Some Other Considerations on LTRTP Compliance Materials Discussed on Mar. 13 TEAC

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Agenda

- Updates on compliance materials presented in 3/13 special TEAC
  - Illustrative table of LTRTP analyses
  - Process flow chart
  - Selection criteria
  - LTRTP Cycle
- (Other materials presented on 3/13 are in the appendix)

Analyses

- **Principles**:
  1. Analyses are performed on all LT Scenarios
  2. Year-10 analyses integrate and inform NT and LT planning
  3. Year-20 analyses are simplified, cover a broad range of assumptions using the three LT Scenarios

- ***Illustrative* application of principles:**

	Reliability	***Economic***

Year-10	• Use conductor ratings
	• Tests performed:
	  • Thermal (All *kV* levels): N-1, N-1-1, LD, GD, IPD
	  • Voltage (230*kV* and above): N-1, N-1-1, LD
	• (No short-circuit and stability)
		• User conductor ratings
		• Test performed:
		  • Production cost simulation
		  • Monitored flowgates (event file) 230*kV* and above

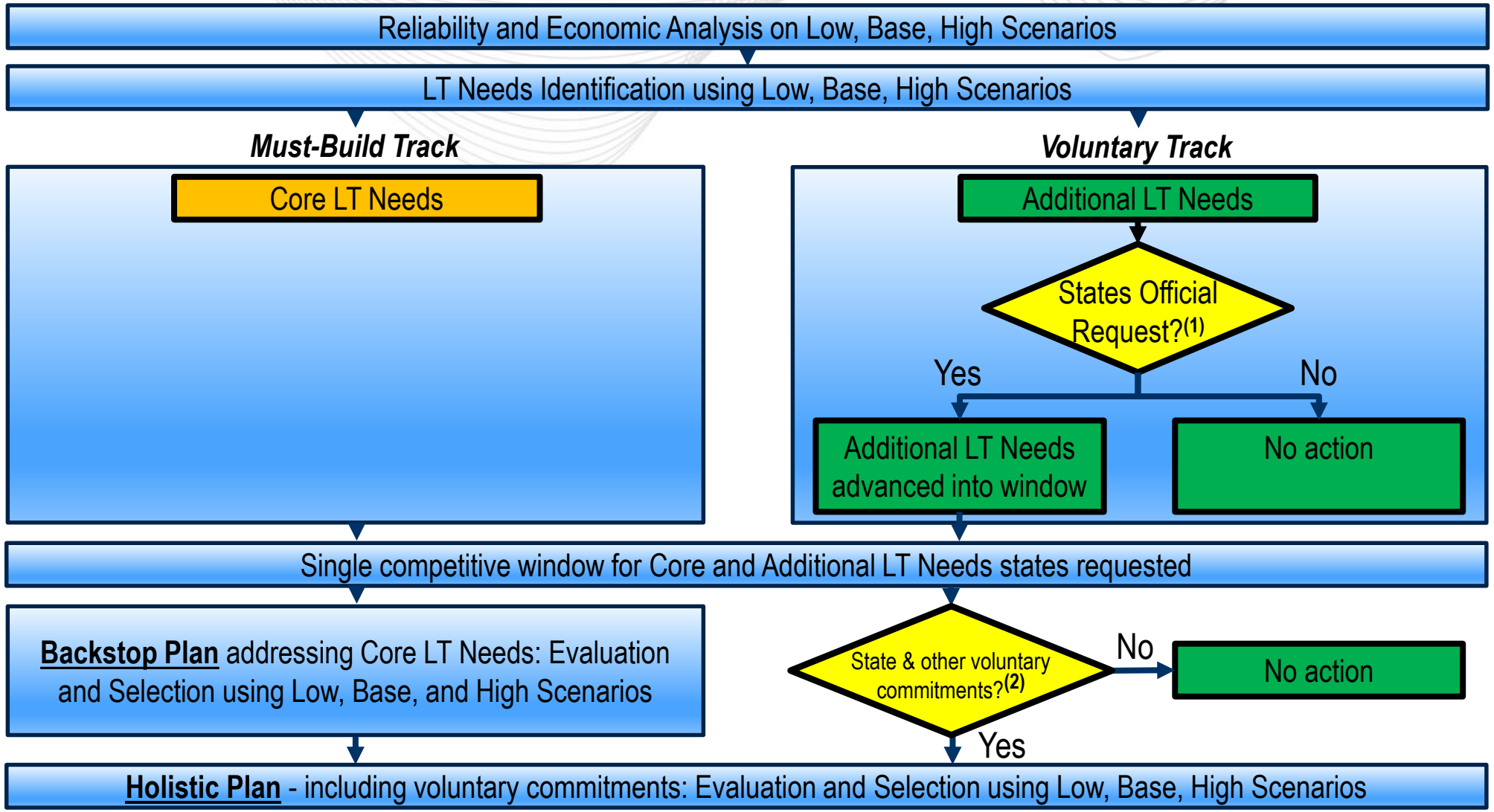
Year-20	• Use conductor ratings
	• Tests performed (230*kV* and above, thermal only):
	  • GD (singles and towers)
	  • Other tests as needed to trend Year-10
	• (No short-circuit and stability)
		• User conductor ratings
		• Test performed:
		  • Production cost simulation
		  • Monitored flowgates (event file) 345*kV* and above

LD: Load Deliverability test; GD: Generation Deliverability test; IPD: Individual Plant Deliverability test

Addressing LT Needs (Process Flow Chart)

1) These decisions can be made by a single state, by a group of states, or collectively by PARSEC – each category of project needs to have its own *ex-ante* cost allocation per Order 1920

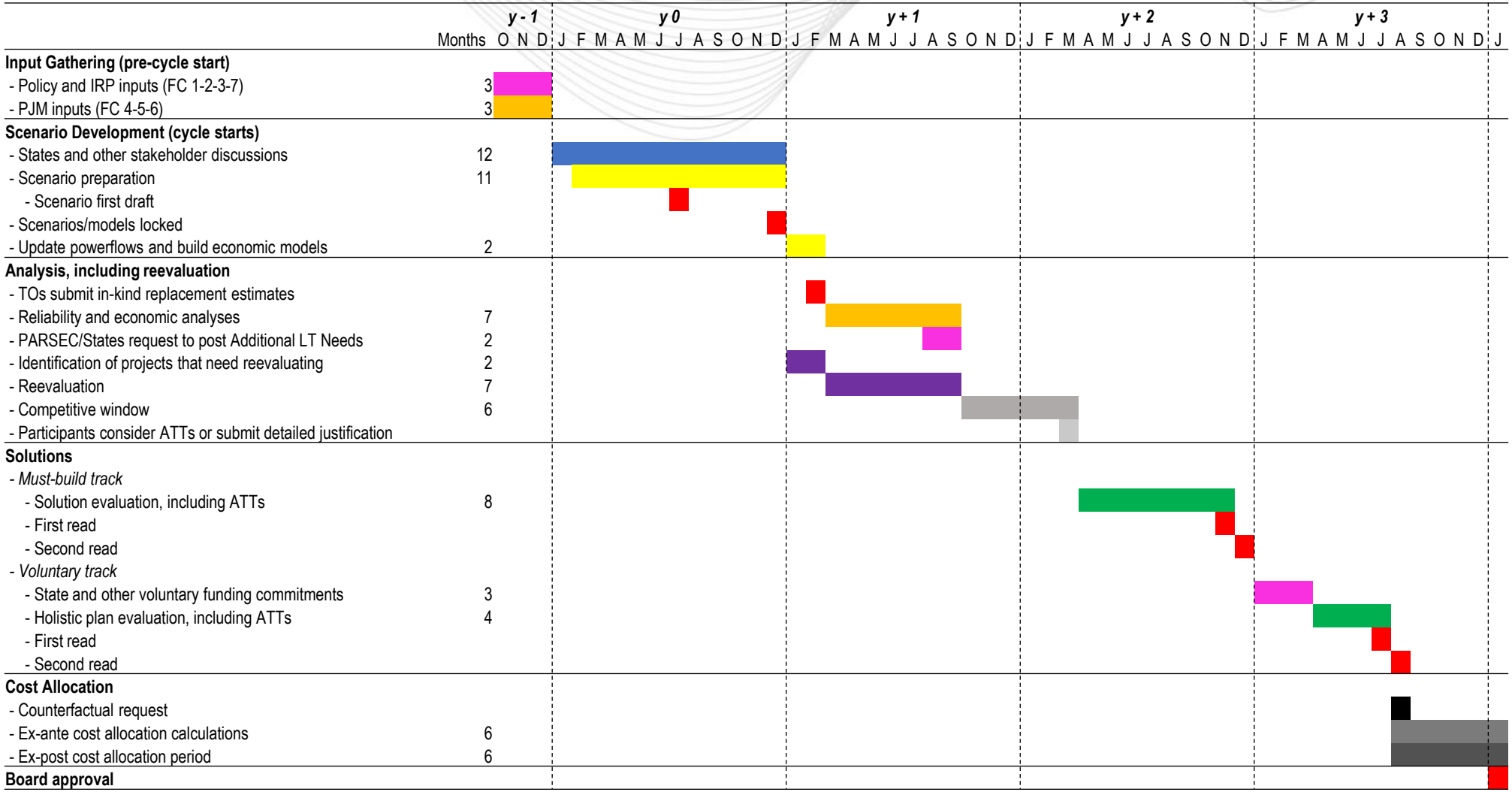
2) States' decision to pursue Additional LT Needs and Voluntary Funding Opportunities, also for interconnection customers, per Order 1920 requirement



Selection

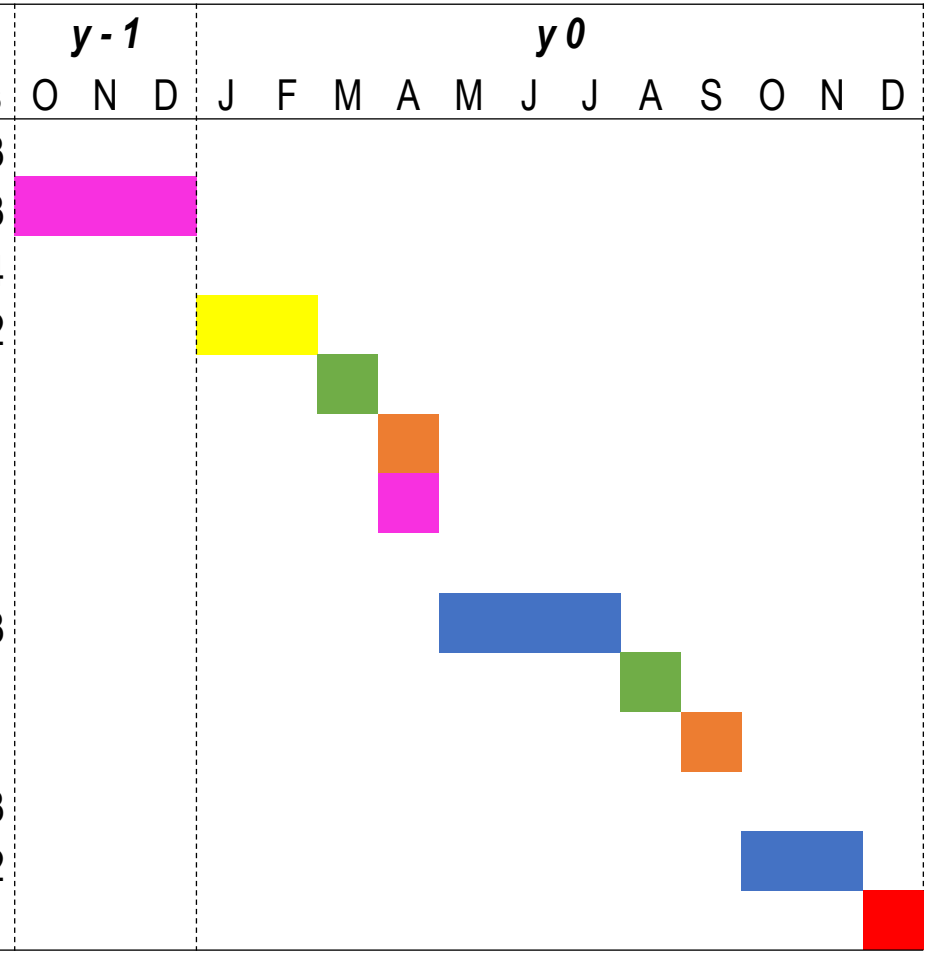
- Principles for Selecting LT Solutions:
  - Required in-service date vis-a-vis lead-time of the LT Solution
    - e.g., select if the need is expected in 12 years and the project lead-time is 12 years; wait if the lead-time is 8 years
  - Robustness of the solution across Base, Low, and High Scenarios and sensitivities, including extreme weather
  - Expandability
  - Constructability, including utilization of existing right-of-ways
  - Operational performance and flexibility
  - Benefits and costs (including for acceleration)
- PJM will not set a minimum benefit threshold for Core LT Needs
- PJM and states can define different evaluation and selection criteria for LT Solutions addressing Additional LT Needs

LTRTP Cycle



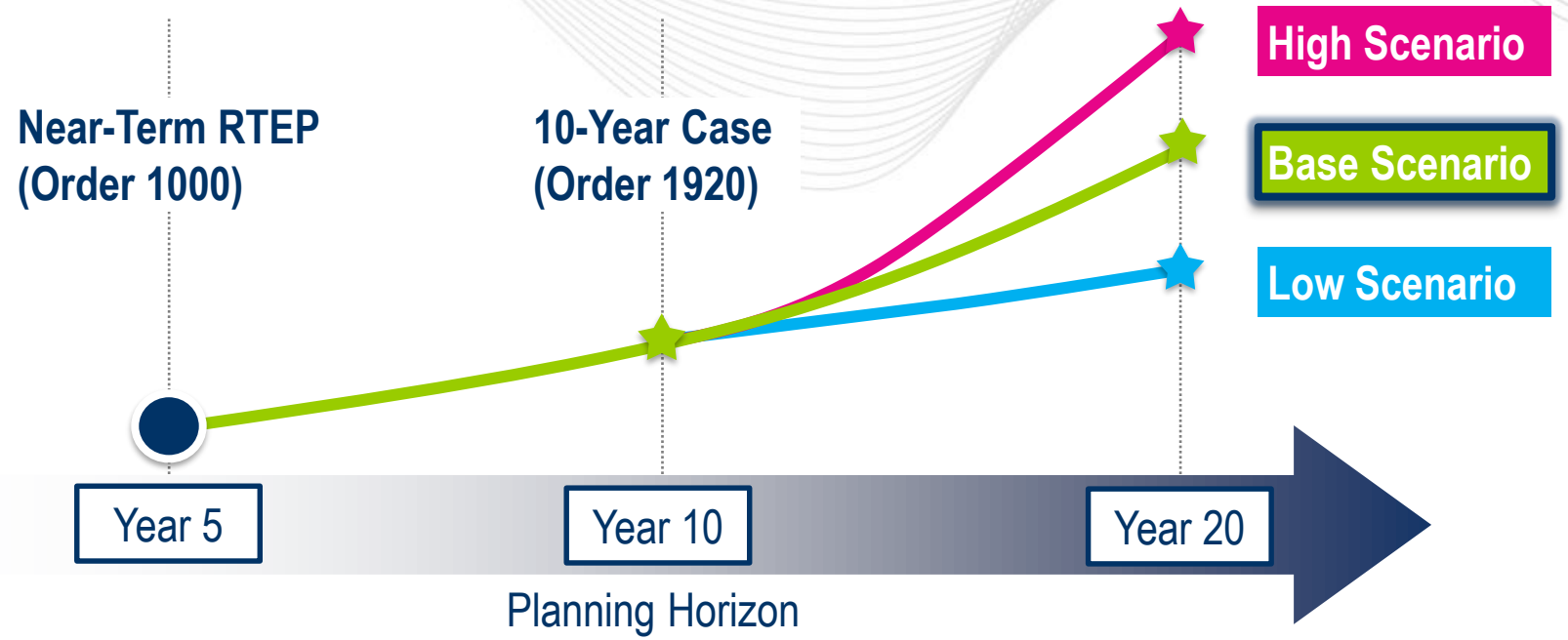
Scenario Development, Detailed Stakeholder Process

	Months
Input gathering from states, local authorities, and tribes	3
- PJM gathers policy inputs from states, local authorities, federal-recognized tribes	3
Initial assumption discussion with states and other stakeholders	4
- PJM develops assumptions for Base/Low/High Scenarios	2
- States and other stakeholders provide feedback on assumption	
- PJM reviews feedback and presents updated assumptions	
- PARSEC requests at most one additional scenario	
PJM develops LT Scenarios *draft* and continue to gather feedback	
- PJM develops and presents Base/Low/High Scenarios draft	3
- Stakeholders/states provide feedback	
- PJM reviews feedback and presents updated scenario assumptions	
PJM finalizes LT Scenarios	3
- PJM finalizes capacity expansion for Base/Low/High Scenarios	2
- PJM presents finalized Scenarios	



Appendix

Long-Term (LT) Scenario Framework



- Base (LT) Scenario is most probable (as required if TP adopts Base/High/Low structure)
  - Year-10 case in addition to required Year-20 cases
- Low and High Scenarios are bookends for transmission needs
- Extreme weather sensitivities for each scenario aligned with TPL-008 standard

Order 1920 Required Seven Factor Categories (*Recap*)

Required Factor Categories
1. Laws and regulations affecting future resource mix and demand
2. Laws and regulations on decarbonization and electrification
3. Integrated Resource Plans and expected supply obligations for LSEs
4. Trends in technology and fuel costs within and outside of the electricity supply industry, including shifts toward electrification of buildings and transportation
5. Retirements
6. Generation interconnection requests and withdrawals
7. Utility commitments and other public policy goals

Some Consideration on Factor Categories

- PJM will not discount FC1-3, consistent with Order 1920 requirements
  - PJM will consult with and consider the position of the PJM Area Relevant State Entity Committee (PARSEC) for FC1-3 and 7 as required by Order 1920
  - PJM will develop a portal to solicit local policy inputs
- PJM will use best-available data to model FC1-7 as required by Order 1920
- Considerations on other factors:
  - PJM will model announced and policy-driven deactivations (FC5) in the Base Scenario
    - Generator Owners can submit documentation demonstrating their plans to comply with federal and state laws and regulations for PJM consideration
    - PJM could consider modeling age-based deactivations in the High Scenario
  - PJM will not model corporate commitments in the Base Scenario but could consider them for the High Scenario (Order 1920-A removed corporate commitments from FC7)

Use of LT Scenarios and Interaction with Order 1000

- Use of LT Scenarios for LTRTP
  - The Base Scenario is the primary scenario used to identify LT Needs and LT Facilities to address those needs (LT Solutions)
  - The High and Low Scenarios identify risks and inform the evaluation and selection process to identify a robust plan (see slide 17)
- Interaction with Order 1000 processes:
  - Order 1920 process informs Order 1000 processes (see slides 9-10)
    - Order 1920 Year-10 case *replaces* Order 1000 Year-8 reliability case
    - Order 1000 Market Efficiency cases beyond the Year-5 case will be consistent with Order 1920 Base Scenario's cases

Identification of LT Needs

- LT Needs are those that are identified through reliability and economic analyses (as defined on slides 9-10) on the Base, Low, and High Scenarios and are expected to require Long-lead solutions (six years or more lead-time, per OA definition)
- PJM will use the following principles to guide the identification LT Needs:
  - Voltage level of the facility affected by the reliability violation or congestion
  - Severity of the issue
    - Addressing a severe overload may require a larger solution with longer lead-time
  - Number and geographic concentration of the facilities affected by the violation/congestion
    - Many needs in close proximity may indicate the opportunity for a larger solution
- The use of these principles depends on the time-horizon
  - In year 20 the criteria to identify LT Needs is more stringent than in year 10

Addressing LT Needs

- Order 1920 does not require PJM to select any LT Facility
- PJM must ensure that LT Needs are addressed to keep the lights on. Order 1920 allows this to occur through holistic analysis:
  - **"Core" LT Needs** establish a minimum set of actionable needs
  - **"Additional" LT Needs** establish a supplementary set of actionable needs that the states will work with PJM on how to best address
- LT Facilities addressing LT Needs (including Core LT Needs) may produce multiple types of benefits – reliability, economic and policy benefits

Core LT Needs and Additional LT Needs Drivers

Core LT Needs

Minimum set of actionable LT Needs that PJM will pursue within an Order 1920 competitive window

(1) PJM load growth (includes policies that are in the PJM Load Forecast)

(2) Deactivations (announced and anticipated policy-driven deactivations)

(3) Additional generation to meet resource adequacy target criteria

Additional LT Needs

Identified needs that go beyond Core LT Needs; can be included within an Order 1920 competitive window in addition to Core LT Needs (see next slide)

Examples of Additional LT Needs:

- Additional generation above the resource adequacy target criteria (including policy-driven generation not part of Core Needs, possibly less certain gen.)
- Standalone economic LT Needs (not overlapping with reliability test violations)

Examples of Core LT Needs and Additional LT Needs

***Core LT Needs*: identified through reliability tests (e.g. generation deliverability) and associated with:**	
Load Forecast	Examples: • Electrification targets • DER targets • Data centers
Deactivations (announced and anticipated policy-driven deactivations)	Examples: • EPA Coal Combustion Residuals • Illinois CEJA
Generation up to 1-in-10 resource adequacy target criteria, with consideration of policies affecting new generation, except resource-specific targets*	Examples, *if needed to meet up to the 1-in-10 reliability criteria*: • Delaware 28% RPS target by 2030 • Maryland 14.5% RPS solar carve-out by 2030

***Additional LT Needs*: any LT Need that is not Core**	
Stand-alone economic needs	Examples: • Significant congestion on a high voltage line • Significant curtailments
Generation above 1-in-10 resource adequacy target criteria	Examples: • Least-economic policy driven generation above 1-in-10 (e.g., if states' RPS are such to drive generation above 1-in-10) • Virginia's OSW target of 5.2 GW by 2034 • Michigan's storage target of 2.5 GW by 2029

* Unless resources have GIA, WMPA or completed SAA. Currently these resource-specific targets correspond to "State Energy Storage Targets" and "State Offshore Wind Targets" tabs of the State Policies Workbook.

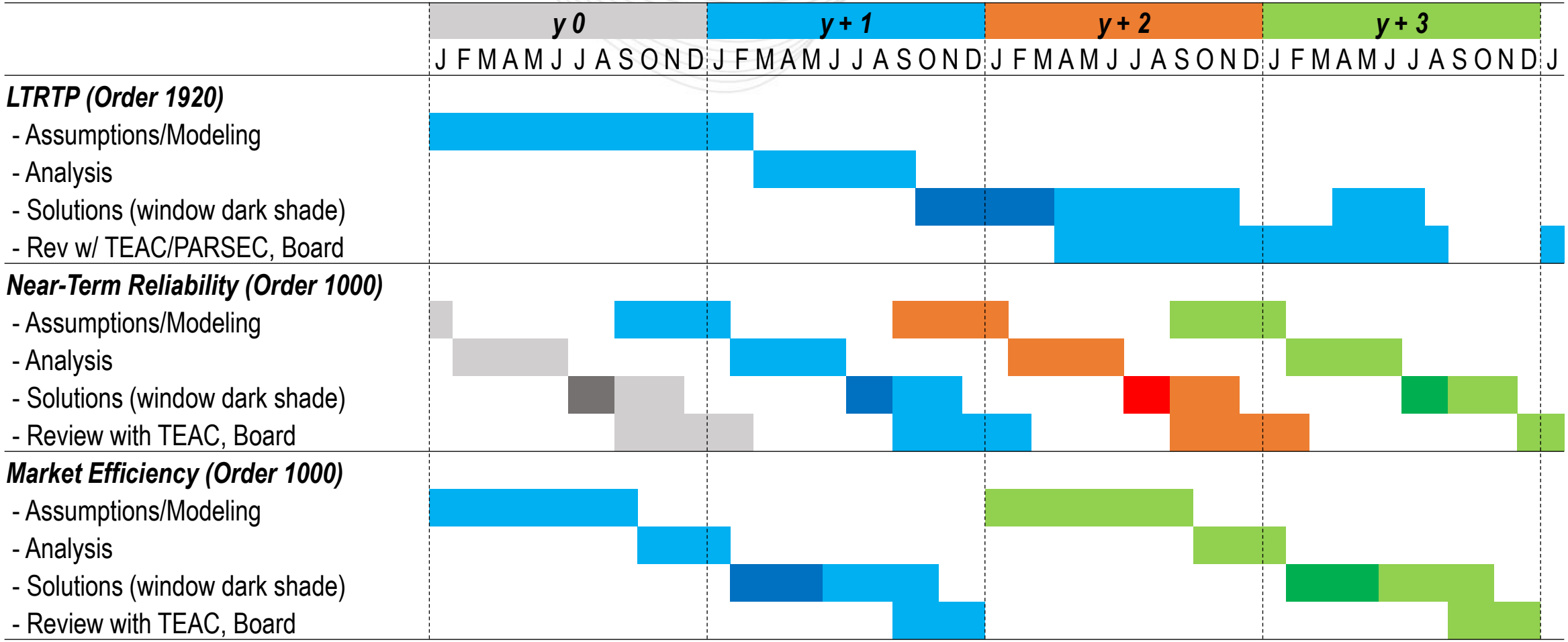
Evaluation Steps

- Sequential evaluation steps to gradually screen and identify more efficient and cost effective LT Solutions:
  1. Feasibility (cost and constructability analyses)
  2. Do-no-harm
  3. Project addresses Core LT Needs or Additional LT Needs with commitments
  4. Benefits used to further screen among alternative LT Solutions
     - Maximize sum of Order 1920 Seven Enumerated Benefits

Voluntary Funding Opportunities

- Voluntary funding opportunities for the states or interconnection customers arise from:
  - Solutions addressing Additional LT Needs
  - Selection of a different solution than the one emerging from applying PJM's evaluation process and selection criteria

Order 1920 and Order 1000 Cycles



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