

Stakeholder Engagement Pre-Reading

Physical Withholding – January 23, 2020

The external stakeholder engagement session on January 23, 2020 will cover the following topic(s):

- Physical Withholding

The purpose of this document is to provide stakeholders with information on the detailed design for the Physical Withholding topic and set expectations for the session. These materials are required reading for the session.

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1. Session Objective

The detailed design engagement meetings are to be considered technical working sessions. The sessions will focus on specific topics that external stakeholders either expressed an interest in during the high-level design phase or where the IESO has identified the need for further stakeholder input to inform the draft detailed design. Each session will concentrate on the proposed design for one specific aspect of the energy market detailed design.

The IESO is publishing materials for each engagement session no later than two weeks in advance of the session. This information is being shared in advance to provide stakeholders the opportunity to review and consider the potential impacts on their organization. The material should also help stakeholders identify who from their respective organizations may be most appropriate to attend the session and provide feedback. Stakeholders are encouraged to submit questions in advance of the sessions that will be addressed either at or before the session.

Stakeholder feedback, questions or concerns can be sent directly to engagement@ieso.ca.

These sessions will allow for interactive discussions with stakeholders regarding the reading material which will be focused on the questions identified below.

Stakeholders may also submit written feedback after the session if they choose to do so. However, these engagement sessions are designed to collect stakeholder feedback in-person and to facilitate a discussion with other stakeholders on that feedback. The IESO will use the input from these sessions to inform the detailed design decisions. Following each engagement session, the IESO will publish a brief summary of the discussion and allow for a short window for feedback for those not able to participate.

In the pre-engagement session, the IESO will be asking the following questions:

- What questions do stakeholders have on the proposed methodologies?
- What questions do stakeholders have on the rationale for the proposed methodologies?
- Do stakeholders agree that the proposed methodologies are consistent with the Market Renewal principles? If not, what changes would be required to better align with the principles?

Figure 1 - Principles of Market Renewal

PRINCIPLES				
<p>Efficiency</p> <p>Lower out-of-market payments and focus on delivering efficient outcomes to reduce system costs</p>	<p>Competition</p> <p>Provide open, fair, non-discriminatory competitive opportunities for participants to help meet evolving system needs</p>	<p>Implementability</p> <p>Work together with our stakeholders to evolve the market in a feasible and practical manner</p>	<p>Certainty</p> <p>Establish stable, enduring market-based mechanisms that send clear, efficient price signals</p>	<p>Transparency</p> <p>Accurate, timely and relevant information is available and accessible to market participants to enable their effective participation in the market</p>

2. Background

Competition is a key principle of the Market Renewal Program and the most effective way for the IESO to encourage efficient participation and outcomes in its markets. Competition drives market participants towards submitting offers at marginal cost, resulting in efficient dispatch and prices.

In situations where competition is restricted, one or more market participants may hold market power as a result. Market power enables a participant to profitably alter their offer price significantly from their marginal costs. This is known as economic withholding and was discussed at the [September 27, 2019 engagement session](#).

A market participant can also exercise market power by withholding some supply from the market in order to increase the price at which the remaining supply is sold; this is known as physical withholding. The exercise of market power drives up costs to consumers because market prices would not reflect the actual marginal costs of available supply, which leads to inefficient outcomes in the short- and long-run.

System operators use market power mitigation (MPM) to reduce incentives for market participants to use market power to increase prices or make-whole payments to their own advantage. An MPM framework therefore reduces the risk of undue wealth transfers between market participants and helps to maintain the efficiency of the market.

MPM is intended to reduce the occurrence of the material exercise of market power but avoid unnecessary intervention in market outcomes. As established in the Single Schedule Market High-Level Design,¹ the future MPM design will:

- Promote market outcomes that are consistent with those that would result under competitive participation;
- Consider and account for relevant Ontario-specific issues that could otherwise significantly impact the efficiency of the mitigation regime;
- Result in market intervention no greater than what is needed to constrain the material exercise of market power;
- Not unnecessarily distort efficient incentives for market participation;
- Balance the administrative burden of maintaining the mitigation regime against the effectiveness of that regime; and
- Become less permissive as competition is more restricted.

The MPM framework supports the market as the primary instrument to provide reliability and efficient dispatch and prices; it does not supplant it.

3. Approach for Physical Withholding

Physical withholding occurs when one or more market participants do not offer energy or operating reserve that is available to offer, or fail to deliver the energy they were scheduled to inject.² Physical

¹ See Section 3.2 of the [Single Schedule Market High Level Design](#).

² Note: This document only discusses how the conduct and impact test for physical withholding will apply to the energy market. The IESO will also use a conduct and impact test for physical withholding of operating reserves. The design for testing for physical withholding of operating reserve is largely consistent with the design for energy and will be included in the Market Power Mitigation detailed design document.

withholding can increase market prices and have a detrimental effect on system reliability because withheld MWs are not available to be dispatched to meet demand.

The IESO will test for physical withholding using a conduct and impact test methodology. This two-part test first determines whether offered quantities by market participants were lower than a reference quantity. A reference quantity is a proxy for the amount of MWs that would have been offered if competition was not restricted. The second test determines if prices would have been materially lower had the offered quantities been higher. Under this test, market power is considered to be exercised only if prices are impacted by a threshold amount.

As with economic withholding,³ certain conditions must be met in order to test for physical withholding, before the conduct and impact test is applied. Unlike economic withholding, testing is done on an ex-post basis because the system operator cannot ask a supplier to produce more than the quantities that have been offered. As a result, offer quantities are not changed before market prices are determined.

3.1. Conduct and Impact Test Process

The conduct and impact test for physical withholding will only be carried out when specific system conditions have been met, corresponding to occasions when and where competition was restricted. Conditions that indicate restricted competition in the energy market are detailed in **Section 4.1**.

The conduct test will examine the following parameters to determine if they were below their reference quantity (taking into account the relevant conduct threshold of the parameter):

- Energy offers
- Energy injections (taking into account the compliance deadband)
- Daily energy limit

The above parameters will be included in the conduct test because they could potentially be used to reduce energy quantities which would otherwise be provided by a resource. Conduct test thresholds are listed in **Section 4.2**.

If the market participant passes the conduct test, the test ends. If the market participant fails the conduct test, the impact test is run.

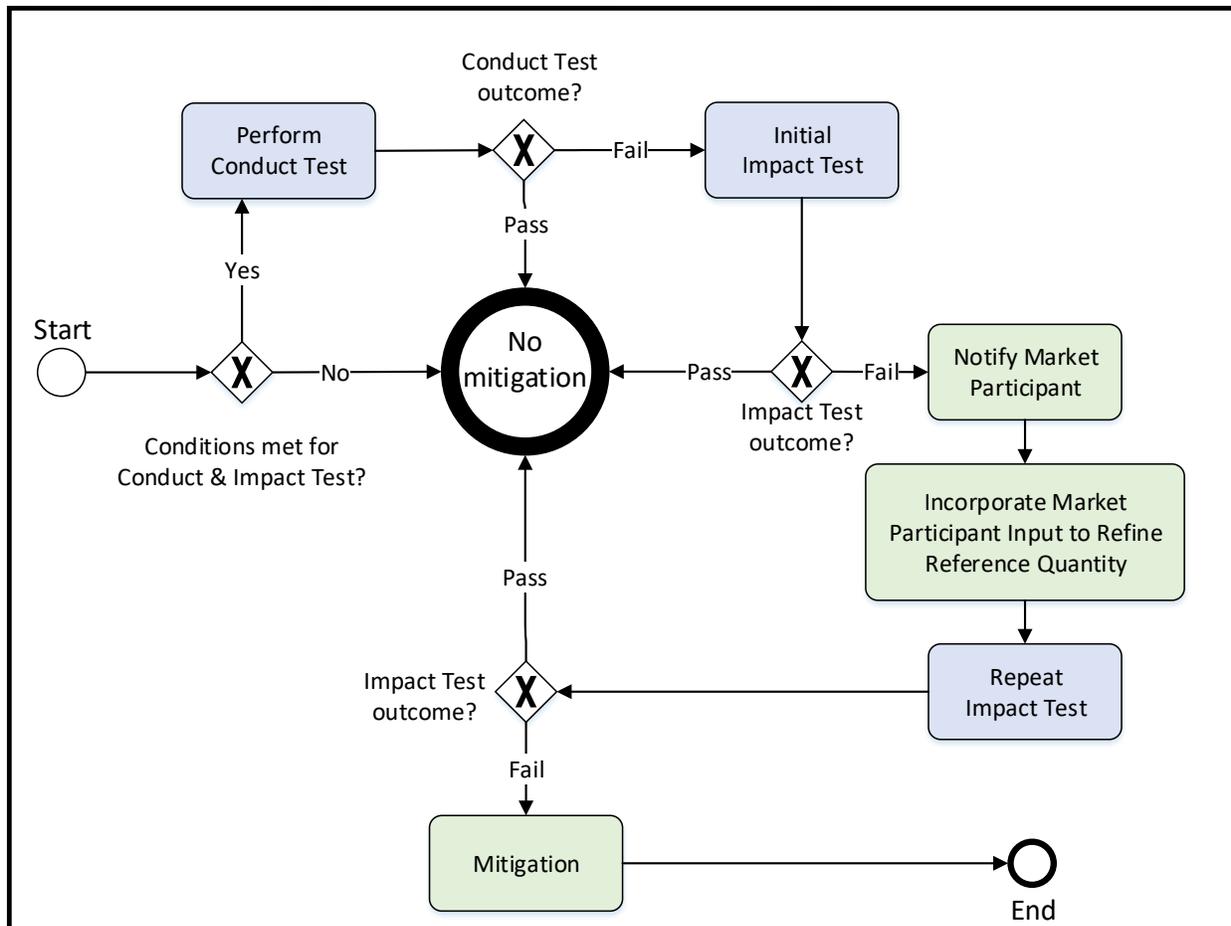
The impact test determines if prices were increased by more than the applicable impact threshold. Impact test thresholds are listed in **Section 4.3**.

Physical withholding will not test for make-whole payment impact. When a resource physically withholds, it does not receive a make-whole payment for those MWs. Testing for market power relating to make-whole payments will be conducted through the economic withholding tests, as appropriate.

³ Economic withholding was discussed at a stakeholder engagement session on September 27, 2019. Pre-reading materials and a discussion summary from the session can be found on the [Energy Detailed Design Engagement](#) page.

If a market participant fails both the conduct and impact tests, the IESO may levy a settlement charge. Settlement charges are discussed in **Section 5.1**. In certain material instances, the IESO may also issue a public notice describing the settlement charge. Public notices are discussed in and **Section 5.2**.

Figure 2 - Conduct and Impact Test Process for Physical Withholding



3.2. Reference Quantities

In order to carry out the conduct and impact tests, the IESO will determine an initial estimate for the quantity of energy the market participant would have offered if competition had not been restricted. This quantity is known as the reference quantity and is analogous to the reference levels used in the tests for economic withholding. The initial estimate of the reference quantity will be used in the opening stages of the analysis and may be refined as a result of input from market participants.

For energy, the initial estimate of the reference quantity shall be equal to the unit's installed capacity (or the IESO's centralized forecast for variable generators), modified by any relevant operating restrictions such as outages or de-ratings.

The IESO will make the initial estimate of the reference quantity available to the market participant. Market participants will have the opportunity to provide input on the reference quantity, as described below.

As indicated in **Figure 2**, the IESO will carry out the conduct and impact test using the initial estimate of the reference quantity. If any resource fails the conduct and impact test using the initial reference quantity, the IESO shall notify the market participant and allow them five business days to make representations regarding the reference quantity.

The IESO will analyze the information provided by the market participant to determine if the initial estimate of the reference quantity, which will be informed by derates and outages, was incorrect. The IESO intends to discuss with stakeholders potential circumstances that could lower the initial estimate of the reference quantity. These conversations are expected to occur in Q3/4 2020.

If the IESO determines that the initial reference quantity was incorrect, the IESO will re-run the conduct and impact test using the revised reference quantity. If the conduct and impact test is failed when the revised reference quantity is used, the results of that test will be used to determine a settlement charge.

3.3. Discretionary Basis for Testing

The IESO will not be obligated to carry out conduct and impact testing in all cases that meet the conditions for physical withholding. Instead, the IESO will exercise its discretion based on the following criteria:⁴

- the IESO does not have sufficient reliable information upon which to conduct the conduct and impact testing;
- the effort that would be required to conduct the analysis is substantially more relative to the materiality of the anticipated price impact; or
- performing the analysis would constitute an inefficient utilization of the IESO's resources.

4. Conduct and Impact Testing

4.1. Testing Conditions

The IESO will only test for physical withholding when competition is restricted. For the purposes of the conduct and impact test, the IESO will consider competition to be restricted when both of the following conditions are met:

Condition 1 – Price

- The energy locational marginal price (LMP) at the resource is above \$25/MWh.

Condition 2 – Location

- The resource is within a constrained area;
- A resource is subject to a reliability constraint; or
- The conditions for testing for global market power have been met.

4.1.1. Constrained Areas

When a transmission constraint binds, leaving a reduced set of supply resources that can meet demand (load) in the constrained area behind the constraint, competition is restricted.

⁴ These criteria are based on the approach for identifying cases to pursue under the current local market power framework.

The constrained area typically has locational prices that are higher than the rest of the province. In some situations, a single constraint results in a constrained area. In other situations, multiple constraints create the constrained area.

Constrained areas are classified based on how frequently the transmission constraints are expected to bind. The three types of constrained areas are defined below:

- **Broad Constrained Area (BCA):** Transmission constraints that bind infrequently. Resources that are inside the BCA can prevent the violation of a transmission constraint.
- **Narrowly Constrained Area (NCA):** Areas of the transmission grid that are expected to be frequently constrained over a long duration.
- **Dynamic Constrained Area (DCA):** Areas of the transmission grid that are expected to be congested on a persistent basis over a shorter duration. DCAs can be designated as a result of outages or de-ratings of grid components that may alter congestion patterns on the grid.

4.1.2. Reliability Constraints

There are specific situations where the system operator needs to manually schedule or dispatch a resource. These out-of-market actions are occasionally required in order to ensure the reliability of the IESO-controlled grid.

4.1.3. Global Market Power

The test for global market power is intended to assess whether competition is restricted province-wide due to reasons other than local transmission or reliability constraints.

When both of the conditions below are met the IESO will test for global market power mitigation:

- The IESO is not able to schedule incremental imports on its interties with New York and Michigan; and
- The price at the reference location (Richview) and the prices at the New York and Michigan interties are all greater than a defined threshold value (excluding intertie congestion).

4.2. Conduct Test Thresholds

Some conduct thresholds for physical withholding will be applied to individual resources, other conduct thresholds will be applied to multiple resources from the same market control entity (see sidebar).

The conduct test will compare a resource's offered and injected energy quantities to conduct thresholds. Conduct thresholds that are applied will depend on the type of constrained area in which the resource is located.

The conduct thresholds for offered and injected energy quantities are listed in **Table 1**.

Table 1 – Offered and Injected Energy Conduct Thresholds

Trigger	Conduct Threshold ⁵	
	Offered Quantity	Injected Quantity
Global Market Power	Single resource: (lesser of) 10% or 100 MW below the resource’s reference quantity	Single resource: real-time output is 1MW below the lower bound of the resource’s compliance deadband.
Broad Constrained Area	Two or more resources: aggregate energy offer quantity from a single market control entity is (lesser of) 5% or 200 MW below the resources’ aggregate energy reference quantities.	
Narrow Constrained Area	Single resource: energy offer quantity is 1 MW below the resource’s energy reference quantity.	
Dynamic Constrained Area		
Reliability Constraint	N/A	

The IESO will test a resource’s Daily Energy Limit (DEL)⁶ against conduct thresholds because low values for this operating parameter could restrict the IESO’s ability to schedule resources to provide energy. The timeframe when the market participant submitted the DEL, such as day-ahead or day-at-hand, will determine the threshold that will apply.

The IESO is considering the use of a rolling 30-day historical median of the DELs submitted as the reference level for the DEL. For days where the market participant did not submit a DEL, the value used to calculate the rolling 30-day median will be the installed capacity of the resource multiplied by 24 hours, or the standing value (as applicable for day-ahead). Submitted DELs for days where the resource is found to have failed the conduct test for the DEL and the subsequent price impact test will be excluded from the data used to calculate the rolling 30-day median. For days where the market participant updated the resource’s

Market Control Entities

All market participants in the future market will be required to disclose who has market control over the participant. Market control is the ability to set the price or quantity of a market participant’s offers or bids made to the IESO-administered markets, or follow dispatch instructions given to a market participant.

Market control information is necessary in order to appropriately assess the impact that any market control entity may have on the offers and bids placed by a market participant.

Those with market control are:

- Persons that control the market participant, either directly or indirectly; and
- Persons with whom a market participant has any form of agreement under which such market participant confers the rights or the ability to determine the:
 - Quantity or price of offers from a generator and/or virtual transaction, and bids from a dispatchable load and/or virtual transaction; or
 - Quantity of generation from a generator or consumption from a dispatchable load.

⁵ The basis for these conduct thresholds is best practice in other jurisdictions.

⁶ DEL is the maximum amount of energy that can be scheduled from a generation resource during a given day.

DEL, the value used to determine the rolling 30-day median for the day-at-hand will be the lowest DEL value for the day.

4.3. Impact Test Thresholds

The IESO will determine “as offered” energy prices using submitted offer quantities, submitted DELs, and injected quantities. The IESO will also determine “reference quantity” energy prices using reference quantities and reference level DELs and scheduled injections. If the as-offered prices are greater than the reference quantity prices by more than the relevant impact threshold, then the impact test is failed.

The IESO will perform the impact test for physical withholding on resources that meet the relevant conditions and fail the conduct test. The impact test thresholds for energy are listed in **Table 2**.

Table 2 - Energy Impact Test Thresholds

Trigger	Impact Threshold ⁷
Global Market Power	As-offered energy LMP is (the lesser of) 100% or \$50/MWh above the reference quantity energy LMP.
Broad Constrained Area	
Narrow Constrained Area	As-offered energy LMP is (the lesser of) 50% or \$25/MWh above the reference quantity energy LMP.
Dynamic Constrained Area	
Reliability Constraint	As-offered energy LMP is above the reference quantity energy LMP.

5. Result of Conduct and Impact Test Failure

Market participants will be advised on the initial findings of the conduct and impact test and, prior to the application of any settlement charge, will have the opportunity to provide information regarding the initial estimate of the reference quantity. This information may result in the IESO using a revised reference quantity value in the ex-post conduct and impact test and any resulting settlement charge assessment.

Following any revisions to the reference quantity, the IESO will re-evaluate the conduct and impact test. If a market participant still fails both the conduct and impact tests, the IESO will issue a settlement charge to the market participant. In some cases, the IESO will also issue a public notice describing the settlement charge.

5.1. Settlement Charge

If a market participant fails the conduct and impact tests for physical withholding, that participant will be subject to a settlement charge for each instance of physical withholding. An instance of physical withholding is defined as a single dispatch day on which physical withholding is found to occur per market control entity.

⁷ These impact thresholds are based on best practices in other jurisdictions and are consistent with the impact thresholds for economic withholding.

The settlement charge will be the base settlement charge adjusted by relevant multipliers for persistence and significance (described in **Section 5.1.2** below).

5.1.1. Base Settlement Charge

The base settlement charge shall be calculated using the MWh quantity that failed the conduct and impact test for physical withholding for a dispatch day.

Day-Ahead Market

In the day-ahead market (DAM), the MWhs of energy withheld for each hour of the dispatch day will be the total hourly quantity that failed the conduct and impact test for physical withholding from the DAM. The price that is used is the day-ahead LMP that occurred at the resource for each hour. The quantity that failed the conduct and impact test in each hour will be multiplied by the corresponding hourly price to yield a settlement charge for the hour.

The day-ahead base settlement charge for a dispatch day is the sum of settlement charges across all hours of the dispatch day for which the conduct and impact test was failed.

Real-Time Market

In the real-time market (RTM), the MWhs of energy withheld for each interval of the dispatch day will be the total quantity per interval that failed the conduct and impact test for physical withholding from the RTM. The price that is used is the real-time LMP that occurred at the resource for each interval. The quantity that failed the conduct and impact test in each interval will be multiplied by the corresponding real-time price to yield a settlement charge for the interval.

The real-time base settlement charge for a dispatch day is the sum of settlement charges across all intervals of the dispatch day for which the conduct and impact test was failed.

Day-Ahead and Real-Time Market

If a resource fails the conduct and impact test for a dispatch hour in both the day-ahead market and the real-time market, the IESO will determine the day-ahead base settlement charge and the real-time base settlement charge for that dispatch hour and will levy the higher of the two base settlement charges.

5.1.2. Settlement Charge Multipliers

The base settlement charge will be multiplied by persistence and significance multipliers to determine the actual settlement charge levied.

Persistence Multiplier⁸

The IESO will apply a persistence multiplier to the base settlement charge for repeat failures of the conduct and impact test for physical withholding. The first instance of physical withholding by a market control entity within an 18-month period will have a persistence multiplier of 1, the second instance will have a multiplier of 2, and the third instance and any additional instances will have a multiplier of 3.

⁸ The basis for the persistence multiplier is best practice in other jurisdictions.

Significance Multiplier⁹

The IESO is considering use of a significance multiplier of 1.5 on occasions when a resource has failed the conduct and impact test for physical withholding in an NCA or DCA, or when dispatched under a reliability constraint. For other circumstances, the significance multiplier would be 1.

5.2. Public Notice

This IESO shall publish the details of the settlement charge and the name of the market participant when both of the following conditions are met:

- There have been two or more instances of physical withholding by a market control entity in an 18-month period; and
- Both of these instances resulted in a settlement charge of no less than \$100,000 each.

The public notice will include the following information in regards to each failure of the conduct and impact test for physical withholding:

- The name of the resource(s) that failed the conduct and impact test for physical withholding;
- The names of the market participant(s) which are the registered market participant for each resource named per the above;
- The amount of MWhs withheld and the duration;
- The date and time physical withholding occurred; and
- The settlement charge levied.

6. Conclusion

In preparation for the engagement session, stakeholders are encouraged to submit any questions or requests for clarification in advance of the interactive session.

For questions or feedback, please email engagement@ieso.ca.

⁹ The basis for the significant multiplier is that it is appropriate to increase the incentive for resources to not attempt to exercise market power in NCAs, DCAs, or when they are subject to a reliability constraint.