

# EDAC Implementation of Linked Wheels

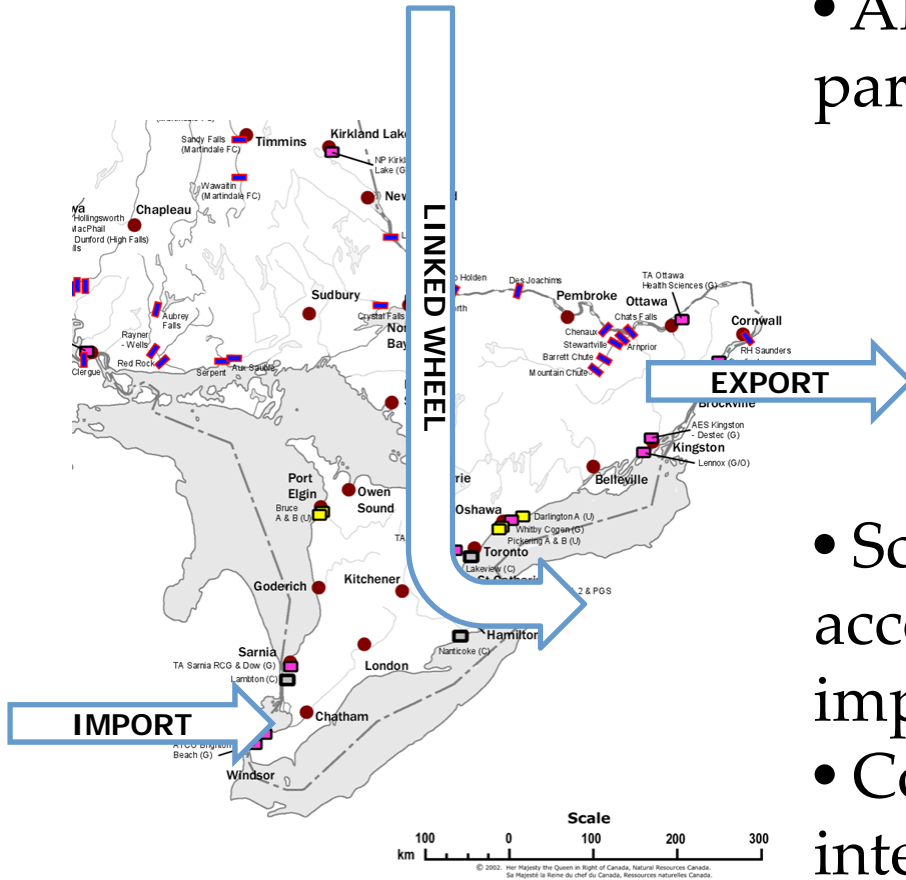
IJTSC Meeting  
November 22, 2010



- EDAC Project will implement enhancements that achieve:
  - New calculation engine performing 24 hour optimization for energy and operating reserve while considering:
    - Three-part offers and commitment parameters
    - Combined cycle plant modeling
    - Inclusion of exports and **linked wheel** transactions
  - Revised cost guarantee principles
  - Revised/new withdrawal failure charges

- All intertie transaction types can participate in the day-ahead.

- Imports
- Exports
- Linked Wheels



- Scheduling of internal resources accounts for intertie traffic and its impact to internal power flow.
- Commitments reflect both internal and external demands.

- Linked wheel offers and bids do not have to follow any sort of pricing format in the day-ahead as compared to scheduling in hour ahead.

$$-\$2000.00 \leq \text{Import Offer} \leq +\$2000.00$$

$$-\$2000.00 \leq \text{Export Bid} \leq +\$2000.00$$

- After 14:00, linked wheel offers and bids will need to be revised so that they follow the linked wheel offer/bid pricing format as described in Market Manual 4.2.

- An import/export is identified as part of a linked wheel based on the NERCtag identifier.
  - Imports: “WI” + common suffix
  - Exports: “WX” + common suffix
- Once identified as a linked wheel transaction, each leg will be linked to its associated leg based on a common suffix.
- In a case where a single leg of a linked wheel does not have a corresponding leg, the day-ahead engine will schedule that transaction to 0MW.

- Once a set of linked wheel transactions are identified, that set of linked wheel transactions are scheduled to an equal amount.

Import Linked Wheel Quantity = Export Linked Wheel Quantity

- The scheduled quantity will be equal to the most restrictive of either the import or export schedule determined due to economics or congestion.

- EDAC scheduling of Linked Wheel presentation stakeholdered on June 4<sup>th</sup>, 2009  
[http://www.ieso.ca/imoweb/pubs/consult/sdwg/sdwg-20090604-Linked\\_Wheels.pdf](http://www.ieso.ca/imoweb/pubs/consult/sdwg/sdwg-20090604-Linked_Wheels.pdf)
  - Presentation outlined a scheduling approach that was aligned with the discussions at the Linked Wheel Economic Dispatch Working Group
  - Linked Wheel was scheduled whenever:  
$$\text{Bid} - \text{Offer} \geq \text{Export Shadow Price} - \text{Import Shadow Price}$$
- This approach would have meant that in some instances a linked wheel would get priority in scheduling over a standalone transaction at the same interface.

# Example of Inappropriate Linked Wheel Priority

Linked Wheel Export Bid: \$80

Export Shadow Price: \$55

Linked Wheel Import Offer: \$50

Import Shadow Price: \$25

Bid – Offer  $\geq$  Export Shadow Price – Import Shadow Price

$$\$80 - \$50 \geq \$55 - \$26$$

$$\$30 \geq \$29$$



Linked Wheel Export Bid  $\geq$  Export Shadow Price

$$\$80 \geq \$55$$



Linked Wheel Import Offer  $\leq$  Import Shadow Price

$$\$50 \leq \$26$$



- These implications were not fully stakeholdered by the EDAC project in June 2009 and in July 2009, the work of the Linked Wheel Economic Dispatch Working Group ceased.
- For these reasons the EDAC implementation differs from this initial proposal.
  - Economic assessment will be carried out for each leg of the linked wheel:

Linked Wheel Export Bid  $\geq$  Export Shadow Price

Linked Wheel Import Offer  $\leq$  Import Shadow Price

- The above noted implementation is described in MR-348 section R06 approved by the Technical Panel and IESO Board in September 2009.

[http://www.ieso.ca/imoweb/pubs/mr2009/MR-00348-R06\\_AP.pdf](http://www.ieso.ca/imoweb/pubs/mr2009/MR-00348-R06_AP.pdf)

- EDAC Operations Detailed Design Section 4.5 was stakeholdered through SE 73 Operations Design Working Group

[http://www.ieso.ca/imoweb/pubs/consult/odwg/odwg-20100813-EDAC-Operations\\_Detailed\\_Design-v1.pdf](http://www.ieso.ca/imoweb/pubs/consult/odwg/odwg-20100813-EDAC-Operations_Detailed_Design-v1.pdf)

- Market Manual 9.2 stakeholdered through SE 73 Project Advisory Group

[http://www.ieso.ca/imoweb/pubs/consult/se73/se73-pag-20101028-EDAC\\_0077.pdf](http://www.ieso.ca/imoweb/pubs/consult/se73/se73-pag-20101028-EDAC_0077.pdf)

- Implementation allows market participants to bid/offer the spread at the incoming and outgoing interties
- However, implementation requires that both legs of the linked wheel are also economic at their respective intertie point.

Once A and B are satisfied, C is assured.

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- ✓ A.) Linked Wheel Export Bid  $\geq$  Export Shadow Price
  - ✓ B.) Linked Wheel Import Offer  $\leq$  Import Shadow Price
  - ✓ C.) Bid – Offer  $\geq$  Export Shadow Price – Import Shadow Price