Medium-Term RFP (MT I RFP) Qualified Capacity Guidance Document

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Introduction

After years of strong supply, the IESO's [Annual Planning Outlook](#) shows that Ontario is facing emerging electricity system needs as demand is forecast to increase steadily, generation contracts expire, nuclear refurbishments continue and the Pickering nuclear plant retires. Recognizing the necessity to address these needs in a timely, cost-effective and flexible manner, the IESO has engaged with stakeholders in the development of a [Resource Adequacy Framework](#). The IESO's Resource Adequacy Framework includes three mechanisms that will help address these needs in the short term, medium term, and long term; namely through the annual Capacity Auction, cadenced Medium-Term Requests for Proposals (RFP) and the Long-Term RFP.

The first [Annual Acquisition Report,](#) issued in July 2021, outlined that the need in the second half of the decade is centered around capacity, and that providing a competitive and transparent mechanism for existing resources coming off contract is an integral step in meeting these capacity needs.

The initial Medium-Term RFP (MT I RFP) is intended to address these capacity needs through competitively procuring up to 750 MW of Qualified Capacity (QC) on a Summer Unforced Capacity (UCAP)[1] basis, with a five year commitment period commencing on May 1ST of either 2024, 2025, 2026 (as selected by proponents) and ending immediately prior to the fifth anniversary of such date.

Purpose of Guidance Document

The purpose of this guidance document is to:

1) Provide stakeholders with an overview of the proposed QC approach for the MT I RFP, including how those methodologies may differ from methodologies developed for the Capacity Auction; and

2) Detail performance obligations for Qualified Facilities (QF) successful in the MT I RFP, to ensure facilities meet their performance obligations and are able to deliver their QC for the term of the contract.

This document is provided for information purposes only and does not alter or affect any provisions of the form of capacity contract prescribed by the MT I RFP.

Capacity Qualification

A key objective of the MT I RFP is to ensure that each MW procured reflects capacity that will contribute towards meeting resource adequacy needs, regardless of the technology type. In support of this objective, the IESO will implement a capacity qualification process to derive the QC (or UCAP value) of a QF.

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[1] UCAP: Unforced Capacity represents a facility un-forced/effective capacity (i.e., ICAP value further reduced by expected forced outage rates)

The intent of establishing a QC approach for each QF is to create a level playing field where each MW of UCAP procured will be expected to contribute equally towards meeting resource adequacy needs, while considering the unique characteristics of the underlying technology. This level playing field between participating QFs will allow the IESO to secure capacity in a transparent, open, and fair manner.

Alignment Across Resource Adequacy Framework

The IESO's resource adequacy framework includes three main mechanisms to meet the province's emerging system needs; the Capacity Auction, the MT I RFP, and the Long-Term RFP. Each of these mechanisms will competitively procure Qualified Capacity on the basis of UCAP. The MT I RFP will look to leverage UCAP methodologies developed and stakeholdered for the Capacity Auction through the Resource Adequacy engagement and documented in the 2022 Capacity Auction Enhancements Design Document. While the UCAP approach is similar across mechanisms, the methodologies may vary slightly, given the different procurement frameworks, forward periods and obligations.

MT I RFP Product (UCAP)

The initial MT I RFP is targeting procuring up to 750 MW of capacity services on a summer UCAP basis that will be fixed over the five-year term of the contract. During the initial registration phase of the MT I RFP, proponents will be invited to indicate the portion of the nameplate capacity of the QF for both the summer and winter that will constitute the QF's reference seasonal ICAP[2]. The IESO will determine the portion of a QF's reference seasonal ICAP that will be eligible to constitute UCAP and which will be eligible to be the subject of the Medium-Term Capacity (MTC I) Contract.

Average Availability (Performance Assessment)

The average availability or performance assessment will ensure that all Qualified Facilities are providing the system with their specified Qualified Capacity, as determined through the QC process, in UCAP for summer months (May-Oct) and winter months (Nov-Apr) (Monthly Qualified Capacity) during business days for all hours from 07:00 to 23:00, eastern standard time (qualifying hours).

Must-Offer Qualified Facility

A Must Offer Qualified Facility (Must-Offer QF) is a registered facility under the IESO Market Rules that is not registered as a variable or self-scheduling generation facility. A Must-Offer QF will be required to meet the "Must-Offer Obligation" such that, on average over a settlement month, the quantity of its offers into the IESO Day-Ahead Market during qualifying hours would need to be at least equal to 95% of its Adjusted Monthly Qualified Capacity[3] (such minimum, the "Minimum Offer Quantity")).

Facility Capacity Factor Qualified Facility

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[2] ICAP: Installed Capacity

[3] Adjusted Monthly Qualified Capacity is the monthly qualified capacity adjusted proportionally for any Qualifying Hours in the Settlement Month that are the subject of a Planned Outage or Force Majeure Outage, as applicable

All Qualified Facilities that are not Must-Offer QFs are designated as Facility Capacity Factor (FCF) QFs, including non-Market Participants (non-MP) and all Variable Generation (VG). Facility Capacity Factor QFs will be subject to a minimum physical operating requirement evaluated each settlement month. Such requirement, the "Facility Capacity Factor Obligation" will require that the FCF QF produce a minimum amount of metered electricity generation during qualifying hours such that the ratio of such metered electricity generation divided by the amount resulting from multiplying the Reference Seasonal ICAP of the FCF QF by the number of qualifying hours in the period (the "Facility Capacity Factor"), is at least equal to 95% of the capacity factor reflected in the ratio of the Adjusted Monthly Qualified Capacity to the Reference Seasonal ICAP for the FCF QF (such minimum, the "Minimum FCF"). The FCF QF will provide the IESO with direct access to revenue-quality meter data in accordance with the metering plan prescribed in the Medium-Term Capacity Contract.

Capacity Qualification Process Overview

In registering for the MT I RFP, proponents will be invited to submit reference seasonal ICAP values for their facilities. The IESO will determine the portion of a Qualified Facility's reference seasonal ICAP (summer and winter) that will be eligible to constitute Qualified Capacity (summer and winter UCAP). Qualified facilities will be provided with seasonal UCAP values through the capacity qualification process, based on the general methodology in the formula below.

UCAP (MW) = ICAP (MW) x Availability De-Rating Factor

Where:
- **UCAP** (Unforced capacity) is the amount, in MW, that a facility is qualified to offer as Qualified Capacity into the MT I RFP.
- **ICAP** (Installed capacity) is the capability, in MW, as specified by the proponent, reflecting the seasonal generation a facility is able to provide considering various factors such as ambient weather conditions.
- **Availability De-Rating Factor** is based on facility historical data or a zonal fleet wide basis as further described in Table 1.

Further detail on ICAP and nuanced variations of the Availability De-Rating Factor (defined below) based on technology can be found in Table 1. Process and timelines for the MT I RFP can be found in Table 2.

ICAP Values

"Reference Seasonal ICAP" values for individual QFs will be submitted by the proponent to the MT I RFP e-mail (MT.RFP@ieso.ca) during the registration process. It is the responsibility of the facility representative to determine the most appropriate value based on the following guidance:

- Reference Seasonal ICAP values, at a maximum, could be equal to the maximum expected offer/bid capability of a facility given optimal operating conditions (i.e. ambient temperature, etc.). However, it is recommended that the likelihood of these conditions (or generally the ability to achieve this maximum capability) on the date of testing should be considered and accounted for in the submission of an ICAP value.

- Reference Seasonal ICAP values are expected to be consistent with other data submitted to the IESO through Form 1230[4] or market registration (if this data exists) and any limitations imposed by applicable permits.
  - Note that during capacity verification requirements (including Capacity Check Tests) under the Medium-Term Capacity Contract, a Qualified Facility will be required to demonstrate output in accordance with its Reference Seasonal ICAP.
- For existing off-contract storage facilities, ICAP should account for four (4) hours energy duration requirement as detailed in the UCAP methodology for Must-Offer QF storage.

Availability De-Rating Factor

The de-rating factor in the UCAP calculation is based on historical availability and/or production data of the qualified facility. Given the unique operating and participation methods of each facility type, five (5) years of historical data will be used to calculate the availability de-rating factor, based on one of the following criteria: equivalent forced outage rate on demand ($EFOR_d$), or production data from the top 200 hours of Ontario demand (per season)

Equivalent Forced Outage Rate on Demand (EFORd)

De-rate factors may be based on Equivalent Forced Outage Rate on Demand, or $EFOR_d$. An industry metric defined by the IEEE,[5] EFORd is the probability that a generating unit will not be available (completely or in part) during hours the unit is called upon to generate (i.e., during on-demand hours) due to forced outages and forced de-ratings. EFORd is calculated using the following formula:

$$EFOR_d = \frac{FOH_d + EFDH_d}{SH + FOH_d} \times 100$$

Where:
- FOHd is Forced Outage Hours on Demand
- EFDHd is Equivalent Forced De-Rated Outage Hours on Demand, and
- SH is Service Hours

Top 200 Hours of Ontario Demand

The top 200 hours of Ontario Demand per season approach is used to assess performance during the roughly 5% of peak hours per year. This sample size is expected to capture a good reflection of the Qualified Facility's contributions and availability during hours of system peak.

Ontario demand represents the total energy that was supplied from the IESO-administered market for the sake of supplying load within Ontario. It is also equal to the sum of all loads within Ontario which is supplied from the market, plus all line losses incurred on the IESO-controlled grid.

Table 1: De-Rating Factor Considerations for all Qualified Facilities

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[4] form 1230 is used by generators for their annual reliability submissions as well as for any updates, when there are material changes. More information on Form 1230 can be found on: https://www.ieso.ca/en/Sector-Participants/IESO-News/2020/03/Generators-and-transmitters-to-submit-reliability-assessment-forms-by-April-1

[5] For more information, refer to the IEEE Std 762-2006: IEEE Standard Definitions for Use in Reporting Electric Generating Unit Reliability, Availability, and Productivity.

	Availability De-Rating Factor
Must-Offer QF (Thermal)	EFORd value based on five (5) years of historical EFORd data
Must-Offer QF (Hydro)	Production and scheduled operating reserve data that coincide with the top 200 hours of highest Ontario demand per season, over the most recent five (5) years
Must-Offer QF (Storage)	EFORd of 5%
FCF QF	**Thermal:** EFORd of 7%[6] **VG[7]:** AQEI and foregone energy or simulated data that coincides with the top 200 hours of highest Ontario demand per season, over the most recent 5 years on a zonal fleet wide basis **VG (Market Participant)**: Production data and foregone energy that coincides with the top 200 hours of highest Ontario demand per season, over the most recent 5 years **Hydro:** Production and scheduled operating reserve data that coincide with the top 200 hours of highest Ontario demand per season, over the most recent 5 years on a zonal fleet wide basis.

Must-Offer QF Thermal Generation

The UCAP formula for Must-Offer QF thermal generation is:

UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
          = ICAP (MW) x (1-EFORd)

Where:
- UCAP (Unforced capacity) is the amount, in MW, that a facility is qualified to offer into the MT I RFP
- ICAP (Installed capacity) is the capability, in MW, as submitted by the QF
- EFORd is the Equivalent Forced Outage Rate on Demand

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[6] This value represents the median EFORd of Ontario's natural gas fleet, excluding Lennox GS.
[7] VG: Variable Generation

EFOR$_d$ for Must-Offer QF thermal generation will be an annual EFOR$_d$ value based on 5 years of historical EFOR$_d$ data established using the existing IESO process. For qualified facilities with less than five (5) years of historical data, a proxy value will be used based on the median EFORd of the facility fleet.

Example 1

 A Must-Offer QF thermal generator registers for the MT I RFP with the following attributes:

- ICAP: 100MW
- EFORd: 8%

Its UCAP would be calculated as follows:

UCAP = ICAP x (1-EFORd)

        = 100MW x (1 – 8%)

        = 100MW x 0.92

        = 92MW

Therefore, the Must-Offer QF thermal generator is qualified to offer 92MW through their proposal.

Must-Offer QF Hydro Generation

The UCAP formula for Must-Offer QF Hydro is:
UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
**   = ICAP (MW) x Median of [(AQEI (MWh)+Scheduled Operating Reserve (MWh))/Maximum Active Power capability (MW)] in Top 200 hours of Ontario demand per season for the last 5 years**

Where:
- UCAP (Unforced capacity) is the amount, in MW, that a QF is qualified to offer into the MT I RFP
- ICAP (Installed capacity) is the capability, in MW, as submitted by the QF
- AQEI is the Allocated Quantity of Energy Injected, in MWh
- Scheduled Operating Reserve (OR) is the Scheduled OR in MWh
- MAPC is the Maximum Active Power Capability, in MW, under any conditions without station service being supplied by the unit

A seasonal UCAP will be determined, using a combination of energy production data and scheduled OR from the top 200 hours of highest Ontario demand from each relevant season over the most recent five (5) years of historical data. The historical production data, gathered from the IESO's records of hourly energy injected to the grid and scheduled OR reserve in the constrained schedule, incorporates the impacts of energy limitations, weather limitations and forced outage rates. Therefore, it is expected that the production and scheduled OR data of Hydroelectric Generation Facilities is an accurate reflection of their historical capability.

Example 2

A Must-Offer QF hydro generator registers for the MT I RFP with the following attributes:

- ICAP: 90MW
- Median [(AQEI + Scheduled Operating Reserve)] in top 200 hours of Ontario demand per season, for the last 5 years: 85MW
- MAPC: 100MW

Its UCAP would be calculated as follows:

UCAP = ICAP (MW) x Median of [(AQEI (MWh)+Scheduled Operating Reserve (MWh)/ Maximum Active Power capability (MW)] in Top 200 hours of Ontario demand per season for the last 5 years

> = 90MW x (85MW/100MW)
>
> = 90MW x 0.85
>
> = 76.5MW

Therefore, the Must-Offer QF hydro generator is qualified to offer 76.5MW through their proposal

Must-Offer QF Storage

The UCAP formula for Must-offer QF storage is:
UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
        = [min (Full Power Operating Mode, Energy Rating/4 hours)] x (1-EFORd)
Where:
- UCAP (Unforced capacity) is the amount, in MW, that a facility is qualified to offer into the MT I RFP
- Full Power Operating Mode is the temperature-sensitive maximum power rating that can be sustained for 1 hour
- Energy Rating is the temperature-adjusted maximum amount of energy in MWh, that the qualified facility is capable of delivering, when it is fully charged
- EFORd is the equivalent forced outage rate on demand and is set at 5%

In determining qualified capacity, the IESO must consider a facility's sustained capability over a specified time period, in order to level the contribution of different resources towards meeting resource adequacy needs. The four (4) hours energy duration requirement currently used in the Capacity Auction and previously in the Demand Response Auction, is meant to find a balance between system needs, operational flexibility and cost. A duration shorter than four (4) hours may increase supply but could be insufficient to meet operational needs during peak times while a duration longer than four (4) hours would increase costs and limit participation.

Therefore, the qualification process for Must-Offer QF storage will consider the facility output that can be sustained for four (4) hours, consistent with the practice used in the Capacity Auction. This means that qualification will be determined by the lower of Full Power Operating or the Energy Rating divided over four (4) hours. This duration adjusted value will then be de-rated using an EFORd. Due to limited data available on historical performance for storage facilities that have been operating in Ontario, a 5% EFORd will be used for all Must-Offer QF storage, which is in alignment with the Capacity Auction.

Example 3

A Must-Offer QF storage registers for the MT I RFP with the following attributes:

- Full Power Operating Mode: 8MW

- Energy Rating: 16MWh

- EFORd: 5%

Its UCAP would be calculated as follows:

UCAP = [min(Full Power Operating Mode, Energy Rating/4 hours)] x (1-EFORd)

   = [min(8MW, 16MWh/4h)] x (1-5%)

   = [min(8MW, 4MW)] x 0.95

   = 4MW x 0.95

   = 3.8MW

Therefore, the Must-Offer QF storage has qualified to offer 3.8MW through their proposal

FCF QF Variable Generation

The UCAP formula for FCF QF – VG (Non-MP and MP with limited data (i.e., less than 5 years)) is:
For wind:
UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
= ICAP (MW) x Median of [Zonal total AQEI (MWh) + Zonal total foregone energy of the fleet (MWh) / Maximum Active Power capability (MW)] in Top 200 hours of Ontario demand per season for the last 5 years
For solar:
UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
= ICAP (MW) x Median of [Fleet wide zonal simulated solar capacity factor data] in top 200 hours of Ontario demand per season

Where:
- UCAP (Unforced capacity) is the amount, in MW, that a facility is qualified to offer into the MT I RFP
- ICAP (Installed capacity) is the capability, in MW, as submitted by the QF
- AQEI is the Allocated Quantity of Energy Injected, in MWh
- MAPC is the Maximum Active Power Capability, in MW, under any conditions without station service being supplied by the unit

Example 4

An FCF QF variable generator (wind) registers for the MT I RFP with the following attributes:

- ICAP: 95MW

- Median of [Zonal total AQEI (MWh) + Zonal total foregone energy of the fleet (MWh)] in Top 200 hours of Ontario demand per season for the last 5 years: 30MW

- MAPC: 100MW

Its UCAP would be calculated as follows:

UCAP = ICAP x [(Median of [Zonal total AQEI (MWh) + Zonal total foregone energy of the fleet (MWh)] in Top 200 hours of Ontario demand per season for the last 5 years) /Maximum Active Power capability (MW)]

> = 95MW x (30MW/100MW)
>
> = 95MW x 0.3
>
> = 28.5 MW

Therefore, the facility has qualified to offer 28.5MW through their proposal

FCF QF Variable Generation (Market Participant)

The UCAP formula for an FCF QF – VG that is also a Market Participant is:
> **For wind and solar:**
> **UCAP (MW) = ICAP (MW) x Availability De-Rating Factor**
> **= ICAP (MW) x Median of [(AQEI (MWh)+Foregone Energy(MWh)/ Maximum Active Power capability (MW)] in Top 200 hours of Ontario demand per season for the last 5 years**

Where:
- UCAP (Unforced capacity) is the amount, in MW, that a facility qualified to offer into the MT I RFP
- ICAP (Installed capacity) is the capability, in MW, as submitted by the QF
- AQEI is the Allocated Quantity of Energy Injected, in MWh
- MAPC is the Maximum Active Power Capability, in MW, under any conditions without station service being supplied by the unit

Example 5

An FCF QF variable generator (solar) that is also a MP registers for the MT I RFP with the following attributes:

- ICAP: 90MW
- Median of [(AQEI (MWh)+Foregone Energy(MWh)] in Top 200 hours of Ontario demand per season for the last 5 years: 20MW
- MAPC:100MW

Its UCAP would be calculated as follows:

UCAP = ICAP x [Median of [AQEI (MWh)+Foregone Energy(MWh)] in Top 200 hours of Ontario demand per season for the last 5 years / Maximum Active Power capability (MW)]

> = 90MW x (20MW/100MW)
>
> = 90MW x 0.2
>
> = 18MW

Therefore, the facility has qualified to offer 18MW through their proposal.

FCF QF Hydro Generation

The UCAP formula for FCF QF -VG is:

UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
= ICAP (MW) x Median of [Zonal total AQEI (MWh) + Zonal total scheduled Operating Reserve of the fleet (MWh)/ Maximum Active Power capability (MW)] in Top 200 hours of Ontario demand per season for the last 5 years

Where:
- UCAP (Unforced capacity) is the amount, in MW, that a QF is qualified to offer into the MT I RFP
- ICAP (Installed capacity) is the capability, in MW, as submitted by the QF
- AQEI is the Allocated Quantity of Energy Injected, in MWh
- MAPC is the Maximum Active Power Capability, in MW, under any conditions without station service being supplied by the unit

Example 6

An FCF QF hydro generator registers for the MT I RFP with the following attributes:

- ICAP: 90MW

- Median of [Zonal total AQEI + Zonal total scheduled Operating Reserve of the fleet] in Top 200 hours of Ontario demand per season for the last 5 years: 80 MW

- MAPC: 100MW

Its UCAP would be calculated as follows:

UCAP = ICAP (MW) x Median of [Zonal total AQEI + Zonal total scheduled Operating Reserve of the fleet] / Maximum Active Power capability (MW)] in Top 200 hours of Ontario demand per season for the last 5 years

= 90MW x (80MW/100MW)

= 90MW x 0.8

= 72 MW

Therefore, the FCF QF hydro generator has qualified to offer 72MW through their proposal

FCF QF Thermal Generation

The UCAP formula for FCF QF -VG is:

UCAP (MW) = ICAP (MW) x Availability De-Rating Factor
= ICAP (MW) x (1-EFORd)

Where:
- UCAP (Unforced capacity) is the amount, in MW, that a facility is qualified to offer into the MT I RFP
- ICAP (Installed capacity) is the capability, in MW, as submitted by the QF

- EFORd is the Equivalent Forced Outage Rate on Demand

Example 7

An FCF QF thermal generator registers for the MT I RFP with the following attributes:

- ICAP: 100MW
- EFORd: 7%

Its UCAP would be calculated as follows:

UCAP = ICAP x (1-EFORd)

  = 100MW x (1 – 7%)

  = 100MW x 0.93

  = 93MW

Therefore, the FCF QF thermal generator has qualified to offer 93MW through their proposal.

Operationalizing the Process

Table 2: MT I RFP Process and timeline

Milestone	Date
IESO's deadline for releasing MT I RFP and MTC I Contract	January 31, 2022
Proponent's deadline for submitting questions and comments, if any	February 14, 2022
Proponent's deadline for Registration	February 21, 2022
IESO's deadline to inform Proponents of their respective UCAP for Summer and Winter via e-mail	March 11, 2022
Proponent's deadline to raise any error of their UCAP value	March 16, 2022
IESO's deadline for responding to the Proponents confirming their status as a Qualified Applicant and their respective Qualified Capacity	March 25, 2022
IESO's deadline for issuing Addenda to MT I RFP and MTC I Contract, if any	April 21, 2022
Proposal submission deadline	April 28, 2022
Notification to all Proponents and announcement of Selected Proposals	August 26, 2022

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