ONTARIO ENERGY BOARD

Market Surveillance Panel

The Industrial Conservation Initiative:

Evaluating its Impact and Potential Alternative Approaches

December 2018

Ontario

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Role of the Market Surveillance Panel

The Market Surveillance Panel (Panel) is a panel of the Ontario Energy Board. Its role is to monitor, investigate and report on activities related to—and behaviour in—the wholesale electricity markets administered by the Independent Electricity System Operator (IESO).

The Panel monitors, evaluates and analyzes activities related to the IESO-administered markets and the conduct of market participants to identify:

- inappropriate or anomalous conduct in the markets, including gaming and the abuse of market power;
- activities of the IESO that may have an impact on market efficiencies or effective competition;
- actual or potential design or other flaws and inefficiencies in the Market Rules and procedures; and
- actual or potential design or other flaws in the overall structure of the IESO-administered markets and assess consistency of that structure with the efficient and fair operation of a competitive market.

Market-related activities and market conduct may also be the subject of a more formal and targeted investigation by the Panel. To that end, the Panel has authority under the Electricity Act, 1998 to compel testimony and the production of information.

The Panel reports on the results of its monitoring and investigations. The Panel does not have the legislative mandate to impose sanctions or other remedies in response to inappropriate conduct or market defects, but it does make recommendations for remedial action as it considers appropriate.

Executive Summary

In 2011, the Government of Ontario introduced a policy known as the Industrial Conservation Initiative (ICI), which changed the way in which Global Adjustment costs are allocated to different classes of consumers.

The stated purpose of the ICI is to provide large consumers with an incentive to reduce consumption at critical peak demand times. The resulting reductions in peak demand were expected to reduce the need to invest in new peaking generation and imports of electricity from coal-reliant jurisdictions. The ICI was also intended to increase the efficiency of price signals, while also recognizing concerns that large volume consumers were paying more than their fair share of costs.

The costs recovered through the Global Adjustment include the costs of contracted and regulated generation, as well as the cost of some conservation programs. The Global Adjustment has grown from $700 million in 2006 (8% of total electricity supply costs) to $11.9 billion in 2017 (more than 80% of total electricity supply costs). As the Global Adjustment has grown, so too has the reduction in peak demand by consumers participating in the ICI. The Panel estimates that ICI participants reduced their consumption by 42% during peak demand conditions in 2016, compared to reductions of 33% and 26% in 2013 and 2011 respectively.

The ICI has the effect of shifting the electricity costs recovered through the Global Adjustment from larger volume consumers to households and small businesses. Because the Global Adjustment now accounts for the lion's share of electricity supply costs, baseload as well as peaking, how those costs are allocated between large and small consumers has a significant effect on the effective electricity prices that they pay. Since its introduction in 2011, the ICI has shifted nearly $5 billion in electricity costs from larger consumers to smaller ones. In 2017, the ICI shifted $1.2 billion in electricity costs to households and small businesses—nearly four times greater than the amount in 2011. In 2017, the ICI increased the cost of electricity for households and small businesses by 10%.

The Market Surveillance Panel (Panel), in the course of its monitoring of activities related to the IESO-administered market that may affect the efficient and fair operation of that market, regularly reports on effective electricity prices, including the Global Adjustment component of those prices. The Panel has noted on more than one occasion that the ICI affects the effective price paid by different classes of consumers.

In the Panel’s view, the ICI as presently structured is a complicated and non-transparent means of recovering costs, with limited efficiency benefits. The magnitude of the incentive to reduce peak demand during a year is inversely related to the Province’s need for peak demand reduction the following year. Arguably, the ICI does not allocate costs fairly in the sense of assigning costs to those who cause them and/or benefit from them being incurred.

The Panel recognizes that striking an appropriate balance between potentially competing objectives and interests in cost allocation is a challenge and will remain so. The Panel has prepared this report to contribute in a positive way to any future discussions regarding that balancing exercise, and with a view to promoting consideration of market efficiency and fairness.

The Panel notes by way of postscript that, as it was finalizing this report, the Ontario government announced in its 2018 Ontario Economic Outlook and Fiscal Review that it was launching a public review of electricity pricing for industrial consumers as part of the government’s open for business policy.

1. Introduction

The Global Adjustment is the mechanism by which certain electricity supply costs are recovered from electricity ratepayers. Since its introduction in 2005, the Global Adjustment has steadily increased as a percentage of total electricity supply costs, accounting for over 80% ($11.9 billion) in 2017. Given its magnitude, the allocation of Global Adjustment costs amongst consumers has a significant impact on the price consumers pay for electricity.

In January 2011, a new methodology for allocating Global Adjustment costs, called the Industrial Conservation Initiative (ICI), came into effect. Since its introduction, participation in the ICI has shifted nearly $5 billion in Global Adjustment costs from larger consumers to residential consumers and small businesses. In 2017, $1.2 billion in electricity costs were shifted, increasing the cost of electricity for residential consumers and small businesses by 10%.

The Panel recognizes that finding the right balance between competing objectives and interests when allocating costs is challenging. The Panel suggests that the following principal criteria are useful when evaluating methodologies—like the ICI—for allocating fixed costs: efficiency; fairness; simplicity/transparency; and cost recovery. In this report, the Panel assesses the performance of the ICI against those criteria.

2. Background: The Global Adjustment

Generating electricity requires significant investment in infrastructure. The bulk of these investments occur when building and maintaining electricity generators. In the electricity sector, the costs of building and maintaining a generator are referred to as "capacity" costs, which include a reasonable rate of return on those investments. As electricity is consumed on a day-to-day basis, capacity costs are considered "fixed" in that they do not increase or decrease with increasing or decreasing production. The fixed capacity costs associated with generating electricity ultimately need to be recovered from the consumers who benefit from this infrastructure.

In addition to fixed capacity costs, there are incremental (variable or "marginal") costs associated with generating electricity. Marginal costs are those associated with generating the electricity itself, such as the purchase of natural gas fuel, and increase or decrease with increasing or decreasing production. These costs also need to be recovered from consumers. In Ontario, there is a wholesale electricity market where generators sell electricity at the prevailing market price, which is intended to cover, at a minimum, the marginal costs of generating that electricity. In cases when the market price exceeds the marginal cost of generating the electricity, the excess revenues from the wholesale electricity market help the investor recover the fixed capacity costs associated with building and maintaining its generator.

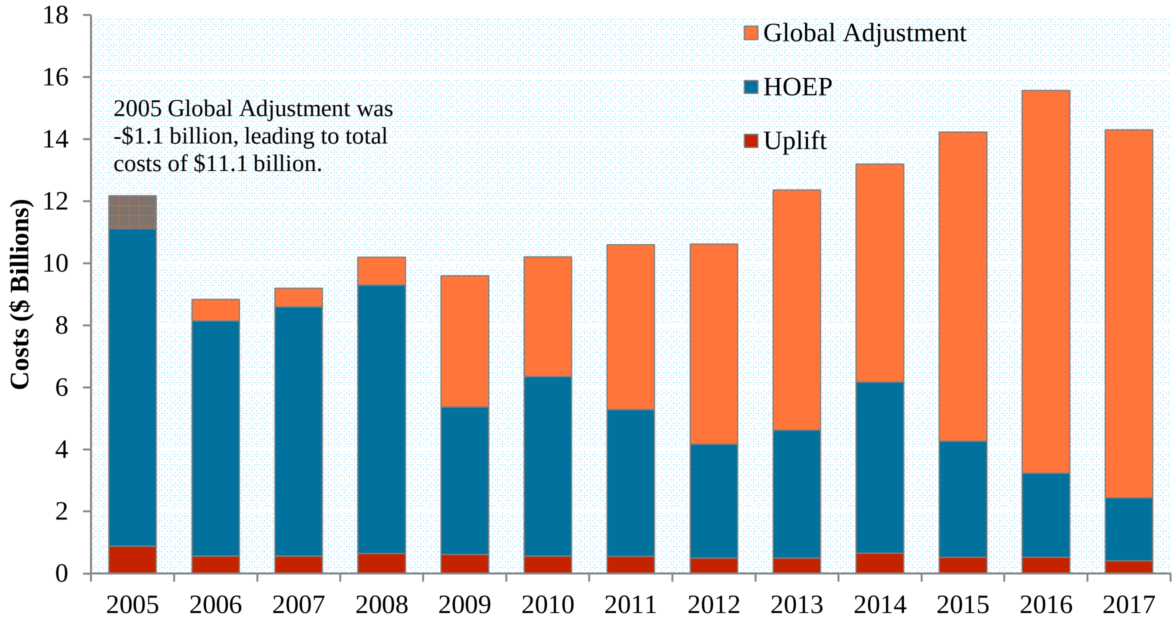
For a number of reasons, revenues from Ontario's wholesale electricity market have been insufficient to cover many generators' fixed capacity costs. In electricity sector parlance, this is referred to as the "missing money" problem. Without long-term financial viability, capacity needed to meet demand may be retired, or may not be built in the first place. Such were the circumstances in the mid-2000s when demand for electricity was growing and Ontario was facing increasingly tight supply conditions.

To address the "missing money" problem and incent investment in new generating capacity, Ontario offered long-term contracts to potential project proponents. While the terms of the contracts differed by generating technology and time of procurement, all contracts were intended to guarantee that investors would recover the fixed capacity costs associated with building and maintaining new generation capacity. This approach proved very successful and significant new generating capacity was built from 2006 onwards. In addition, some of the generation assets owned by Ontario Power Generation Inc. are subject to regulated rates that cover their fixed capacity costs. Generally speaking, when market revenues are insufficient to cover the contracted or regulated amount, supplementary payments need to be made, so a new mechanism was needed to recover these payments from electricity consumers. The Global Adjustment, a charge to Ontario electricity consumers, serves that purpose.

Since its introduction in 2005, the Global Adjustment has made up an increasing portion of the cost of electricity supply charged to consumers. There are many factors driving this trend, including an increasing number of dollars committed to an increasing number of contracted generators. Also a factor is a steady decrease in wholesale electricity market prices, which decreases revenues from the market and necessitates the recovery of a greater portion of fixed capacity costs through the Global Adjustment.

Figure 1 displays how the recovery of electricity supply costs has increasingly shifted from wholesale electricity market charges (the Hourly Ontario Energy Price or "HOEP" and uplift),[1] to the Global Adjustment, which grew from $700 million in 2006 to $11.9 billion in 2017.

Figure 1: Annual Electricity Supply Costs
2005 – 2017
($ Billions)



3. Background: The Industrial Conservation Initiative

Prior to 2011, the Global Adjustment was allocated to all Ontario consumers on a volumetric basis: the costs associated with the Global Adjustment were summed and allocated equally over all megawatt-hours consumed in the Province each month.[2] For example, if the total Global Adjustment was $500 million for a given month, and Ontario consumption was 10 million megawatt-hours, there would be a $50/MWh Global Adjustment charge for all consumers.

In 2011, the Government of Ontario introduced the ICI, a new way of allocating Global Adjustment costs. The change in the allocation of the Global Adjustment was intended to provide large consumers with an incentive to reduce consumption at critical peak demand times. The resulting reductions in peak demand were expected to reduce the need to invest in new

[1] Uplift is charged by the IESO to wholesale market participants in order to recover the costs associated with various wholesale electricity market services and programs, such as the Generation Cost Guarantee program.
[2] Exporters do not pay the Global Adjustment.

peaking generation and imports of electricity from coal-reliant jurisdictions. The ICI was also intended to increase the efficiency of price signals, while also recognizing concerns that large volume consumers were paying more than their fair share of costs.[3]

The Industrial Conservation Initiative: How it Works

The ICI is the mechanism for allocating Global Adjustment costs amongst Ontario consumers. Under the ICI, a consumer's allocation of Global Adjustment costs depends on their consumer class and consumption profile.

New Consumer Classes

The introduction of the ICI divided Ontario consumers into two classes: "Class A" and "Class B". Initially, ***Class A*** was limited to very large consumers with an average monthly peak demand of more than 5 MW (primarily large industrial consumers). Since then, the government has expanded eligibility such that Class A now includes all consumers with an average monthly peak demand of more than 1 MW, as well as consumers in certain manufacturing, industrial and agricultural sectors with an average monthly peak demand of more than 0.5 MW. As a result, the number of Class A consumers has increased from less than 200 in 2011 to over 1,600 in 2018. ***Class B*** comprises all other consumers, including residential consumers and small businesses.

Allocating Global Adjustment Costs

Under the ICI, Class A and Class B consumers are allocated Global Adjustment costs differently. ***Class A*** consumers are charged the Global Adjustment based on their share of consumption during the five peak demand hours in a year.[4] For example, if a Class A consumer was responsible for 1% of Ontario demand during the five peak demand hours in a 12-month period, they would pay 1% of the Global Adjustment in the ensuing 12-month period.[5] By reducing their consumption during peak demand hours, Class A consumers are able to reduce the amount of the

[3] The proposal to amend O. Reg. 429/04 is available at: http://www.ebr.gov.on.ca/ERS-WEB-External/displaynoticecontent.do?noticeId=MTEwNzI0&statusId=MTY2MTgw&language=en
[4] Referred to as "coincident peak" demand hours, these five peak demand hours must occur on different days. For example, in 2016 three of the five highest demand hours occurred on August 8th, but only the peak hour during that day (hour ending 18 at 23,100 MW of demand) was treated as one of the five peak demand hours for the purposes of allocating the Global Adjustment under the ICI.
[5] The year-long period during which a consumer's demand during peak demand hours is recorded is the "base period", taking place from May 1 to the following April 30. A consumer's peak demand factor (i.e. percentage of total peak demand) during this base period determines their share of the Global Adjustment for a 12-month "adjustment period" beginning July 1 following the end of the base period.

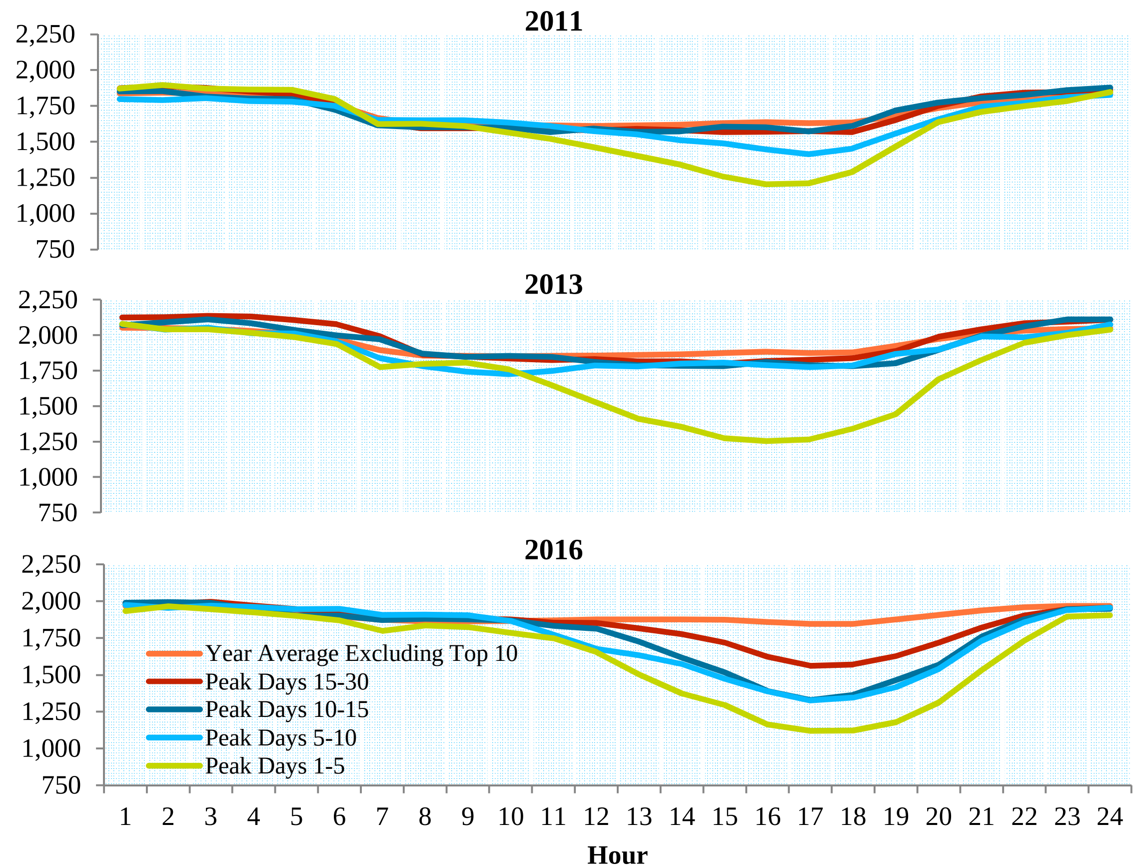
Global Adjustment they pay. Those avoided costs are shifted to ***Class B*** consumers, who pay the remaining Global Adjustment costs on a volumetric basis.

3.1 Impact on Class A Consumption during Peak Demand Hours

The ICI provides Class A consumers with a strong incentive to reduce consumption during peak demand hours. The Panel estimates that by reducing consumption by one megawatt during each of the five peak demand hours in 2016, a Class A consumer would have saved approximately $520,000 in Global Adjustment charges. This incentive has proved effective in reducing Class A consumption during peak demand hours. Figure 2 compares the aggregated consumption profile of all directly-connected Class A consumers[6] on days when peak demand hours occurred in 2011, 2013, and 2016. Reductions in consumption can be measured by comparing consumption during days with a peak demand hour ("Peak Days 1-5" line) to consumption during days without a peak demand hour ("Year Average Excluding Top 10" line).

[6] Directly-connected Class A consumers are those that are connected to the transmission grid. This does not include Class A consumers that are connected at the distribution level. Except where otherwise noted, references to Class A consumers in this report refer to all Class A consumers.

Figure 2: Directly-Connected Class A Response During Peak Demand Days 2011, 2013 and 2016 (MW)



Over the years, consumption reductions have grown as the magnitude of the Global Adjustment, and thus the ICI incentive, have grown. In 2016, on the five days when a peak demand hour occurred, the ICI produced a maximum hourly reduction in directly-connected Class A consumption of 42%, and more moderate reductions during other hours of those days. This compares to a 33% reduction in 2013, and a 26% reduction in 2011.

The Panel cannot precisely determine the total magnitude of peak demand reductions resulting from the ICI as it does not have access to hourly consumption data for Class A consumers that are connected at the distribution level, and not directly connected to the transmission grid.[7] In 2016, 40% of Class A consumers were connected at the distribution level, increasing to 49% in 2017. Based on the assumption that these distribution-connected Class A consumers had the

[7] For more information on data limitations, see the Panel's April 2015 Monitoring Report, pages 105-109, available at: http://www.ontarioenergyboard.ca/oeb/_Documents/MSP/MSP_Report_Nov2013-Apr2014_20150420.pdf

same consumption profile as directly-connected Class A consumers, the Panel estimates that the ICI produced an average peak reduction of 1,200 MW on the five days with peak demand hours in 2016.

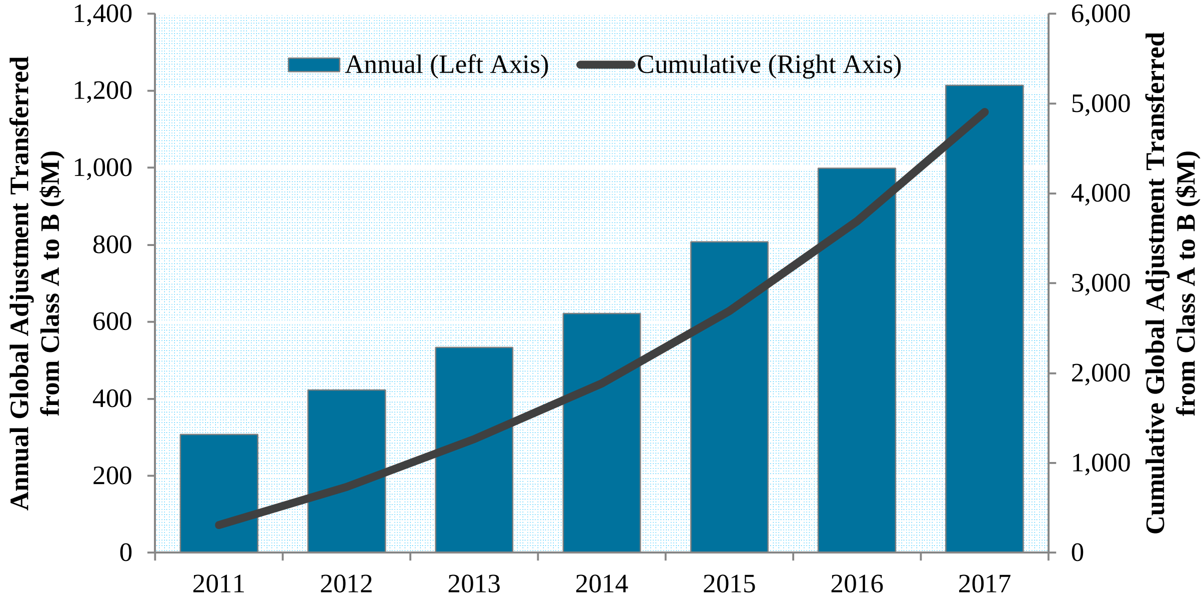
Due to the uncertainty around the days when the year's top five peak demand hours will occur, and given the costly implications of consuming during those hours, Class A consumers reduce consumption in more than just the top five days. This behaviour was prevalent in 2016 (see Figure 2), when there was less certainty around which hours would ultimately make up the five peak demand hours. As a result, directly-connected Class A consumers reduced consumption during a greater number of days (days 6 through 30) compared to years past.[8]

3.2 Impact of the Allocation of the Global Adjustment

As Class A consumers reduce their consumption during peak demand hours and, by extension, the Global Adjustment they pay, the Global Adjustment payable by Class B consumers increases. The resultant shifting of Global Adjustment costs from Class A to Class B consumers has had a significant impact on the effective electricity price paid by both consumer classes. Figure 3 displays the annual Global Adjustment costs shifted from Class A to Class B as a result of participation in the ICI.

[8] In some years, the days containing peak demand hours have been consecutive and easier to predict, resulting in less peak-reducing behaviour outside of those days. In recent years, Ontario has been a summer-peaking jurisdiction, with the peaks typically set during the hottest weekdays in the summer, when air conditioning usage is at its highest. For example, in both 2011 and 2013 the five peak demand hours occurred on consecutive days in the midst of an intense heat wave. Both of these episodes were in mid-July, thus there was little reduction in consumption during the lesser demand days that followed. In the summer of 2016, the 10 highest demand hours occurred over four different weeks from July to September, and this uncertainty induced consumption reductions during hours outside of the days containing the five highest peak demand hours (seen in Figure 2). The expansion of Class A adds further uncertainty around predicting peak demand hours. As more consumers are added to the class, ICI-related demand reductions increase, potentially shifting when the peak demand hours occur. In other words, Class A consumers need to predict the response of other Class A consumers to correctly identify the five peak demand hours.

Figure 3: Global Adjustment Costs Shifted from Class A to Class B Consumers 2011 – 2017 ($ Millions)

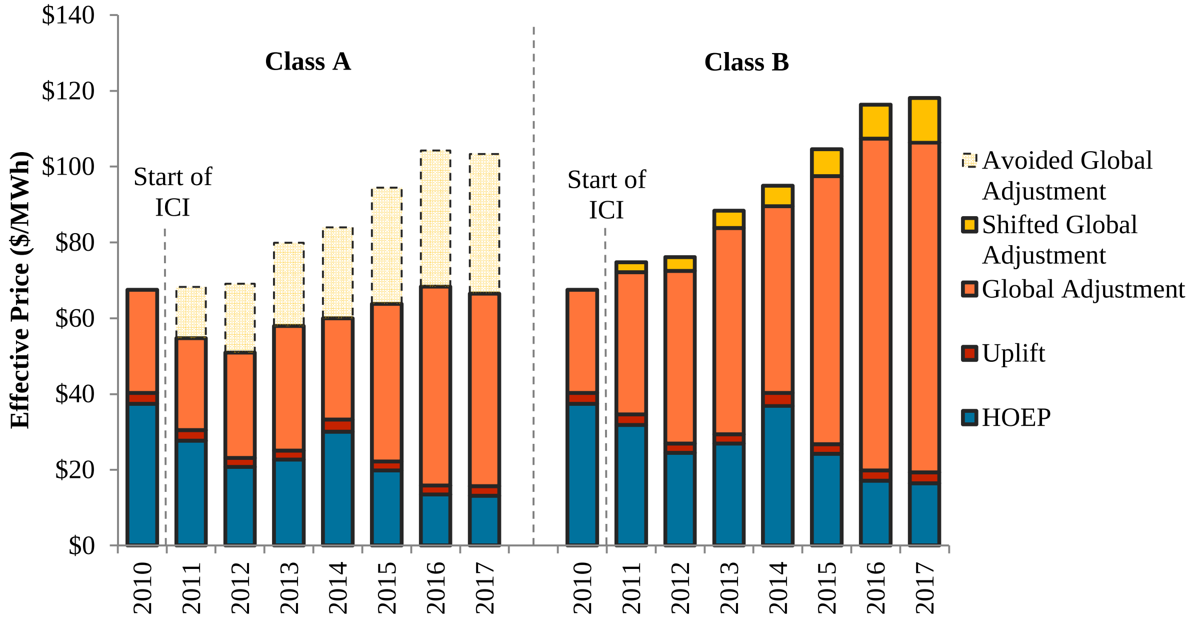


The amount of Global Adjustment costs shifted from Class A to Class B consumers has increased every year since the introduction of the ICI. In 2011, approximately $300 million in Global Adjustment costs were shifted from Class A to Class B consumers as a result of participation in the ICI, representing approximately 3.5% of the total electricity supply costs for Class B consumers that year. In 2017, the costs shifted had increased to $1.2 billion, representing approximately 10% of the total electricity supply costs for Class B consumers. Since 2011, participation in the ICI has shifted a total of $4.91 billion in Global Adjustment costs from Class A to Class B consumers.[9]

Figure 4 displays the average effective electricity price paid by Class A and Class B consumers since 2010, the year prior to the introduction of the ICI. The effective price is broken down by cost component and shows the Global Adjustment costs avoided by Class A consumers and shifted to Class B consumers as a result of Class A participation in the ICI.

[9] As measured from January 2011 to December 2017. Not adjusted for inflation.

Figure 4: Average Effective Electricity Price by Consumer Class 2010 - 2017 ($/MWh)



In 2010, the average effective electricity price for both Class A and Class B consumers was $67/MWh. Since then, the average effective price for Class A consumers has decreased to $66/MWh (1.5% decrease), while the average effective price for Class B consumers has increased to $118/MWh (76% increase). In 2017, through participation in the ICI, Class A consumers were able to reduce the average price they pay by $37/MWh. The resultant shift in Global Adjustment costs added approximately $12/MWh to the average price paid by Class B consumers in that same year, representing 24% of the total increase since 2010.[10]

In light of the expansion of the ICI and the increased number of consumers that are eligible for Class A, it is reasonable to expect that the Global Adjustment costs shifted from Class A to Class B consumers will continue to increase.

4. Criteria for Effective Cost Allocation

The Panel recognizes that finding an appropriate balance between competing objectives and interests when allocating costs is challenging. When evaluating the ICI and other methodologies

[10] The per megawatt-hour effective price increase for Class B consumers is smaller than the corresponding decrease for Class A because Class B consumes far more electricity, spreading the cost over more megawatt-hours.

for allocating fixed costs, the Panel suggests that the following should be the principal criteria: efficiency; fairness; simplicity/transparency; and cost recovery.[11] Prices should incent efficient production and consumption decisions in the short-term and efficient investment decisions in the long-term. Prices should be "fair", in the sense of allocating costs to those who cause them and/or benefit from them being incurred. Prices should be simple and transparent, so that consumers can make informed decisions. Finally, prices should be set to wholly recover costs, and should be sustainable in the long-term.

In the following section, the Panel assesses the ICI against these criteria.

5. Assessment of the Industrial Conservation Initiative

5.1 Efficiency

Prices should incent efficient production and consumption decisions in the short-run and efficient investment decisions in the long-run.

Efficiency is concerned with the optimal use of scarce resources in both the short-term and the long-term. In the short-term, this means the least-costly producers of electricity are supplying it to the consumers who value it the most. In the long-term, this means making investments that minimize the average cost of electricity over that period.

Short-Term Efficiency

In a competitive wholesale electricity market, suppliers will offer to sell electricity based on their marginal cost of production, while consumers will bid to buy electricity based on the marginal value they derive from consuming electricity. These offers and bids are aggregated into supply and demand curves respectively, and the market price is set at the intersection of these curves. The result will be a market price equal to the system-wide marginal cost of production. This market price will serve to coordinate the production and consumption of electricity: suppliers of electricity with production costs below the market price will be induced to produce electricity, while consumers who value electricity above the market price will be induced to consume that electricity. This is an efficient outcome.

[11] These principles were articulated in the paper *The Price Isn't Right: Need for Reform in Consumer Electricity Pricing* (2010), available at: https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed//backgrounder_124.pdf . For a recent summary of economic principles and an overview of fixed cost recovery pricing designs see Severin Borenstein's *The Economics of Fixed Cost Recovery by Utilities* (2016), available at: https://ei.haas.berkeley.edu/research/papers/WP272.pdf .

Charging consumers more than the market price of electricity may cause them to forgo consumption, notwithstanding that the value they derive from that electricity exceeds the actual cost of production. This is not an efficient outcome. The volumetric allocation of the Global Adjustment that predated the ICI exhibited deficiencies in this regard. Under that allocation, consumers participating in the wholesale electricity market were charged the market price plus a Global Adjustment charge for every megawatt they consumed. For example, in 2010 the average market price (HOEP) was $37/MWh, while the average volumetric Global Adjustment charge was $27/MWh. Consequently, assuming that market prices reflected the marginal cost of production, consumers were charged $64/MWh (plus uplift) for electricity that cost $37/MWh to produce. Any consumer that valued electricity at more than $37/MWh, but less than $64/MWh, would have been dissuaded from consuming electricity, despite that consumption being efficient.

For a subset of consumers and hours, the ICI represents an efficiency improvement over the volumetric allocation of the Global Adjustment. Class A consumers no longer pay the Global Adjustment based on their consumption in all hours. Instead, their share of the Global Adjustment is now wholly determined by their consumption during the five peak demand hours of the year; their consumption during all other hours has no impact on the Global Adjustment they pay. Consequently, the incremental cost of consumption during all non-peak demand hours is equal to the market price (plus uplift), which serves to maximize short-term efficiency during those hours.

While the ICI resulted in short-term efficiency gains for Class A consumers during non-peak demand hours, it resulted in short-term efficiency losses for Class A consumers during peak demand hours and potential peak demand hours. Whereas a Class A consumer’s allocation of the Global Adjustment was formerly determined by their consumption in all hours, it is now determined based on their consumption in just five hours per year, greatly increasing the cost of consumption during those hours. In 2016, the cost of consuming during a single peak demand hour was approximately $104,000/MWh, more than 6,000 times the average market price of $16/MWh in the same period. In the face of this much higher cost, Class A consumers have foregone from what would otherwise be efficient short-term consumption (see Figure 2).

While shifting costs amongst consumers may not always be viewed as fair, it can be efficient. Consumers value electricity differently; those that place the highest value are willing to bear higher costs before reducing their consumption. To the degree that costs can be shifted from more price-sensitive consumers to less price-sensitive ones, efficiency can be improved. Under the ICI, Class B consumers continue to pay the Global Adjustment on a volumetric basis. As Global Adjustment costs are shifted to Class B consumers, their cost of consumption increases well above the market price. In the face of this higher cost, Class B consumers may also forgo efficient short-term consumption.

When assessing the ICI's overall impact on short-term efficiency, the Panel estimates that the efficiency loss associated with foregone economic consumption by Class A consumers during peak and potential peak demand hours offsets the efficiency gains associated with improving efficiency during non-peak demand hours.[12] An ambiguous or even negative impact on short-term efficiency may ultimately be an acceptable trade-off if it results in increased efficiency in the long term; this is discussed below.

In order to maximize short-term efficiency, the cost of consumption should reflect the short-term marginal cost of production. This should apply to as many consumers and during as many hours as possible.

Long-Term Efficiency

Achieving long-term efficiency means making investments that minimize the average cost of electricity. Doing so means procuring sufficient capacity to meet future demand and reliability needs, but no more, and doing so at the least cost.

Future demand will be affected by expected decreases in peak consumption associated with the ICI. In this respect, the ICI—and the expected peak demand reduction—serve as an alternative to constructing new generating capacity. This can improve long-term efficiency: unlike building a new generator, in theory the ICI does not increase total electricity supply costs, it merely shifts existing costs amongst consumers.

The Panel has not assessed past central-planning activities to determine whether expected demand reductions associated with the ICI alleviated the need to procure additional grid-

[12] See pages 84-91 of the Panel's June 2013 semi-annual Monitoring Report, available at: https://www.oeb.ca/oeb/_Documents/MSP/MSP_Report_May2012-Oct2012_20130621.pdf

connected generating capacity. Assuming that the ICI alleviated the need to procure additional grid-connected generating capacity, it has not necessarily increased long-term efficiency.

The ICI creates an incentive for Class A consumers to invest in new generating or storage capacity located at their facilities. On-site generation offsets consumption from the transmission or distribution grids, allowing Class A consumers to continue their operations during peak demand hours while simultaneously benefiting from the reduction in Global Adjustment charges. Investing in on-site generation has become increasingly economic as the Global Adjustment has increased: building an on-site generator has an annualized cost of approximately $105,000/MW to $135,000/MW, while operating that generator during all five peak demand hours in 2016 would have saved a Class A consumer approximately $520,000/MW in Global Adjustment costs.[13]

Information on exactly how much on-site generation or storage has been built in response to the ICI is not readily available. Nevertheless, there is some evidence that suggests such investments are being made. In 2017 and 2018, three Class A consumers made a combined 33 applications to the Ministry of Environment and Climate Change (as it then was) to build a total of 44 MW of natural gas-fired capacity.[14] One of the express purposes for which this new on-site capacity is being built is "peak shaving", which in turn suggests the purpose is, at least in part, to reduce Global Adjustment costs through participation in the ICI.[15]

The ICI has the potential to change – and appears to be changing – the nature of a portion of generation investments in the province: from large-scale, centrally-procured, grid-connected investments to small-scale, privately-funded, on-site investments. This has the benefit of shifting risk from ratepayers (who pay the costs associated with the IESO's supply contracts) to private investors and increasing the reliability of service for those investing in on-site generation. However, there are potential inefficiencies associated with the decentralization of supply planning.

[13] Estimates of the cost of building on-site generation are based on the construction of a 5 MW gas-fired generator, amortized over 20 years. These estimates are informed by a 2016 study from the U.S. Energy Information Administration and a 2015 study from the U.S. Environmental Protection Agency.
[14] Pending and approved Environmental Compliance Approvals in the province of Ontario are publicly available at: https://www.ebr.gov.on.ca/ERS-WEB-External/
[15] An August 2018 article notes that, "Ontario's Global Adjustment is creating a behind-the-meter energy storage boom," citing the construction of a 10 MW storage system as a recent example. Peter Mahoney, Utility Dive, *Behind-The-Meter Storage is Booming in Ontario,* available at: https://www.utilitydive.com/news/btm-storage-is-booming-in-ontario/530518/

The decision to centrally procure additional grid-connected capacity should be based on whether that capacity is needed to meet system-wide demand. Conversely, a private enterprise's decision on whether to build an on-site generator is based on their private incentives, not on the supply needs of the system as a whole.

Ontario currently finds itself in surplus supply conditions, yet the incentive to reduce consumption under the ICI has never been stronger. Perversely, the incentive for Class A consumers to reduce peak demand—by investing in on-site generation capacity or otherwise—is strongest when there is ample supply and wholesale market electricity prices are low. As shown in Figure 1, lower market prices result in a higher portion of costs being recovered through the Global Adjustment, providing a stronger incentive for Class A consumers to reduce their consumption during peak demand hours. These conditions may encourage private investment in generating capacity that is not needed to meet system-wide demand. The converse is also true; when supply is tight and market prices are high, the Global Adjustment is smaller and the incentive to reduce peak consumption is lower.

Additionally, investment in small on-site generation capacity may be less efficient than investment in large grid-connected capacity. To the degree capacity was or will be needed, Ontario has a multitude of options available to it, including investments in different generating technologies, demand response, conservation, etc. The IESO also has (or is developing) competitive mechanisms to procure these resources, which uniquely situates it to be able to select the least costly sources of capacity. IESO procurement also benefits from economies of scale, as its investments in large grid-connected capacity may be less costly than many private investments in small on-site capacity on a per megawatt of capacity basis.

Improving long-term efficiency requires a better understanding of how the current allocation of the Global Adjustment is affecting investment in new capacity. To that end, information related to the construction of on-site generation and storage should be gathered. That information can inform decisions about the extent to which the ICI is inducing private investment in unnecessary capacity. If investment is needed, the ICI should not provide a private incentive to build on-site capacity that significantly exceeds the cost of centrally procuring grid-connected capacity, as is the case with the ICI incentive today.

5.2 Fairness

Prices should be fair, in the sense of assigning costs to those who cause them and/or benefit from them being incurred.

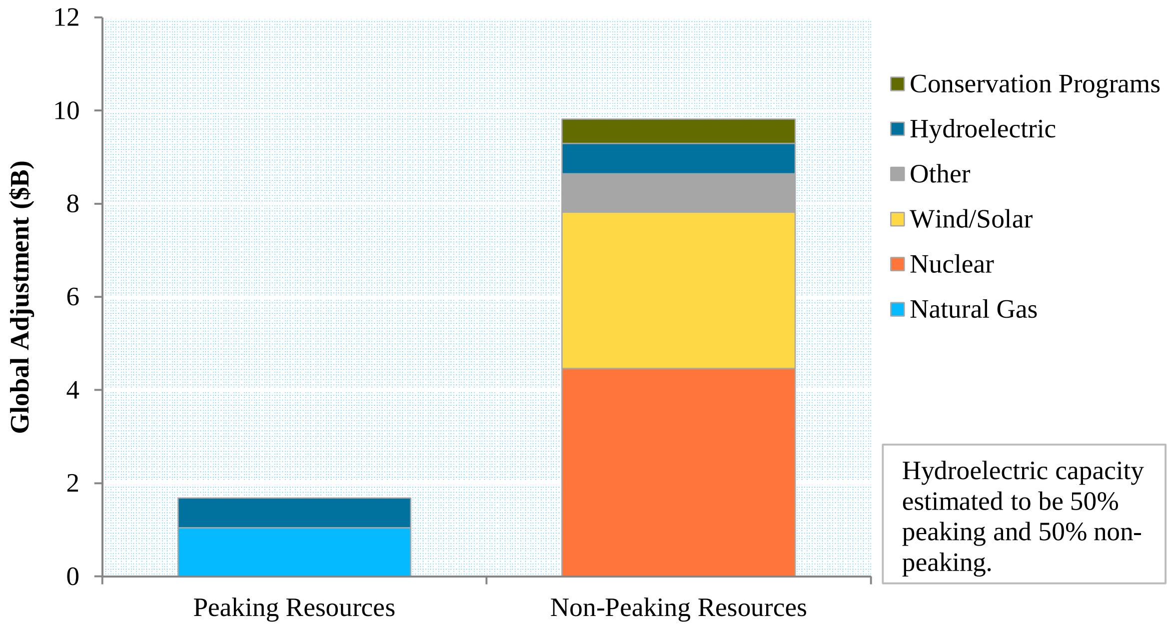
The costs recovered through the Global Adjustment are not limited to the cost of needed generation, nor was all capacity procured on a least-cost basis. Global Adjustment costs include costs related in part to the achievement of environmental and other social policy goals. For instance, the *Green Energy and Green Economy Act, 2009* (Act) offered prospective proponents the opportunity to build new wind and solar generators based on long-term contracts. However, the Act had objectives beyond simply securing needed generating capacity at least cost, including environmental and health objectives related to greenhouse gas reductions and economic objectives related to developing new green industries in the province. In the service of these broader policy goals, the Act procured clean, but more costly, generating capacity in the form of wind and solar resources, in lieu of less clean, but less costly, capacity. Paying a premium to procure clean capacity and recovering those costs through the Global Adjustment means the associated charge covers more than the cost of procuring needed generation at least cost. Incremental costs incurred in support of such broader policy goals are to the benefit of all Ontarians—not just electricity consumers subject to paying the Global Adjustment.

Assuming that costs unrelated to the fixed capacity costs of needed generation are removed from the Global Adjustment, allocating the remaining costs in a fair manner becomes a question of who induces the fixed capacity costs and who benefits from having that capacity available.

One of the considerations in transitioning to the ICI was a concern that large electricity consumers were paying more than their fair share of fixed capacity costs under the volumetric allocation of the Global Adjustment. As the argument goes, large industrial consumers, who typically consume a similar quantity of electricity irrespective of the time of day or weather, do not typically contribute to peaks in demand. Therefore, they should not have to pay the fixed capacity costs of generators that primarily operate during periods of peak demand.

While that fairness argument has some merit, the ICI goes further than necessary. The fixed capacity costs recovered through the Global Adjustment are not limited to those associated with peaking capacity; in fact, the Global Adjustment is mainly composed of the fixed capacity costs of non-peaking generators, as seen in Figure 5.

Figure 5: Components of the Global Adjustment
May 2016 – April 2017
($ Billions)



The Panel estimates that payments to peaking resources make up less than 20% of the costs recovered through the Global Adjustment.[16] The remaining 80% of fixed capacity costs are for non-peaking resources, which Class A consumers use and benefit from during most hours of the year. Despite benefitting from non-peaking resources, the ICI provides Class A consumers with the opportunity to avoid all Global Adjustment costs, which some manage to do. During the five peak demand hours in 2017, five directly-connected Class A consumers consumed no electricity, meaning they pay no Global Adjustment during the following 12-month period. Of the other directly-connected Class A consumers, more than half paid less than 50% of the Global Adjustment they would have paid under a volumetric allocation. This suggests that they too avoided paying for some of the fixed capacity costs of non-peaking generation from which they benefit. Fairness would therefore be enhanced if the cost of peaking generation were to be

[16] Another way to delineate between the fixed capacity costs associated with peaking generation versus non-peaking generation is to consider the utilisation of these resources during peak demand hours. For instance, if a wind resource could reliably generate 25% of its maximum capacity during peak demand hours, 25% of its fixed capacity costs would be considered peaking, while 75% would be considered non-peaking.

allocated based on consumption during peak demand hours, with the cost of non-peaking generation being allocated such that all consumers that benefit from that capacity pay for that capacity.

5.3 Simplicity and Transparency

Prices should be simple and transparent, so that consumers can make informed consumption decisions.

For Class A consumers, determining the cost of consuming electricity during peak and potential peak demand hours is neither simple nor transparent. In order to know the cost of consuming, a Class A consumer must correctly predict whether the hour in question will be a peak demand hour, what percentage of Ontario demand their consumption will represent and the size of the Global Adjustment in the following year, among other things. Figure 1 shows that the Global Adjustment has grown ten-fold in the last decade and has varied by billions of dollars from one year to the next.

Consider the uncertainty around whether or not a given hour will be a peak demand hour, and how the cost of consumption changes under either scenario. The cost of consuming during a non-peak demand hour is equal to the market price for electricity plus uplift, which together averaged approximately $16/MWh in 2016. During a peak demand hour—when a Class A consumer's share of Global Adjustment costs is determined—the cost of consumption is vastly greater. In 2016, the cost of consuming during a single peak demand hour was approximately $104,000/MWh, over 6,000 times the cost of consumption in an average non-peak demand hour.

Not knowing whether the cost of consumption is $16/MWh or $104,000/MWh complicates consumption decisions. The risk of the much higher cost can drive Class A consumers to reduce their consumption during what turn out to be non-peak demand hours (see Figure 2), foregoing efficient consumption. Knowing the cost of consumption in advance of having to make their consumption decision—or being able to predict the cost more easily—can prevent this undesirable outcome.

5.4 Cost Recovery

Prices should be set to wholly recover costs, and should do so sustainably.

The ICI results in the full recovery of Global Adjustment costs. However, as the cost of electricity increases—for Class B consumers, in part as a result of the ICI—consumers are incented to reduce their consumption or withdraw from the grid entirely.[17] As they do so, the average Global Adjustment to be recovered from all remaining consumers increases further, incenting additional consumers to reduce consumption or withdraw, perpetuating the cycle.

Class B consumption has decreased every year since the ICI was introduced, with 2017 consumption down 15.3 TWh (12.9%) relative to 2011. Part of this decline can be attributed to a number of larger Class B consumers converting to Class A consumers as the threshold for participating in the ICI was lowered. Illustrating this, Class A consumption has increased every year, with 2017 consumption up 10.2 TWh (44.7%) relative to 2011. The remaining decline in Class B consumption is in part due to the rising cost of electricity over the years. The decline in Class B consumption increases the price of electricity for remaining Class B consumers. While this dynamic is currently only a minor contributor to increasing Class B electricity costs, its effects could grow as Class B consumption declines.

6. Conclusion and Enhancing Alignment with Cost Allocation Principles

In the Panel's view, the ICI as presently structured is a complicated and non-transparent means of recovering costs, with limited efficiency benefits. Arguably, the ICI does not allocate costs fairly in the sense of assigning costs to those who cause them and/or benefit from them being incurred. In addition, the ICI perversely creates the greatest incentive for peak conservation in years when the supply is ample and marginal cost is lowest and the least incentive in years when supply is tight and marginal cost is high.

The Panel recognizes that trade-offs may be necessary or desirable in relation to the cost allocation criteria discussed in this report; sacrificing fairness in service of long-term efficiency, for example. Nevertheless, the Panel believes that both market efficiency and fairness of the ICI

[17] Withdrawing from the grid entails consuming no electricity from the transmission or distribution grid. For some, particularly large industrial or manufacturing loads, this means relocating business; for others, this means installing on-site generation, such as solar panels. Withdrawing from the grid is becoming increasingly economic as the cost of small-scale generating technology decreases and the price of consuming electricity from the grid increases.

(or an alternative methodology intended to serve much the same purpose) can be enhanced by ensuring that:

- Costs that are not related to the fixed capacity costs of needed generation are removed from the Global Adjustment and recovered by other means.
- Only the cost of peaking generation is recovered based on consumption during peak demand hours; the cost of non-peaking generation should be allocated such that all consumers that benefit from that capacity pay for that capacity.
- Information is gathered in relation to the construction of on-site generation and storage; this can inform decisions about the extent to which the ICI is incenting private investment in unnecessary capacity.
- The ICI does not provide a private incentive to build on-site capacity that significantly exceeds the cost of centrally procuring grid-connected capacity, as is the case with the ICI incentive today.
- The cost of consumption reflects the short-term marginal cost of production; this should apply to as many consumers and during as many hours as possible.