Export Transmission Service (ETS) Charge

Recommendation of an Appropriate ETS Charge for Ontario

August 2009

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1.0 Introduction

Export Transmission Service (ETS) tariff revenues are based on the volume of electricity exported from or wheeled-through Ontario at a rate of $1/MWh. The IESO collects these revenues and remits them on a monthly basis to the transmission company whose transmission system is used to facilitate the export. Ontario's ETS tariff has not changed in the past decade since it was originally set in 1999. At the time, it was considered to be a compromise between the many competing proposals that were advanced by stakeholders in the course of that year's proceeding. Moreover, it was seen as an interim solution to a rather complex and contentious issue.

In Hydro One's Transmission Rate Application (EB-2006-0501), the parties to the settlement agreement were supportive of the IESO undertaking a study of an appropriate ETS tariff and, through negotiation with neighbouring jurisdictions, to pursue acceptable reciprocal arrangements with the intention to jointly eliminate all ETS tariffs. It was expected that this study would be completed prior to the 2010 transmission rate re-setting process and it was understood that any change to the ETS tariff must be approved by the Ontario Energy Board (the "Board") as part of this process. As an outcome of the earlier Hydro One preceding the IESO was asked to consider a minimum of three options. A fourth option was later added to the scope of work at the request of stakeholders.

The four options that were assessed as part of the study are as follows:

Option 1: Status Quo – Under this option the ETS tariff would remain at $1/MWh applicable to export and wheel-through transactions.

Option 2: Equivalent Average Network Charge - Under this option, export and wheel through transactions would pay a rate equivalent to the average Network Transmission Service cost, but using energy as the charge determinant (i.e. $/MWh).

Option 3: Reciprocal Treatment of the ETS Charge - This option considers two potential forms of reciprocal treatment: 1) the mutual elimination of all ETS tariffs between jurisdictions; and 2) establishing Ontario's ETS tariff based upon the regulated average network cost of providing transmission service in each of the other jurisdictions, except New York wherein the ETS is deemed to be jointly eliminated.

Option 4: Unilateral Elimination of the ETS tariff - This option considers two scenarios: 1) unilateral elimination of the tariff in all hours; and 2) unilateral elimination of the tariff only during off-peak hours.

A working group (Stakeholder Engagement SE-78) comprising of various electricity sector market participants was established to support this work. The stakeholder engagement process provided a forum through which individuals or organizations with an interest in, or concern about, the ETS tariff could provide the IESO with their input. A list of the stakeholder working group participants is provided in Appendix B. A summary of stakeholder feedback received to date is provided in Appendix C. In addition, further information regarding the stakeholdering activities is available on IESO's web site at http://www.ieso.ca/imoweb/consult/consult_se78.asp

2.0 Study Approach

2.1 OVERVIEW

The study approach adopted for this work involved both a quantitative and qualitative review. The quantitative review involved the examination and analysis of a number of key variables in order to determine the incremental changes in these variables against the Status Quo. The summary of results of the quantitative review are set out in Tables 3 – 5. The test variables are reflective of stakeholders' broad interests and concerns in regards to the ETS tariff. These are as follows:

a) **Total electricity export and import volumes** - a measure of the projected incremental change in export, wheel-through and import volumes.

b) **ETS tariff revenues** – a measure of the projected incremental change in export and wheel-through revenues.

c) **Hourly Ontario Energy Price (HOEP)** – a measure of the incremental change in HOEP.

d) **Market efficiency** – a measure of allocative efficiency calculated as the incremental change in the consumer and producer surplus.[1]

e) **Cross-border emissions** – a measure of the total change in NO_x, SO_x and CO_2 from generation sources in the region associated with incremental import and export and wheel-through volumes.[2]

The aim of the study was not to optimize any of the variables but rather to ascertain and measure the incremental impact on these variables attributed to each ETS tariff option. In so doing, this would allow the IESO to determine an "appropriate" ETS tariff based on findings of the independent study. Charles River Associates International (CRA) was contracted, via a competitive tendering process, to undertake the quantitative aspect of the review and analysis using its North American Electricity and Environment Model (NEEM).[3]

The results of CRA's quantitative analysis are included in the *Export Transmission Service (ETS) Tariff Scenario Analysis – Final Report and Findings* ("the ETS Report") which is included in Appendix A.

The IESO also conducted a series of qualitative reviews aimed at testing whether there would be any regulatory or legal impediments to the selection or implementation of the ETS tariffs under consideration, or that would create any operational challenges in the administration of the electricity markets or maintaining the reliability of the IESO-controlled grid. The summary results of the qualitative assessments are set out in Table 6.

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[1] The **consumer surplus** is the amount that Ontario consumers benefit by being able to purchase electricity for a price that is less than they would otherwise be willing to pay. The **producer surplus** is the amount that producers benefit by selling at a market price higher than they would otherwise be willing to sell for in the market. The change in consumer surplus is calculated using the price change in each load block. The change in producer surplus is calculated using the changes in the total energy margin for all Ontario units (energy margin is the difference between energy revenue and variable costs). The change in total surplus is determined as the sum of the changes in consumer surplus and producer surplus and is an aspect of determining the net benefit to Ontario of each ETS tariff option considered. In the ETS tariff study, the net benefit to Ontario that is attributed to the tariff is determined by adding total surplus and export revenues.

[2] Cross-border emissions are generally of concern to stakeholders such as the Green Energy Coalition and Pollution Probe whose primary interest in this matter is to ensure that the export and wheel-through tariff, or policy change, will not exacerbate or promote increased emission discharge from generation resources in the region.

[3] NEEM is a production model which represents the U.S. electric power system and portions of the Canadian system.

The results of the quantitative and qualitative reviews provided useful insight into the impacts of each ETS tariff option under consideration and assisted the IESO in developing its recommendation of an appropriate tariff for Ontario. For an ETS tariff to be considered appropriate, it should be characteristic of, or demonstrated to exemplify, the following principles which were also adopted from Hydro One's transmission rate proceeding:

- Simplicity of implementation (i.e., the tariff should be relatively simple to implement and administer);
- Consistency with rates in neighbouring markets (i.e., the tariff should be comparable to neighbouring markets);
- Fair and equitable (i.e., the tariff should reflect the cost of the transmission network that is used to provide the service and all users should contribute to this cost accordingly) ; and
- Net Ontario Benefit (i.e., the tariff should result in Ontario being better off overall).

2.2 CALCULATION OF ETS TARIFF AND ALL-IN COSTS

The ETS tariff values and associated transactions costs used in the study are set out in the tariff and costs matrix that is found in *Appendix B – ETS Tariff and All-In Costs* of the ETS Report. A summary of these charges are also provided in Table 1 below.

The following assumptions and approach were adopted in determining the ETS tariff values for years 2010 and 2015 (future year values were adjusted to 2007 dollar values using time value for money):[4]

- For the year 2007, the IESO assumed an Ontario ETS Tariff of $1.00/MWh and associated uplifts of $3.48/MWh.

- The average embedded network cost associated with Option 2 was determined to be $5.00/MWh. This is based on the Ontario transmitters' network 2007 revenue requirements as filed with the Ontario Energy Board (approximately $700 Million) divided by the annual provincial energy consumption (approximately 150 TWh). All-in costs for other jurisdictions were developed from a number of sources including publicly available transmission tariff

[4] It was important to adjust future year's values into 2007 values given that the baseline and comparator year is 2007; accordingly, this provided an equal basis on which to measure and analyse incremental changes from each of the ETS tariff. All references to dollars are in Canadian currency, except where otherwise noted.

schedules and the J.R. Rudden survey report on neighbouring transmission export and wheel through service rates that was prepared earlier for Hydro One. As agreed by stakeholders, the ETS tariffs for the other jurisdictions should be based on their annual firm transmission service schedule to permit suitable comparison.

Table 1 – Summary of Export and Wheel-through Costs

Path		**Export & Wheel-through Costs ($/MWh)**		
Source	Sink	Transmission Service Charge	Other Charges	All-In Export Costs
ON	NY, MISO, HQ	1.00 (Status Quo)	3.48	4.48
		5.00 (Option 2)	3.48	8.48
HQ	ON	8.08	4.44	12.52
MISO	ON	4.49 US	0.61 US	5.10 US
MISO	PJM	0.00 US	0.61 US	0.61 US
NYISO	ON	3.42 US	3.18 US	6.30 US
PJM	MISO	0.00 US	0.55 US	0.55 US
PJM	NYISO	3.35 US	0.55 US	3.90 US
NYISO	PJM	4.71 US	3.18 US	7.89 US

- The 2007 ETS tariff and all-in costs were estimated to increase by the annualized change in the Consumer Price Index (CPI) as forecasted by the Toronto Dominion (TD) Economics as of March 2009. The annual CPI change forecast for year 2015 was kept at the 2013 level, the longest horizon covered.

- Projected currency valuation (i.e., exchange rates used for converting US and Canadian dollars) was also based on TD's Bank Exchange Rate and Inflation Forecasts[5]. The exchange rate for year 2015 was kept at the year 2010 level, the longest horizon covered.

[5] The referenced forecasts can be found at: www.td.com/economics/qef/long term mar09.pdf.

- The TD's CPI Adjustments were also used to rebase, in 2003 US dollars, for the years 2010 and 2015.

The example below provides the calculation used to determine the Status Quo 2010 export tariff out of Ontario (2008 $ /MWh) as shown in *Appendix B – ETS Tariff and All-In Costs* (page 84) of the ETS Report. All amounts shown in Appendix B of the ETS Report are calculated in a similar manner:

<u>2010 Status Quo Export Tariff out of Ontario (in 2008 $ /MWh): **$1.02**</u>

- Ontario ETS for year 2007: **$1.00**
- Use the annualized March 2009 TD Forecast for CPI to reflect the 2010 Ontario ETS Tariff of **$1.02** (escalation factors for 2008: +2.4%; 2009: -0.8%; 2010: +0.8%)
- Use Exchange Rate of 1.136525 to convert for the 2010 Ontario ETS Tariff to **$0.90 USD** ($1.02 Cdn/1.136525)
- Rebase in 2003 USD for 2010 Ontario ETS Tariff using TD Forecast CPI Adjustment of 1.16562: **$0.77 USD** ($0.90 USD/1.165652)
- Use CPI adjustment of 1.170386 to convert to 2008 USD and Exchange Rate of 1.136525 to convert back to 2008 Cdn: **$1.02** ($0.77 USD*1.170386*1.13625)

3.0 Recommendation

The IESO's quantitative and qualitative analysis indicates that Option 2 (i.e. a tariff based on Average Embedded Network Transmission cost) would be the tariff option that best satisfies the four selection principles of simplicity of implementation, consistency with rates in neighbouring markets, fair and equitable, and net Ontario benefit, principally through shifting of a portion of transmission network cost recovery from the domestic consumer to the exporting parties.

Since undertaking the study the IESO has observed a number of factors that have changed significantly including: load deterioration due to economic conditions, recent legislative changes through the Green Energy and Green Economy Act, and increased occurrences of surplus base-load generation conditions. All of these changes have served to highlight the operational benefits of exports. During low load periods, surplus situations can be alleviated or even avoided through exports. As variable renewable resources become more prevalent in Ontario, the supply/demand balance will become more volatile and exports can help smooth out such volatility. As a result, a recommendation that would place downward pressure on exports is not considered appropriate or consistent with the new reality of lower demands and a future with significant increases in variable renewable generation. The magnitude of the net Ontario benefits observed in option 2 are relatively small ($20M and $13M in 2010 and 2015) when compared with the overall Ontario transactional costs (i.e. $10 B in annual sales) and may well be further degraded as a result of the changing conditions. It appears that the incremental benefit seen with option 2 is not sufficiently material as to warrant a change to the export tariff. The IESO therefore recommends that we remain with the $1/MWh until such time as conditions change or we are able to engage in meaningful discussions with our neighbours regarding the reciprocal elimination of the export tariffs; the option which we believe would be the most beneficial option for efficiency in the region and for the province of Ontario.

Table 2 – Summary of Selection Principles Comparison

ETS Tariff Option	Simplicity of implementation	Consistent with rates in neighbouring markets	Fair & Equitable*	Net Ontario Benefit**
Option 1 - Status Quo	Simple	No	No	N/A
Option 2 - Equivalent Average Embedded Network Rate	Relatively Simple	Yes	Yes	Positive
Option 3 (1) - Reciprocal Treatment - Joint ETS tariff elimination	Complex	Yes	Yes	Negative
Option 3 (2) - Reciprocal Treatment - Avg. Embedded Network Cost, except New York.	Moderately complex	Yes	Partial	Negative
Option 4 (1) - Unilateral Tariff Elimination - In All-hours.	Simple	No	No	Negative
Option 4 (2) - Unilateral Tariff Elimination - Off-peak hours only.	Moderately complex	No	No	Negative

*As a measure of user pay principles.
** As a measure of total surplus (i.e., sum of consumer and producer surplus) and export revenues.

4.0 General Assumptions

4.1 STUDY INPUTS AND DATA SOURCES

The ETS tariff study was performed using input data and information from a number of sources including public and commercial agencies. In particular, the load forecast and underpinning resource mix and developmental plan for the 2010 and 2015 test years was provided by the Ontario Power Authority (OPA). Some of the key inputs and assumptions used in the study are listed in the final report under the "*Key Assumptions for Calibration and Scenario Analysis*" section of the ETS Report (pages 7 – 16) which is included in Appendix A.

5.0 Quantitative Assessment

5.1 DESCRIPTION OF THE MODEL

As noted earlier, the ETS tariff study and economic analysis were carried out by CRA using its proprietary North American Electricity and Environment Model (NEEM). The NEEM is a regional production cost model that represents the US electric power system as 29 regions and portions of the Canadian system as 5 regions (i.e., BC, Alberta, Manitoba, Ontario and Quebec). For this particular analysis, the model constructs a generation offer curve based on the estimated production costs of Ontario generating units.[6] The model then uses this supply stack (i.e., a ranking of the generation costs) to meet forecasted demand using lowest cost generation first and the most expensive generation last. This matching of supply and demand occurs in the model (using "load blocks") while respecting the capability of the interties connecting Ontario with surrounding markets and neighbours (i.e., Quebec, New York, PJM and MISO which included Manitoba). The transaction costs associated with trades (i.e., all-in cost which includes the ETS tariff and other related export or wheel-through transaction charges) are also factored into the model in order to generate the most economical trades based on the price differentials between markets. In other words, the model permits imports and exports between regions in order to optimize the total system supply costs. Accordingly, trade decisions are assumed to incorporate the all-in costs, and critical to this analysis of the export tariffs, pertaining to inter-market transactions. The model produces key outputs for Ontario such as prices (HOEP), export and import volumes, export revenues, consumer and producer surplus and emission quantities and permits the calculation of Ontario net benefit and the assessment of impact on SBG events. It was also important, for the effectiveness of the study, that the tool be able to model Ontario's mix of forecasted generation, and cost structure in future years.

[6] Production costs for the Ontario generating units were estimated by CRA.

5.2 BENEFITS OF THE MODEL

The NEEM uses a large amount of input data and assumptions to represent and approximate the dynamic operation of the North American power system while respecting a number of operational factors including:

- Capability of interties and interregional power flows;
- Reserve margins requirements;
- Environmental constraints;[7]
- Generating resource operational capability and energy limits; and
- Generation unit's maintenance requirements.

For the study, 2007 was established as the baseline year. The model was calibrated and the key outputs verified against 2007 actual results. The calibrated model produced outputs that closely mirrored the 2007 baseline actual results (as can be seen on pages 20 to 23 of the ETS Report). This exercise provided confidence that the model is able to produce results that reasonably approximate real-world situations.

As with most modelling exercises, there was a need to make some trade-offs between the level of detail deemed necessary in order to gain meaningful insight into the likely impacts of each ETS tariff option on the key test variables, and the resources and time required to do so. NEEM was determined to be appropriate in this regard. Modeling the ETS tariff options was a fairly complex exercise requiring consideration of many inter-related and moving parts. For example, for this analysis it was necessary that the tool had the ability to model the dynamic trade flows between regions.

5.3 ASSUMPTIONS AND POTENTIAL LIMITATIONS OF THE MODEL

In carrying out the study there was a need to simplify certain features of the Ontario market or how these are features are replicated in the model in order to create a reasonable representation of the integrated power system. It is not possible to perfectly represent all aspects of the real-world or the dynamic nature of the integrated power system in the model due to, among other things, complexity and lack of information about these features. However, through simplification these were reasonably

[7] It was important to model the potential effects of Ontario emissions policy (i.e., coal retirement and limits on sulphur dioxide and nitrogen dioxide) as well as future impact of a North American Federal carbon policy. Given this, these policies are expected to influence, among other things, resource mix and trade patterns.

replicated. While simplification of certain features may contribute to disparities between the observed and actual results, a review of the calibrated baseline results would suggest that any such disparities are unlikely to be sufficiently material as to alter the results. The following section discusses the various assumptions or simplifications that were adopted and used in the model.

Treatment of gas generators

There are a number of generators with signed contracts in place with the OPA. As a result, some may have incentives to respond to prices while others may not. Furthermore, how certain gas generators offer into the market may also be influenced by their participation in programs such as Spare Generation On-Line (SGOL) and Day Ahead Commitment Process (DACP). Since these details are generally not public knowledge or may be limited for the most part, these resources may have been modelled in more limited detail than the specific provisions of their operational arrangements. In addition, all Non-Utility Generators (NUGs) and Combined Heat and Power (CHP) resources are treated as price-taking resources (i.e., their bidding behaviour and output is not deemed to be influenced by the market prices in the model).

New gas generation resources are treated in the model as price sensitive merchant generation. Strategic bidding of gas units are simplified in the model and the peak gas units are assumed to always bid a fixed percentage over their variable cost at all times, but are restricted from bidding in such a way as to capture scarcity rents.[8] In addition, except for the calibration of the model where Lennox G.S. production was adjusted to reflect actual 2007 output, the output from Lennox G.S. was allowed to vary with prices in the market for the test years 2010 and 2015.

[8] Rents are the difference between the price and the marginal cost during scarcity conditions.

Treatment of coal generation

Coal generation, although the full capacity is available, is modeled to respect the emissions limits (i.e., NO_x, SO_x and CO_2) imposed by Ontario's environmental regulation. Furthermore, in reality the units may actually be producing less energy than is limited by the emissions caps.

Treatment of Quebec and New York hydroelectric generation

In general, Quebec and New York hydroelectric production profiles are based on publicly available data sources. This is due to a lack of access to generation production information in those markets, as well as our limited understanding of how these resources are expected to operate strategically in these regions. For example, the month-to-month variation in Quebec hydroelectric production was estimated using NEB statistics and demand data filed with the North American Electric Reliability Corporation (NERC). A run-of-the-river portion of hydropower production was estimated based on minimum load requirements and historical operational information for Quebec and New York, respectively.

Consideration of potential transmission limitations

Ontario was modeled as a single electricity pool and the transfer capacity on the interties were assumed to be the same for every hour of the year (i.e., the study did not account for potential transmission constraints or operational limitations within Ontario and the interties).

5.4 KEY STUDY FINDINGS AND CONCLUSIONS

The study and analysis provided the basis on which to identify any correlation between the ETS tariff and export and import volumes, producer and consumer surplus, export revenues, HOEP, market efficiency and emissions. The study also provided a basis on which to assess whether there is a material correlation between the ETS tariff options and SBG events. The following is a summary of some of the key findings and conclusions from the ETS tariff study:

Impact on Export and Import Volumes

Unilateral elimination of the ETS tariff (i.e., Option 4) will contribute to marginal increases in export volumes from the Status Quo but imports are generally less affected on an absolute basis. In the case where the ETS tariff is mutually eliminated in all jurisdictions (i.e., Option 3, Scenario 1), increase in export volumes from the Status Quo are expected to be greater on average; however, import volumes are even more affected because Ontario's neighbours have a higher export tariff to begin with (i.e., all things being equal, external participants will see a greater change in the incremental price differentials between markets with joint elimination of the ETS tariff). For example, under Option 3, Scenario 1, as illustrated in Table 3, in 2010 export and import volumes will increase by as much as 38% and 174%, respectively. On the other hand, an increase in the ETS tariff from the Status Quo will tend to add downward pressure on export volumes. In this regard, as can also be seen in Table 3, Option 2 is expected to add downward pressure on export volumes by as much 35% in 2010 and 46% in 2015.

Producer and Consumer Surplus

Options that are associated with unilateral elimination of the ETS tariff (i.e. Option 4 scenarios 1 & 2) tend to increase producer surplus (i.e., correlates with increased export volumes) and correspondingly reduce consumer surplus resulting from upward pressure on HOEP associated with more export demand. As can be seen in Table 3, under Option 4, scenarios 1 and 2, in 2010 the incremental producer surplus was $102 million and $35 million, respectively. Conversely, under the options where the ETS tariffs are increased or mutually eliminated, this tends to increase consumer surplus and decrease producer surplus. Option 2 involves a unilateral increase in the ETS tariff, consequently reducing external demand for Ontario power which will add downward pressure on HOEP. In addition, given that Ontario's ETS tariff is considerably lower than its neighbours to begin with, reciprocal tariff elimination (i.e., Option 3, Scenario 1) will tend to reduce net exports from Ontario which decreases producer surplus and increases consumer surplus. While mutual elimination of the ETS tariffs also appears to be an attractive option, this will be very difficult to achieve in the near term.

Table 3 - Summary of Incremental ETS Tariff Impacts

ETS Tariff Option	Export Volume (GWh)		Import Volume (GWh)		Producer Surplus ($Millions)		Consumer Surplus ($Millions)	
Test Year	2010	2015	2010	2015	2010	2015	2010	2015
Status Quo	11,715	12,996	5,511	5,259	$5,971	$9,999	-	-
Avg. Embedded Network Rate	-35%	-46%	-33%	-35%	-$214	-$187	$207	$176
Reciprocal Treatment - Joint ETS Tariff Elimination	38%	24%	174%	158%	-$299	-$198	$297	$192
Reciprocal Treatment - Avg. Embedded Network Cost	1%	-1%	3%	-5%	-$14	-$53	-$5	$46
Unilateral ETS Tariff Elimination - All-Hours	7%	10%	14%	6%	$102	$59	-$111	-$56
Unilateral ETS Tariff Elimination - Off-Peak Hours	3%	6%	6%	1%	$35	$20	-$36	-$18

All dollar values are 2008 dollars.

Export Tariff Revenues

ETS tariff revenues rise in the scenarios that involve tariff increases; while this tends to reduce export volume, in general, the reduced exports volumes are offset by the higher tariff revenues (i.e., Option 2 and Option 3, scenario 2);

Impact on HOEP

A lower tariff also results in upward pressure on HOEP because external demand and exports from neighbouring markets are expected to rise. Conversely, as can be seen in Table 4, where there are increases in the tariff this tends to add downward pressure on HOEP.

Table 4 - Summary of Incremental ETS Tariff Impacts

ETS Tariff Option	ETS Tariff Revenues ($Millions)		HOEP ($/MWh)		Market Efficiency ($Millions)		Net Ontario Benefit ($Millions)	
Test Year	2010	2015	2010	2015	2010	2015	2010	2015
Status Quo	$12	$13	$52	$79	-	-	-	-
Avg. Embedded Network Rate	$27	$23	-2.5%	-1.4%	-$7	-$10	$20	$13
Reciprocal Treatment - Joint ETS Tariff Elimination	-$12	-$13	-3.7%	-1.6%	-$1	-$6	-$13	-$19
Reciprocal Treatment - Avg. Embedded Network Cost	$2	$2	-0.2%	-0.4%	-$19	-$7	-$17	-$5
Unilateral ETS Tariff Elimination - All-Hours	-$12	-$13	1.3%	0.4%	-$9	$3	-$21	-$10
Unilateral ETS Tariff Elimination - Off-Peak Hours	-$9	-$10	0.5%	0.2%	-$1	$2	-$10	-$8

All dollar values are 2008 dollars.

Market Efficiency

Establishing the definition of market efficiency enables the IESO to calculate the net incremental benefit to Ontario from each of the ETS tariff option. In this case, the market efficiency was determined based on the allocative efficiency, calculated as the net incremental change in the consumer and producer surplus or the "total surplus". As discussed above, the study results show that there is a relationship between consumer and producer surplus and changes in the ETS tariff.

The overall net incremental Ontario benefit was determined based on the total surplus and ETS tariff revenues; accordingly.

Emissions

It is expected that the potential impacts on SO_2 and NO_x emissions will be relatively minor in all options considered, as a result of the following factors:

- Ontario's policy to close the coal fired generation plants concurrently reduces SO_2 and NO_x emissions well below their regulated caps irrespective of the ETS tariff scenario;
- The US Clean Air Interstate Rule (CAIR) policy restricts the emissions of both pollutants in neighbouring U.S. regions; however, some scenarios show small increases in regional emissions relative to the Status Quo; and
- Under a North American cap-and-trade policy aimed at curbing CO_2 emissions, the ETS tariffs will have no significant effect on North American power system CO_2 emission levels because such a policy would control any CO_2 leakage that may be associated with export and import volumes resulting from a change in the ETS tariff.

Table 5 - Summary of Incremental ETS Tariff Impacts

ETS Tariff Option	Cross-Border Emissions					
	Regional NOx (tonnes)		Regional SOx (tonnes)		Regional CO_2 (thousand tonnes)	
Test Year	2010	2015	2010	2015	2010	2015
Status Quo	790,349	769,716	2,558,569	2,154,373	873,511	858,314
Avg. Embedded Network Rate	-999	-1,052	-5,547	-1,941	304	196
Reciprocal Treatment - Joint ETS Tariff Elimination	-3,143	287	-15,004	-1,678	1,609	2,067
Reciprocal Treatment - Avg. Embedded Network Cost	-327	-449	-905	606	-516	-342
Unilateral ETS Tariff Elimination - All-Hours	-112	-9	-657	1,347	-130	-75
Unilateral ETS Tariff Elimination - Off-Peak Hours	103	68	22	244	-6	34

6.0 Qualitative Assessment

6.1 OPERABILITY AND RELIABILITY IMPACTS

The ETS Tariff study conducted by the IESO also considered the potential reliability and operational implications of each of the ETS tariff options. This analysis involved a review of historical trade patterns under various market conditions as well as a qualitative examination of the potential impacts, on reliability and operation of the IESO-controlled grid, given incremental trade volumes (both increases and decreases) observed with each ETS tariff option. The IESO also reviewed the impact that each ETS tariff option would have on IESO settlement process and the market rules. For the purposes of the assessment, Option 1 – Status Quo, was used as a baseline against which the other options were measured. Although Option 1 is used as the baseline it does not suggest any preference to this option but is simply a means by which to compare the potential changes in trade volumes or impacts associated with each of the other options relative to today's environment.

Assessment

Each of the ETS tariff options was studied with quantitative analysis performed by CRA. From this study each option has been shown to have pricing (HOEP), export revenue, import and export volumes, and market efficiency and emission impacts relative to the Status Quo. Because actual future outcomes will be impacted by changes in, among other things, economic activities, generation resource mix, government policy change (e.g., CO_2), etc. internal and external to Ontario, the IESO's reliability and operational assessment did not rely solely on the findings of the CRA study and analysis. The IESO also relied on its knowledge of historical practices and an understanding of how participants generally react to changing market and system conditions.

In the CRA findings the transactional changes relative to the Status Quo showed, depending on the option, export volume changes which range from a potential reduction of 35% to a 38% increase for the 2010 test period. Correspondingly, import volumes are projected to range from a potential 33% reduction to an increase of up to 174% of current export volume. Year 2015 revealed similar patterns with export volumes ranging from a potential 46% decrease to an increase of 24%, while import volumes range from a potential decrease of 35% to an increase of up to 158%. It is not possible to accurately predict the actual reliability or operational impacts that these changes will have on the integrated power system, given that changes to Ontario trade patterns will likely have an associated cause and effect in respect of the surrounding jurisdictions. In all ETS tariff cases however, a change in trade volumes will result in a change in loop-flows across the system and will also impact the frequency and magnitude of congestion arising from contract path scheduled flows, as well as unscheduled flows. Since market opening, the IESO has witnessed a wide range of transaction scheduling and loop-flows across the interfaces with our neighbours. For example, in 2002 during periods when Ontario was energy deficient, the IESO saw record imports exceeding 4,000 MW per hour, while more recently with the turn in the economy, due to reduced demands and large amounts of surplus base-load generation Ontario has been exporting at unprecedented volumes. In that time Ontario has also experienced a change in loop flow patterns where the predominately and sometimes extreme counter-clockwise Lake Erie circulation has reversed clockwise reaching comparable extremes.

During these dynamic periods of operation, the combination of market and operational responses and processes employed in Ontario has successfully managed reliability effects within the prescribed requirements of the prevailing standards authorities. On reviewing the CRA study, the IESO also observed that the incremental changes in trade volumes attributed to different ETS tariff options fall well within the boundaries of the extremes that have been observed to date; accordingly, they are manageable from a market and reliability perspective. The IESO's dispatch processes are designed to ensure that all transmission and adequacy requirements are maintained within reasonable limits, and the transmission system optimized and resources scheduled and dispatched to account for prevailing transmission limits, including the impact of loop-flow and demand requirements. The CRA study didn't reveal any new challenges that the IESO dispatch and reliability management processes cannot accommodate; accordingly potential operational and reliability impacts are considered manageable.

In reviewing the options under consideration only Option 2 and Option 3, scenario 2 would require market rule changes and Option 3, scenario 2 and Option 4, scenario 2 would require changes to settlement systems or processes. None of the other options considered would require market rule or settlement changes.

6.2 LEGAL AND REGULATORY ASSESSMENT

Qualitative research and analysis was undertaken to assess the potential legal and regulatory implications of each of the ETS tariff options (however, given that Option 3 was deemed to not be feasible mid-way through the study, legal and regulatory assessment of this option was limited)[9]. The research and analysis was carried out to determine whether there are any genuine legal or regulatory related impediments to the selection or implementation of each of the particular ETS tariff options and, among other things, focused on the following specific areas: (i) potential conflicts with existing inter-jurisdictional trade obligations; (ii) compliance issues with respect to domestic electricity export permit and license obligations; and (iii) potential conflicts relating to foreign reciprocal transmission access, tariff design and export principles.

As a result of its qualitative assessment, the IESO is comfortable that none of ETS tariff Options 1, 2 and 4, if implemented, appear likely to hinder Ontario market participant's ability to comply with applicable laws and regulatory practices.

6.3 SURPLUS BASELOAD GENERATION

Surplus base-load generation (i.e., SBG) is a condition that occurs when Ontario's electricity production from base-load resources such as nuclear, wind, non-utility generators (NUGS) and must-run hydroelectric units (e.g. Sir Adam Beck 1 and 2, Decew, and R.H. Saunders) is greater than market demand. Surplus base-load generation periods are typically the result of low demand and may be exacerbated by other conditions such as:

a) spring freshet when hydroelectric stations has limited ability to reduce their generation output;

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[9] The primary basis for limiting further legal and regulatory assessment of Option 3 was twofold:

1) Given that the IESO was unable to secure interest among all the parties to pursue joint elimination of the ETS tariff, Option 3, Scenario 1 is not considered reasonable at this time; and

2) If implemented, Option 3, Scenario 2 would likely result in the Board having to materially depart from the traditional cost of service basis for approving or fixing just and reasonable rates for transmission service.

b) the inability of neighbouring jurisdictions to absorb surplus energy in the form of exports; and

c) high production from intermittent resources such as wind generation.

The issue of SBG was raised by several stakeholders who requested that the IESO consider how each of the ETS options will likely affect SBG outcomes in the future. Initially, this was considered to be outside the scope of the IESO's review; in particular, given the IESO's limited resources. With recent negative pricing in the Ontario market resulting from SBG, this heightened the need for consideration of other ETS tariff options and scenarios and potential impacts on future SBG occurrences. Given this situation, and in response to requests from various stakeholders, the IESO expanded the scope of its review to consider two additional ETS tariff options and to undertake a qualitative review of the potential impacts of each of the options on SBG events.[10]

The study and subsequent analysis shows that, given the assumptions regarding certain factors such as demand forecasts, resource mix, transfer capability and limitations and planned outages, we would not expect any SBG events in either 2010 or 2015 test years. This outcome is a function of the key assumptions that were used in the model. It is extremely difficult (if not impossible) to predict with any reasonable degree of accuracy how these factors are likely to unfold or develop in the future; accordingly, a potentially different outcome could occur if these key factors were to unfold in a materially different way from how they were modelled in the study. The following section summarises the key assessment and assumptions that were used to arrive at this conclusion.

SBG Assessment and Assumptions

For our analysis the IESO used the SBG definition provided in the IESO Operability Report [11] and the simulated market conditions as represented in the CRA NEEM model to assess potential SBG events under each ETS option. The SBG analysis makes the following assumptions:

- Planned nuclear outages are optimally chosen by the model. As a result, these outages tend to occur in the fall/spring and are distributed evenly over the whole month;

[10] Bruce Power agreed to reimburse the IESO for some of the additional cost of studying the potential impacts of the ETS tariff on future SBG events.

[11] IESO Operability Review of OPA's Integrated Power System Plan, Issue 2 available at http://www.ieso.ca/imoweb/pubs/ircp/IESO-Operability_Review_of_IPSP.pdf

- The amount of run-of-the river (i.e., must-run) hydroelectric generation in Ontario during SBG periods varies between 3,100-4,700 MW in 2010 and 3,300-4,900 MW in 2015;
- Wind generation is considered as a price-taking non-dispatchable resource and is used ahead of nuclear generation;
- Combined Heat and Power (CHP) and Non-utility Generation (NUGs) are treated as price-taking non-dispatchable resources and they are also used ahead of nuclear generation; and
- The amount and duration of exports during SBG periods are determined within the model and are driven, in large part, by economical arbitrage opportunities between markets.

Under these assumptions the model selects the least costly set of generation assets that is required to meet a forecasted demand value in each load block. A load block is simply an interval of time that has a fixed demand value (the hours that comprise a load block in NEEM are typically not sequential). Whenever the nuclear generation is backed down across load blocks the analysis identifies potential SBG hours since it would suggest that there is too much base-load generation to meet demand in that block. It should be noted that the analysis and results are merely an indication of the "potential" for SBG to occur, because in reality the IESO generally has a number of control actions at its disposal to minimize the need for manoeuvring base-load resources such as nuclear and run-of-river hydro. Given the assumptions and data inputs which formed the basis of the analysis (e.g., demand, load shape, transfer capability), the study did not find SBG to be of a material concern in the test years 2010 and 2015 for any of the ETS options considered.

Potential Limitations of SBG Analysis

The study simplifies a fairly complex market issue by attempting to predict future expected outcomes (i.e., SBG) based on a set of assumptions about future market conditions and events. From these assumptions, and the input data used, the model produces a set of results. A material change in any of the key inputs or assumptions can therefore have an impact on the outcome of the model. In section 5.3, we also discuss how certain features of the Ontario market were simplified or replicated in the model in order to create a reasonable representation of the integrated power system. This section provides a qualitative assessment of the potential impact on future SBG events resulting from a material change in key input data and assumptions.

Demand Forecast

Future demand is among the most difficult factors to accurately predict. Over time, actual consumption may deviate from forecasted levels due to any number of uncontrollable factors such as weather or economic conditions. Needless to say that the demand forecast is also one of the most significant factors in determining the potential for occurrences of SBG events, their magnitude, and duration and timing of occurrence. As noted, the actual demand forecast used by the IESO in the study is based on the OPA's earlier outlook for the 2010 and 2015 tests years and is of particular importance to the study because they correspond with the OPA's current resource plan for same period. Since this earlier outlook the forecast has not been revised by the OPA to reflect any modifications to its assumptions. In 2009, we are already seeing demand levels which are significantly lower than was earlier forecasted. If this trend continues throughout the 2010 and 2015 test years, all other factors being equal, we would expect to see a higher frequency of SBG events than resulted from this analysis.

Wind Generation Output

In the model, it is assumed that wind production is below nuclear generation in the generation supply stack and is also fixed across each load block. It is also assumed that wind production over test years will mirror that of 2007-2008 actual production profile. In the future, it is possible that wind production profile across Ontario may change and wind resource may be treated differently in the Ontario market; where currently it is treated as a base-load resource that is not responsive to changes in market prices, in particular during periods of surplus base-load resource. If the wind production profile across Ontario changes materially (e.g., increase frequencies when peak wind production coincides with low demand periods), all things being equal, this could contribute to increase occurrences of SBG events. On the other hand, if wind resource was treated as a dispatchable resource or made to be price responsive (e.g., if wind is manoeuvred down when prices are negative), this measure would likely contribute to lower frequencies of SBG occurrences. Deviations in the capacity of Ontario wind builds (versus planned) could also influence the number of SBG occurrences.

Nuclear Outage Schedule

The NEEM model chooses the optimal time for scheduled nuclear outages; it does this in a way which allocates the outages uniformly across the month. For example, it may allocate nuclear outages for the whole month of April to correspond with high hydroelectric production from spring run-offs. In reality the facility may be out of service for only part of the month; consequently, this would have the effect of underestimating the amount of energy that may in fact be generated in the period and the potential frequency of SBG events in the analysis that might otherwise be observed in the period.

Consideration of potential transmission limitations

In balancing demand and resources in the integrated markets, the model selects the optimal amount of net exports based on the price differences between markets. The model doesn't attempt to impose limitations on the interties to account for potential transmission outages, congestion or contingencies that could actually occur in real-time. This has the effect of showing potentially higher exports than might otherwise be reasonable if the interties were in fact restricted or de-rated in real time. For example, the study results show exports in certain circumstances in excess of 5,000 MW; in particular, during low demand periods in 2010 and 2015 (i.e., the lower demand periods usually correlates with the highest differential price periods). While we don't have any reason to believe this will not occur in the future, we are cognizant that the analysis doesn't take into consideration transmission limitations that could in fact occur during the period. Lower levels of exports than that considered by the model due to transmission limitations will have the effect of increasing the occurrences of SBG events, as well as impact the magnitude and periods of when these occur.

6.4 SUMMARY OF IMPLEMENTATION IMPACT TESTS

As noted earlier, the qualitative reviews were aimed at testing whether there would be any regulatory or legal impediments to the selection or implementation of the tariff, or that would create any operational challenges in the administration of the electricity markets or maintaining the reliability of the IESO-controlled grid. The summary results of the qualitative assessments are set out in the following table.

Table 6 - Summary of Implementation Impact Tests

ETS Tariff Option	Implementation Impact Tests			
	Operations & Reliability	Regulatory & Legal	Surplus Base-load Generation Events	
			2010	2015
Status Quo	Impacts manageable. No rules or settlement changes required.	Regulatory and legal tests are satisfied.	Limited	Limited
Avg. Embedded Network Rate	Potential impacts manageable. Market Rules amendment required.	Regulatory and legal tests are satisfied.	Moderate	Moderate
Reciprocal Treatment - Joint ETS Tariff Elimination	Potential impacts manageable. No rules or settlement changes required.	Regulatory and legal tests are satisfied.	Limited	Limited
Reciprocal Treatment - Avg. Embedded Network Cost	Potential impacts manageable. Market Rules and settlement changes required.	Appears to be in conflict with traditional "cost of service" principles for approving or fixing just and reasonable rates.	Moderate	Moderate
Unilateral ETS Tariff Elimination - All-Hours	Potential impacts manageable. No rules or settlement changes required.	Regulatory and legal tests are satisfied.	Limited	Limited
Unilateral ETS Tariff Elimination - Off-Peak Hours	Potential impacts manageable. No rules changes required; however, minor settlement changes required.	Regulatory and legal tests are satisfied.	Limited	Limited

Appendix A – Export Transmission Service (ETS) Tariff Scenario Analysis – Final Report and Findings, July 30, 2009.

Appendix B – List of Stakeholder Working Group Participants

Appendix C - Summary of Stakeholder Feedback

Export Transmission Service (ETS) Tariff Scenario Analysis

Final Report and Findings

Prepared for
Independent Electricity System Operator

July 30, 2009

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Key Study Objectives

- Assess and analyse the potential incremental impact of each ETS tariff option with respect to:
  - Hourly Ontario Energy Price (HOEP);
  - Export Revenues
  - Export and Import Volumes; and
  - Market Efficiency (i.e., total consumer and producer surplus)
- Aim is not to optimize these parameters; rather, to ascertain the potential incremental impact of each option on these key parameters.
- Observe and analyse potential incremental impacts on environmental emissions (i.e., SO_2, NO_x and CO_2) in the region attributed to each ETS tariff option.

General Conclusions

- ETS tariff options such as the *average embedded network rate* and the modeled *reciprocal treatment* tend to increase consumer surplus and decrease producer surplus
  - The average embedded network rate scenario involves a unilateral increase in the ETS tariff, consequently reducing external demand for Ontario power, and reducing the HOEP
  - Because Ontario has a lower export tariff than its neighbours, reciprocal tariff elimination reduces net exports from Ontario, decreases producer surplus, and increases consumer surplus.
- ETS tariff options such as *unilateral tariff elimination* tend to increase producer surplus and decrease consumer surplus
- Ontario’s ETS revenues increase in the scenarios that involve ETS tariff increases
- Impacts on SO2 and NOx emissions are small as a result of:
  - Ontario’s CO2 policy concurrently reduces those emissions well below their regulated caps irrespective of the ETS tariff scenario
  - The US Clean Air Interstate Rule (CAIR) policy restricts the emissions of both pollutants in neighbouring U.S. regions.
  - However, some scenarios show small increases in regional emissions relative to the status quo (but all scenarios are well below their caps)
- Under a North American cap-and-trade policy for CO2 emissions, the ETS tariff scenario will have no significant effect on North American power system CO2 emissions (because emissions would be set by the cap)

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Limitations of Analysis

- Contracted generator arrangements and obligations for the most part have been modeled with limited detail (i.e., with the exception of NUG/CHP resources)
- Strategic bidding behaviour within Ontario and within Ontario's neighbouring regions has been modeled in only a rudimentary fashion
  - Peaking gas units' bids are inflated to reflect strategic bidding on-peak
  - Coal units' bids are reduced to reflect bidding behaviour off-peak
- Implications of potential changes in uplift charges, and their consequential impacts on export/import transactions are not considered
- Limited understanding of hydropower output shape in Quebec and New York
- Some potential transmission constraints into, out of, and inside of Ontario are not modeled. No internal constraints are modeled.

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Unit characteristics - coal

Unit	Summer MW	Heat Rate (Btu/kWh)	SO2 Controls	NOx Controls
Atikokan GS 1	211			
Lambton GS 1	485			
Lambton GS 2	485			
Lambton GS 3	475		FGD	SCR
Lambton GS 4	475		FGD	SCR
Nanticoke 1	440			
Nanticoke 2	440			
Nanticoke 3	460			
Nanticoke 4	440			
Nanticoke 5	460			
Nanticoke 6	460			
Nanticoke 7	480			SCR
Nanticoke 8	480			SCR
Thunder Bay GS 2	155			
Thunder Bay GS 3	155			
Capacity-weighted Average	6,101			

Sources: Ventyx Velocity Suite and IESO.

Note: Heat rates are considered confidential information; accordingly, these are not disclosed.

Unit characteristics (2007) - other

Technology	Summer MW	Capacity-weighted Average Heat Rate (Btu/kWh)
Nuclear	11,504	10,500
Natural Gas Combined-Cycle	3,065	7,691
Natural Gas Combustion Turbine	397	12,257
Peaking Oil	1,070	11,000
Steam Turbine Gas/Oil	2,120	9,891
Hydroelectric	7,935	N/A
Wind Turbine	396	N/A
Other Renewables	93	N/A

Note: Non-coal units are aggregated in CRA's NEEM model. Combined-cycle units are grouped into two or three tiers (depending on year) and combustion turbines into two tiers. Tiers are based on heat rate, in-service year, and operational characteristics (NUGs are in their own tier).

Sources: Ventyx Velocity Suite and IESO.

Key assumptions

	Notes	2007	2010	2015
Load	Ontario electricity demand, in TWh	152	159	165
Peak/Min Demands*	Peak/Min hour electricity demand, in MW	25,737 / 11,798	26,986 / 10,937	28,099 / 11,350
Hydro Output	Annual total of hydro-generated electricity, in GWh	33,400	36,734	39,225
SO_2 Cap	Ontario cap on SO_2 emissions, in kilotonnes	127	127	127
NO_x Cap	Ontario cap on NO_x emissions, in kilotonnes	41.3	41.3	41.3
CO_2 Cap	Ontario cap on CO_2 emissions from **coal –fired power plants**, in million metric tons	None	15.6	coal retired
Nuclear POD**	Annual planned outage days for Ontario nuclear fleet	altered to target 2007 nuclear generation	39	36
Nuc. Forced Outage Rate**	Annual forced outage rate for Ontario nuclear fleet		3.5%	3.4%

Source: IESO data

* Minimum demand is expressed for the minimum load block in the NEEM model. Therefore, *it is not the true lowest demand for the year.*

** Nuclear POD and forced outage rate reflect a capacity-weighted annualized rate calculated from IESO reliability assessment data

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Key Transfer Limits

FROM	TO	Transfer Limit (MW)
Ontario	Quebec	1,600 (only 350 MW in 2007)
Ontario	New York + PJM via NY PJM via NY	1,450 1,050
Ontario	Michigan + PJM via Michigan	2,150
Ontario	Manitoba	274
Ontario	Minnesota	140
Quebec	Ontario	1,600 (only 350 MW in 2007)
New York + PJM via NY	Ontario	1,550
Michigan + PJM via Michigan PJM via Michigan	Ontario	1,800* 1,500*
Manitoba	Ontario	342
Minnesota	Ontario	90

*** PJM-to-Michigan + Michigan-to-Ontario is limited to 3,000 MW. For example, if 1,201 MW is transferred from PJM to Michigan, only 1,799 MW can be transferred from Michigan to Ontario.**

Forecasted Ontario hydro output by month was provided by the IESO

Hydro Energy On-peak and Off-peak

Month	On/Off-Peak	MWh 2010	MWh 2015
Jan	Off-Peak	1,507,276	1,580,781
Jan	On-Peak	1,427,344	1,650,064
Feb	Off-Peak	1,310,327	1,467,978
Feb	On-Peak	1,351,465	1,527,088
Mar	Off-Peak	1,304,916	1,592,998
Mar	On-Peak	1,645,621	1,710,196
Apr	Off-Peak	1,533,539	1,649,420
Apr	On-Peak	1,580,534	1,729,833
May	Off-Peak	1,959,169	2,027,629
May	On-Peak	1,720,857	1,807,942
Jun	Off-Peak	1,449,395	1,502,878
Jun	On-Peak	1,797,971	1,907,897
Jul	Off-Peak	1,442,111	1,456,945
Jul	On-Peak	1,615,329	1,763,502
Aug	Off-Peak	1,347,874	1,494,490
Aug	On-Peak	1,514,388	1,494,371
Sep	Off-Peak	1,267,121	1,331,106
Sep	On-Peak	1,431,909	1,508,148
Oct	Off-Peak	1,542,192	1,547,099
Oct	On-Peak	1,496,555	1,631,385
Nov	Off-Peak	1,432,817	1,574,989
Nov	On-Peak	1,776,502	1,802,899
Dec	Off-Peak	1,591,419	1,696,968
Dec	On-Peak	1,687,533	1,768,231
TOTAL		36,734,162	39,224,839

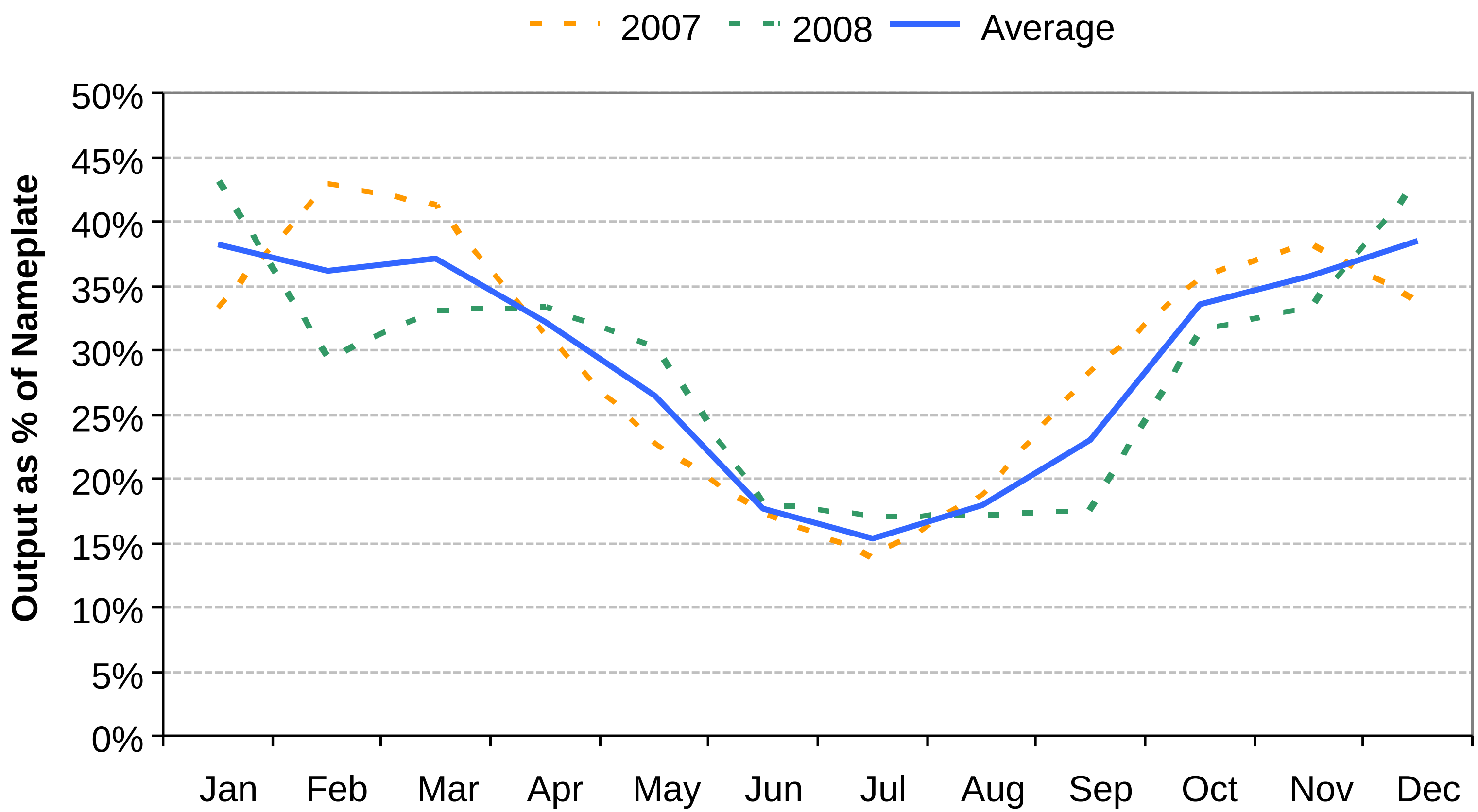
Source: IESO

Run-of-River Hydro Output (corresponds to off-peak output)

MW	2010	2015
Jan	3,621	3,797
Feb	3,485	3,904
Mar	3,135	3,827
Apr	3,807	4,094
May	4,706	4,871
Jun	3,598	3,731
Jul	3,464	3,500
Aug	3,238	3,590
Sep	3,145	3,304
Oct	3,705	3,716
Nov	3,557	3,910
Dec	3,823	4,076

Note: The hydro energy output is met by a combination of run-of-river resources and hydro resources that are economically optimized by NEEM. The maximum possible (combined) hydro output is about 7900 MW and 8700 MW in 2010 and 2015, respectively.

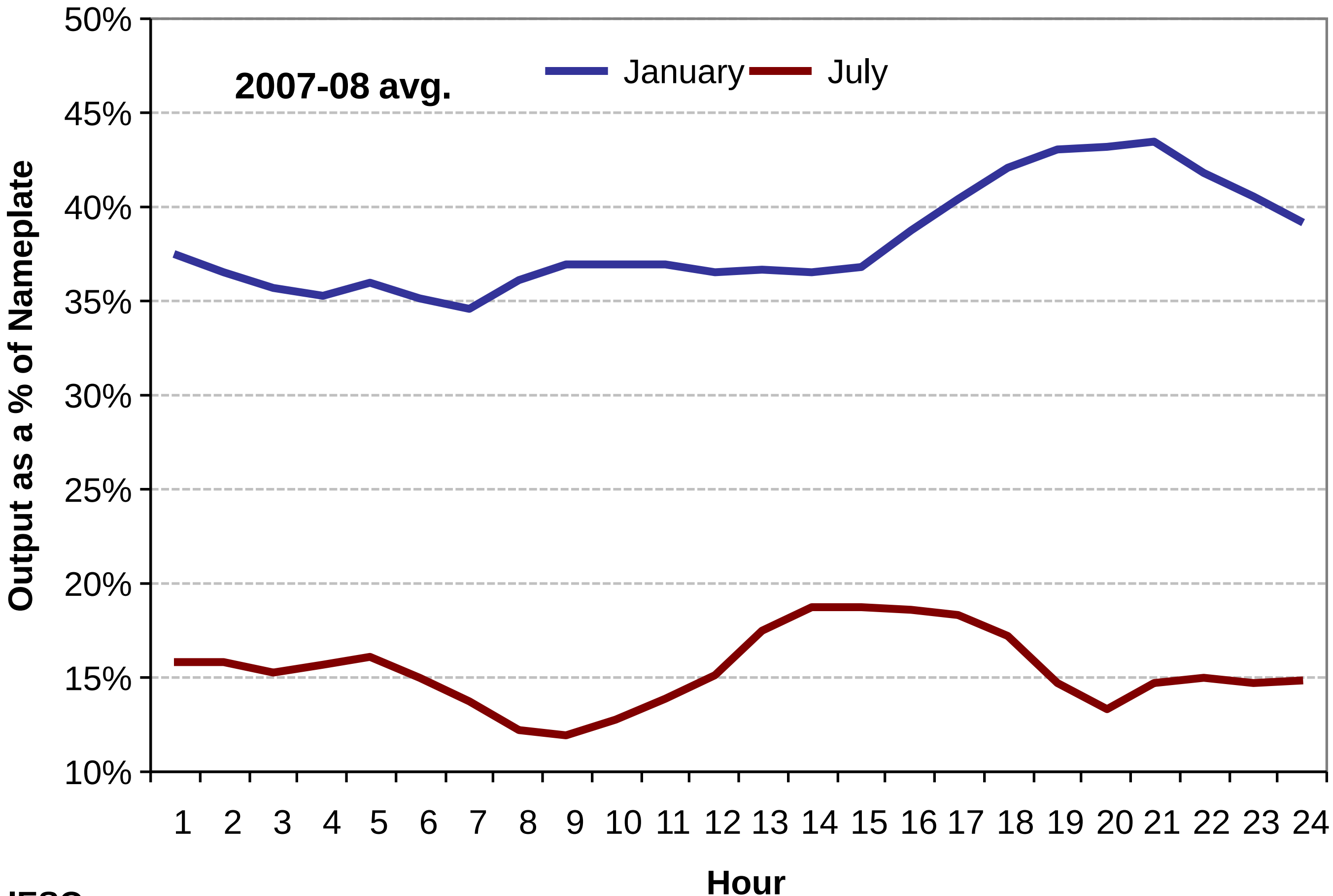
Wind output assumptions (monthly) are based on historical data



Source: IESO

Ontario wind output in NEEM reflects an average of historical wind resource performance.

Wind output assumptions (diurnal variation in winter and summer)

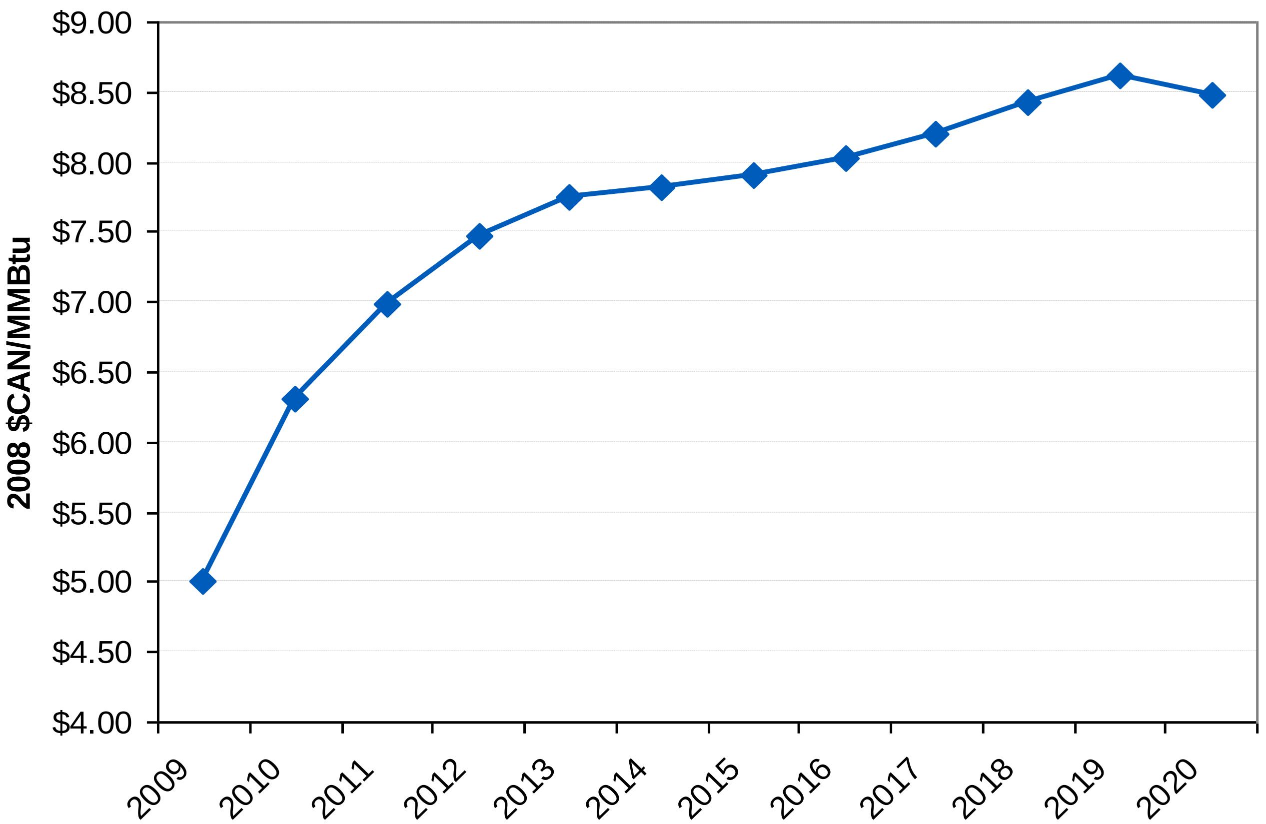


Source: IESO

Summer and winter output levels and shapes are different.

Key Assumptions

Natural gas delivered prices to Ontario power plants



Henry hub prices are based on a blend of NYMEX futures (April 1, 2009) and Energy Information Administration's Annual Energy Outlook (AEO) 2009 forecast. A regional basis differential adjusts the AEO forecast to Ontario delivered prices.

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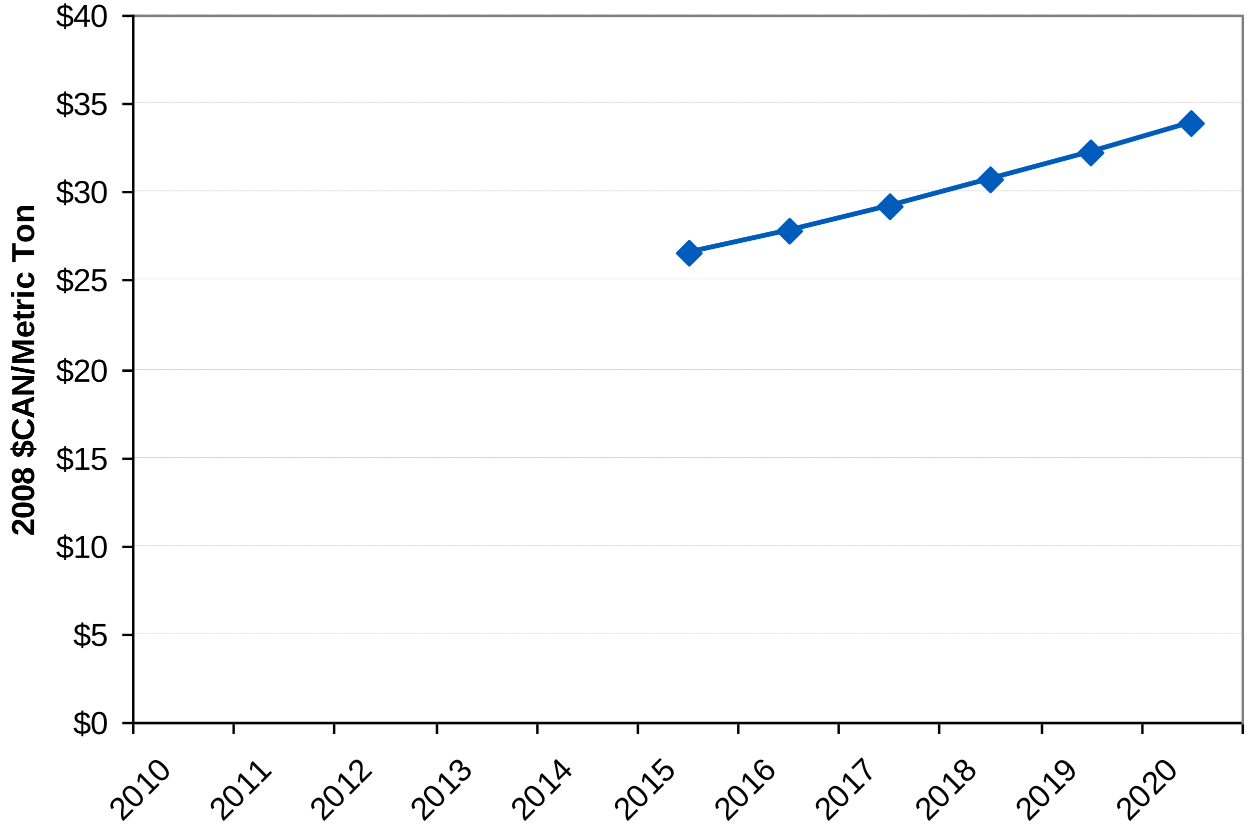
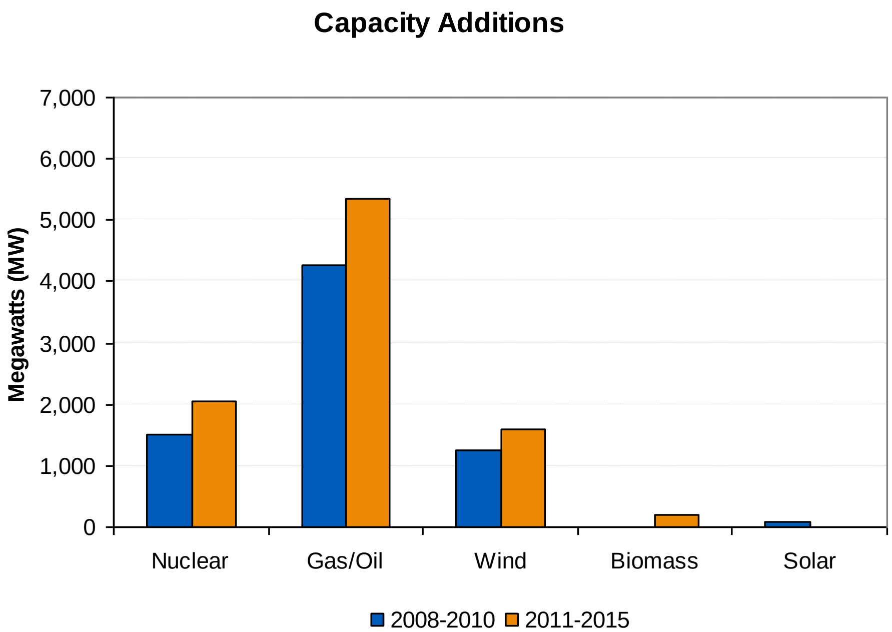
North-American CO2 policy affects 2015 assessment



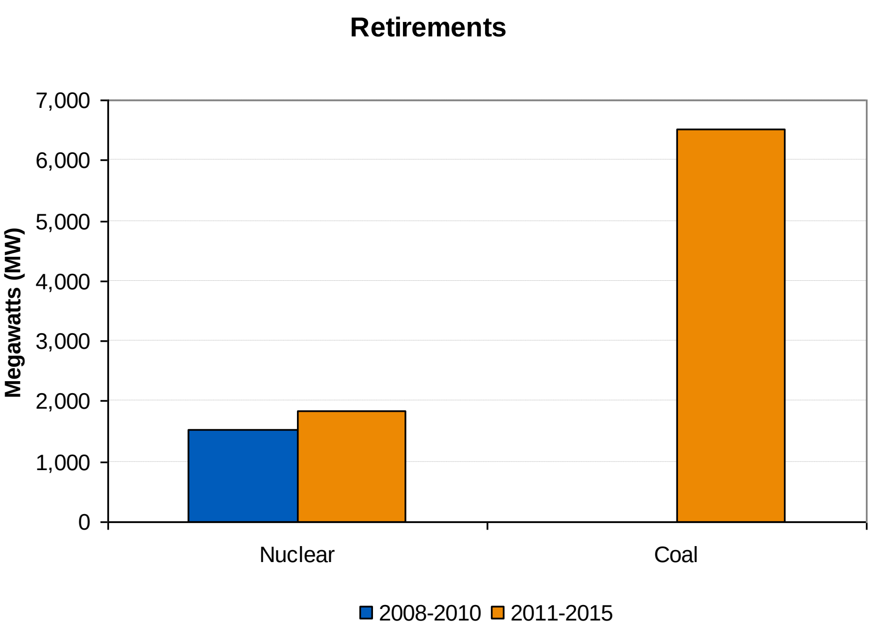
North-American carbon policy is assumed to start in 2015 at a CO_2 price of $26.53/tonne (2008 CAN$), escalating at 5% real.

New build and retirement schedule (by 2010 and *during* 2011-2015)



Notes: (1) Although NEEM was allowed to select economic additions, it did not choose any over or above IESO's reported planned builds/retirements schedule

(2) Gas/oil retirements were determined by the model; many of these resources remained only for capacity reasons but did not generate energy



Gas, nuclear, and wind comprise the majority of new capacity in transition to low-emissions fleet.

Calculation of Changes in Consumer Surplus and Producer Surplus (*focus on Ontario producers and consumers only*)

Change in Consumer Surplus in any block* = (Price $_{\text{status quo}}$ – Price $_{\text{scenario}}$) * block demand

Total change in Consumer Surplus ➔ sum across the 120 blocks

Change in Producer Surplus in any block = change in energy margin for all Ontario units

[Energy margin = Energy Revenue less all variable costs (e.g., fuel, variable operating and maintenance costs, and allowance costs, etc.)]

Total change in Producer Surplus ➔ sum across the 120 load blocks

*** The CRA NEEM model divides the annual load curve into 120 blocks. There are 10 blocks in each month. The loads are sorted from highest to lowest (within each month) and are not necessarily sequential.**

Status Quo Economics (facilitates understanding of changes under the various scenarios reported subsequently)

- **2010 Producer Surplus = $5,971 (Million 2008 CAN$)**
- **2015 Producer Surplus = $9,999 (Million 2008 CAN$)**

- ***Status quo consumer surplus cannot be reported because load is fixed (demand is perfectly inelastic), so consumer surplus cannot be measured***

- **2010 ETS Tariff Revenue = $12.0 (Million 2008 CAN$)**
- **2015 ETS Tariff Revenue = $13.5 (Million 2008 CAN$)**

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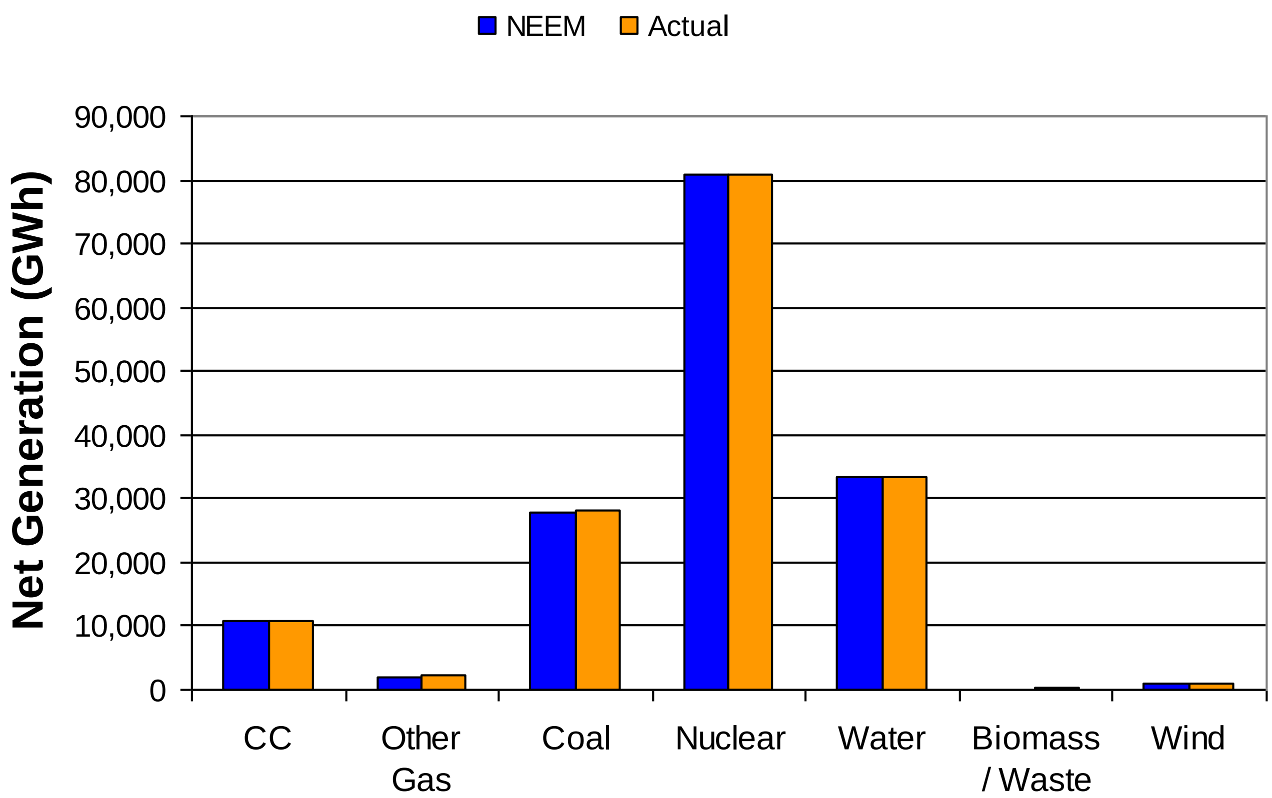
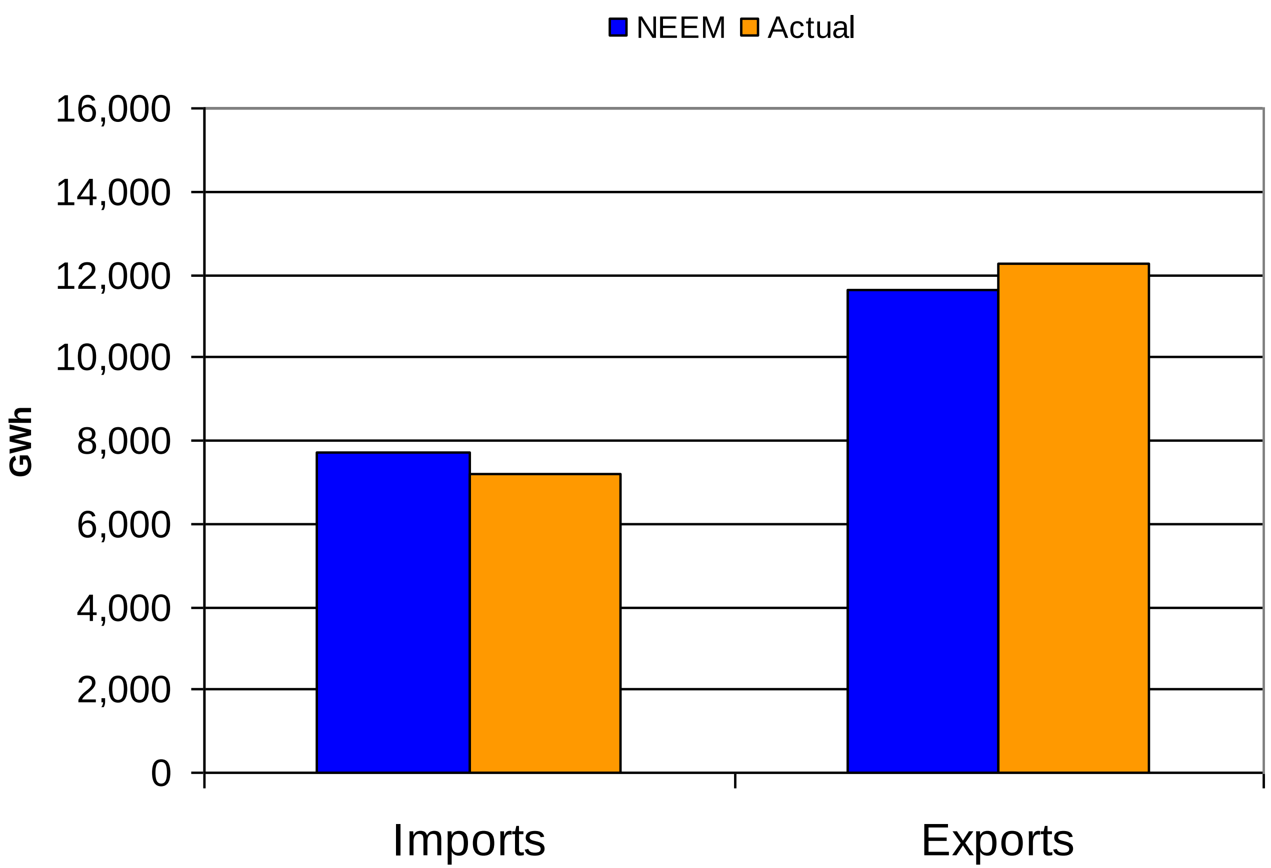
Generation Calibration - 2007

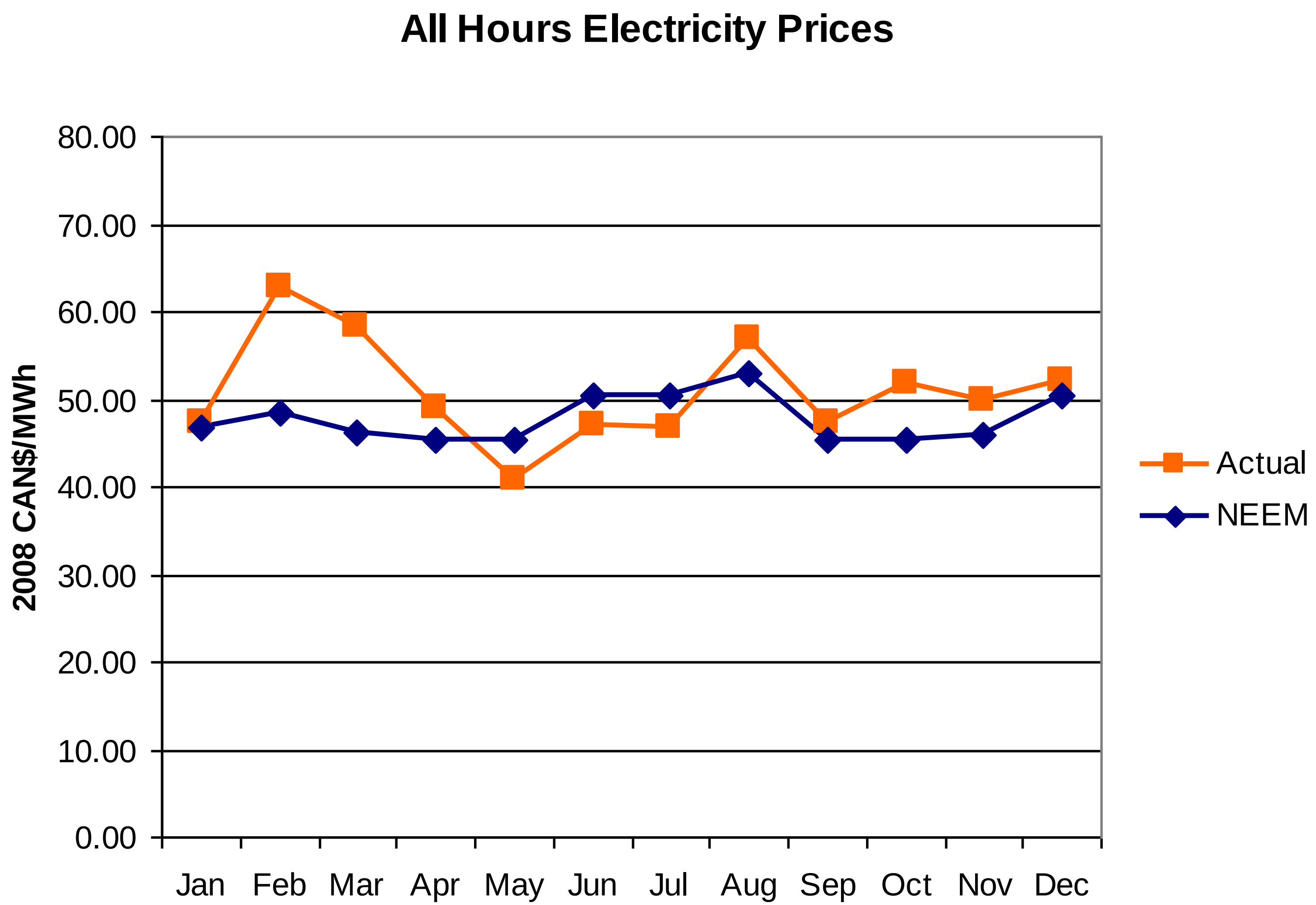


Coal bids are calibrated to roughly match generation. NUGs (included in CC or Combine-Cycle) are assumed to operate with 74% capacity factor. Other Gas is bid down by 25-35% percent. In 2010 and 2015, the Coal/Gas adjustments are the same except Other Gas is not bid down because of expected contractual changes (i.e., Lennox RMR Agreement). In 2010 and 2015, CHP is projected to operate at 42% capacity factor.

Import/Export Balance Calibration - 2007

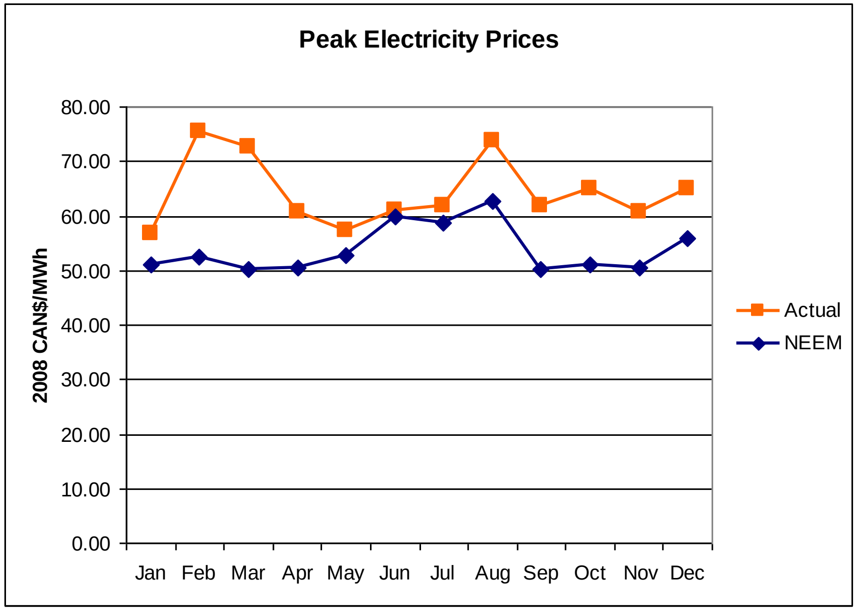


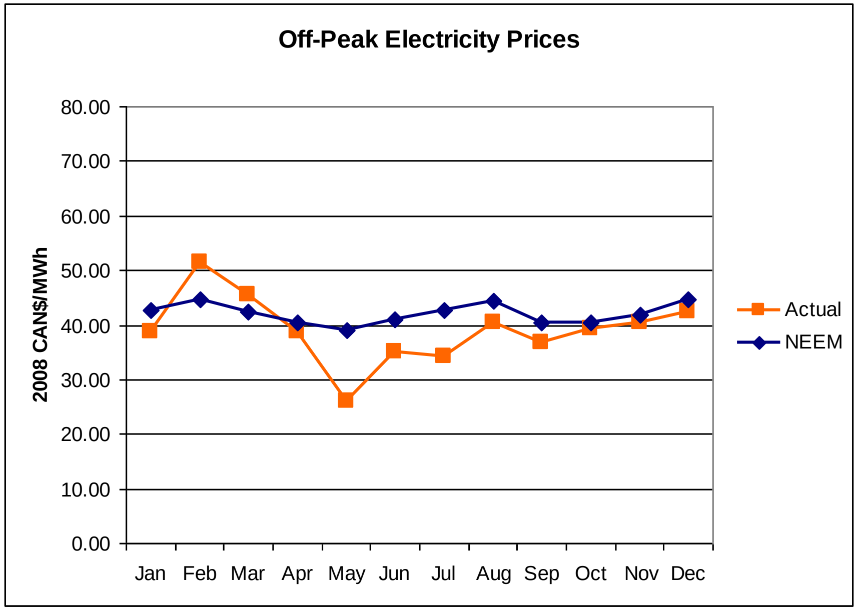
All-Hours Prices Calibration



NEEM-projected all-hours prices are quite close to actual (with the exception of February and March). In these two months (especially February), even though actual Ontario prices are high, actual exports were high and imports were low.

Peak and Off-peak Prices Calibration





On-peak prices from production cost models (like CRA's NEEM Model) typically are lower than real-world on-peak prices. Production cost models anticipate load and generator outages perfectly and hence do not have periods when units that are otherwise available are not committed. In the real world, these unit commitment errors result in peakers running more than they would otherwise (increasing on-peak prices). Similarly, production cost models tend to have off-peak prices that are higher than actual prices because they do not capture the off-peak bidding behaviour of base load units. Base load units often offer capacity at prices below marginal cost to remain on-line during low load periods.

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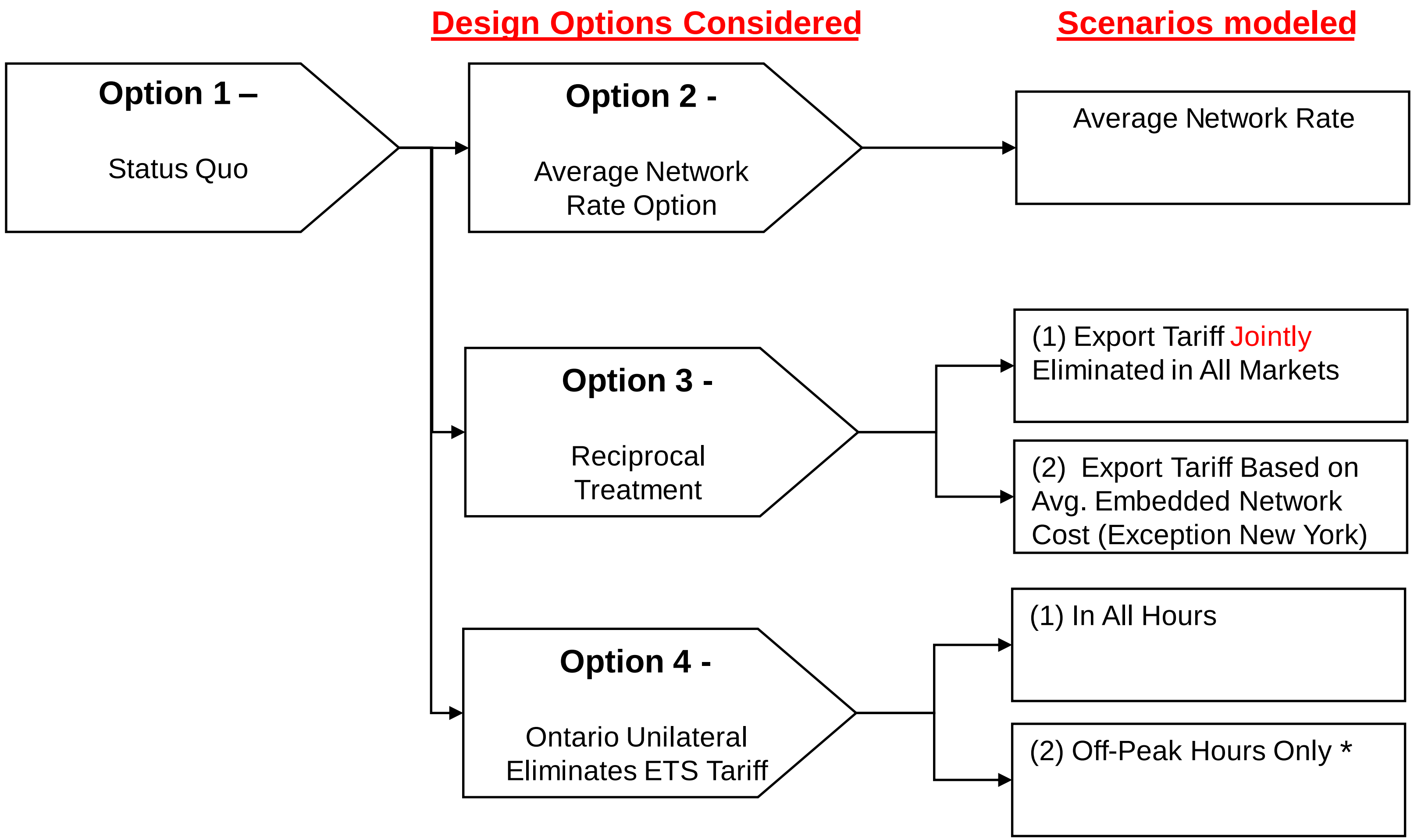
ETS Tariff Design Options and Scenarios Considered



* On-peak is 5x12 basis for this scenario.

See Appendix B for more detail on the ETS tariff and all-in costs scenarios considered.

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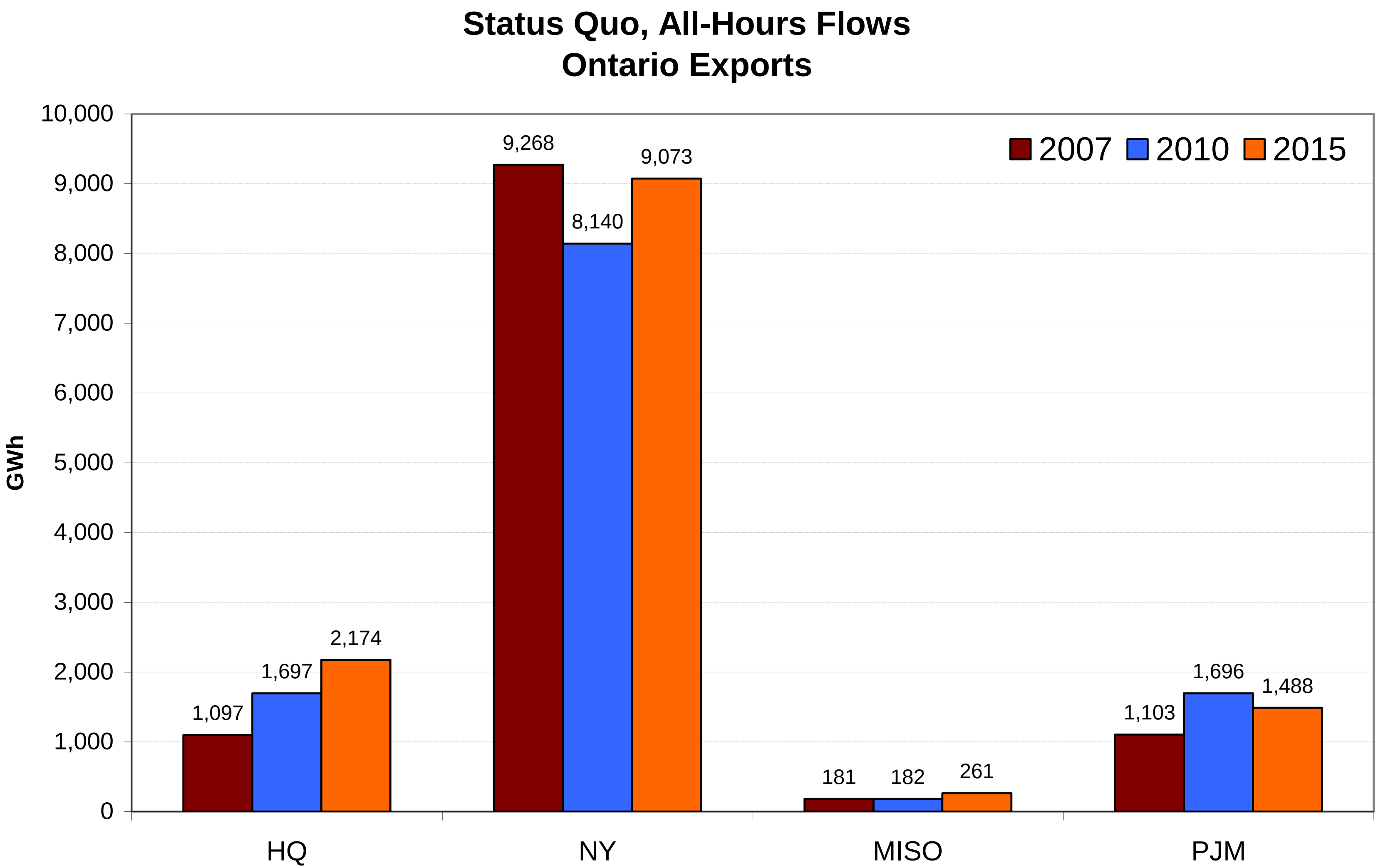
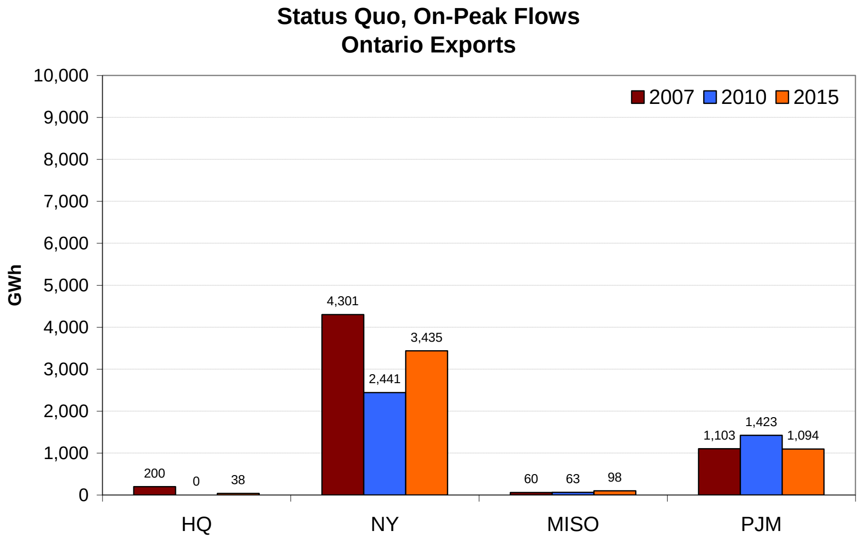
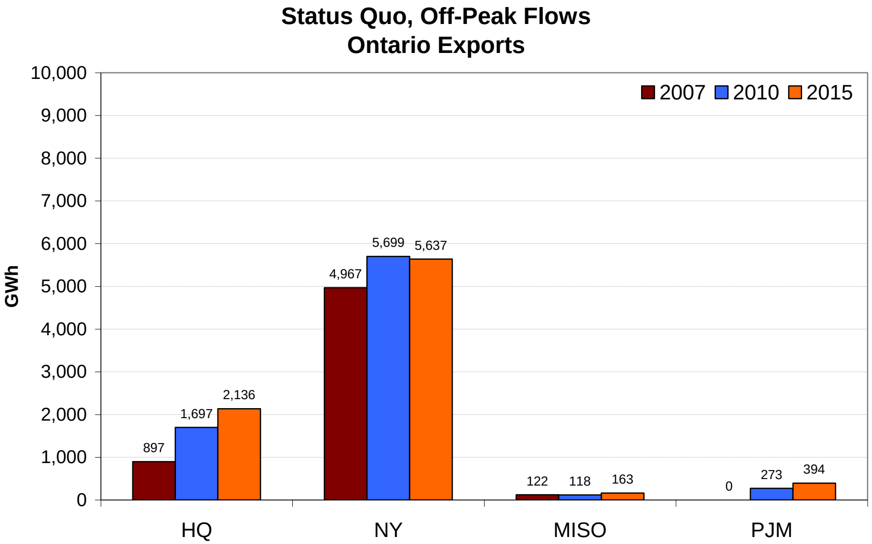
Observation: Exports are predominantly to NYISO



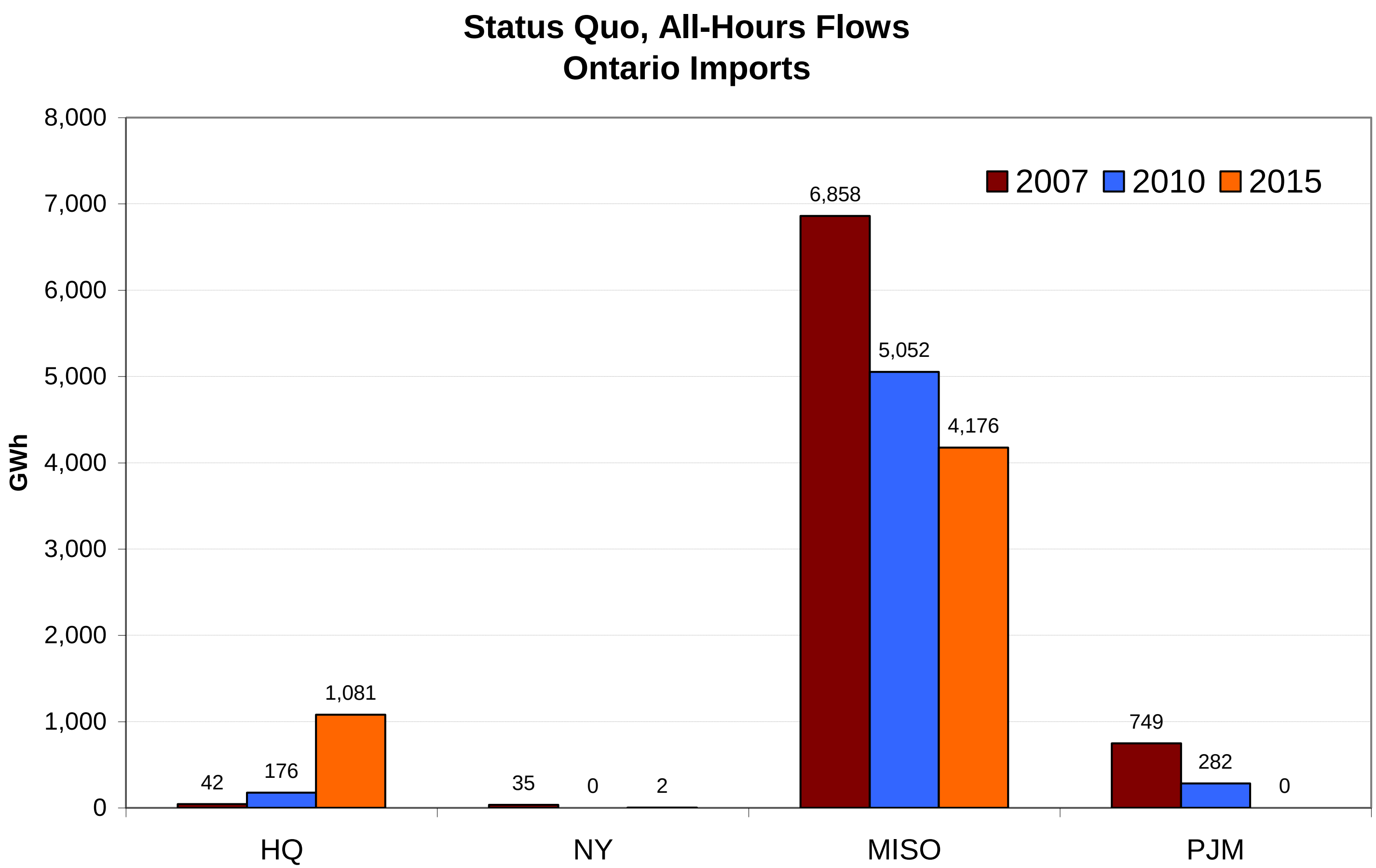
Status Quo Exports: On-Peak and Off-Peak



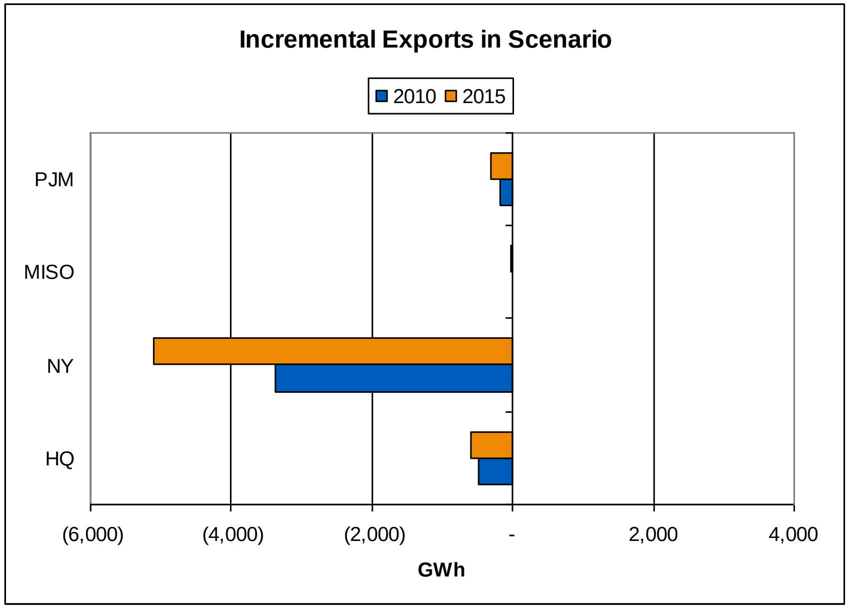


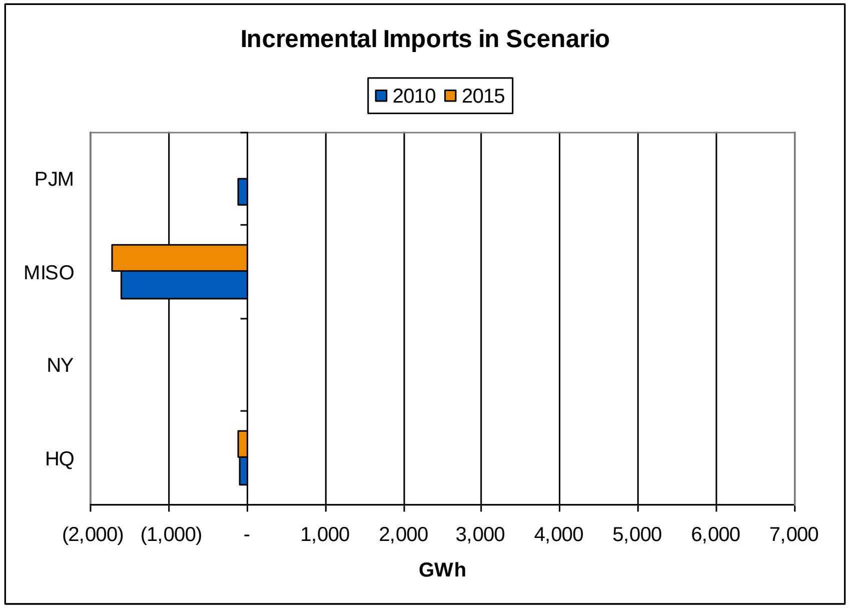
Exports to Quebec are primarily off-peak.

Observation: Imports are predominantly from PJM/MISO



Option 2 (average network rate option)

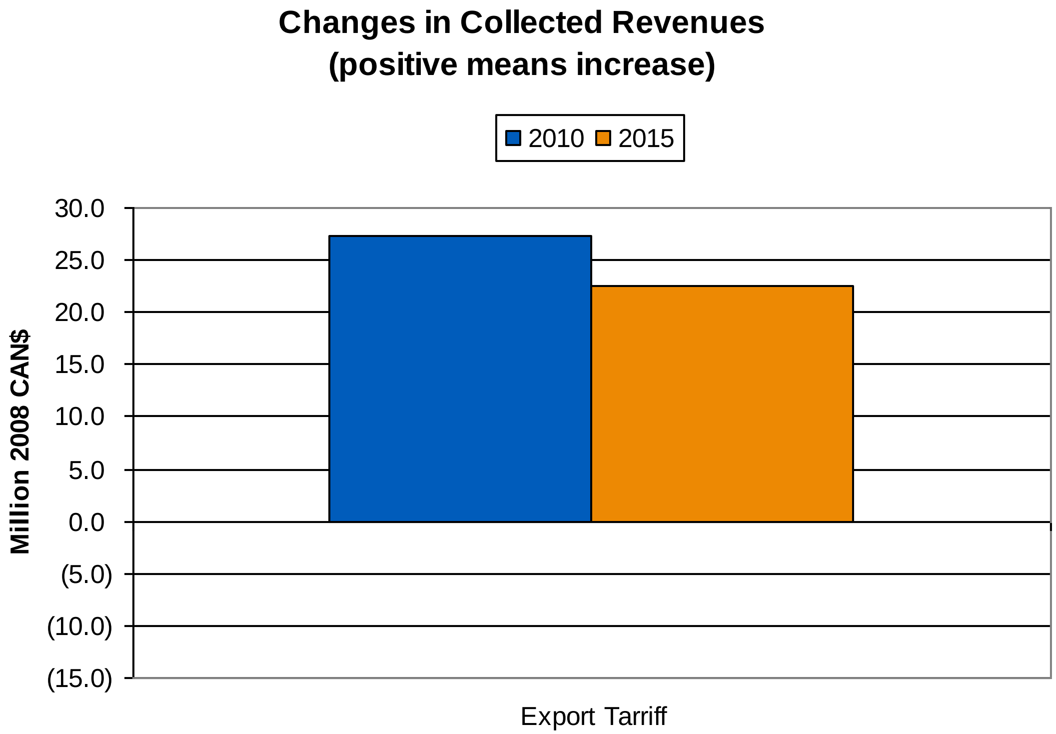




Year	Change in Total Exports from Status Quo	Change in Total Imports from Status Quo
2010	(35%)	(33%)
2015	(46%)	(35%)

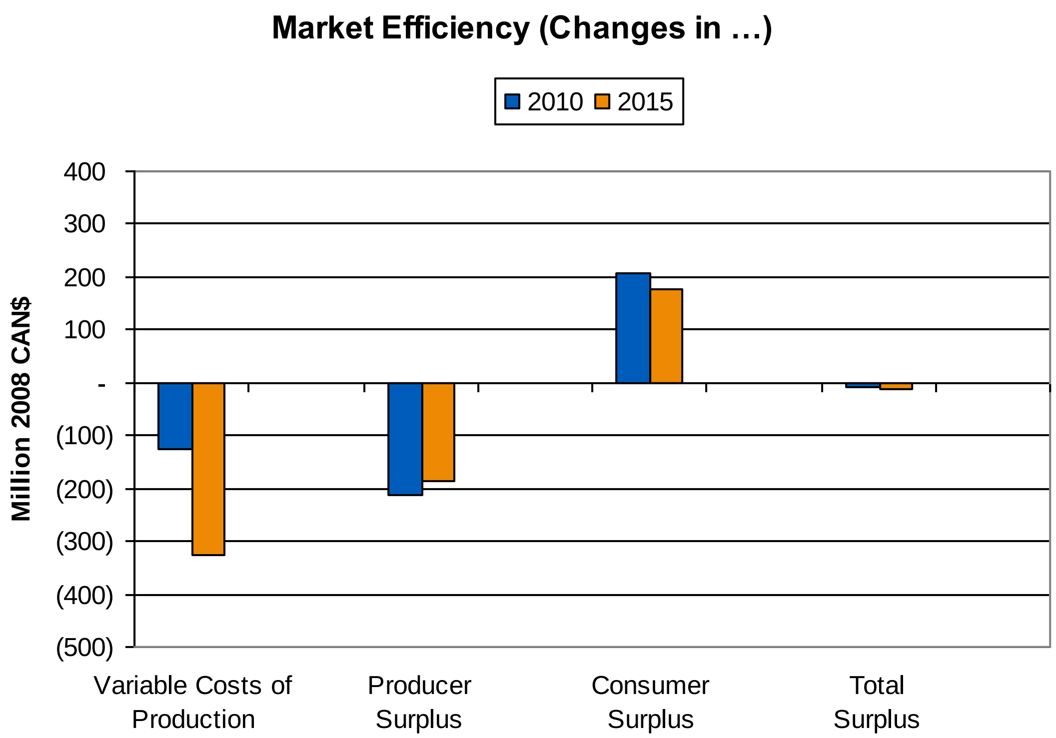
Observation: Exports are reduced because of the increased ETS tariff. Imports are less affected on an absolute basis.

Option 2 (average network rate option)



Observation: A reduction in export volume is more than offset by the higher ETS tariff; accordingly, there is an increase in ETS tariff revenues.

Option 2 (average network rate option)



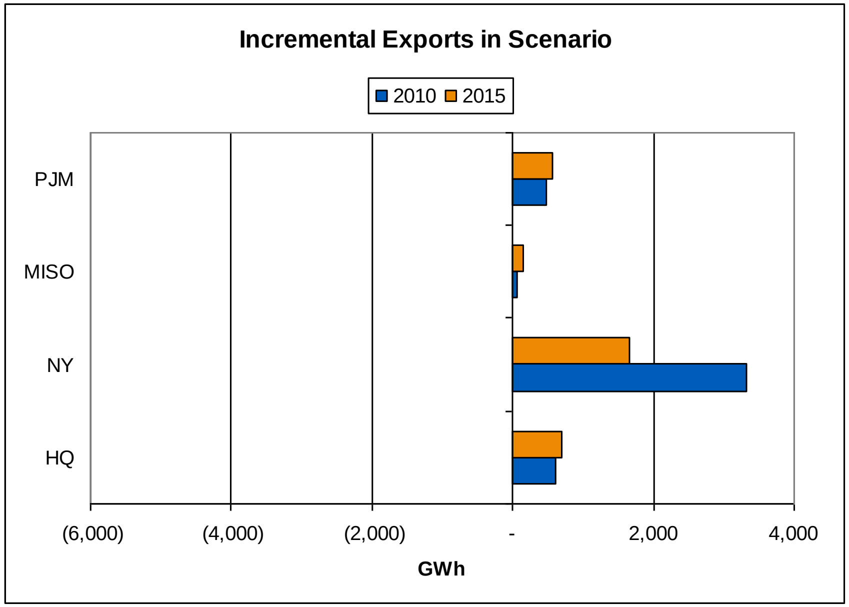
Observation: A unilateral increase in the ETS tariff reduces producer surplus (through reduced exports) but increases consumer surplus by lowering prices (i.e., there is less upward pressure on prices due to reduction in external demand).

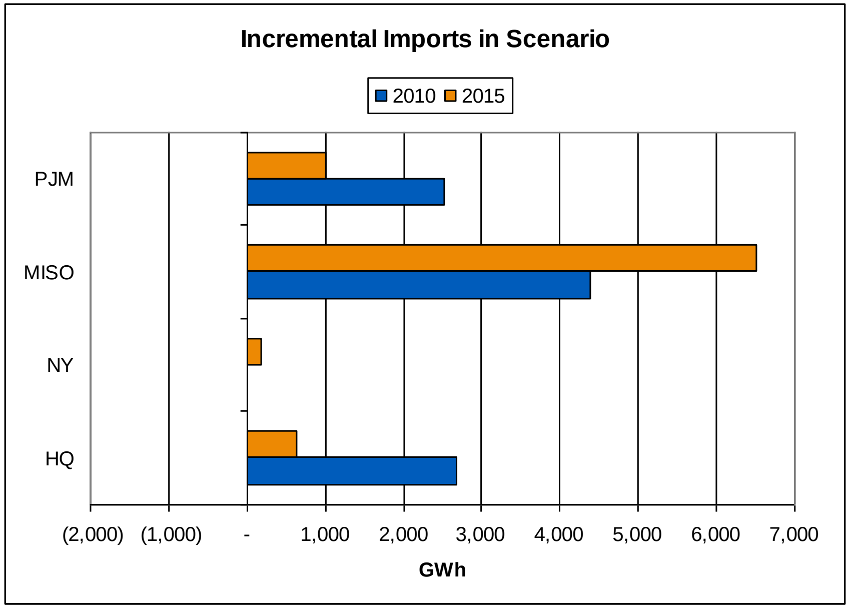
Option 2 (average network rate option)

	Change in Electricity Prices Relative to Status Quo		
Year	**All-Hours**	**Peak**	**Off-Peak**
2010	(2.5%)	(1.9%)	(3.2%)
2015	(1.4%)	(1.2%)	(1.7%)

Observation: Prices are lower because the increased ETS tariff dampens external demand.

Option 3, Scenario 1 (reciprocal treatment, ETS tariff jointly eliminated)

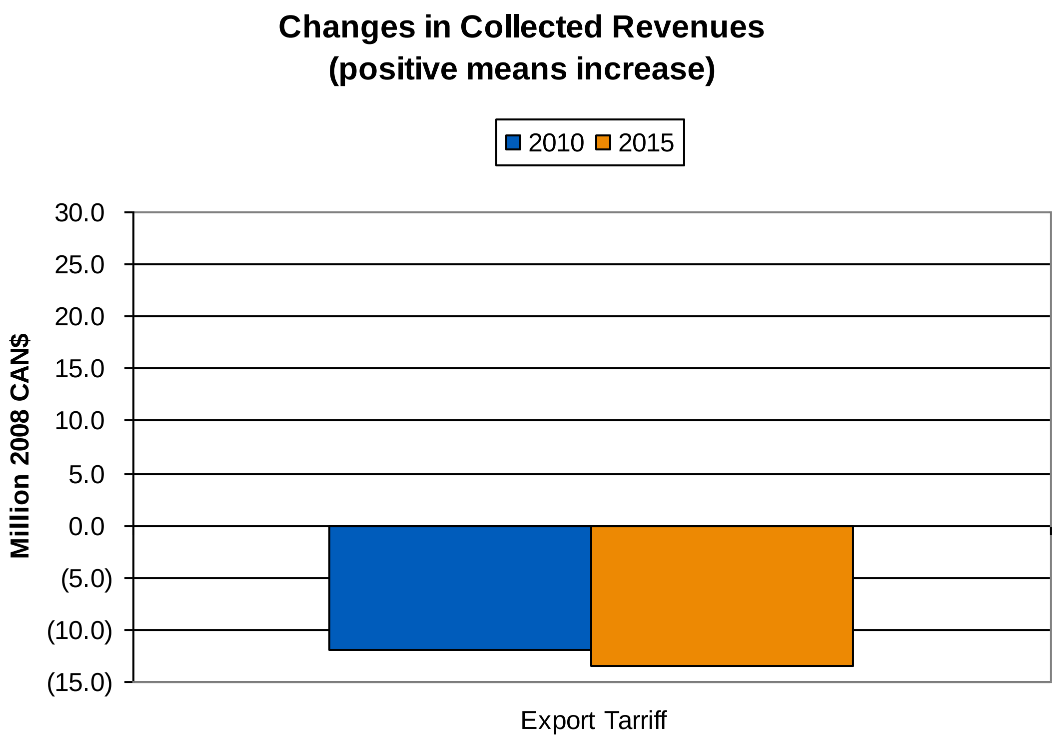




Year	Change in Total Exports from Status Quo	Change in Total Imports from Status Quo
2010	38%	174%
2015	24%	158%

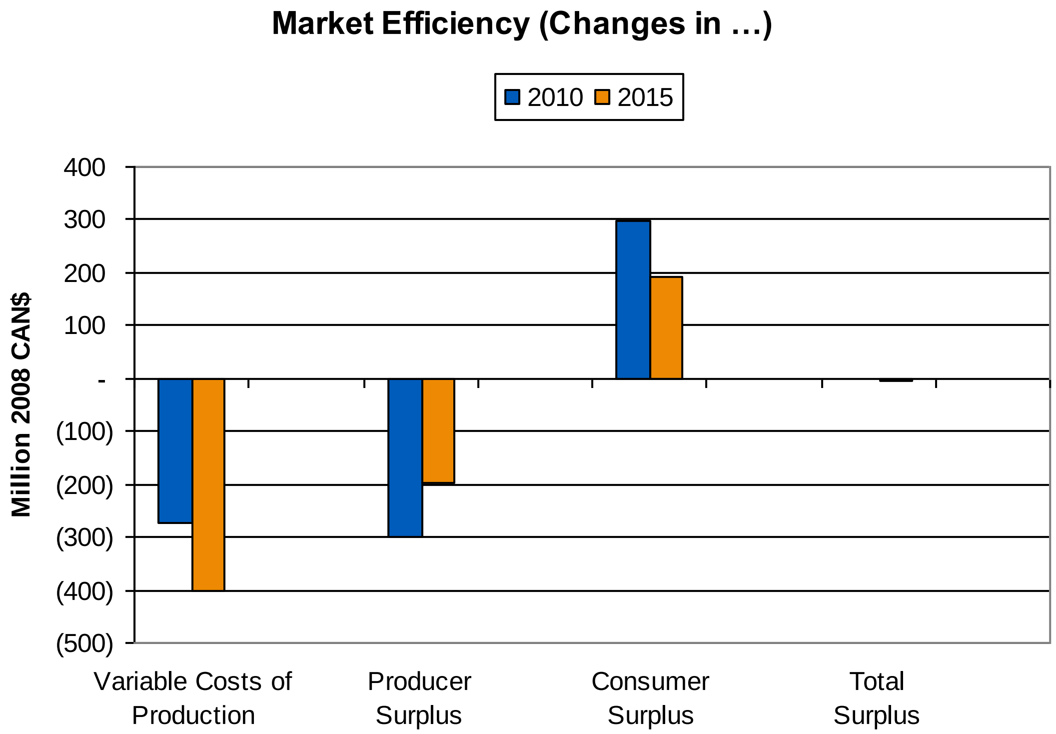
Observation: Reducing Ontario's ETS tariff to zero has a relatively small impact on exports because the tariff is low in status quo. However, imports to Ontario are more affected because Ontario's neighbours have a higher export tariff to begin with in status quo.

Option 3, Scenario 1 (reciprocal treatment, ETS tariff jointly eliminated)



Observation: ETS tariff revenue is reduced to zero when the tariff is eliminated.

Option 3, Scenario 1 (reciprocal treatment, ETS tariff jointly eliminated)



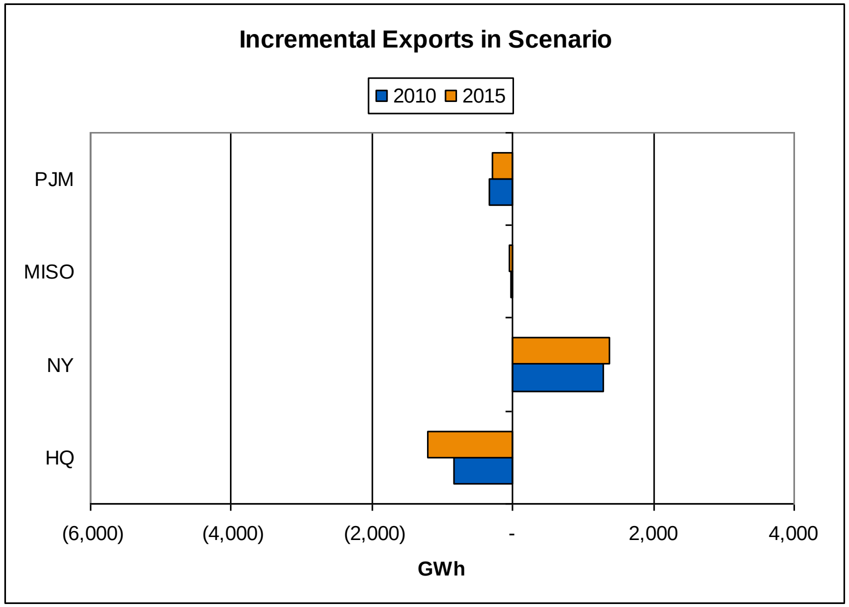
Observation: Since Ontario's neighbours' export tariffs are higher to begin with (i.e., in status quo), Ontario's net exports (after tariff is eliminated) decrease and therefore producer surplus decreases. Consumer surplus increases as imports are subject to lower tariffs when exiting Ontario's neighbours' systems.

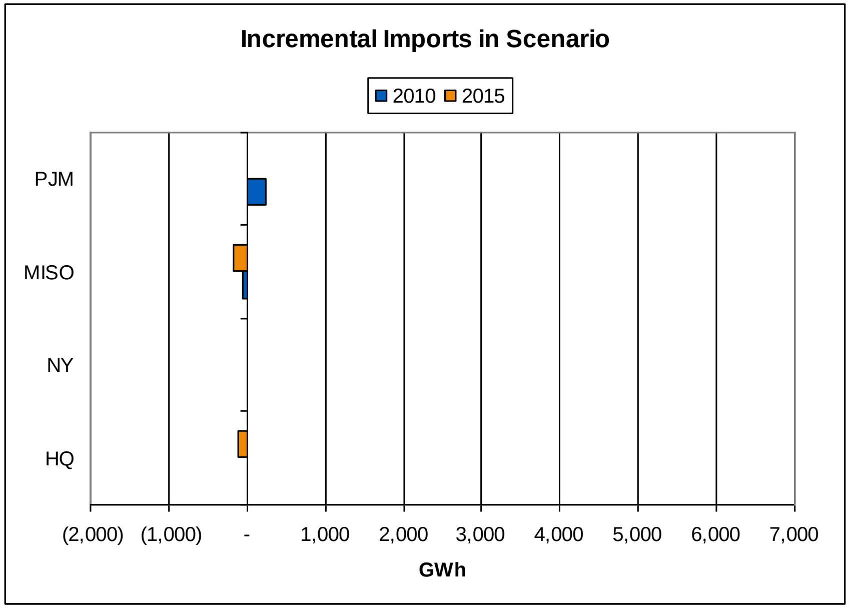
Option 3, Scenario 1 (reciprocal treatment, ETS tariff jointly eliminated)

	Change in Electricity Prices Relative to Status Quo		
Year	**All-Hours**	**Peak**	**Off-Peak**
2010	(3.7%)	(2.7%)	(4.9%)
2015	(1.6%)	(1.0%)	(2.4%)

Observation: Prices are lower in Ontario in this scenario. As export tariffs are eliminated in neighbouring regions (i.e., by a larger increment than in Ontario), export costs from those regions are lowered, exerting downward pressure on prices in Ontario.

Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)



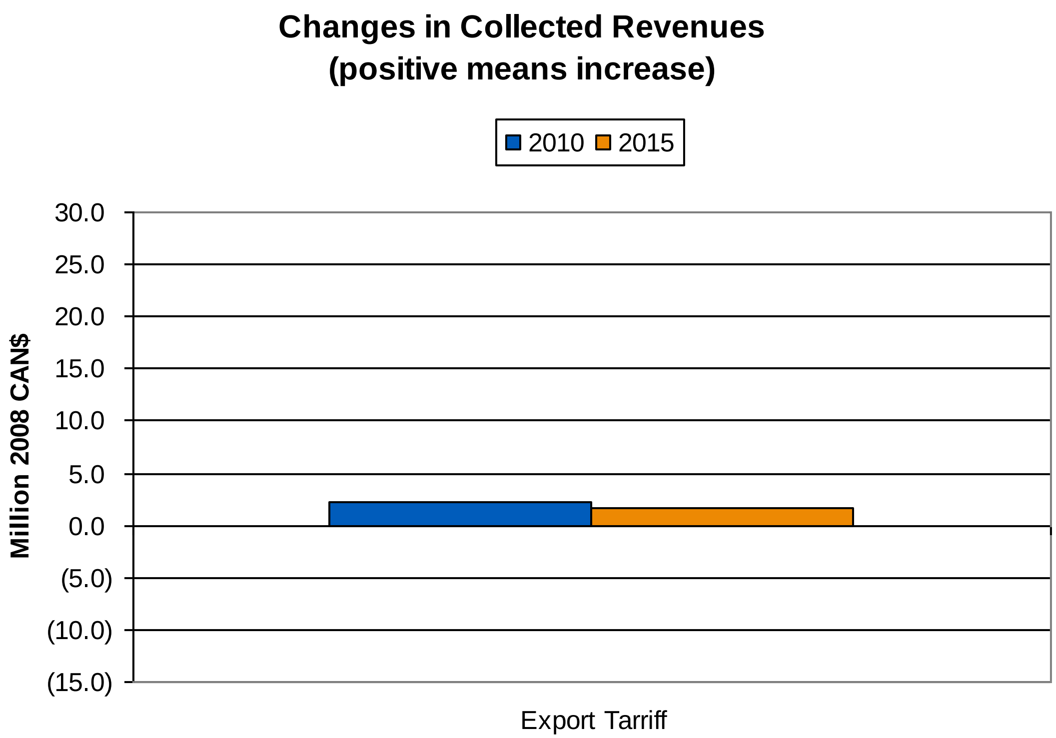


Year	Change in Total Exports from Status Quo	Change in Total Imports from Status Quo
2010	1%	3%
2015	(1%)	(5%)

Impacts on Ontario's total imports/exports are relatively small under this scenario.

Exports to NY are expected to increase in both test years because NY is the only neighbour to which the ETS tariff is assumed to be eliminated.

Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)



Observation: The export revenue that is lost on exports to NY (when the NY tariff is eliminated) offsets most of the revenue gained in exports to Ontario's other neighbours.

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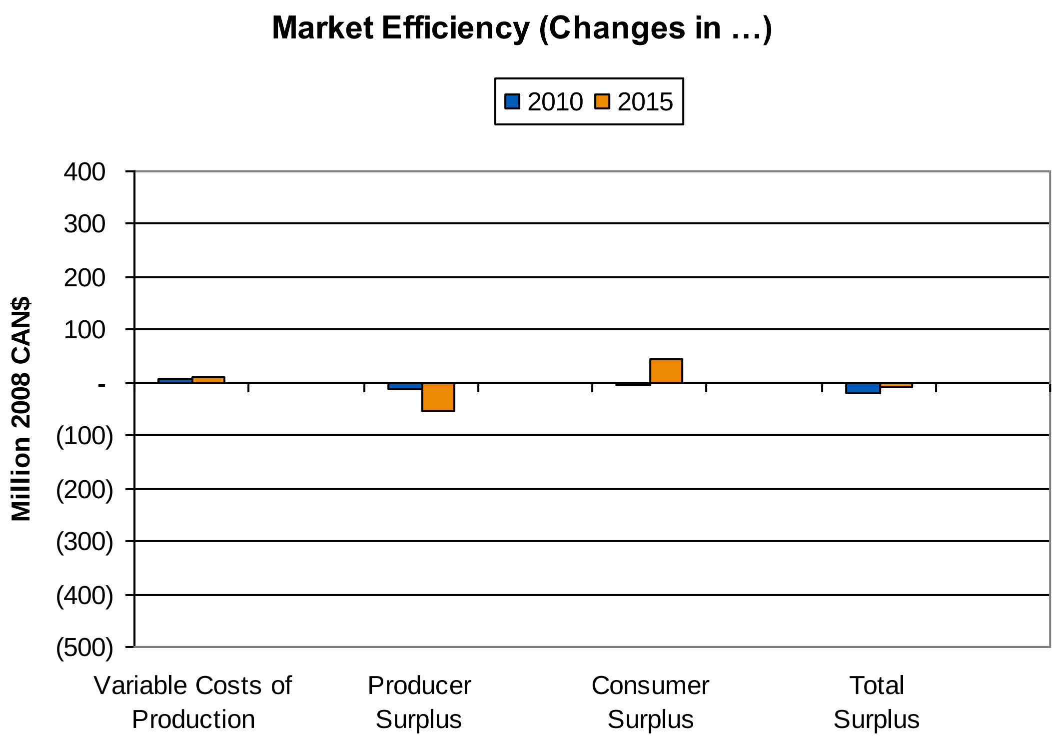
Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)



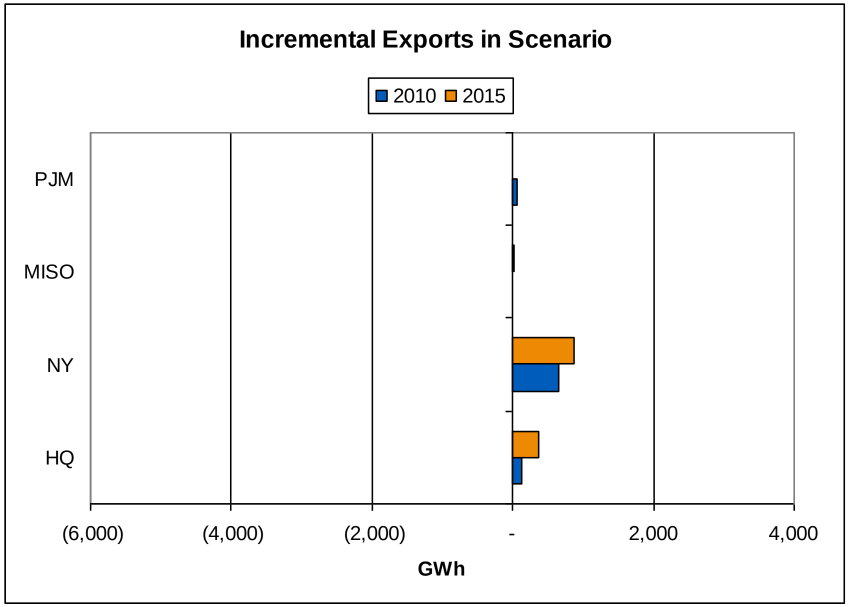
Observation: Because impacts on net exports are relatively small, the impacts on producer and consumer surplus are relatively small. In 2015 (when impacts are somewhat larger), lower prices lead to increased consumer surplus and decreased producer surplus.

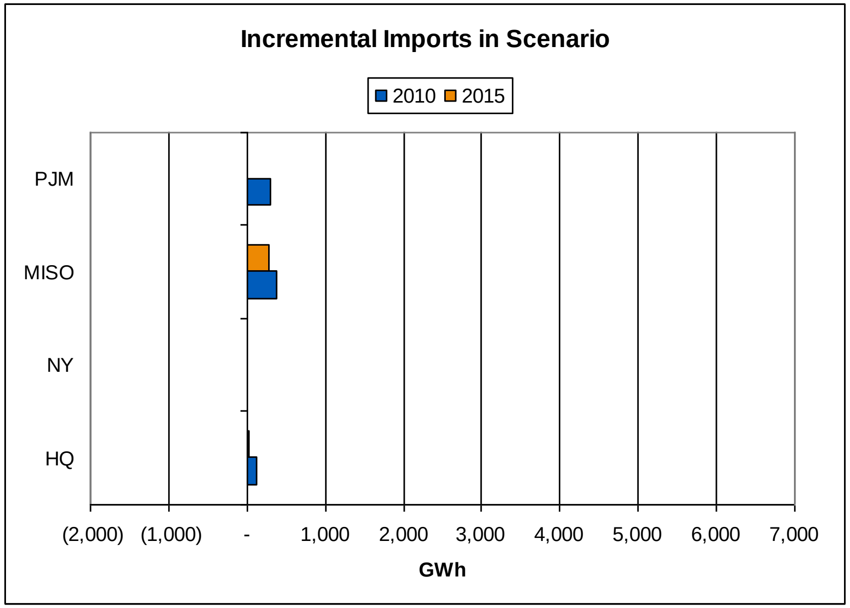
Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)

	Change in Electricity Prices Relative to Status Quo		
Year	**All-Hours**	**Peak**	**Off-Peak**
2010	(0.2%)	1.0%	(1.5%)
2015	(0.4%)	0.0%	(0.8%)

Observation: All-hours prices (duration-weighted) are reduced under the scenario in both years. Higher peak prices in 2010 reduce consumer surplus slightly as shown on the previous slide (*note: the change in the load-weighted all-hours price in 2010 is actually positive and not negative*).

Option 4, Scenario 1 (unilateral tariff elimination in all hours)

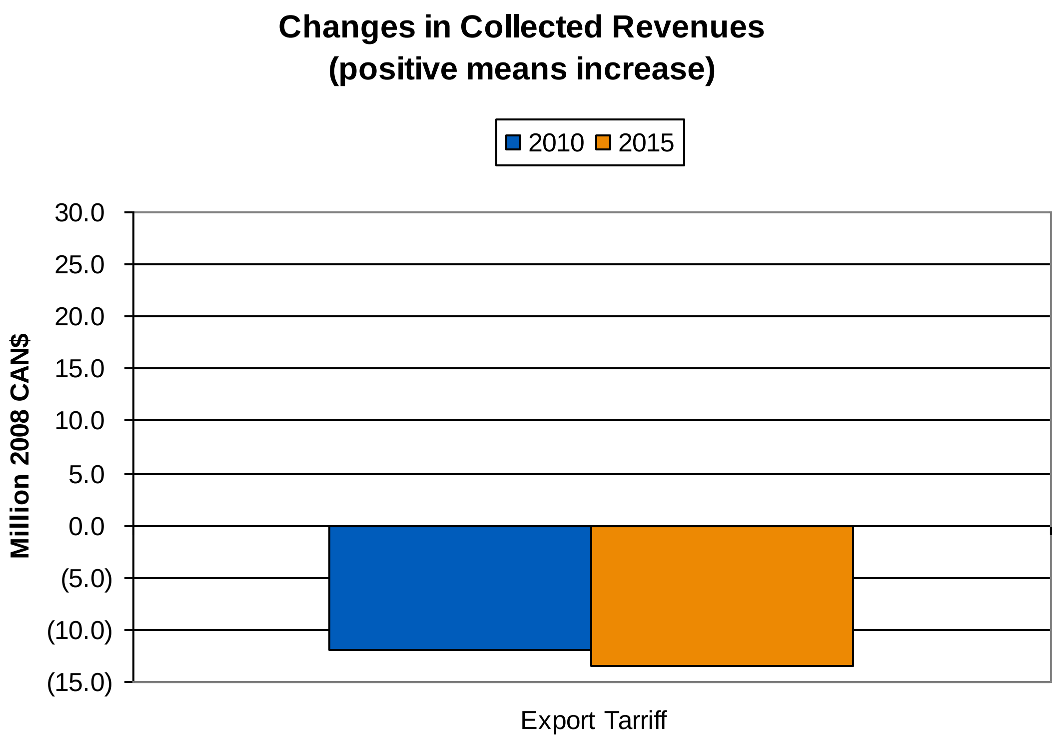




Year	Change in Total Exports from Status Quo	Change in Total Imports from Status Quo
2010	7%	14%
2015	10%	6%

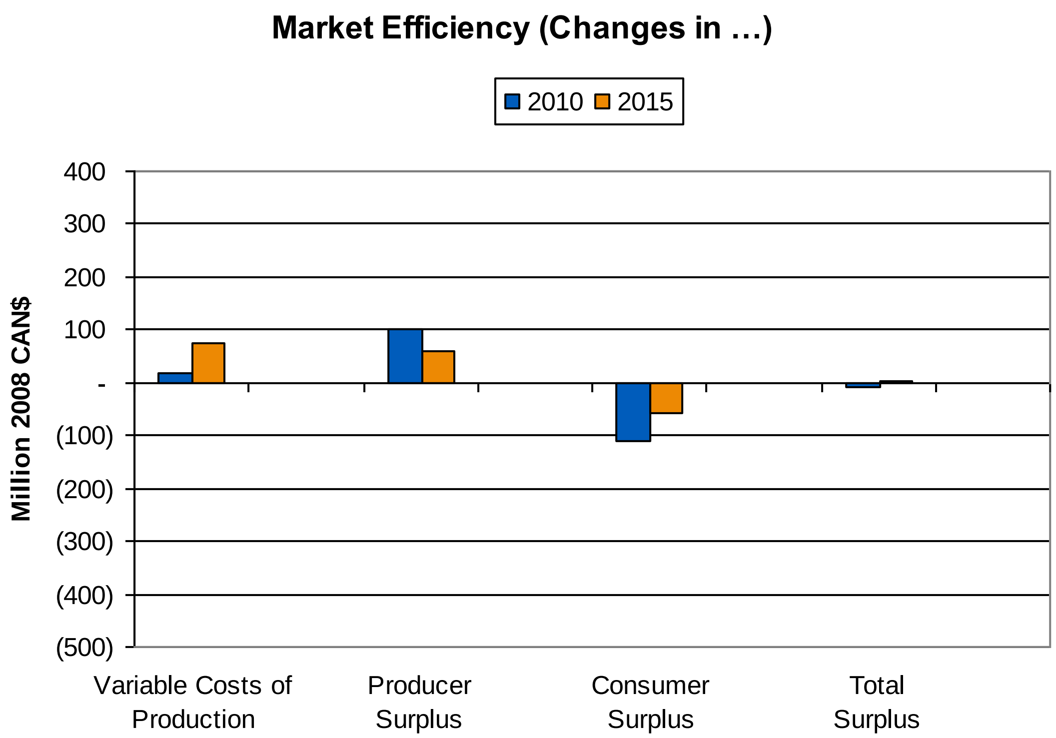
Observation: Since the Ontario ETS tariff is relatively small, increases in export volumes are expected to be small when the ETS tariff is unilaterally eliminated. Likewise, impacts on imports are expected to be small.

Option 4, Scenario 1 (unilateral tariff elimination in all hours)



Observation: The ETS tariff revenue is eliminated under this scenario. The consequential loss in ETS tariff revenue is the same as in Option 3, scenario 1.

Option 4, Scenario 1 (unilateral tariff elimination in all hours)



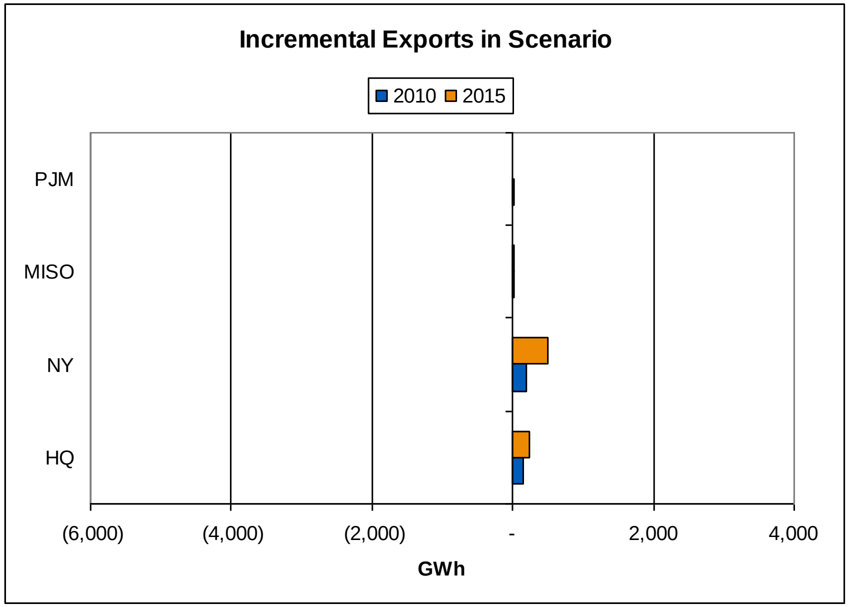
Observation: When the ETS tariff is unilaterally eliminated there is a consequential increase in exports, as well as prices. This increases producer surplus and reduces consumer surplus.

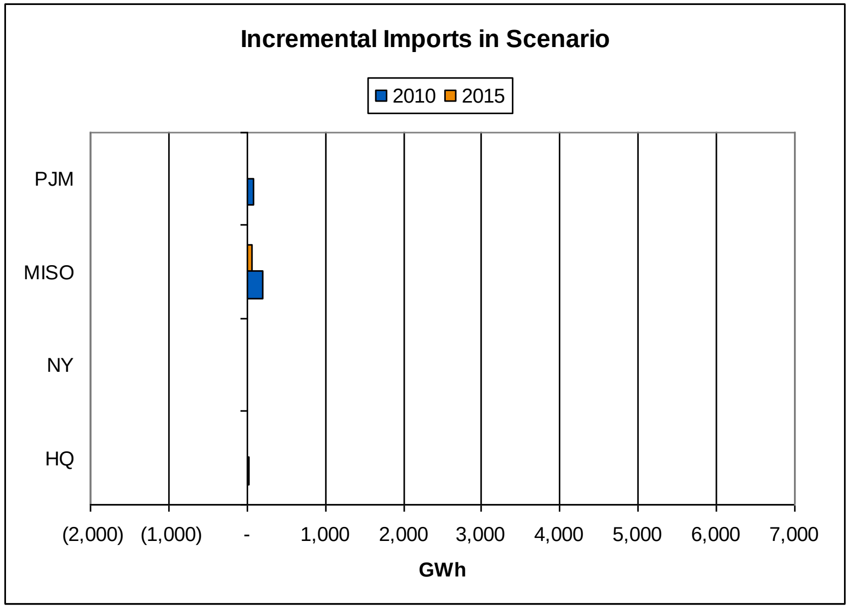
Option 4, Scenario 1 (unilateral tariff elimination in all hours)

	Change in Electricity Prices Relative to Status Quo		
Year	**All-Hours**	**Peak**	**Off-Peak**
2010	1.3%	1.4%	1.2%
2015	0.4%	0.5%	0.3%

Observation: A unilateral reduction in the ETS tariff increases prices in Ontario because external demand and exports increase.

Option 4, Scenario 2 (unilateral tariff elimination, off-peak only)

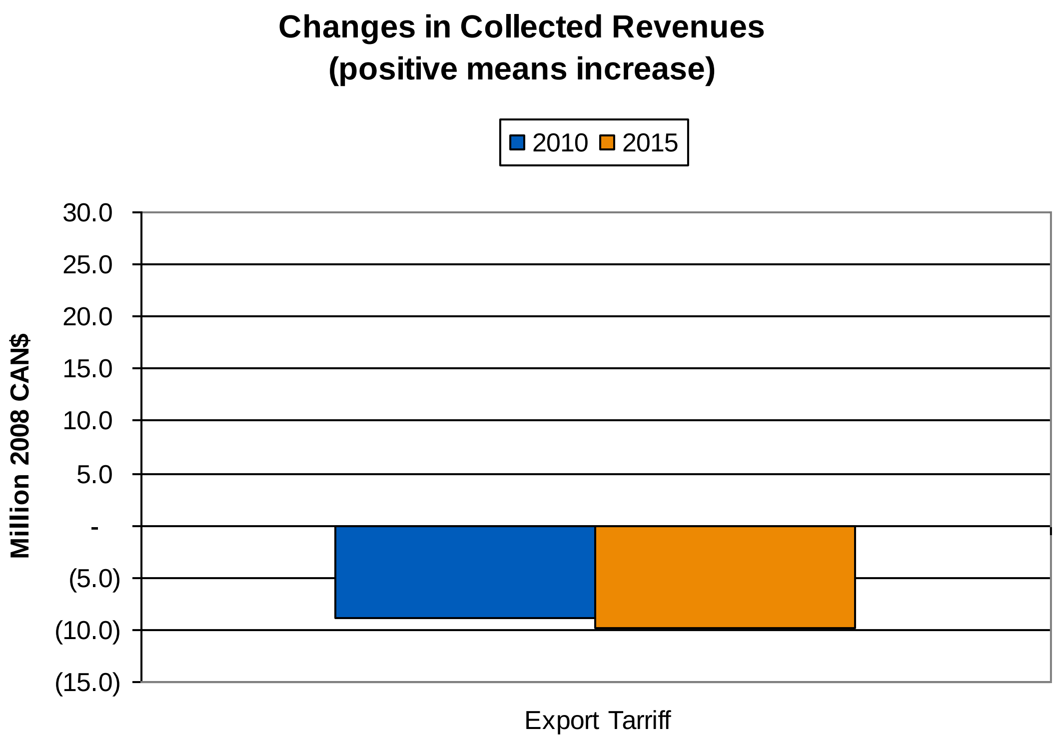




Year	Change in Total Exports from Status Quo	Change in Total Imports from Status Quo
2010	3%	6%
2015	6%	1%

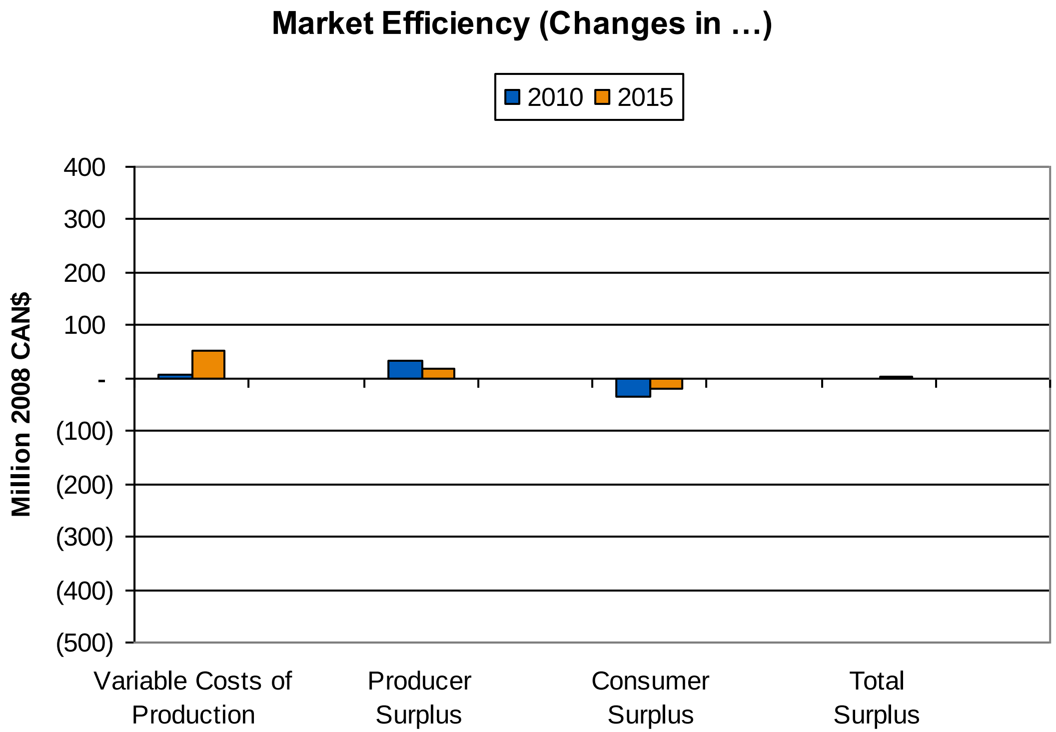
Observation: This results in a similar outcome as Option 4, Scenario 1. Given that the Ontario ETS tariff is small, impacts on exports are expected to be modest when the tariff is eliminated in off-peak hours. Impacts on imports are also modest.

Option 4, Scenario 2 (unilateral tariff elimination, off-peak only)



Observation: This scenario has a lower-magnitude (negative) impact on the ETS tariff revenue than Option 4, scenario 1 (because the tariff is retained during peak hours, creating a revenue stream).

Option 4, Scenario 2 (unilateral tariff elimination, off-peak only)



Observation: When compared to Option 4, Scenario 1, the incremental increase in producer surplus and decrease in consumer surplus are smaller. This is due to the ETS tariff being retained during on-peak hours under Option 4, Scenario 2.

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Option 4, Scenario 2 (unilateral tariff elimination, off-peak only)

	Change in Electricity Prices Relative to Status Quo		
Year	**All-Hours**	**Peak**	**Off-Peak**
2010	0.5%	0.1%	0.9%
2015	0.2%	0.1%	0.2%

Observation: A unilateral elimination of the ETS tariff increases prices because external demand increases. Under Option 4, Scenario 2, this is more pronounced during the off-peak hours when the ETS tariff is eliminated.

Key Assumptions for Calibration and Scenario Analysis

2007 Model Calibration Results

Scenario Definitions

Results by Scenario

Emissions Impacts by Scenario

General Conclusions

Appendices

Changes in Net Exports (these generally drive emissions impacts)

Change in Net Exports - 2010
GWh

Option	Scenario	Destination PJM	MISO	NY	HQ	Total
Option 2		(76)	1,610	(3,379)	(406)	(2,252)
Option 3	Scenario 1	(2,037)	(4,338)	3,319	(2,080)	(5,135)
Option 3	Scenario 2	(560)	41	1,289	(836)	(66)
Option 4	Scenario 1	(235)	(369)	656	4	56
Option 4	Scenario 2	(78)	(186)	195	133	64

Change in Net Exports - 2015
GWh

Option	Scenario	Destination PJM	MISO	NY	HQ	Total
Option 2		(312)	1,700	(5,104)	(469)	(4,185)
Option 3	Scenario 1	(445)	(6,357)	1,487	73	(5,243)
Option 3	Scenario 2	(283)	129	1,364	(1,101)	108
Option 4	Scenario 1	(3)	(257)	867	337	944
Option 4	Scenario 2	(10)	(55)	494	233	663

Note: A negative value means that Ontario's net exports (exports less imports) would decrease.

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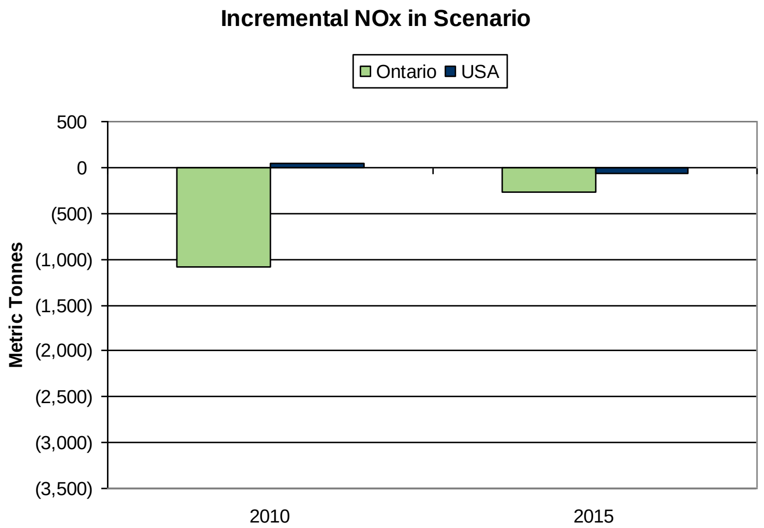
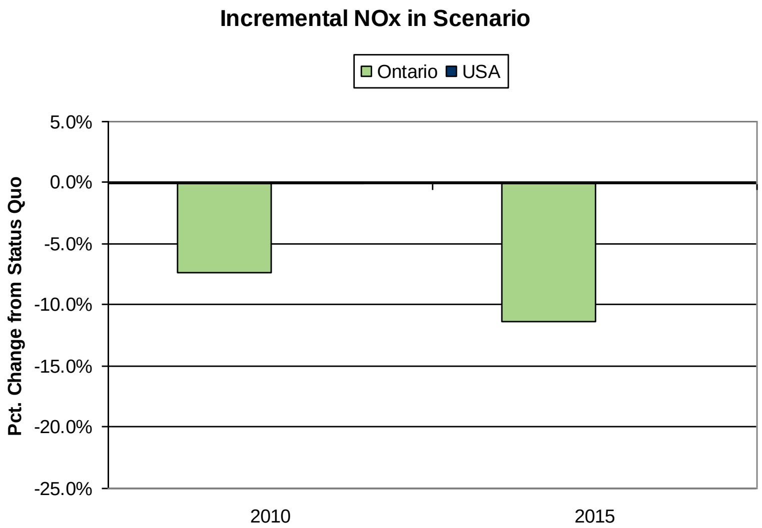
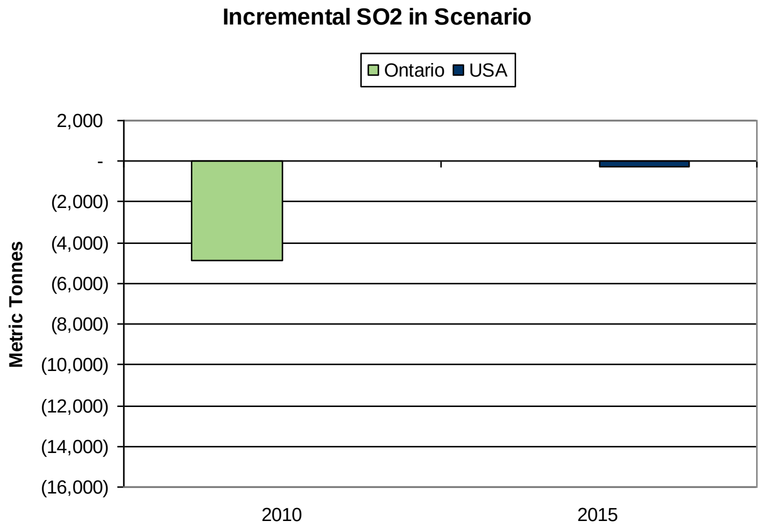
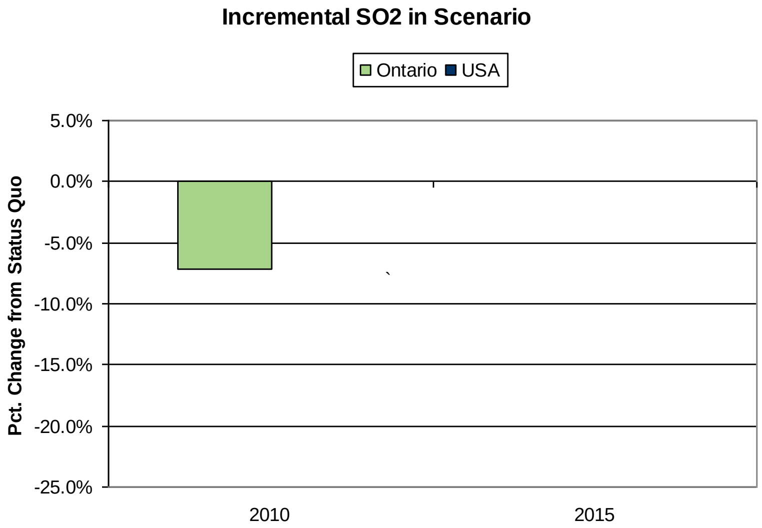
Option 2 (average network rate option)





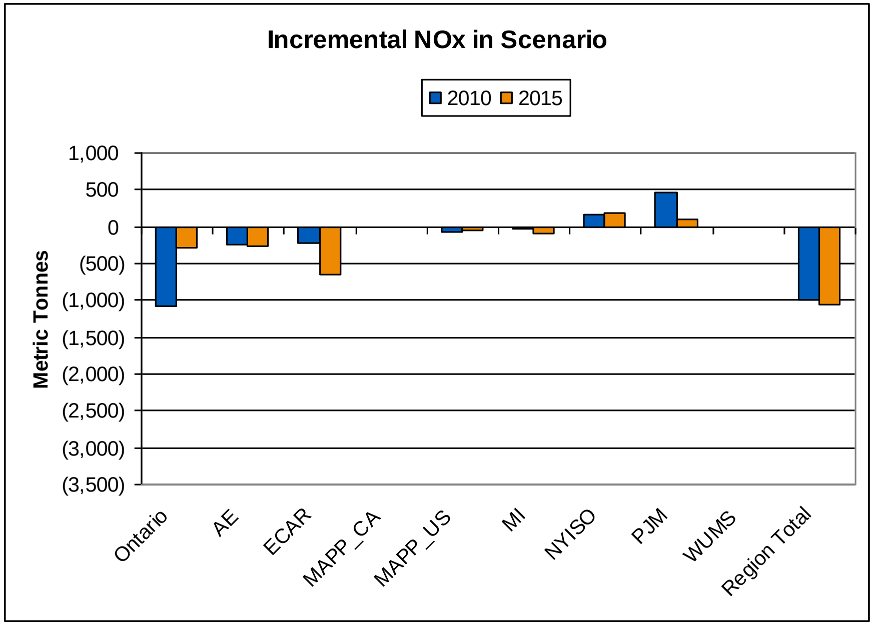


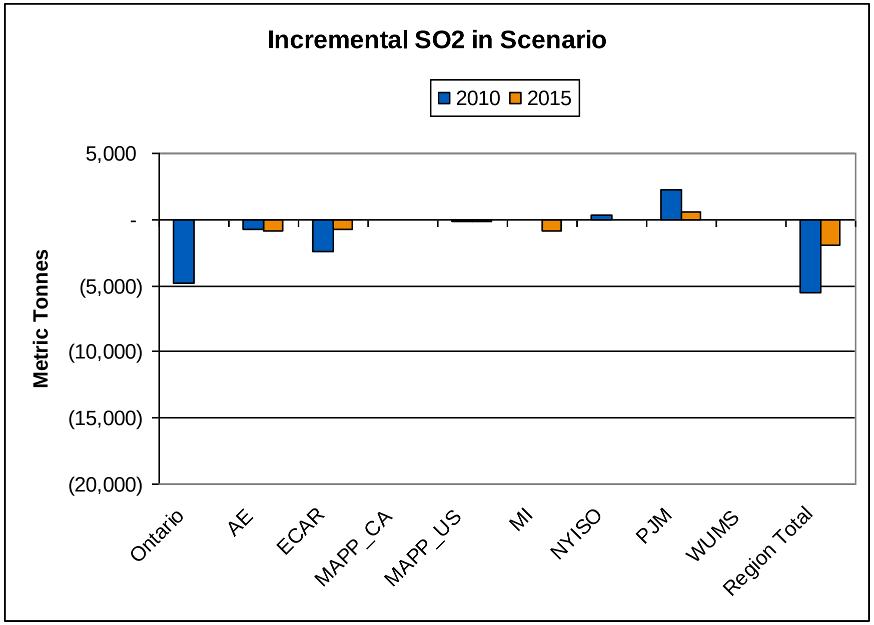


Option 2 - SO_2 and NO_x

- Ontario SO_2 and NO_x emissions would be well under the caps in both Status Quo and Option 2 (in 2010 and 2015) due to the consequential impacts of Ontario's CO_2 cap (and Ontario's policy to retire the coal-fired generation fleet by the end of 2014)
- Option 2 reduces Ontario emissions relative to Status Quo because Option 2 assumes Ontario has unilaterally increased its export tariff; accordingly, there is a decrease in net exports
- There is no change in SO_2 in Ontario in 2015 (versus status quo) because the coal-fired fleet is assumed to be retired by the end of 2014, and hence there are no SO_2 emissions
- SO_2 and NO_x emissions are relatively unchanged (versus status quo) in the U.S. because of US CAIR policy restrictions pertaining to both pollutants

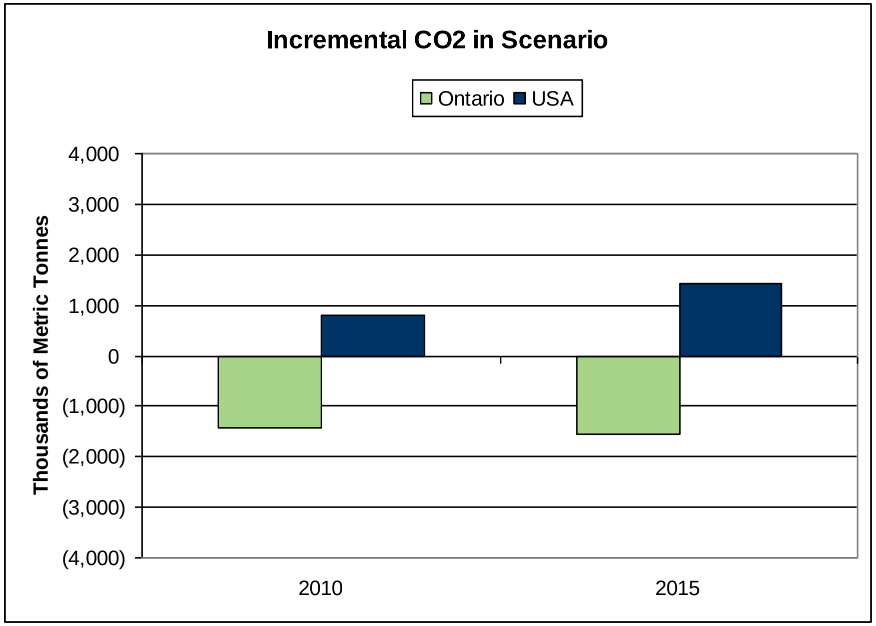
Option 2 (average network rate option)

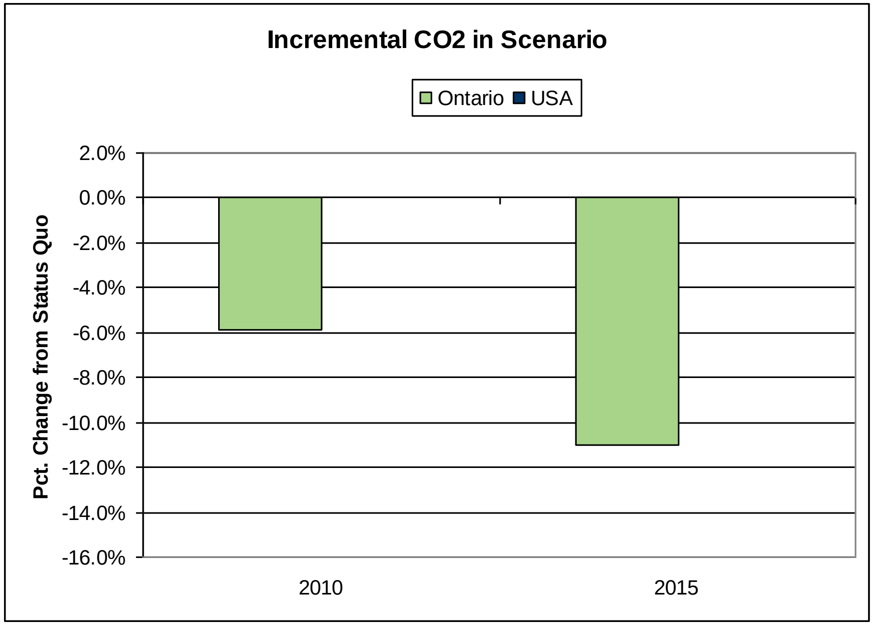




See Appendix C for a map of NEEM's regions.

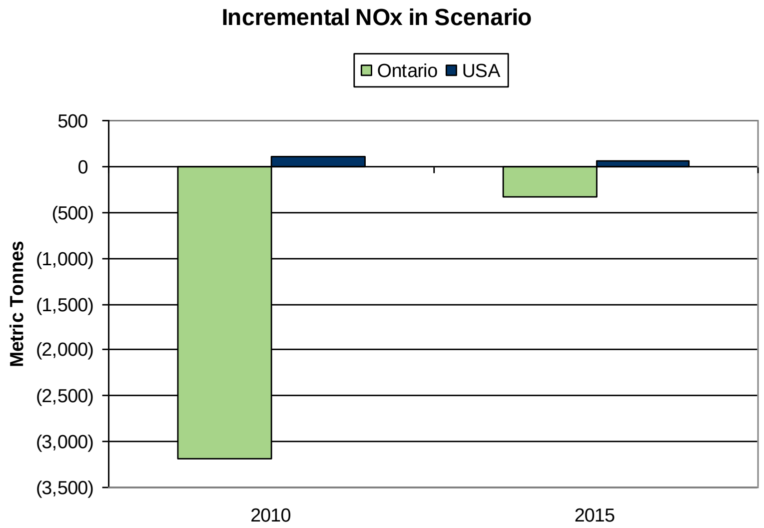
Option 2 (average network rate option)

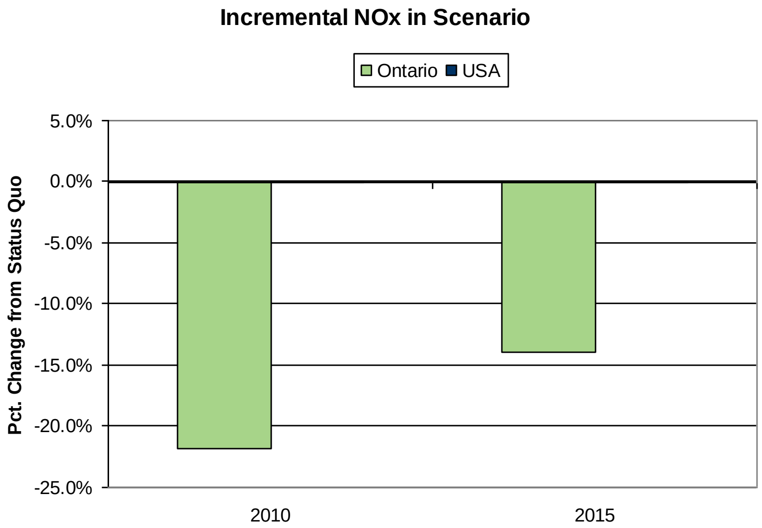


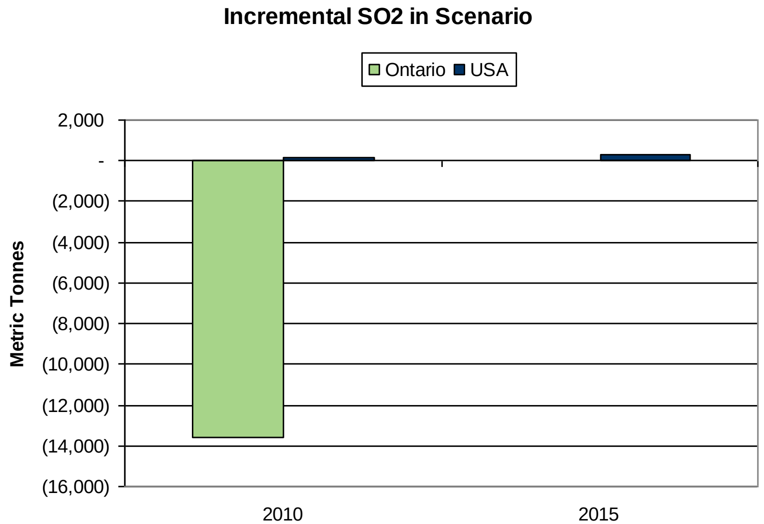


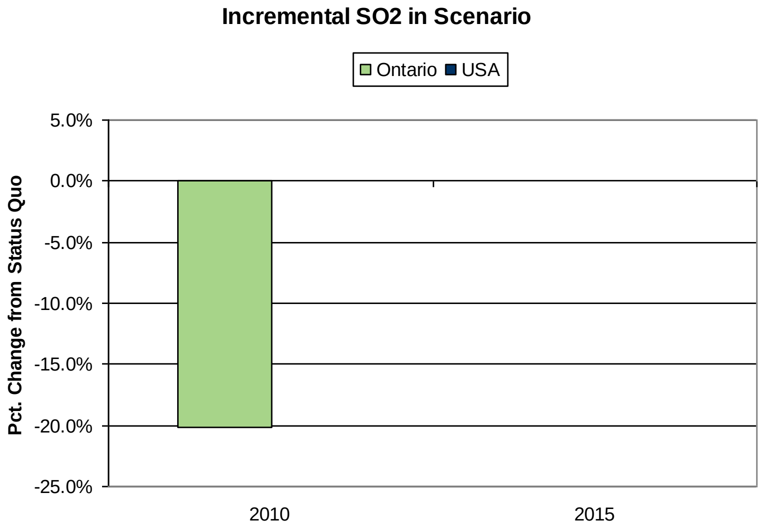
CO_2 impacts are small and offsetting.

Option 3, Scenario 1 (reciprocal treatment, tariff eliminated)









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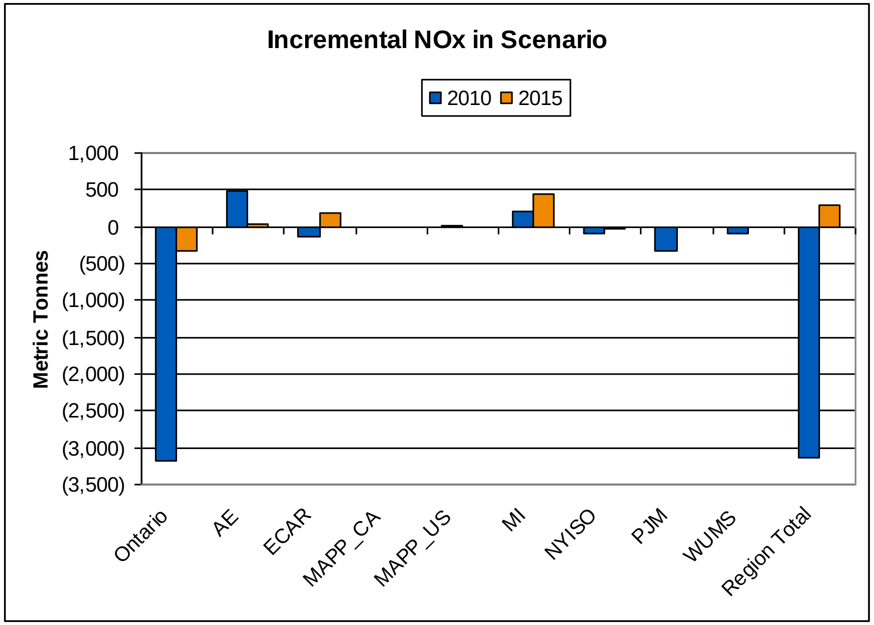
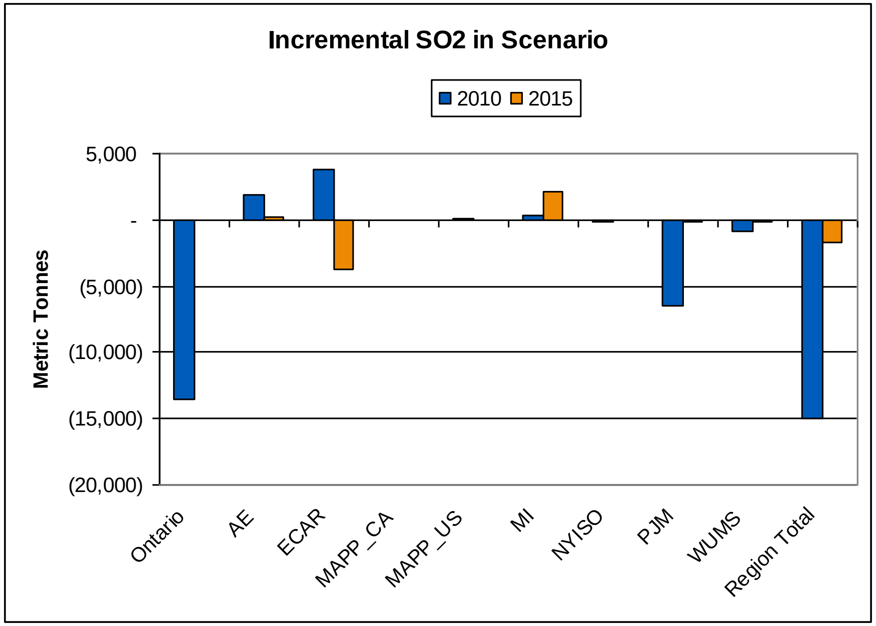
Option 3, Scenario 1 – SO2 and NOx

- Ontario SO2 and NOx emissions would be well under the caps in both Status Quo and Option 3, Scenario 1 (in 2010 and 2015) due to the consequential impacts of Ontario's CO2 cap (and Ontario's policy to retire the coal-fired generation fleet by the end of 2014)
- Option 3, Scenario 1 reduces Ontario emissions relative to Status Quo because Ontario's net exports are decreased (because Ontario's neighbours' tariffs are cut more than Ontario's tariffs)
- There is no change in SO2 in Ontario in 2015 (versus status quo) because the coal-fired fleet is assumed to be retired by the end of 2014, and hence there are no SO2 emissions
- SO2 and NOx emissions are relatively unchanged (versus status quo) in the U.S. because of US CAIR policy restrictions pertaining to both pollutants

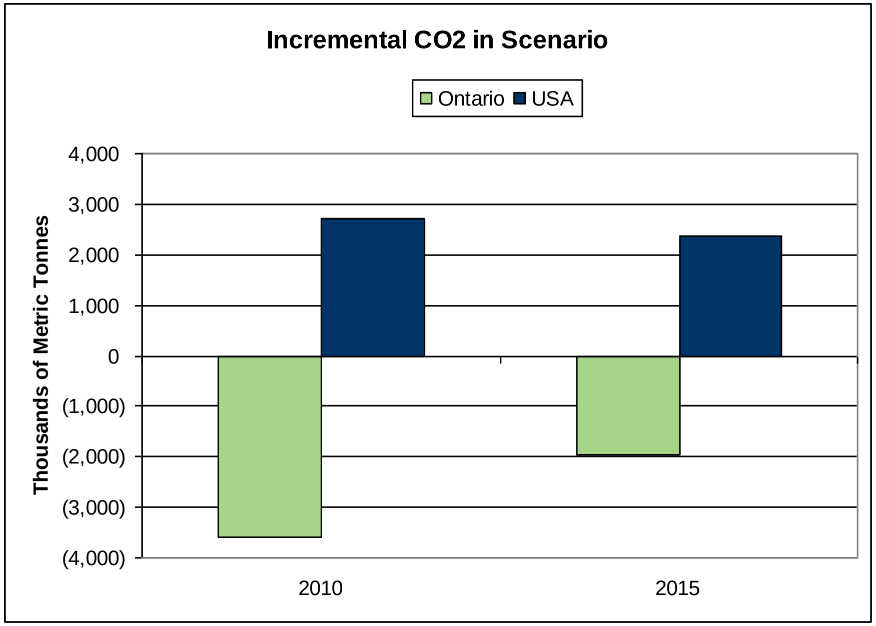
Option 3, Scenario 1 (reciprocal treatment, tariff eliminated)

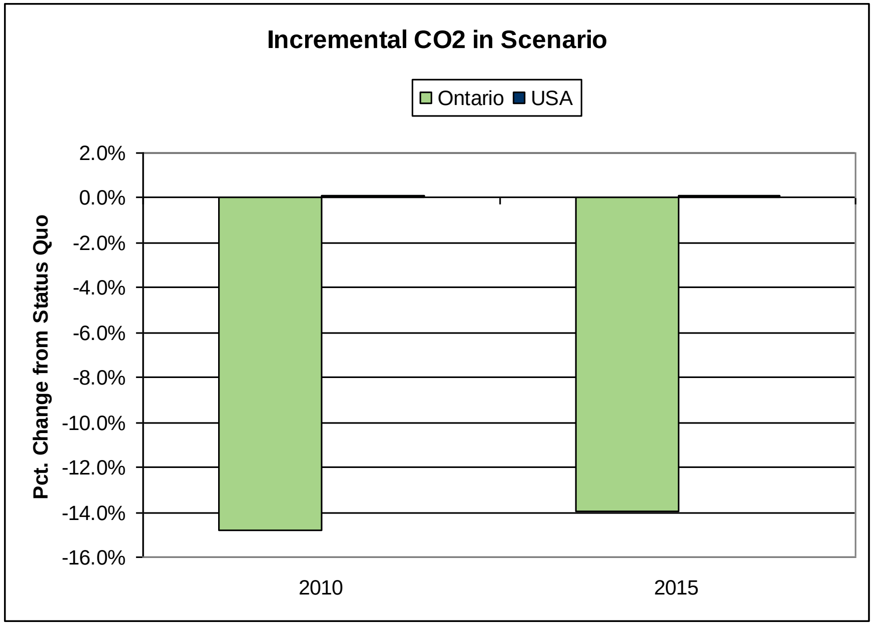




See Appendix C for a map of NEEM's regions.

Option 3, Scenario 1 (reciprocal treatment, tariff eliminated)





CO2 impacts are small and nearly offsetting.

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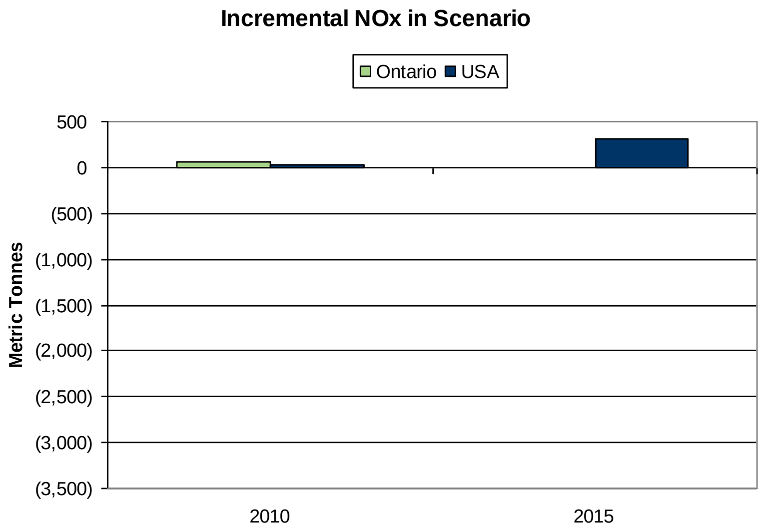
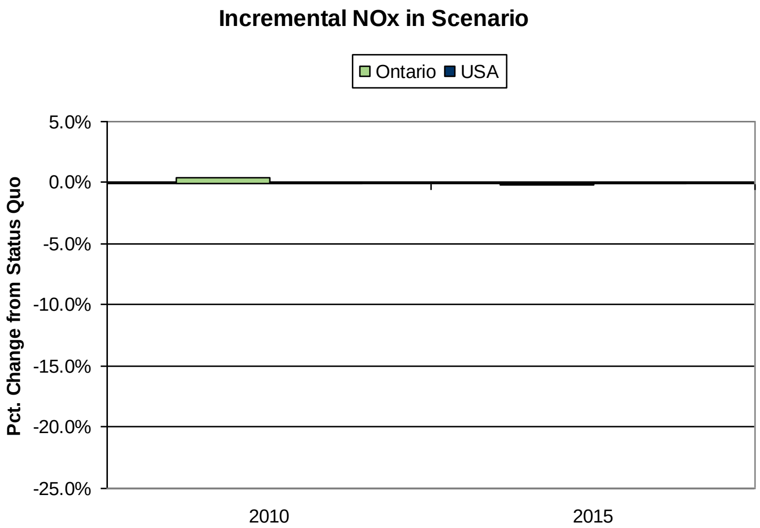
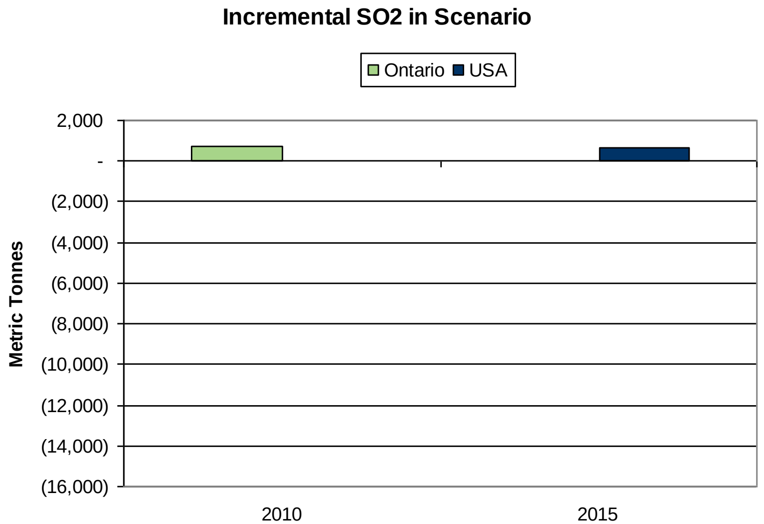
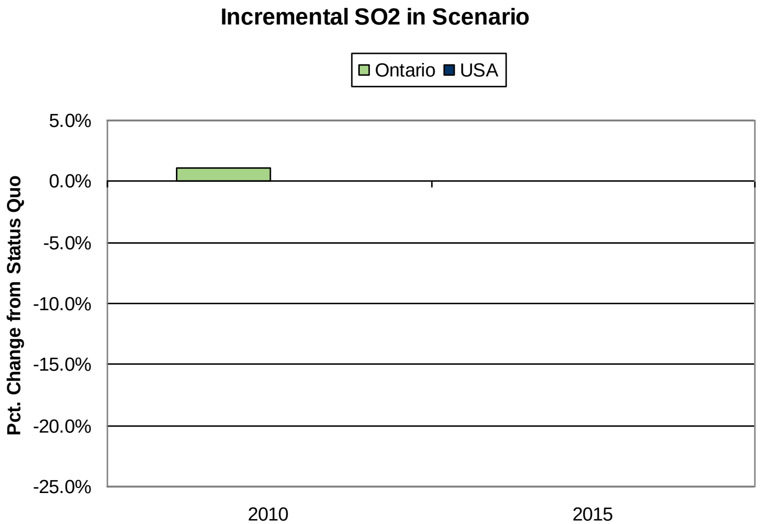
Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)





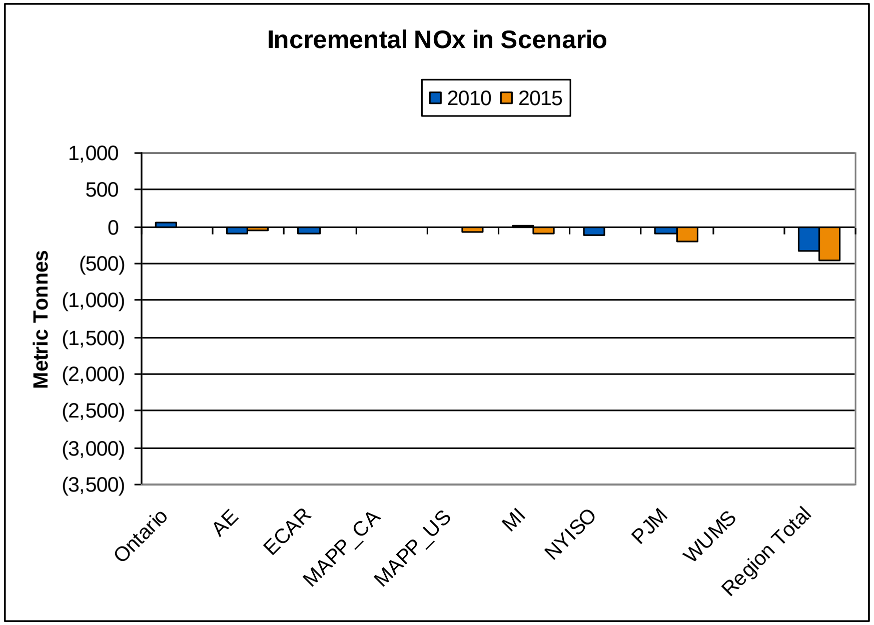


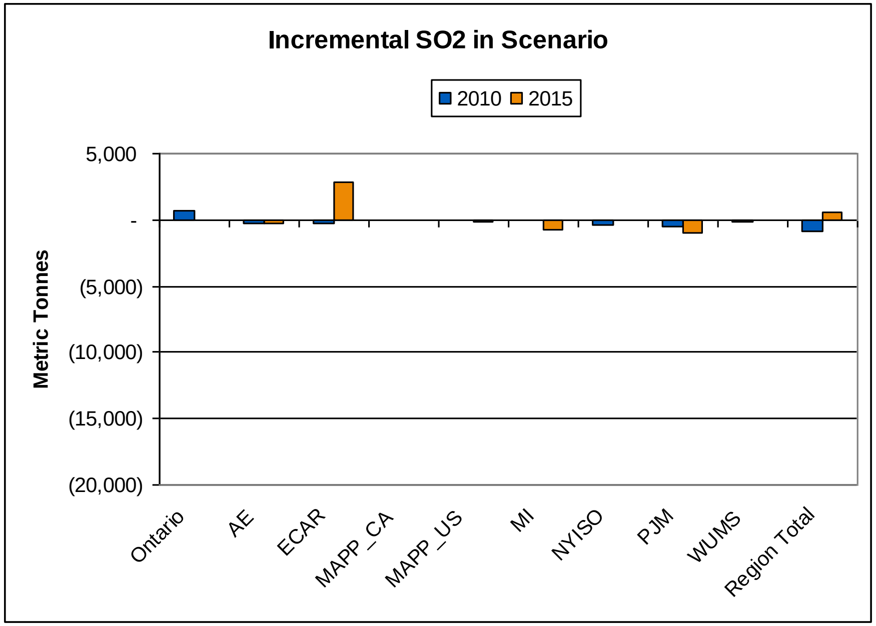


Option 3, Scenario 2 – SO2 and NOx

- Ontario SO2 and NOx emissions would be well under the caps in both Status Quo and Option 3, Scenario 2 (in 2010 and 2015) due to the consequential impacts of Ontario's CO2 cap (and Ontario's policy to retire the coal-fired generation fleet by the end of 2014)
- Impacts on emissions are small in this scenario because the impact on net exports is small
- There is no change in SO2 in Ontario in 2015 (versus status quo) because the coal-fired fleet is assumed to be retired by the end of 2014, and hence there are no SO2 emissions
- SO2 and NOx emissions are relatively unchanged (versus status quo) in the U.S. because of US CAIR policy restrictions pertaining to both pollutants

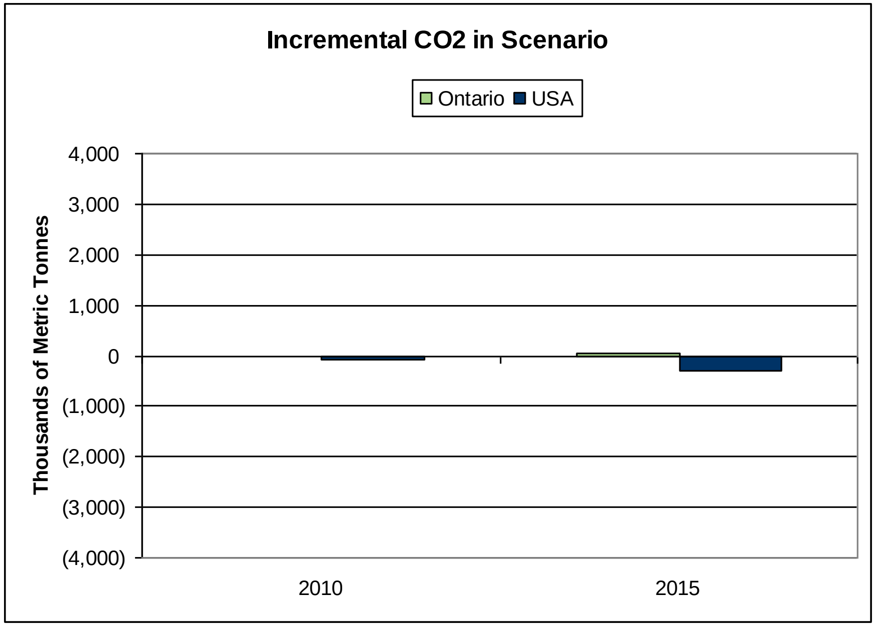
Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)



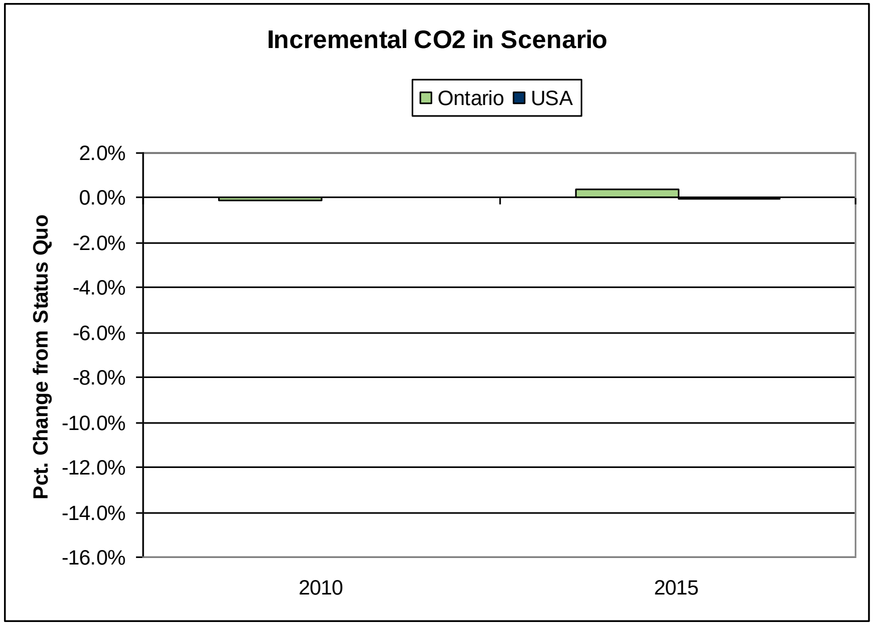


See Appendix C for a map of NEEM's regions.

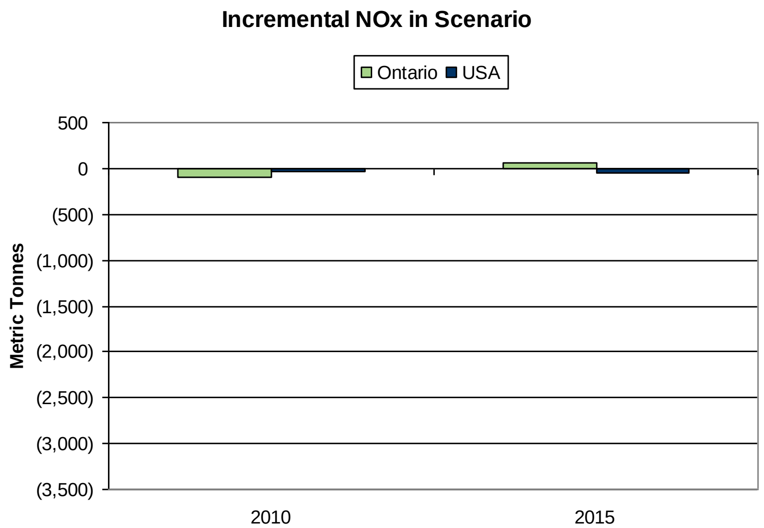
Option 3, Scenario 2 (reciprocal treatment, avg. embedded network cost)

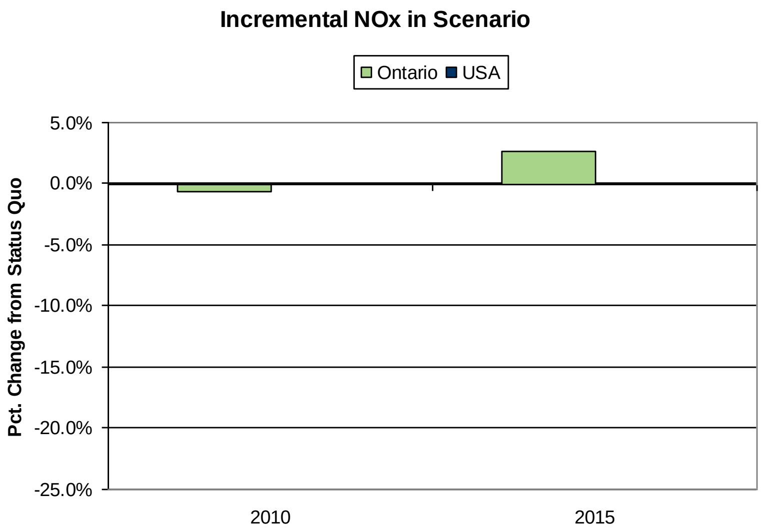


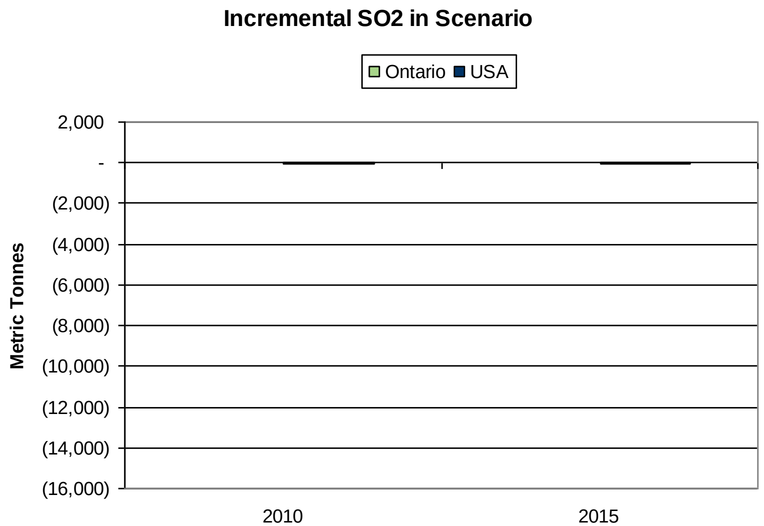
CO2 impacts are very small.

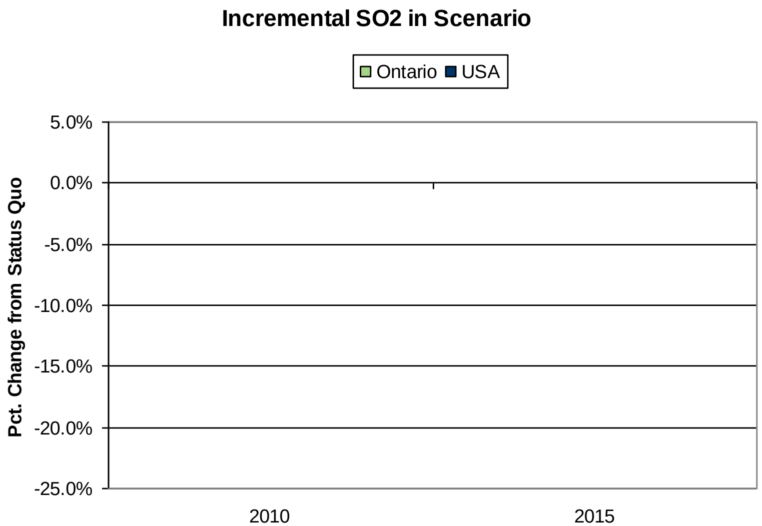


Option 4, Scenario 1 (unilateral tariff elimination in all hours)





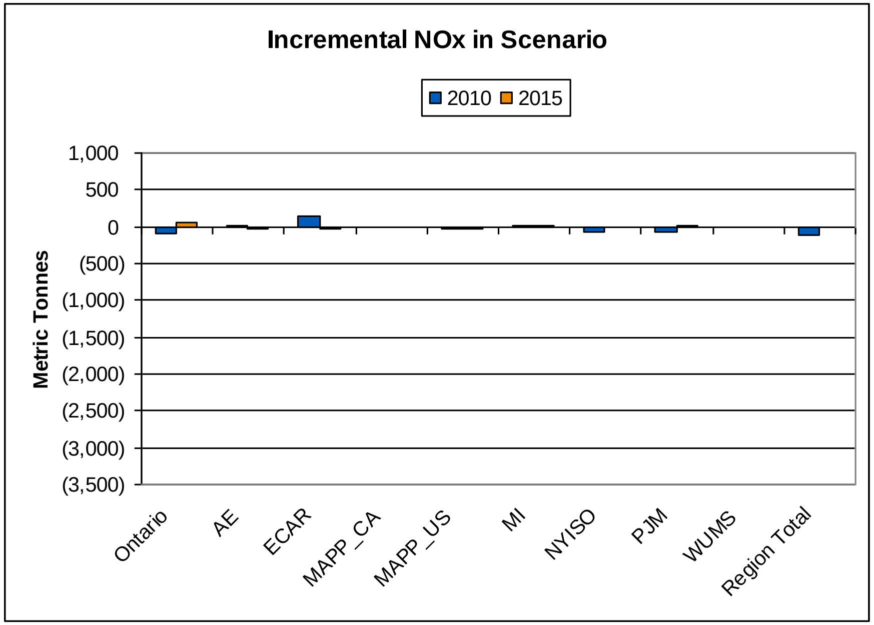


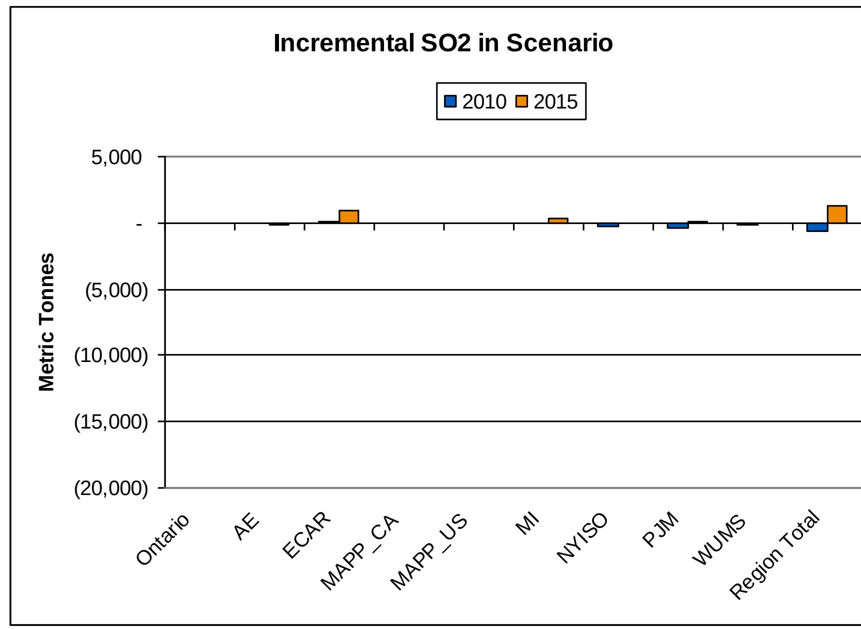


Option 4, Scenario 1 – SO_2 and NO_x

- Ontario SO2 and NOx emissions would be well under the caps in both Status Quo and Option 4, Scenario 1 (in 2010 and 2015) due to the consequential impacts of Ontario’s CO2 cap (and Ontario’s policy to retire the coal-fired generation fleet by the end of 2014)
- Impacts on emissions are small in this scenario because the impact on net exports is small
- There is no change in SO2 in Ontario in 2015 (versus status quo) because the coal-fired fleet is assumed to be retired by the end of 2014, and hence there are no SO2 emissions
- SO2 and NOx emissions are relatively unchanged (versus status quo) in the U.S. because of US CAIR policy restrictions pertaining to both pollutants

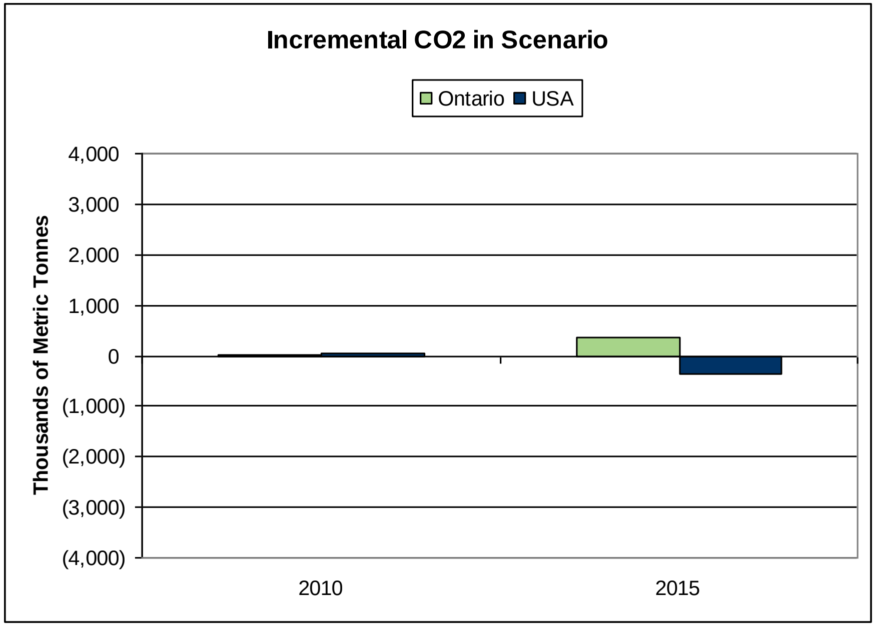
Option 4, Scenario 1 (unilateral tariff elimination in all hours)

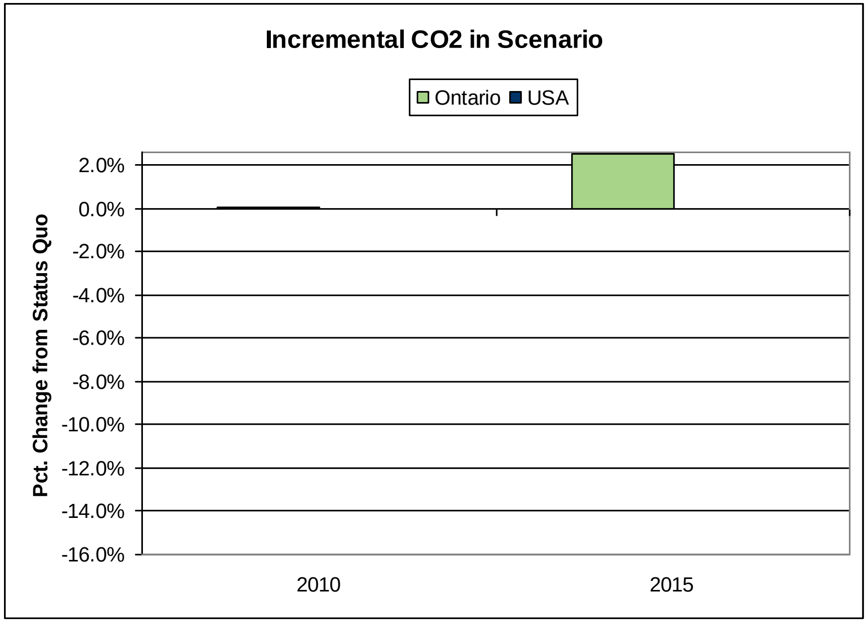




See Appendix C for a map of NEEM's regions.

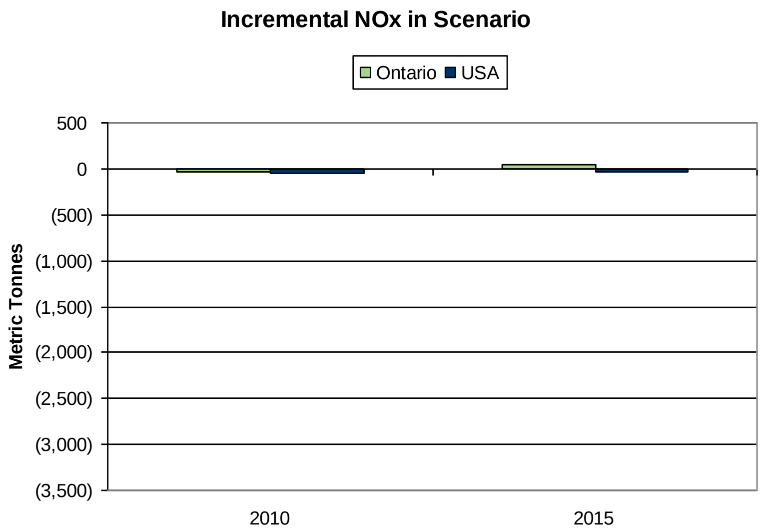
Option 4, Scenario 1 (unilateral tariff elimination in all hours)

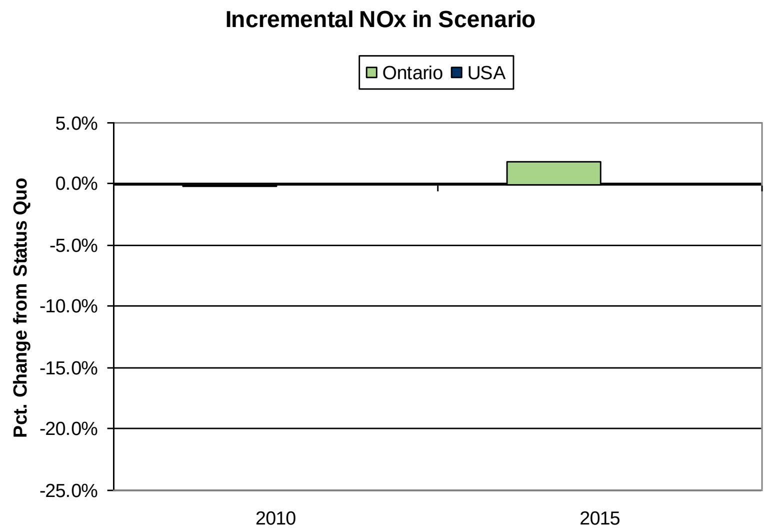


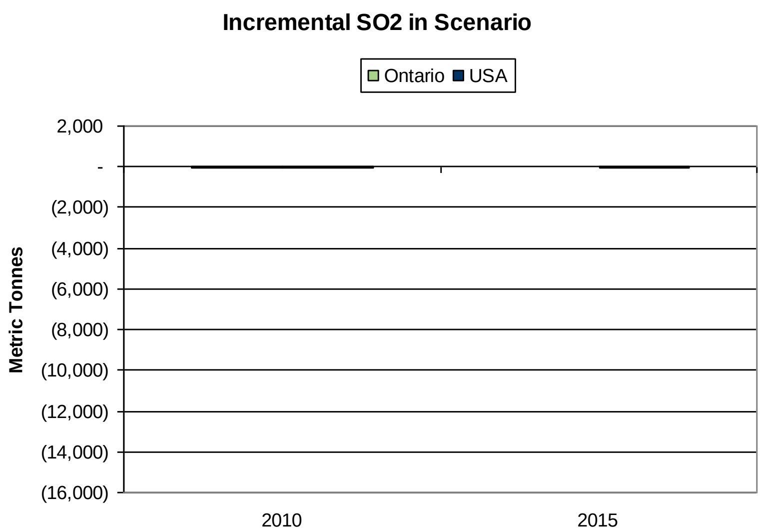


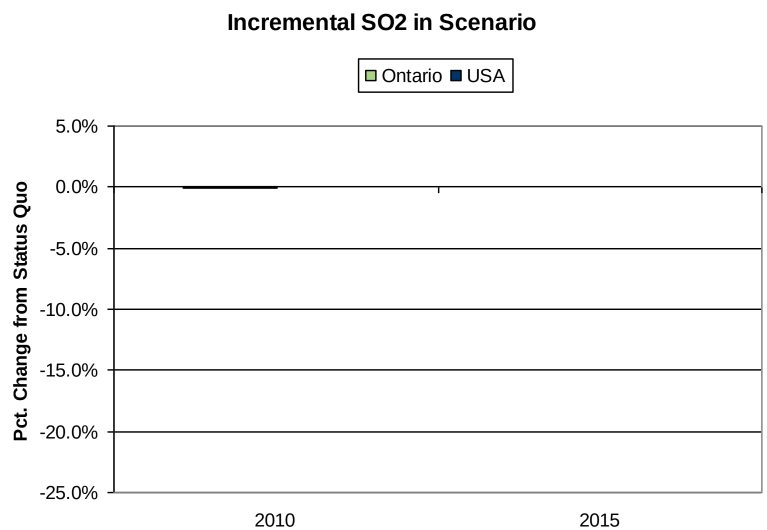
CO2 impacts are small.

Option 4, Scenario 2 (unilateral tariff elimination, off-peak hours only)





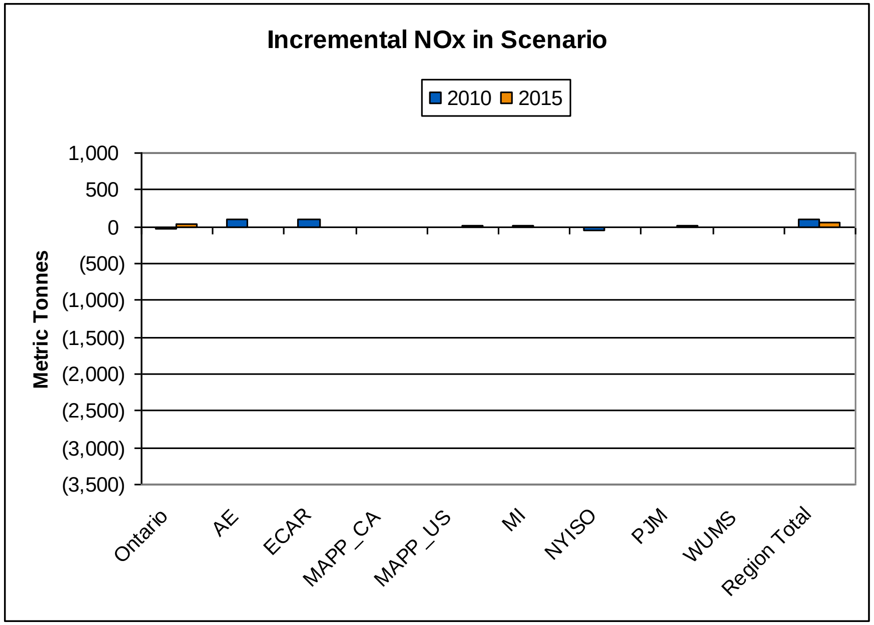


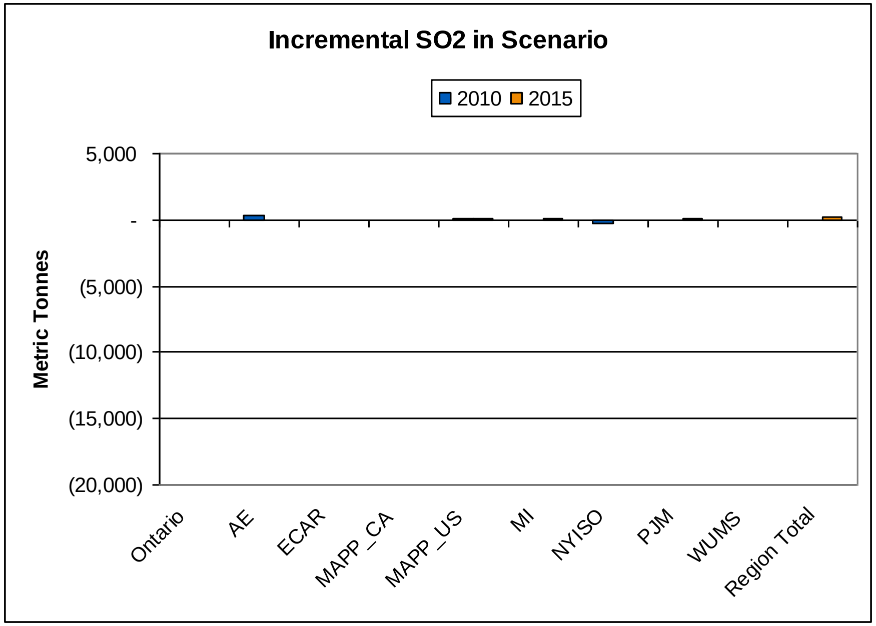


Option 4, Scenario 2 – SO2 and NOx

- Ontario SO2 and NOx emissions would be well under the caps in both Status Quo and Option 4, Scenario 2 (in 2010 and 2015) due to the consequential impacts of Ontario's CO2 cap (and Ontario's policy to retire the coal-fired generation fleet by the end of 2014)
- Impacts on emissions are small in this scenario because the impact on net exports is small
- There is no change in SO2 in Ontario in 2015 (versus status quo) because the coal-fired fleet is assumed to be retired by the end of 2014, and hence there are no SO2 emissions
- SO2 and NOx emissions are relatively unchanged (versus status quo) in the U.S. because of US CAIR policy restrictions pertaining to both pollutants

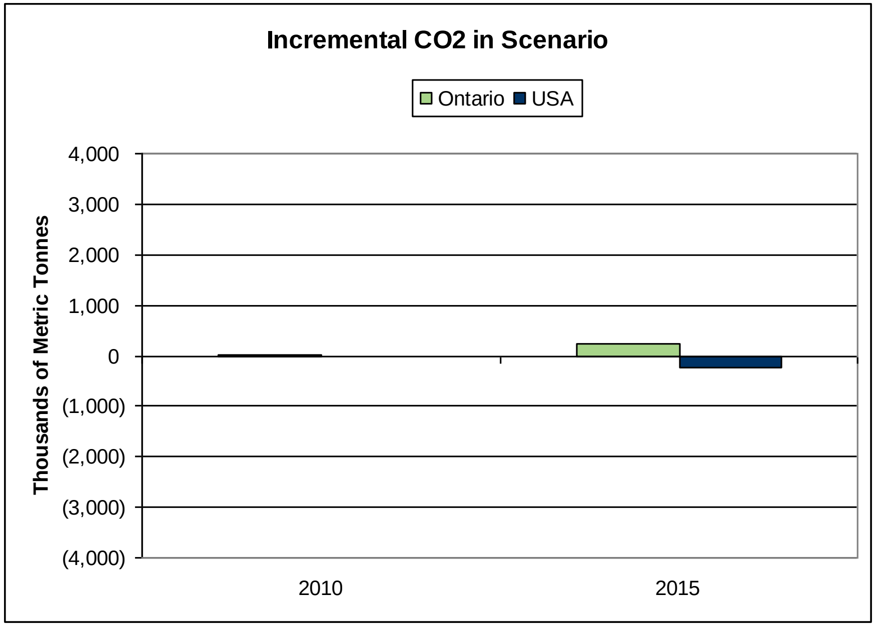
Option 4, Scenario 2 (unilateral tariff elimination, off-peak only)

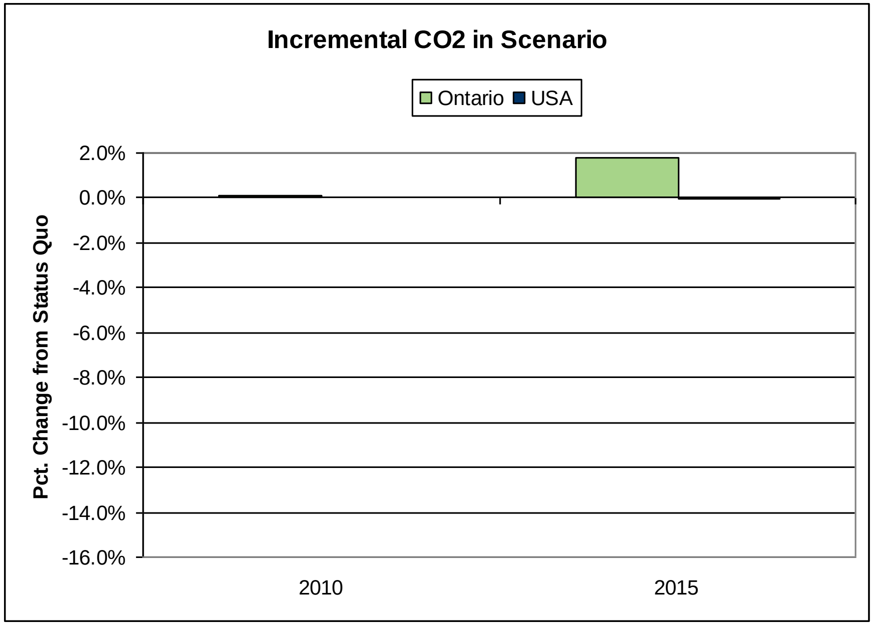




See Appendix C for a map of NEEM's regions.

Option 4, Scenario 2 (unilateral tariff elimination, off-peak only)





CO_2 impacts are small.

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Key Assumptions for Calibration and Scenario Analysis

2007 Model Calibration Results

Scenario Definitions

Results by Scenario

Emissions Impacts by Scenario

General Conclusions

Appendices

Economic Impacts

- Option 2 (average embedded network rate) and Option 3 (reciprocal treatment) tend to increase consumer surplus and decrease producer surplus (the small decrease in consumer surplus in Option 3, scenario 2 in 2010 is the exception)
- Option 4, scenarios 1 and 2 increase producer surplus, but scenario 2 less so. Option 4, scenarios 1 and 2 decrease consumer surplus, but scenario 2 less so. (These are the unilateral tariff elimination options - Scenario 2 involves tariff elimination only in the off-peak hours)
- Option 2 and Option 3, scenario 2 increase ETS tariff revenue. These are the options that involve an increase in the ETS tariff. The increase in Option 3, scenario 2 is small because tariffs are both increased and decreased (depending on the recipient of the exports). All other options decrease ETS tariff revenue.

Emissions Impacts

- Overall emissions impacts are small
- Ontario SO2 and NOx will be well below their caps regardless of the export tariff scenario due to the consequential effects of Ontario's CO2 cap (and Ontario's policy to retire the coal-fired generation fleet by the end of 2014)
- North American cap-and-trade policy for CO2 would control any CO2 leakage associated with export tariff changes
  - If all power sector CO2 emissions in North America were subject to cap-and-trade, North American CO2 emissions would not be affected by the choice of export tariff scenario
  - Since we modeled the North American policy as a CO2 price and allowed emissions to change, we see small net changes in CO2 emissions

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Key Assumptions for Calibration and Scenario Analysis

2007 Model Calibration Results

Scenario Definitions

Electric Power Results by Scenario

Emissions Impacts Sector Results by Scenario

General Conclusions

Appendices

Appendix A: Summary Results Tables

Impacts on Ontario Exports

Incremental Exports - 2010
GWh

Option	Scenario	Destination PJM	MISO	NY	HQ	Total
Option 2		(184)	(3)	(3,380)	(493)	(4,060)
Option 3	Scenario 1	478	55	3,320	601	4,453
Option 3	Scenario 2	(323)	(19)	1,290	(839)	109
Option 4	Scenario 1	56	2	657	132	847
Option 4	Scenario 2	13	8	195	152	368

Incremental Exports - 2015
GWh

Option	Scenario	Destination PJM	MISO	NY	HQ	Total
Option 2		(312)	(17)	(5,105)	(591)	(6,025)
Option 3	Scenario 1	560	148	1,664	698	3,070
Option 3	Scenario 2	(283)	(44)	1,367	(1,215)	(175)
Option 4	Scenario 1	(2)	25	868	360	1,251
Option 4	Scenario 2	(9)	13	494	237	735

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Impact on Ontario Imports

Incremental Imports - 2010
GWh

Option	Scenario	Origin				
		PJM	MISO	NY	HQ	Total
Option 2		(107)	(1,613)	(0)	(87)	(1,808)
Option 3	Scenario 1	2,515	4,392	0	2,681	9,588
Option 3	Scenario 2	237	(60)	0	(3)	174
Option 4	Scenario 1	291	370	0	128	791
Option 4	Scenario 2	91	194	0	19	304

Incremental Imports - 2015
GWh

Option	Scenario	Origin				
		PJM	MISO	NY	HQ	Total
Option 2		0	(1,718)	(1)	(123)	(1,840)
Option 3	Scenario 1	1,005	6,505	177	625	8,313
Option 3	Scenario 2	(0)	(173)	4	(114)	(284)
Option 4	Scenario 1	0	282	1	23	307
Option 4	Scenario 2	0	68	0	4	72

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ETS Tariff Revenue and Market Efficiency Impacts

Change in ETS Revenue
Million 2008$CAN

Option	Scenario	2010	2015
Option 2		27.4	22.5
Option 3	Scenario 1	(12.0)	(13.5)
Option 3	Scenario 2	2.2	1.7
Option 4	Scenario 1	(12.0)	(13.5)
Option 4	Scenario 2	(8.9)	(9.8)

Market Efficiency Impacts - 2010
Million 2008$CAN

Option	Scenario	Sum Variable Costs	Producer Surplus	Consumer Surplus	Total Surplus
Option 2		(126)	(214)	207	(7)
Option 3	Scenario 1	(272)	(299)	297	(1)
Option 3	Scenario 2	9	(14)	(5)	(19)
Option 4	Scenario 1	16	102	(111)	(9)
Option 4	Scenario 2	6	35	(36)	(1)

Market Efficiency Impacts - 2015
Million 2008$CAN

Option	Scenario	Sum Variable Costs	Producer Surplus	Consumer Surplus	Total Surplus
Option 2		(325)	(187)	176	(10)
Option 3	Scenario 1	(403)	(198)	192	(6)
Option 3	Scenario 2	10	(53)	46	(7)
Option 4	Scenario 1	76	59	(56)	3
Option 4	Scenario 2	53	20	(18)	2

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Impacts on the HOEP

Impacts on the HOEP

% Change

Option	Scenario	2010	2015
Option 2		-2.5%	-1.4%
Option 3	Scenario 1	-3.7%	-1.6%
Option 3	Scenario 2	-0.2%	-0.4%
Option 4	Scenario 1	1.3%	0.4%
Option 4	Scenario 2	0.5%	0.2%

NOx Emissions Impacts

Incremental NOx Emissions - 2010

Tonnes

Option	Scenario	Ontario Ontario	Neighbor AE	Neighbor ECAR	Neighbor MAPP_US	Neighbor MI	Neighbor NYISO	Neighbor PJM	Neighbor WUMS	Region Total	USA Total
Option 2		(1,077)	(242)	(227)	(65)	(18)	173	456	3	(999)	48
Option 3	Scenario 1	(3,189)	476	(137)	16	202	(102)	(319)	(92)	(3,143)	101
Option 3	Scenario 2	55	(95)	(82)	(4)	17	(111)	(98)	(8)	(327)	24
Option 4	Scenario 1	(93)	12	143	(28)	6	(73)	(68)	(11)	(112)	(37)
Option 4	Scenario 2	(32)	93	99	(13)	16	(53)	(7)	0	103	(43)

Incremental NOx Emissions - 2015

Tonnes

Option	Scenario	Ontario Ontario	Neighbor AE	Neighbor ECAR	Neighbor MAPP_US	Neighbor MI	Neighbor NYISO	Neighbor PJM	Neighbor WUMS	Region Total	USA Total
Option 2		(276)	(272)	(643)	(49)	(101)	195	102	(8)	(1,052)	(63)
Option 3	Scenario 1	(339)	35	182	(1)	446	(20)	(5)	(11)	287	58
Option 3	Scenario 2	(5)	(44)	(17)	(72)	(94)	(14)	(201)	(1)	(449)	309
Option 4	Scenario 1	64	(22)	(33)	(21)	7	(17)	12	2	(9)	(57)
Option 4	Scenario 2	43	3	(9)	17	3	(3)	15	(1)	68	(29)

See Appendix C for a map of NEEM's regions.

SO2 Emissions Impacts

Incremental SO2 Emissions - 2010

Tonnes

Option	Scenario	Ontario Ontario	Neighbor AE	Neighbor ECAR	Neighbor MAPP_US	Neighbor MI	Neighbor NYISO	Neighbor PJM	Neighbor WUMS	Region Total	USA Total
Option 2		(4,853)	(751)	(2,358)	(126)	(33)	334	2,306	(66)	(5,547)	34
Option 3	Scenario 1	(13,576)	1,871	3,838	75	276	(108)	(6,485)	(896)	(15,004)	162
Option 3	Scenario 2	718	(314)	(204)	(31)	(62)	(432)	(478)	(103)	(905)	(8)
Option 4	Scenario 1	17	(9)	98	(18)	(6)	(264)	(349)	(126)	(657)	(21)
Option 4	Scenario 2	(61)	303	12	76	(4)	(275)	(26)	(3)	22	(39)

Incremental SO2 Emissions - 2015

Tonnes

Option	Scenario	Ontario Ontario	Neighbor AE	Neighbor ECAR	Neighbor MAPP_US	Neighbor MI	Neighbor NYISO	Neighbor PJM	Neighbor WUMS	Region Total	USA Total
Option 2		-	(881)	(695)	(100)	(875)	12	625	(30)	(1,941)	(260)
Option 3	Scenario 1	-	195	(3,753)	27	2,077	(25)	(115)	(86)	(1,678)	276
Option 3	Scenario 2	-	(208)	2,790	(203)	(754)	(7)	(1,009)	(3)	606	661
Option 4	Scenario 1	-	(94)	976	19	281	(12)	154	23	1,347	(54)
Option 4	Scenario 2	-	(41)	(15)	58	129	1	113	(1)	244	(55)

See Appendix C for a map of NEEM's regions.

CO2 Emissions Impacts

Incremental CO2 Emissions

Thousand Tonnes

Option	Scenario	2010 Ontario	2010 USA	2015 Ontario	2015 USA
Option 2		(1,420)	795	(1,548)	1,423
Option 3	Scenario 1	(3,603)	2,721	(1,967)	2,358
Option 3	Scenario 2	(27)	(66)	51	(293)
Option 4	Scenario 1	19	46	358	(367)
Option 4	Scenario 2	23	(0)	249	(230)

Incremental CO2 Emissions

% Change

Option	Scenario	2010 Ontario	2010 USA	2015 Ontario	2015 USA
Option 2		-5.8%	0.0%	-11.0%	0.1%
Option 3	Scenario 1	-14.8%	0.1%	-13.9%	0.1%
Option 3	Scenario 2	-0.1%	0.0%	0.4%	0.0%
Option 4	Scenario 1	0.1%	0.0%	2.5%	0.0%
Option 4	Scenario 2	0.1%	0.0%	1.8%	0.0%

Status Quo

2010								
All-In Export Costs (2008 $CAN/MWh)			To					
			ON	HQ	PJM		NY	MISO
					Via MISO	Via NY		
From	ON			17.47	5.31	13.64	4.60	4.60
	HQ		12.87				12.87	
	PJM	Via MISO	6.48				4.47	0.63
		Via NY	12.04					
	NY		7.57	20.44	9.04			
	MISO		5.85		0.70			

2010	
Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	1.02
NY	1.02
MISO	1.02

2015								
All-In Export Costs (2008 $CAN/MWh)			To					
			ON	HQ	PJM		NY	MISO
					Via MISO	Via NY		
From	ON			17.55	5.33	13.67	4.63	4.63
	HQ		12.93				12.93	
	PJM	Via MISO	6.48				4.47	0.63
		Via NY	12.04					
	NY		7.57	20.49	9.04			
	MISO		5.85		0.70			

2015	
Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	1.04
NY	1.04
MISO	1.04

Option 2 – Average Embedded Network Rate

2010								
All-In Export Costs (2008 $CAN/MWh)			To					
			ON	HQ	PJM		NY	MISO
					Via MISO	Via NY		
From	ON			21.60	9.43	17.77	8.72	8.72
	HQ		12.87				12.87	
	PJM	Via MISO	6.48				4.47	0.63
		Via NY	12.04					
	NY		7.57	20.44	9.04			
	MISO		5.85		0.70			

2010	
Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	5.15
NY	5.15
MISO	5.15

2015								
All-In Export Costs (2008 $CAN/MWh)			To					
			ON	HQ	PJM		NY	MISO
					Via MISO	Via NY		
From	ON			21.68	9.46	17.79	8.75	8.75
	HQ		12.93				12.93	
	PJM	Via MISO	6.48				4.47	0.63
		Via NY	12.04					
	NY		7.57	20.49	9.04			
	MISO		5.85		0.70			

2015	
Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	5.16
NY	5.16
MISO	5.16

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Option 3, Scenario 1 – Reciprocal Tariff Joint Elimination

2010								
All-In Export Costs (2008 $CAN/MWh)			To					
			ON	HQ	PJM Via MISO	PJM Via NY	NY	MISO
From	ON			16.45	4.28	12.62	3.58	3.58
	HQ		4.56				12.87	
	PJM	Via MISO	1.33				4.47	0.63
		Via NY	8.11					
	NY		3.64	20.44	9.04			
	MISO		0.70		0.70			

2010	
Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	0
NY	0
MISO	0

2015								
All-In Export Costs (2008 $CAN/MWh)			To					
			ON	HQ	PJM Via MISO	PJM Via NY	NY	MISO
From	ON			16.52	4.30	12.63	3.59	3.59
	HQ		4.59				12.93	
	PJM	Via MISO	1.33				4.47	0.63
		Via NY	8.11					
	NY		3.64	20.49	9.04			
	MISO		0.70		0.70			

2015	
Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	0
NY	0
MISO	0

Option 3, Scenario 2 – Reciprocal Treatment, Avg. Embedded Network Cost**

2010

All-In Export Costs (2008 $CAN/MWh)			To: ON	To: HQ	To: PJM Via MISO	To: PJM Via NY	To: NY	To: MISO
From		ON		24.76	9.43	12.62	3.58	8.72
		HQ	12.87				12.87	
	PJM	Via MISO	6.48				4.47	0.63
		Via NY	8.11					
		NY	3.64	20.44	9.04			
		MISO	5.85		0.70			

2010

Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	8.31
NY	0
MISO	5.15

2015

All-In Export Costs (2008 $CAN/MWh)			To: ON	To: HQ	To: PJM Via MISO	To: PJM Via NY	To: NY	To: MISO
From		ON		24.85	9.44	12.63	3.59	8.74
		HQ	12.93				12.93	
	PJM	Via MISO	6.48				4.47	0.63
		Via NY	8.11					
		NY	3.64	20.49	9.04			
		MISO	5.85		0.70			

2015

Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	8.34
NY	0
MISO	5.15

**Note: Except between New York where the ETS tariff is deemed to be eliminated.

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Option 4, Scenario 1 and 2 – Unilateral Tariff Elimination (note: *Scenario 2 is status quo on-peak*)

2010

All-In Export Costs (2008 $CAN/MWh)			To: ON	To: HQ	To: PJM Via MISO	To: PJM Via NY	To: NY	To: MISO
From	ON			16.45	4.28	12.62	3.58	3.58
From	HQ		12.87				12.87	
From	PJM	Via MISO	6.48				4.47	0.63
From	PJM	Via NY	12.04					
From	NY		7.57	20.44	9.04			
From	MISO		5.85		0.70			

2010

Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	0
NY	0
MISO	0

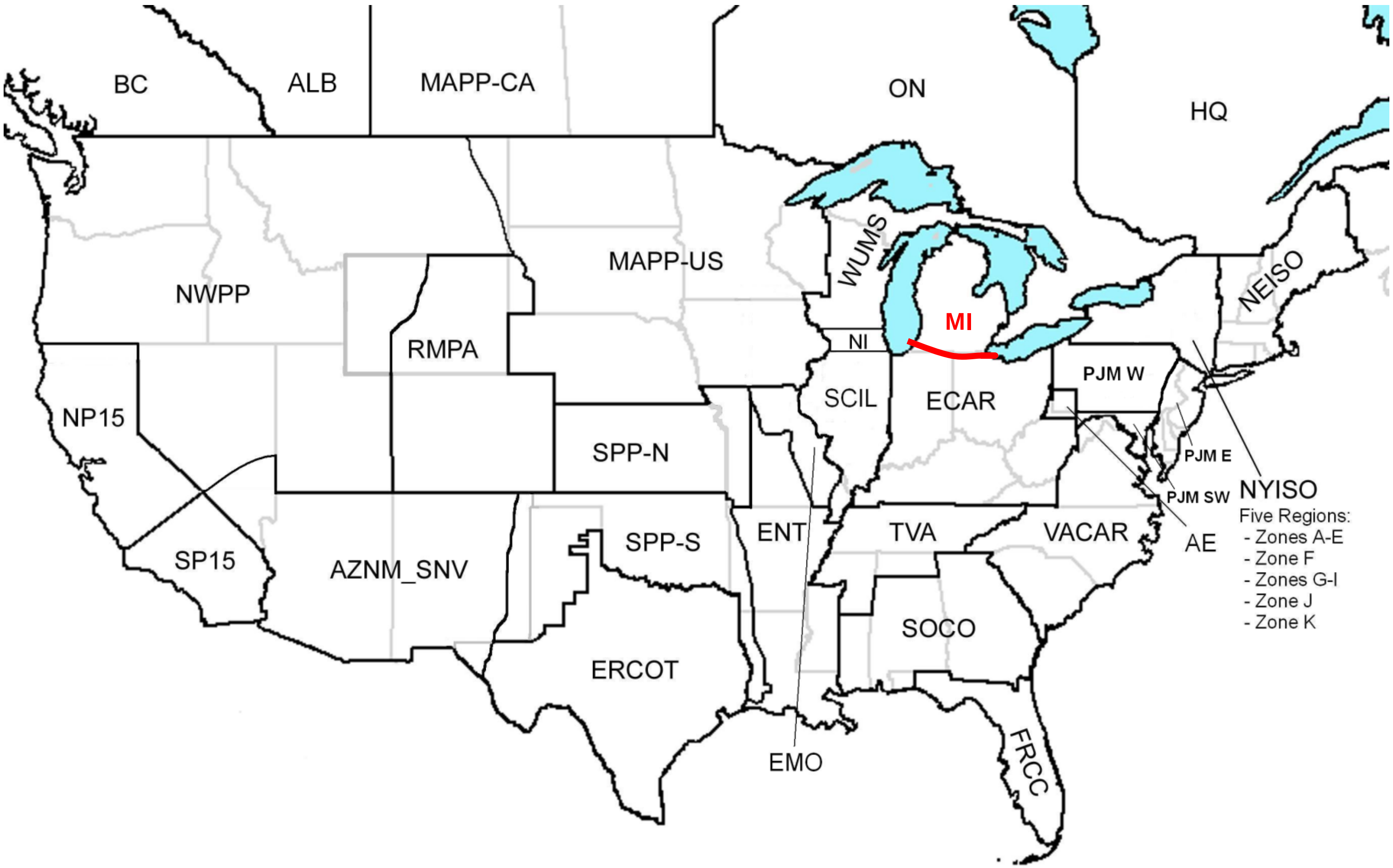
2015

All-In Export Costs (2008 $CAN/MWh)			To: ON	To: HQ	To: PJM Via MISO	To: PJM Via NY	To: NY	To: MISO
From	ON			16.52	4.30	12.63	3.59	3.59
From	HQ		12.93				12.93	
From	PJM	Via MISO	6.48				4.47	0.63
From	PJM	Via NY	12.04					
From	NY		7.57	20.49	9.04			
From	MISO		5.85		0.70			

2015

Export Tariff out of Ontario (2008 $CAN/MWh)	
HQ	0
NY	0
MISO	0

Map of NEEM Regions



Michigan is a separate region.

Export Transmission Service Tariff Study (SE-78)

Working Group List

Company Names
Brookfield Energy Marketing Incorporated
Bruce Power
Consumers Council of Canada
Hunt Management Services Limited
Hydro One
Hydro Quebec
NorthPoint Energy Solutions
Ontario Energy Board
Ontario Power Generation
Power Workers Union
SanZoe Consulting Incorporated
Shell Energy
TransCanada Energy

Export Transmission Service Tariff Study (SE-78)
Stakeholder Feedback

On December 11, 2008, the IESO posted the Export Transmission Service Tariff Study stakeholder engagement plan. Stakeholders were asked to send in written comments by January 12, 2009.

Two comments were received.

The following is a summary of Stakeholders key comments on each topic followed by the IESO response which has been indented for ease of reading.

Vulnerable Energy Consumers Counsel

Roles and Responsibilities

Mr. Bounaguro observes that: [a]s the Plan notes, the ultimate responsibility for approving the Export Tariff lies with the OEB and the ultimate responsibility for making the associated application for approval lies with Hydro One Networks. It is VECC's understanding that the IESO's involvement in this issue arises primarily due to the need to determine whether reciprocal arrangements can be made with neighbouring jurisdictions regarding transmission pricing for power exchanges between jurisdictions. As a result, VECC considers this to be a key and central aspect of the IESO's study.

> **IESO Response**
> The IESO agrees that the ongoing discussions with neighbouring jurisdictions to pursue arrangement for reciprocal treatment of the export tariff is an important aspect of this undertaking. We believe that due to our role as both System and Market operator the IESO was deemed as appropriately positioned to engage our neighbours in these discussions.

Objectives

Mr. Bounaguro suggests that the assessment approach described in the Stakeholder Engagement Plan appears to focus almost entirely on the issue of market efficiency with no consideration regarding the fairness/equity of the resulting rates. And that this is significant shortcoming as the Board's objectives include consumer protection and Hydro One Network's pricing principles require that pricing methodologies be fair and equitable and should not favour any group or type of customers. Furthermore, fairness and equity should be particularly important consideration, if as the stakeholder plan observes, establishing arrangements for reciprocal treatment of the export tariff with neighbouring jurisdictions does not appear to be a reasonable outcome at this time.

IESO Response

In formulating the approach for undertaking the study and process for reviewing and recommending the appropriate ETS tariff, the IESO will rely upon parameters and evaluation principles that were discussed as part of Hydro One's transmission rate review (EB-2006-0501, Exhibit HI, Tab 5, Schedule 1, Page 7 -8). The primary focus of the IESO's effort is to consider various alternatives to the current tariff design and rate, and the likely impacts of each of these alternatives on a number of parameters that were identified as being important to stakeholders. These parameters include: export volumes, ETS revenues, HOEP and market efficiency. Based on a review of the impacts of the current and alternative tariff design on these parameters, the IESO will propose the appropriate tariff design and rate(s) which will strike a balance between simplicity of implementation, fairness and equity, the degree to which it will promote market efficiency in the region, and consistency with rates in neighbouring jurisdictions.

Mr. Bounaguro also notes that: in terms of objectives, the degree of need for consistency with rates in neighbouring jurisdictions will depend on whether reciprocity in transmission pricing arrangements is possible. What is likely more important is consistency in rate setting methodologies – recognizing that costs and therefore rates will vary by jurisdiction.

IESO Response

The IESO recognizes the potential for inconsistent treatment of the export tariffs between jurisdictions if the parties are unable to arrive at an arrangement to eliminate the tariff on a reciprocal basis. Accordingly, under option 3 the IESO will also be reviewing scenarios that could otherwise ensure reciprocal treatment of the tariff between Ontario and each of the interfacing markets.

Mr. Bounaguro further notes that: the Plan suggests (page 6) that Ontario could end-up with a mix of ETS rates at its different interfaces. There is a need to distinguish between reciprocity in terms of common transmission charges/methodologies versus reciprocity in terms of elimination of overlapping transmission charges. These are two very different interpretations and it is VECC's view that the IESO should be pursuing the later with neighbouring jurisdictions while maintaining a common export tariff where applicable.

IESO Response

The IESO agrees that these are separate interpretations. However, given the status of the discussions with our neighbours, the IESO will likely assess the potential impacts of both scenarios under option 3 of the study.

<u>SanZoe Consulting Inc. (Representing AMPCO)</u>

Process

Mr. Clark suggested that the IESO should consider seeking agreement/approval from the OEB in order to fund intervenor involvement in this initiative. Mr. Clarke believes that such action would ensure maximum involvement of intervenors.

Mr. Clark suggests that the IESO should provide specific notice to all intervenors in EB-2008-0272 (Hydro One Transmission Rate Application) of this review, with indication of whether intervenor funding will be available.

> **IESO Response**
> Any change to the ETS tariff will need to be approved by the Board as part of a rate setting process. Since this stakeholder engagement is not a hearing, the IESO believes that it is more appropriate for intervenors to request funding as part of any subsequent hearing before the Board to review and approve changes to the current transmission tariff. In addition, the IESO's stakeholdering process is quite flexible, enabling all interested stakeholders to participate in the process with limited time and resource commitments. As such the IESO will not be providing intervenor funding in support of this Stakeholder Engagement.
>
> In addition to its weekly bulletin, the IESO has sent a notification to all intervenors in Hydro One's Transmission Rate hearing.

<u>Assessment of Options</u>

Mr. Clark asked that cost allocation be added to the items to be evaluated.

> **IESO Response**
> In formulating the approach for undertaking the study and process for reviewing and recommending the appropriate ETS tariff, the IESO will rely upon parameters and evaluation principles that were discussed as part of Hydro One's transmission rate review (EB-2006-0501, Exhibit HI, Tab 5, Schedule 1, Page 7 -8). The primary focus of the IESO's effort is to consider various alternatives to the current tariff design and rate, and the likely impacts of each of these alternatives on a number of parameters that were identified as being important to stakeholders. These parameters include: export volumes, ETS revenues, HOEP and market efficiency. Based on a review of the impacts of the current and alternative tariff design on these parameters, the IESO will propose the appropriate tariff design and rate(s) which will strike a balance between simplicity of implementation, fairness and equity, the degree to which it will promote market efficiency in the region, and consistency with rates in neighbouring jurisdictions.

The result of the IESO's review of potential alternatives to the current ETS tariff, and recommendation regarding an appropriate ETS tariff design and rate(s) may assist AMPCO and others in any subsequent discussions and review of cost allocation undertaken by the Board.

Mr. Clark suggested that the review should provide comment on the options being considered in terms of the extent to which they may incent or discourage "phoney" wheeling for financial purposes only.

IESO Response

The study will look at the impact on import, export and wheel through transactions and we expect to be able to perform a qualitative assessment of whether the proposed options will either incent or discourage circuitous wheel through transactions as occurred in New York in 2008.

Mr. Clark asked for the reason for the insertion of cross border emissions as part of the review.

IESO Response

Although potential implications on cross-border emissions was not specifically identified as a proposed evaluation parameter for the ETS tariff study it has been raised as a potential concern by certain stakeholders. To address the potential concern, the IESO considered that it may be beneficial to obtain a better understanding of what impacts, if any, new or reciprocal transmission export tariffs may have on electricity trades and consequentially on air emissions in the region. If this issue is not considered important to stakeholders it can certainly be removed from the scope of the study.

On January 22, 2009, the IESO posted the Export Transmission Service Tariff Study Approach and Methodology. Stakeholders were asked to send in written comments by February 5, 2009.

One comment was received.

Bruce Power Comments and Observations

There should be some recognition by the OEB, IESO and participants that this study approach is not a substitute for a full cost of service finding for export transmission service. This study will not determine the cost of exports to the transmission system as a full cost of service hearing would. The rate ultimately determined from this model will have no connection with the cost of providing export service. The rates used in this analysis should not be construed to be the 'appropriate' or 'efficient rate'. The model as proposed will not determine the optimal rate for export transmission service. The model will use the ETS rate as an input to calculate the lowest cost of meeting demand in the region (Ontario, New York, PJM, etc). The efficiency results and trade flows that result from the model will be affected directly by the choice of the ETS tariff. The ETS rate used in the model has been chosen arbitrarily during discussion at the stakeholder session and should not be construed as an efficient rate. The model will demonstrate the market impacts of various rates and provides the IESO, OEB and stakeholders with information to determine the potential impact of different ETS rates. Following this study an open question remains as to the true cost of exports of the transmission system.

IESO Response

We believe that Bruce Power's concern is that the ETS design and rate(s) which will be studied are not the result of a full cost of service study; accordingly, any ensuing ETS design and rate that may be proposed in this regard should not be construed as being "appropriate" or "efficient".

As discussed at the first stakeholder session on January 22, 2009, the IESO will not attempt to duplicate the Ontario Energy Board (the "Board") transmission rate review and approval processes nor would this be appropriate. The IESO noted that three ETS design options and various rate scenarios will be reviewed as part of the study—one of which is based on current and projected cost of providing transmission service from network assets (i.e., the ETS design and rate that that will be modelled under Option 2 will be based on the average cost of providing network transmission service). In addition, transactional costs (i.e., applicable uplifts) that are associated with facilitating export and wheel-through will also be taken into consideration. Accordingly, the cost of service applicable to export and wheel-though transactions will be considered under Option 2.

The appropriateness of the three options will be determined based on the impact of each option on four key parameters: HOEP, export and import volumes, export revenues and market efficiency. Further, any change to the ETS rate will have to be reviewed and approved by the Board as part of its provincial uniform transmission rate review process.

Bruce Power Comments and Observations

When conducting the ETS review Bruce Power requests the IESO to investigate the impact of a peak and off-peak rate for export transmission service. This proposal is based in part on the assertion that most surrounding jurisdictions have peak and off-peak rates for export transmission service.

IESO Response

Due to the complexity, cost and time required to undertake a study of additional multifaceted ETS design and rate scenarios, this study will be limited to a review of the three ETS design options and rate scenarios discussed at the stakeholder meeting. We note that in the two jurisdictions (i.e., PJM and MISO) where export and wheel-through transmission service is available on a time-of-use basis, this form of service is only available on a short-term basis (i.e., weekly, daily and/or hourly basis). It was discussed and endorsed by stakeholders at the stakeholder meeting on January 22, 2009 that, for the purpose of undertaking an appropriate and comparative analysis, the IESO should adopt and used the long-term (i.e., annual) firm transmission rate for export and wheel-through service applicable to each jurisdiction.

The IESO appreciates stakeholders concern regarding the need to optimize the use of Surplus Base-load Generation (SBG) resource. We note however that there are potentially numerous ways of addressing this issue. Also, it is also worthwhile noting that this issue is currently under reviewed by IESO working group SE-57. http://www.ieso.ca/imoweb/consult/consult_se57.asp

In terms of the current ETS study, the IESO will modify the scope of the study to enable us to gain greater insight with respect to any material correlation that may exist between export transmission rates and SBG. We believe this information could also help to inform the discussion in SE-57.

Bruce Power Comments and Observations

With a study of this type the assumptions used in the analysis will have a direct impact on the results. For this reason it is very important to understand the inputs used for model. For this reason all the input assumptions should be released publicly wherever possible. When it is not possible to publish the exact input assumptions a qualitative statement of the inputs should be presented in its place. Promoting transparency in a study like this is the only way to ensure that all stakeholders have the opportunity to clearly understand the results and the drivers that lead to the results.

IESO Response

The IESO agrees that it is important for stakeholders have a thorough understanding of the inputs and assumptions which forms the basis of the study and analysis. Accordingly, the IESO will, to the extent possible, make public any non-confidential data and assumptions used in the model, as well as information that will not prejudice the competitive position of any market participant or interfere with known contractual or other negotiations involving participants.

On June 25, 2009 and July 14, 2009, the IESO posted the preliminary results and impact assessments. Stakeholders were asked to send in written comments by July 21, 2009. Four comments were received. Also, there were a number of key issues raised at the June 25 meeting that needed to be addressed before moving forward. A complete list of those issues and the IESO response is noted in the chart below.

Issue No.	Issue	Raised by	Response
1	It was unclear whether the study had modeled the Manitoba - Ontario transmission interface at all. The key transmission links cited in the presentation listed all of Ontario's transmission interfaces that were modeled, including the Minnesota link at International Falls (90/140 MW transfer capability). However, there wasn't any mention of the much larger Manitoba-Ontario interface. If the study model inadvertently omitted the Manitoba - Ontario interface, the IESO must repeat the analysis, this time including the Manitoba-Ontario interface in order for the study results to be meaningful.	Manitoba Hydro	There are multiple transmission interfaces connecting Ontario and adjacent dispatch areas or markets, or virtual markets in the case of how PJM is considered in the study. Slide 7 of the Export Transmission Service (ETS) Charge Scenario Analysis - Overview: Draft Preliminary Report and Findings ("overview presentation") shows the links between the IESO-administered market and adjacent dispatch regions that were considered in the study. Slide 80 of the overview presentation is intended to provide a summary of the aggregate transfer capability of the interfaces between the IESO-administered market and other dispatch areas considered in the study. The reference to Ontario-Minnesota transfer limit is not to suggest that this interface is representative of a separate dispatch area in the model; rather, it is to show the Ontario-Minnesota transfer capability within the aggregate MISO dispatch area. Also, it is not intended to suggest that the Ontario-Manitoba transfer capability was not taken into account in the study. The IESO will update slide 80 to show the Ontario-Manitoba transfer limit that is included in the aggregate MISO dispatch area total.
2	The study has lumped Manitoba inside the MISO market. That is, Manitoba isn't treated as a separate market like the Hydro-Quebec system. Why was that study approach taken? Although Manitoba Hydro coordinates transmission service with the Midwest ISO, the Manitoba Hydro open access transmission tariff is an	Manitoba Hydro	The study doesn't treat Manitoba as a separate dispatch area; but rather as part of the MISO footprint given that electricity trades between Ontario and Manitoba, as well as transmission reservations are facilitated through the IESO and MISO markets. For example, Manitoba Hydro's Open Access Transmission Tariff (OATT) requires that the processing of short-term firm and non-firm point-to-point transmission service request be conducted by MISO on behalf of Manitoba Hydro. Unbundling Manitoba into a separate and distinct market would effectively result in the creation of a sub-market

Issue No.	Issue	Raised by	Response
	independent tariff and MH Transmission Services can have a different export tariff than MISO. Recently, Manitoba Hydro's transmission tariff rate was removed from the MISO schedules (schedule 7 for firm point-to-point service and 8 for non-firm service). Manitoba Hydro's rates are no longer included in the MISO system average rate for drive-out transmission service. These changes were driven by a revision to the MH-MISO coordination agreement, effective Nov 1, 2008. Due to the current "carve-out" of Manitoba Hydro's transmission rates, it is not appropriate to lump the Manitoba system inside the MISO region. Manitoba's interaction with the Ontario market should be explicitly modeled, similar to the HQ system.		within the MISO dispatch foot print. For the purposes of the ETS study, this would be a significant and costly undertaking which we do not believe would add any additional benefit to the study or change the results in a material way. In addition, while Manitoba is permitted to administer a separate OATT from that of MISO, export and wheel-through transactions that originate in Manitoba and terminate in Ontario would not be put at a disadvantage with respect to applicable transmission charges given the reciprocity and non-discriminatory requirements of the two tariffs. Likewise, transactions destined for Manitoba from Ontario will attract the same transmission charges as with other zones within the MISO footprint. Furthermore, Manitoba has not demonstrated how modeling it as part of the MISO footprint will limit or adversely impact its ability to trade with Ontario market participants, or facilitate wheel-through transactions through Ontario under any of the Export and Wheel-through Tariff (EWT)options under consideration. While Manitoba's transmission tariff, including the EWT has been unbundled from the MISO transmission tariff schedules for point-to-point services, in our view this has little impact on the ETS Study, especially given the relatively small transfer capability (342 MW) and limitations on the Ontario and Manitoba transmission interface. The IESO has confirmed with the Ontario Power Authority that there is currently no plan for increasing the transfer capability with Manitoba. Accordingly, regardless of whether Manitoba is treated as a separate market or integrated as part of the broader MISO footprint or the applicable EWT, we do not believe that this will have a material impact on the basis for determining a reasonable EWT for Ontario. In comparison to the Quebec interface, the Ontario-Manitoba transfer capability is almost five times smaller.
3	General concerns on the CRA NEEM model, which is non-chronological and significantly aggregates the data into large averaged load	Manitoba Hydro	The study did not aim to establish the detail or quantify the potential impacts of the ETS options on potential operation and implementation issues (e.g., potential impact on uplift payments to nuclear and wind generators that may be subject to fixed price contracts or hourly SBG events). For

Issue No.	Issue	Raised by	Response
	blocks. Such a coarse model cannot adequately capture operational issues and hence the CRA NEEM model may underestimate the potential impact of Option 2 and Option 3 ETS rate designs. It is unclear what impact these Options may have on uplift payments to nuclear generators and fixed price contracts for wind. In order for the IESO to capture operations issues (such as SBG) as it has tried to do, it will need to utilize an hourly chronological market model.		example, with respect to surplus baseload generation (SBG), the aim was to observe the potential impact of each option on SBG events in respect of their magnitude, duration (e.g. # of hours/month) and timing. In our earlier stakeholder meeting we also identified and discussed certain potential limitations of the analysis that was to be undertaken; in particular, we explained that the study did not account for any price protection and obligations that may be afforded to contracted generators, as well as material changes in uplift costs and revenues. While more detailed inputs such as contracted nuclear and wind generator arrangements and requirements might have provided more granular insights into potential impacts on various operational and administrative issues such as SBG and uplifts, the NEEM model was deemed to be satisfactory by those present at the initial stakeholder meeting for carrying out the objectives, and the scope of work which was outlined in the ETS Stakeholder Plan. Accordingly, we are confident that the NEEM model is appropriate to undertake the quantitative analysis (impact on HOEP, export revenues, export and wheel-through volumes and market efficiency) of this study.
4	How was Hydro Quebec's hydro fleet modelled	OPG	The total hydro electric output used in the model for Quebec is 192 TWh (Source: Hydro-Quebec annual report) and the month-to-month variation in Quebec hydropower output was inferred by the shape of Quebec demand plus net exports (Source of net exports: Canada National Energy Board; Source of demand forecast: NERC); While the analysis released in June 2009 had the Quebec hydropower resources operating flat within each month, the final July 2009 analysis has a run-of-river portion which is sized to approximately meet the minimum load in each month. The remainder of each month's hydro output is optimized.
5	On page 9 of the report (page 11 of the overview presentation) we have stated that the cap for CO2 in 2015 is 11.5 million metric tonnes. There is general concern regarding this number	Bruce Power	The Ontario coal units are retired in the CRA NEEM model by 2015, with the exception of tiny fractions of units needed to avoid modeling infeasibilities. Therefore, the modeled emissions of CO2 from Ontario's coal-fired generation are essentially zero in 2015. The amount of CO2 emissions from the Ontario coal in 2015 have no practical significance whatsoever and do not affect the analysis conclusions.

Issue No.	Issue	Raised by	Response
	considering there should be no emissions from coal fired plants in 2015		The Ontario Government's Shareholder Declaration (dated May 15, 2008) and Resolution (dated May 16, 2008) requires OPG to stage the reduction measures to meet, on a forecast basis, the interim CO2 emission targets of 19.6 million tonnes in 2009, and 15.6 million tonnes in 2010. Proposed amendment to the current enabling regulation would require a reduction in CO2 emissions to 11.5 million tones beginning in 2011, from CO2 emissions of 34.5 million tonnes in 2003. The limit would continue on an annual basis until December 31, 2014. The table on page 9 will be revised to show 0 tonnes of CO2 in 2015.
6	Concern from Stakeholders that the model uses a flat hydroelectric production profile for the analysis. Many think that this is an incorrect assumption as hydro units would be used for peak shaving in future years	OPG	Please refer to responses to issue no. 4 and 13
7	On page 13 the prices shown for natural gas for Ontario seems way too high and the curve is too steep. There is a concern that this may have a significant impact since the model is cost based	APPrO	The 2010 gas prices used in the analysis are based on NYMEX futures (Henry Hub) from the beginning of April 2009. These prices are the futures that were available at the time the model was loaded in the model. The 2015 prices are based on the EIA AEO 2009 (April release) forecast. We do not believe it is material to update the gas price forecast for the following two reasons: 1) since all regions are subject to the same underlying gas price forecast, the effect of different gas prices on the differential impact of the tariff scenarios is likely immaterial, 2) while it is possible that the 2010 gas prices currently in the model could be too low relative to next year's actual gas prices, it is also possible that the assumed 2010 gas price will be very realistic for 2011 or 2012 and therefore remains quite meaningful to establishing an appropriate ETS for Ontario (regardless of the exact time path of actual future gas prices).

<table>
<tr><th>Issue No.</th><th>Issue</th><th>Raised by</th><th>Response</th></tr>
<tr><td>8</td><td>On page 15 there is a need to provide a justification for the new build and retirement numbers for wind and nuclear. There is concern that the nuclear numbers are too high and the wind is too low.</td><td>Bruce Power</td><td>The information was provided by the OPA and is consistent with its planned resource scenario.

Committed nuclear in year 2010 includes the Bruce units 3 and 4 at 1500 MW installed capacity. In 2010, it is anticipated that Bruce units 1 and 2 (each 770 MW) are taken out of service for refurbishment. They are subsequently assumed to return to service in years 2012 and 2013 and factored into the committed nuclear annual installed capacity for those years. Similarly, in year 2013, Pickering B unit 4 at 516 MW is taken out of service for refurbishment and assumed to return in service in year 2015 and subsequently an additional Pickering B unit 6 and Bruce unit 5 coming out of service in 2015. This is summarized in the table below:

The installed wind capacity represents nameplate capacity and is consistent with the OPA’s publicly announce planned resource scenario.

<table>
<tr><th></th><th></th><th>2010</th><th>2015</th></tr>
<tr><td>Additional Capacity</td><td></td><td>Bruce Units 3 and 4 -1500 MW</td><td>Bruce Units 1 and 2 – 1540 MW</td></tr>
<tr><td></td><td></td><td></td><td>Pickering – 516 MW</td></tr>
<tr><td></td><td>Total</td><td>1500 MW</td><td>2056 MW</td></tr>
<tr><td>Planned Refurbishment</td><td></td><td>Bruce Units 1 and 2 – 1540 MW</td><td>Pickering B – 4 & 6 Units & Bruce Unit 5 – 1829 MW</td></tr>
<tr><td></td><td>Total</td><td>1540 MW</td><td>1829 MW</td></tr>
</table></td></tr>
<tr><td>9</td><td>For the data shown on page 18 of the overview presentation it is unclear what bidding/offer</td><td>Multiple</td><td>For the 2007 calibration, NUGS were modeled as price takers, combined-cycle gas were exposed to market prices and oil/ gas units (predominantly Lennox units) had their</td></tr>
</table>

Issue No.	Issue	Raised by	Response
	strategies were assumed and if this was used for current and future years		bids adjusted downward by roughly 15-25%. The coal units' bids were also adjusted by lowering the effective heat rate. None of the bid adjustments affect the actual costs borne by the units. For the future years of 2010 and 2015, we used same adjustments with the exception of the following: Oil/gas units (other than NUGs/CHP) - The bid adjustments were removed for future years to reflect that contractual arrangements for Lennox are expected to change. NUGS/CHP units – The units are modeled as per OPA issued capacity factors.
10	On page 24 of the overview presentation, CRA had included additional information to the far right of the slide indicating the price differences used in the model. These should be explained	Multiple	Over the study period (i.e., 2007-2010 and 2007-2015) ETS "all-in costs" were estimated to increase by the annualized change in Consumer Price Index (CPI) as forecasted by the Toronto Dominion Economics as at March 2009. The annual CPI change forecast for 2015 is kept at the 2013 levels. Projected currency valuation (exchange rates used for converting US and Canadian dollars) is also based on Toronto Dominion's Bank Exchange Rate and Inflation Forecasts. The exchange rate for 2015 is kept at 2010 levels. The forecasts can be found at: www.td.com/economics/qef/long_term_mar09.pdf. The Toronto Dominion's Consumer Price Index Adjustments was also used to rebase, in 2003 US dollars, for 2010 and 2015 ETS all-in costs and the US Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2009 chain-type price index was used to convert 2003 US dollars to 2008 US dollars. The latter can be found at: http://www.eia.doe.gov/oiaf/aeo The example below shows the sources for the consumer price indices used for rebasing and exchange rates for converting to US and Canadian dollars and associated calculations: Option 3, Scenario 1: Ontario decreases rate by $0.95 Cdn • 2007 ON ETS: $1.00 Cdn • Used the annualized March 2009 TD Forecast for CPI Index to reflect 2010 ON ETS: $1.02 Cdn (escalation factors for 2008:+2.4%; 2009:-0.8%;

Issue No.	Issue	Raised by	Response
			2010:+0.8%) • Used US Exchange Rate @ 1.136525 to convert to USD for 2010 ON ETS: $0.90 USD ($1.02*1.136525) • Rebased in 2003 USD for 2010 ON ETS using TD Forecast CPI Adjustment of 1.165652: $0.77 USD ($0.90*1.165652) • Used CPI adjustment of 1.145 to convert to 2008 USD and Exchange Rate @ 1.078 to convert back to Cdn: $0.95 ($0.77*1.145*1.078)
11	On page 27 of the report there was a request for further explanation of the numbers for HQ in 2010 and 2015 specifically concerning the peak/off peak hours.	Bruce Power	For the draft preliminary analysis, the hydroelectric shapes in the region were all flat. The level varied by month and the resources were different in the different regions (e.g., Quebec and Ontario hydro resources are modeled as separate units in their respective regions). One consequence of this simplified assumption (flat shapes) was that Quebec had excess hydroelectric power off-peak but was short on-peak. This resulted in Ontario exporting to Quebec significantly more during the on-peak hours than in the off-peak hours. This is not realistic given Quebec's storage capabilities. For the revised final analysis, all hydroelectric resources in the region are divided into a run-of-river resource and a portion that can be optimized and thus used more intensively on-peak. Consequently, in the revised analysis, Ontario tends to export to Quebec predominantly during the off-peak hours. This is consistent with the comments received during the June 2009 stakeholder meeting.
12	On page 39 of the report (page 30 of the overview presentation)need to clarify that non-NY neighbours includes HQ, MISO and PJM	Hydro Quebec	Report has been adjusted to clarify that non-NY neighbours include HQ, MISO and PJM.
13	General concerns with the SBG analysis including: - Size and shape of the demand curve - Hydro electric profile	Multiple	The IESO is carrying out a review of the SBG analysis taking into account the various concerns expressed by stakeholders, including confirming the seasonal demand forecast used in the earlier runs, use of Ontario on-peak and off-peak hydro production forecasts, and refining Quebec's

<table>
<tr><th>Issue No.</th><th>Issue</th><th>Raised by</th><th>Response</th></tr>
<tr><td></td><td>- Lack of granularity of the model
- Results are counterintuitive
- Wind inputs
- Imports from Quebec</td><td></td><td>hydro production assumptions. For example, the refined approach for modeling Ontario hydro production is as follows:
Ontario’s Hydroelectric output has been separated into a base- load (Run-of-River) component and a “storable” component The approach used in the model is to allocate total hydro electric generation between baseload and storable components. The quantity allocated to the baseload component varies by month and by seasons. The historical off peak hydro electric output has been used as a proxy for baseload. In the model, the storable component is allowed to manoeuvre in response to economic conditions such that peaking hydro resource production correlates with the highest price periods. The net result of this approach is an improved hydroelectric production profile which we believe should address the concerns of stakeholders.

<table>
<tr><th colspan="3">Ontario Hydro Resources</th></tr>
<tr><td></td><td>2010 (MW)</td><td>2015 (MW)</td></tr>
<tr><td>Run of River</td><td>3,100-4,700</td><td>3,300-4,900</td></tr>
<tr><td>Storable</td><td>3,200-4800</td><td>3,800 - 5,400</td></tr>
<tr><td>Total Ontario Hydroelectric Output (incl. Run of River and Storable)</td><td>7,900</td><td>8,700</td></tr>
</table>
</td></tr>
</table>

Four comments that were received.

Brookfield Power

Analysis/Model concerns:

The four options that will be assessed as part of the study are as follows:

Option 1: Remain the same at $1/MWh applicable to export transactions (Status Quo).
Option 2: Equivalent Average Network - Under this option, export and wheel through transactions would pay a rate equivalent to Transmission Network Service, but using energy as the charge determinant (i.e. $/MWh).
Option 3: Reciprocal Treatment of Export Transmission Service Charge. This option considers two potential mode of reciprocal treatment, including the mutual elimination of all ETS tariffs between jurisdictions.
Option 4: Unilateral Elimination of the ETS tariff. This option considers two scenarios under which the Ontario ETS tariff could be unilaterally eliminated: 1) unilateral elimination of the tariff in all hours; and 2) unilateral elimination of the tariff only during off-peak hours.

- The model does not properly shape generating units and is thus giving inaccurate results/forecasts.
- The model's results show the exact opposite of what the real market results have been (SBG events are forecasted during winter and summer and none during spring). This is the exact opposite of real events and could render the analysis/model irrelevant. We do agree that the explanation of some of the past SBG "can" happen in the summer months as the example given was a holiday, but we do not forecast SBG to occur most/all of the time in the summer or winter and none in the spring; the results are clearly incorrect.
- SBG study does not look into positive effects of exports (as they would clearly have a positive impact on resolving these issues).
- Why does the model show more exports to HQ on-peak rather than off-peak (we would assume more exports off-peak than on peak as on all other interties HQ exports on-peak and imports off-peak).
- We have not been given any information about internal studies into reliability and transmission issues.
- Bidding behavior is not consistent over time and excluding that may skew the results.
- Not considering transmission constraints will skew results (actual flows, constraints, limitations, outages)
- NEEM's model "flattens" prices: on-peak low and off-peak high. "flattening" of prices effected by the assumption that outages/dispatches are all perfectly anticipated/implemented/dispatched. This will decrease the benefits of imports and exports for supply/demand balancing as in real events nothing happens perfectly.
- 2009 gas price of $5, huge economic changes since initial price set for model. How will a more accurate gas price affect results?

- Were FTR auction values included in the model? (If not, FTR auction prices would inevitably increase for all models reducing export fees and would be reduced for models that increase export fees. This will reduce the surplus in options with increased fees and increase the surplus in models with decreased export fees). This value will also offset some of the reductions in tariffs collected for transmission providers. (high export fees reduce otherwise economic transactions from occurring and decrease global market efficiency)

BEMI's Conclusions:

BEMI agrees that if there is no chance of negotiating a reciprocal elimination of export fees then we can conclude that Option #3 – Scenario 1 can be eliminated from our list of available options.

BEMI agrees that to charge more than the cost of service for transmission could be against a FERC mandate, so reciprocal fee treatment in Option #3 – Scenario 2 can be eliminated from our list of available options.

Since emissions are well below cap for all options, we can conclude that this is not a major issue that should determine which option is optimal.

BEMI's Recommendation:

BEMI believes on a high level evaluation that market efficiency will be achieved through the reduction (or better) the elimination of transaction fees. As predicted, the model (even though inaccurate, we believe it will always produce a higher total surplus when transaction fees are eliminated; as basic economic theory on market efficiency predicts) shows that the surplus is greatest for Option #4 – Scenario 1 (Option #4 – Scenario 2 had the second highest surplus). Option #2 had the largest negative surplus and basic economic principals would predict that this will decrease market efficiency.

As both Scenario's in Option #4 are the only ones that increase net exports, we believe that they will have additional benefits for the forecasted SBG events and reliability benefits; as well as, they will increase global market efficiency through dispatching the least cost generator across interconnected markets.

Surplus Results Analysis:

- Option #2 shows a transfer of surplus from producers to consumers of: -$271 million from producers and +$256 million for consumers for 2010 and -$284 million from producers and +$246 million for consumers for 2015. This creates a transfer difference of $527 million for 2010 and $530 million for 2015; although the total market surplus is only (-$15 million) for 2010 and (-$38 million) for 2015.
- Option #4 – Scenario 1 shows a transfer of surplus from consumers to producers of: -$47 million from consumers and +$47 million for producers for 2010 and -$52 million from consumers and +$60 million for producers for 2015. This creates a transfer difference of $94 million for 2010 and

$112 million for 2015; although the total market surplus is only $0 for 2010 and +$8 million for 2015.

- Option #4 – Scenario 2 shows a transfer of surplus from consumers to producers of: -$33 million from consumers and +$30 million for producers for 2010 and -$6 million from consumers and +$6 million for producers for 2015. This creates a transfer difference of $63 million for 2010 and $12 million for 2015; although the total market surplus is only -$2 million for 2010 and +$1 million for 2015.

as mentioned earlier: both Options #4 will have an increased surplus when FTR values are included and Option #2 will have a decreased surplus

As you can see not only does Option #4 produce the only positive total surplus, it has the smallest transfer of surplus from one group to another. An extremely large transfer of surplus would seem unfair for whichever stakeholder who is negatively affected the most. Although Option #4 – Scenario 2 has the smallest magnitude of transfer from one group to another, we believe that Option #4 – Scenario 1 is the best overall option as it has the highest total surplus while maintaining a small transfer differential.

Regardless of future results, we believe that as markets evolve we see that market efficiency is achieved through the reduction of transaction fees and to move away from the inevitable solution would not make sense (as we see the continued effort to reduce transaction fees and increase global market efficiency). This is also a view held by OEB in RP-1999-0044 section 3.8.20; *"The Board considers that the Government's long-term objective of reducing energy costs through competition can be served by the development of larger, open power markets where trade can take place with the minimum of impediment. In this regard, the Board appreciates the recommendation by the Market Design Committee that EWT transactions should be subject to only incremental transaction-specific charges and no contribution to sunk costs should be levied"*, which supports the idea of no export tariff in able to encourage market efficiency; as well, since load has first priority to the transmission grid (exports are cut first for reliability) then sunk or fixed network costs would be born by the load even if there are no exports. Exports are a marginal transaction and only occur when economically feasible and should not incur any fixed or sunk costs.

We believe that a model that predicts more closely real market events (or this model re-run with new assumptions that allow NEEM to better predict current market conditions) would be more useful for analysis, but we believe inevitably all results will show that the reduction of transaction fees and a move toward a more efficient global marketplace will benefit the market as a whole the most in the future; as well as, the IESO should continue to strive towards an efficient market regardless of the co-operation of other adjoining control areas decisions. BEMI supports Option #4-1, but Option #4-2 is an improvement from status quo and is a small step towards the many benefits/goals listed above. Any other option would be contrary to market development/efficiency and would result in negative surplus (so other than Options #4, keeping the status quo is the only other option that does not negatively impact many participants and the market as a whole).

AMPCO

I am writing with comments on the IESO's recent study of options to replace the current $1/MWh export transmission service tariff.

The economic analysis that the IESO has commissioned provides useful insight into the comparative and incremental impacts of implementing options to the status quo. Of interest to AMPCO is the implicit acknowledgement of the deleterious impact of the current tariff on the welfare of consumers. The reality is that domestic consumers have, since 1999 at least, subsidized foreign consumers. While the study makes no explicit estimate of this, the conclusions of the study must be considered in this context, i.e., that an increase in consumer surplus relative to producer surplus necessarily represents an improvement from the status quo, whereas a relative increase in producer surplus would make a bad situation worse.

AMPCO supports the fundamental principle of "user pay". With respect to transmission services, AMPCO has taken the position that, as closely as possible, charge determinants for network services should be designed to reflect the marginal cost of providing those services. Since perfect marginal cost pricing of transmission service is not currently practical, AMPCO has proposed a network charge determinant (in the recent OEB hearing of Hydro One's application for transmission rates in 2009 and 2010) based on customers' demand during periods of peak demand on the network. AMPCO's proposal is based on the understanding that transmission network investment is largely driven by peak, not average demand, and is similar to rates already in place in other jurisdictions. We recognize however, as a practical matter, that a tariff design that is best for a domestic customer might be unsuitable for a foreign consumer. Exports are unlike domestic consumers in that export transactions are transitory and not necessarily or readily attributable to a specific customer or consumption pattern.

While we support the IESO's efforts to review all the potential impacts of a change in the ETS tariff, we would suggest that effects on air emissions in the USA are not of primary relevance to the determination of an optimal tariff for export service by the IESO. (Looking at emissions of a few selected contaminants hardly qualifies as an environmental impact assessment in any case; if environmental attributes were to be used as a basis for rate design, we would expect a much more comprehensive analysis.) We note also the limitations of the study with respect to modelling market responses, changes in market players, fuel costs, etc.

Option 1 (status quo) is not acceptable to AMPCO, since it proposes to continue with a tariff that has no factual foundation in cost drivers. While we understand the original rationale for this level as a "placeholder" tariff, the time has long passed since it should have been discarded.

Option 2 (average network cost, calculated on a $/MWh basis) would appear to provide the simplest solution by doing a simple update of the current tariff. It also has the appeal of eliminating the existing subsidy of exporters by Ontario customers. However, it is not clear that the value calculated by the IESO has considered properly the actual usage of the network by exports and how this usage drives the cost of export transmission service. We would appreciate the IESO providing more detail on how the value of the equivalent average network cost has been calculated.

Option 3 (reciprocal agreements) appears to be a non-starter, given the lack of interest by other jurisdictions.

Option 4, Scenario 1 (unilateral elimination of the ETS tariff) is unacceptable, since it would clearly provide preferential treatment for exports over Ontario customers.

Option 4, Scenario 2 (status quo during peak hours, elimination of the tariff during off peak hours) is unacceptable as written, since it would continue the unjustified $1/MWh tariff during peak hours. This option does, however, contain the basic elements of an ETS tariff design that we suggest should be explored further. AMPCO would support a tariff design similar to this scenario if the tariff during peak hours were calculated based on the average cost of service during peak hours. Presumably, this average network cost would be higher than that calculated by the IESO as an "all hours" average. While not perfect, such a design would more closely reflect the cost of providing export service and would be an improvement on the current design.

We support the IESO's leadership in this area and look forward to the next iteration of the analysis incorporating our suggestions.

Ontario Power Generation

Thank you for the opportunity to comment on the results of the Export Transmission Tariff Study undertaken by the IESO at the direction of the OEB.

During the stakeholder meeting held at the IESO on June 25, 2009 the participants expressed concerns with the model inputs used in performing the analyses. It was our belief that there was a need for the IESO to review the inputs and give consideration to revising the inputs and rerunning the model.

The IESO captured the identified concerns in the June 25, 2009 Meeting Minutes Action Items and provided an assessment of each of the concerns. It is our belief that the IESO has adequately addressed each of the concerns either through explanation or revision to the initial input. The minutes have indicated that the IESO is undertaking a rerun of the study using revised inputs. OPG looks forward to seeing the results of the most recent run of the model.

The IESO has made an assessment of the potential impact of the 4 scenarios on future SBG events. SBG continues to be a growing concern in the Ontario market and the problem is expected to increase in magnitude in the coming years. It is important that the final decision gives consideration to this important issue.
In the past OPG has cautioned the IESO that any assessment of the differences in tariffs between neighbouring markets compare total cost of export from each market. For example, Ontario's current export tariff does not include uplift, which is a separate charge to exporters. Conversely, other markets imbed some or all of these uplift charges directly in the export tariff.

It is difficult to provide any further comment until such time as the IESO publishes the results from the latest version of the study.

Power Workers Union

The PWU's Comments

The PWU's comments on the ETS Study's preliminary results and the responses to stakeholders' questions that the IESO posted on July 14, 2009, are made in recognition of the following:

The PWU recognizes the effort that the IESO staff and CRA have made in the face of the challenging task of attempting to determine the potential incremental impacts of each of the options under consideration on the four parameters established under the objectives of the Study as accurately as possible. The PWU recognizes that a number of variables and data that have the ability to skew the findings of the Study are hard to identify, quantify or account for due to the constant change of circumstances particularly in the recent few years and months. Factors related to the ETS require a lot of resources and time to analyze and forecast their impacts. These factors include, among others,: changes in economic activities, the anticipated Cap and Trade policy for CO2 emissions, the recent decline in demand for electricity in Ontario, the negative price phenomena, the uncertainty around the new nuclear build planned by the government, and the varying interests of the jurisdictions that trade electricity with Ontario.

The PWU believes that it is important that the Study's findings are factual-based, reasonably acceptable to stakeholders from a public interest perspective and one that is durable or able to adjust and respond to the Ontario power market as it continues to evolve in Ontario given the significant implications of adopting any one of the tariff options.

Having reviewed both the preliminary results of the Study and the responses to questions that were posted subsequently, the PWU is of the view that the Study results, while informative, do not realistically provide for a decision making framework that can be relied on. The Study requires further improvement in many areas. Moreover, the preliminary results and the responses alone do not provide sufficient information to enable stakeholders to propose the appropriate tariff option or options that the IESO should recommend to the Board. For example, the PWU has not received at the time of preparing these comments the IESO's report in respect of its assessment of potential impacts on the Federal Energy Regulatory Commission ("FERC") / U.S. Department of Energy ("DOE") non-discriminatory transmission access and rate principles, which the IESO has promised to release. Similarly, with respect to questions and concerns raised on Surplus Baseload Generation ("SBG") analysis, it is not clear how the data provided to show the impact of the options on SBG relates to the OPA's projection of almost 800 hours in 2014 in the Integrated Power System Plan submission[1] . Also the IESO's latest communication with stakeholders indicates that further work is still underway:

[1] IESO Operability Assessment of the OPA's Integrated Power System Plan Issue 2.0 – April 21, 2008 Table 3 pg 15

The IESO is carrying out a review of the SSG analysis taking into account the various concerns expressed by stakeholders, including confirming the seasonal demand forecast used in the earlier runs, use of Ontario on-peak and off-peak hydro production forecasts, and refining Quebec's hydro production assumptions.[2]

With respect to the responses to the Action Items identified on June 25, 2009, the PWU notes that in some instances the Study will be updated to reflect stakeholders' comments, in other instances the response has been that such concerns were reviewed but deemed to be too insignificant to have any material impacts. The PWU is of the view that without the opportunity to review the results of the re-run of the model that takes into consideration stakeholders' comments, stakeholders would find it difficult to determine the materiality of the updates and their implications on the potential incremental impacts of the proposed tariff options.

Recommendations

The PWU intends to make its position with respect to each of the proposed options once the above noted clarification and update from the IESO and eRA are made available. For the purpose of assisting the IESO in its effort to make a reasonable recommendation to the Board, the PWU recommends that the IESO consider the following:

a. Market efficiency improves with reduction of export transaction fees; in fact, the elimination of transaction fees as a means of achieving market efficiency should be considered as the ultimate goal.

b. As can be seen from recent events and as projected by the OPA, it is likely that SBG will increase over time which will significantly increase operating pressure on nuclear generation and puts these assets at increased operating and reliability risk as well as increased cost of maintenance and operations. As recently as July 14, 2009, the 795MW Unit 8 at the Bruce B generating station was taken offline at the request of the IESO due to SBG in Ontario. Appropriate compensation should be made to generators maneuvered as a result of such SBG decisions. A tariff option that results in the largest net export will allow nuclear units to operate on a more predictable load profile and avoid unexpected maneuvering of nuclear units that are deleterious to these assets. Moreover, the recommendation should take into account the potential and the need for more exports in light of contracted generator arrangements that have been made with the OPA.

c. As pointed out by the ETS Study, due to its relatively green generation mix, Ontario has an excellent opportunity to export more capacity when carbon trading comes into place.

d. On balance, therefore, Option #4 appears to be superior to the other options in terms of positive impacts on export and market efficiency

[2] Responses to Action Items – ETS Stakeholder Session – June 25, 2009

e. According to an update by the IESO staff at the stakeholders' meeting held on June 25, 2009, the IESO's discussion with its direct neighbours on the possibility of reciprocal elimination of the tariff (Option 3) has not been successful with the exception of the New York ISO ("NYISO"). The IESO indicated that, Hydro Quebec Trans-Energie had sent a letter stating that they have no basis on which to engage in any negotiation or to participate in any reciprocal arrangements on ETS elimination. Similarly, it was indicated that the Midwest ISO ("MISO") and its committees have not indicated a willingness to participate in such discussions. In this respect, the PWU is of the view that the IESO take this unwillingness on the part of these parties to negotiate a reciprocal elimination of tariff as a key consideration when making recommendations to the Board. In fact, given this circumstance, the PWU does not see the need to keep Option #3 - Scenario 1 in the list of options.

f. While the PWU is still waiting for the IESO's report in respect of its assessment of potential impacts of the proposed options on FERC/OOE non-discriminatory transmission access and rate principles, the PWU agrees with the comments of Brookfield Renewable Power that reciprocal fee treatment proposed under Option #3 Scenario 2 could result in the possibility of charges that are in excess of the cost of service for transmission which is contrary to FERC's mandate. Therefore, subject to the IESO's expected report, the PWU suggests that Option #2 Scenario 2 should be ruled out.

g. Reciprocal fee treatment under Option #3 would also be more complex and administratively more difficult to manage and may have some disadvantages related to achieving optimal utilization of the transmission system.

h. The PWU notes that the assessment of the reliability and operational impacts of the proposed options relied not just on the findings of the ETS Study and analysis but also on the IESO's knowledge of historical practices and understanding of how participants generally react to market and system conditions. The PWU is satisfied that the assessment report is clear on the issue and that the various ETS tariffs considered will not adversely impact the IESO's ability to maintain reliability in that the potential trade volumes contemplated under the various ETS tariff scenarios do not represent a new risk or impairment to Ontario's reliability. The PWU also submits that the option that allows more export from Ontario through lower ETS tariff (at least lower off-peak tariff) would offer more reliability by allowing nuclear units to operate on a more predictable load profile and avoiding the maneuvering of units on short notice. The serious reliability risk that SBG places on Bruce Power and Ontario Power Generation should not be minimized and it is essential that the OEB is fully informed on this issue in the IESO's submission to the OEB.

i. The appropriate option should also be one that prevents gaming the system by wheel through transactions carried out solely for financial gain. This is a potential threat under options that involve varying reciprocal fee arrangements with different neighbouring jurisdictions which, if not strictly regulated, could result in circuitous wheel through transactions.

CONCLUSION

The PWU will be making further comment and submission when complete information and analysis is available. Based on the information so far, the PWU is inclined to recommend the following options in order of preference:

1. Option 4, Scenario 1 (Unilateral Elimination of the ETS tariff in all hours);
2. Option 4, Scenario 2 (Unilateral Elimination of the ETS tariff in off-peak hours); and
3. Option 1, Status Quo.