



Presentation for Power Advisory Expert Report on Market Impact of Changes to the Export Transmission Service Rate

EB-2021-0243: Generic Proceeding on UTR-Related Issues
and the ETS Rate

August 4, 2022

Power Advisory's Authors



Brady Yauch

Manager, Markets & Regulatory
416.822.6884
byauch@poweradvisoryllc.com



Travis Lusney

Director, Power Systems
647.680.1154
tlusney@poweradvisoryllc.com

Overview of Proceeding and Proposed Evidence

- The Ontario Energy Board ("OEB") is holding a hearing on its own motion under Sections 19, 21, and 78 of the Ontario Energy Board Act, 1998 (the "OEB Act") to consider various Issues related to Ontario's Uniform Transmission Rates ("UTR") (the "Proceeding")
 - The first phase of the Proceeding is focused on reviewing and setting the Export Transmission Service ("ETS") rate
- Power Advisory was retained by Borden Ladner Gervais LLP ("BLG"), acting as counsel to the Association of Power Producers of Ontario ("APPRO"), to provide expert evidence on a number of issues related to the ETS rate
- Notably, evidence was intended to provide a quantitative assessment of a change in the ETS rate on intertie congestion revenues and the other ratepayer benefits and costs derived from exports
- In particular, the evidence would seek to help the OEB answer questions like:
 - What is likely to happen to Intertie Congestion Price (ICP) revenues and other ratepayer benefits and costs if the ETS rate is increased to \$6.07/MWh (Power Advisory ultimately looked at the impact of increasing it to \$6.54/MWh)?
 - What is likely to happen to ICP revenues and other ratepayer benefits and costs if the ETS rate is decreased to \$0/MWh?
- Ultimately, the evidence was intended to provide a straightforward and transparent analysis on the impact of increasing the transactional cost of exporting energy from Ontario and whether this higher cost (and revenue) would be offset by other system-wide impacts

Summary of Findings

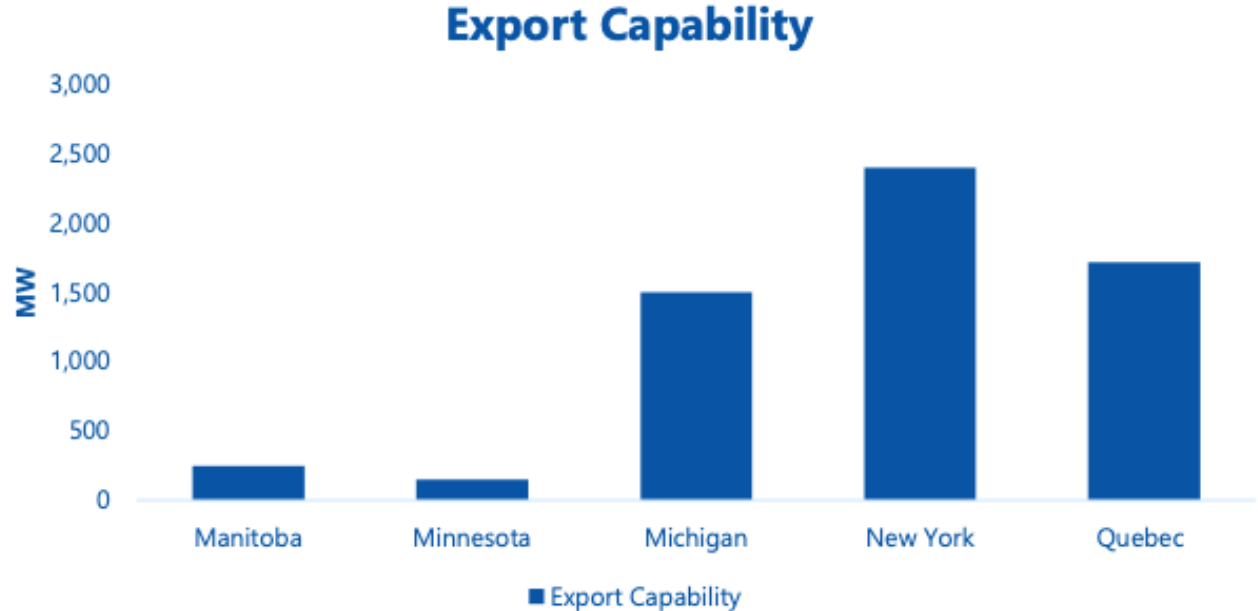
Table 1 Financial Impact of Increase and Decrease to ETS Rate²

	Increasing ETS Rate to \$4.69/MWh	Lowering ETS Rate to \$0/MWh
Increase/Decrease in Export Revenue	\$245,050,684	(\$140,529,626)
Increase/Decrease in Wind Curtailment Cost	(\$17,985,020)	\$4,996,536
Increase/Decrease in Congestion Rent	(\$169,030,871)	\$111,034,685
Increase/Decrease in Hydro Curtailment Cost	(\$59,811,638)	\$58,230,547
Decrease in Market Revenues	(\$40,871,596)	
Benefit to Ontario Ratepayers	(\$42,648,440)	\$33,732,142

- Increasing the ETS rate by \$4.69, as is being considered in this proceeding, would provide additional revenues (i.e. each MWh of exports would pay a higher ETS rate), but would result in a number of offsetting declines in revenues or increased costs for ratepayers
- Notably, the higher ETS rate would result in:
 - Lower congestion rents
 - Lower market-based revenues
 - Increased hydro and wind curtailment and higher associated costs of curtailment for Ontario ratepayers

Understanding Ontario's Export Interties

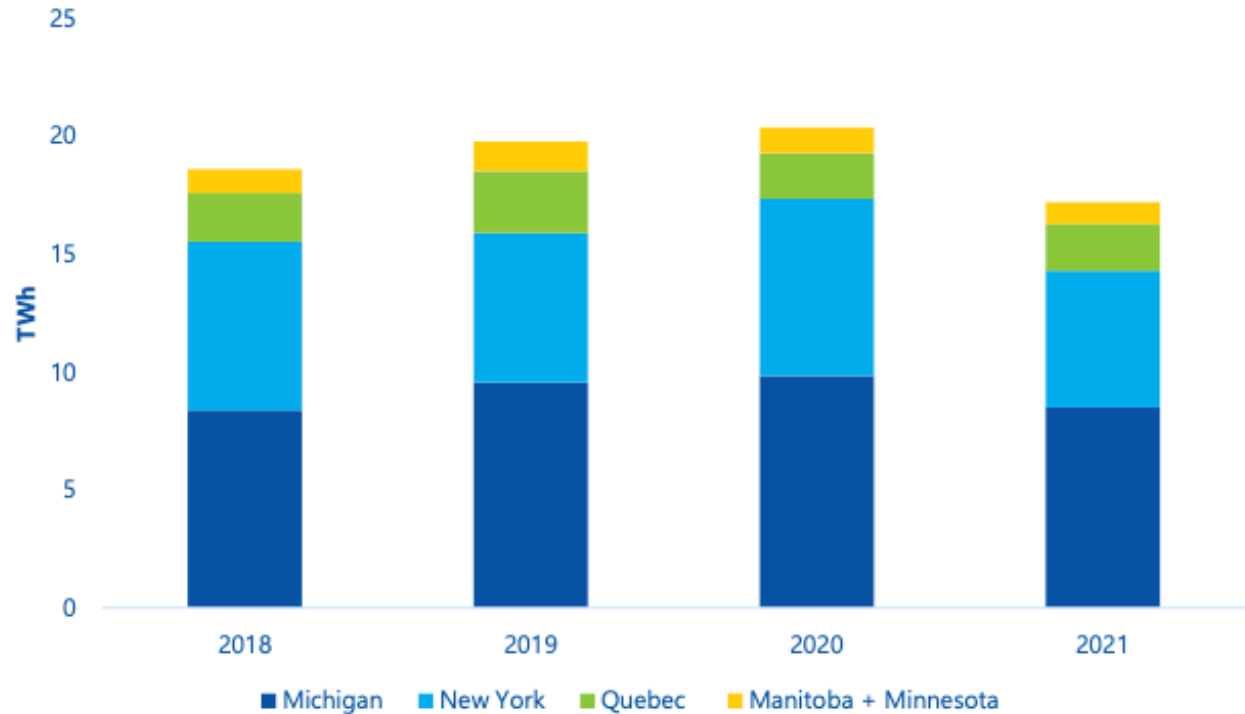
- Ontario's electricity grid is connected to a number of jurisdictions through interties
 - Manitoba (250 MW)
 - Minnesota (150 MW)
 - Michigan (1,500 MW)
 - New York (2,400 MW)
 - Quebec (1,720 MW)
- In total, Ontario's export capacity totals more than 6,000 MW
- The interties are connected to jurisdictions with both wholesale electricity markets (NYISO, MISO) and vertically integrated crown corporations (Quebec and Manitoba)



Source: IESO 2021 APO

Ontario's Energy Exports

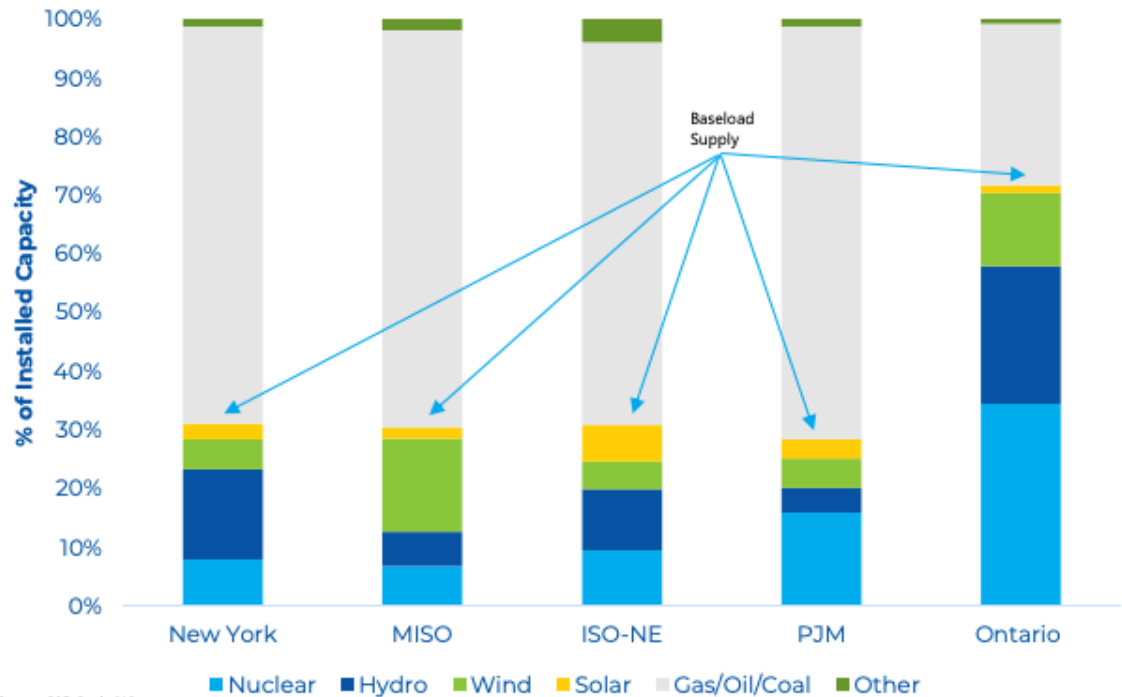
- Over the last 15 years, Ontario's electricity grid has become a net exporter – a result of plateauing demand and growing supply from baseload and intermittent sources of supply
- Michigan and New York have been the largest recipients of Ontario exports, given the size of those wholesale markets and cost advantage of Ontario's baseload supply compared to neighbouring jurisdictions (discussed in more detail in the next slide), although price spreads are lower between Ontario and New York than Michigan



Ontario's Baseload Supply

- Exports from Ontario into neighbouring jurisdictions are partly driven by Ontario's unique supply mix
- A large percentage of Ontario's supply mix includes baseload supply – most notably nuclear and must-run hydro facilities (and to lesser extent wind and solar)
- Baseload supply has a low marginal cost, particularly when compared to neighbouring wholesale markets, which include a large percentage of higher marginal cost thermal units
- Exports result in low marginal cost supply from Ontario moving to higher price wholesale markets

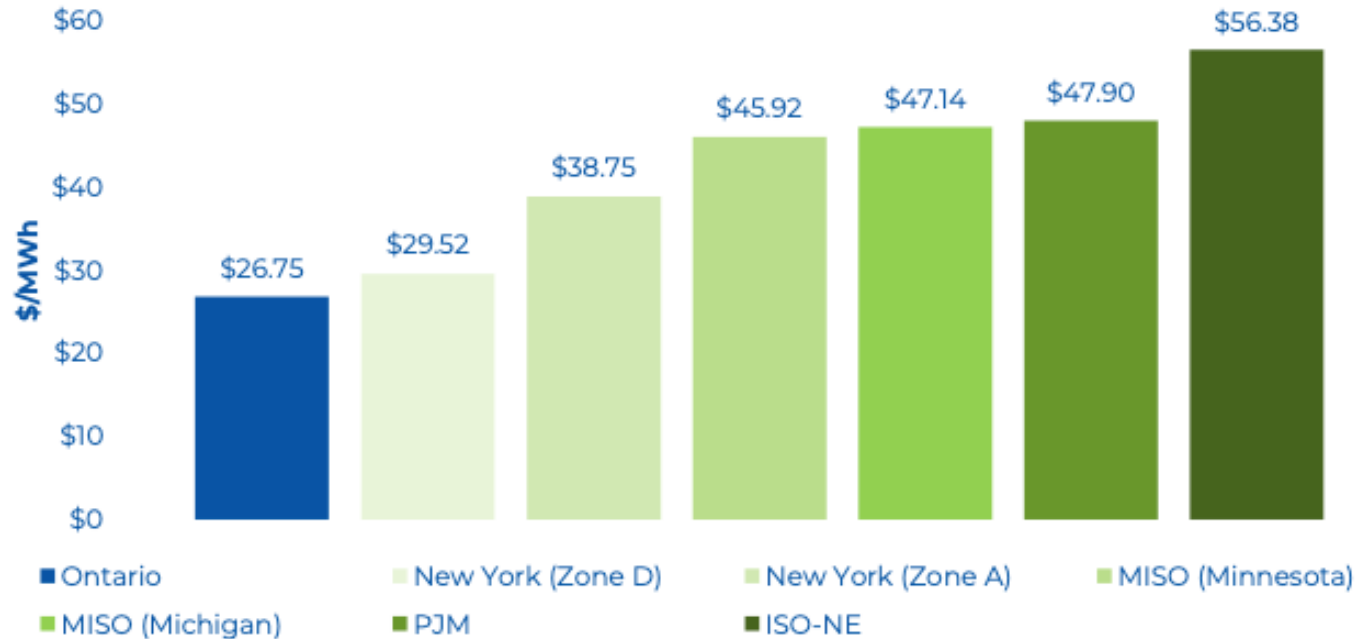
Figure 5 Baseload supply as % of Installed Capacity



Source: S&P Capital IQ

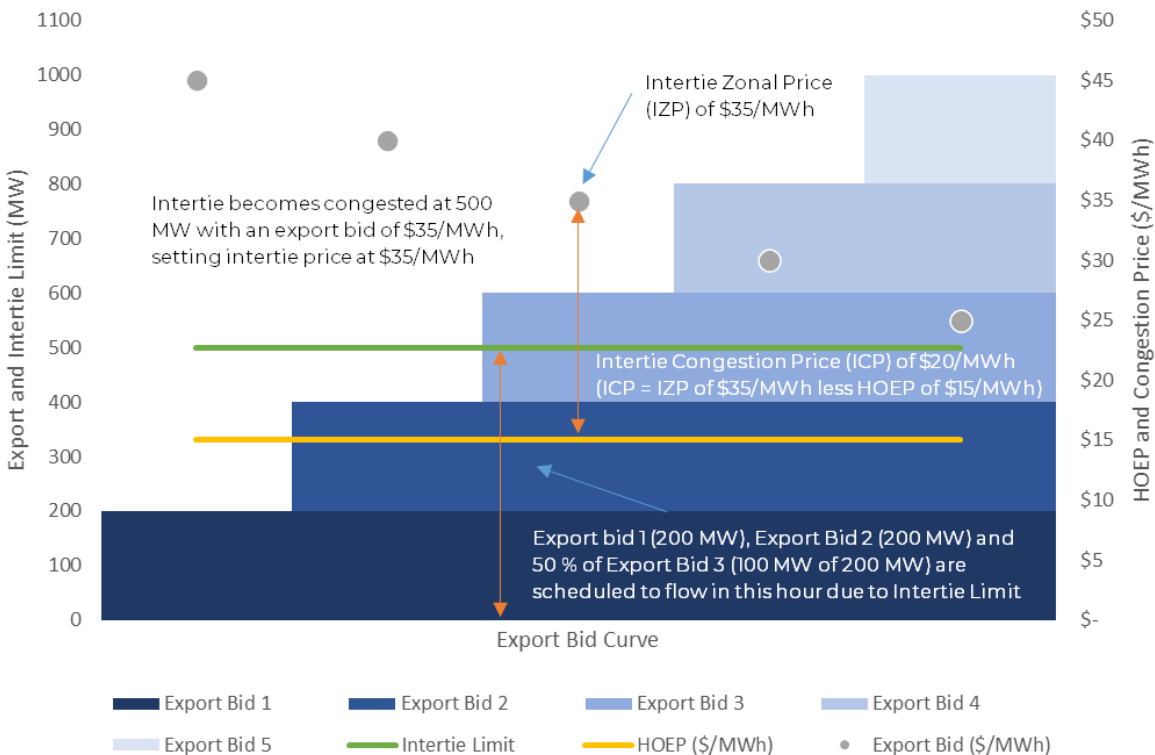
Understanding the Marginal Cost of Supply in ON

- As noted, Ontario's large fleet of baseload supply (i.e. nuclear, must-run hydro, wind, and solar) results in the Market Clearing Price (MCP) typically being much lower than neighbouring jurisdictions
- The graph to the right provides the average HOEP in Ontario compared to other comparable wholesale markets in 2021



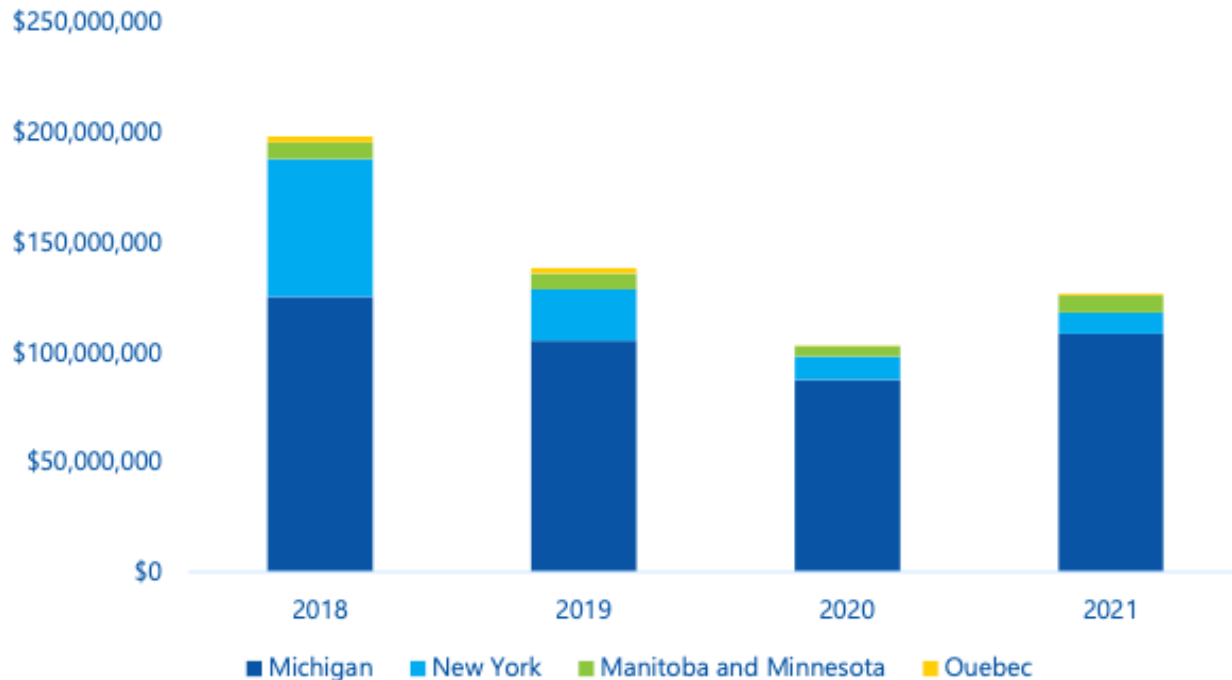
How Prices are set on Ontario's Interties

- Prices on Ontario's interties are set independently of the domestic market and will change in hours when there is congestion on the intertie
- The graph to the right provides a high-level overview of how the price is set on the intertie
- Exports bids are stacked from highest to lowest – ensuring those export bids willing to pay the most for Ontario supply will flow first
- When the intertie is congested – meaning there are more export bids (MWs) than intertie capacity – the last export bid that is economically scheduled sets the price on the intertie
- The difference between HOEP and the price in the intertie zone is known as the Intertie Congestion Price (ICP)



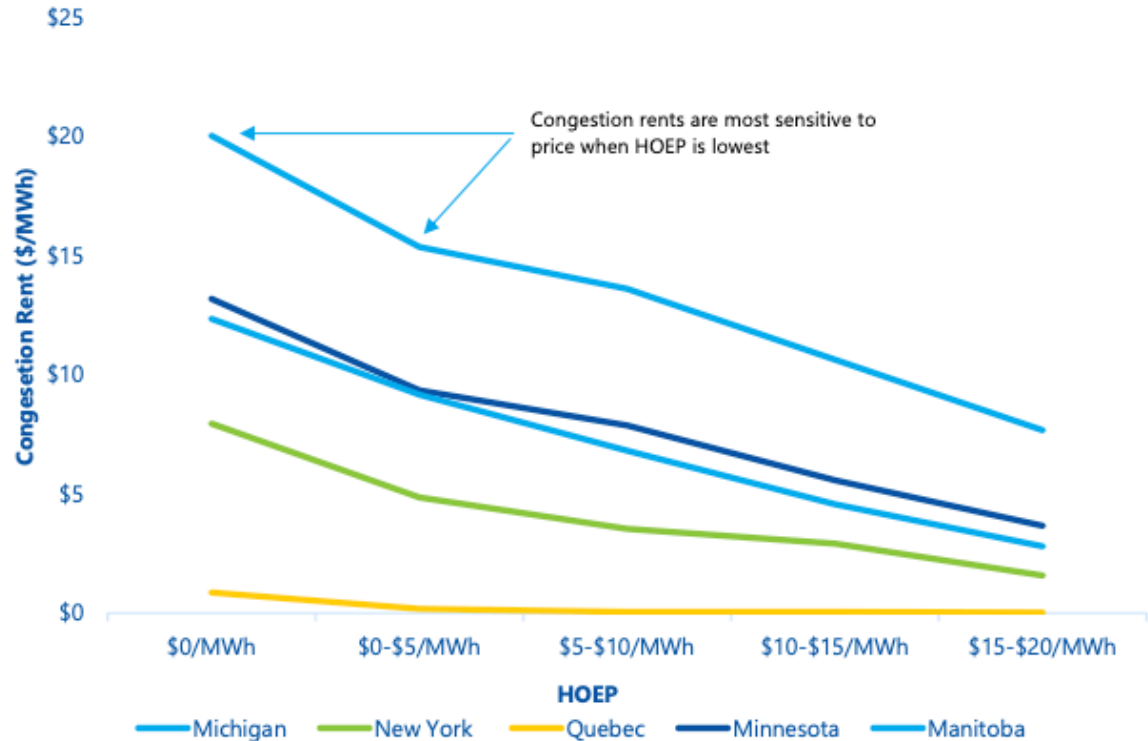
The Value of Congestion Rent

- The ICP is collected from exports on behalf of ratepayers and can be used to offset transmission-related costs
- The ICP is commonly referred to as congestion rents and totalled more than \$500 million over the 2018 – 2021 time period
- Congestion rents occur as a result of a competitive process among market participants on the province's intertie – allowing competition to determine the value of energy in Ontario



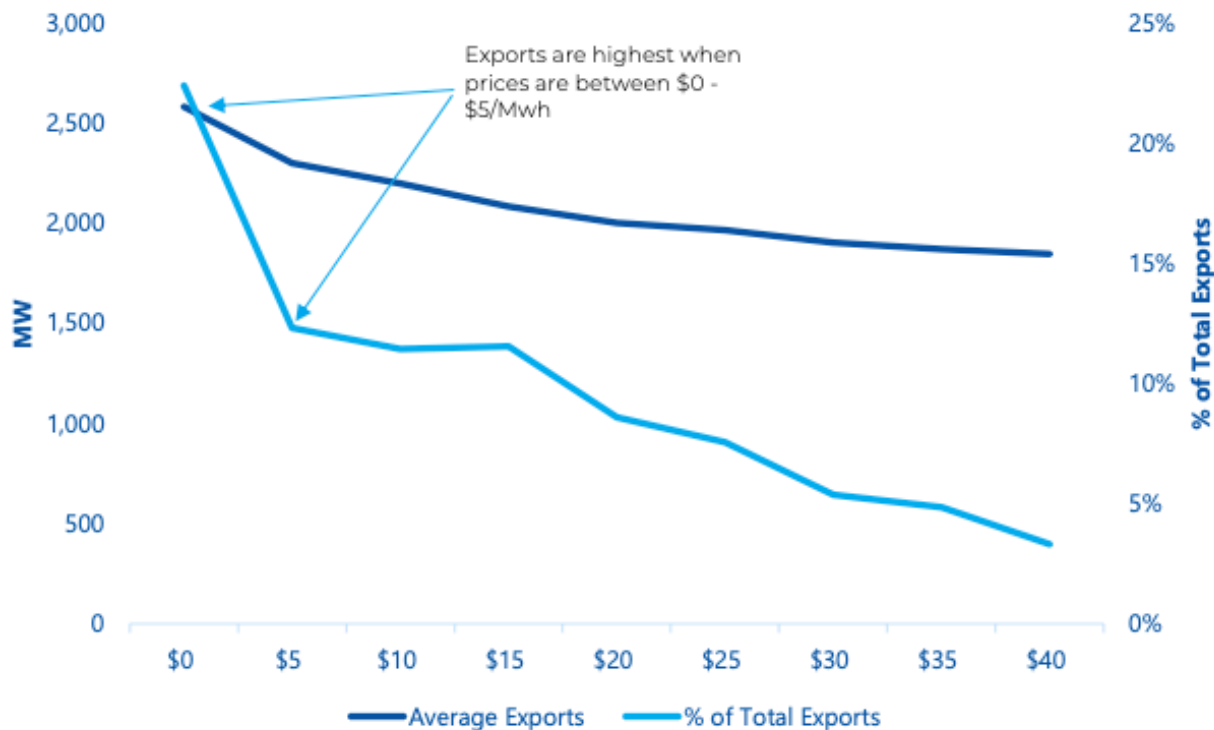
Congestion Rents and Ontario's Wholesale Market

- Congestion rents are largely inversely related to HOEP – as the province's energy prices increases (decreases) congestion rents will decrease (increase)
- As Power Advisory's analysis shows, a higher transactional cost in the form of an increased ETS will result in reduced congestion rents
- Power Advisory's analysis considers an increase/decrease in HOEP as a proxy for an increase/decrease in the ETS rate
- A higher or lower ETS rate may also have long-term operational considerations, as discussed by the IESO, but not directly quantified by Power Advisory



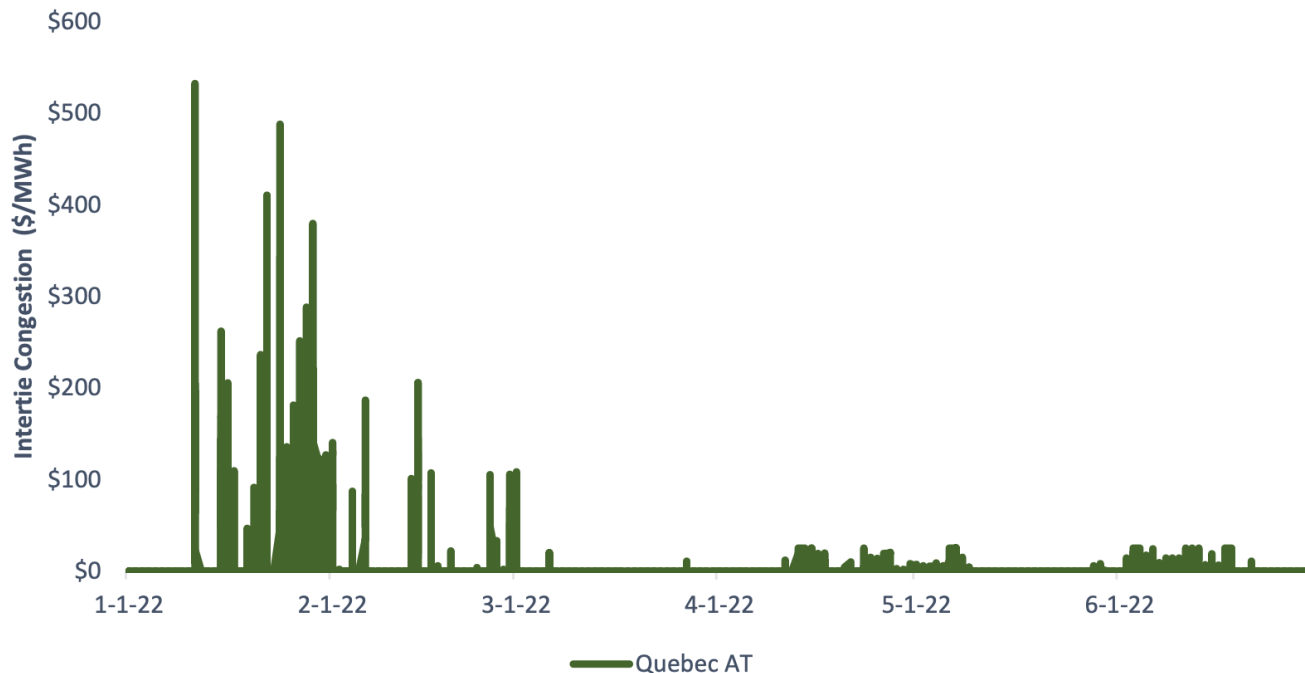
Price Responsiveness of Exports

- Exports from Ontario are highly price responsive, with a majority of exports occurring when HOEP is below \$15/MWh
 - The most notable decline in export volumes occurs when HOEP increases from \$0/MWh to \$5/MWh
- A small percentage of exports occur when HOEP is greater than \$25/MWh
 - A near \$5/MWh increase in the ETS charge would be equivalent of increasing HOEP from \$15/MWh to near \$20/MWh and the subsequent material decline in export volumes



Export Volumes, HOEP and Congestion Rents

- While congestion rents are highly correlated with lower HOEP (and the surplus supply over the last decade that has led to reduced HOEP levels), congestion rents can also occur when HOEP is elevated
- As an example, Power Advisory provided congestion rents in 2022 on the HVDC intertie with Quebec
- As can be seen in the graph to the right, congestion rents were hundreds of \$/MWh throughout the winter, even when HOEP was greater than \$40/MWh in many hours



Power Advisory's Methodology

- HOEP and Pre-Dispatch Hour 1 (PD-1) pricing, export flow and wind data was collected from the IESO's website for the 2018-2021 time-period
- The second step was to compile 5-minute Market Clearing Prices (MCP) for the different intertie zones (i.e. the Intertie Zonal Price (IZP)). The data was then cleaned to create an hourly price for each intertie zone.
 - In order to calculate the Intertie Congestion Price (ICP), the difference between the intertie price and HOEP was determined for every hour
- To calculate congestion rents, the difference between the IZP and HOEP (which is the same as the ICP) was multiplied by exports on each intertie when the difference was greater than \$0/MWh
- The average and total amount of exports and congestion rents were calculated using a variety of HOEP ranges.
 - The reduced market revenues are calculated as the decrease in exports multiplied by \$4.69/MWh
 - The reduced congestion rents are calculated as the decrease in congestion rents between the different price ranges
 - Hydro curtailment was calculated as the decline in exports when HOEP \$13-\$15/MWh and \$17-\$19/MWh multiplied by \$14.40
- Using the wind data, the difference between actual and forecasted output was calculated for hours when HOEP was \$5/MWh or below – wind curtailment cost was calculated as the decline in exports in the \$-0.1/MWh - \$4.69/MWh range and the next price range

Power Advisory's Findings with \$6.54/MWh ETS

- Using data from 2018 – 2021, moving the ETS rate from \$1.85/MWh to \$6.54/MWh, as is being proposed as part of this proceeding would result in a number of outcomes based on Power Advisory's analysis (among others):
 - Export volumes would decline by 17 TWh (falling to 59 TWh)
 - ETS-related revenues would increase by \$245 million
 - Congestion rents would fall by \$169 million
 - Costs of wind and hydro curtailment would increase by \$17 million and \$59 million, respectively
- Overall, the financial impact to Ontario ratepayers – i.e. the additional costs they would face – would have been \$43 million higher

		Financial Impact (2018 - 2021)	Calculation
a).	Total Congestion Rent	\$567,017,643	
b).	ETS Revenue at \$1.85/MWh	\$140,529,626	
c).	Decline in Export Volumes From ETS Increase to \$6.54	17,004,726	
d).	Export Volumes with \$6.54 ETS Rate	58,957,234	
e).	ETS Revenue with \$6.54 ETS Rate	\$385,580,310	d). x \$6.54/MWh
f).	Difference in Export Revenues With Current vs Proposed ETS Rate	\$245,050,684	e). - b).
g).	Ontario Ratepayer Impact from Curtailed Wind Supply	(\$17,985,020)	
h).	Reduced Market Revenues from Lower Exports with \$6.54/MWh ETS Rate	(\$40,871,596)	
i).	Lower Congestion Rent as a Result of \$6.54/MWh ETS Rate	(\$169,130,871)	
j).	Financial Impact of Increased Hydro Spill	(\$59,871,638)	
k).	Total Impact of \$6.54/MWh ETS Rate	(\$287,699,125)	g). + h). + i) + j).
l).	Net Impact to Ratepayers	(\$42,648,440)	f). + k).

Power Advisory's Findings with \$0/MWh ETS

- Using data from 2018 – 2021, moving the ETS rate from \$1.85/MWh to \$0/MWh, would result in a number of outcomes based on Power Advisory's analysis (among others):
 - Export volumes would increase by 10 TWh (growing to 59 TWh)
 - ETS-related revenues would fall to \$0
 - Congestion rents would increase by \$111 million
 - Costs of wind and hydro curtailment would fall by \$4 million and \$58 million, respectively
- Overall, the financial benefit to Ontario ratepayers – i.e. costs they would avoid – would have been \$33 million lower

		Financial Impact (2018 - 2021)	Calculation
a).	Total Congestion Rent	\$567,017,643	
b).	ETS Revenue at \$1.85/MWh	\$140,529,626	
c).	Increase in Export Volumes From ETS Decrease to \$0/MWh	10,044,775	
d).	Export Volumes with \$0 ETS Rate	86,006,735	
e).	ETS Revenue with \$0 ETS Rate	\$0	d). x \$0/MWh
f).	Difference in Export Revenues With Current vs \$0 ETS Rate	(\$140,529,626)	e). - b).
g).	Cost Savings from Reduced Curtailed Wind	\$4,996,536	
h).	Increased Congestion Rent as a Result of \$0/MWh Rate	\$111,034,685	
i).	Financial Benefit of Reduced Hydro Spill	\$58,230,547	
j).	Total Impact of \$0/MWh ETS Rate	\$174,261,768	g). + h). + i).
k).	Net Impact to Ratepayers	\$33,732,142	j). + f).