
	CAC	There needs to be more information about the specific costs for diesel and electric operations.	Specific costs for each network option are available in the final report.
Implementation	SW#3	Construction/implementation timing and costs should be evaluated in the detailed assessment of the options.	Noted.
	CAC	Corridor ownership is a significant factor that will impact the implementation of the Electrification Study.	Noted.
	CAC	Is there enough reliable electrical power in the GTHA to power a fully electrified GO network? What happens if there are power	Yes, verified by OPA who also indicated that priority would be given to Transit.

		outages in the GTHA?		
7. Technology and Network Options				
<i>Topic</i>	<i>Source</i>	<i>Issue/Comment</i>	<i>Response</i>	
Rolling Options	Stock	Email	The Study Team should consider the viability of adding weight to electric locomotives to increase tractive effort.	Noted. The Study Team conducted a thorough review of all available rolling stock technology options.
		Update Meeting; CAC	The Study Team should examine other electrification studies from around the world in order to understand electrification best practices.	The Study Team has reviewed electrification projects from around the world and has visited the AMT in Montreal to discuss the progress of their ongoing electrification study.
		Email	Diesel is an outdated technology that has negative consequences on the communities surrounding GO rail lines.	Noted. Completing the Electrification Study is the first step needed to understand the appropriate rolling stock technology and network option(s) for use on the GO network in the future.
		Email	Hybrid trains should be considered as a potential technology option.	Noted. The Electrification Study Team conducted a thorough review of all available rolling stock technology options.
		Update Meeting; CAC; SW#2; SW#3; CAC	Tier 4 diesel technology is neither proven nor commercially available in North America. How confident is Metrolinx that they will be available by 2020?	The EPA in the United States is requiring diesel locomotives to comply with Tier 4 emissions standards by 2015. GO is has already looked into the potential availability of Tier 4 locomotives and is very confident that they will be available in the medium term.
		SW#3	If electric locomotives are the preferred option for electrification, Metrolinx should begin to survey the used electric locomotive market.	Noted.
		SW#2	The Study Team should look beyond running 12 car consists	The Study Team examined a wide variety of rolling stock and

		on all lines at all times.	network options to understand the most efficient way to meet GO's current and planned service levels.
	SW#3; Email	The choice of available technology and network options for GO operations seem in line with best practices around the world.	Noted.
	SW#3; Email	Although EMUs have a higher energy demand than electric locomotives which lead to increased GHG emissions, the technology provides improved service and ridership.	Noted.
	SW#3	Reliability of rolling stock technology options should be considered in the assessment of options.	Reliability has been considered in the multiple category evaluation.
	SW#1	Technology options must be able to operate in extreme climates.	Technology options selected for the GO Network must be proven to operate effectively in a comparable climatic setting.
Network Options	Email; SW#2	Dual mode locomotives should be considered for a phased approach to electrification.	Noted. The Electrification Study Team conducted a thorough review of all available rolling stock technology and network options.
	SW#1; Transit Briefing	Freight demands need to be balanced with the competing demands of regional commuter rails.	Freight movement was an important consideration of this study and was examined in detail.
	SW#3; Email	Where will substations for an electrified system be located in the GTHA?	The Study Team has confirmed with the OPA that there is adequate capacity to support a fully electrified GO rail network. The details of where individual substations may be located will be part of any future design studies or environmental assessment processes pertaining to

			electrification.
	Email	Willowbrook may not be the best candidate for an electric locomotive/EMU maintenance facility since there are insurmountable problems west of Aldershot.	Noted
	Email; SW#4	As service levels along the Georgetown corridor increase, the Study Team should look at the potential opportunity to integrate the services between these two lines.	Outside the scope of the study
	CAC	Do EMUs require more station stops to be a viable technology option?	No.
Air Rail Link	Email (2); CSAC; SW#1; CAC; SW#2	The Air Rail Link should be included within the scope of the Electrification Study. More information about how it is included should be given to stakeholders.	Metrolinx is now responsible for the Air Rail Link, and as such, the ARL was part of the Electrification Study.
	SW#1; Update Meeting; SW#2; SW#3	The ARL should be the starting point for electrification.	The Electrification Study considered what corridors and lines should be prioritized for electrification. The results of the study will be used by the Metrolinx Board to make a recommendation(s) to the Province of Ontario.
	Update Meeting; SW#3	The ARL can accommodate different technology alternatives than the rest of the GO network and thus should be evaluated separately from the rest of the system.	Noted.
	Email; CAC; SW#4	The Study Team should assume that the ARL DMUs will be converted to EMUs.	The Study is assuming that the DMUs will be converted to EMUs.

	SW#3; Email	If the ARL is included in the study why is it missing from key study diagrams?	The ARL was part of the operations plan for all modelling related to electrification study. Diagrams that do not show the ARL have been corrected.
	Email; CAC; SW#4	The ARL is not included in the total numbers arrivals at Union Station in the morning rush hour.	The ARL is planned to stop on the western side of Union Station. Because it won't come under the actual train shed it was not included in the number of arrivals at Union Station.
	SW#3; Email	The ARL should be evaluated and considered apart from the Georgetown corridor because it will operate on its own corridor and utilize a different technology option from the rest of the GO network.	The ARL is coupled with the Georgetown line in this study because it will not be operating on a dedicated track. Similar to GO operations in the area, the ARL will be required to share track with GO Transit, CN, and CP. As a result, if the Province decided to electrify the ARL all of the tracks running from Union Station through the corridor would need to be electrified.
	SW#3	Are their technology constraints for the ARL relating to axle loading and redevelopment efforts currently underway at Pearson International Airport?	We are not aware of any ARL technology constraints related to axle loading.
	SW#3	The ARL evaluation should study offering both express and local service from Union Station to Pearson Airport.	Outside the scope of this study.
	SW#3	The Study Team should examine the potential for future airport expansion as a result of electrifying the ARL.	Outside the scope of this study.
Union Station Capacity	SW#1; Update Meeting;	The findings and conclusions of ongoing Metrolinx studies (e.g. (Union Station Capacity Study,	The Study Team looked at Union Station and tried to understand what impacts it has on the various

	SW#2; SW#3	Union 2031 Demand / Opportunity Study) should be integrated into the Electrification Study	technology and network options. The Study Team liaised with project teams from those studies and, if available on time, will integrate the findings and conclusions into the Electrification Study.
	SW#1; CAC; SW#2	Can capacity issues at Union Station be overcome by operating non FRA compliant trains in the future?	No.
	SW#2	The study should consider the formation of new network hubs (e.g. Bloor Subway Line) that could reduce constraints associated with Union Station capacity.	Determining the locations of potential network hubs is outside the scope of the Electrification Study.
	Email; SW#4	Contrary to what was stated by the Study Team, Union Station capacity does not impact journey times. Capacity limitations are a function of train size and headways.	Noted.
	Email	Union Station capacity should not be treated as an insurmountable barrier to electrification.	The Study Team worked to understand and address all factors that will influence the ability of Metrolinx to electrify the GO rail network.
	Email; SW#3	Offloading GO traffic onto the TTC is not realistic given the fact that they do not have enough room to handle all of its passengers.	Noted.
	Email	If the Union Station capacity study decides that more tracks and better throughput are required, could the conclusions of the electrification study be significantly impacted?	No.
	SW#3;	Currently GO Transit has a	Those details are currently being

	CAC	turnaround time of 5-10 minutes while the TTC subway turnaround time is 2 minutes. Is there any way for GO to decrease turnaround times for their existing fleet or through using EMUs?	studied by AECOM as part of the Union Station capacity study. We haven't considered all of those details because of the other capacity constraints getting into Union Station.
Georgetown South Corridor	SW#1; Update Meeting; CSAC; Email	Electrify the Georgetown South Corridor on a priority basis. The community has significant concerns about the air quality and noise impacts of existing operations and planned service expansion within their communities.	Completing the Electrification Study is the first step needed to understand the appropriate rolling stock technology, network option(s) for the GO network, as well as where and when electrification may be appropriate.
	Update Meeting	Air quality monitoring data within the Georgetown corridor should be shared with the community.	Air quality monitoring stations are currently being installed along the Georgetown Corridor. Metrolinx will provide the community with all relevant information and data once it is available.
	SW#2	The Georgetown lines should be included in the reference case as a line with half hour GO service.	Under review by GO.
	Email	The Study Team should ensure that all figures used in meeting presentations are consistent.	Noted.
	Email	Why are the Georgetown service levels outlined in the Electrification Study lower than Lakeshore and numbers outlined in the 'GO 2020' plan and 'The Big Move'?	The Reference Case is consistent with GO 2020 which bridges the service levels forecasted in The Big Move. All corridors evolve differently, however demand is consistently higher for the Lakeshore line.
8. Other Comments and Questions			
Topic	Source	Issue/Comment	Response

Other Comments / Questions	SW#1	What are the risks that the Study Team might not deliver the final report by the year-end deadline?	The Study Team and Metrolinx are fully committed to that deadline. Both parties meet weekly in order to assess the project schedule and ensure incremental deadlines are met.
	Update Meeting	Who is responsible for monitoring and regulating air quality emission standards for GO Train vehicles?	Railroads self-administer emission standards.
	Transit Briefing	Metrolinx should work with municipal transit operators to determine the impacts of increased GO service on regional mobility (e.g. movement into and out of station stops).	The comment is outside the scope of Electrification Study, but has been passed to the appropriate representatives at Metrolinx.
	SW#2	The 'Big Move' needs to be revised so that Metrolinx can work toward achievable infrastructure targets.	The Study Team gathered a tremendous amount of information for the study that will assist Metrolinx in understanding the viability of the targets outlined in the 'Big Move'.
	SW#2	More reverse peak service is needed to encourage growth in suburban downtowns and employment centres.	The comment is outside the scope of Electrification Study, but has been passed to representatives at Metrolinx.
	SW#2; Email; SW#3	GO Transit operations should evolve beyond a commuter rail service to a regional all-day network.	The comment is outside the scope of Electrification Study, but has been passed to representatives at Metrolinx.
	SW#3	Metrolinx should begin negotiations with both federal and provincial agencies to ensure that potential electrification projects can go through an accelerated EA process.	Noted.
	CAC	Is there any opportunity to disentangle freight operations from transit service?	Outside the scope of this study.

