IESO Market Renewal

Third Party Commentary on Zonal Pricing in Northern Ontario

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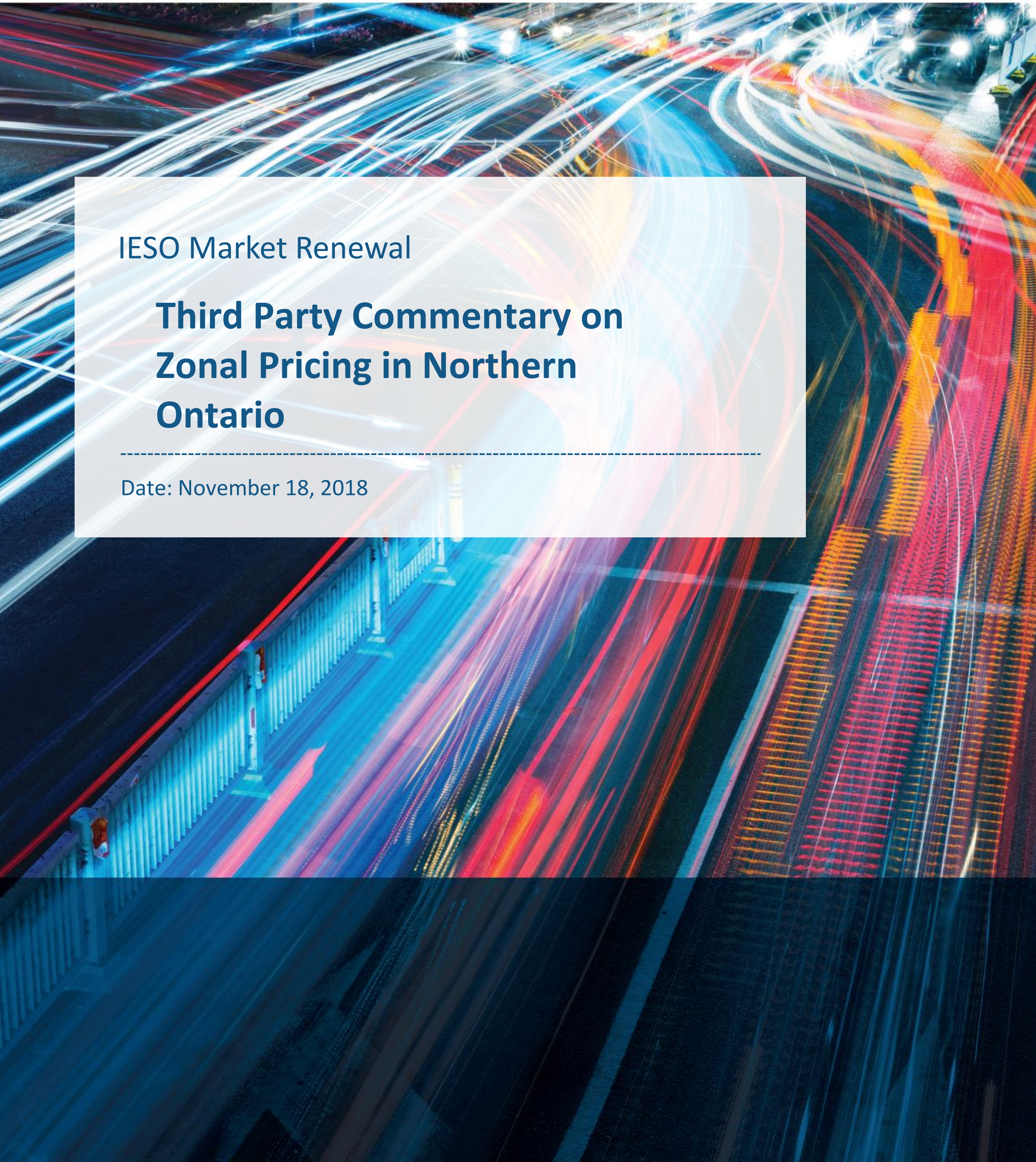

1 Summary of IESO's Planned Changes to Ontario Wholesale Market

This introduction section summarizes the planned changes to transition the Ontario wholesale market from the current two-schedule uniform pricing system to a single-schedule system with zonal and nodal prices.

The remaining sections of this report summarize the anticipated impacts of moving to locational electricity prices for wholesale market participants in Northern Ontario under the proposed Single Schedule Market design.

1.1 Current Two-Schedule System

- Since 2002 Ontario's electricity system has been based on a two-schedule market used to set province-wide wholesale electricity prices. This market design was originally intended as a temporary solution to help Ontario transition from a regulated to a deregulated system but remains in place 16 years later as the only two-schedule market in North America. The IESO's Market Renewal effort will address some of the shortcomings and inefficiencies associated with the current two-schedule market design and is intended to lower costs for consumers and generate new opportunities for market participants.[1]
- The current market design settles participant generators and dispatchable loads based on two schedules: an unconstrained and a constrained schedule. When participants submit bids to the market, the IESO collects the information and determines prices and quantities to be provided by participants by first matching supply to expected demand *without considering intra-provincial transmission limitations*. The bid price where supply meets demand is known as the uniform province-wide **Market Clearing Price** (MCP)[2] for that interval (i.e., five-minute window) under the unconstrained schedule (i.e., market schedule).
- The IESO must continuously ensure that supply and demand are balanced *at all locations* in the network, to ensure reliability. As the transmission capacity is limited in some locations and the Ontario grid can sometimes become congested (i.e., constrained), the IESO must dispatch generation in a way that accounts for any transmission limitations the grid may be experiencing at a given time. For this reason, the IESO may elect to dispatch some participants that bid higher than the unconstrained MCP in any given five-minute window or may elect to not dispatch participants that bid lower than the unconstrained MCP. Nodal prices (i.e., shadow prices) are calculated by the IESO to reflect the specific supply-demand balance at each location in Ontario and are used to determine dispatch under the constrained schedule.[3]
- When the unconstrained schedule produces a different dispatch than the constrained schedule, Congestion Management Settlement Credits are paid to the affected participants. These participants may have been instructed to turn off even though their bid was lower than (or equal to) the MCP or were dispatched even though their bid was higher

[1] IESO - Single Schedule Market High-Level Design (September 2018)

[2] The wholesale price in any given hour, known as the Hourly Ontario Energy Price (HOEP), is calculated based on the consumption-weighted average of the twelve MCPs set every 5 minutes within in each hour.

[3] IESO – Introduction to Ontario's Physical Markets (February 2014)

than the MCP. These CMSC payments (known as out-of-market payments) are not transparent to participants and are complex to administer – one of the major shortcomings of the two-schedule system. Further, when the unconstrained and constrained schedules differ significantly, the price signals do not reflect the actual needs of the electricity network, leading to inefficient markets and higher prices for consumers.

1.2 Single-Schedule Market

- As part of the Market Renewal effort launched in the spring of 2016 the IESO is proposing a Single-Schedule Market (SSM) designed to address the major shortcomings of the two-schedule system outlined above. The SSM is based on a single locational price that incorporates the cost of generation (similar to the existing unconstrained schedule) and the cost of congestion and losses (similar to the existing constrained schedule). By providing a single clear and transparent price signal that reflects the true costs of generation and consumption of electricity at any given location, the SSM will encourage participants to align their operations with the actual needs of the system, which should lead to more efficient markets and overall lower prices for consumers (estimated savings range from $2.2 to $5.2 billion[4] over a ten-year period).
- If there is congestion in the system at a given time, the price paid to generators and the price paid by consumers may be different. In these cases, congestion rents and loss residuals will be collected and paid to consumers to account for this difference.[5]
- In the SSM, wholesale market-participant generators and consumers will be priced on a locational basis, including dispatchable loads. Local Distribution Companies (e.g., Thunder Bay Hydro), are market-participant consumers and will purchase electricity from the IESO at a zonal price. [6]
- Overall, the cost of supply is expected to decrease under the SSM by addressing the inefficiencies and complexities of the current market structure. This decrease in supply should lead to overall lower prices for consumers, but exactly how these savings will be passed on to non-market-participant consumers will ultimately be regulated by the Ontario Energy Board:
    - Large consumers within an LDC service territory currently pay the uniform province-wide Hourly Ontario Energy Price. The OEB has not yet indicated whether these consumers will continue to pay a uniform province-wide price under the SSM, or a price reflective of the zonal price paid by their LDC – more detail is provided in Section 3.1.
    - Residential and small business consumers within an LDC service territory currently pay Regulated Price Plan (RPP) prices set by the OEB. It is not yet clear if these customers will continue to pay a province-wide RPP, or if some adjustments will be made to account for the zonal prices paid by each LDC - more detailed is provided in Section 3.2.

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[4] Brattle Group – March 2017 - The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project
[5] IESO - Single Schedule Market High-Level Design (September 2018)
[6] IESO - Single Schedule Market High-Level Design (September 2018)

2 Projected SSM Wholesale Electricity Prices in Northern Ontario

2.1 Historical Data Analysis

The IESO provided consolidated historical data for analysis to estimate the wholesale market price of electricity under the proposed SSM. Data was collected and summarized for all nodes in the Northwest and Northeast zones[7], and more narrowly for all nodes serving the Thunder Bay Hydro and Greater Sudbury Hydro LDCs, over a 4-year period spanning from January 2014 to December 2017.

The "Status Quo" price calculated by IESO and presented below is the price under the current two-schedule system and includes the historical Hourly Ontario Energy Price, all uplift costs (transmission congestion costs currently captured by CMSCs) and all losses. The "Zonal" price calculated by the IESO, which can be directly compared with the current Status Quo, is the theoretical wholesale price that would have been in effect under the SSM, inclusive of all congestion rents and loss residuals reimbursements.

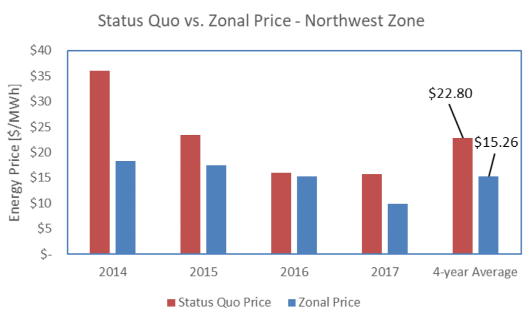

Figure 1: Status Quo vs. Zonal Price – Northwest Zone[8]

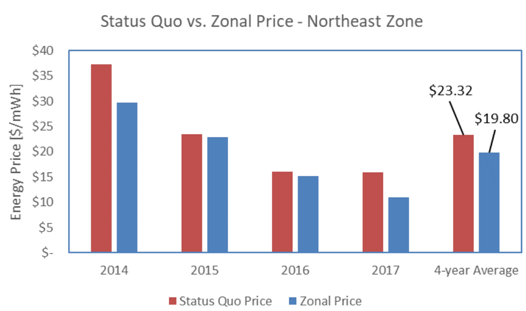

Figure 2: Status Quo vs. Zonal Price – Northeast Zone

The total generation resources in the Northwest and Northeast Zones generally exceed the zone peak demand, resulting in opportunities to export (mainly) low-cost hydroelectric power to southern zones of Ontario[9]. However, the inter-zone transmission links are frequently congested, limiting the amount of power that can be exported to southern zones, resulting in lower nodal and zonal prices in the North (especially in the Northwest). In fact, negative shadow prices are observed more frequently in the Northern zones than any other zones in Ontario[10]. It follows that transitioning the Northern region from a uniform province-wide price to an SSM locational price would result in overall lower costs for these regions.

Figure 1 and Figure 2 show that zonal prices are expected to be lower in both Northern regions relative to the Status Quo. Prices decrease from the Status Quo of roughly $23/MWh to $15.26/MWh in the Northwest (a 33% decrease), and $19.80/MWh in the Northeast (a 15% decrease). The larger decrease in the Northwest is reflective of significant amounts of low-cost generation being "stranded" in that zone due to the congestion on the intertie through the Northeast and to the southern zones.

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[7] The IESO segments Ontario into ten electrical zones according to congestion and expected price separation
[8] According to the IESO, 2014 prices were higher due to the prolonged winter in that year, commonly termed the "Polar Vortex"
[9] Ontario Transmission System – IESO – December 12, 2017
[10] Market Power Mitigation and Load Pricing – IESO – November 13, 2017

The IESO also provided consolidated historical data for analysis for two large Local Distribution Companies (LDCs) in the Northern Regions: Thunder Bay Hydro and Greater Sudbury Hydro. All nodes serving each LDC service territory were collected and summarized, and a consumption-weighted average price was established for the Status Quo and proposed SSM Zonal price. As Thunder Bay is located in the Northwest zone, and Sudbury is located in the Northeast zone, the results shown for each LDC in Figure 3 and Figure 4 parallel the results in Figure 1 and Figure 2. Wholesale prices paid to the IESO by Thunder Bay Hydro closely mirror the Northwest zone wholesale price at $15.66/MWh (a 36% decrease), while wholesale prices paid to the IESO by Greater Sudbury Hydro closely mirror the Northeast zone wholesale price at $21.22/MWh (a 16% decrease).

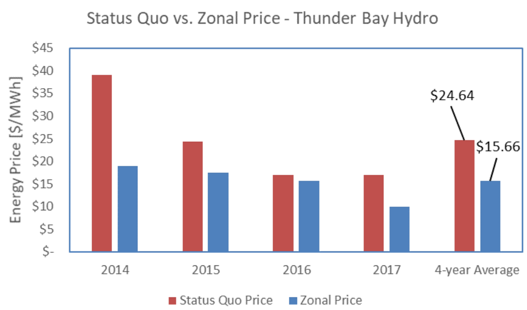

Figure 3: Status Quo vs. Zonal Price – Thunder Bay Hydro

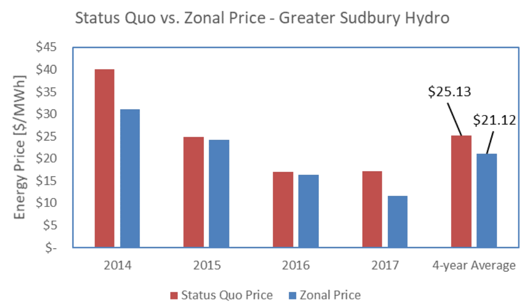

Figure 4: Status Quo vs. Zonal Price – Greater Sudbury Hydro

2.2 Future Outlook

While the historical analysis in Section 2.1 presents the prices that would have been observed under the SSM for the past four years, the prevailing historical condition of constrained generation within Northern zones may not necessarily be representative of conditions in the future. Changes to the network that may materially affect the dynamics of pricing in Northern zones include:

- Load growth (e.g., new mining operations, connection of remote communities)
- Variations in generation (e.g., low-water years, new generation developments);
- Infrastructure upgrades that reduce transmission bottlenecks and alleviate congestion;
    - For example, the Northwest Bulk Transmission Line, East-West Tie Expansion; and
- Upgrades to interties with Manitoba and Minnesota;

In general, load growth would help alleviate congestion and could lead to increased zonal prices. Additions of generation would exacerbate the congestion and could decrease zonal prices, but reductions in generation (e.g., from low-water years) would reduce congestion and might lead to increased zonal prices. Improvements to the transmission system would make it easier to export power from the North (increasing zonal prices), while also making it easier to import power from the south when needed (reducing zonal prices). Any price increases observed in the North would likely be mitigated by reducing exports to Manitoba and Minnesota.

It is difficult to forecast the combined effects of the market dynamics listed above; however, the efficiencies realized by the SSM will tend to reduce overall supply prices in general. The IESO will work to assess the relative effects of all market dynamics as the Market Renewal design progresses.

3 Changes to Customer Rates

3.1 Commercial and Industrial Rates

The move from uniform pricing to zonal wholesale pricing will directly impact large direct-connect customers and LDCs, as they will pay wholesale zonal prices under the proposed SSM. In the Northern zones of Ontario, zonal prices are anticipated to be lower than the prices resulting from the existing two-schedule market design.

It is not certain what the impact of the SSM will be to commercial and industrial customers[11] *within LDC service territories* who currently pay wholesale rates through the uniform Hourly Ontario Electricity Price (HOEP). The OEB has not made any public comment on the specifics of the proposed SSM aside from stating their general support for Market Renewal and providing assistance to the IESO in moving to the high-level design phase of the project[12]. The recent documentation submitted to OEB's current consultation on **Rate Design for Commercial and Industrial Customers**[13] does not appear to address the possibility of zonal pricing and focuses instead on distribution rate design not affected by the SSM.

3.2 Residential and Small Business Rates

Moving to a SSM will not directly impact residential and small business consumers. Under the current Status Quo, these consumers follow the province-wide Regulated Price Plan (RPP), which has been in place in Ontario since April 2005. The RPP is intended to ensure that consumers are provided with stable and predictable electricity pricing, are encouraged to conserve, and are charged prices reflecting the costs paid to generators.

The legislation underpinning the RPP requires that prices set by the OEB reflect the cost of supply over time. For this reason, should the Market Renewal project succeed at removing the market inefficiencies and complexities outlined in Section 1.1, then overall cost of supply should naturally decline, and RPP rates should decline proportionally. It is unclear if the Ontario Energy Board (OEB) will continue to require Local Distribution Companies (LDCs) to charge the province-wide RPP prices to residential and small business customers, or if LDCs will be permitted to adjust their residential and small commercial rates to account for their unique zonal wholesale prices. The most recent RPP Roadmap issued by the OEB in November 2015 does not make any comment on location-based pricing, but future Roadmap publications may provide a signal on OEB's intent as the IESO's high-level design project progresses.

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[11] With peak demands of 50 kW or more

[12] OEB Market Surveillance Panel (Feb 2018) – Monitoring Report on the IESO-Administered Electricity Markets (for the period from May 2016-October 2016)

[13] OEB Case #EB-2015-0043

4 Impact on Global Adjustment Avoidance Program

The Industrial Conservation Initiative is a form of demand response that allows participating Class A customers[14] to lower their global adjustment costs by curtailing demand during Ontario's peak periods. Customers are assessed their portion of global adjustment costs based on the percentage that their demand contributes to the top five Ontario system peaks. The Peak Demand Factor set during the base period (May through April) is used to calculate the customer's monthly global adjustment charge during the annual adjustment period (July through June)[15].

The proposed SSM is projected to decrease commodity prices, but the Global Adjustment (GA) charge is expected to increase in response. This is a result of the long-term supply purchase contracts signed by the Ontario Power Authority, Ontario Power Generation, and the Ontario Electricity Financial Corporation, which pay generators the difference between the wholesale and contracted price of energy[16]. As the price of energy decreases under SSM, the difference between the wholesale price and (fixed) contracted prices will increase, requiring a larger Global Adjustment charge[17]. However, in a recent stakeholder feedback document[18], the IESO indicated that the expected increase in the GA amount is expected to be less than half the expected savings from moving to a SSM.

While the proportion of energy and GA charges will change for consumers under SSM, the net cost to consumers of commodity and GA charges is expected to be lower due to the efficiencies realized by market renewal. However, given the increased share of GA charges, the incentive for customers to reduce their GA payments through the ICI program will persist under zonal pricing in the SSM.

The potential for peak demand savings through the ICI program may be impacted by zonal pricing as generators, dispatchable loads, and non-dispatchable loads adjust to the realities of the SSM. Behind-the-meter generation and storage technologies may become more attractive under the SSM as these technologies could be used to avoid high zonal prices, particularly during peak congestion times. For these customers, it may be easier to participate in the ICI program because of investments already made in behind-the-meter technologies.

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[14] Class A customers can include some facilities in key manufacturing and industrial sectors with peak demands between 500 kW – 1 MW, and all customers with peak demands > 1 MW

[15] IESO - Industrial Conservation Initiative Backgrounder (April 2018)

[16] IESO - Guide to Wholesale Electricity Charges

[17] IESO - Global Adjustment Components and Costs

[18] IESO - Market Renewal – Energy Work Stream: July 2018 Response to Stakeholder Feedback