Analysis of the Impact of Assuming that the Congestion Charges for Delivering Internal Generation to Internal Load are Fully Hedged

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Purpose of the Analysis

- ✓ To provide a common understanding of the impact of assuming the congestion charges for delivering internal generation to internal load are fully hedged
- ✓ To make sure that we are all on the same page before we continue down this path

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Vertically Integrated Utility Environment

- ✓ Internal dispatched Generation = 1,000 MW @ $10/MW
- ✓ Internal Load = 1,000MW
- ✓ Interchange = 0MW
- ✓ Production Cost = $10,000
- ✓ Internal Generation Revenue = $10,000
- ✓ Gross Load Payment = $10,000

- ✓ If Offcost for delivering generation to internal load = $0
  - Net Load Payment = $10,000

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Single Area LMP Market Environment

- ✓ Internal dispatched Generation = 1,000 MW @ $10/MW
- ✓ Internal Load = 1,000MW
- ✓ Interchange = 0MW
- ✓ Production Cost = $10,000
- ✓ @ Generation Bus LMP = $10/MW
  - Internal Generation Revenue = $10,000
- ✓ @ Load Bus LMP = $30/MW
  - Gross Load Payment = $30,000
  - Internal Congestion Charges = $20,000 [$30,000 - $10,000]

- ✓ If Internal Congestion Charges are fully hedged
  - FTR Credit = $20,000
- ✓ Net Load Payment = $30,000 - $20,000 = $10,000

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LMP Market of An Exporting Zone

- ✓ Internal dispatched Generation = 1,500 MW @ $10/MW
- ✓ Internal Load = 1,000MW
- ✓ Internal Generation = 1,000MW
- ✓ Export (Interchange) = 500MW
- ✓ Production Cost = $15,000 [$10,000 internal + $5,000 export]
- ✓ @ Generation Bus LMP = $10/MW
  - Interchange generation revenue = 500 x $10 = $5,000
  - Generation Revenue = $15,000 [$10,000 internal + $5,000 export]
- ✓ @ Load Bus LMP = $30/MW
  - Gross Load Payment = $30,000
  - Internal Congestion Charges = $20,000 [1,000 x ($30 - $10)]
- ✓ If Internal Congestion Charges are fully hedged
  - FTR Credit = $20,000
- ✓ Net Load Payment = $30,000 - $20,000 = $10,000

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Observation for Exporting Zones

- ✓ Based on the assumption that the congestion charges for delivering internal generation to internal load are fully hedged (Internal Congestion Charges = $0), load in an exporting zone will incur no congestion charge.
- ✓ There are no congestion charges in the exporting zone for the economic transmission to mitigate.
- ✓ For a two area model, cross border economic transmission will show no benefit to a pure exporting zone.

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LMP Market of an Importing Zone

- ✓ Internal dispatched Generation = 500 MW @ $30/MW
- ✓ Internal Load = 1,000MW
- ✓ Import (Interchange) = 500MW
- ✓ Internal Production Cost = $15,000
- ✓ @ Generation Bus LMP = $40/MW; Gen Revenue = $20,000
- ✓ @ Load Bus LMP = $60/MW
  - Gross Load Payment = $60,000
  - Internal Congestion Charges = $10,000 [500 x ($60 - $40)]
- ✓ Implicit Congestion Charges for economic import = Interchange x Load LMP = 500 x $60 = $30,000
- ✓ If Internal Congestion Charges are fully hedged
  - FTR Credit = $10,000
- ✓ Net Load Payment = $50,000 [in which $30,000 is for economic import purchase]

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MISO/PJM Interchange Congestion Charge

- ✓ Note that Interchange Congestion Charge = MW Interchange x Load weighted LMP of an importing zone - MW Interchange x Generation weighted LMP of an exporting zone.
  - The first term is the Implicit congestion charge for economic import purchase paid by Load in the importing zone.
  - The second term is the interchange revenue for the export sale by the generation in the exporting zone.

- ✓ Under the assumption of zero internal congestion charge, this Interchange Congestion Charge is the only congestion charge to be mitigated by the economic transmission

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Benefits to an Exporting Zone

- ✓ Assuming Internal Congestion Charges are fully hedged; Net Load Payment in an exporting Zone
  - = Generator Revenue – Interchange x Generation Weighted LMP
  - = [Total Generation – Interchange] x Generation Weighted LMP
  - = Load in an Exporting Zone x Generation Weighted LMP
- ✓ The benefits of an economic project calculated using Net Load Payment will simply be the difference of the Generation Weighted LMP before and after the economic project
- ✓ If an Economic Transmission increases the export, the Generation Weighted LMP will be higher after the project is built. The benefits to the exporting zone are negative.
- ✓ The beneficiary will only be the load in the importing zone.

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Conclusion

- ✓ Under the assumption that internal congestion charges are fully hedged,
  - The accrued benefit is a function of the net interchange between MISO and PJM.
  - The hourly benefit to an exporting RTO is negative.
  - An exporting RTO will not be benefiting from the project.
  - A project is unlikely to pass individual RTO criteria simultaneously.
  - There will unlikely be any cross-border project.

- ✓ Changes in Net Load Payment before and after the economic project is the best measure of which load will be benefiting from the project.
- ✓ An accurate FTR credit (without relying on an assumption) must be determined for MISO and PJM in order to accurately assess the congestion charges and hence the benefits of an economic transmission project.

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