**Capacity Expansion Modeling for Transmission Planning**

**Model Developer Questionnaire/Webinar**

Introduction:

ESIG, with DOE support, is launching an effort to examine the use of capacity expansion models for transmission planning.

The key questions this initiative seeks to answer are:

* What are the capabilities of today’s modeling tools and how can they be applied in transmission planning?
* What do transmission planners need so that these models are more effective as a first step in the transmission planning process and can this be accomplished while still allowing these models to be tractable?

We will hold a half-day workshop in Minneapolis on the morning of October 24th immediately prior to the ESIG [Fall Technical Workshop](https://www.esig.energy/event/2022-fall-technical-workshop/), to convene a discussion between model developers and transmission planners to explore capabilities of and needs from capacity expansions models for transmission planning applications. Following this workshop, ESIG will publish a summary.

Many transmission planners have not used capacity expansion models in this application before or are not aware of the capabilities of these tools. In order to ensure that the workshop participants have a basic level of understanding of the various models and their capabilities, *we are requesting model developers to fill out this brief questionnaire and record a brief webinar about their model*. We will create a summary from the questionnaire responses and will post the webinars on our [webpage](https://www.esig.energy/capacity-expansion-modeling-for-transmission-planning/) and [YouTube](https://www.youtube.com/c/EnergySystemsIntegrationGroup) channel, which will be publicly available. We will ask workshop participants to review the summary and view the webinars prior to the workshop. This will eliminate the need for high-level overviews at the workshop so that we will be able to focus on specifics within the models or in the transmission planning process to better align model capabilities and transmission planning needs.

Please note that we are not trying to say that one model is better than any other or to rank models, as we believe each model is fit for some purpose.

Thank you for your participation in this effort!

Aaron Bloom, System Planning Working Group Chair and Debbie Lew, Associate Director

Please contact Debbie at debbie@esig.energy or (303) 819-3470 if you have any questions.

**Questionnaire**

We interviewed a number of transmission planners to better understand their questions about capacity expansion models to create this questionnaire, and pared them down so this would not be too onerous. Because there are so many differences in approaches, some of these questions may not apply to some of the developers and you should feel free to skip those or explain how your model gets at the goal in a different way. Some models can be run in multiple ways or configurations, so please select the configuration that you think is most appropriate for transmission planning applications or feel free to submit multiple questionnaires for different configurations of your model.

**Name of capacity expansion model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Version of capacity expansion model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. What is the intended geographic scope of your product?
	* + A single utility service area
		+ Single ISO/RTO
		+ Multiple ISO/RTOs
		+ National
		+ Model is capable for multiple types, but commonly used for \_\_\_\_\_\_\_\_
2. What is the timescale for planning that your model is used for?
	* + Near-term (<5 years)
		+ 5 years
		+ 10 years
		+ Multi-decade
		+ Model is capable of any of these but commonly used for \_\_\_\_\_\_\_
3. If your model combines other tools (production simulation, power flow, loss of load expectation etc), please list those capabilities.
4. What does your model optimize or co-optimize (e.g. co-optimizes generation and transmission; co-optimizes generation, transmission, storage and distribution; etc.)?
5. How is transmission characterized in your model (e.g. zonal/nodal; DC power flow with distribution factors; pipe and bubble approach, etc.)?
6. How does your model represent transmission investment? Can it evaluate different voltages?
7. How does your model evaluate capacity adequacy (e.g., planning reserve margins and capacity value inputs, loss-of-load expectation)?
8. How does your model evaluate energy adequacy (e.g., load duration curve, a derivative of a load duration curve, chronological dispatch, or representative dispatch or some other method)?
9. If your model performs chronological dispatch, what time-step can be used? If your model uses time slices, how many time slices do you use to characterize diurnal and seasonal changes?
10. If your model does not perform chronological dispatch, how does it manage the dispatch of variable renewables, storage, demand response, etc.?
11. If you do provide input datasets with your models, can you briefly describe the types of datasets available (e.g., resource, load, existing generation and transmission, etc.)?
12. If your model includes underlying wind/solar resource data, what is the spatial resolution of the resource data (e.g., 2 km wind plant siting data)? If that data is based on specific historical years, how many years of data is represented?
13. We are interested in the runtime and computing needs of your model. Can you give an example of a study which used your model and explain the geographic scope of the study, runtime, and computing needs (e.g., do you need high performance computing).
14. Is your model publicly available for purchase/license for users or do users need to commission you to run the model?
15. If you have a link to documentation on your model, please list it here.

Please email this questionnaire to debbie@esig.energy by September 15, 2022.

**Webinar Questions**

In addition to the questionnaire, we invite you to record a 15-30 minute webinar introducing your capacity expansion model and its key features. Please take this time as an opportunity to discuss the features of your model. This audience will be particularly interested in how your model can be used for transmission planning, and also how your model treats variable renewables and limited duration resources. In addition to your own content, please address the questionsbelow so that each webinar will be grounded in a consistent set of questions for viewers to understand each tool's capability in advance of the workshop. This will allow the workshop to focus on discussion, rather than answering clarification questions about each model.

We will not be doing live webinars due to the difficulties in scheduling many webinars. Please use whatever recording software (e.g., Zoom, Webex, powerpoint audio recording) you are comfortable with or contact ryan@esig.energy for assistance in recording the webinar. The recordings will be posted on our webpage and YouTube channel and workshop participants will be asked to watch these prior to the workshop.

***Please - no blatant overly commercial sales pitches or speaking negatively about someone else’s model!***

1. Can you walk us through how you would do transmission planning for an appropriate geographic footprint with your model? How do you take your model’s solution and input it into power flow, production cost simulation and loss of load expectation tools. In the reverse, how can your model incorporate results from other power flow, production cost and resource adequacy models?
2. How would you compare distributed PV versus utility-scale PV + transmission in your model (e.g., is the amount or ratio of distributed resources an exogenous input or does the model endogenously compare distributed resources to remote resources that require transmission)?

Please contact ryan@esig.energy to get a link to upload the webinar recording. We ask that recordings be submitted by September 30, 2022.