



PROCEDURE

Market Manual 4: Market Operations

**Part 4.6: Real-Time
Generation Cost
Guarantee Program**

Issue 9.0

This procedure provides guidance to *market participants* on the operation and settlement of the Real-Time Generation Cost Guarantee Program

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This *market manual* may contain a summary of a particular *market rule*. Where provided, the summary has been used because of the length of the *market rule* itself. The reader should be aware, however, that where a *market rule* is applicable, the obligation that needs to be met is as stated in the Market Rules for the Ontario Electricity Market ("*market rules*"). To the extent of any discrepancy or inconsistency between the provisions of a particular *market rule* and the summary, the provision of the *market rule* shall govern.

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Reference (Section and Paragraph)	Description of Change
Section 5.4	IMDC-70: Updates to the section 5.4 fuel cost recovery methodology.

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Market Manuals

The *market manuals* consolidate the market procedures and associated forms, standards, and policies that define certain elements relating to the operation of the *IESO-administered markets*. Market procedures provide more detailed descriptions of the requirements for various activities than is specified in the "*market rules*". Where there is a discrepancy between the requirements in a document within a *market manual* and the "*market rules*", the "*market rules*" shall prevail. Standards and policies appended to, or referenced in, these procedures provide a supporting framework.

Market Procedures

The "Market Operations Manual" is Series 4 of the *Market Manuals*, where this document forms "Part 4.6: Real-Time Generation Cost Guarantee Program".

– End of Section –

1. Introduction

Market Manual 4.6: Real-Time Generation Cost Guarantee Program is comprised of the following sections:

Section	Name of Section
1.0	Introduction
2.0	Real-Time Generation Cost Guarantee Program Overview
3.0	Registration
4.0	RT-GCG Eligibility
5.0	Cost Recovery
6.0	Settlements
7.0	RT-GCG Program Reviews
8.0	Audit

1.1 Purpose

The Real-Time Generation Cost Guarantee Program (RT-GCG Program) is a voluntary program administered by the *IESO* that provides *generation facility* resources (also referred to as *generation unit* throughout this manual) that meet eligibility criteria, recovery of certain incremental costs to the extent that those costs are not recovered through market revenues. The *IESO* considers incremental costs to be the variable costs incurred from point of ignition until the *generation unit* reaches its *minimum loading point (MLP)* that would not have been incurred if the resource did not invoke a RT-GCG start¹.

This “Real-Time Generation Cost Guarantee Program” manual is designed to provide *market participants* with an introduction to the RT-GCG Program, to further specify the incremental costs eligible for recovery and to address other matters such as RT-GCG cost submission.

The manual also provides information on *market participants’* eligibility criteria, timelines and the *settlement process*.

1.2 Scope

The RT-GCG Program comprises the following aspects:

- Registration to participate in the program,

¹ “Start” refers to the specific eligible RT-GCG start for the applicable resource.

- For each registered resource, defining the incremental costs (fuel, and operating and maintenance) of starting and ramping to *minimum loading point* that are eligible to be recovered through the RT-GCG Program,
- Methodology to be used by program participants when calculating and submitting incremental costs, and
- Defining cost components that are subject to audit.

In support of these aspects, this manual provides additional detail regarding the criteria, actions and timelines required for both the RT-GCG Program participants and the IESO. This manual is based on obligations expressed in the “*market rules*” (Chapter 7 and Chapter 9).

This manual refers to other *market manuals* and *market rules* that provide additional information.

1.3 Who Should Use This Manual

The “Real-Time Generation Cost Guarantee Program” manual is meant to be used by *market participants* undertaking any of the following activities:

- Registering a *generation facility* resource(s) in the RT-GCG Program,
- Submitting a RT-GCG cost for recovery under the RT-GCG Program, or
- Otherwise participating in the RT-GCG Program.

1.4 Conventions

The standard conventions followed for *market manuals* are as follows:

- The word 'shall' denotes a mandatory requirement.
- Terms and acronyms used in this market manual including all Parts thereto that are italicized have the meanings ascribed thereto in Chapter 11 of the “*market rules*”.
- Double quotation marks are used to indicate titles of legislation, publications, forms and other documents.

Any procedure-specific convention(s) shall be identified within the procedure document itself.

– End of Section –

2. Real-Time Generation Cost Guarantee Program Overview

2.1 Program Overview

The *IESO-administered markets* schedule resources to ensure energy and operating reserve demands are met at any given time. If there is a disturbance on the electricity system or market demand increases, resources need to be ready to *dispatch* to meet system conditions. Not having enough resources online to meet changing conditions can have significant impacts on reliability.

Some resources can take several hours to reach the point at which they are available for *dispatch*, called the *minimum loading point*. During the period between initiating a start to reaching *minimum loading point*, a resource will incur costs as a result of starting up. Without assurance that the resource will be dispatched in real-time, a *registered market participant* offering the resource into the market faces uncertainty that the resource will be able to recover the incremental costs of starting and ramping to *minimum loading point*. As a result, some resources may be less likely to be offered when the *IESO* may need them to be available.

To help address this concern, the *IESO* administers the Real-Time Generation Cost Guarantee (RT-GCG) Program. Participation in the RT-GCG Program is voluntary.

The RT-GCG Program is not a full cost-recovery program. The objective of the program is to provide *generation facility* resources that meet the applicable eligibility criteria, recovery of certain incremental fuel, operating, and maintenance costs incurred as a result of starting up and ramping to *minimum loading point*, to the extent those costs are not recovered through market revenues.

The *IESO* considers incremental costs to be the variable costs incurred from point of ignition until the *generation unit* reaches its *minimum loading point* that would not have been incurred if the resource did not invoke a RT-GCG start.

The *IESO* will constrain a *generation facility* resource that invokes a RT-GCG start for its registered *minimum generation block run-time*². During this time, the *generation facility* resource will be constrained on to respect its operational requirements, such as operating at its *minimum loading point* for its *minimum generation block run-time*.

2.2 Conditions for Eligibility

A *generation facility* resource must meet certain conditions to be eligible to receive a cost guarantee under the RT-GCG Program. These conditions are:

- The *facility* must be domestic (located within the Province of Ontario),
- The *facility*, including its resources, must be registered to participate in the RT-GCG Program,

² *Minimum generation block run-time* means the number of hours, specified by the *market participant*, that a *generation facility* must be operating at *minimum loading point* in accordance with the technical requirements of the *facility*.

- The *facility* must be dispatchable,
- The *facility* must be a non quick-start facility³,
- The *facility* must operate as per the RT-GCG Program requirements, and

the *market participant* must submit *facility* cost information on a per-registered resource basis to the *IESO* for *settlement*, in accordance with applicable *market rules* and this *market manual*.

2.3 Capacity Exports

A Capacity Resource⁴ that has committed its capacity to an external *control area* is **not** eligible to receive payment under the RT-GCG program if:

- The external *control area operator* has called a *called capacity export* **prior to** the Capacity Resource being scheduled for the RT-GCG in accordance with Chapter 7, Section 5.7 of the *market rules*, or
- The external *control area operator* has called a *called capacity export* **after** the Capacity Resource has been scheduled for the RT-GCG in accordance with Chapter 7, Section 5.7 of the *market rules*, and the *IESO* is restricting other transactions on *interconnected systems* in accordance with Chapter 5, Sections 2.3 and 5.7 of the *market rules*, while maintaining the *called capacity export* transaction.

The *IESO* will withhold or recover RT-GCG *settlement amounts* made in respect of the Capacity Resource and shall redistribute any recovered payments in accordance with Chapter 9, Section 4.8.2 of the *market rules*.

All RT-GCG *settlement amounts* will be withheld or recovered regardless of any differences between the number of hours called and the number of hours committed through RT-GCG.

2.3.1 Same Day Capacity Call Examples

Note: These examples are for illustrative purposes only and are not exhaustive.

Example 1: Called and committed through RT-GCG for the same MW for MGBRT period

- A Capacity Resource with an *MLP* of 100 MW and a six-hour *MGBRT* receives a call for a *called capacity export* during HE08 for delivery of 100 MW between HE16 and HE21
- The Capacity Seller calls and notifies the *IESO* of its intention to synchronize under the RT-GCG and to reach its *MLP* by HE16
- The Capacity Resource synchronizes and reaches *MLP* in HE16 and desynchronizes at the end of HE21
- *IESO* will withhold or recover all RT-GCG *settlement amounts* in respect of HE16 through HE21

³ “Non-quick start facility” refers to a *generation facility* resource that cannot synchronize and follow a dispatch instruction within a five-minute dispatch interval.

⁴ Capitalized terms in Section 2.3 are defined in Market Manual 13: Capacity Export Requests, Appendix A: Glossary of Capacity Export Terms.

Example 2: Called for fewer MW than committed through the RT-GCG

Principle: Start was as a result of the *called capacity export*. As such, all RT-GCG *settlement amounts* will be withheld or recovered, even if the call is for less than the Capacity Resource's *MLP*.

- A Capacity Resource with an *MLP* of 100 MW and a six-hour *MGBRT* receives a call for a *called capacity export* during HE08 for delivery of 50 MW between HE16 and HE21
- The Capacity Seller calls and notifies the *IESO* of its intention to synchronize under the RT-GCG and to reach its *MLP* by HE16
- The Capacity Resource synchronizes and reaches *MLP* in HE16 and desynchronizes at the end of HE21
- *IESO* will withhold or recover all RT-GCG *settlement amounts* in respect of HE16 through HE21

Example 3: Called and committed for same MW, called for fewer hours than MGBRT

Principle: Start was as a result of the *called capacity export*. As such, all RT-GCG *settlement amounts* will be withheld or recovered regardless of the difference between the number of hours called and the number of hours committed through the RTM.

- A Capacity Resource with an *MLP* of 100 MW and an eight-hour *MGBRT* receives a call for a *called capacity export* during HE08 for delivery of 100 MW between HE16 and HE21
- The Capacity Seller calls and notifies the *IESO* of its intention to synchronize under the RT-GCG and to reach its *MLP* by HE14
- The Capacity Resource synchronizes and reaches *MLP* in HE14 and desynchronizes at the end of HE22
- *IESO* will withhold or recover all RT-GCG *settlement amounts* in respect of HE14 through HE22

Example 4: Called and committed for same MW, called for more hours than MGBRT

- A Capacity Resource with an *MLP* of 100 MW and a four-hour *MGBRT* receives a call for a *called capacity export* during HE08 for delivery of 100 MW between HE16 and HE22
- The Capacity Seller calls and notifies the *IESO* of its intention to synchronize under the RT-GCG and to reach its *MLP* by HE16
- The Capacity Resource synchronizes and reaches *MLP* in HE16 and desynchronizes at the end of HE22
- *IESO* will withhold or recover all RT-GCG *settlement amounts* in respect of HE16 through HE22

Example 5: Called and committed for same MW, satisfies MGBRT prior to the start of the *called capacity export*

- A Capacity Resource with an *MLP* of 100 MW and a four-hour *MGBRT* receives a call for a *called capacity export* during HE08 for delivery of 100 MW between HE16 and HE22
- The Capacity Seller calls and notifies the *IESO* of its intention to synchronize under the RT-GCG and to reach its *MLP* by HE10
- The Capacity Resource synchronizes and reaches *MLP* in HE10. It operates to 100 MW and desynchronizes at the end of HE22

IESO will withhold or recover all RT-GCG settlement amounts in respect of HE10 through HE22

– End of Section –

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3. Registration

In order to participate in the RT-GCG Program, the IESO must determine the pre-approved cost values or approve an alternate approach, as allowed under the *market rules*. Discussions between the *market participant* and the *IESO* must begin with sufficient lead-time in advance of the first day the *market participant* intends to participate in the RT-GCG Program, in order to establish pre-approved values for the registered *market participant*. The process can take in excess of four months depending on the quality of submitted information and complexity of the costs.

The registration requirements can be found in Market Manual 1.5: Market Registration Procedures.

3.1 Registration of Generation Facility/Resource Data

The *market participant* registers to participate in the RT-GCG Program by *facility* and resource. For a facility with multiple combustion turbines and one steam turbine, each of these turbines would be a 'resource', except where two resources are registered as one aggregated resource, and the sum of these resources would be the '*facility*'. Each resource is registered separately. The *market participant* does not have to register all resources which are part of the *facility*, however, as noted elsewhere in this manual, a resource must be registered under the RT-GCG Program in order to be eligible for the cost guarantee. Costs must be submitted for the registered resource that incurs the cost.

Program participants shall register the following *generation facility* resource values to participate in the RT-GCG Program:

- *Minimum run-time (MRT)*,
- *Minimum loading point (MLP)*, and
- *Minimum generation block run-time (MGBRT)*.

The participant may be asked to provide support for these values.

– End of Section –

4. RT-GCG Eligibility

Participation in the RT-GCG Program is voluntary. RT-GCG Program participants must indicate their intention to qualify for the RT-GCG at the time they notify the *IESO* Control Room of their intention to synchronize. A declaration of RT-GCG Program participation is mandatory for each start for which the program participant intends to qualify for the RT-GCG.

RT-GCG eligibility criteria can be broken down into two distinct phases of the start event, as follows:

- Pre-dispatch scheduling eligibility criteria, and
- Real-time scheduling and operations eligibility criteria.

4.1 Pre-dispatch Scheduling Eligibility Criteria

The *IESO* will review the RT-GCG cost submission and determine if the *generation unit* has met the pre-dispatch scheduling requirements, as defined in the “*market rules*” Chapter 7, Section 5.7, and as detailed below:

- a. The *generation facility* is not already synchronized at the time of the publication of the applicable *pre-dispatch schedule*.
- b. The *registered market participant* for the *generation facility* notifies the *IESO* of its intention to synchronize and then run for at least the *minimum generation block run-time*.
- c. At the time of notification to synchronize, the *registered market participant* for the *generation facility* also notifies the *IESO* of its intention to qualify for the generation cost guarantee.
- d. The *offer* in the submitted *price-quantity pair* corresponding to the *minimum loading point* for that *generation facility* for all hours of the *minimum generation block run-time* must be the same until after the *IESO* has constrained on the *generation facility*.
- e. The *generation facility* is scheduled in any *pre-dispatch schedule* published within 3 hours ahead of the *dispatch hour*:
 - For the *dispatch hour*, and
 - For at least half of *minimum generation block run-time*, rounded up, at *minimum loading point* or higher, during the period from the *dispatch hour* until the earlier of:
 - The end of the period representing *minimum generation block run-time*, or
 - The end of the period representing *minimum run-time*.

4.2 Real-Time Scheduling and Operations Eligibility Criteria

If the *market participant* for the *generation facility* wishes the *facility* to participate in the RT-GCG Program, they must notify the *IESO* of their intent to synchronize, and then run at their *MLP* for at least the *minimum generation block run-time*. At the time of notification the *market participant* is

asked to notify the *IESO* of the time at which they expect to reach their *MLP*. In the event that the *generation facility* will not reach their *MLP* at the estimated time, the *market participant* is asked to contact the *IESO* and adjust their estimate. The *IESO* will accept all requests to participate in the RT-GCG Program, except where their participation will affect reliability, and will review all RT-GCG starts for compliance with the *IESO market rules*.

In order to qualify for a RT-GCG payment, the *generation facility* resource *must* pass certain eligibility criteria related to how the participant:

- Offers the *generation unit* for *dispatch*, and
- Operates the *generation unit* in *real-time*.

The *IESO* will review the RT-GCG cost submission to determine if the *generation unit* has met the real-time scheduling and operations requirements, as defined in the “*market rules*” Chapter 7 Section 5.7 and 6.3A, and as detailed below:

- a. The *registered market participant* for the *generation facility* does not increase the *offer* prices in its submitted *price-quantity pairs* corresponding to the *generation facility’s* *minimum loading point* for the *minimum generation block run-time* after notifying the *IESO* of its intention to synchronize, or after the *IESO* has applied a manual constraint.
- b. After the *registered market participant* for a *generation facility* eligible for the generation cost guarantee notifies the *IESO* of its intent to synchronize, that *generation facility* shall synchronize, unless otherwise agreed to by the *IESO*, before the end of the specified *dispatch hour* and run until the end of the *minimum generation block run-time*.

The *generation unit* is required to synchronize no earlier than the beginning of the hour before the *dispatch hour* and no later than the end of the *dispatch hour*. Once the *generation facility* is synchronized, the *IESO* will constrain the *generation facility* on for its *minimum generation block run-time* from the time the *registered market participant* has estimated that the *generation facility* will reach its *minimum loading point*.

4.3 Replacement Energy Offer Program (REOP)

In the event it becomes clear that the committed *generation unit* will not be able to synchronize, ramp to *minimum loading point* and remain at *minimum loading point* for the duration of its registered *minimum generation block run-time*, the Replacement Energy Offer Program (REOP) may be used, and a different *generation unit* at the same *facility* that is also registered in the RT-GCG Program may take its place. The replacement unit must meet the schedule of the original unit in order to receive a generation cost guarantee.

If the REOP is used, the pre-dispatch scheduling eligibility criteria and the real-time eligibility criteria will only apply to the original unit except as noted below. The replacement unit:

- a. Must not be already synchronized to the *IESO-controlled grid* at the time of the publication of the applicable *pre-dispatch schedule* that the original *generation unit* invokes on,
- b. *Offer* prices corresponding to the *minimum loading point* for the *minimum generation block run-time* of the replacement unit must not exceed those of the original unit, and
- c. The replacement unit must synchronize prior to the end of the original unit’s *dispatch hour*, ramp to its *minimum loading point* and sustain that level for the entire *minimum generation block run-time*.

4.4 Operating in Real-Time

The IESO identifies a *generation unit* start-up for *settlement* purposes by using *revenue metering* results for the applicable *trading day* (synchronization date). The metering results must indicate a change from zero in one interval to a sustained positive value for four consecutive intervals in order to be considered an eligible RT-GCG start. After a valid start-up has been identified, the *generation unit* is determined to be on-line in an interval where the *revenue metering* results for the resource show a positive value.

If the IESO de-commits (constrains off) a *generation unit* for *reliability* reasons after synchronization and before the end of its *minimum run-time*, the *generation unit* remains eligible for the generation cost guarantee. All the information noted in Section 6.1 RT-GCG Cost Submission for the RT-GCG event must still be submitted to be eligible for recovery. The costs submitted should represent the costs incurred prior to de-commitment. However, should a *generation facility* fail to run until the end of its *minimum generation block run-time* for reasons other than to maintain the *reliability* of the IESO-controlled grid, its eligibility for the generation cost guarantee will be forfeited.

If a *registered market participant* is removing *offers* within the mandatory window because the resource cannot meet its operational requirements, the *registered market participant* shall communicate this as the reason in the *offer* removal request to the IESO Control Room.

4.4.1 Combined Cycle Facilities

A steam *generation unit* is only eligible for the generation cost guarantee to its registered 1x1 *minimum loading point* if the steam unit has met the RT-GCG eligibility requirements prior to any operational constraints being applied. Therefore, when invoking RT-GCG on a steam unit, the *registered market participant* must indicate to the IESO the time that the unit will synchronize and reach its 1x1 *minimum loading point*. The IESO will constrain the steam unit at this value for the unit's *minimum generation block run-time*.

If the steam unit's *minimum loading point* is required to be at a higher level than its 1x1 value, the *registered market participant* should use best efforts to have the unit economically scheduled to the higher level. If the *registered market participant* is unable to get the appropriate 2x1 or 3x1 *minimum loading point* scheduled, the *registered market participant* can request the IESO to constrain the unit to its operational minimum as submitted by the *registered market participant*, for the required *minimum generation block run-time*, based on the number of combustion turbines synchronized for RT-GCG.

If the *registered market participant* does not intend to have their steam unit participate in the RT-GCG program, they may still request that it be constrained to its operational minimum at the time they invoke RT-GCG on their combustion turbines. The registered market participant is not permitted to submit any costs for recovery for the steam turbine unit when it's being requested to be constrained on by the participant. The *registered market participant* is still under the obligation to ensure that its *offers* are reflective of its operational requirements as per Market Manual 4.2 Appendix C.1 and C.2.

– End of Section –

5. Cost Recovery

5.1 Eligible Costs

The RT-GCG Program will reimburse participants for certain eligible costs incurred during an eligible RT-GCG start provided the cost is accepted by the *IESO* as reasonable, and all other applicable eligibility criteria are met.

Eligible costs are defined as:

1. Incremental: variable costs that would not have been incurred if the resource did not invoke a RT-GCG start.
2. Limited to the period from start-up to when the resource reaches its *minimum loading point*.

The RT-GCG Program reimburses participants for the total eligible costs for the *registered facility* resource related to the eligible RT-GCG start(s), minus the revenues⁵ earned by the *registered facility* resource during the eligible RT-GCG start(s) to which the costs are attributed.

5.2 Cost Recovery Methodology

The *IESO* will use one of the following methodologies for calculating each of the costs eligible for recovery:

1. Universal pre-approved cost values, or
2. Resource-specific pre-approved cost values.

Where the *IESO* determines pre-approved values are not appropriate, incremental eligible costs may be submitted by the participant after the cost is incurred, if approved by the *IESO*. The *registered market participant* must receive express written approval from the *IESO* to submit costs on this basis.

⁵ As per Market Rule Chapter 9 Section 4.7B.1.1

5.3 Cost Recovery Methodology for Each Fuel Type

The IESO will use the following methodologies to determine eligible costs for facilities that are primarily fueled by natural gas, biomass and oil. Where a secondary fuel is required during the eligible period, the IESO may develop a separate *generation facility* resource-specific pre-approved value.

Cost Component	Resource Type				
	Combined Cycle Gas Turbine (CCGT)	Combined Cycle Steam Turbine	Gas-fired Steam Turbine	Oil-fired Steam Turbine	Biomass-fired Steam Turbine
Fuel price	Universal pre-approved index	Universal pre-approved index	Universal pre-approved index. Separate <i>generation facility</i> resource-specific pre-approved values may be developed if different types of fuel are used during start-up for ignition and reaching <i>MLP</i> .	<i>Generation facility</i> resource-specific pre-approved value. Separate <i>generation facility</i> resource-specific pre-approved values may be developed if different types of fuel are used during start-up for ignition and reaching <i>MLP</i> .	<i>Generation facility</i> resource-specific pre-approved value. Separate <i>generation facility</i> resource-specific pre-approved values may be developed if different types of fuel are used during start-up for ignition and reaching <i>MLP</i> .
Start Volume (Fuel)	Participant to provide metered volume	Fuel consumed when the duct burner is utilized to generate additional steam for the Heat Recovery Steam Generator (HRSG) during the eligible period can be claimed	Participant to provide metered volume	Participant to provide metered volume for each type of fuel used	Participant to provide metered volume for each type of fuel used
Compressor Fuel Volume Adder	Universal pre-approved value	Not applicable	Universal pre-approved value	Not applicable	Not applicable
Services Price Adder	Universal pre-approved value	Not applicable	Universal pre-approved value	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value
Electricity Consumption Price	Universal pre-approved value	Universal pre-approved value	Universal pre-approved value	Universal pre-approved value	Universal pre-approved value

Cost Component	Resource Type				
	Combined Cycle Gas Turbine (CCGT)	Combined Cycle Steam Turbine	Gas-fired Steam Turbine	Oil-fired Steam Turbine	Biomass-fired Steam Turbine
Electricity Consumption Quantity	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value
Operating Consumables Cost Adder	Universal pre-approved value	Not applicable	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value
Planned Maintenance Cost Adder	<i>Generation facility</i> resource-specific pre-approved value for each starting state of resource	<i>Generation facility</i> resource-specific pre-approved value for each starting state of resource	<i>Generation facility</i> resource-specific pre-approved value for each starting state of resource	<i>Generation facility</i> resource-specific pre-approved value for each starting state of resource	<i>Generation facility</i> resource-specific pre-approved value for each starting state of resource
Carbon Price Adder	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value Only for fuel consumed when the duct burner is utilized to generate additional steam for the Heat Recovery Steam Generator (HRSG) during the eligible period can be claimed	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value	<i>Generation facility</i> resource-specific pre-approved value Only fossil fuels consumed during start-up for ignition and reaching MLP can be claimed

5.3.1 Exchange Rate

Incremental costs may be incurred in a different denomination than Canadian dollars (CAD).

For the purposes of RT-GCG cost submissions, conversion to CAD from another currency will be based upon the applicable end of day foreign exchange rate as posted by the Bank of Canada by 16:30 on the day of synchronization.

The *IESO* will split the pre-approved planned maintenance value into costs incurred in Canadian versus US dollars. The participant will submit the two separate values for each eligible RT-GCG start. The planned maintenance value expressed in USD will be converted to CAD based upon the applicable foreign exchange rate on the day of synchronization.

A hedged foreign exchange rate is not eligible for recovery under the RT-GCG Program.

5.3.2 Escalation Factor for Planned Maintenance Costs

Where appropriate, the *IESO* will build escalation factors into the *generation facility* resource-specific planned maintenance values to bring historic costs to the present value at the time that the value is determined. If verifiable escalation factors are documented in existing contracts (e.g. Contractual Service Agreement costs), these factors will be used to determine the planned maintenance present values. If a verifiable escalation factor is not available, the *IESO* will apply a published inflation factor to determine, where appropriate, the present values for the types of costs covered under planned maintenance.

Once pre-approved planned maintenance values are set, the *IESO* will adjust values on an annual basis by applying the % change from the previously reviewed period (i.e. previous year) in the Consumer Price Index for “all-items” for Ontario.

5.4 Fuel Cost Recovery Methodology

5.4.1 RT-GCG Program Registered Resources Primarily Fueled by Natural Gas during Start-up

The *IESO* has established the following pre-approved fuel costs to be used by RT-GCG Program registered resources that are primarily fueled by natural gas:

Component	Measure	Source
Fuel Price	\$	NGX Union Dawn Day-Ahead Index price for the gas day converted to CAD based upon the applicable foreign exchange rate on the day of synchronization. Fuel price converted to GJ using a conversion factor of 1.055056 GJ/MMBtu.

Component	Measure	Source
Start Volume ^{6,7}	GJ	Participant to provide based on metered volume ⁸ . If the eligible RT-GCG start spans across two gas days, the fuel consumed during the start period should be allocated to the appropriate gas day price accordingly.
		For a gas turbine submitting resource or a gas turbine component of an aggregated submitting resource, the volume is only at the submitting resource gas turbine combustion burners. For a steam turbine submitting resource or steam turbine component of an aggregated submitting resource, the volume is only at the duct burners or boilers used to generate steam to drive the submitting resource steam turbine.
Compressor Fuel Volume Adder	%	Universal pre-approved value of 1% added to the fuel volume for the incremental percentage of fuel consumed by the compressor associated with each RT-GCG eligible start, including volumes for injecting or removing gas from storage.
Services Price Adder	\$	Universal pre-approved value of \$0.048 added to the fuel price for the additional services related to the marketer risk premium, commodity charge for transportation and balancing and storage.
Carbon Price Adder For Non-Large Final Emitter (non-LFE) Generators ⁹	\$	Facility Carbon Charge: Universal pre-approved value of \$0.003/GJ will be applied to all non-LFE RT-GCG eligible facilities served by Enbridge Gas Inc. The Facility Carbon Charge is an average of the OEB-approved rates charged by Enbridge Gas Inc. to such facilities. Federal Carbon Charge: Universal pre-approved value of \$2.52/GJ for natural gas will be applied to all non-LFE RT-GCG eligible facilities served by Enbridge Gas Inc. Updates to the universal pre-approved values will be applied when the OEB approves a change to the applicable Enbridge Gas Inc. rates. The Carbon Price Adder will not be applied to compressor volume.

⁶ As per Market Rules Chapter 11

⁷ The start volume for a combined cycle facility is only at the submitting resource gas turbine combustion burners or the duct burner fuel for a steam turbine submitting resource.

⁸ The start volume will be calculated using five-minute revenue data as supporting evidence, or operational data where necessary.

⁹ "Non-Large Final Emitter Generators are defined as: i) facilities emitting less than 10ktCO₂e (kilotonne CO₂ equivalent) per year attributable to fossil fuels; and ii) facilities emitting between 10ktCO₂e to 50ktCO₂e attributable to fossil fuels, that do not opt-into the Output Based Pricing System (OBPS)

Component	Measure	Source
Carbon Price Adder For Large Final Emitter Generators (LFE) Generators ¹⁰	\$	<p>Facility Carbon Charge: Universal pre-approved value of \$0.003/GJ will be applied to all LFE RT-GCG eligible facilities served Enbridge Gas Inc. The Facility Carbon Charge is an average of the OEB approved rates charged Enbridge Gas Inc. to those facilities.</p> <p>Updates to the universal pre-approved values will be applied when the OEB approves a change to the applicable Enbridge Gas Inc. rates.</p> <p>Federal Carbon Charge: Generation facility resource-specific pre-approved value for the Output Based Pricing System (OBPS) will be applied to all LFE generators after the annual emissions data for a compliance period is verified in the following year, and the verification report and proof of payment have been submitted to the IESO for review¹¹, and will be calculated as follows:</p> <p>Eligible carbon costs = [(Annual Start Volume * Fuel Carbon Content) – (Output Based Standard * Annual Start Energy)] * Excess Emissions Charge</p> <p>where:</p> <p>Annual Start Volume (GJ) = Sum of Start Volumes (as outlined in this table, above) over the applicable compliance year across all eligible resources comprising the facility, based on the RT-GCG online claim form submissions</p> <p>Fuel Carbon Content (tCO₂e/GJ) = Published value from Table 20-3 of the Ontario Greenhouse Gas Emissions Reporting Guide under “Marketable Gas (kg/GJ)” for Ontario, converted to tCO₂e/GJ using a conversion factor of 0.001 t/kg</p> <p>Output Based Standard (tCO₂e/GWh) = Published value from Schedule 1 - Item 38(c) of the “Output-Based Pricing System Regulations”</p> <p>Annual Start Energy (GWh) = Sum of energy generated from synchronization to MLP for eligible RT-GCG starts over the applicable compliance year across all eligible resources comprising the facility, calculated by the IESO based on <i>revenue metering</i> data</p> <p>Excess Emissions Charge (\$/tCO₂e) = Published value from Schedule 4 of the “Greenhouse Gas Pollution Pricing Act” for the applicable compliance year</p> <p>Note: If the calculated Eligible carbon costs is a negative number, the Federal Carbon Charge shall be zero. Additionally, for eligible RT-GCG starts where revenues exceeded costs, the difference—up to the calculated carbon cost amounts for those starts—will be deducted from the overall Eligible carbon costs. Refer to Section 6 for more information.</p> <p>The Carbon Price Adder will not be applied to compressor volume.</p>

Fuel Cost Calculation Examples:

Example 1: Gas Generator Submission – Non-Large Final Emitter Generators

$$\begin{aligned}
 \text{Eligible fuel costs} &= (\text{Fuel Price} + \text{Services Price Adder}) * (\text{Start Volume} + (\text{Start Volume} * \text{Compressor Fuel Volume Adder})) + \text{Carbon Price Adder} * \text{Start Volume} \\
 &= (\$3.00 \text{ CDN} + \$0.048) * (3000 \text{ GJ} + (3000 * 1\%)) + (\$2.52/\text{GJ} * 3000 \text{ GJ}) + (\$0.003/\text{GJ} * 3000 \text{ GJ}) \\
 &= (\$3.048/\text{GJ} * 3030 \text{ GJ}) + (\$2.52/\text{GJ} * 3000 \text{ GJ}) + \$9 \\
 &= \$9,235.44 + \$7560.00 + \$9 \\
 &= \$16,804.44
 \end{aligned}$$

Example 2: Gas generator submission – Large Final Emitter Generators

$$\begin{aligned}
 \text{Eligible fuel costs} &= (\text{Fuel Price} + \text{Services Price Adder}) * (\text{Start Volume} + (\text{Start Volume} * \text{Compressor Fuel Volume Adder})) + (\text{Carbon Price Adder}) * \text{Start Volume} \\
 &= (\$3.00 \text{ CDN} + \$0.048) * [3000 \text{ GJ} + (3000 * 1\%)] + (\$0.003/\text{GJ} * 3000 \text{ GJ}) \\
 &= (\$3.048 * 3030 \text{ GJ}) + \$9 \\
 &= \$9,235.44 + \$9 \\
 &= \$9,244.44
 \end{aligned}$$

Example 3: Annual Federal Carbon Charge Reimbursement for participants enrolled in OBPS (2019 Compliance Year – Natural Gas)

$$\begin{aligned}
 \text{Eligible carbon costs} &= [(\text{Annual Start Volume} * \text{Fuel Carbon Content}) - (\text{Output Based Standard} * \text{Annual Start Energy})] * \text{Excess Emissions Charge} \\
 &= [(550,000 \text{ GJ} * 0.04903 \text{ tCO}_2\text{e/GJ}) - (370 \text{ tCO}_2\text{e/GWh} * 45 \text{ GWh})] * 20 \text{ \$/tCO}_2\text{e} \\
 &= [26,966.5 \text{ tCO}_2\text{e} - 16,650 \text{ tCO}_2\text{e}] * 20 \text{ \$/tCO}_2\text{e} \\
 &= 10,316.5 \text{ tCO}_2\text{e} * 20 \text{ \$/tCO}_2\text{e} \\
 &= \$206,330
 \end{aligned}$$

Note: These examples use a fictional price and start volume for illustrative purposes only.

¹⁰ Large Final Emitter Generators are defined as: i) facilities emitting more than 50ktCO₂e attributable to fossil fuels per year; and ii) facilities emitting between 10ktCO₂e to 50ktCO₂e attributable to fossil fuels, that voluntarily opt-in to OBPS.

¹¹ RT-GCG participants are not expected to incur any costs under the OBPS until their annual emissions data is verified.

5.4.2 RT-GCG Program Registered Resources NOT Primarily Fueled by Natural Gas during Start-up

The IESO has established the following pre-approved fuel costs to be used by RT-GCG Program registered resources that are not primarily fueled by natural gas:

Component	Measure	Source
Fuel Price	\$	<i>Generation facility</i> resource-specific pre-approved value will be applied to all RT-GCG eligible resources that are not fueled primarily by natural gas e.g. oil and biomass.
Start Volume	as metered	Participant to provide based on metered volume.
Carbon Price Adder For Non-Large Final Emitter (non-LFE) Generators ¹²	\$	Federal Carbon Charge: Universal pre-approved value of \$3.80/GJ for Heavy Fuel Oil, and \$3.20/GJ for Light Fuel Oil will be applied to all RT-GCG eligible resources that are not fueled primarily by natural gas. Updates to the universal pre-approved values will be applied when the OEB approves a change to the applicable Enbridge Gas Inc. rates.
Carbon Price Adder For Large Final Emitter (LFE) Generators ¹³	\$	Federal Carbon Charge: Generation facility resource-specific pre-approved value for the Output Based Pricing System (OBPS) will be applied to all LFE generators after the annual emissions data for a compliance period is verified in the following year, and the verification report and proof of payment have been submitted to the IESO for review ¹⁴ , and will be calculated as follows: Eligible carbon costs = [(Annual Start Volume * Fuel Carbon Content) – (Output Based Standard * Annual Start Energy)] * Excess Emissions Charge where: Annual Start Volume (kL) = Sum of Start Volumes (as outlined in this table, above) over the applicable compliance year across all eligible resources comprising the facility, based on the RT-GCG online claim form submissions, converted to kL using the applicable conversion factor (e.g. 0.1589873 kL/bbl)

¹² Non-Large Final Emitter Generators are defined as: i) facilities emitting less than 10ktCO₂e (kilotonne CO₂ equivalent) attributable to fossil fuels per year; and ii) facilities emitting between 10ktCO₂e to 50ktCO₂e attributable to fossil fuels, that do not opt-into Output Based Pricing System (OBPS)

¹³ Large Final Emitter Generators are defined as: i) facilities emitting more than 50ktCO₂e attributable to fossil fuels per year; and ii) facilities emitting between 10ktCO₂e to 50ktCO₂e attributable to fossil fuels, that opt-in OBPS.

¹⁴ RT-GCG participants are not expected to incur any costs under the OBPS until their annual emissions data is verified.

Component	Measure	Source
		<p>Fuel Carbon Content (tCO₂e/kL) = Published value from Table 20-2 - Liquid Fuels of the Ontario Greenhouse Gas Emissions Reporting Guide under “CO₂ Emission Factor (kg/kL)” for the applicable fuel type (e.g. Residual Fuel Oil (#5&6) – Electric Utilities), converted to tCO₂e/kL using a conversion factor of 0.001 t/kg</p> <p>Output Based Standard (tCO₂e/GWh) = Published value from Schedule 1 - Item 38(b) of the “Output-Based Pricing System Regulations”</p> <p>Annual Start Energy (GWh) = Sum of energy generated from synchronization to MLP for eligible RT-GCG starts over the applicable compliance year across all eligible resources comprising the facility, calculated by the IESO based on <i>revenue metering</i> data</p> <p>Excess Emissions Charge (\$/tCO₂e) = Published value from Schedule 4 of the “Greenhouse Gas Pollution Pricing Act” for the applicable compliance year.</p> <p>Note: If the calculated Eligible carbon costs is a negative number, the Federal Carbon Charge shall be zero. Additionally, for eligible RT-GCG starts where revenues exceeded costs, the difference—up to the calculated carbon cost amounts for those starts—will be deducted from the overall Eligible carbon costs. Refer to Section 6 for more information.</p>

Fuel Cost Calculation Examples:

Example 1: Non-Gas Generator Submission – Non-Large Final Emitter Generators

$$\begin{aligned}
 \text{Eligible fuel costs} &= (\text{Fuel Price} * \text{Start Volume}) + (\text{Carbon Price Adder} * \text{Start Volume}) \\
 &= (\$4.57 \text{ CDN} * 3000 \text{ GJ}) + (\$3.80/\text{GJ} * 3000 \text{ GJ}) \\
 &= \$13,710.00 + \$11,400.00 \\
 &= \$25,110.00
 \end{aligned}$$

Example 2: Non-Gas Generator Submission – Large Final Emitter Generators

$$\begin{aligned}
 &= (\text{Fuel Price} * \text{Start Volume}) \\
 &= (\$4.57 \text{ CDN} * 3000 \text{ GJ}) \\
 &= \$13,710.00
 \end{aligned}$$

Example 3: Annual Federal Carbon Charge Reimbursement for participants enrolled in OBPS (2019 Compliance Year – Liquid Fueled)

$$\begin{aligned}
 \text{Eligible carbon costs} &= [(\text{Annual Start Volume} * \text{Fuel Carbon Content}) - (\text{Output Based Standard} * \\
 &\text{Annual Start Energy})] * \text{Excess Emissions Charge} \\
 &= [(2,000 \text{ kL} * 3.124 \text{ tCO}_2\text{e/kL}) - (550 \text{ tCO}_2\text{e/GWh} * 1 \text{ GWh})] * 20 \text{ \$/tCO}_2\text{e}
 \end{aligned}$$

$$\begin{aligned}
 &= [6,248 \text{ tCO}_2\text{e} - 550 \text{ tCO}_2\text{e}] * 20 \text{ \$/tCO}_2\text{e} \\
 &= 5,698 \text{ tCO}_2\text{e} * 20 \text{ \$/tCO}_2\text{e} \\
 &= \$113,960
 \end{aligned}$$

Note: These examples use a fictional price and start volume for illustrative purposes only.

5.5 Operating and Maintenance (O&M) Cost Recovery Methodology

The IESO considers incremental O&M costs to be the variable costs incurred from point of ignition until the *generation unit* reaches its *minimum loading point* that would not have been incurred if the resource did not invoke a RT-GCG start. Incremental O&M excludes costs that are independent of resource operation, such as, but not limited to labour, lighting, and security. Incremental O&M costs can be broken down according to the reason they are incurred:

1. For start-up and ramp: If the cost is incurred because the resource has started and ramps to *minimum loading point*.
2. For continuing production after reaching *minimum loading point*, including the shutdown period: If there is an additional cost related to injections during *minimum generation block run-time*, these costs are not eligible for recovery in the RT-GCG Program.

The IESO has established the following pre-approved operating and maintenance (O&M) costs to be used by RT-GCG Program participants with natural gas fueled facilities:

Component	Measure	Source
Electricity Consumption Price	\$/MWh	<p>Universal pre-approved value (\$/MWh) for the cost of electricity represented by Average Supply Cost for Regulated Price Plan + Wholesale Market Services Rate + regulatory charges (Rural and Remote Rate Protection, Ontario Electricity Support Program, Debt Retirement Charge).</p> <p>The universal pre-approved value will be updated on the date that changes to any of the individual components of the value become effective. These consist of:</p> <ol style="list-style-type: none"> 1. Average Supply Cost for Regulated Price Plan (available on the Ontario Energy Board website in the "Regulated Price Plan: Price Report" which is published every six months) 2. Wholesale Market Services rate (available on the Ontario Energy Board website in the "Decision on Regulatory Charges" which is published annually) 3. Rural and Remote Electricity Rate Protection rate (also available in the "Decision on Regulatory Charges")

Component	Measure	Source
		4. Ontario Electricity Support Program rate (also available in the “Decision on Regulatory Charges”) 5. Debt Retirement Charge (available in O. Reg. 493/01: DEBT RETIREMENT CHARGE - RATES AND EXEMPTIONS)
Electricity Consumption Quantity	MWh	<i>Generation facility</i> resource-specific pre-approved value for the incremental quantity of electricity consumed during a RT-GCG eligible start, when starting from a cold state.
Operating Consumables Cost Adder	\$/gas turbine resource ¹⁵	Universal pre-approved value of \$62 for the incremental cost of materials consumed during the RT-GCG eligible start.
Planned Maintenance Cost Adder	\$/resource	<i>Generation facility</i> resource-specific pre-approved value for the incremental cost of planned maintenance materials and services dependent on the GCG eligible starting state (e.g. cold, warm, hot). Where appropriate these costs will be converted to CAD based upon the applicable foreign exchange rate on the day of synchronization.

O&M Cost Calculation Example

Eligible O&M costs = (Electricity Consumption Price * Electricity Consumption Quantity) + Operating Consumables Cost Adder + Planned Maintenance Cost Adder

Example for a combined cycle 1x1 start:

Gas Turbine Submission

(\$124.41 * resource-specific electricity consumption) + \$62 + planned maintenance

Steam Turbine Submission

(\$124.41 * resource-specific electricity consumption) + planned maintenance

5.5.1 Planned Maintenance Costs

The *IESO* will establish a resource-specific pre-approved value that represents the eligible incremental cost of planned maintenance activities. The value will be established by assessing information provided by the RT-GCG Program participant, discussing the information with the program participant and assessing other information acquired by the *IESO* and considered by the *IESO* to be relevant.

¹⁵ Operating consumables costs are driven by the heat recovery steam generators with the operation of each gas turbine resource. These costs are only eligible for steam turbines registered in the RT-GCG Program (individually or as part of an aggregated resource). For facilities that are eligible for this cost, the pre-approved value will be submitted as a component of the costs for each gas turbine for every RT-GCG eligible start.

This process will be initiated by the *IESO* through a request for information on planned maintenance costs for each *facility* sent to the registered representative for the *facility*. The request specifies the information requirements, also identified below, and the evidence (e.g. Contractual Service Agreements, invoices, etc.) required to support the information submitted to the *IESO*. Once the completed response to the information request is received by the *IESO*, technical consultants, representatives from the *IESO*, and the program participant will meet to discuss the information and proposed *generation facility* resource-specific values. The *IESO* will provide formal confirmation of the facility's pre-approved values to the participant when the process is complete.

The assessment will take account of information considered relevant by the *IESO*, including the following:

- Incremental planned maintenance costs that can be attributed to *wear and tear* incurred during the period from point of ignition to when the resource reaches its *minimum loading point* that would not have been incurred if the resource did not invoke a RT-GCG start,
- Costs that are verified with supporting documentation. There must be a high level of certainty that the expected costs are likely to be incurred as well as the quantum of such costs,
- Planned maintenance activities from the time of the review up to and including the next planned 'major' inspection (major inspection following the hot gas path inspection for a gas turbine, and after the minor inspection for a steam turbine) will typically be included in the assessment¹⁶,
- If the next planned major inspection is less than three years from the time of the review, the pre-approved values used after the planned major inspection should be the same as before until a review is triggered and a new value provided, and
- The work-scope, and the period over which the work-scope is to be completed, as defined by the facility's Contractual Services Agreement (CSA), Long Term Services Agreement (LTSA) or the original equipment manufacturer's (OEM) recommendations for the gas turbine island or steam turbine island.

The *IESO* will request the following information, as a minimum, on planned maintenance costs to assist in determining planned maintenance values.

Resource Type	Information Required
Gas Turbine	<ul style="list-style-type: none"> • <i>Generation facility</i> information including the model, capacity, start-up times under different start conditions (e.g. cold, warm, hot) • Inspection intervals and number of inspections per planned maintenance cycle for each type of planned maintenance (e.g. combustion inspection, hot gas path inspection, major inspection) • Key CSA information such as the anticipated payment structure for CSA/LTSA, variable fees, ratio of fire factored hours to factored starts

¹⁶ Alternatively, at the discretion of the *IESO*, the assessment may be based on a reasonable planning time period where, for example, the next planned 'major' inspection is more than 10 years away or the program participant's maintenance planning does not include this concept.

Resource Type	Information Required
	<ul style="list-style-type: none"> Supporting documentation for above information
Steam Turbine and Steam Generator	<ul style="list-style-type: none"> <i>Generation facility</i> information including the model, capacity, start-up times under different start conditions (e.g. cold, warm, hot) Minor and major inspection intervals (equivalent operating hours) Weighting factors and calculated equivalent operating hours per start under different start conditions Supporting documentation for above information

Each RT-GCG Program participant is required to provide supporting documentation from verifiable sources to substantiate the value of costs claimed for recovery. Acceptable forms of documentation include, but are not limited to the following:

- Paid invoices from contractors or vendors for relevant services or products,
- Relevant contracts for equipment suppliers and/or service providers,
- Original Equipment Manufacturer (OEM) manuals/recommendations,
- Independent third party references from a reputable organization such as a recognized international standard organization, government agency, or industry recognized research body,
- Vendor quotation for a firm commitment that provides reasonable details on the scope of services and/or parts being supplied to substantiate the reasonableness of the quoted costs, and
- Other documentation considered relevant by the IESO in relation to planned maintenance values.

The IESO reserves the right to reject or disregard documentation considered unreliable, including, for example, where the documentation is illegible, incomplete, vague or unclear.

The following incremental costs may be incurred during a planned maintenance outage and may be included in determining the planned maintenance values, subject in all cases to acceptance by the IESO as reasonable:

Resource Type	Incremental Costs
Gas Turbine	<ul style="list-style-type: none"> CSA/LTSA milestone payments Replacement in-kind / refurbishment of parts required for the planned maintenance outage for the gas turbine and gas turbine generator, if applicable¹⁷

¹⁷ Certain maintenance parts that cannot be refurbished are normally replaced as part of the resource planned maintenance work-scope, for example, gaskets, seals, certain casing hardware, certain thermos-couple and

Resource Type	Incremental Costs
	<ul style="list-style-type: none"> • Maintenance Consumables • Technical advisors, incremental labour • Crane rentals, temporary infrastructure • Cost of permits, incremental cost of utilities • Waste disposal costs • Additional items with sufficient justification may be considered
Steam Turbine and Steam Generator	<ul style="list-style-type: none"> • Replacement in-kind / refurbishment of parts required for the planned maintenance outage for the steam turbine, and steam turbine generator if applicable • Maintenance Consumables • Technical advisors, incremental labour • Crane rentals, temporary infrastructure • Cost of permits, incremental cost of utilities • Waste disposal costs • Additional items with sufficient justification may be considered
<i>Generation Facility</i> Maintenance Consumables (Balance of Plant)	<ul style="list-style-type: none"> • Boiler feed water pumps • Bypass systems and/or sky vents • Heat Recovery Steam Generator (HRSG) components (limited), if applicable • Condenser cooling water pumps • Fuel gas booster compressor, where applicable • Auxiliary boilers • Miscellaneous maintenance consumables (nuts, bolts, gaskets, etc.) • Additional items with sufficient justification may be considered

valve repair kit components. These parts are eligible for replacement cost recovery. Replacement costs for parts that can be refurbished would not be recoverable, however, when such a part is removed and replaced, the refurbishment cost of the removed part would be recoverable. This recognizes that removal and replacement of the part relates to the *wear and tear* incurred leading up to the related outage. Examples of such parts are rotors, bearings, blades, vanes, and casing components.

Where a removed part has reached the end of its useful life and thus would not, in practice, be refurbished, the IESO may estimate a reasonable refurbishment cost based upon information such as past refurbishment costs and similar work in other *generation facility* resources, as applicable. This would inform the determination of the refurbishment cost eligible for recovery under the RT-GCG Program in those cases.

5.5.2 Determining Eligible Portion of Planned Maintenance Costs

The RT-GCG Program rules allow eligible program participants to recover certain incremental operating and maintenance costs from point of ignition until the *generation unit* reaches its *minimum loading point*. The following options have been identified as appropriate for determining planned maintenance costs eligible under the RT-GCG Program.

Equivalent Operating Hours for Planned Maintenance Intervals

Equivalent operating hours (EOH) are used to form the basis of a planned maintenance interval by various original equipment manufacturers of steam turbines and gas turbines. In this method, the maintenance recommendation is based on the total number of EOH that can accrue on the resource before a planned maintenance event should be completed.

The eligible portion of planned maintenance costs per eligible RT-GCG start can be pro-rated based on the EOH that is accrued on the resource from the period from point of ignition to when the resource reaches its *minimum loading point*. For example, if a resource incurs 10 EOH upon the start initiation and takes 5 hours to reach *minimum loading point*, the applicable EOH per start is 15. If the maintenance interval is 48,000 EOH, the eligible planned maintenance costs per start would be calculated by multiplying the cost of the planned maintenance event at that interval by 15/48,000.

This method may be applied to any RT-GCG registered resource.

Starts and Hours Criteria for Planned Maintenance Intervals

A common approach for maintenance of gas turbines is to recommend an interval based on either the number of starts or the number of hours, with additional factors that would increase the number of hours or starts due to certain operational events to account for their impact on the equipment life. In this method, a planned maintenance event will be triggered based on whichever interval is reached first, either hours or starts.

In order to allocate the costs to the eligible period from point of ignition to when the resource reaches its *minimum loading point*, the planned maintenance costs of the resource in an hours limited operation profile will be compared against the costs operating in a starts limited profile. A ratio of the hourly costs and the costs per start and the average number of hours that the participant runs with each start can be used to identify an amount of the start-based cost to allocate to the start period. For example, the cost allocation could be calculated using the following information as defined in the applicable CSA:

- N Ratio (FFH/FS)
- Major Maintenance Interval
- Cost Per Start (starts triggered maintenance cost)
- Cost Per Hour (hours triggered maintenance cost)

Using this information the percentage of the allocated cost per start would be calculated as: $1 - (N \text{ ratio} * \text{cost per hour}) / \text{cost per start}$. The total eligible CSA cost would then be calculated as: $\text{Allocated Cost per Start} + (\text{Cost per Hour} * \text{Hours from Synchronization to MLP})$.

This method may be applied where the original equipment manufacturer of a gas turbine recommends a starts and hours criteria maintenance cycle.

– End of Section –

6. Settlements

RT-GCG Program payments are made to eligible program participants whose *combined guaranteed costs*, for the registered resource, are not recovered through applicable market revenues.

Chapter 9, Section 4.7B of the *market rules* describes the calculation of the costs, revenues, and the RT-GCG payment.

If the market revenues are not sufficient to cover the eligible *combined guaranteed costs*, the program participant is compensated for the amount of the shortfall by way of a RT-GCG payment.

All eligible incremental costs that are determined using a pre-approved cost value or calculated with a methodology for an eligible RT-GCG start will be submitted to the *IESO* and settled within the timelines specified in the [IESO Real-Time Generation Cost Guarantee Payment Calendar](#), other than the Federal Carbon Charge for Large Final Emitters enrolled in the Output Based Pricing System (OBPS), which will be calculated and settled annually following the *IESO*'s review of the verification report and proof of payment for the applicable compliance period.

6.1 RT-GCG Cost Submission

To be considered for compensation under the RT-GCG Program, program participants must provide all of the required information through the “generation cost guarantee” on-line data entry screen available on the *IESO* portal.

Participants must submit the following information for each RT-GCG start event:

- The trade date,
- The *generation facility* resource name,
- The intended synchronization hour-ending (EST) at the time you requested qualification of a RT-GCG start,
- The number of actual ramp intervals required to achieve *minimum loading point* after synchronization.
- The number of ramp intervals represents the number of five minute intervals used to reach *minimum loading point* from synchronization. For example, if the *generation unit's* actual ramp time is 3.25 hours, participant would submit 39 intervals.
- The completed fuel and O&M cost form.

This submission is due by 17:00 on the 16th *business day* following the day of synchronization. The “*market rules*” allow the *IESO* to audit any information submitted related to a RT-GCG claim.

The *IESO* uses the submitted information and the registration information for the *generation unit* when evaluating the RT-GCG eligibility and when calculating the *settlement*. The *IESO* evaluates the eligibility of an RT-GCG cost submission when the *settlement* data for the *final settlement statement* is available in the Commercial Reconciliation System.

6.1.1 Replacement Energy Offer (REOP) Submission

If a replacement unit is used, the information submitted through the “generation cost guarantee” on-line data entry screen available on the *IESO* portal must relate to the replacement unit, rather

than the original unit. Section 4 RT-GCG Eligibility outlines the pre-dispatch and real-time eligibility criteria that are applied to the replacement unit.

6.2 RT-GCG Settlement

The RT-GCG *settlement amounts* are calculated at month-end, and applied as a manual line item on the next applicable *preliminary settlement statement* using the *charge type 133* “Real-time Generation Cost Guarantee Payment”. RT-GCG calculations are only included in the current *invoice* for days that have gone final since the last *invoice* was prepared.

The Federal Carbon Charge for Large Final Emitters enrolled in OBPS is calculated annually (following the IESO’s review of the verification report and proof of payment for the applicable compliance period) and applied as a manual line item on the next applicable preliminary settlement statement using the charge type 137 “Generation Cost Guarantee - Output Based Pricing System Reimbursement Settlement Amount”.

RT-GCG payments and OBPS reimbursements are recovered through an uplift charged to loads and exports through *charge type 183* “Generation Cost Guarantee Recovery Debit”.

6.2.1 RT-GCG Payments – Costs

The total *combined guaranteed costs* will be calculated by the IESO and will be the sum of the following costs:

1. Incremental Costs (eligible costs submitted on a per-registered resource basis) are:
 - The incremental cost of fuel for start-up and ramp to *minimum loading point*
 - The incremental operating and maintenance costs to start-up, synchronize to the *IESO-controlled grid* and ramp to *minimum loading point*.
2. Minimum generation costs:
 - the *offer price* associated with the real-time *dispatch* multiplied by the *energy injected*, to a maximum of the *minimum loading point*, during the period from the beginning of the *minimum generation block run-time* until the earlier of the end of the *minimum generation block run-time*, or the end of the *minimum run-time*.

The *minimum generation block run-time* starts with the first interval after the submitted number of ramp intervals is added to the valid start-up interval. A valid start-up occurs when metering results indicate a change from zero in one interval to a sustained positive value for four consecutive intervals.

Taxes

Harmonized Sales Tax (HST) and other such tax-related levies would not be eligible for recovery under the RT-GCG Program. The IESO adds HST to the recoverable cost when calculating the relevant amount for *settlement* purposes. Accordingly, inclusion of HST in the cost submission would effectively double-count the HST.

6.2.2 RT-GCG Payments – Revenues

Revenues are calculated for the period from start-up until the earlier of the end of the *minimum generation block run-time*, or the end of the *minimum run-time*. The end of the *minimum generation block run-time* is determined by adding the submitted number of ramp intervals and *minimum generation block run-time* to the valid start-up interval. It is the last interval of the *minimum generation block run-time*.

The revenues included in the calculation are:

- Revenue from *energy sales* up to the *minimum loading point*¹⁸, and
- *Congestion management settlement credits* (CMSC) associated with Allocated Quantity of Energy Injected (AQEI) up to the *minimum loading point*¹⁹.

6.3 Interaction between RT-GCG and PCG

In some cases the day-ahead schedule may interact with a RT-GCG event. These independent events may link back to one *generation unit* start-up. In these situations, some additional evaluations and calculations will be required for the RT-GCG event. Below are three scenarios and their respective treatment with respect to eligibility and *settlement*.

The Day-Ahead Commitment Process and related *settlement* payment includes a Day-Ahead Production Cost Guarantee (DA-PCG) that allows participants to recover certain costs called “day-ahead costs” for eligible *generators* committed by the DACP. The guarantee applies if participants have not recovered these costs through other market revenues. The DA-PCG which is described in Market Manual 9 replaced the previous Day-Ahead Generation Cost Guarantee.

The registration eligibility requirements can be found in “Market Manual 9: Day-Ahead Commitment Process”.

Scenario 1: RT-GCG Precedes DA Schedule of Record: No Overlap

In this scenario, a *generation unit* starts-up before the first hour of their day-ahead *schedule of record* with sufficient time to complete a RT-GCG run immediately or shortly prior to the first hour of the day-ahead *schedule of record*. In this situation, the end of the RT-GCG event can match exactly with the start of the day-ahead *schedule of record* or the *generation unit* can stay online for a period between the RT-GCG event and the start of the day-ahead *schedule of record*. In either case both events can be tied back to a single *generation unit* start-up. Figures 1a and 1b below depict the two possible situations in this scenario.

¹⁸ We use the value for *minimum loading point* that is in our Market Registration database corresponding to the *start-up time*.

¹⁹ Ibid

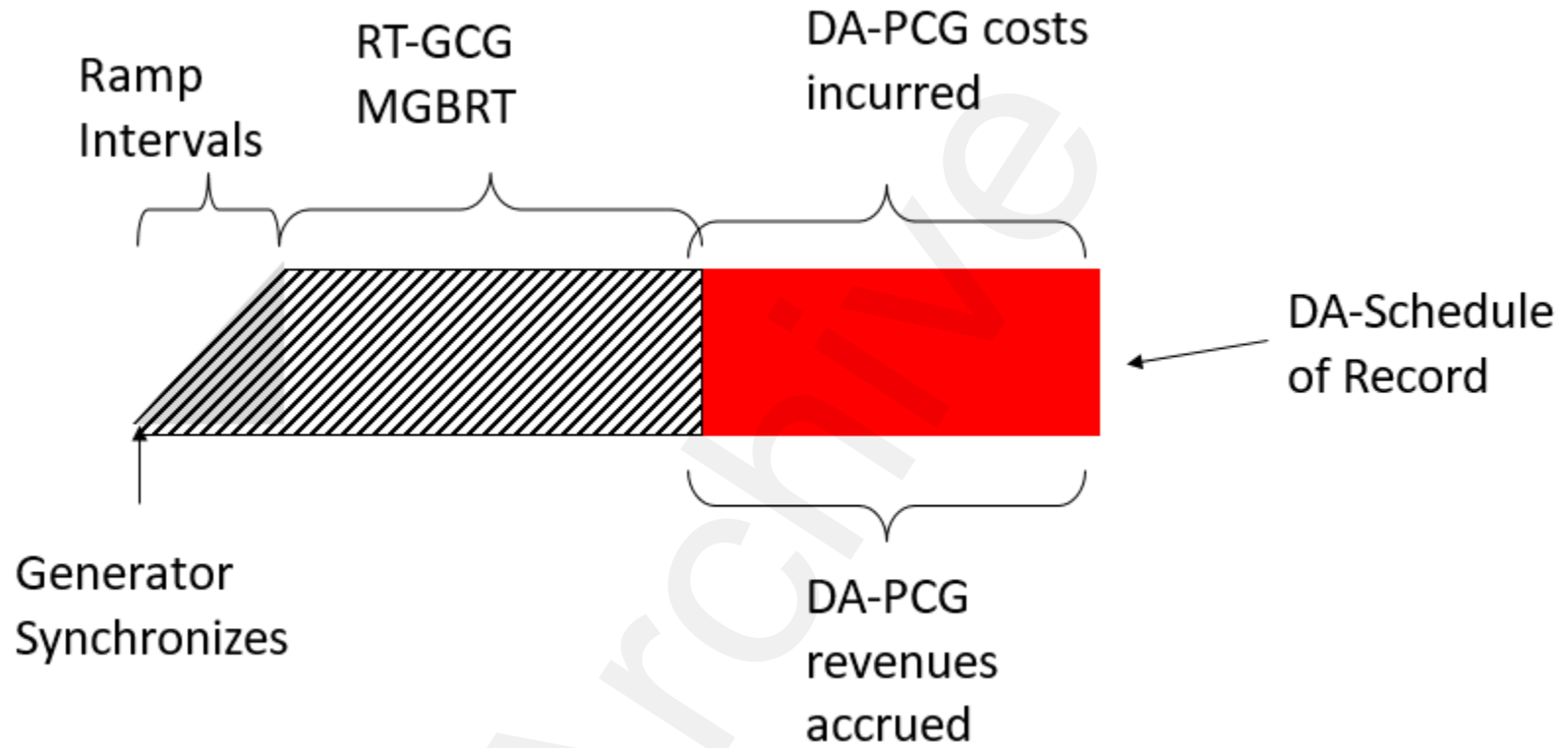


Figure 1a - RT-GCG Precedes DA *Schedule of Record*: No Overlap - No gap between events

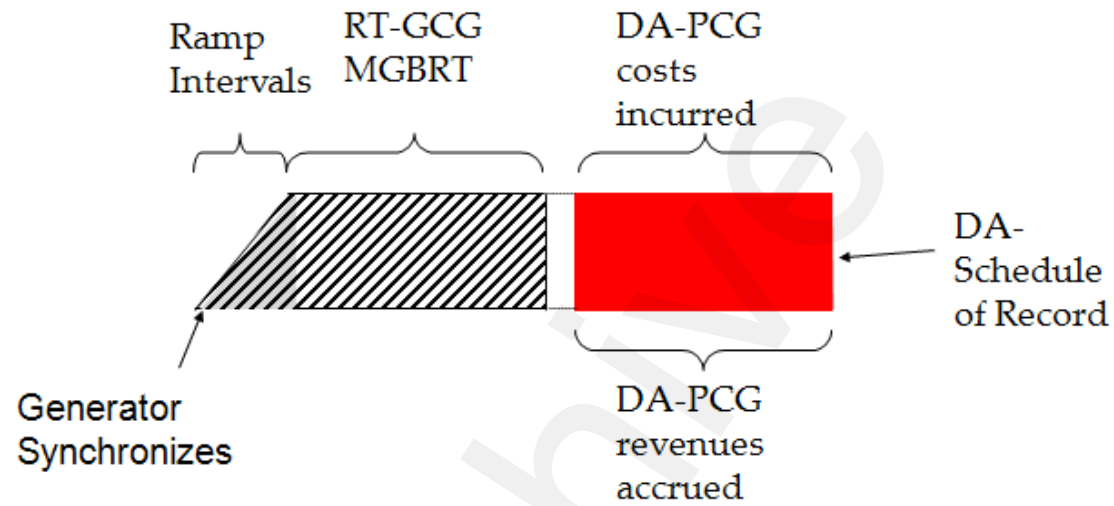


Figure 1b - RT-GCG Precedes DA Schedule of Record: No Overlap - Gap between events

Scenario 2: RT-GCG Precedes DA Schedule of Record: With Overlap

In this scenario, a *generation unit* starts-up before the first hour of their day-ahead *schedule of record*, however, the combination of ramp time and *minimum generation block run-time* means the RT-GCG event will overlap with the day-ahead *schedule of record*. In this scenario both events can be tied back to a single *generation unit* start-up. Figure 2 below depicts this scenario.

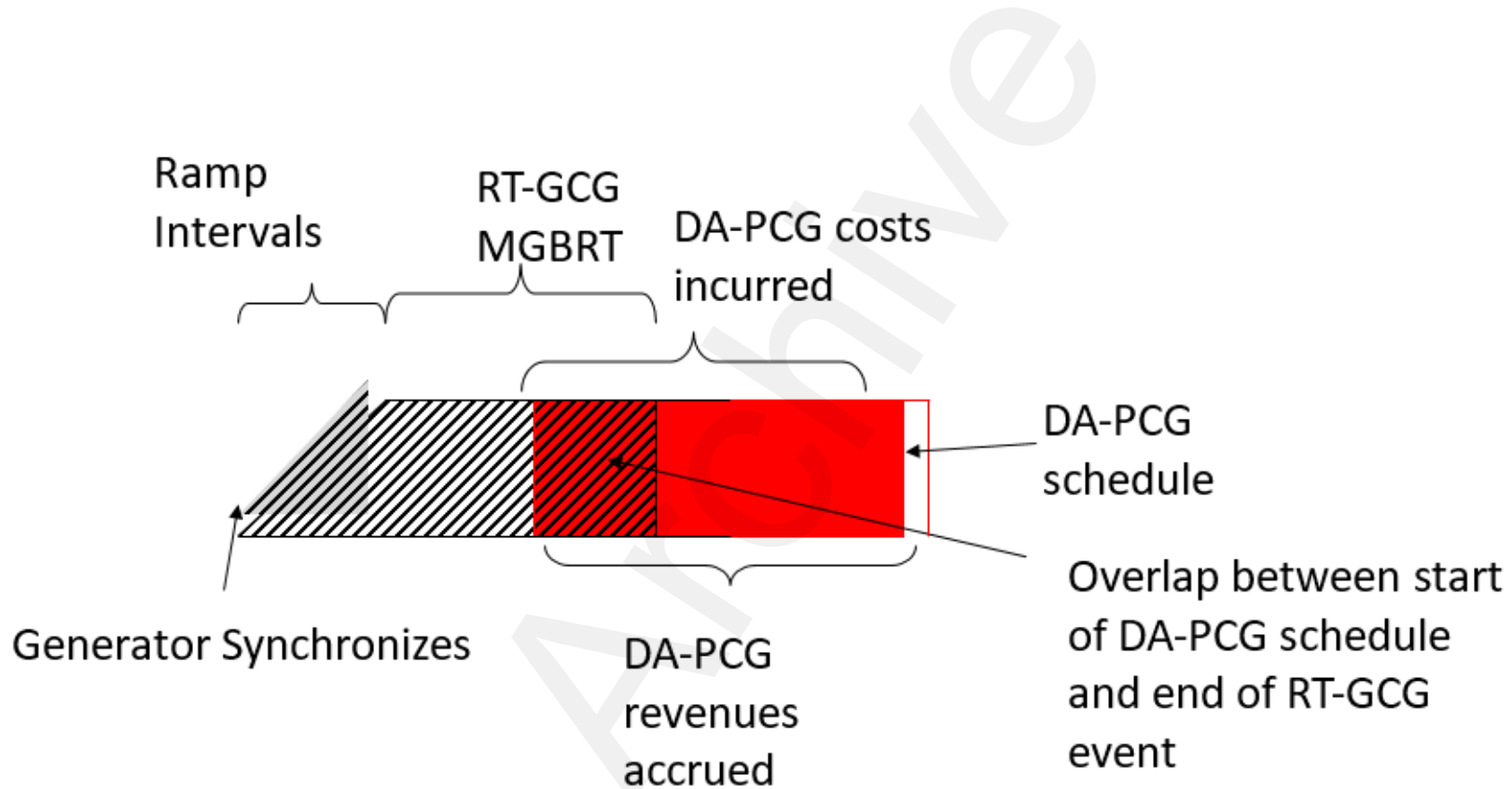


Figure 2 - RT-GCG Precedes DA Schedule of Record: With Overlap

Scenario 3: RT-GCG Interacts with Withdrawn *Schedule of Record*

This scenario is similar to scenarios 1 and 2 such that the *generation unit* starts ahead of the *schedule of record* in order to participate in the RT-GCG Program, however in this scenario the *generator* has taken the appropriate actions to withdraw from the day-ahead *schedule of record* and the withdrawal is for reasons within the *generator's* control. This withdrawal may be for all or a portion of the day-ahead *schedule of record*, the result being that the *generator* is not eligible for a DA-PCG *settlement* and further may be subject to a Day Ahead Generator Withdrawal Charge. If the withdrawal of the *generation unit* is for reasons not within the control of the *generator*, then the *generator* continues to be eligible for the DA-PCG *settlement* for the completed hours of the day-ahead schedule, resulting in *settlement* treatment comparable to scenarios 1 or 2 above.

Principles for Eligibility and *Settlement*:

- 1) The outcome of the day-ahead process is a *schedule of record* for the next day based on the three-part day-ahead bids. These schedules are carried forward into real-time processes with constraints up to *minimum loading point* applied. Similar to manual constraints that are applied in real-time, usually as a result of invoking a RT-GCG start, these PCG constraints will not be considered in RT-GCG pre-dispatch eligibility.
- 2) In scenarios 1 and 2 above, where both the DA-PCG event and the RT-GCG event can be tied to the same *generation unit* start-up, and the incremental fuel costs for start-up and ramping to *minimum loading point* along with the related incremental O&M costs are eligible for inclusion in the DA-PCG *settlement*, these costs will not be considered in the assessment of the RT-GCG *settlement*.

The *generator* will indicate zero for these costs in the RT-GCG submission through the *IESO* in this situation. In the event that the RT-GCG event interacts with a DA-PCG event under scenarios 1 and 2 as described above, and the submitted incremental fuel and incremental O&M costs submitted are not zero, these submitted costs will be deemed as unreasonable and *settlement* of the RT-GCG event will not include these costs, unless strong evidence exists to the contrary.

If the incremental fuel costs for start-up and ramping to *minimum loading point* along with the related incremental O&M costs are not eligible for inclusion in the DA-PCG *settlement*, these costs will be considered in the assessment of the RT-GCG *settlement* and submitted through the *IESO* portal.

- 3) In scenario 3 above, where the *generation unit* is not eligible for a DA-PCG *settlement*, the incremental fuel costs for start-up and ramping to *minimum loading point* along with the related incremental O&M costs will be included in the assessment of the RT-GCG *settlement*. These costs will be submitted as part of the RT-GCG claim in the *IESO* portal.

The table below provides the details for the *submission*, eligibility, and *settlement* of the any RT-GCG claim under the three potential scenarios where there is interaction with a Day-Ahead PCG event.

		RT-GCG Precedes day-ahead Schedule of Record: <i>No Overlap</i> (Scenario 1)	RT-GCG Precedes day-ahead Schedule of Record: <i>With Overlap</i> (Scenario 2)	RT-GCG Precedes withdrawn day-ahead Schedule of Record (Scenario 3)
RT-GCG Submission	<ul style="list-style-type: none"> the trade date, the event type (select RT for RT-GCG), the <i>generation facility</i> resource name, 	No change	No change	No change
	<ul style="list-style-type: none"> the intended synchronization hour ending (EST) 	No change	No change	No change
	<ul style="list-style-type: none"> the number of actual ramp intervals required to achieve <i>minimum loading point</i> 	No change	No change	No change
	<ul style="list-style-type: none"> the incremental fuel costs of start-up and of ramping to <i>minimum loading point</i>, the incremental O&M costs associated with start-up and ramping to <i>minimum loading point</i>. 	The treatment and submission of incremental fuel costs for start-up and for ramping to <i>minimum loading point</i> are outlined in Principle (2) above.	The treatment and submission of incremental fuel costs for start-up and for ramping to <i>minimum loading point</i> are outlined in Principle (2) above.	No change
Eligibility As expressed in “market rules” Chapter 7	<ul style="list-style-type: none"> the <i>generation facility</i> is not already synchronized at the time of publication of the applicable <i>pre-dispatch schedule</i>, 	No change	No change	No change
	<ul style="list-style-type: none"> participant notified the <i>IESO Control Room</i>, of its intent to qualify for an RT-GCG start, and run for at least its <i>minimum generation block run-time</i>, 	No change	No change	No change

		RT-GCG Precedes day-ahead Schedule of Record: <i>No Overlap</i> (Scenario 1)	RT-GCG Precedes day-ahead Schedule of Record: <i>With Overlap</i> (Scenario 2)	RT-GCG Precedes <i>withdrawn day-ahead</i> Schedule of Record (Scenario 3)
Section 5.7 and 6.3A	<ul style="list-style-type: none"> the <i>offer</i> in the submitted <i>price-quantity pair</i> corresponding to the <i>minimum loading point</i> for that <i>generation facility</i> for all hours of the <i>minimum generation block run-time</i> must be the same until after the <i>IESO</i> has constrained on the <i>generation facility</i> 	No change	No change	No change
	<ul style="list-style-type: none"> the <i>generation unit</i> is scheduled in any <i>pre-dispatch schedule</i> published within 3 hours ahead of the <i>dispatch hour</i> (e.g. PD-3, PD-2 or PD-1) for: <ul style="list-style-type: none"> the <i>dispatch hour</i>, and for at least half of <i>minimum generation block run-time</i>, at <i>minimum loading point</i> or higher, during the period from <i>dispatch hour</i> until the earlier of <ul style="list-style-type: none"> the period representing <i>minimum generation block run-time</i>, or the end of the period representing <i>minimum run-time</i> 	<i>Pre-dispatch Schedules</i> with either manual or PCG constraints applied will not be considered	<i>Pre-dispatch Schedules</i> with either manual or PCG constraints applied will not be considered	<i>Pre-dispatch Schedules</i> with either manual or PCG constraints applied will not be considered
	<ul style="list-style-type: none"> the <i>offer prices</i> corresponding to the <i>minimum loading point</i> for the <i>minimum generation block run-time</i> are not increased after notifying the <i>IESO</i> of the participant’s intention to synchronize or after the <i>IESO</i> has applied a manual constraint, 	No change	No change	No change
	<ul style="list-style-type: none"> participant synchronizes its <i>generation unit</i> no later than the end of the <i>dispatch hour</i>, and 	No change	No change	No change
	<ul style="list-style-type: none"> participant runs its <i>generation unit</i> until the end of the <i>minimum generation block run-time</i>. 	No change	No change	No change

		RT-GCG Precedes day-ahead Schedule of Record: <i>No Overlap</i> (Scenario 1)	RT-GCG Precedes day-ahead Schedule of Record: <i>With Overlap</i> (Scenario 2)	RT-GCG Precedes <i>withdrawn day-ahead</i> Schedule of Record (Scenario 3)
RT-GCG Cost As expressed in “ <i>market rules</i> ” Chapter 9 Section 4.7B	<ul style="list-style-type: none"> the incremental fuel costs and incremental O&M costs for start-up and ramp to <i>minimum loading point</i> 	The treatment and submission of incremental fuel costs for start-up and for ramping to <i>minimum loading point</i> are outlined in Principle (2) above.	The treatment and submission of incremental fuel costs for start-up and for ramping to <i>minimum loading point</i> are outlined in Principle (2) above.	No change
	<ul style="list-style-type: none"> the <i>offer</i> price associated with the real-time <i>dispatch</i> multiplied by the <i>energy</i> injected, to a maximum of the <i>minimum loading point</i>, during the period from the beginning of the <i>minimum generation block run-time</i> until the earlier of the end of the <i>minimum generation block run-time</i>, or the end of the <i>minimum run-time</i> 	No change	Cost from start of <i>minimum generation block run-time</i> to start of DA-PCG event	No change
RT-GCG Revenues As expressed in “ <i>market rules</i> ” Chapter 9 Section 4.7B	<ul style="list-style-type: none"> Revenues are calculated for the period from start-up until the earlier of the end of the <i>minimum generation block run-time</i>, or the <i>end</i> of the <i>minimum run-time</i> including: <i>energy</i> sales up to the <i>minimum loading point</i> CMSC associated with AQEI up to the <i>minimum loading point</i> 	No change	Revenue from start up to start of DA-PCG event	No change

– End of Section –

Archive

7. RT-GCG Program Reviews

7.1 Program Review

The IESO will complete a review of the RT-GCG Program at least every three years, including a review of all universal and resource-specific pre-approved values. Pre-approved cost values or methodologies remain in effect until revised by the IESO.

7.1.1 Review of Pre-Approved Values

IESO will accept requests from program participants to review pre-approved values, earlier than three years. The IESO will determine if the request is material and appropriate before initiating a full review. The IESO may complete an earlier review of a pre-approved value at its discretion if, for example, there is material change in the underlying costs or a new cost is proposed for recovery. The IESO may initiate a review at a participant's request or on its own initiative.

To review a universal pre-approved value, the IESO will require historical cost data and supporting evidence. Participants are required to retain data for review of pre-approved values for seven years from when the cost is paid.

Examples of information required to assess or review pre-approved values include:

- Contracts: fuel contracts or CSA/LTSA contracts effective during the period including any amendments,
- Operational data: 5-minute interval fuel operational meter consumption aligned 5-minute electrical revenue data reconciled to hourly gas provider data in GigaJoules (GJ),
- OEM documentation, operational data, counter information and narratives detailing the cold, warm and hot start-ups for the steam turbine and various HRSG configurations,
- Invoices and supporting data for operating and maintenance costs (e.g. CSA/LTSA invoices, resource-specific water consumption, gas consumption, chemical consumption, lubricant consumption, etc.),
- Narratives explaining how costs related to submissions may have changed in quantum and methodology over the period,
- Third party outage reports related to the *generation facility*, and
- Data needed to calculate station service, consumables costs.

– End of Section –

8. Audit

The *IESO* may review submissions received to verify that any inputs provided by the participant are eligible. For example, the *IESO* may request supporting documentation to verify that the correct fuel index price was applied.

The *IESO* may carry out audits of costs submissions and payments under the RT-GCG Program, as contemplated by the “*market rules*”.

If the *IESO* identifies that a cost submission requires additional review prior to payment, the submission will proceed to the *settlement process* and will then be reversed (e.g. a line item for both a payment and a reversal of payment will appear on a *settlement statement*) until the review can be completed and the participant has an opportunity to provide additional information, if required. Any steps that the *IESO* may take to assess or verify cost submissions before payment may mitigate the need to audit but will not remove the ability to audit cost submissions that have been paid. The *Notice of Disagreement* timelines do not come into effect until after the submission has appeared on the *preliminary settlement statement*.

As a general principle, provided that the *registered market participant* has submitted data in accordance with Section 2.2B of Chapter 7, and Sections 10A.1 and 11.2.1 of Chapter 1 of the “*market rules*” the audit does not allow the *IESO* to reduce pre-approved RT-GCG payments by retroactively revising or re-auditing pre-approved cost values.

Audits will not review pre-approved cost values. Where a pre-approved value is established, the audits will focus on validating inputs and submitted fuel volumes to assess whether costs are accurate, have actually been incurred, been paid for, and are reasonable. Where pre-approved values are not established, audits will focus on all costs submitted to assess eligibility and reasonableness.

Information needed for adequate support and verification of the submitted costs, including *facility-related* information, must be retained for a period of seven years from when the cost is paid.

Where an audit requires the RT-GCG Program participant to obtain and provide documentation to the *IESO* to substantiate a cost, the participant will receive notification prior to the audit.

The audit may be conducted with an on-site portion at the participant’s premises as well as remotely, including access to relevant documents and other records. Further investigation may be required to be performed after the completion of the initial fieldwork through interviews/meetings and/or additional information requests.

– End of Section –

References

Document ID	Document Title
MDP_RUL_0002	Market Rules for the Ontario Electricity Market
PRO-408	Market Manual 1.5: Market Registration Procedures
MDP_PRO_0027	Market Manual 4.2: Submission of Dispatch Data in the Real-Time Energy and Operating Reserve Markets
IESO_MAN_0041	Market Manual 9: DACP Overview
PRO-357	Market Manual 13.1: Capacity Export Requests

– End of Document –