Enhanced 15-Year Long-Term Planning (Master Plan)

Scenario Based Transmission Planning

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The Three Threshold Questions

PJM ANOPR Comments Outlined Three Threshold Questions for FERC Consideration in Moving Forward on Long Range Planning:

1. At the end of the day, ***who decides*** among an array of future scenarios, which set of future scenarios are actionable and should guide future planning?

2. Assuming the planning authorities ultimately decide (after stakeholder and state input), ***what are the criteria*** planners should utilize to determine which futures should guide future planning?

3. What ***regulatory 'check-in' processes*** should be developed to ensure that the plan remains prudent?

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GOAL	**Develop a robust, scenario-based transmission planning criteria that:** • Analyzes an array of future generation expansion scenarios based on a documented record of customer needs and a series of regulatory "check-ins" • Establishes "guard rails" that help avoid either overbuilding or underbuilding the future transmission system
BENEFITS	**Scenario-based transmission planning will:** • Highlight areas of the system that may experience increased transfers and subsequent transmission criteria violations • Provide advanced situational awareness of potential needs for required system reinforcements

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CHALLENGE

How transmission planners, working with states and stakeholders, can narrow down a vast number of future scenarios to determine those which should be deemed actionable for purposes of integrating new generation?

POTENTIAL APPROACH

- Scenarios are developed by defining input parameters and associated thresholds based on a set of drivers.
- A series of decision-making criteria is utilized to “sort” this vast number of future possible scenarios into actionable forecasts of future needs and a reasoned justification for a directive to build new transmission, or upgrade existing transmission, via a new scenario-based transmission planning driver.
- Predefined study criteria are then applied to a plausible subset of scenarios.

Scenario-Based Transmission Planning Terminology

Scenario parameters are building blocks that are defined in order to construct a scenario.

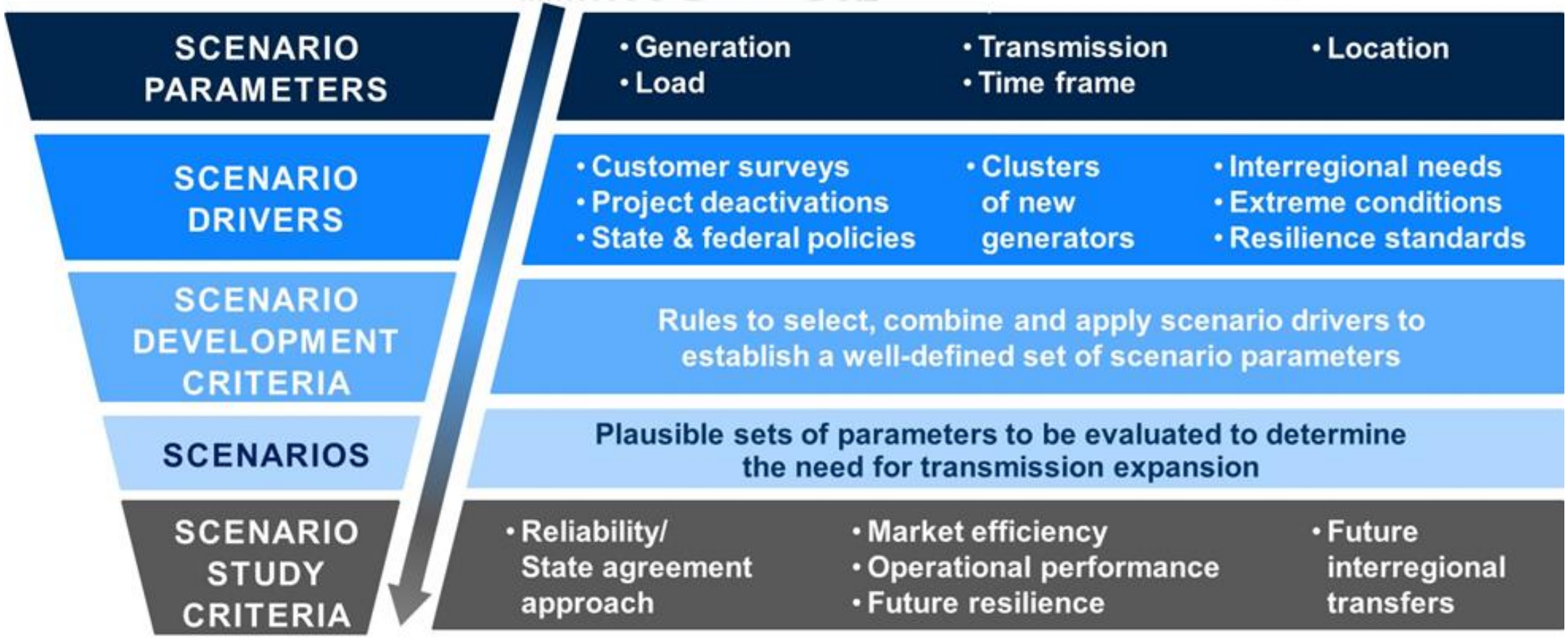
Scenario drivers are those factors that impact scenario parameters.

Scenario development criteria are the rules by which the scenario drivers are selected.

Scenario is a plausible set of parameters to be evaluated as part of power flow base case.

Scenario study criteria are the methodology by which the scenario is analyzed including the decision-making process that determines whether potential reliability violations warrant transmission expansion.

Scenario-Based Transmission Planning



Major elements of scenarios (assumptions in the case(s))

- Load Forecast
- Generation type and location
- Retirement assumptions
- Underlying case assumption for interregional transfer capability

The current process out to 15 years uses generation loaded in the 5-year case to meet the load and then scales the load and generation as needed to meet the load forecast at 15 years

How can we change the longer term assumption inputs if trends are changing?

Considerations to Planning Timeframes

Potential drivers

Long-Term Planning Inputs

- Sensitivities to load forecast
- Policies driving new generation and retirements
- Customer survey needs
- Interregional transfer criteria

Intermediate-Term Planning

- Refined assumptions

Known drivers

Near-Term Planning Inputs

- Current RTEP modeling
- Interregional transfer criteria

QUESTIONS TO ANSWER:

- How to identify these potential long-term drivers?
- When do these potential drivers become actionable planning inputs?
- Decision making criteria and role of FERC and the states?
- Are changes needed to the short-term RTEP analysis?

Goal is to find a way to bridge long-lead time projects identified in the Intermediate Term for build-out in the RTEP.

Appendix

Applying Scenario-Based Planning: A Resilience Example

- ***Step 1* – *Identification of a Specific Scenario Driver***:
  - A resilience driver is defined as ensuring that no adverse reliability impact will result from loss of an entire substation.
- ***Step 2* – *Application of Scenario Development Criteria***:
  - PJM would then model scenario drivers, as per established rules. For example, substation loss may be analyzed under standard and extreme forecast conditions.
- ***Step 3* – *Utilization of Scenario Study Criteria***:
  - PJM would analyze and identify potential reliability violations resulting from the loss of an entire substation using a probabilistic cascading trees analysis.
- ***Step 4* – *Identify if Scenario Results are Actionable and Required Time Frame***:
  - PJM would consider whether and when the issue would need to be addressed consistent with established criteria by examining:
    - Identify severity and risk
    - Frequency in which reliability violations are identified.
    - An analysis of potential solutions and expected time frames for planning, siting and construction of such solutions.

Asks of FERC

- ***Consistency in Direction and Planning Requirements Across the Nation***---FERC direction is required to ensure that the scenario-based transmission planning process is robust and relatively consistent across the nation, while allowing for regional differences in its application.
  - Avoids inconsistent roll-out as experienced with Order 1000
  - Avoids developers 'shopping' for locations based on tariff rules rather than best locations to meet stated demands and build
  - Regional differences in implementation can still be accommodated—e.g. reflect different customer requirements, state policies, system topology etc.
- ***Establish Meaningful Regulatory 'Check-In' Processes***---FERC direction for Scenario-based transmission planning should be accompanied by clear regulatory processes so as to avoid endless litigation and re-litigation over scenarios that can paralyze forward movement.
  - Ensure ability for plan to be modified for changing dynamics while avoiding endless litigation over choice of future scenarios and potential disallowances
  - Ensure state input and support for the plan to limit later siting challenges as to need.