



MARKET POWER MITIGATION IN ONTARIO AND LEARNINGS FROM U.S. ISOs

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October 18, 2018

Annual Workshop on the Economics of Electricity Policy and Markets
IVEY Energy Policy and Management Centre



TYPES OF ELECTRICITY MARKETS

Administrative intervention to mitigate market power occurs in:

CAPACITY MARKETS

- Run months or years in advance of energy delivery
- Product transacted is megawatts of available capacity
- Clearing price may be region-wide or zonal

ENERGY MARKETS

- Run day-ahead and/or close to time of energy delivery
- Product transacted is real-time energy demand or supply
- Clearing price may be uniform for region or locational
- Ancillary services markets often clear concurrently with energy markets



CANADIAN ELECTRICITY MARKETS

Focus on energy market power mitigation proposed for Ontario's Market Renewal Project

ALBERTA

- **Today:** Region-wide market for real-time energy, settled at hourly prices
- **Proposed:** Addition of capacity market, run once a year for delivery three years in the future

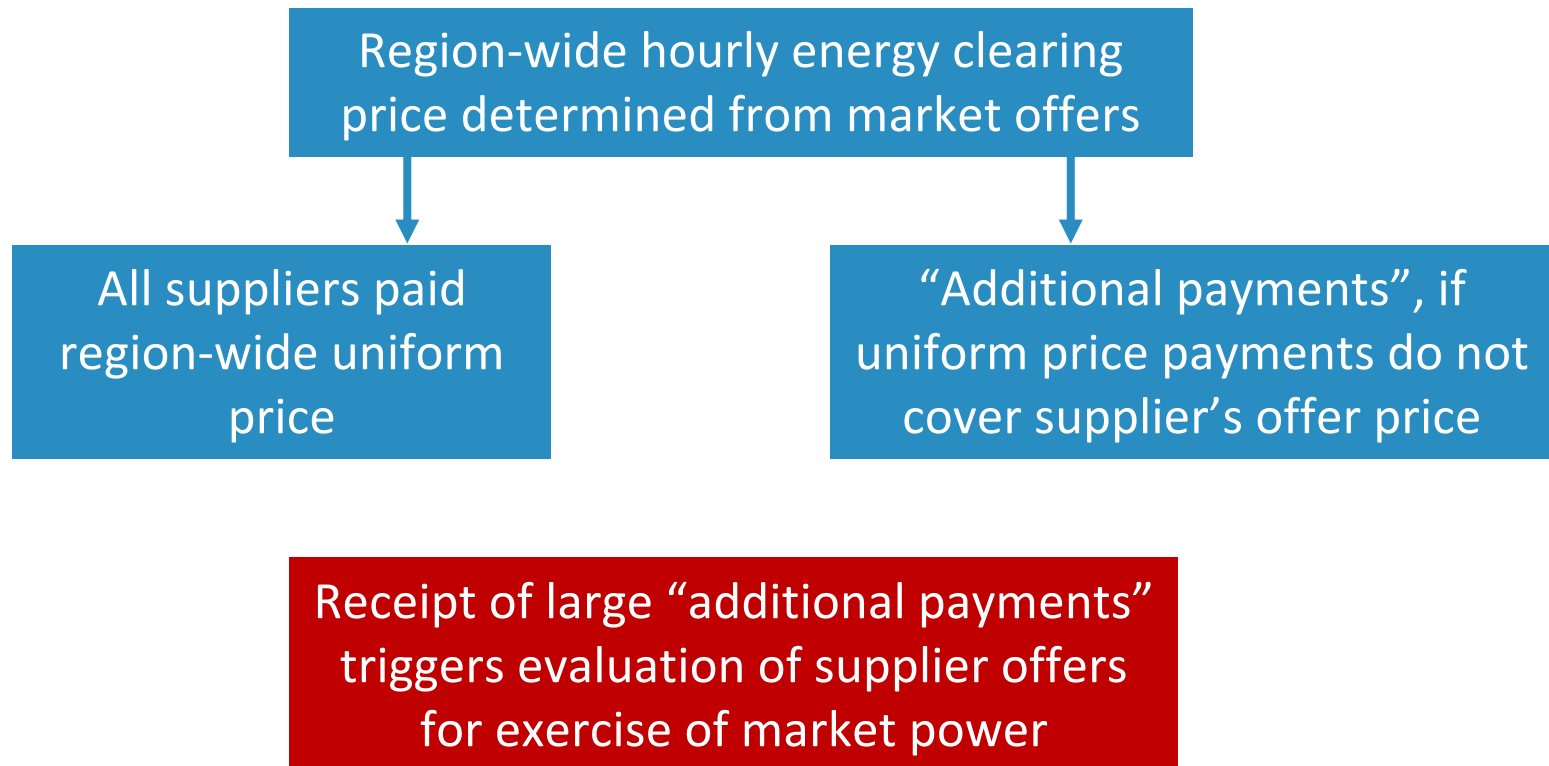
ONTARIO

- **Today:** Region-wide market for real-time energy, settled at hourly prices
- **Proposed:**
 - Day-ahead market, settled at hourly locational prices
 - Real-time energy market, settled at 5-minute locational prices
 - Capacity market

ONTARIO ENERGY MARKET: TODAY

Today, energy market power mitigation occurs after market clearing

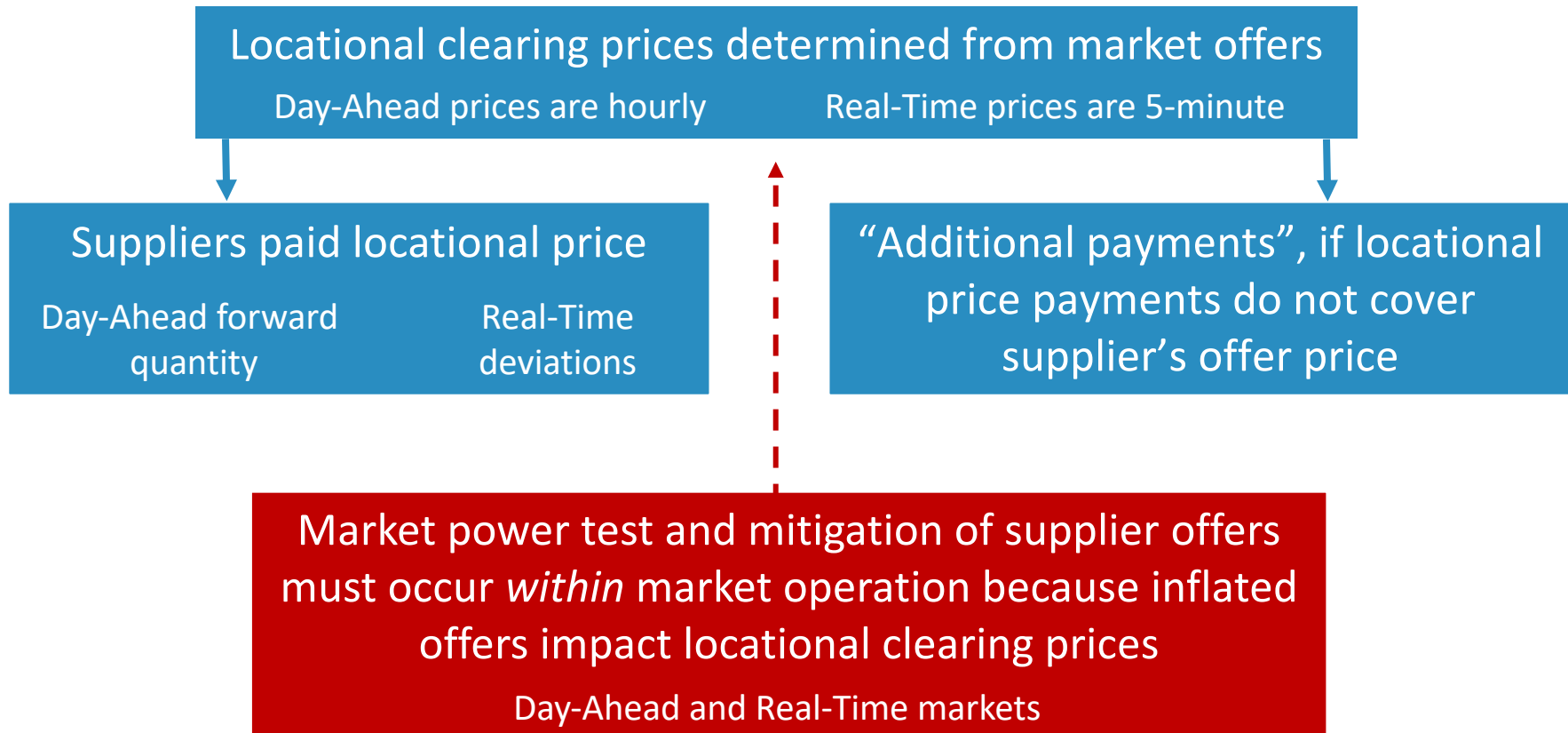
Real-Time Market



ONTARIO ENERGY MARKET: PROPOSED

Under Ontario's proposed energy market design, market power mitigation would occur during market clearing (SSM: 9.27.2018)

Day-Ahead Forward Market and Real-Time Market





CHANGE TO ENERGY MARKET POWER MITIGATION WITH ONTARIO SSM

SSM Change

- Locational price settlements
- Day-ahead market settlements for day-ahead scheduled quantities

Reason for

Market Power Mitigation During Market Operation

- Market power exercise more likely to affect clearing prices locationally than region-wide
- Real-time dispatch quantities and prices need to be based on mitigated offers
- For consistency of day-ahead market clearing with real-time market, same market power mitigation needed day-ahead
- Day-ahead market power mitigation needed to support robust participation and efficient unit commitment



ALTERNATIVES FOR ENERGY MARKET POWER MITIGATION

PIVOTAL SUPPLIER TEST

- Evaluates whether particular market participants, or groups of market participants are “pivotal”
- At least some of their output is needed to manage congestion on a particular transmission constraint

CONDUCT AND IMPACT TEST

- Evaluates whether the offer price of particular resources exceeds a “conduct” threshold, *and*
- Evaluates whether the offers of resources failing the conduct test materially impact market prices



PIVOTAL SUPPLIER TEST

Pros

- Links assessment of whether a particular supplier possesses local market power to the competitive market structure
- Applied separately to each transmission constraint and to each supplier or combination of suppliers

Cons

- Testing pivotality of each resource with a full dispatch would be too time-consuming to implement within day-ahead or real-time windows; would require multiple dispatch solutions for each binding transmission constraint
- Actual methods used for *ex ante* mitigation designs rely on many approximations differing from economic concept
- Resource offers can be mitigated and resources dispatched even if high offers had no market impact



CONDUCT AND IMPACT TEST

Pros

Does not need complicated approximations for:

- Costs of suppliers competing with the resources being tested
- Limits on output of competitive fringe
- Supply offered at low prices by a supplier potentially able to exercise market power
- The impact of non-price bid parameters

Cons

- Cannot identify *which* supply offer(s) failing conduct test cause a violation of the impact test
- Because of solution time, impact test is run collectively for all bids and offers that violate the conduct threshold
- May impact market offer and posting deadlines due to solution time

SSM MARKET POWER MITIGATION

Ontario is proposing to use the conduct and impact test, primarily because it mitigates resources only when there is a demonstrated impact of supply offers failing the conduct test on clearing prices for the actual dispatch.

Test	Examines each supplier separately?	Full dispatch to estimate impact?	Uses conduct trigger?	Which units mitigation applied to	Examines each constraint separately?
Pivotal Supplier	1, 2 or 3 at a time	No, simplified approaches necessary	Yes	Pivotal units	Yes
Conduct and Impact	No, because of run time limits	Yes, for all suppliers failing conduct test	Yes	All units failing conduct test if impact test failed (latter run for all units at same time)	No

U.S. ISO MARKET POWER MITIGATION

ISO	Pivotal Supplier	Conduct & Impact	Pivotal Supplier & Other
PJM	Yes (3)		
NYISO		Yes	
ISO-NE		Yes	
MISO		Yes	
SPP		Yes	
CAISO	Yes (3)		
ERCOT			Yes



CHALLENGES FOR MARKET POWER MITIGATION

- Balancing risks of over-mitigation and under-mitigation
 - Energy-Limited Hydro as an example
- Improving mitigation processes to use data as consistent as possible with expected supplier costs
- Improving software to run real-time mitigation tests as close as possible to real-time to account for the impact of intermittency on net load