Question text

Can utilities make use of this technology or is it really just for the RTO grid operators?

Are load and generation considered "market participants" in this context? If so, how do they identify congestion patterns? What info sources should be used?

The tool works off thermal limits. Can it honor offline derived stability and/or voltage limits?
Wouldn't these short term congestion mitigation actions divert away the absolute need for system upgrade at those places?

In operations does the tool function in a standalone off-line mode or is it integrated into the EMS? I assume it requires manual operator approval of changes?

In long term planning is the tool integrated into PSSE/PSLF or is it standalone?

It was mentioned in 2022 the additional cost was $20 billion due to congestion. How do you quantify these costs? What are the biggest drivers of these costs?

In addition to system stability, what about impacts to short circuit duty, especially if you close in a normally open bus tie?

How can we best determine what traditional activities will get amplified value from TopOpt and which will see decreased value after adoption of TopOpt?

What risks do you see using this method for long term planning vs near term planning / real time operations

Can you describe the sort of benefits analyses that are performed to determine if a topology change is beneficial? Is there a link to production cost models?

Doesn't FERC regulate that marketing function and transmission function be independent of each other?
Is there a method you use to select which topological actions would be beneficial on a grid besides checking LMPs?

Are you using an optimization solver (LP, MIP, etc.) for selecting the actions within the tool?

Is there implications for any 'grid availability' KPIs or similar incentives for transmission owners having their assets taking out?

how is flow relief measured (physical meaning)? The flow is reduced by 15% in average in that area?
What are the requirements for implementing system? Hardware mainly?
Do you have any estimate for installing this system (percentage compared to grid asset)?
What models/system information does NewGrid need access to in order to identify reconfiguration solutions?

What is ITC's incentive for implementing these solutions? (How does it affect what they are paid?)

How might this work into Order No. 1920(-A) implementation: could it integrate into compliance filings as a consideration to increase benefit-cost ratio?

Hi! Wouldn't MISO be the one doing this reconfigurations?

For the foregone reconfiguration opportunities, does MISO indicate why the reconfiguration you proposed was rejected?

It seems like the topology optimization is implemented in the planning phase. What is the relationship here between planning and real-time grid operation?

Answer Text

With the example shown in the webcast, other market participants and transmission owners can also use the technology and present it to the grid operator.

Yes. The realized congestion patterns are public information in nodal markets. In addition, system operators in nodal markets provide transmission models to market participants to perform analyses. Historical experience is another way to anticipate congestion patterns.

Yes, the topology optimization software can enforce generic flow constraints to model stability and/or voltage limit proxies. Also, the power flow solution is AC, so steady-state voltage impacts are captured directly.

These actions are typically used as a bridge to address operational issues until identified transmission upgrades are in place.

The tool can be integrated with the EMS or not, depending on the application. Even when not integrated (strictly speaking), it can read node-breaker case exports from the EMS. In either case, it's advisory only (like a GPS application in the transportation analogy), the operator always needs to approve/implement any selected reconfiguration.

Standalone

In this particular study, the authors look at those costs reported by market monitors of ISOs and may extrapolate for the national congestion costs. Costs are due to congestion where expensive generation are used instead of lower cost generation to serve load in import constrained areas.

Short circuit duty needs to be accounted for in the evaluation. When short circuit constraints are limiting, requiring buses to operate in a split configuration for example, the optimization process would see if there can be improvements in the split, while respecting the short circuit constraints.

The objective of TTO is provide system-wide value, by lowering congestion costs across the entire network.

See this ESIG blog on the use of topology optimization in long-term planning: https://www.esig.energy/transmission-switching-and-topology-optimization-in-long-term-grid-planning/

Production cost models and market simulations, properly capturing the congestion scenarios of focus

Yes. Reconfiguration decisions are made independently by transmission function staff. Marketing function staff have no visibility into reconfiguration decisions until they are posted in the OASIS. There are also mutiple layers of separation with topology optimization. With the MISO process, a market participant provides a reconfiguration idea to MISO (an independent entity) who then works with impacted transmission owners (additional indepenent entities) to consider the solulion. Both MISO and impacted transmission owners need to agree on implementation.

Reliability metrics, lower number of actions, familiarity, etc. can all be used

Yes, in addition to running contingency and other analyses
Transmission reconfiguration actions taken for any reason, including economics, are typically tracked as a defined category of Transmission Outages KPI's. The defined category is used as an indicator for the need to for transmission upgrades by some transmission owners and RTO's.

Flow relief is measured either as a fraction of the limit of the constraint of interest, or as a fraction of the pre-reconfiguration transfer capability of interest.
The topology optimization system runs on Windows servers.
The cost of any software solution pales in comparison with the cost of grid capital assets
Power flow cases of system conditions reflecting the congestion of focus are the basic input to execute a topology optimization study
These are no direct financial incentives for ITC to implement these solutions. However, ITC supports the appropriate use of Topology Optimization because we see there is value for our customers, and we also want to be able to get the most out of our system.

Topology optimization is included as one of the alternative technologies to be considered in Order 1920-A
They can do the reconfigurations themselves, but in these examples they also may validate the reconfigurations that are provided to them.

Many of these were not outright rejected, there was insufficient time to develop the reconfiguration and evaluate it, or were implemented late during an event.
When a reconfiguration is rejected MISO provides a reason, as per the process.

These examples are primarily in the operations planning phase