SIR73-Operational Congestion Mitigation

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SIR73-Operational Congestion Mitigation Requests

- Submitted by EDF Renewables
  - Member of SPP
  - EDF Renewables is a global renewable developer
    - With 20GW developed in North America
    - With a 34GW pipeline in the U.S., comprised of solar, storage, onshore and offshore wind projects,
    - Owner and operator of several wind farms in SPP footprint
- Developed in collaboration with NewGrid

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Issue Description:

- Congestion management today is primarily performed through generation redispatch in the day-ahead and real-time energy markets. This redispatch leads to high congestion costs borne by market participants and their end customers.

- At the same time, the cost of congestion management can be significantly reduced by actions that TOPs can implement.

- These operational actions include transmission reconfigurations (e.g., topology optimization), changes to setpoints of power flow control devices (e.g., phase shifters), adjustments of series reactor setpoints, etc.

- This initiative is to develop a process for market participants to request evaluation of specific transmission operations actions to mitigate congestion in a transparent manner.

- Possible applications:
    - For mitigating impact of grid outages
    - For general adoption to mitigate economic congestion, improve reliability and optimize the capacity of the existing transmission infrastructure

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- **Proposal:** Establish a transparent process that will specify:
  - The means for a market participant to submit an operational congestion mitigation request
  - The set of constraints eligible for mitigation through transmission operation actions
    - To avoid concerns about introducing differences between TCR auctions and the DA/RT energy markets, the constraints eligible for mitigation might be limited to those that either
      - Did not bind in the latest TCR auction (and as such did not impact the TCR prices or the cleared quantities), or
      - Did bind in the latest TCR auction but the constraint causes underfunding, indicating that the TCR auction did not reflect current operational conditions for that constraint (e.g., the constraint was oversubscribed in the TCR auction) and as such it warrants constraint mitigation in the energy market.
  - The minimum information needed in the request, such as
    - Target constraint for relief
    - Operational action specification,
    - Conditions under which they would be implemented (e.g., during a specified outage),
    - Duration for the actions.
  - The criteria that the RTO and TOP will use to evaluate the requests
    - Example economic evaluation criteria: minimum % flow relief on the specified constraint, the actions do not increase flow on other binding constraints and do not lead to new constraints loaded above a certain level (e.g., 95%) under conditions when the target constraint would bind.
    - Example reliability evaluation criteria:
      - System security: actions must lead to secure system state under all specified contingencies for a range of conditions expected for the duration of the period when the actions would be implemented.
      - Maximum load radialization allowed (e.g., none, 10 MW, 30 MW), and under what conditions.
    - The evaluation criteria may vary depending on the TOP, to account for TOP practices and local system characteristics.
  - The evaluation, response timeline
    - Example timeline: initial evaluation response to be provided within 5-7 days.
    - Example responses: Approved, Rejected (with specified reason for rejection, e.g., flow on line X exceeds 95% of emergency rating under contingency Y), Request clarification or additional data

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Potential Benefits

- **Economic benefits**:
  - SPP has recently conducted studies of the feasibility and the benefits that topology optimization actions can provide to the market.
  - Annual congestion cost savings ranging from $5 million (HITT M4 Report) to over $18-44 million (2018 Topology Optimization Study) under a limited set of reconfiguration actions (specified as the *Preferred* reconfiguration criteria) while maintaining or improving reliability by reducing breached constraints.

- **Reliability benefits** by mitigating breached constraints
  - In the Fall of 2020, 60% of the real-time market impacts had at least one breached constraint (Fall 2020 Quarterly State of the Market Report).
  - The 2018 Topology Optimization Study found that reconfigurations provided over 25% flow relief on average for the constraints studied, i.e., usually sufficient to eliminate a constraint breach.

- **Improvement in TCR funding:**
  - Expected to be achieved by reducing congestion on chronically underfunded constraints, as well as on constraints not binding in the TCR market.

Potential risks

- There are no known risks, particularly with the suggested limitations on constraints eligible for mitigation.

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Research/Analytical Work Supporting SIR#73: If the incentives lead to the broad use of advanced technologies in real-time operation and markets, the expected market efficiency gains will be significant

- SPP conducted a topology optimization Pilot and Study which found:
  - Reduced frequency of breached intervals from 34% (2017) to 8%
  - Annual RT market savings of over $18-44 million
  - Significantly reduced wind curtailments, full relief under some conditions
- Topology optimization use in RUC to avoid the need for unit starts could provide an additional $10-20 million in savings per year:
  - Based on the annual RUC make-whole payments of $45 million in 2018 (SPP MMU SOM 2018)
  - About 50% of historical out-of-market unit starts are for constraint management
- In MISO IMM Summer 2021 report, IMM notes how the costliest constraint in MISO has a reconfiguration solution that could reduce the costs of the constraint by roughly two-thirds
- Top 2019 constraints were addressed with reconfiguration as per the SPP MMU SOM 2019

Figure 5-10 Top ten congested flowgates with projects

Flowgate name	Region	Flowgate location	Projects that may provide relief
TMP175_24736	North-central Oklahoma	Braman-Newkirk Tap 69kV for the loss of Hunter-Woodring 345kV (OKGE)	TOP and SPP RC implemented re-configuration option. No Projects identified at this time.
TMP109_22593*	Eastern Oklahoma	Stonewall Tap-Tupelo Tap 138kV (WFEC) ftlo Seminole-Pittsburg 345kV (CSWS-OGE)	Tupelo 138 kV Terminal Upgrades (July 2021, 2017 ITP10). Operations has Operating Guide.
TAHH59MUSFTS*	West Arkansas/East Oklahoma	Tahlequah-Highway 59 161kV ftlo Muskogee-Fort Smith 345kV (GRDA-OKGE)	SPP RC and TOP have an Operating Guide in place that considers multiple reconfiguration options if normal congestion management is not effective. No Projects identified at this time.
TMP379_24692	North-central Oklahoma	Braman-Newkirk Tap 69kV ftlo Kildeer Tap-Chikaskia 138kV (OKGE)	TOP and SPP RC implemented re-configuration option. No Projects identified at this time.