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Market Surveillance Panel

Report on an Investigation into Possible Gaming Behaviour Related to Congestion Management Settlement Credit Payments by Greenfield Energy Centre LP

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REPORT ON AN INVESTIGATION INTO POSSIBLE GAMING BEHAVIOUR RELATED TO CONGESTION MANAGEMENT SETTLEMENT CREDIT PAYMENTS BY GREENFIELD ENERGY CENTRE LP

Executive Summary

This Report sets out the findings of the Market Surveillance Panel (the "Panel") in relation to Congestion Management Settlement Credit ("CMSC") payments received by Greenfield Energy Centre LP ("GEC") during the period from January 2010 to August 2011.

The Panel's investigation considered whether three aspects of GEC's market conduct constituted gaming, which the Panel defines as obtaining a profit or benefit, at the expense or disadvantage of the market, through behavior that exploits a defect in the design, rules or procedures governing the wholesale electricity markets.

The three aspects of GEC's conduct that were investigated by the Panel were: (i) the use of slower ramp rates from October 2010 to May 2011 relative to ramp rates that had been used prior to that period; (ii) an increase in the frequency with which GEC shut down its generation facility for short periods of time (two hours or less) in the second quarter of 2010; and (iii) an increase in the offer prices used by GEC to signal that it wished to take its generation facility offline starting in December 2010. Conduct of this nature can be used by a market participant to exploit certain defects in the design of, or rules governing, the wholesale electricity market in Ontario and obtain incremental CMSC payments.[1]

The Panel has concluded that GEC exploited market defects related to the CMSC regime in respect of the increase in its shut down offer price in the period from December 2010 to August 2011. In so doing, GEC obtained a profit or benefit of approximately $432,000 in CMSC payments, and there was a corresponding disadvantage or expense to the market. The Panel has therefore found that GEC engaged in gaming in respect of the increase in its shut down offer price. The Panel has also concluded that the remaining two conducts were undertaken by GEC

[1] The nature of the market defects at issue in this investigation is explained in section 5 of this Report.

for purposes other than exploiting a market defect in relation to the CMSC regime, and that there was therefore no gaming in that regard.

CMSC Payments

In the case of generators, CMSC payments are made by the Independent Electricity System Operator ("IESO") when a generation facility operates in real time at a level that is different from what would have been the case based on the economics of its offers into the market (in other words, where the generation facility produces more or less electricity than the economics of its offers would have dictated). CMSC payments were designed to apply where the market participant responds to instructions from the IESO to take specific actions to avoid possible overloads of the transmission system or to maintain the balance between supply and demand. Although the rationale for CMSC payments is clear, there are circumstances under which the Market Rules allow CMSC payments to be made when the market participant's actions are voluntary or self-induced rather than being triggered by IESO instructions that are driven by transmission constraints or supply/demand balance concerns. In addition, the CMSC payment regime's rationale is based on the assumption that a generator's offer prices reflect the generation facility's marginal cost of production (the incremental cost of generating one additional MW of electricity). This assumption generally has no validity in circumstances when a generator is voluntarily taking its facility offline.

CMSC payments made by the IESO are recovered from market participants based on their respective withdrawals from the IESO-controlled grid. Ultimately, the cost of the CMSC payments is borne by all Ontario electricity ratepayers.

Slower Ramp Rates and Short Duration Shut Downs

The Panel has found that these aspects of GEC's conduct were undertaken for purposes other than exploiting a market defect in relation to the CMSC regime.

The Panel is satisfied that the slower ramp rates were used by GEC for the purpose of addressing environmental and technical issues relating to the operation of GEC's generation facility. The

Panel has also accepted that the short duration shut downs were implemented by GEC for reasons of risk management, outage management and dealing with contemporaneous grid conditions (such as outages of transmission lines or of other generation facilities).

The Panel has therefore concluded that GEC's use of slower ramp rates and short duration shut downs did not constitute gaming.

Increase in Shut Down Offer Price

The Panel has concluded that GEC exploited a market defect in the period December 2010 to August 2011 when GEC increased the offer price that it used to signal that it wished to take its generation facility offline.

Generators come offline in Ontario's wholesale electricity market when they become uneconomic, which can happen in one of two ways. First, a generator may be dispatched off by the IESO as demand declines and/or other less expensive sources of supply are available, thereby rendering the generator's offers no longer economic. Coming offline in this manner does not raise gaming issues if the participant has not raised its offer price to induce the dispatching off. Second, market participants sometimes choose the point in time at which they want their generation facilities to come offline for their own business reasons. This can be achieved by submitting an offer price (the "Shut Down Offer Price") that is higher than the usual operating offer in order to increase the likelihood that the generation facility is not scheduled to operate during the period that the generator wishes to have its facility offline. The magnitude of the Shut Down Offer Price affects the magnitude of the CMSC payment made to a generator during the hour it comes offline; the higher the offer price, the higher the CMSC payment. In the context of a gaming investigation, the Panel's focus is on the incremental CMSC payments that are triggered by a Shut Down Offer Price that is higher than necessary to achieve the objective of voluntarily coming offline, as such a Shut Down Offer Price can trigger unnecessarily large CMSC payments.

The Panel has concluded that GEC raised its Shut Down Offer Price in the period December 2010 to August 2011 for the purpose of increasing its CMSC payments. GEC obtained a profit or

benefit from that conduct, and there was a corresponding expense or disadvantage to the market, of approximately $432,000. The Panel believes that it would be appropriate for GEC to voluntarily repay that amount to the IESO, failing which the Panel encourages the IESO to take whatever action may be open to it to recover that amount.

In August 2011, the Panel issued its *Monitoring Document: Generator Offer Prices Used to Signal an Intention to Come Offline* to provide guidance to market participants regarding the level of Shut Down Offer Prices that normally will not give rise to gaming concerns. The Panel notes that, following the issuance of this *Monitoring Document*, GEC decreased its Shut Down Offer Price and has, since the end of August 2011, predominantly used Shut Down Offer Prices in the range of $●/MWh to $●/MWh.

GEC's Response

In accordance with section 7.2.2 of the Ontario Energy Board's By-law No. 3, a draft of this Report was given to GEC to provide it with an opportunity to discuss the findings with the Panel. GEC was also invited to comment on matters of factual accuracy and confidentiality.

In its written response, GEC noted its disappointment with the Panel's finding of gaming regarding the increase in GEC's Shut Down Offer Price. GEC stated that at no time did it intend to exploit a market defect, but rather governed its conduct with respect to its Shut Down Offer Price based on principles of fairness and transparency and other *bona fide* reasons. Specifically, GEC stated that, given the market conditions and information available to it at the relevant time, it legitimately believed that the likelihood and consequences were significant enough to have warranted a conservative approach in adjusting its Shut Down Offer Price.

While disagreeing with the Panel's characterization of GEC's actions with respect to its Shut Down Offer Price, GEC indicated that it nonetheless takes the Panel's conclusion that GEC gained at the market's expense seriously and has undertaken to make a voluntary repayment to the IESO of the $432,000 involved, subject to verification of the calculation of that amount with the IESO.

In its written response, GEC requested that the Panel redact certain information from the final version of this Report for the purposes of public communications. In accordance with section 7.5 of the Ontario Energy Board's By-law No. 3, both public and confidential versions of this Report have been prepared. The public version of the Report is redacted such that information identified by GEC and determined by the Panel to be confidential is not disclosed.

1. Introduction

This Report contains the analysis and findings of the Market Surveillance Panel (the "Panel") in respect of an investigation (the "Investigation") into the possible exploitation of market defects related to Congestion Settlement Management Credit ("CMSC") payments received by Greenfield Energy Centre LP ("GEC") during the period January 2010 to August 2011 inclusive (the "Relevant Period").

This Report begins by describing GEC and its generation facility (section 2). It also summarizes the Panel's investigation framework and process, the applicable Market Rules and relevant aspects of the design of Ontario's wholesale electricity market (sections 3 and 4). It then identifies the market defects at issue (section 5), and provides the Panel's analysis and findings in relation to each of three aspects of GEC's conduct (sections 6 to 8): (i) the submission of slower ramp rates starting in late 2010; (ii) an increase in the number of times that GEC's generation facility was being shut down for short periods of time in the second quarter of 2010; and (iii) an increase in the offer price used by GEC to signal its intention to bring its generation facility offline starting in late 2010. The Report concludes with the Panel's observations regarding continuing unwarranted CMSC payments and remedial action (section 9).

With the exception of that portion of the Executive Summary that addresses GEC's response to the Panel's findings and references below to the Panel's January 2014 Monitoring Report, the information set out in this Report is as at December 31, 2013.

2. The Market Participant and Generation Facility

GEC is a limited partnership formed by CM Greenfield Power Corp. (the general partner), MIT Power Canada LP Inc. (a subsidiary of Mitsui & Co., Ltd.) and Calpine Greenfield Commercial Trust (a subsidiary of Calpine Corporation).[2]

GEC owns and operates a 1,005 MW natural gas-fired combined cycle electricity generating facility located in Courtright near Sarnia, Ontario (the "GEC Facility"). The GEC Facility,

[2] http://www.powerauthority.on.ca/sc-cc/greenfield-energy-centre-10050-mw-sarnia.

which started commercial operation in October 2008, consists of three Siemens Westinghouse 501FD2 combustion turbines and one steam turbine. The GEC Facility is connected to the Ontario electricity grid by way of two 230 kV overhead circuits at Hydro One's Lambton transformer station.

The GEC Facility can only be operated in the combined cycle configuration (with the steam turbine and between one and three gas turbines in operation). The operational characteristics of the GEC Facility (efficiency, production capacity, etc.) vary depending on the configuration and capacity utilization that is being employed at a given time.

At all relevant times, CM Greenfield Power Corp., on behalf of Greenfield Energy Centre LP, held a Generation Licence issued by the Ontario Energy Board (the "OEB") which authorized it to operate the GEC Facility and to buy and sell electricity through the IESO-administered markets.[3]

According to GEC, it has only one employee, a General Manager who manages activities at the GEC Facility and reports to the owners (the subsidiaries of Calpine and Mitsui).[4] GEC stated that the daily operation and maintenance of the GEC Facility is managed by Wood Group Power Plant Services Inc. ("Wood Group"),[5] part of a group of energy services companies with worldwide operations.[6]

GEC also explained that energy management services for the GEC Facility are provided by a subsidiary of Emera Inc. ("Emera Energy").[7] Emera Energy provides a variety of services to assist GEC with the operation and optimization of the GEC Facility. Among the services provided ●.[8] [9] [10] [11]

[3] Generation Licence EG-2006-0019, online at: http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/200034/view/licence_eg_cmgreenfield_20060623.PDF.
[4] GEC's August 26, 2011 response to Panel Requests for Information (the "August Response to RFIs"), p. 1.
[5] *Ibid*, and GEC presentation "Greenfield Energy Centre November 15th 2011: Meeting with Market Surveillance Panel Investigation #2011-4" (the "November Meeting Presentation"), p. 3.
[6] http://www.woodgroup.com/investors/pages/default.aspx.
[7] August Response to RFIs, p. 1.
[8] *Ibid.*

GEC identified two agreements relating to the operation of the GEC Facility that are relevant to the Investigation. The first is a Clean Energy Supply contract (the "GEC CES Contract") with the Ontario Power Authority (the "OPA"). One feature of the structure of the OPA's Clean Energy Supply contracts was highlighted by GEC in particular. Specifically, under those contracts, monthly payments to the counterparty are reduced by the net revenue that the counterparty is deemed or imputed to have earned from the IESO-administered market in certain hours, regardless of whether or not the generation facility actually operated in those hours. The hours in which the counterparty is deemed to have earned market revenue are hours in which pre-dispatch and/or real-time market prices are higher than the counterparty's variable energy cost of production as set out in the contract. In such hours, the counterparty's payments under the contract are reduced by an amount determined based on the generation facility's contract capacity and variable energy cost, and the Hourly Ontario Energy Price ("HOEP"). If the generation facility does not operate in that hour, it will not earn any revenue from the market to offset the reduction in its payments under the contract.[12]

The second agreement identified by GEC is a long-term service agreement with ● to provide maintenance and warranty services for the GEC Facility turbines (the "Service Agreement"). According to GEC, under the terms of the Service Agreement the GEC Facility is limited in the number of starts that can be done for each of the turbines before a major outage for maintenance is required, and GEC also incurs a fixed cost per start.

3. Investigation Process and Framework

This section provides an overview of the Panel's mandate in respect of market monitoring and investigations, background on the events leading to the commencement of the Investigation, the information gathered and the analytical framework used by the Panel to assess gaming.

[9] November Meeting Presentation, p. 5.
[10] August Response to RFIs, pp. 1-2.
[11] *Ibid.*
[12] The provisions of the OPA's Clean Energy Supply contracts regarding deemed revenues are considerably more complex than what is presented here. However, this higher level description is sufficient for purposes of this Report. Material provided to the Panel by GEC confirms that the structure of the GEC CES Contract accords with this description.

3.1 Market Surveillance Panel Mandate

The Panel is empowered under the *Electricity Act, 1998* to conduct investigations into any activity related to the IESO-administered markets or the conduct of a market participant.[13] The Panel, with the support of the Independent Electricity System Operator's ("IESO") Market Assessment Unit ("MAU"),[14] is also required by the OEB's By-law #3 (the "MSP By-Law") to monitor activities related to the IESO-administered markets and the conduct of market participants with a view to identifying, among other things:

- inappropriate or anomalous market conduct, including possible abuses of market power and gaming;
- design flaws and inefficiencies in the Market Rules and other rules and procedures of the IESO; and
- design flaws in the overall structure of the IESO-administered markets.[15]

The general process applicable to Panel investigations is set out in the MSP By-Law, which provides, among other things, that:

- the Panel may initiate an investigation on its own, upon receipt of a complaint, or at the request of the OEB Chair;[16]
- where the Panel commences an investigation, the Panel shall, upon determining that there is a *prime facie* case in respect of the conduct of a person that is the subject matter of the investigation, notify that person of the commencement of the investigation;[17]

[13] *Electricity Act, 1998*, S.O. 1998, c. 15, Sched. A., section 37(1), online at: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_98e15_e.htm#BK95.
[14] The MAU provides support to the Panel pursuant to a "Protocol" between the IESO and the OEB, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/msp_protocol.pdf. References in this Report to investigative steps carried out by the Panel include investigative steps carried out by the MAU on behalf of the Panel.
[15] Section 4.1.1 of the MSP By-Law, online at**:** . http://www.ontarioenergyboard.ca/OEB/_Documents/About%20the%20OEB/OEB_bylaw_3.pdf.
[16] *Ibid*, section 5.1.1.

- for the purpose of carrying out an investigation, the Panel has the power to examine and compel the production of any documents or other things, to summon and compel testimony, to conduct examinations and inspections, and to obtain warrants for search and seizure as authorized by the *Electricity Act, 1998*;[18] and

- upon completion of an investigation, the Panel shall prepare a written report on the matter investigated, the Panel's findings and its recommendations, if any.[19]

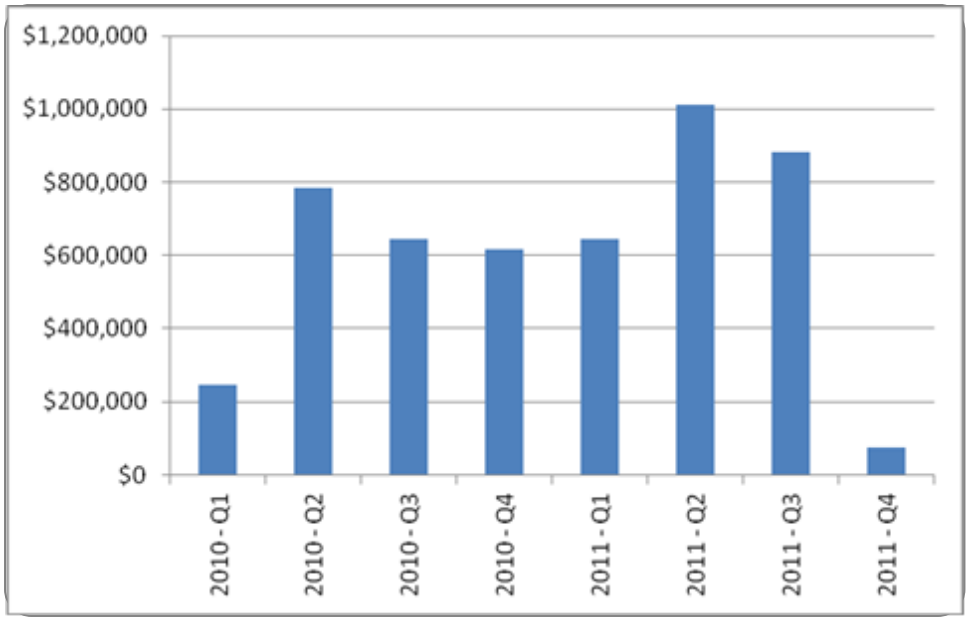
3.2 Background to the Investigation

In its Monitoring Report covering the 2010 summer period,[20] the Panel noted that some generation facilities were shutting down for short periods of time, sometimes for as little as two hours, before restarting. The GEC Facility was one such facility. The Panel further noted that short-term (two hours or less) shut downs in the period May to October, 2010 resulted in efficiency losses to the market.[21] The Panel identified several incentives for gas-fired generation facilities to carry out short duration shut downs, including opportunities to profit from constrained-on CMSC payments during ramp down.[22]

At the same time, the Panel observed what appeared to be large CMSC payments being made in relation to the GEC Facility. Figure 1 shows the CMSC payments received by GEC when the GEC Facility was ramping down in each quarter of 2010 and 2011. With the exception of the last quarter of 2011, GEC received at least $200,000 in ramp down CMSC payments in each quarter during those two years, and in most cases substantially more than that amount. Monthly ramp down CMSC payments were higher than $200,000 in each of the last 9 months of 2010 and each of the first 9 months of 2011.

[17] *Ibid*, section 5.1.9.
[18] *Ibid*, section 5.1.11 and *Electricity Act, 1998*, section 37.
[19] *Ibid*, sections 5.1.13 and 7.2
[20] Market Surveillance Panel, *Monitoring Report on the IESO-Administered Electricity Markets for the period from May 2010 – October 2010*, February 2011, online at http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_20110310.pdf .
[21] *Ibid*, p. 92.
[22] *Ibid*, page 93.

Figure 1: Quarterly Ramp Down CMSC Payments to GEC 2010 to 2011



The Panel's initial analysis of the CMSC payments received by GEC identified three behaviours that resulted in higher CMSC payments being made than would otherwise have been the case:

- Starting in October 2010, GEC submitted slower ramp rates for the GEC Facility than the ramp rates it had submitted since the facility started commercial operation in 2008.

- In the second quarter of 2010, GEC frequently shut down the GEC Facility for only a short period (often two hours) before resynchronizing with the grid.[23]

- In December 2010, GEC increased the offer price used to signal its intent to bring the GEC Facility offline, from the $●/MWh which it had used since late 2008 to $●/MWh.

[23] In order for a generation facility to supply power to a grid in parallel with other generation facilities without causing technical issues, a number of conditions must be met prior to closing the breaker between the generator and the grid. Among other things, the voltage, phase sequence, phase angle and frequency of the generation facility must be adjusted until they meet specific values. This process of adjustment constitutes synchronization to the grid. See Chapman, S. J., *Electric Machinery Fundamentals* (McGraw-Hill, 1991), pp. 459-460,

On March 31, 2011, the MAU requested that GEC provide information in relation to these behaviours, and GEC did so.

On July 18, 2011, the Panel notified GEC in writing that the Panel was initiating the Investigation under Article 5 of the MSP By-Law in relation to operating characteristics and activities of the GEC Facility that had contributed to large CMSC payments.

3.3 Information Obtained by the Panel

For the purposes of this Investigation, the Panel has reviewed information and materials that were provided to the Panel by GEC. In addition to its descriptive responses to Panel requests for information ("RFIs"), GEC also provided documents including copies of e-mails, minutes of meetings, strategy documents and transcripts of strategy discussions. The Panel and certain members of the MAU met once with representatives of GEC. Information and materials were provided by GEC without the Panel having to use its statutory inspection or other compulsory powers. GEC confirmed that the responses that it provided to the Panel's RFIs were correct and complete in all material respects.[24]

The Panel also obtained and considered market and operational data from the IESO that included data for the Relevant Period. This included statistical information related to prices, scheduled and actual production, settlement payments and other data. The Panel retained the services of an individual with an extensive technical background and experience with combined cycle gas turbines (the "Industry Expert") to assist the Panel in understanding certain technical aspects of the operation of combined cycle facilities.[25]

3.4 Framework for Gaming Investigations

The Panel's mandate includes investigations in relation to conduct that may constitute an abuse of market power or gaming. In the course of providing a framework for analyzing market power

[24] Letter from GEC to the Panel dated April 5, 2012.
[25] The Industry Expert has over 20 years of experience serving in various industry positions. The Industry Expert has extensive knowledge of combined cycle and simple cycle gas turbines, plant management, sales and marketing, maintenance management, and outage management plant operations.

issues, the Panel has noted that gaming is a separate concept (which may or may not overlap with market power concerns) that encompasses, among others, market manipulation and conduct that involves the following four elements:

(i) a defect in the market design, poorly specified rules or procedures or a gap in the Market Rules or procedures (collectively referred to as a "market defect");

(ii) exploitation of the market defect by the market participant;

(iii) profit or other benefit to the market participant; and

(iv) expense or disadvantage to the market.[26]

4. Relevant Aspects of the Wholesale Market Design

This section provides an overview of how dispatchable generators participate in the Ontario wholesale electricity market, the "two-schedule" market design and the associated CMSC payment regime.

The IESO administers the wholesale electricity markets in Ontario.[27] It operates a real-time energy market, in which electricity demand and supply are balanced and instructions are issued to dispatchable generators and loads every five minutes as well as to intertie traders on an hourly basis. The IESO selects the most economic offers from generators and importers as well as bids from dispatchable loads and exporters in order to match the supply and consumption of electricity for each five-minute interval. The outputs of this process include dispatch quantities

[26] See Market Surveillance Panel, *Report on an Investigation into Possible Gaming Behaviour Related to Infeasible Import Transactions by TransAlta Energy Marketing Corp. on the Manitoba-Ontario Intertie*, Investigation No. 2011-02, October 22, 2012, p.7, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_Investigation_TranAlta_20121022.pdf.
[27] See, *e.g.*, IESO, *Introduction to Ontario's Physical Markets: An IESO Marketplace Training Publication*, online at: http://www.ieso.ca/imoweb/pubs/training/IntroOntarioPhysicalMarkets.pdf.

and the Market Clearing Price ("MCP"). The simple average of the 12 interval MCPs in an hour is the HOEP.[28]

4.1 Dispatchable Generators

In order to be dispatchable, a generation facility must be capable of receiving and responding to dispatch instructions sent every five minutes by the IESO. This is the case for all gas-fired generation facilities in the province, including the GEC Facility, as well as for other large generation facilities.

Under the Market Rules, a dispatchable generator submits offers in the wholesale market that indicate the quantity of electricity that the generator wishes to produce at particular price levels. Dispatchable generators also submit ramp rates (in MW/minute) that indicate how quickly the generator can change the amount of energy it is producing. The IESO uses this information to determine dispatch instructions that a generation facility can physically follow. The IESO directs (dispatches) a dispatchable generator's energy production based on the generator's offers, market supply and demand and conditions in the generator's local area.

4.2 The Two-Schedule Market Design[29]

The real-time wholesale electricity market is a uniform-price market in which suppliers (generators and importers) generally receive, and wholesale customers (including dispatchable and non-dispatchable loads as well as exporters) generally pay, a system-wide market price[30] for electricity irrespective of their location in Ontario. The decision to adopt a uniform-price market, rather than a market in which prices vary by location, has resulted in a "two-schedule" system in order to deal with differences between the province-wide "market" (or

[28] See, *e.g.*, IESO, *Overview of the IESO-Administered Markets: An IESO Training Publication*, online at: http://www.ieso.ca/imoweb/pubs/training/MarketsOverview.pdf.
[29] The description of the two-schedule system in this section is a simplified summary. For more detail, see IESO, *Introduction to Ontario's Physical Markets: An IESO Training Publication*, online at: http://www.ieso.ca/imoweb/pubs/training/IntroOntarioPhysicalMarkets.pdf.
[30] The price for generators and dispatchable loads is the MCP for each interval. Non-dispatchable loads pay the HOEP. Export and import transactions are also based on the HOEP, subject to adjustments related to localized intertie congestion.

"unconstrained") demand/supply and the physical capabilities of the system which results in the need for the IESO to "constrain" market participants in order to deal with localized demand/supply imbalances.

Under the two-schedule system, the IESO's dispatch algorithm[31] is run in two modes for every five-minute interval of market operation:

- The "unconstrained mode" ignores most physical limitations of the transmission system inside Ontario. The outputs are settlement prices and "market schedules" (also referred to as "unconstrained schedules") that show the amount of energy that dispatchable facilities would have been prepared to inject or withdraw if there were no constraints on the system.

- The "constrained mode" considers all physical limitations of the grid, including transmission constraints and transmission line losses. The outputs are the dispatch instructions that are issued by the IESO and "dispatch schedules" (also referred to as "constrained schedules") that show energy injections and withdrawals for dispatchable facilities that can actually happen within the physical constraints of the system.

A dispatchable generator is "constrained on" when the constrained schedule dispatches it to produce more electricity than is indicated in the unconstrained schedule. Conversely, a dispatchable generator is "constrained off" when the constrained schedule dispatches it to produce less electricity than is indicated in the unconstrained schedule. As discussed below, CMSC payments may be triggered when a dispatchable facility is constrained on or constrained off.

4.3 Congestion Management Settlement Credits

In the case of dispatchable generators, CMSC payments are intended to compensate the market participant when, based on the constrained schedule, the IESO instructs it to supply electricity in an amount that is less profitable for the participant relative to the operating profit that would

[31] The dispatch algorithm is the formulation by which offers and bids are selected in the wholesale market.

have been expected from generating or consuming at the level indicated for the participant in the unconstrained schedule.

CMSC payments arose from the decision to adopt a uniform-price market and the two-schedule system. The Market Design Committee ("MDC") – the committee charged with designing a competitive electricity market for Ontario – proposed such payments to compensate dispatchable facilities for reductions in their operating profits that resulted from responding to system operator instructions to alter their output or consumption in order to relieve transmission constraints:

> A uniform "market" price (the price is actually administratively determined) implies a set of corresponding market quantities that each participant would sell or buy at that uniform market price. However, transmission constraints may prevent participants from injecting or withdrawing those corresponding market quantities. In order to relieve the actual constraints and remain within system security limits during dispatch, the IMO may have to direct generators (and dispatchable loads) to produce (consume) more or less energy than they are willing to produce (consume) at the uniform price, given the prices each participant has indicated in its bid or offer. To induce generators and loads to change their outputs or takes to the required levels, a uniform pricing approach thus requires the IMO to compensate participants for any differences between the uniform price and their bids/offers whenever they are "constrained on" or "constrained off" in order to relieve transmission constraints.[32] (emphasis added)

The Market Rules establish CMSC payments as compensation for reduced operating profits that result from responding to IESO dispatch instructions to produce or consume at a level different than the unconstrained schedule:

> Dispatch instructions provided by the IESO to market participant 'k' will sometimes instruct k to deviate from its market schedule in ways that, based on market participant k's offers and bids, imply a change to market participant k's net operating profits relative to the operating profits implied by market participant k's market schedule. When this occurs and market participant k responds to

[32] Market Design Committee, *Final Report*, January 29, 1999, Volume 1, chapter. 3, p. 3-8, online at: http://www.ieso.ca/Documents/mdc/Reports/FinalReport/Volume-1.pdf. The reference to the "IMO" is to the Independent Electricity Market Operator, as the IESO was known prior to 2005.

> the IESO's dispatch instructions, market participant k shall, subject to Appendix 7.6 of Chapter 7, receive as compensation a settlement credit equal to the change in implied operating profits resulting from such response, calculated in accordance with section 3.5.2.[33] (emphasis added)

The CMSC payment for a dispatchable generator in any five-minute interval is effectively calculated as the difference between its offer price and the MCP, multiplied by the difference between its unconstrained schedule and constrained schedule quantities. As the quantity differences between the two schedules increase, so too do the associated CMSC payments.

CMSC payments made by the IESO are recovered from wholesale market participants based on their respective withdrawals from the IESO-controlled grid (in other words, based on their consumption) through what is referred to as an "uplift" charge. In the case of an electricity distributor, uplift charges paid by the distributor to the IESO are ultimately passed through to the distributor's own customers (or, where applicable, to any embedded distributors who in turn pass the charges through to their respective customers).

4.4 CMSC Payments During Ramping

When determining the constrained schedules for a market participant, the constrained mode uses the ramp rates submitted by the market participant. However, in determining the unconstrained schedules the unconstrained mode assumes that a facility can ramp up or down three times faster than reflected in the ramp rates submitted by the market participant (referred to as the "3x Ramp Rate Multiplier"). As a result of the 3x Ramp Rate Multiplier, the quantity in the unconstrained schedule for a generation facility that is ramping up or down will, all else being equal, always differ from the quantity in the constrained schedule; specifically, when the generation facility is ramping down, the constrained schedule is greater (in MW terms) than the unconstrained schedule and when the generation facility is ramping up, the constrained schedule is less (in MW terms) than the unconstrained schedule.

[33] Market Rules, chapter 9, section 3.5.1.

All else being equal, the 3x Ramp Rate Multiplier results in the generation facility being treated as constrained on (during ramp down) or constrained off (during ramp up) during the ramping period, and receiving CMSC payments as a result.

The amount of CMSC payments to a generator during ramp down depends on:

- The generator's submitted ramp rate. The slower the ramp rate, the higher the quantity difference between the constrained and unconstrained schedules and the higher the CMSC payments.

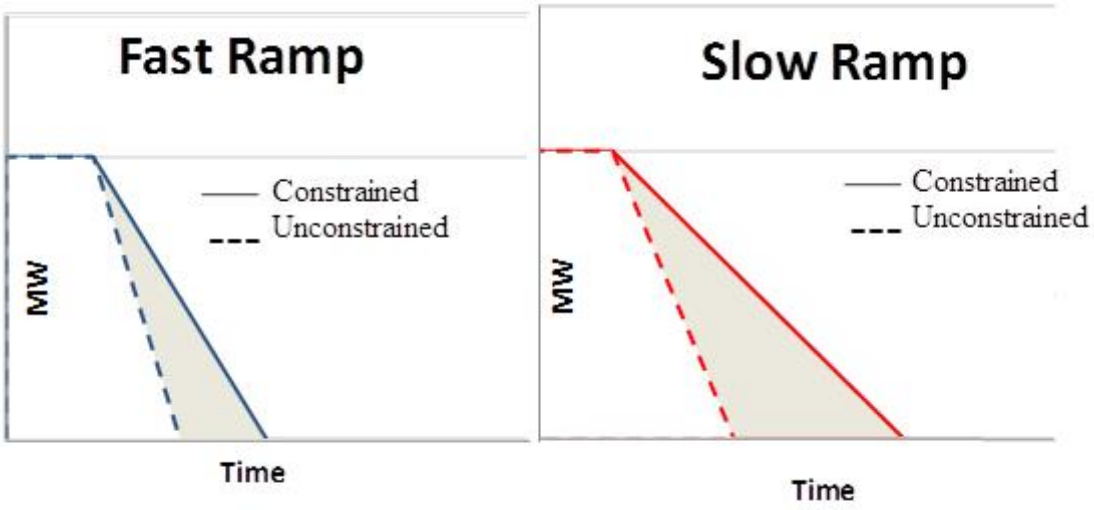
- The number of times that a generator ramps down. All other things being equal, more frequent ramping leads to more CMSC payments being made.

- The generator's offer price for the ramp down hour. Higher offer prices lead to higher CMSC payments.

Figure 2 illustrates how a generator's ramp rate affects the quantity differences during a ramp down hour. Assume the facility is ramped down from its minimum loading point ("MLP")[34] to 0 MW. The diagram on the left represents a fast ramp rate and the diagram on the right represents a slower ramp rate. In both diagrams, the solid line represents the ramp in the constrained sequence, which is based on ramp rates submitted to the IESO by the generator, while the dashed line represents the ramps in the unconstrained sequence (which as noted above are based on the 3x Ramp Rate Multiplier). The shaded areas between the solid and dashed diagonal lines show the quantity differences (measured in MWh) between the two schedules. The quantity difference is relatively small in the fast ramp case but much larger in the slower ramp case.

[34] To operate safely, once a gas fired generation unit is started up it must ramp to a minimum level of output and then maintain at least that minimum level of output for a minimum period of time. That minimum level of output is referred to as the facility's minimum loading point or MLP, and the minimum period of time is referred to as the facility's "minimum generation block run time" or "MGBRT".

Figure 2: Quantity Difference Under Slow and Fast Ramp Rates



4.5 Shut Down Offer Prices to Signal Intention to Come Offline

Generators come offline in Ontario's wholesale electricity market when they become uneconomic, which can happen in one of two ways. First, a generator may be dispatched off by the IESO as demand declines and/or other less expensive sources of supply are available, thereby rendering the generator's offers no longer economic. Coming offline in this manner does not raise gaming issues if the participant has not raised its offer price to induce the dispatching off. Second, market participants sometimes choose the point in time at which they want their generation facilities to come offline for their own business reasons. This can be achieved by submitting an offer price (the "Shut Down Offer Price") that is higher than the usual operating offer in order to increase the likelihood that the generation facility is not scheduled to operate during the period that the generator wishes to have its facility offline. Once the generator's constrained schedule falls below its MLP, it will be ramped off at its submitted ramp rate. In these cases, there will likely be a quantity difference between the generator's constrained schedule and its unconstrained schedule. As explained in section 4.4 above, the principal reason for the difference is the 3x Ramp Rate Multiplier. The use of that Multiplier results in quantity differences during the ramp down period, which in turn give rise to constrained-on CMSC

payments to the extent that the generator's Shut Down Offer Price is different from the prevailing market price.

The magnitude of a Shut Down Offer Price affects the magnitude of the CMSC payments to a generator (during ramp down, the higher the offer price the larger the CMSC payment), and gaming considerations can arise where the Shut Down Offer Price is higher than necessary to achieve the operational objective of coming offline – thereby triggering unnecessarily large CMSC payments. In August 2011, the Panel issued its *Monitoring Document: Generator Offer Prices Used to Signal an Intention to Come Offline* (the "August 2011 Monitoring Document") to provide guidance to market participants regarding the level of Shut Down Offer Prices that normally will not give rise to gaming concerns.[35]

4.6 Relationship Between Marginal Cost of Production and Operating Profits

The marginal cost of production is the incremental cost to generate an additional MW of electricity. While there is no Market Rule that requires that an offer price submitted by a dispatchable generator reflect the generator's marginal cost of production, the Market Rules related to the calculation of CMSC payments assume that a dispatchable generator's offer price will reflect its marginal cost of production:

> The dispatch scheduling and pricing process shall be a mathematical optimisation algorithm that will determine optimal schedules for each time period referred to in section 2.1.1, given the bids and offers submitted and applicable constraints on the use of the IESO-controlled grid. Marginal cost-based prices shall also be produced and, for such purpose, offer prices shall be assumed to represent the actual costs of suppliers and bid prices shall be assumed to represent the actual benefits of consumption by dispatchable load facilities.[36] (emphasis added)

[35] Market Surveillance Panel, *Monitoring Document: Generator Offer Prices Used to Signal an Intention to Come Offline*, August 19, 2011, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MonitoringDocument_GeneratorOfferPrices_20110819.pdf**.** The Panel's guidance as set out in the August 2011 Monitoring Document is discussed further in section 8.3.
[36] Market Rules, Appendix 7.5, section 2.3.1.

In other words, the CMSC calculation assumes that the offer price submitted by a dispatchable generator would reflect the generator's marginal cost of production. The generator's operating profit is assumed to be reduced whenever the generator is dispatched by the IESO to produce more "cheap" power (MCP < generator's offer price) than it otherwise would. Similarly, when market prices are "expensive" from the generator's perspective (MCP > generator's offer price), the generator's operating profit is assumed to be reduced whenever the generator is dispatched by the IESO to produce less than it otherwise would.

5. Defects in the Market Rules

Even before the Ontario electricity market opened in 2002, the MDC and the Panel were both concerned that market participants could, by their own actions, obtain CMSC payments that exceed any reduction in their operating profits and that these excess payments could be contrary to the overall purpose of the CMSC framework. Moreover, the Panel expressed concern that the CMSC regime was conducive to gaming [37] and the MDC suggested that "rules be developed to discourage gaming of side payments."[38]

The Report of the MDC and the Market Rules both clearly indicate that three conditions should exist for a CMSC payment to be made:

(i) the reason for constrained-on or constrained-off dispatch instructions relates to conditions on the grid (*i.e.*, the IESO instructs a generator to produce electricity in larger or smaller amounts than the economics of the generator's offer would otherwise dictate in order to relieve transmission constraints and remain within system security limits);

(ii) the generator would have produced a different amount of energy absent the constrained-on or constrained-off dispatch instruction, and it earns lower operating profits by following the IESO's instruction; and

[37] IESO, *The Market Surveillance Panel In Ontario's Electricity Market: Monitoring, Investigating and Reporting – Backgrounder*, April 2002, online at: http://www.ontla.on.ca/library/repository/mon/4000/10306902.pdf, p. 13.
[38] Market Design Committee, *Second Interim Report*, June 30, 1998, p. 9 of the Appendix and pp. 3-15, online at: http://www.ieso.ca/imoweb/historical_devel/MDC/Reports/InterimReport2/2ndRept.pdf.

(iii) the amount of the CMSC payment should be limited to the amount necessary to provide compensation for operating profit reductions that are linked to the two foregoing conditions.

Although these conditions appear to be straightforward and sensible, the Market Rules and the IESO's settlement tools allow CMSC payments to arise in other situations and may result in a market participant receiving payments that exceed compensation for reduced operating profits arising from responses to dispatch instructions caused by grid conditions.

CMSC payments were designed to "make whole" market participants who are required by transmission congestion or other factors beyond their control to follow a constrained schedule that differs from their unconstrained schedule. One market defect is that a generator can receive CMSC payments when it self-induces differences between the unconstrained and constrained schedules, which happens when a generator chooses to voluntarily come offline. When a generator chooses to voluntarily come offline in a particular hour (which it generally does by submitting an offer price for that hour that is higher than its usual operating offer), its constrained schedule will be reduced in accordance with its submitted ramp rates. There will, however, be differences between the quantities in the constrained and unconstrained schedules during that ramp down hour, which is largely due to the 3x Ramp Rate Multiplier that is used in the unconstrained schedules as explained in section 4.4. These quantity differences, which are used in the CMSC payment formula, are triggered by the generator's voluntary decision to come offline; they are not the result of an IESO dispatch instruction aimed at alleviating transmission constraints. This market defect can provide an incentive for generators to ramp up and down more frequently than necessary or to submit slower ramp rates, both of which have the effect of increasing the quantity differences between the unconstrained and the constrained schedules, and hence of increasing the CMSC payments.

Another market defect is that the Market Rules governing the calculation of CMSC payments are based on the assumption that a generator's offer price reflects its marginal cost of production. While that assumption might be valid in hours when a generator wishes to operate and is competing to be scheduled, there is no good reason to assume that this is the case when a

generator intentionally submits a high Shut Down Offer Price for the express purpose of being dispatched off by the IESO. A generator can trigger an inappropriately large CMSC payment when its Shut Down Offer Price for an hour in which it wishes to voluntarily come offline is higher than the greater of: (i) the price required to ensure that operational result; and (ii) the generator's marginal cost of production when it is ramping down.

The Panel therefore finds that there are market defects in the CMSC regime that can be exploited through self-induced (i.e., voluntary) ramping behaviour and Shut Down Offer Prices. Based on the information and materials considered in this Investigation, the Panel is satisfied that two aspects of GEC's market conduct during the Relevant Period – the use of slower ramp rates and short duration shut downs – were undertaken for reasons other than exploiting these market defects (see sections 6 and 7). The Panel has therefore found there to be no gaming in that regard. However, the Panel has concluded that GEC exploited these market defects during the Relevant Period by increasing its Shut Down Offer Price for the purpose of obtaining larger CMSC payments, and hence has found there to be gaming in that regard (see section 8).

6. GEC's Ramping Behaviours

6.1 Use of Slower Ramp Rates

Since it started commercial operation in 2008, the GEC Facility has submitted three different sets of ramp rates to the IESO. Those ramp rates are summarized in Table 1. The starting point for the ramp rates is ● MW, which is the MLP of a gas-fired unit at the GEC Facility. The variation in ramp rates concerns only the gas-fired units at the GEC Facility; GEC has always submitted the fast ramp rate for its steam generator.

Table 1: Ramp Rates Submitted to the IESO by GEC

Δ MWs	Ramp Rate (MW/minute)		
	Fast	**Medium**	**Slow**
● → ●	●	●	●
● → ●	●	●	●
● → ●	●	●	●
Minutes to shut down	●	●	●
Period of use	Oct 08 – Apr 11	May 11 -	Oct 10 – May 11

The ramp down rates submitted for the GEC Facility during the Relevant Period can be summarized as follows:

- The fast ramp rate (the "Fast Ramp Profile") was first submitted at the outset of commercial operation by GEC in October 2008, was consistently used until October 2010 and was used from time to time until April 2011, when it ceased to be used. The Fast Ramp Profile implied that GEC would take approximately ● minutes to shut down a unit from its MLP to desynchronization.

- Starting in October 2010 and continuing until May 21, 2011, GEC commonly submitted ramp down rates for its gas units that implied that GEC would take approximately ● minutes to shut down a unit from its MLP to desynchronization (the "Slow Ramp Profile").

- Since May 21, 2011, GEC has submitted ramp down rates for its gas units that implied that GEC would take approximately ● minutes to shut down a unit from its MLP to desynchronization (the "Medium Ramp Profile"). [39]

[39] The MW quantities which GEC used as break points between different ramp rates for the Medium Ramp Profile were not always as identified in Table 1 above. For example, GEC sometimes ramped from MLP to ● MW at ●MW/minute (as opposed to going from MLP to ● MW), and then at a rate of ●MW/minute from ● MW to ● MW.

The number of ramp downs of the GEC gas-fired units under each of the different ramp profiles is shown in Table 2.

Table 2: GEC's Ramp Downs under Various Ramp Profiles, 2010 – 2011

Month	Ramp Profile		
	Fast	Medium	Slow
Jan-10	9		
Feb-10	29		
Mar-10	31		
Apr-10	83		2
May-10	71		6
Jun-10	44		
Jul-10	77		
Aug-10	74		
Sep-10	75	1	
Oct-10	24		8
Nov-10	47		19
Dec-10	49		18
Total 2010	**613**	**1**	**53**
Jan-11	53		9
Feb-11	58		26
Mar-11	35		5
Apr-11	15		9
May-11		32	8
Jun-11		78	
Jul-11		84	
Aug-11		64	
Sep-11		82	
Oct-11		78	1
Nov-11		81	
Dec-11		75	
Total 2011	**161**	**574**	**58**

As noted in section 4.4 above, the slower a generator's ramp rate, the higher the quantity difference between the constrained and unconstrained schedules and the higher the CMSC payments. The constrained and unconstrained schedules that resulted from each of the three

ramp profiles used by GEC are depicted in the figures set out in Appendix A. Table 3 shows the CSMC payments that GEC obtained during ramp downs over the Relevant Period in relation to each of the three ramp profiles.

Table 3: Shut Down CMSC by Ramp Profile, 2010 – 2011[40]

	Ramp Profile			
Year	Fast	Medium	Slow	Annual Total
2010	$2,052,573	$0	$239,942	$2,292,515
2011	$1,150,452	$1,174,178	$287,292	$2,611,922
Total	$3,203,025	$1,174,178	$527,234	$4,904,437

GEC explained that it changed its ramp rates in order to improve the GEC Facility's environmental performance and to minimize the potential for any environmental, health and safety issues at the GEC Facility.[41] According to GEC, these goals were achieved by burning hot gas in lieu of venting it into the atmosphere. Given the technical parameters of the GEC Facility (discussed below), a slower shut down ramp rate is required to burn the hot gas.

In addition, GEC indicated that there were technical standards that factored into the decision to use the Slow Ramp Profile.[42] GEC explained that the combustion turbines at the GEC Facility are designed to require fuel gas at a temperature of greater than 116 degrees Celsius (C) when the unit's output is greater than 50%, and at a temperature of less than 40 degrees C when the unit is restarted. To allow a successful restart, GEC must reduce the gas temperature during shut down. Rather than venting gas to achieve that outcome, GEC chose to burn it. To burn the gas, a shut down ramp rate of slower than ● MW/minute must be used.

Given the above explanations, the Panel questioned why the Slow Ramp Profile was used only periodically (approximately 33% of the time). GEC indicated that it had maintained the Slow

[40] Ramp rates, actual energy production, market prices and offer prices all have an effect on a market participant's schedules and CMSC payments. The totals in Table 3 do not isolate the effect of slower ramp rates on CMSC payments from the effects of those other contributing factors.
[41] August Response to RFIs, pp. 2-4.
[42] *Ibid*, pp. 3-4.

Ramp Profile since October 11, 2010, except for the period between December 17, 2010 to April 12, 2011 when icing conditions at the GEC Facility required a return to the Fast Ramp Profile in order to reduce the risk of ice on the compressor inlet vanes and compressor blades.[43]

6.2 The Panel's Findings on Slower Ramp Rates

GEC provided information to support the operational rationale for the change in the ramping behaviour of the GEC Facility. The Industry Expert retained by the Panel confirmed that the information provided by GEC generally supported GEC's position that slower ramp rates would alleviate the gas temperature issue.

GEC was aware of the CMSC implications of changing its ramp rates.[44] However, the Panel accepts that the slower ramp rates were used for the purpose of addressing environmental and technical issues relating to the operation of the GEC Facility. The Panel finds that GEC did not use slower ramp rates for the purpose of exploiting the market defects described in section 5. The Panel therefore concludes that GEC's use of a slower ramp rate during the Relevant Period did not constitute gaming.

7. Short Duration Shut Downs

7.1 Increase in Short Duration Shut Downs

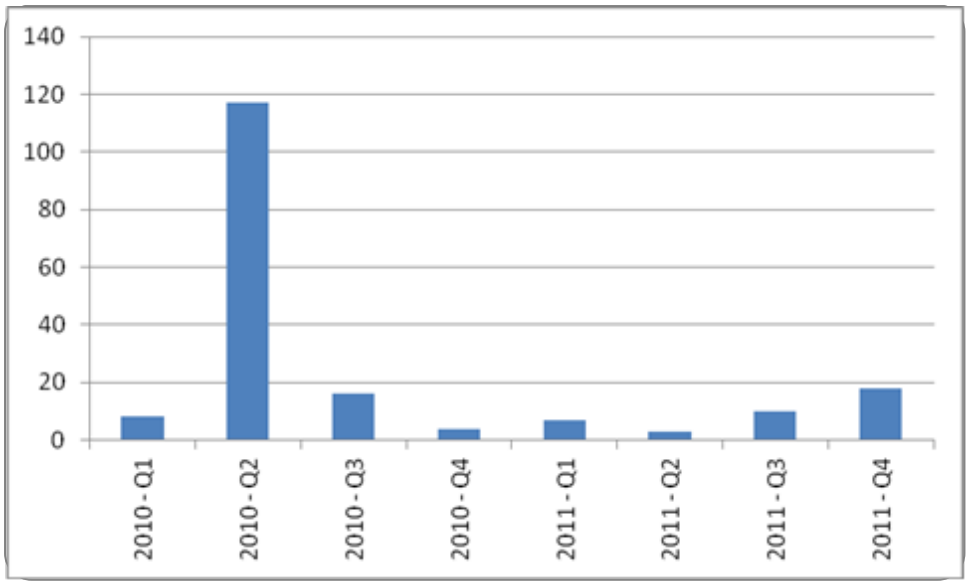
In the second quarter of 2010, there was a significant increase in the number of times that the GEC Facility would ramp down, desynchronize from the grid, resynchronize to the grid and ramp back up, all within two hours (the "Short Duration Shut Downs").

Figure 3 shows the number of Short Duration Shut Downs of the GEC Facility in 2010 and 2011.

[43] *Ibid.*, p. 4. GEC also explained that, over a two-month period at the end of 2010, ramp rates were occasionally submitted by ● that differed from the physical shut down ramp rate of the GEC Facility. This was discovered by GEC in May 2011, and steps were taken to ensure that ramp rates are correctly entered.

[44] In its February 29, 2012 response to the Panel's RFIs, GEC acknowledged that it was cognizant that a slower ramp rate resulted in higher CMSC payments but that, in its view, the magnitude of the effect was not material or inappropriate. GEC also stated that, in instances where the IESO raised an economic impact that the IESO considered to be excessive or unjustified, GEC was quick to review the issue and respond, as appropriate, through operational changes and refunds.

Figure 3: Number of GEC Facility Short Duration Shut Downs by Quarter, 2010 - 2011



GEC explained that there were two reasons for its decision to increase the frequency of Short Duration Shut Downs.[45] First, the Short Duration Shut Downs were a means of managing costs and outages under the Service Agreement with ● for the turbines. As noted in section 2 above, GEC stated that it incurs a fixed cost per start under that Agreement, and is also limited in the number of starts that it can carry out for a given unit before the unit is required to undergo a major outage for maintenance.

When GEC carried out a Short Duration Shut Down, it would reduce the output of the GEC Facility to 0 MW and then disconnect the Facility from the IESO-controlled grid. While disconnected from the IESO-controlled grid, GEC would keep the GEC Facility in an operating state but not injecting energy into the grid. The IESO would register that the GEC Facility was not injecting into the grid, and classified it as having shut down. Following a period of being classified as shut down, GEC would reconnect and begin injecting into the IESO-controlled grid. For the purposes of this Report, this practice is referred to as full speed no load or "FSNL". According to GEC, this practice avoided triggering a shut down and therefore a subsequent start as those terms are defined in the Service Agreement.

[45] August Response to RFIs, p. 10 and March Response to RFIs, pp. 2-3.

GEC further noted that a maintenance outage that it had scheduled with the IESO for the spring of 2010 was rejected by the IESO by reason of system conditions (including high seasonal demand), and GEC decided to reschedule the outage for the fall season. GEC stated that this rescheduling was only possible to the extent that shut downs and starts at the GEC Facility were limited – otherwise, if GEC shut down and re-started frequently in the spring in order to meet high seasonal demand the GEC Facility may have required maintenance under the terms of the Service Agreement before the fall, even potentially during the summer when demand is typically high.[46]

The second reason provided for the Short Duration Shut Downs was that they enhanced GEC's ability to manage its financial exposure under the GEC CES Contract with the OPA. As noted in section 2 above, monthly payments under the OPA's Clean Energy Supply contracts are reduced by the net revenue that the counterparty is deemed to have earned from the IESO-administered energy market in certain hours. If the generation facility does not operate in any such hour, the counterparty will not earn any revenue from the market to offset the reduction in its payments under the contract.

According to GEC, the Short Duration Shut Downs were in part an attempt to manage the risk of not being online in hours when its revenue under the GEC CES Contract could be reduced.[47] Based on GEC's understanding of the IESO's spare generation online ("SGOL") [48] guarantee program prior to June 2010, GEC determined that shutting down quickly and then resynchronizing could help GEC establish a generation cost guarantee for the GEC Facility's MGBRT up to its MLP, which in turn would minimize exposure to deemed revenue under the GEC CES Contract.[49] GEC understood that the IESO's generation cost guarantee programs offered generators a minimum revenue guarantee to offset market pricing exposure during

[46] August Response to RFIs, pp. 10-11.
[47] August Response to RFIs, p. 11 and March Response to RFIs, p. 3.
[48] The term "spare generation on-line" is used by the IESO to describe a generation cost guarantee program. For a description of the IESO's generation cost guarantee programs, see Market Surveillance Panel, *Monitoring Report on the IESO-Administered Markets for the period from November 2012 to April 2013*, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_Nov2012-Apr2013_20140106.pdf.
[49] GEC's March 9, 2012 response to the Panel's RFIs (the "March Response to RFIs"), p. 3. As part of its February 29, 2012 response to the Panel's RFIs, GEC provided a copy of an e-mail that it had received from the IESO confirming that a generator is entitled to submit generation cost guarantee claims for more than one start per day.

MGBRTs, and therefore limited the chances of being dispatched offline in a single low-price hour and ensured as much coverage throughout the day as possible.

GEC also stated that it elected not to continue its Short Duration Shut Down practice after receiving the following e-mail communication from the IESO clarifying that eligibility for the SGOL program was conditional on the facility being offline at the relevant time: [50]

> **From:** IESOInfo
> **Sent:** June 4, 2010 10:58 AM
> **To:** IESO Recipient
> **Subject:** SGOL Eligibility Clarification
>
> **SGOL Eligibility Clarification**
> Following a number of customer questions, the IESO has determined that a clarification of one of the eligibility requirements for the Spare Generation On-Line (SGOL) program is needed. In order to be eligible for SGOL, a facility must be offline at the time the applicable pre-dispatch schedule was published. This is based on Chapter 7, sections 5.7.1 and 5.7.1.5 of the Market Rules which states that "A *generation facility* shall be eligible on a voluntary basis for the generation cost guarantee on a *per-start* basis for a given *dispatch hour*, provided that: …the *generation facility* is not already synchronized at the time of the publication of the applicable *pre-dispatch schedule* referred to in section 5.7.1.3". Effective June 11, 2010, the IESO will reject SGOL claims for any start where the facility was synchronized at the time of the publication of the applicable pre-dispatch schedule.
>
> For more information, please contact IESO Customer Relations at:

[50] This e-mail communication was sent by the IESO to all gas-fired generators among others.

Tel: 905.403.6900
Toll Free: 1.888.448.7777
Fax: 905.403.6921
customer.relations@ieso.ca

According to GEC, this effectively meant that the amount of time between back-to-back guarantee periods would have to increase, or the GEC Facility would be at risk of being restarted without a guarantee.[51] Based on public information about the IESO's generation cost guarantee programs the Panel understands that, following the clarification issued by the IESO, GEC would be unable to submit an application for a guarantee until they had shut down a unit. As such, GEC would have to bring a unit offline, then wait for the unit to meet the necessary qualifying criteria, then submit an application for the guarantee. This is in contrast to the situation before the IESO clarification, when GEC could secure a guarantee prior to ramping a unit down. GEC stated that it discontinued its Short Duration Shut Downs following issuance of the IESO's communication, as GEC considered that the risk of not receiving a SGOL commitment outweighed the deemed revenue exposure under the GEC CES Contract.[52]

7.2 The Panel's Findings on Short Duration Shut Downs

The information provided by GEC during the Investigation supported GEC's expressed rationale for the Short Duration Shut Downs. Materials provided by GEC identified that the Short Duration Shut Downs were carried out for reasons of risk management,[53] outage management,[54] and dealing with contemporaneous grid conditions (such as outages of other generators and transmission lines).[55] The Panel accepts that this is the case, including in relation to managing exposure under the GEC CES Contract by using Short Duration Shut Downs to qualify for IESO

[51] Letter from GEC to the MAU dated April 15, 2011, provided in response to the MAU's March 31, 2011 request for information.
[52] *Ibid*.
[53] Transcript of a conference call held on March 26, 2010 that involved representatives of GEC, ● and others, p.19, provided as part of the March Response to RFIs.
[54] Transcript of a conference call held on May 26, 2010 that involved representatives of GEC, ● and others, pp.21-23, provided as part of the March Response to RFIs.
[55] Transcript of a conference call held on March 26, 2010 that involved representatives of GEC, ● and others, pp. 12-15, provided as part of the March Response to RFIs.

generation cost guarantees and avoid being offline in hours when the GEC Facility might be deemed to have earned revenues under the GEC CES Contract. The Panel also acknowledges that, following the June 4, 2010 communication from the IESO regarding eligibility for the SGOL program, GEC could no longer secure a guarantee for upcoming hours prior to ramping a unit down. Given that GEC would have had to wait to qualify for another guarantee prior to ramping the unit up, the amount of time between ramping a unit down and ramping it back up would have been uncertain and a GEC unit might have had to run at FSNL for longer periods of time in order to qualify for a further cost guarantee following issuance of the IESO's communication. It is clear from the information provided by GEC that they felt that running a unit at FSNL for prolonged periods was undesirable for environmental reasons.[56]

GEC was aware that the Short Duration Shut Downs were leading to higher CMSC payments, and indeed even anticipated that a given generation run could be flagged as a gaming opportunity.[57] However, the Panel accepts that the Short Duration Shut Down practice was implemented for purposes other than exploiting the market defects described in section 5. The Panel therefore concludes that GEC's use of Short Duration Shut Downs during the Relevant Period did not constitute gaming.

8. Increase in Shut Down Offer Price

8.1 GEC's Shut Down Offer Prices

Table 4 shows the Shut Down Offer Prices used by GEC since it commenced commercial operation in 2008.

[56] Transcript of a conference call held on June 6, 2010 that involved representatives of GEC, ● and others, pp. 5-7, provided as part of the March Response to RFIs.
[57] Transcript of a conference call held on April 9, 2010 that involved representatives of GEC, ● and others, pp. 4-6, provided as part of the March Response to RFIs.

Table 4: GEC's Shut Down Offer Prices, 2008 – 2011

Predominant Offer Price	Period
$●/MWh	Oct 16, 2008 - November 6, 2008
$●/MWh	Nov 7, 2008 - December 13, 2010
$●/MWh	December 14, 2010 - August 30, 2011
$●/MWh -$●/MWh	September 1, 2011 -

After using a Shut Down Offer Price of $●/MWh for over two years (the "2008-2010 Shut Down Offer Price"), GEC started to submit a Shut Down Offer Price of $●/MWh (the "Higher Shut Down Offer Price") on December 14, 2010. GEC frequently submitted that Higher Shut Down Offer Price until the end of August 2011, which was the month in which the Panel issued the August 2011 Monitoring Document on offer prices used to signal an intention to come offline,[58] after which time GEC predominantly used Shut Down Offer Prices in the range of $●/MWh to $●/MWh.

Table 5 shows the number of shut downs by Shut Down Offer Price for the GEC Facility in 2010 and 2011.

Table 5: Number of GEC Shut Downs by Shut Down Offer Price, 2010 and 2011

Year	Shut Down Offer Price		
	2008-2010 Shut Down Offer Price $●/MWh	**Higher Shut Down Offer Price $●/MWh**	**$●/MWh - $●/MWh**
2010	770	32	119[59]
2011	8[60]	560	542
Total	**778**	**592**	**661**

[58] *Supra*, note 35.
[59] There were occasions during 2010 when GEC was offering at these prices and became uneconomic and thus was shut down.
[60] These occurred over 4 days in 2011.

Table 6 shows the amount of CMSC payments received by GEC during voluntary ramp downs. GEC received almost $2.6 million in CMSC payments when it used the Higher Shut Down Offer Price of $●/MWh. In the period December 14, 2010 to August 31, 2011, this is approximately $432,000 more than it would have received based on a 2008-2010 Shut Down Offer Price of $●/MWh.

Table 6: CMSC Payments to GEC by Shut Down Offer Price, 2010 and 2011

Year	Shut Down Offer Price		
	2008-2010 Shut Down Offer Price $●/MWh	**Higher Shut Down Offer Price $●/MWh**	**$●/MWh - $●/MWh**
2010	$2,173,578	$124,043	$-5,106
2011	$32,950	$2,470,836	$108,136
Total	**$2,206,528**	**$2,594,879**	**$103,030**

Table 7 sets out, for comparative purposes, the highest Shut Down Offer Prices submitted by other fossil-fueled generators during the period May 2010 to April 2011:

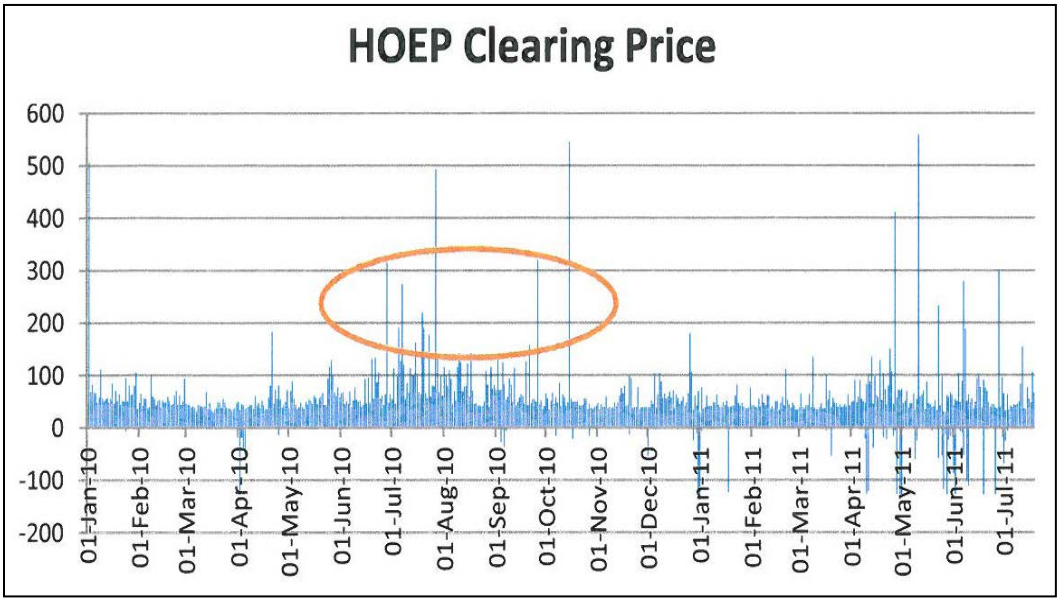
Table 7: Highest Shut Down Offer Price by Participant, May 2010 – April 2011

Facility	Highest Shut Down Offer Price
GEC	$●/MWh
Participant A	$200/MWh
Participant B	$150/MWh
Participant C	$149/MWh
Participant D	$120/MWh
Participant E	$97/MWh
Participant F	$95/MWh
Participant G	$90/MWh

As seen from this table, GEC's former 2008-2010 Shut Down Offer Price of $●/MWh was itself at least as high as – and in most instances higher than – the next highest Shut Down Offer Price submitted for any other generation facility in Ontario.

8.2 The $●/MWh Increase in GEC's Shut Down Offer Price

The Panel's investigation focused on the increase in the Shut Down Offer Price – from the 2008-2010 Shut Down Offer Price of $●/MWh to the Higher Shut Down Offer Price of $●/MWh – that GEC used starting in mid-December 2010. GEC stated that it increased its Shut Down Offer Price from the 2008-2010 Shut Down Offer Price of $●/MWh to the Higher Shut Down Offer Price of $●/MWh after observing increases in the HOEP during the summer and fall of 2010, as shown in the following chart provided by GEC:[61]



According to GEC, the higher HOEPs increased GEC's concern that the then current 2008-2010 Shut Down Offer Price of $●/MWh might be inadequate to signal a shut down. GEC stated that its concern was two-fold.[62] First, if GEC's Shut Down Offer Price was lower than the hour-ahead pre-dispatch price, the GEC Facility would be constrained on for its expected shut down

[61] August 26 Response to RFIs, pp. 9-10.
[62] *Ibid.*

hour. However, GEC would be unable to perform as required by the IESO because GEC's gas contracts require a one hour advance notice to nominate gas whereas the IESO can change its dispatch decision 45 minutes ahead of the dispatch hour. Second, if GEC were unable to perform as dispatched by the IESO, the IESO would presumably dispatch an alternative quick start resource, which could result in an even higher HOEP for the hour. This could be an hour in which GEC would be deemed to have earned revenue from the market under the terms of the GEC CES Contract, in which case GEC would be exposed to a reduction in its contract revenues for the entire 1,005 MW.

GEC acknowledged that it was aware that an increase in its Shut Down Offer Price would result in GEC receiving incremental CMSC payments, and that the increase could be perceived as a means of obtaining incremental revenue.[63] However, GEC stated that it considered it imprudent to fail to react to its perceived increased risk exposure. GEC therefore added an increment of $● to the then prevailing $●/MW "strike price" under the GEC CES Contract, bringing the new Higher Shut Down Offer Price to $●/MWh effective in December 2010 (which GEC noted was less than half of an HOEP on October 15, 2010).[64] The Panel understands the "strike price" to be the hourly electricity price that would be necessary to just cover the GEC Facility's variable energy costs as specified in the GEC CES Contract (gas costs, based on current gas prices and the fixed heat rates in the contract, and variable operations and maintenance expenses).

8.3 The Panel's Findings on the $●/MWh Increase in GEC's Shut Down Offer Price

The Panel accepts that there may be adverse consequences to GEC if it is constrained on in an hour in which it has planned to shut down, and the Panel also accepts that GEC, like any market participant, will take steps to reduce its exposure to those consequences. The Panel has noted GEC's concerns regarding the potential consequences arising from or associated with GEC's gas nomination arrangements and the GEC CES Contract. Even were the Panel to accept a material increase in GEC's risk in relation to either of these elements as potentially justifying an increase in GEC's Shut Down Offer Price, GEC has not provided any information tying the increase in its

[63] *Ibid.*
[64] *Ibid.*

Shut Down Offer Price to changes in its risk profile related to its gas nomination arrangements or the GEC CES Contract, other than the reference to perceived increases in the HOEP during the summer of 2010.

The question is therefore whether the increase in GEC's Shut Down Offer Price could reasonably have been regarded as necessary to ensure that the GEC Facility would be shut down at the desired times under prevailing circumstances. If not, then the Panel must determine the reasons for adopting the higher Shut Down Offer Price, including whether the higher Price was implemented to obtain incremental CMSC payments. For the following reasons, the Panel concludes that GEC's purpose was, in fact, to obtain such payments.

As noted above, GEC claimed that higher market prices in the summer and fall of 2010 caused it to be concerned that a 2008-2010 Shut Down Offer Price of $●/MWh might be insufficient to achieve the desired outcome. Beyond the chart reproduced above, GEC provided no analysis of market prices to support its contention that a 2008-2010 Shut Down Offer Price of $●/MWh, which had been used for over two years, would be insufficient to signal a shut down. Neither did GEC identify factors that it believed would contribute to higher market prices. Further, GEC also provided no explanation for having chosen $● as the increment to its Shut Down Offer Price, beyond noting that this was the "strike price" under the GEC CES Contract at the relevant time.

GEC's stated concerns regarding higher market prices are not supported by the market pricing data. The Panel's Monitoring Report for the period May 2010 to October 2010 does show that the average HOEP in that period was $39.45/MWh, an increase of 62.5% compared to the same period in 2009.[65] Importantly, however, while average hourly prices were significantly higher in 2010 than in 2009, there were only seven hours in the May 2010 to October 2010 period when the HOEP exceeded the 2008-2010 Shut Down Offer Price of $●/MWh, compared to six hours in the same months during 2009 (and 17 hours in the same months during 2008).[66] While there

[65] Market Surveillance Panel, *Monitoring Report on the IESO-Administered Markets for the period from May 2010 - October 2010, supra,* note 20.
[66] *Ibid.,* p. 7.

are commonly a few hours each summer when prices spike above the 2008-2010 Shut Down Offer Price of $●/MWh, such instances were neither numerous in 2010 nor appreciably more frequent than they were in 2009. It is therefore difficult for the Panel to accept that GEC was in fact motivated by this concern to adopt the higher Shut Down Offer Price.

Furthermore, although GEC stated that the new, higher Shut Down Offer Price was instituted after "discussing the high HOEP incidents and associated risks",[67] the material provided by GEC provides no evidence of discussions on this point. GEC stated that "on September 30, 2010, the energy marketing committee met in the normal course of business and decided to implement a strategy of increasing the shut-down offer price from $● to $● plus GEC's CES strike price, which at the time was approximately $●/MW, bringing the new total offer price to $●". GEC added in its response to the Panel's RFIs that this price "was less than half of a cleared HOEP on October 15, 2010."[68] However, the minutes from the meeting that GEC refers to in this response to the Panel's RFIs do not reflect any price analysis, do not mention HOEP and do not reveal any discussion whatsoever related to the increase in the Shut Down Offer Price to the Higher Shut Down Offer Price of $●/MWh.[69]

GEC itself acknowledged that at no point prior to December 2010 was its 2008-2010 Shut Down Offer Price of $●/MWh insufficient to ensure that the GEC Facility was shut down when GEC so desired. GEC also confirmed that there were no hours after December 2010 for which a Higher Shut Down Offer Price of $●/MWh resulted in a shut down but where a 2008-2010 Shut Down Offer Price of $●/MWh would have been insufficient for that purpose.[70]

The Panel's analysis arrives at the same conclusion. Market pricing data for the hours during which GEC shut down a unit between January 1, 2010 and August 30, 2011 reveals that there were no instances where a Higher Shut Down Offer Price of $●/MWh would have been

[67] August 26, Response to RFIs, p. 9.
[68] March Response to RFIs, p. 4.
[69] Minutes of a September 30, 2010 energy marketing committee meeting provided to the Panel on February 15, 2012 in response to the Panel's RFIs, p. 7.
[70] GEC's January 31, 2012 response to the Panel's RFIs, p. 6.

sufficient to achieve the desired outcome but a 2008-2010 Shut Down Offer Price of $●/MWh would not.[71]

Information provided by GEC makes it clear that GEC understood how CMSC payments are triggered when a unit is shut down by reason of a high offer price. GEC recognized that the increase in its Shut Down Offer Price to the Higher Shut Down Offer Price of $●/MWh "may result in higher CMSC revenue, and that the offer price increase might therefore be perceived as a means of obtaining incremental revenue".[72] However, GEC denied that this was its motivation for increasing its Shut Down Offer Price. GEC also stated that it chose not to offer higher than the Higher Shut Down Offer Price of $●/MWh notwithstanding the HOEPs that it had observed, and noted that the increase in its Shut Down Offer Price was in conformance with the current Market Rules and well below the maximum limit.

Based on the information and materials reviewed for purposes of the Investigation, including information and materials provided by GEC, the Panel finds that there was no reasonable or credible basis on which GEC could have concluded that changes in market prices in 2010 would have created a greater risk that a 2008-2010 Shut Down Offer Price of $●/MWh would be insufficient to bring the GEC Facility units offline when desired. There is nothing in the frequency or magnitude of high market prices in 2010 to support a concern that a significant shift in market prices necessitated a higher Shut Down Offer Price. GEC's Shut Down Offer Price was, moreover, consistently and substantially higher than that of other generation facilities throughout the Relevant Period, and GEC was at all times aware of the increase in incremental revenue in the form of CMSC payments that would be triggered by its Shut Down Offer Price.

The Panel concludes that GEC raised its Shut Down Offer Price by $●/MWh for the purpose of exploiting the market defects referred to in section 5, and obtained incremental CMSC payments as a result. The Panel does not accept GEC's expressed position that its purpose was to respond

[71] For each shut down hour, this analysis is based on a consideration of when real time nodal prices in the first three intervals of that hour were higher than the 2008-2010 Shut Down Offer Price of $●/MWh but no higher than the Higher Shut Down Offer Price of $●/MWh. Nodal prices represent the cost of energy at each injection and withdrawal point in Ontario.
[72] August Response to RFIs, pp 9-10.

to a perceived increase in risk that the 2008-2010 Shut Down Offer Price of $●/MWh would be an insufficient Shut Down Offer Price to achieve the desired result. In reaching this conclusion, the Panel gave weight not only to the lack of a credible basis to expect unusually high spikes in the HOEP based on 2010 experience and the other inferences set out above, but also to the lack of contemporaneous documentation confirming GEC's alleged rationale, including within the minutes of the meeting at which GEC claimed that its decision to increase its Shut Down Offer Price was discussed.

The mere receipt of a CMSC payment does not necessarily mean that a market participant has profited or benefited as those concepts are used by the Panel as one of the elements of gaming. In the case of Shut Down Offer Prices that are being used to signal an intention to voluntarily come offline for *bona fide* business reasons, a market participant will profit or benefit when it obtains constrained-on CMSC payments that exceed the amount that would have been paid based on a Shut Down Offer Price that is the greater of: (i) the generator's marginal cost of production during ramp down; and (ii) the price that is sufficient to achieve the objective of shutting down. The Panel's August 2011 Monitoring Document provides guidance to market participants as to a Shut Down Offer Price that the Panel would normally consider to be sufficient for the purposes of ensuring the shut down of a facility when desired; namely, a Shut Down Offer Price that does not exceed the greater of (i) 130% of the generator's 3-hour ahead pre-dispatch constrained schedule price, or (ii) the generator's marginal (or other incremental or opportunity) cost.

The Panel observes that even GEC's 2008-2010 Shut Down Offer Price of $●/MWh would have been above the 130% threshold set out in the August 2011 Monitoring Document. Further, the 2008-2010 Shut Down Offer Price of $●/MWh was itself clearly not reflective of GEC's marginal cost of production. However, the focus of the Panel's investigation was the increase in GEC's Shut Down Offer Price to the Higher Shut Down Offer Price of $●/MWh, and the Panel has therefore made no finding in this investigation regarding the propriety of GEC's conduct in relation to its other Shut Down Offer Prices. On that basis, the Panel finds that GEC obtained a profit or benefit of approximately $432,000 in the form of incremental CMSC payments in the period December 14, 2010 to August 30, 2011 by raising its Shut Down Offer Price from the

2008-2010 Shut Down Offer Price of $●/MWh to the Higher Shut Down Offer Price of $●/MWh.

As noted in section 4.3, CMSC payments are charged to Ontario wholesale electricity market customers as part of uplift charges, and much of those uplift charges are ultimately passed on to consumers throughout the province. When a market participant exploits market defects in the CMSC regime and profits from its behavior, this imposes an expense and disadvantage throughout the market. In this case, all customers have paid higher uplift charges as a result of GEC's Shut Down Offer Price conduct during the Relevant Period.

9. Elimination of Unwarranted CMSC Payments and Recent Developments Regarding Gaming

It has long been the Panel's view that CMSC payments were not intended to provide a revenue stream for market participants that take a voluntary action, such as ramping down for reasons other than responding to IESO instructions.[73] Moreover, the market defects identified in section 5 provide an incentive to market participants, in the form of incremental CMSC payments, to set their Shut Down Offer Prices at levels that exceed the market participant's marginal cost of production and, for that matter, at levels that exceed what is reasonably necessary to ensure that a unit will be shut down at the desired times. The Panel has previously recommended that the IESO implement a permanent, rule-based solution to eliminate self-induced CMSC payments to generators that are

[73] Each Panel *Monitoring Report on the IESO-Administered Electricity Markets* listed here (in chronological order) address this point: *Monitoring Report* dated January 2009, pp. 216-217, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/msp_report_200901.pdf; *Monitoring Report* dated January 2010, p. 113, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/msp_report_201001.pdf; *Monitoring Report* dated August 2010, p. 270-273, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_20100830.pdf; *Monitoring Report* dated February 2011, p. 93, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_20110310.pdf; *Monitoring Report* dated November 2011, p. 123, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_20111116.pdf; *Monitoring Report* dated April 2012, p. 52, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_20120427.pdf; and *Monitoring Report* dated June 2013, pp. 61-67, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/MSP_Report_May2012-Oct2012_20130621.pdf.

ramping down.[74] The IESO has indicated that this recommendation will be addressed as part of its current stakeholder engagement initiative aimed at a comprehensive review of the real-time and day-ahead generation cost guarantee programs.[75]

As set out in section 3.1, the Panel's responsibilities include monitoring, investigations and reporting.[76] The Panel submits its investigation reports to the OEB and the IESO. The Panel's investigation reports may include recommendations (including recommendations regarding Market Rule amendments). However, the Panel does not have the legislative mandate to impose sanctions or to take other remedial action in respect of the investigated behaviour. While a compliance and enforcement regime exists in relation to breaches of the Market Rules, gaming does not necessarily constitute a breach of the Market Rules. At present, there is no provision in the Market Rules that addresses gaming as a separate and distinct activity, although as noted below a "general conduct rule" is currently under development by the IESO.

The Panel regards gaming as a serious concern because of the potential negative impact on the operation of the wholesale market, the harm to market participants (and ultimately to all electricity consumers in Ontario) who bear the cost of it, and the undermining of public confidence in the market. The Panel therefore believes that remedial action should be available in appropriate cases, whether that action be in the form of penalties, the recovery of gains made by the market participant or some other sanction. In addition to remedying conduct that has occurred, the prospect of meaningful remedial action would help to deter gaming and contribute to the integrity of the electricity market.

The IESO is currently engaging in stakeholder consultations regarding the introduction of a "general conduct rule" into the Market Rules that could encompass gaming (among other

[74] This recommendation was made most recently in the Panel's June 2013 *Monitoring Report*, *ibid.*
[75] Letter from Bruce Campbell, President & CEO of the IESO, to Rosemarie Leclair, Chair & CEO of the Ontario Energy Board, dated July 17, 2013, online at: http://www.ontarioenergyboard.ca/OEB/_Documents/MSP/IESO_Reply_to_OEB_Letter_MSP_Report_20130717.pdf.
[76] See *Electricity Act, 1998*, section 37 and MSP By-law, Articles 4, 5 and 7.

matters).[77] The Panel supports this initiative, and encourages the IESO to proceed expeditiously with its consultations and to ensure that any rule that it implements is drafted so as to capture the kinds of activities that are the subject of this Report or activities of a similar nature that have been discussed in other Panel reports.

[77] Details of the consultation, referred to as Stakeholder Engagement SE-112, are available at http://www.ieso.ca/Pages/Participate/Stakeholder-Engagement/SE-112.aspx.

Appendix A: Constrained and Unconstrained Schedules Resulting from GEC's Ramp Profiles

The following figures provide an approximate illustration of the constrained and unconstrained schedules associated with each of the Fast (FigureA1), Medium (FigureA2) and Slow (FigureA3) Ramp Profiles described in section 6.1 of this Report when ramping down.

Figure A1: Fast Ramp Profile

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Figure A2: Medium Ramp Profile

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Figure A3: Slow Ramp Profile

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