Day-Ahead Market Enhancements discussion

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Local Market Power Mitigation in IFM
Example 1: Setup

- **G₁**
  - Energy bid: $10/MWh
  - IRU bid: $2/MW

- **G₂**
  - Energy bid: $70/MWh
  - DEB: $40/MWh
  - IRU bid: $4/MW

- **L**
  - Energy self-schedule: 450MW
  - IRU requirement: 30MW

- Line A-B power flow limit: 50MW
Local Market Power Mitigation in IFM
Example 1: MPM Base and IRU Deployment Scenario

- **G_1**
  - Schedule: 300MW; IRU award: 15MW

- **G_2**
  - Schedule: 150MW; IRU award: 15MW

- Line A-B power flow at limit: 50MW
  - Shadow prices: $87/MWh, $3/MW

- **LMPs**
  - A: Energy: $10/MWh; IRU: $2/MW
  - B: Energy: $70/MWh; IRU: $4/MW
  - C: Energy: $40/MWh; IRU: $3/MW
Local Market Power Mitigation in IFM
Example 1: IFM Base and IRU Deployment Scenario

- **G₁**
  - Schedule: 300MW; IRU award: 15MW

- **G₂**
  - Schedule: 150MW; IRU award: 15MW
  - Energy bid is mitigated to the higher of DEB or competitive LMP ($40/MWh)

- Line A-B power flow at limit: 50MW
  - Shadow prices: $42/MW, $3/MWh

- LMPs
  - A: Energy: $10/MWh; IRU: $2/MW
  - B: Energy: $40/MWh; IRU: $4/MW
  - C: Energy: $25/MWh; IRU: $3/MW

- IRU cost allocated to L: $90

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Local Market Power Mitigation in IFM
Example 2: Can G₂ exercise market power in IRU?

- **G₁**
  - Energy bid: $10/MWh
  - IRU bid: $2/MW

- **G₂**
  - Energy bid: $70/MWh
  - DEB: $40/MWh
  - IRU bid: $38/MW

- **L**
  - Energy self-schedule: 450MW
  - IRU requirement: 30MW

- **Line A-B power flow limit:** 50MW
Local Market Power Mitigation in IFM
Example 2: MPM Base and IRU Deployment Scenario

- **G₁**
  - Schedule: 300MW; IRU award: 15MW

- **G₂**
  - Schedule: 150MW; IRU award: 15MW

- Line A-B power flow at limit: 50MW
  - Shadow prices: $36/MWh, $54/MWh

- **LMPs**
  - A: Energy: $10/MWh; IRU: $2/MW
  - B: Energy: $70/MWh; IRU: $38/MW
  - C: Energy: $40/MWh; IRU: $20/MW

- IRU cost allocated to L: $60
Local Market Power Mitigation in IFM
Example 2: IFM Base and IRU Deployment Scenario

- **G₁**
  - Schedule: 285MW; IRU award: 30MW

- **G₂**
  - Schedule: 165MW; IRU award: 0MW
  - Energy bid is mitigated to the higher of DEB or competitive LMP ($40/MWh)

- Line A-B at limit: 40MW + 10MW
  - Shadow prices: $0/MWh, $45/MWh

- **LMPs**
  - A: Energy: $10/MWh; IRU: $2/MW
  - B: Energy: $40/MWh; IRU: $32/MW
  - C: Energy: $25/MWh; IRU: $17/MW

- IRU cost allocated to L: $60
Local Market Power Mitigation in IFM
Example 2: IFM with both Energy and IRU Mitigation

- **G₁**
  - Schedule: 300MW; IRU award: 15MW
  - Energy bid is mitigated to $40/MWh
  - IRU bid is mitigated to $20/MW

- **G₂**
  - Schedule: 150MW; IRU award: 15MW
  - Energy bid is mitigated to $40/MWh
  - IRU bid is mitigated to $20/MW

- **Line A-B power flow at limit: 50MW**
  - Shadow prices: $18/MWh, $27/MWh

- **LMPs**
  - A: Energy: $10/MWh; IRU: $2/MW
  - B: Energy: $40/MWh; IRU: $20/MW
  - C: Energy: $25/MWh; IRU: $11/MW

- **IRU cost allocated to L:** $330
Congestion revenue rights

- No changes are proposed to the existing congestion revenue rights (CRRs) nomination and auction processes to account for imbalance reserves.
- Congestion revenue will not be collected on the imbalance reserve flows.
Congestion revenue rights – example 1

- **G₁**
  - Schedule: 300MW

- **G₂**
  - Schedule: 165MW

- Line A-B at limit: 50MW
  - Shadow price: $45/MWh

- **LMPs**
  - A: Energy: $10/MWh
  - B: Energy: $40/MWh
  - C: Energy: $25/MWh

- Congestion revenue: $2250
Congestion revenue rights – example 2

- **G₁**
  - Schedule: **285MW**; IRU award: **30MW**

- **G₂**
  - Schedule: **165MW**; IRU award: **0MW**

- **Line A-B at limit**: **40MW + 10MW**
  - Shadow prices: $0/MWh, $45/MWh

- **LMPs**
  - A: Energy: $10/MWh; IRU: $2/MW
  - B: Energy: $40/MWh; IRU: $32/MW
  - C: Energy: $25/MWh; IRU: $17/MW

- **Congestion revenue**: $1800
Congestion revenue rights

- ISO expects the constrained transmission to be consumed mostly by energy
  - Current position is to monitor the issue

- Potential solutions are complex to implement and come with own set of challenges
  - Reserve transmission capacity in the CRR model for imbalance reserve deployment
  - Directly settle the locational imbalance reserve price with load and VERs
Accounting for energy offer cost in upward capacity procurement

• Market cannot differentiate between two resources with same capacity bid but different energy bid costs when awarding upward capacity products

• Greater concern for IRU/RCU than contingency reserves because there is a higher likelihood of being dispatched for energy in RTM

• Objective is to prevent opportunities for high energy cost resources from routinely being awarded IRU/RCU when the resources will rarely be dispatched for energy in the RTM
Options considered to date

• Use energy bid cap to limit eligibility or compensation of resources awarded IRU/RCU
• Include energy offer price in bid for imbalance reserves
• Include penalty parameter based on energy offer price in bid for imbalance reserves
• Include a real-time dispatch cost with imbalance reserve bid
• Tiered imbalance reserve products with varying real-time bid caps
• Call option approach with IRU capacity strike price
Accounting for energy offer cost in upward capacity procurement

- Proposes a real-time energy bid price cap consistent with the expected system marginal price if the entire upward uncertainty requirement materialized (“P97.5 price”) that applies to all resources awarded IRU/RCU
- Resources with energy costs above cap must incorporate financial risk into IRU/RCU bid → higher bids for RCU and IRU → less likely to be awarded → meets policy objective
- Quantity of real-time energy bids subject to the real-time energy bid price cap limited to the MW quantity of IRU/RCU awards
Accounting for energy offer cost in upward capacity procurement

- Looking to establish general acceptance of the concept before finalizing the P97.5 price methodology
  - Use latest available bid stack from a previous day and clear against upward uncertainty requirements for the applicable trading day
  - Use next-day gas prices to scale previous day’s bid stack in order to reflect applicable trading day’s conditions
  - One P97.5 price per hour for entire system
  - P97.5 price would be published in advance of DAM close
  - Propose to implement functionality to turn off bid cap during pre-defined tight system conditions
Glossary

- **CRR** = Congestion Revenue Right
- **DAM** = Day Ahead Market
- **DEB** = Default Energy Bid
- **IFM** = Integrated Forward Market
- **IRU** = Imbalance Reserve Up
- **LMP** = Locational Marginal Price
- **MPM** = Market Power Mitigation
- **RCU** = Reliability Capacity Up
- **RTM** = Real Time Market
- **VER** = Variable Energy Resource