Long-Term Transmission Planning Reform

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Objectives for Workshops

- Review current PJM RTEP processes
- Discuss PJM initial thoughts in light of ANOPR comments under RM21-17
- Discuss need and approach for gathering stakeholder input
- This workshop is not intended to actually develop rule changes but rather to engage in dialogue and collect feedback

Current PJM Reliability Planning Process

- 5 year
  - Current in-service generation
    - May include generation which has executed a Facilities Study Agreement if need to meet load (not implemented in almost a decade)
  - Orders transmission based on bright line criteria for thermal, voltage, and load drop conditions

Current PJM Reliability Planning Process

- Long-Term Process (7-8 year and out to 15 year studies)
  - Identify any reliability violations on the PJM system that may require an upgrade for years 6 through 15
    - Extrapolates 5 year thermal results
      - May include generation which has executed a Facilities Study Agreement
      - Other generation needs would be met through scaling existing generation beyond current output levels
    - 7-8 year cases are developed to confirm extrapolated results as needed (7 year case on odd calendar year, 8 year case on even calendar year)
  - May result in certain actions
    - New 230 kV or 345 kV circuits to support load growth in years 6 through 8
    - Right-of-way acquisition for any new 230 kV or 345 kV circuits to support load growth in years 9 and 10
    - New 500 kV or greater circuits to support load growth in years 6 through 12

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

- **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" that can prudently establish "guard rails" that help avoid either overbuilding or underbuilding the future transmission system.

- **Benefits:** Scenario-based transmission planning will help highlight areas of the system that may experience increased transfers and subsequent transmission criteria violations, providing advanced situational awareness of potential needs for required system reinforcements.

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

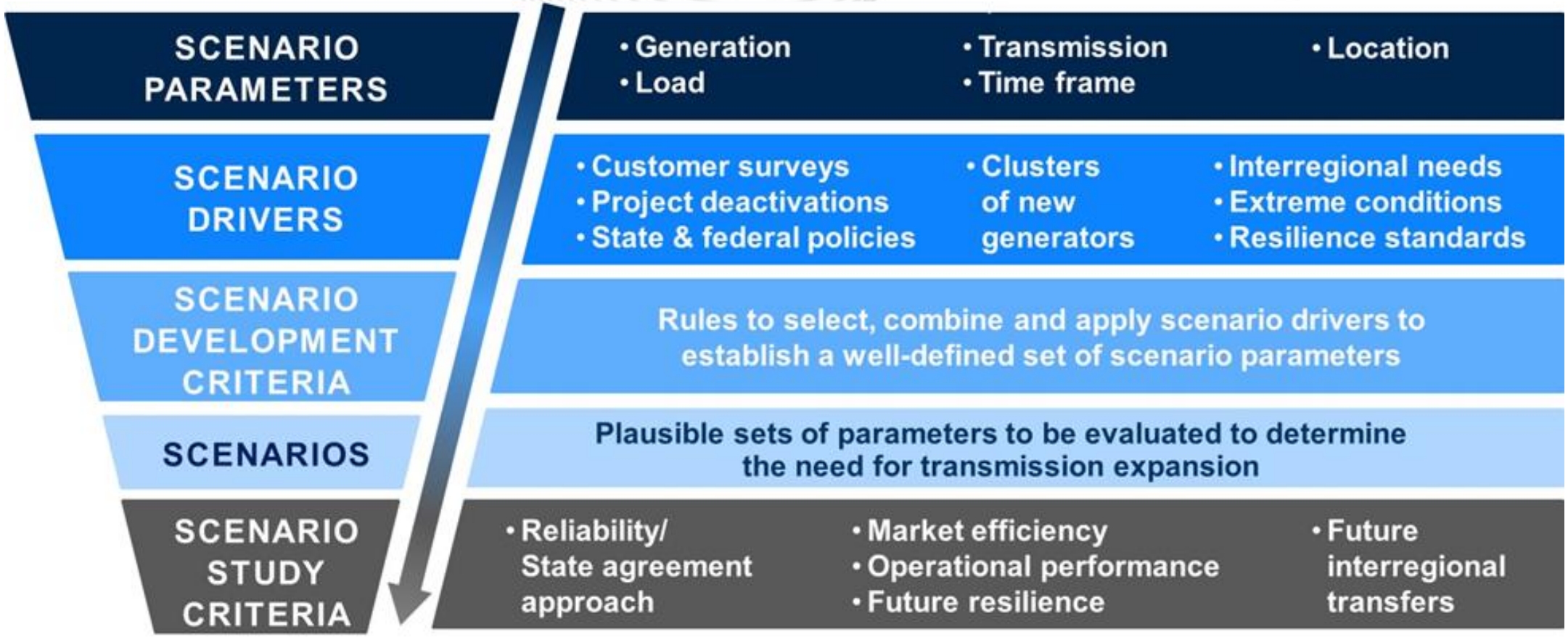
- **Challenge:** How transmission planners, working with states and stakeholders, can narrow down a vast number of future scenarios to determine those which should be deemed actionable for purposes of integrating new generation?

- **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 powerflow 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.

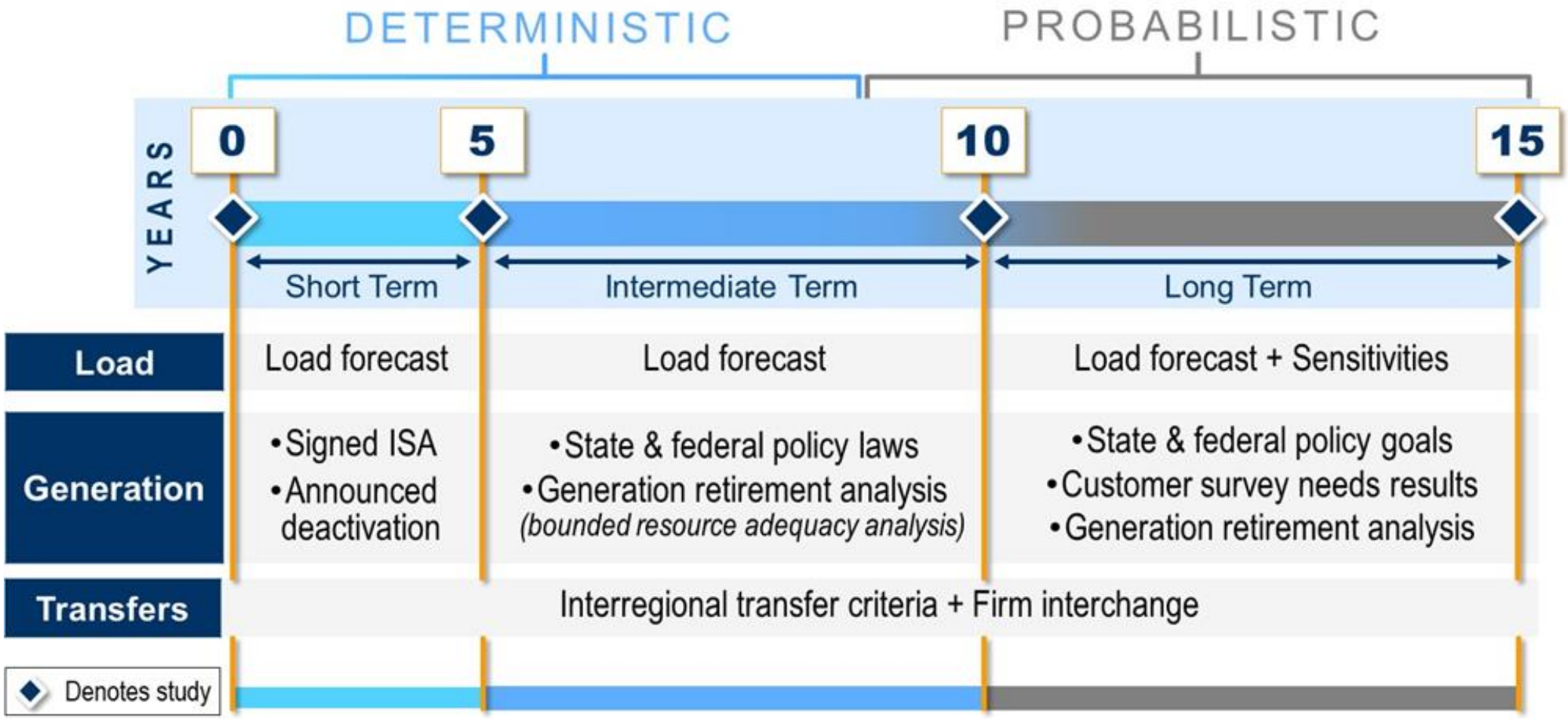
Scenario-Based Transmission Planning



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.

Planning Timeframes



Stakeholder Feedback

- Feedback on Goal/Benefit/Challenge/Potential Approach to Enhanced 15-Year Long-Term Planning (Slides 5 – 6)
- Feedback on Scenario Based Transmission Planning (slide 8)
  - Thoughts on Scenario Drivers?
  - Thoughts on rules to select, combine and apply scenario drivers?
- Feedback on Planning Timeframes (slide 10)
  - Thoughts on an approach to obtain clearly defined record of customer needs for incorporation into Long-Term Planning?
  - Thoughts on approaches around generation profile modeling?
  - Thoughts on probabilistic long-term planning transition to deterministic short-term planning?

Stakeholder Feedback

- Thoughts on approach to develop clear criteria for determining the “trigger” as to when competitive solicitation for projects should commence versus waiting until some of the uncertainties are clear?
  - Triggers must be a clear decision making criteria to support a transparent, repeatable transmission planning process. What are the clearly defined triggers to initiative transmission development at 15-year timeframe?
- Thoughts on appropriate “guard rails” to help avoid either the overbuild or underbuild of the future transmission system?

Contact

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