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Technical Panel: Education

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Agenda

- Background and Context
- Technical Proposals
- Stakeholder Engagement
- Next Steps



Background and Context

Evolution of the Capacity Auction

2015-2019
Demand Response Auction

- Open to demand response resources only



2020
Capacity Auction

- Expanded participation to off-contract, dispatchable generation and storage resources, and system-backed capacity imports



2021
Capacity Auction

- Minor Administrative updates only



2022
Capacity Auction

- Capacity auction now part of broader Resource Adequacy framework, will play the role of short-term balancing mechanism
- Enhancements proposed to ensure reliability and increase competition to effectively meet resource adequacy need

2022 Enhancements: Drivers

Ensure Reliability:

Ontario will be emerging from a decade of surplus to a period of acute capacity need starting mid-decade, and capacity secured in the Capacity Auction will be increasingly relied upon for resource adequacy.

- Enhancements to pre-auction qualification and performance assessment framework will collectively ensure that capacity secured in the Auction, from all resource types, is **available and reliable at times of need**

Maintain Competition:

Enabling and expanding participation from different resources helps to ensure continued competitive and cost-effective outcomes

Engagement and Design Approach



Monthly engagement, targeted outreach and facilitated discussions with key stakeholder groups to address contentious issues



Design proposals and responses to feedback have been guided by clear design principles, informed by needs and based on sound rationale and best practices



Holistic set of enhancements (from qualification to assessment) outlined in Design Document provide for fairness while accounting for the characteristics and participation framework of different resources



Technical Proposals

2022 Auction Enhancements

Enhancement #1: Capacity Qualification

- Adopt transparent methodologies to derive an Unforced Capacity (UCAP) value for all resources while accounting for unique resource participation frameworks and characteristics

Enhancement #2: Performance Assessment Modifications

- Changes to performance assessment obligation and assessment framework to ensure alignment with qualification methodology, to incent availability and reliable performance from acquired capacity resources

Enhancement #3: Expand Participation

- Increase competition and cost effectiveness through enabling participation from generator-backed capacity imports

Holistic Design Enhancements



Design Document

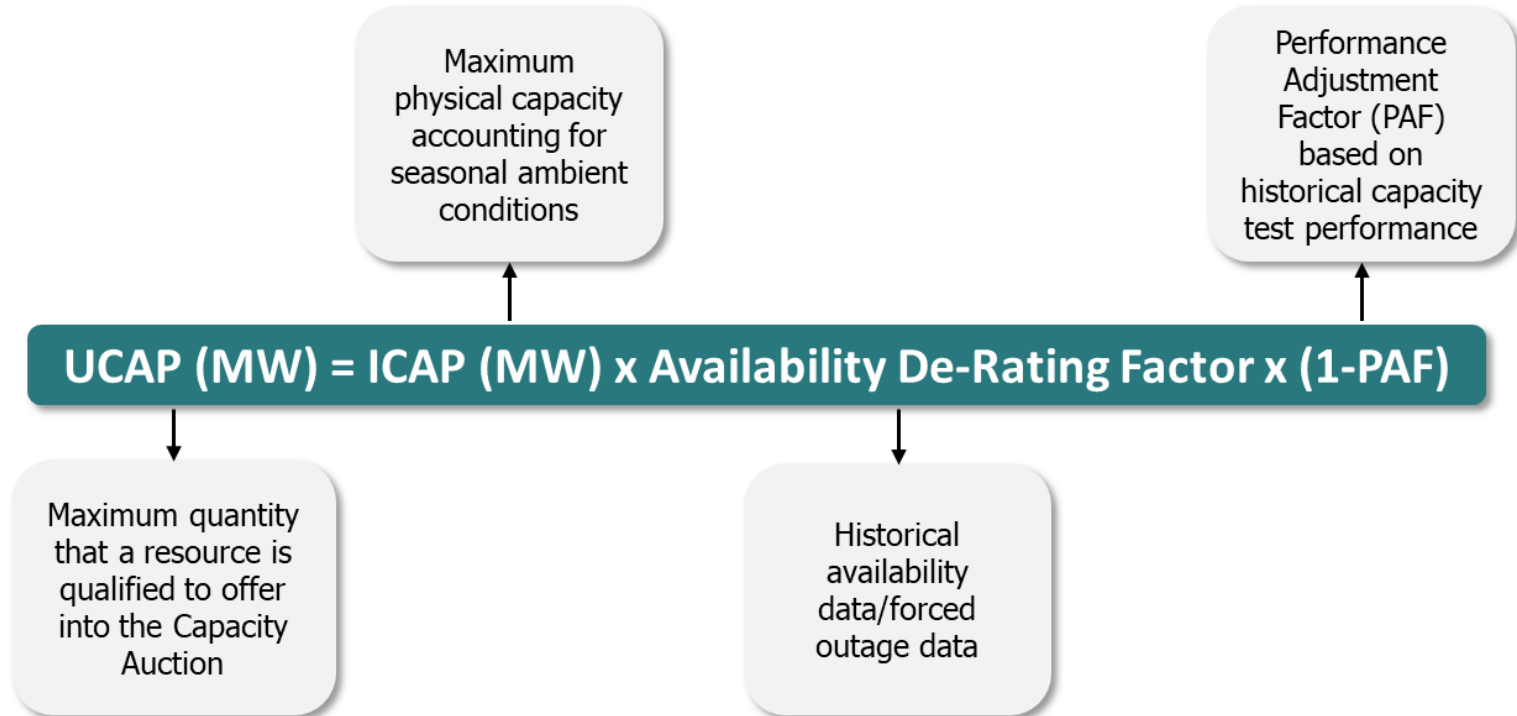
- Draft Design Document posted in October 2021
- Updated Design Document posted in February 2022
- Accompanying 'Guidance Document' posted assist readers in understanding the changes between the original design document and the updated version.
 - The guidance document highlights the specific change, where in the document the update has been made, and the rationale for the change

Qualified Capacity (QC)

UCAP reflects the amount of capacity a resource can be expected to provide during peak hours by accounting for historic availability and/or forced outages

- Aims to equalize the contribution of each MW across all resource types towards satisfying resource adequacy needs
- Methodologies provide for fairness while accounting for the characteristics of different resource types
- Work with performance assessments to incent resources to maximize availability and be reliable at times of need.

Generalized UCAP Formula



Qualification: Availability De-Rating Factors

Equivalent
Forced
Outage Rate
on Demand
(EFOR_d)

- Represents the probability that a resource 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 or forced de-rates.

The top 200
hours of
Ontario
Demand

- Used to assess performance (availability or production) during the roughly 5% of peak hours per year. This is a good reflection of resource contributions and availability during hours of system peak.

The most appropriate availability de-rating factor to use will depend on the resource being qualified, its characteristics and participation framework (see appendix)

Example: Dispatchable Thermal Generation Resource

$$\text{UCAP (MW)} = \text{ICAP (MW)} \times \text{Availability De-Rating Factor} \times (1 - \text{PAF})^*$$

For a thermal generation resource, the availability de-rating factor is its forced outage or EFOR_d

For a resource with a 100 MW ICAP and an EFOR_d of 8%, the UCAP will be calculated as follows:

$$\text{UCAP} = 100\text{MW} \times (1 - 8\%) \times (1 - 0) = 100\text{MW} \times 0.92 \times 1$$

$$\text{UCAP} = 92 \text{ MW}$$

**PAFs will not be applied in the 2022 Auction but test performance during the obligation periods will determine PAFs for future Auctions*

Qualified Capacity and HDR

The HDR participation framework is unique in some respects from other resources in the energy market

- Requirement to maintain energy market bids is contingent on receiving a standby (triggered by prices)
- Limited historical data (only required to provide consumption data when tested)

This unique framework needs to be accounted for in the design enhancements

Qualified Capacity and HDR

The lack of historical availability data of HDR resources, means that the IESO is unable to apply availability de-rates as part of qualification

To account for this, and to ensure fair treatment between different resource types, HDRs will be subject to an Standby Availability Charge structure during the obligation period (discussed in the next section).

The intent of this Standby Availability Charge is to incentivize an HDR resource to self-qualify to offer MWs into the Auction that will be available at times of need.

Performance Assessment Framework Enhancements

Enhancements to the performance assessment framework can be categorized into the following:

- Consistent Capacity Tests protocols across all resource types
- Improve Performance and Availability
- Fair assessment – alignment with qualification methodologies

Performance Assessment Enhancements

Consistent Capacity Tests

- **Assess to Capability (ICAP)**

All resources will be assessed to their actual capability (or cleared ICAP) when tested

- **Revised Performance Thresholds**

For HDR, reduce the performance threshold from 20% to 10% beginning with the December 2022 Auction; allow a 5% threshold for all other resources

- **Capacity Test Scheduling**

All resources will be required to successfully schedule their resource to demonstrate its ICAP/cleared ICAP capability within an IESO-determined 5-day testing window

Performance Assessment Enhancements

Improve Performance

- **Future De-rates based on performance**

If a resource fails a capacity test, in addition to settlement charges, their UCAP value in the subsequent auction will be de-rated through the application of a Performance Adjustment Factor (PAF)

- **Dispatch Testing**

IESO will continue to have the discretion to test resources by scheduling them in the energy market to verify their ability to comply with dispatch based on submitted bids and offers.

Performance Assessment Enhancements

Improve Availability

- **Augmented Availability Charge**

Higher availability charges (10x) apply to all resources for MWs not made available when the IESO has issued an emergency advisory notice

- **Standby Availability Charge**

Higher availability charges apply to Hourly Demand Response resources for MWs not made available when placed on standby

- IESO continues to stakeholder the implementation details of this charge, including the application scope or magnitude

Performance Assessment Enhancements

Fair Assessment (Availability Charge True-up)

- Settlement true-up will compensate resources for some of the availability charges incurred if, on average the resource was available equal to or greater than their obligation amount over the period
- The availability of the resource for each hour is capped at the minimum of either 15% above the resource's capacity obligation, the resource's cleared ICAP or the resource's registered capability (applicable only to virtual HDRs)
- The true-up payment is capped to the availability charge incurred; i.e., no extra payment for over availability



Expanding Participation to Generator-Backed Capacity Imports

Expanding Capacity Auction Participation

The Capacity Auction currently procures capacity from a variety of resource types including demand response, generators, energy storage and system-backed imports.

As part of the 2022 Capacity Auction enhancements, a new resource type, generator-backed imports, will be eligible to participate in the Auction. Generator-backed imports are capacity imports that are tied to or “backed-up” by a specific generating resource in a neighbouring jurisdiction.

Operating Agreements

Operating agreements between the IESO and its neighbouring jurisdictions will outline the internal provisions required to be in place to facilitate the trade of capacity between the participating jurisdictions.

IESO has completed a Memorandum of Understanding and Operating Instruction with NYISO that will facilitate Capacity Imports from NYISO to Ontario.

Eligibility

- In-service (for at least 1 year), dispatchable generation resources only
- Only generation technologies/fuel types that are currently eligible to participate in the auction, i.e. no coal
- Demonstrate energy is deliverable to the Ontario border
- Demonstrate that the resource is not under obligation to deliver the same capacity to any other system
- Provide an accredited UCAP value from an external jurisdiction/balancing authority (with the exception of storage)

Imports Obligation

Must-offer import obligation

- Availability performance would be assessed relative to energy import offer data (not resource availability data).
- Charges would be applied when offers are not submitted, even if the reason for not offering is related to intertie outages

Capacity Test

- Backing generator must demonstrate its ability to get scheduled in host market AND schedule an import during the first two months of the obligation period

Capacity 'Call'

IESO has the ability to issue a 'call' to generator-backed capacity imports. The call will indicate the amount (MW) and hours that the generator-backed capacity import resource(s) will need to successfully schedule into Ontario

- Under normal conditions, when scheduled, the import will be backed by operating capacity of the host jurisdiction (e.g. NYISO)
- However, in certain circumstances (including if the host jurisdiction experience shortage conditions) the generator may need to be online to physically back a capacity import (to avoid it being curtailed by the host jurisdiction)



Administrative Updates

Background

The IESO presented two administrative updates to stakeholders for feedback:

- 1. Point-in-time Rules** - in recognition of the pending volume of market rule amendments being introduced by Market Renewal, the IESO identified a need to make necessary changes to the point-in-time provisions of the Capacity Auction (CA)
- 2. Zonal Group Constraints** - the IESO proposed utilizing zonal group constraints in the CA, to yield more economic outcomes

Point-in-Time Challenge

Versioning strategy introduced in 2020 puts a “freeze” on rules and manual sections related to capacity auction participation that were in effect on the day of an auction until the end of its associated commitment period

The implementation of Market Renewal presents a challenge to this versioning strategy due to:

- the magnitude of changes being implemented and advanced notice the capacity auction needs, and;
- the proposed timing of the implementation of Market Renewal which falls in the middle of an obligation period

Proposed Enhancement to Point-in-time Rule

The IESO proposed an enhancement to the point-in-time rule which would apply to any proposed Market Rule or Market Manual amendment related to the ability to satisfy a capacity obligation (the “how”).

Changes that affect the underlying obligation or performance assessment methodology are not in scope.

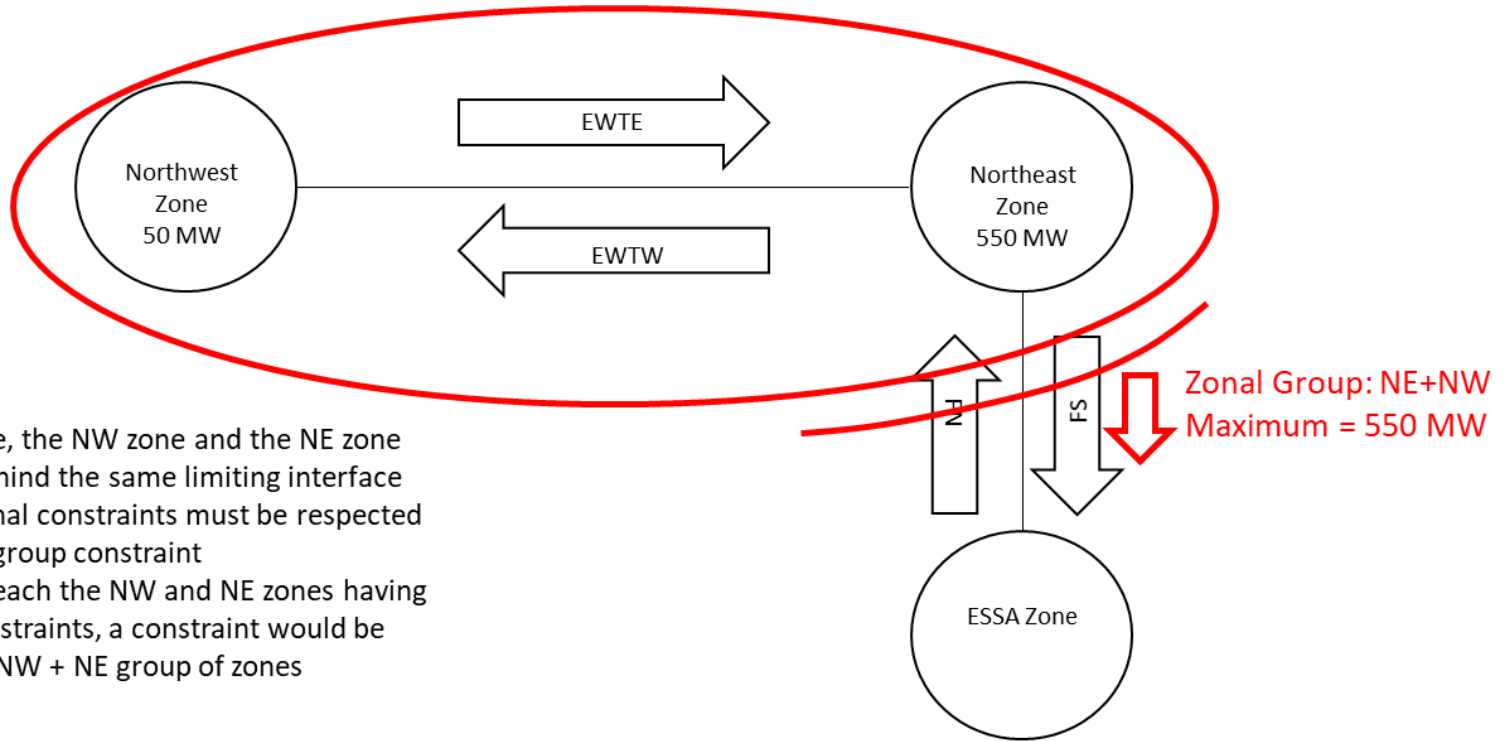
The enhanced point-in-time rule would require that any proposed amendment expressly state that an exception to the “freeze” on the point-in-time rules would be necessary.

Explicitly referring to the new point-in-time exception rule in the proposed amendment ensures any requested exemption is transparent to stakeholders, the Technical Panel and the IESO Board.

Zonal Group Constraints

- In the current auction there are two types of zonal constraints: total zonal and virtual zonal
- The IESO has proposed adding zonal group constraints to the auction
- Under this concept, a constraint is applied to a collection of zones that are located behind a single limiting interface
- The zonal group limit would apply to all resources located within any underlying zones within the grouping
- Zonal group constraints will be published in the pre-auction report

Zonal Group Constraint Example



- In this example, the NW zone and the NE zone are located behind the same limiting interface
- Each of the zonal constraints must be respected as well as the group constraint
- In addition to each the NW and NE zones having total zonal constraints, a constraint would be placed on the NW + NE group of zones

Price Setting

- If a zonal group constraint is reached, any zones in the group that have not reached their total zonal constraint will have their price set by the group constraint
- Price setting for the individual zones will remain

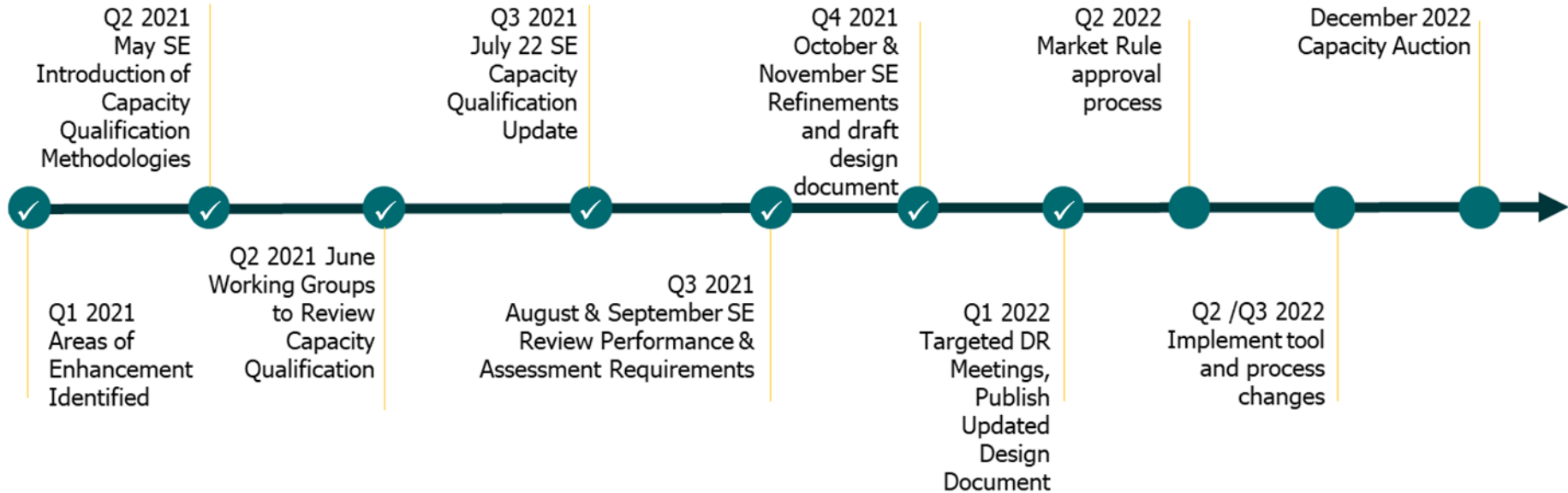


Stakeholder Engagement

Capacity Auction Enhancements – Overview

DESIGN AND STAKEHOLDER

IMPLEMENT



Summary

Issue	Response
UCAP Methodologies and Approaches	Refinements based on feedback with commitment to review in future years based experience and best practice.
PAF should not apply to historical performance under different rules	PAFs will not be implemented until the 2024 auction (based on go- forward performance assessment in the 2022 auction obligation periods and under the new rules).
Testing procedures	IESO will replace the current framework with a 5-day testing window where participants can schedule their own test and notify the IESO after it has taken place.

Summary cont'd

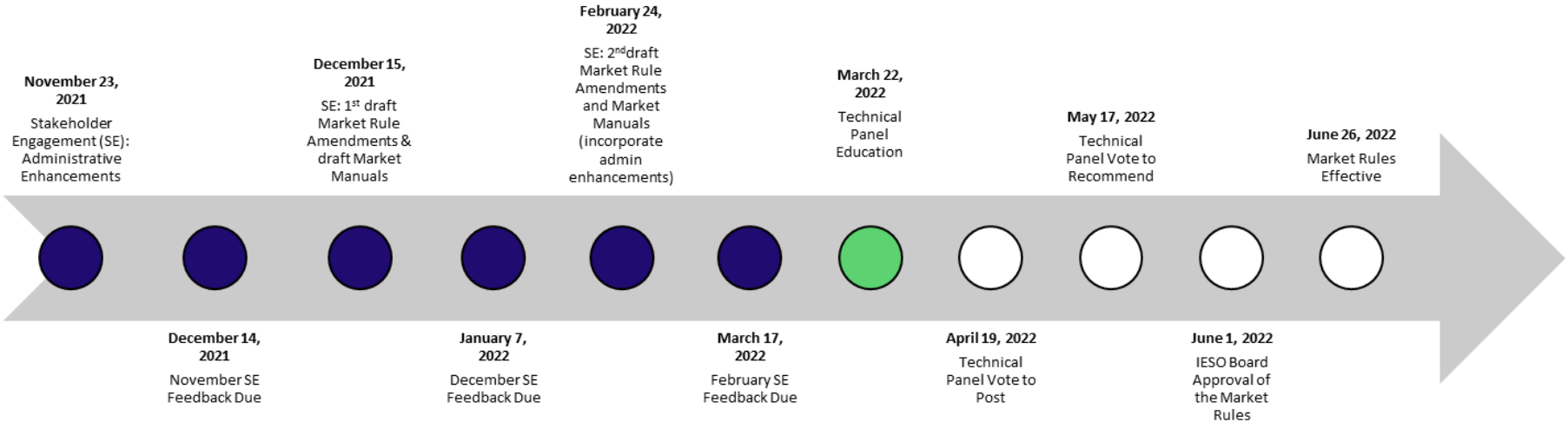
Issue	Response
Standby Availability Charge is unfair to HDR	<p>The augmented availability charge is essential to ensure fairness between different resource types and to incent MWs offered into the Auction will be available and reliable at times of need.</p> <ul style="list-style-type: none">- IESO continues to stakeholder the implementation details of this charge, including the application scope and magnitude
Avoided line losses should be considered in methodologies	Internal deliverability is not currently part of the capacity qualification process; accounting of avoided line losses is not part of the design scope.
The 4-hour duration requirement for storage	4-hour duration is meant to find a balance between system needs, operational flexibility and cost. This has been a part of requirements for resources procured within both the Capacity Auction and the previous Demand Response Auction



Market Rules & Market Manuals

- Drafting, Stakeholdering, and Next Steps

Market Rules and Manuals: Engagement & Next Steps





Appendix

Useful Links

[Resource Adequacy Engagement Webpage](#)

- Contains all engagement material including the draft Market Manuals and Market Rule Amendments that were posted for stakeholder feedback

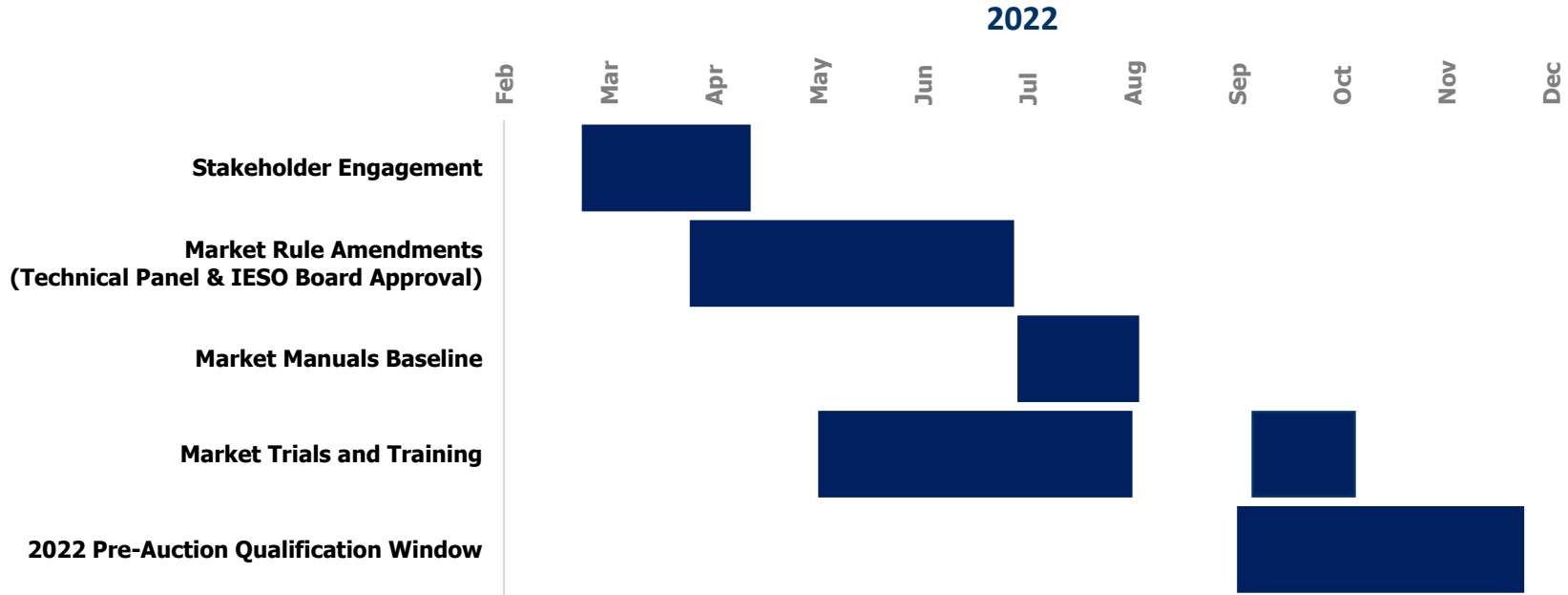
[Design Document](#)

- [Link](#)

[Guidance Document](#)

- [Link](#)

High Level Implementation Timeline



UCAP Methodologies

MAPC = Maximum Active Power Capability
AQEI = Allocated Quantity of Energy Injected

Resource Type	UCAP Methodology
Dispatchable Thermal Generation	$ICAP (MW) \times (1 - EFOR_d) \times (1 - PAF)$
Dispatchable Hydro	$ICAP (MW) \times \text{Median} [(AQEI (MWh) + \text{Scheduled Operating Reserve (MWh)}) / MAPC (MW)] \text{ in Top 200 hours of Ontario demand per season per year over the last 5 years} \times (1 - PAF)$
Dispatchable Storage	$[\min(\text{Full Power Operating Mode, Energy Rating}/4 \text{ hours})] \times (1 - EFOR_d) \times (1 - PAF)$
Dispatchable Load	$ICAP (MW) \times \text{Median} (\text{Hourly bids quantity} / \text{maximum seasonal energy bid quantity}) \text{ in top 200 hours of Ontario demand per season} \times (1 - PAF)$
System Backed Capacity Imports	$UCAP (MW) = ICAP (MW)$
Generator Backed Imports	$UCAP (MW) = \text{External System UCAP accreditation (MW)} \times (1 - PAF)$
Hourly Demand Response (HDR)	$UCAP (MW) = ICAP (MW) \times (1 - PAF)$

UCAP Methodologies

Auction Year	December 2022	December 2023	December 2024
Qualification Inputs	<ul style="list-style-type: none"> ▪ ICAP for all resources ▪ Historical data as required 	<ul style="list-style-type: none"> ▪ ICAP for all resources ▪ Historical data as required 	<ul style="list-style-type: none"> ▪ ICAP for all resources ▪ PAF for all resources ▪ Historical data as required
Inputs for Summer PAF Calculation	N/A	N/A	All resources: Resource specific capacity test activation data from summer of auction year 2022 (Summer obligation period of May – October 2023)
Inputs for Winter PAF Calculation	N/A	N/A	All resources: Resource specific capacity test activation data from winter of auction year 2022 (Winter obligation period of November 2023 to April 2024)
Qualification Outputs	UCAP for all resources	UCAP for all resources	UCAP for all resources

UCAP Methodologies

Auction Year	December 2022	December 2023	December 2024
Auction Outputs	<ul style="list-style-type: none"> ▪ Cleared UCAP ▪ Cleared ICAP – used for capacity test 	<ul style="list-style-type: none"> ▪ Cleared UCAP ▪ Cleared ICAP – used to for capacity test 	<ul style="list-style-type: none"> ▪ Cleared UCAP ▪ Cleared ICAP –used for capacity test
Testing Criteria	<ul style="list-style-type: none"> ▪ Cleared ICAP for all resources <ul style="list-style-type: none"> ▪ 10% threshold for HDR ▪ 5% threshold for all other resources 	<ul style="list-style-type: none"> ▪ Cleared ICAP for all resources <ul style="list-style-type: none"> ▪ 10% threshold for HDR ▪ 5% threshold for all other resources 	<ul style="list-style-type: none"> ▪ Cleared ICAP for all resources <ul style="list-style-type: none"> ▪ 10% threshold for HDR ▪ 5% threshold for all other resources
Performance Outputs	Summer & Winter PAF - to be calculated for all resources and used for qualification in December 2024 Auction	Summer & Winter PAF - to be calculated for all resources and used for qualification in December 2025 Auction	Summer & Winter PAF - to be calculated for all resources and used for qualification in December 2026 Auction

Capacity Auction Engagement Timeline

January 2021

- High-level work plan of planned enhancements for the 2021 and 2022 Capacity Auctions

March 2021

- Discussion of purpose and goals of planned Capacity Auction enhancements

April 2021

- Administrative enhancements planned for the 2021 Capacity Auction

May 2021

- Beginning of the discussion on transition to a capacity qualification process in UCAP terms, including a general overview of the process, design principles and objectives and presentation of draft resource-specific UCAP calculation methodologies for stakeholder comment. Discussion of establishing a minimum target capacity for future Capacity Auctions.

Capacity Auction Engagement Timeline

June 2021

- Resource-specific, working level meetings held to discuss qualified capacity process in general, draft UCAP methodologies, early stakeholder feedback, questions and concerns

July 2021

- Review of stakeholder feedback and updates to initial UCAP proposals, presentation of proposal to expand participation to generator-backed capacity imports for the 2022 Capacity Auction

August 2021

- Presentation of proposed updates to the Capacity Auction performance assessment framework

September 2021

- Brief update on next steps for 2022 Capacity Auction enhancements

Capacity Auction Engagement Timeline

October 2021

- Draft design document published prior to October Resource Adequacy engagement session
- Discussion of purpose and overview of the 2022 Capacity Auction Enhancements draft design document, including highlight of updates to enhancement designs previously presented to stakeholders
- Discussion of proposed plans and timelines to move from enhancement design to implementation activities

November 2021

- Review of updates to proposals driven by stakeholder feedback, identified opportunities to enhance current practices and to ensure holistic alignment and fairness from qualification to assessment.
- Design Enhancement Updates included:
 - 2x monthly capacity charge during times of potential use of emergency operating state control actions revised to augmented hourly availability performance charge of 10x

Capacity Auction Engagement Timeline

November 2021

- Design Enhancement Updates included (continued):
 - Revised implementation of performance adjustment factors (PAFs) beginning with the Dec. 2023 Auction instead of Dec. 2022. This proposal was later further revised to be implemented beginning with the Dec. 2024 Auction
 - Revised testing proposal to allow resources to self-schedule their capacity test within an IESO-determined 5-day testing window

December 2021

- Beginning of shift from enhancements design to implementation activities. Draft market rules and manuals presented to for early opportunity for stakeholder review and comment

February 2022

- Updated design document published prior to February Resource Adequacy engagement session

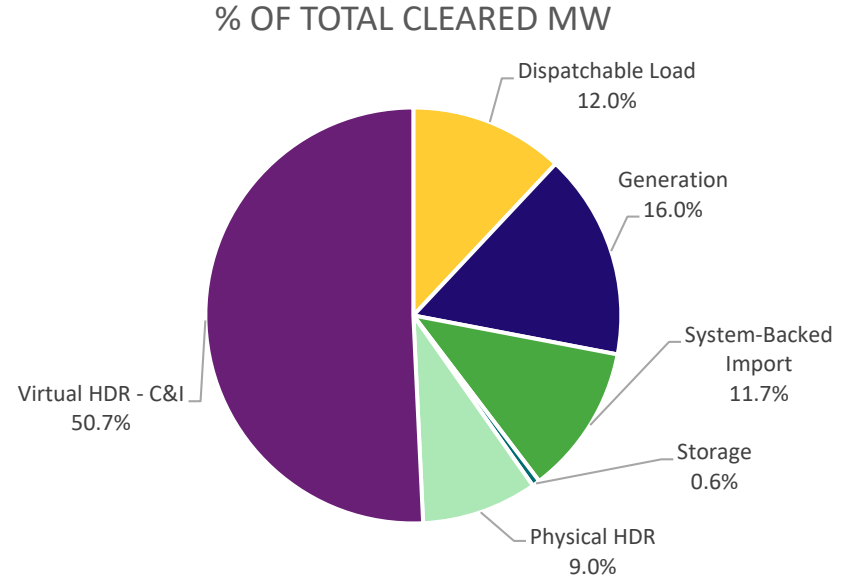
Capacity Auction Engagement Timeline

February 2022 (continued)

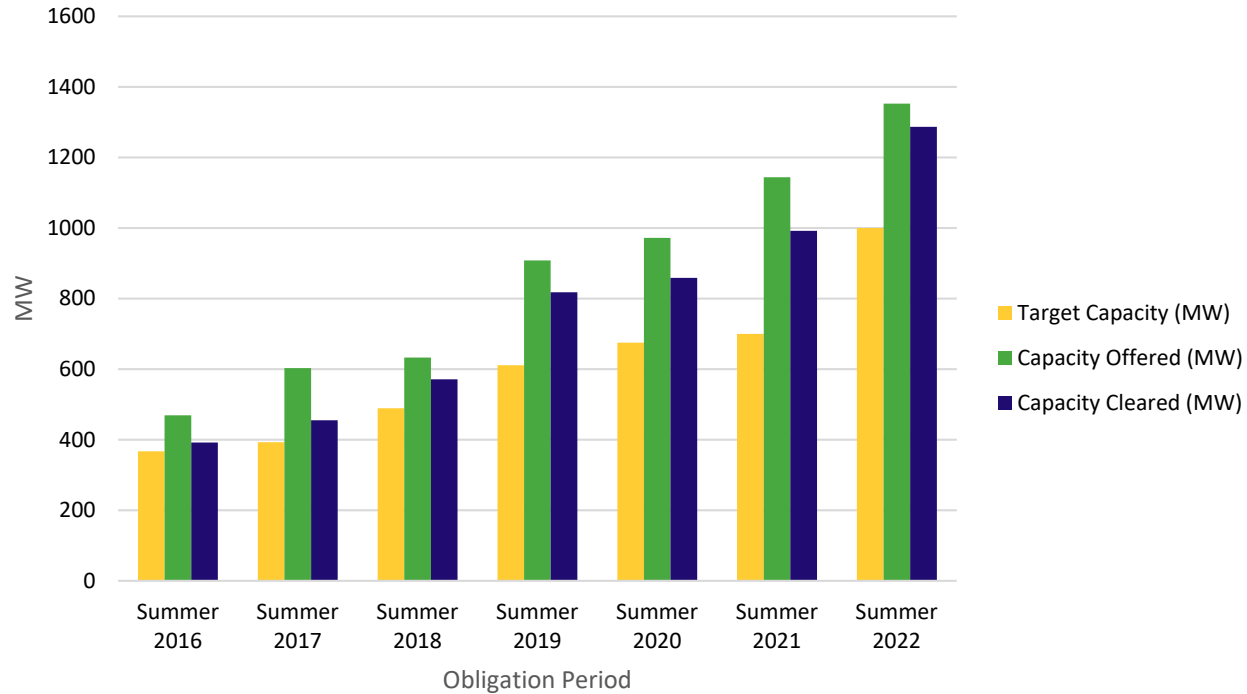
- Overview of updated design document and accompanying guidance document developed to assist readers' understanding of changes between the original design document and the updated version.
- Discussion with stakeholders to clarify misconceptions, intent and understanding of enhancements and IESO's objectives
- Overview of implementation activities and associated timelines, discussion of early stakeholder feedback received and additional opportunity for stakeholder review and feedback on draft market rule and manual amendments for December 2022 Capacity Auction enhancements

2021 Auction Results: Resource Breakdown (Summer)

Resource Type	Number Cleared	Cleared MW
Dispatchable Load	8	154.3
Generation	5	206
System-backed Import	1	150
Storage	5	7.7
Physical Hourly Demand Response	8	115.7
Virtual Hourly Demand Response – Commercial, Industrial, Institutional	56	653
Total	83	1286.7

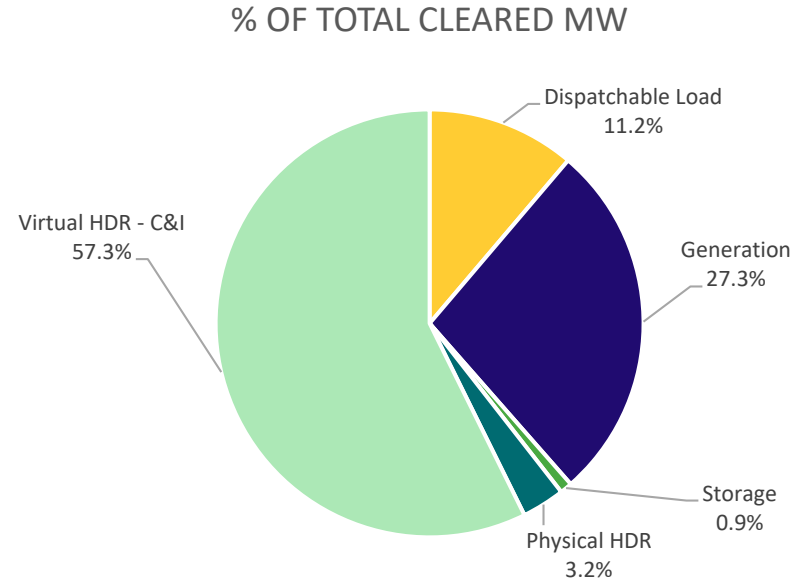


Historical Comparison: Cleared Capacity (Summer)

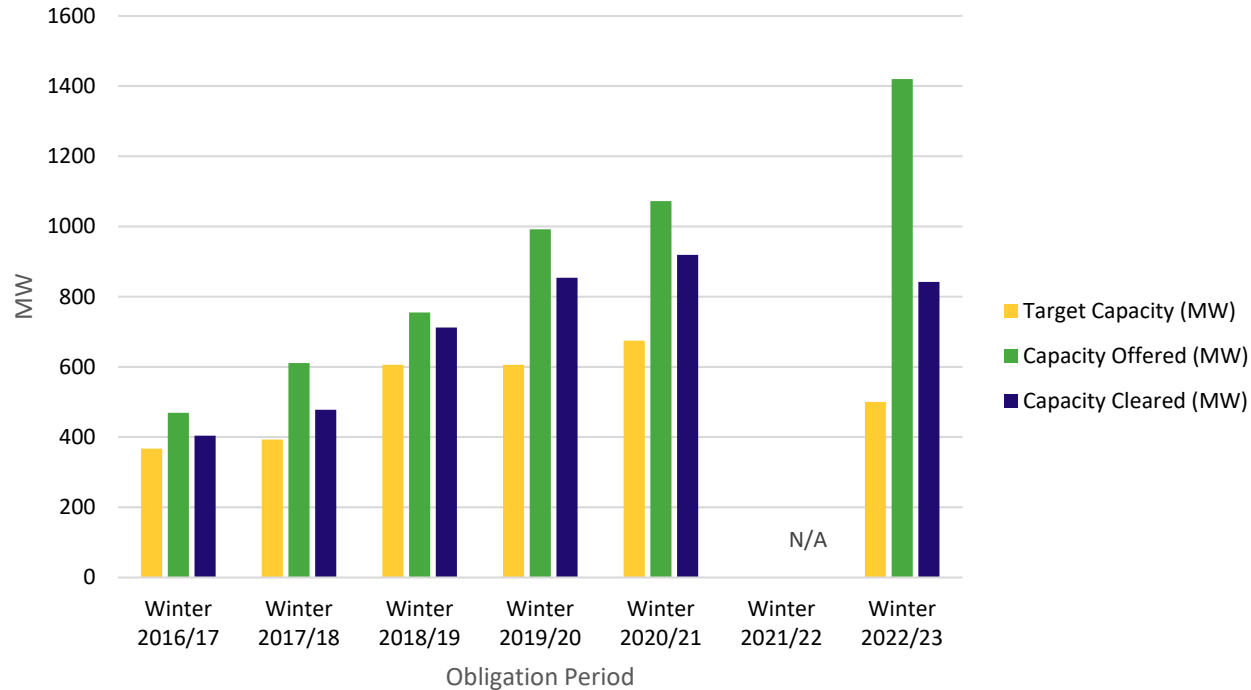


2021 Auction Results: Resource Breakdown (Winter)

Resource Type	Number Cleared	Cleared MW
Dispatchable Load	7	94.4
Generation	5	230
System-backed Import	-	-
Storage	5	7.7
Physical Hourly Demand Response	4	27.3
Virtual Hourly Demand Response – Commercial, Industrial, Institutional	43	482.5
Total	64	841.9

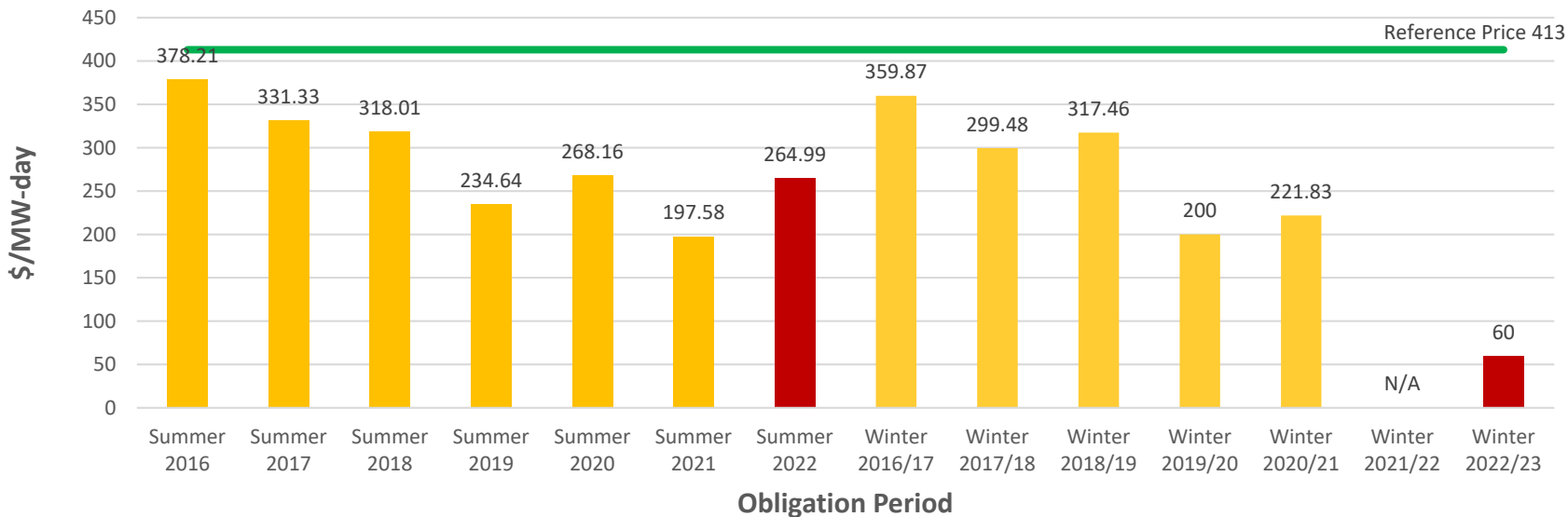


Historical Comparison: Cleared Capacity (Winter)



Historical Comparison: System-wide Clearing Price

DR and Capacity Auction - Ontario Clearing Prices



Thank You

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