

Stakeholder Engagement Pre-Reading

Negative Pricing – February 13, 2020

The external stakeholder engagement session on February 13, 2020 will cover the following topic(s):

- Negative Pricing

The purpose of this document is to provide stakeholders with information on the detailed design for the Negative Pricing 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 design?
- What questions do stakeholders have on the rationale for the proposed design?
- Do stakeholders agree that the proposed design is 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				
Efficiency Lower out-of-market payments and focus on delivering efficient outcomes to reduce costs	Competition Provide open, fair, non-discriminatory competitive opportunities for participants to help meet evolving system needs	Implementability Work together with our stakeholders to evolve the market in a feasible and practical manner	Certainty Establish stable, enduring market-based mechanisms that send clear, efficient price signals	Transparency Accurate, timely and relevant information is available and accessible to market participants to enable their effective participation in the market

2. Background and Summary

In Ontario's wholesale energy market offers from suppliers reflect the marginal costs of supplying power and bids from consumers reflect their marginal benefit from consumption. Marginal cost offers/bids result in the efficient scheduling of resources and locational prices that reflect the cost of meeting incremental demand at any location. Most resources have positive, or slightly negative marginal costs for supplying energy. This is reflected in Ontario's current unconstrained price (HOEP) and its constrained locational (shadow) prices, which, the vast majority of the time, are either positive, zero or slightly negative (~-\$3/MWh).

However, in certain regions in Ontario, there are instances when locational prices¹ can be significantly less than \$0/MWh. This has been most frequently observed in the Northwest of the province with negative prices occurring in roughly 10% of observed intervals between 2014 and 2016.²

A common reason for locational prices that are significantly negative is supplier offers at negative prices. Such offers may reflect the need to obtain a specific dispatch sequence in order to respect water management requirements related to safety, environmental and/or regulatory considerations.

Insofar that locational prices are the result of offers that reflect the need to manage water levels or system constraints such as transmission limits, then market prices may be inefficient and settlement results can be distorted. For example, in areas with surplus generation, the locational price could be as low as -\$2,000/MWh.

In recent years negative prices have been managed by the IESO under the two-schedule system. That system has a uniform price that ignores locational transmission constraints and therefore seldom reaches substantially negative prices. Additionally, other features temper the effects of negative locational prices such as the inclusion of the offer floor prices for wind/solar and flexible nuclear as well as settlement rules allowing replacement offer/bid prices for the purpose of determining CMSC payments.

The offer floor prices for wind, solar and flexible nuclear were created to achieve an appropriate dispatch order, resulting in more efficient market outcomes. The offer floors were set to -\$3/MWh for 90% of wind and 100% of solar, -\$5/MWh for flexible nuclear and -\$15/MWh for wind's remaining 10% of capacity. In the two-schedule market design this translates to a cluster of offers in the unconstrained supply stack around the offer floors. As a result, the uniform price is rarely lower than the marginal costs of wind, solar and flexible nuclear. While these offer floors will still be applicable under Market Renewal, the locational prices in a Single Schedule Market represent location specific conditions and as a result can be determined by offers lower than those of wind, solar and flexible nuclear.

¹ Currently, locational prices in the IESO-administered markets are determined and published for informational purposes and are not used for settlement. Energy market settlement is based primarily on a uniform price known as the hourly Ontario energy price. In the future Single Schedule Market, locational prices will be used for settlement.

² For more information please see the IESO's stakeholder engagement materials, [Market Power Mitigation and Load Pricing—Analysis of Design Elements and Options](#), from November 13, 2017.

Another feature used in today's market to manage the effect of negative prices are the settlement rules to replace offer/bid prices for the purpose of calculating CMSC payments. The impact of these rules was a reduction of inefficient uplift payments. In the future Single Schedule Market, most of today's make-whole payments related to transmission constraints will be eliminated and the effectiveness of the CMSC replacement bid/offer prices in reducing inefficient market outcomes will be reduced.

Thus, given the differences between the current two-schedule system and the future Single Schedule Market, primarily the settlement of market participants at locational prices, there is a need to develop a new way to address significantly negative settlement prices.

To address this, the IESO is proposing a settlement floor of $-\$20/\text{MWh}$. This settlement floor would define the minimum price that a market participant can pay or be paid for its injection or withdrawal of energy in the IESO-administered market. The settlement floor price would be used in all timeframes, meaning an hourly basis in the Day-Ahead Market and a five minute interval basis in the Real-Time Market.

To increase the effectiveness of the settlement floor price, the IESO believes that an import offer floor price should also be implemented. The IESO is proposing an import offer floor equal to the settlement floor, which is $-\$20/\text{MWh}$.

3. Types of Floors

3.1 Price Floor

A price floor in the context of the IESO-administered market is the minimum $\$/\text{MWh}$ value a price can be cleared at. Today the price floor is set at $-\$2,000/\text{MWh}$ for the energy market, meaning that the uniform market clearing price from the unconstrained schedule cannot be lower than $-\$2,000/\text{MWh}$. In the operating reserve markets, the current price floor is set at $\$0/\text{MWh}$.

In the context of a Single Schedule Market, a price floor is the minimum $\$/\text{MWh}$ value a locational price can be cleared at. The price floor for the future Single Schedule Energy Market will continue to be $-\$2,000/\text{MWh}$. Likewise, the operating reserve markets will continue to have a price floor of $\$0/\text{MWh}$.

As communicated during high level design, the IESO will retain the minimum market clearing price of $-\$2,000/\text{MWh}$.

3.2 Offer Floor

An offer floor is the minimum $\$/\text{MWh}$ value a market participant can offer or bid into the IESO-administered market. Today the IESO has different offer floors depending on fuel type. The different offer floors are intended to create an efficient dispatch order to promote market efficiency.

Today the offer floors into the energy market are as follows:

- $-\$3$ for 90% of wind capacity and 100% of solar capacity
- $-\$5$ for flexible nuclear
- $-\$15$ for the first 10% of wind capacity
- $-\$2,000$ for all other resources

The offer floor for all market participants offering into the operating reserve markets is \$0/MWh.

As noted above, a common reason for negative locational prices is that the marginal offer in an area with surplus supply is at a negative price. This is most common in regions supplied primarily by hydroelectric facilities. Thus, one consideration is to use a higher offer floor for hydroelectric resources that would be appropriate for determining market prices and settlement outcomes. However, the imposition of such an offer floor could have detrimental effects on the ability for hydroelectric facilities to appropriately manage their water restrictions. Therefore, the IESO has decided against introducing an offer floor for such facilities.

3.3 Settlement Floor

A settlement floor is the minimum price in \$/MWh that a market participant would pay or be paid for its injections or withdrawals of energy in the IESO-administered market. There is no settlement floor in the market today.

4. Development of the Settlement Floor

4.1. Settlement Floor Rationale

A settlement floor applied equally to all market participants – both suppliers and consumers - promotes market efficiency by providing appropriate settlement outcomes for all market participants; including those that may wish to continue producing at negative prices.

Unlike the other options considered, the settlement floor permits hydroelectric facilities to continue to offer in a manner that allows them to manage the dispatch of their resources and thus to manage applicable water restrictions. The settlement floor will result in efficient price signals and appropriate settlement results. This would not necessarily be the case without such a floor.

Without introducing a settlement floor market, participants could be exposed to an inefficient and inappropriate settlement that could result in a significant financial impact. For example, assume a resource with positive marginal costs required 10 minutes to ramp from its current schedule of 100 MW down to 50 MW. If a transmission limit suddenly bound, the generator's LMP could (in the extreme) be -\$2,000/MWh while it ramps down. Assuming a linear ramp down, the generator would have injected an average of 87.5 MW in the first interval and 62.5 MW in the second. As a result, the market participant would pay $150 \text{ MW} \times -\$2,000/\text{MWh} / 12\text{Int} = -\$25,000$ during its two-interval ramp down.

4.2. Settlement Floor Price

To align with market renewal principles of efficiency and competition, the IESO is proposing a settlement floor price of -\$20/MWh. This price is -\$5/MWh below the lowest wind offer floor price of -\$15/MWh. This amount has been included to account for the effects of losses inherent in the dispatch and pricing in a Single Schedule Market. A settlement floor of -\$20/MWh will allow wind resources with a high loss factor to compete with other low loss factor resources that do not have an offer floor. Simply stated, the resource with a low loss factor and no offer floor would be able to displace the wind resource in the dispatch order only if it were to offer and then be settled at roughly -\$20/MWh. If the settlement floor were to be set at a higher price, the resource with the lower loss factor could offer at -\$20/MWh but be settled at a higher price, providing that resource with a competitive advantage.

Figure 2 - Proposed Settlement Floor, Price Floor, and Variable Generation/Flexible Nuclear Offer Floors



5. Import Offer Floor

5.1. Rationale for Import Offer Floor

The introduction of a $-\$20/\text{MWh}$ settlement floor necessitates the inclusion of an import offer floor equal to the settlement floor ($-\$20/\text{MWh}$). The import offer floor is needed to remove an inefficient market incentive that would exist should the import offer floor be anything below the settlement floor. That is, imports would be able to offer at one price but knowingly get paid a different, higher price. This would have the potential to inappropriately re-order an efficient dispatch. This could especially be an issue during times of surplus baseload generation (SBG).

As mentioned above, a similar floor for the offers of internal suppliers will not be implemented. Such an offer floor could have a detrimental effect on their ability to manage water levels or other fuel restrictions.

5.2. Import Offer Floor Price

Since the primary reason to impose an import offer floor is to promote efficient outcomes, the price of the import offer should be set at least equal to the settlement floor price. This would prevent the case where imports could have an incentive to import into Ontario during times of SBG.

As the currently proposed settlement floor price is $-\$20/\text{MWh}$, the import offer floor price should also be set to $-\$20/\text{MWh}$. In the event that the settlement floor price is set at a different value, the import offer floor price should also be revised to match it.

For the import leg of a linked wheel, the IESO is considering whether the marginal cost of the import leg can be appropriately reflected with an offer price of $-\$20/\text{MWh}$.

6. Next Steps

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.