



Future Grid Study Proposals

ISO Feedback on Modeling Constructs



Overview of Proposals

- The ten submitted proposals pose a wide range of questions, requiring a range of distinct analytic methods and models to provide quantitative responses
- These types of requests for macro-trend studies, ranging from economic studies to transmission-expansion planning scenarios to Forward Capacity Market (FCM) forecast modeling, are not contained in one modeling platform that could accomplish all these tracks



Overview of Models

Focusing on the requests for higher-level scenario analyses, we note they cover the following distinct models:

- FCM market model
- Probabilistic reliability model (e.g. GE MARS)
- Production cost model (e.g. GridView)
- Ancillary service needs (e.g. Dartmouth model)
- Detailed transmission expansion plan



FCM Market Model

- The ISO does not have a model of FCM clearing
 - To date, The Analysis Group (TAG) has performed FCM price projections to meet stakeholder requests
- Once the study assumptions and modeling parameters are established (a process that has previously taken 3-6 months, using ESI impact analysis as an example), it has previously taken approximately 6-12 months for TAG to complete a study and provide results
 - Consultant availability, scope of work, and other factors may impact timing
- Developing an in-house ISO model would take at least 15 months, though the ISO remains concerned about developing such a model itself because the marketplace may view it as a projection of anticipated market outcomes by the market administrator
- Therefore, the ISO recommends continuing the use of a consultant to perform this type of work for participants.
- **Relevant Requests:** EMA, Eversource (1), FirstLight, National Grid, NextEra/Dominion
- **Timing considerations:** TBD



Probabilistic Reliability Model

- Economic studies often rely, at least in part, on the use of reliability models
- Economic studies generally take more than a year to complete
- These studies would be in addition to the regular economic studies requested by stakeholders under the Tariff
- In that case, we would expect such a study to take longer - unless stakeholders temporarily withdrew or halted other study requests
- **Relevant Requests:** API, Anbaric, EMA, Eversource (1) & (2), FirstLight, National Grid, NextEra/Dominion, NESCOE*
- **Timing considerations:** 12 months, if done concurrently with the 2020 economic study
 - Can be accelerated by 2-3 months if the future grid study scope is finalized and prioritized, with a pause on the 2020 study that is underway

*ISO infers application of this model from the NESCOE memo

Production Cost Model

- We do these studies frequently through our economic studies that often rely, at least in part, on the use of production cost models
- Economic studies generally take more than a year to complete
- These studies would be in addition to the regular economic studies that can be requested under the Tariff
- In that case, we would expect such a study to take longer - unless stakeholders temporarily withdrew or halted other study requests
- **Relevant Requests:** API, Eversource (1), FirstLight, National Grid, NextEra/Dominion, NESCOE*
- **Timing considerations:** 12 months, if done concurrently with 2020 economic studies
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Modeling Ancillary Service Needs

- To project ancillary service needs in a few of the Economic Studies (2016, 2017, 2019), the ISO used pre-production versions of the Electric Power Enterprise Control System (EPECS) model developed by Dartmouth, which is still a work-in-progress
 - It is limited in its flexibility, requires significant manual intervention to conduct a study, and has not yet been upgraded to a production grade quality
 - In addition, this model is limited in its data transfer capability, is simplified, and is incomplete in its existing logic
- The ISO has identified substantial improvements that need to be made to this tool such that it used to study multiple scenarios in a sustainable way
 - The ISO anticipates that it could take over a year for the ISO to bring such a model to full production capabilities or we would need to rely on as is
 - Reliance on the model “as-is” also requires time to compensate for existing limitations
- It is worthwhile to improve this model either for this effort and/or for repeatable future uses
- **Relevant Requests:** Multi-Sector Group A, NESCOE*
- **Timing considerations:** TBD, but best estimate is 15 months minimum given the upgrades required



Detailed Transmission Expansion Plan

- The ISO generally studies incremental changes to the transmission system
- Large transmission-project studies could certainly be addressed by ISO staff; however, the group is not currently staffed to handle a large design/modeling project while also performing the required interconnection and reliability studies
 - Current studies include voluminous, smaller-scale projects in the region
- The ISO does not have the requisite skills to estimate transmission costs and it would be best performed by engineers with relationships with vendors and extensive cost estimation experience
- We would be more than willing to work with ISO-led consultants to conduct this expanded effort once stakeholder have had an opportunity to derive a well-defined study scenario
- **Relevant Requests:** Anbaric, Multi-Sector Group B, National Grid, NESCOE*
- **Timing considerations:** Minimum 12 months, assuming current ISO staffing is augmented with consultants



GENERAL CONSIDERATIONS



Timing Perspectives

- Each of these modeling tasks could be performed by outside consultants with support from the ISO, possibly in shorter timeframes
- If stakeholders agree, in the October or November timeframe, on finalizing the necessary assumptions for an ISO administered economic study (from another source such as E3/EFI), then the ISO would need support from National Grid and stakeholders for the following:
 - The ‘new’ future grid study request will become the top priority and displace the current 2020 National Grid economic study request
 - The new study request will likely be completed by September 2021
 - Other, new 2021 economic study requests submitted in April 2021 would be held until (a) the future grid study is complete and (b) the National Grid study is complete

Necessary Modeling for Future Grid – ISO Plans

- To our knowledge, there is currently no model yet in existence for studying the detailed, operational dispatch needs of a system with significant inverter-based resources, interaction between the transmission and distribution systems, and evolving load profiles that may occur in the future
- The ISO is embarking on developing this model internally, but it is significantly more time-intensive and will be a multi-year effort
- The ISO plans to build an enhanced simulator model between 2020-2023, in phases and with staged deliverables, and looks forward to sharing more information on its plan with stakeholders
 - The ISO is currently in the planning stage and intends to build a sustainable and robust model that can be used for a variety of simulations

Summary

- A number of modeling approaches are well within the ISO's area of expertise and, where needed, engagement with consultants can be considered
- Timing to conduct any study will depend on the clarity and scope of the proposal, the availability of models, the granularity of the analysis, and the commencement of the engagement
- The ISO looks forward to continued discussions with stakeholders as their study proposal develops