Recommendations on PJM’s FERC Order 1920 Compliance

Shadab Ali
Sr. Director, Transmission Development

NextEra Energy Transmission

Agenda

1 **NextEra Energy Transmission**
A leading transmission developer in the U.S.

2 **Recommendations on PJM's FERC Order 1920 Compliance**

About NextEra Energy, Inc.

NextEra Energy, Inc. is the largest and most diverse energy company in the world

~72,000 MW
generating capacity
as of year-end 2023

$177 B
in total assets
as of year-end 2023

~$181 B
infrastructure capital
deployed since 2003

~94,000 miles
of transmission and
distribution lines
as of year-end 2023

~16,800
employees as of
year-end 2023

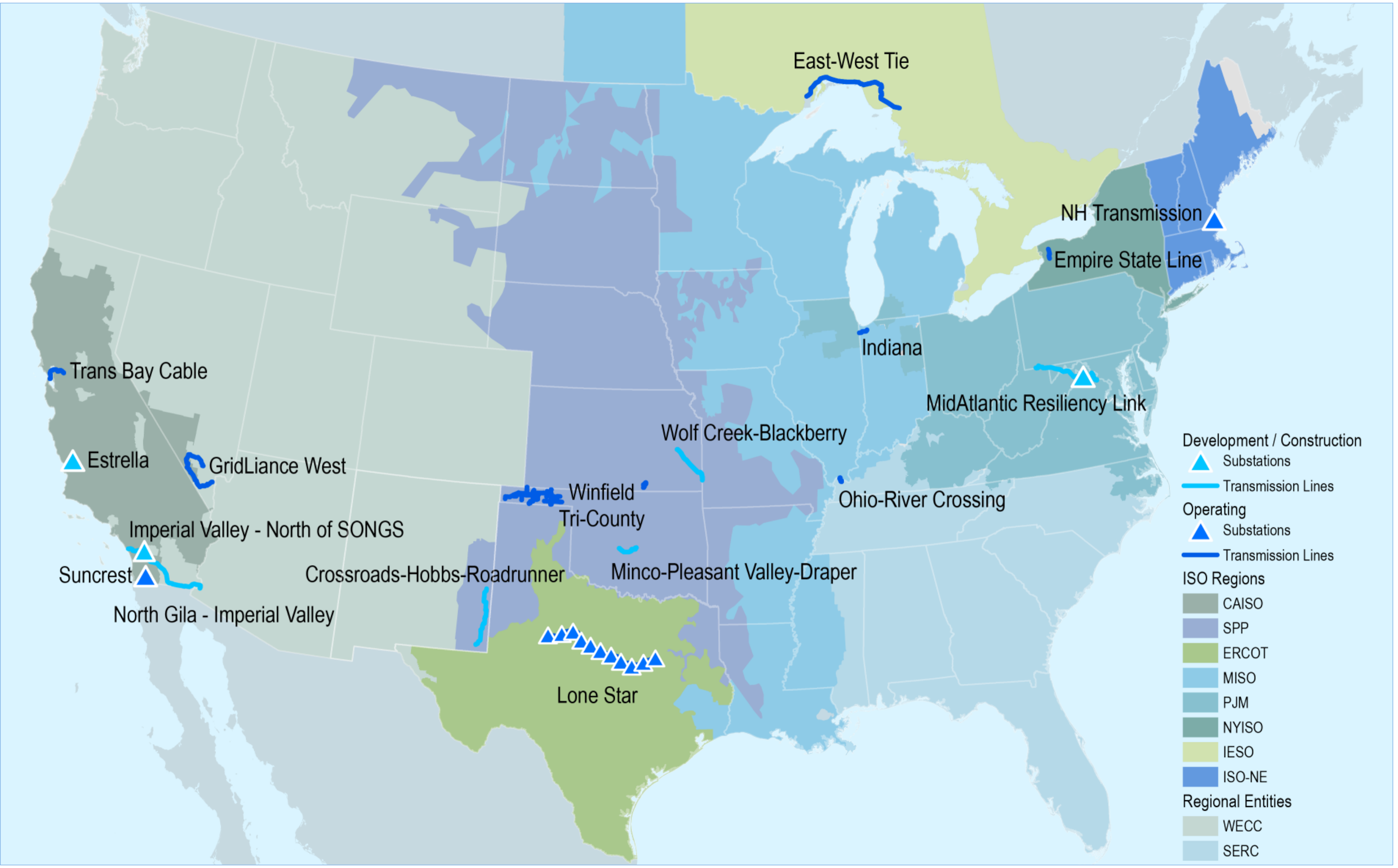
$28 B
operating revenues
as of year-end 2023

49 states
with operations and
development projects

4 Provinces
in Canada, with operations
and development projects

About NextEra Energy Transmission

Over the last decade, NextEra Energy Transmission has built a proven track record of working with local communities and regulators to build and operate complex transmission projects across North America



$5 billion in total investments

280+ employees

~2,900 miles of transmission lines in development and operation

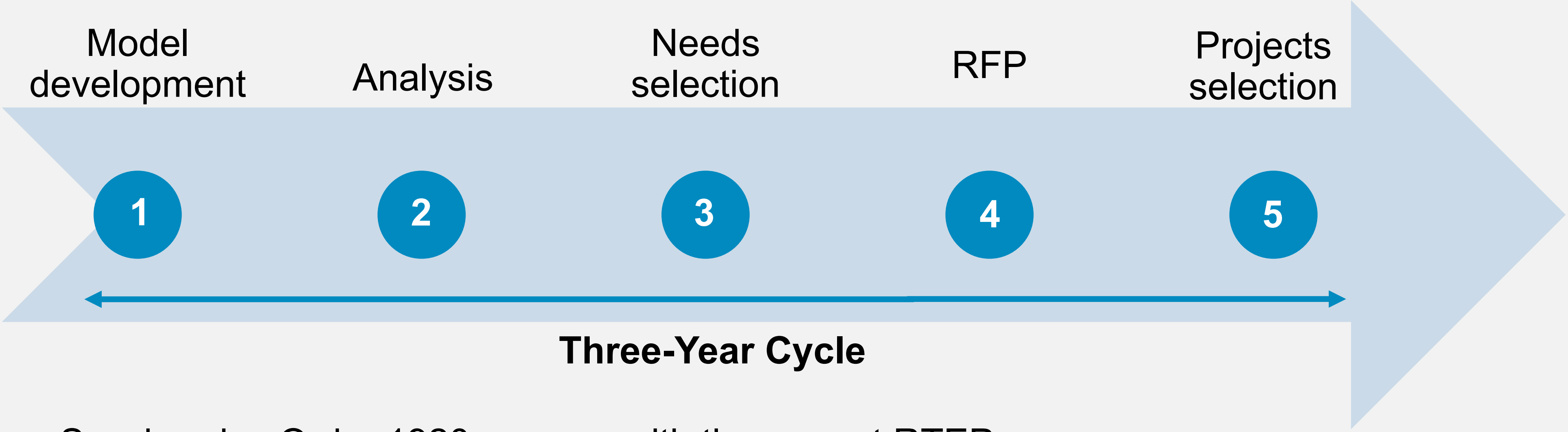
16 states, Canada and all RTOs with operating or development projects

Our subsidiaries were among the first non-incumbents to be awarded projects by system operators and utility commissions in California, New York, Kansas, Missouri, Oklahoma, and Ontario, Canada.

Recommendations on PJM's FERC Order 1920 Compliance

1) Establish a three-year process to implement FERC Order 1920
   - Synchronize Order 1920 process with PJM's current RTEP process
2) Develop three scenarios for year 10 and 20 to identify various transmission needs
3) Develop transparent criteria to identify needs for transmission RFP
   - Solicit portfolio of projects that can be sequenced to address the 10 and 20 year out needs
   - Use FERC Order 1920 assessment to inform current five-year RTEP project selection
4) Develop repeatable and transparent project selection metrics
   - Make sure Production Cost Benefits calculation criteria applies consistently regardless of the project voltage
   - Must designate a point after which reevaluation is not needed

1) Establish a three-year process to implement FERC Order 1920



- Synchronize Order 1920 process with the current RTEP process
  - Consider replacing the current Market Efficiency window with the new 1920 RFP window
- Conduct six-month multi-driver RFP using PJM's FERC Order 1000 process

2) Develop three scenarios for transmission needs in years 10 and 20

- Develop three scenarios to identify 10 and 20 year out needs
- Develop extreme weather (hot/cold) sensitivities for each scenario
- Develop summer, winter, light load models for reliability analysis
- Develop Production Cost and Resource Adequacy models for each scenario

Scenario 1 (Baseline)

Extension of current RTEP

- 50/50 load forecast
  - Surgical modeling of large load
- Use Resource Adequacy Analysis and generation queue
- Include expected generation retirement
- IRP, State Laws, and Regulation

Scenario 2

Baseline + Adjust Generation and Load inputs (Moderate)

- Analyze robustness of grid with moderate energy transition
- Evaluate high, medium, and low fuel price assumptions

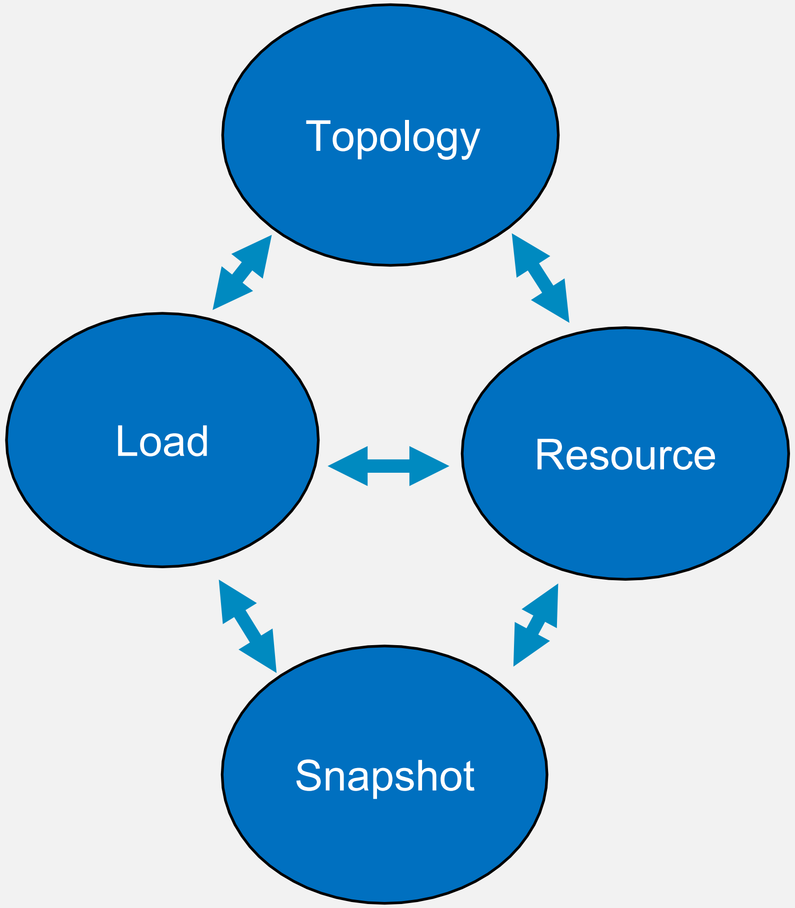
Scenario 3

Baseline + Adjust Generation and Load inputs (Accelerated)

- Stress case with high electrification, accelerated generation retirement and energy transition
- New technology (improved storage, etc.)

2) Develop three scenarios for transmission needs in years 10 and 20

a) Topology and Load Modeling recommendation



Topology

- Use PJM's five-year RTEP model
- Model development should be done in coordination with neighboring RTOs
- Share conductor ratings

Load Modeling

- Update load forecasting to include the following:
  - State polices, goals, and objectives
  - Corporate commitment
- Transparency, QA/QC around large load forecasting
- Surgical modeling of large load instead of linear scaling

2) Develop three scenarios for transmission needs in years 10 and 20

b) Peak Hours Snapshot recommendation

Snapshot Assumptions

- The snapshot will be key to capturing periods of high load and low non-dispatchable resource output
- Summer Daytime/Evening Peak
- Winter Daytime/Evening Peak
- Examples below from ISONE 2050 study[1]

Snapshot	Months	Hours
Summer Daytime Peak	May – September	9 AM to 5 PM
Summer Evening Peak	May – September	7 PM to 10 PM
Winter Evening Peak*	January – April	4 PM to 10 PM

1) https://www.iso-ne.com/static-assets/documents/2021/12/draft_2050_transmission_planning_study_scope_of_work_for_pac_rev2_clean.pdf

2) Develop three scenarios for transmission needs in years 10 and 20

c) Resource Modeling recommendation

Resource Modeling

- Develop resource forecasting like load forecasting process
  - Strategically add generation based on geographic fuel resource availability; Consider queue data/siting of resources
  - Use capacity expansion model for future generation
- State law, policy goals, and objectives
- Consideration for high-capacity factor renewables from neighboring RTOs

Resource modeling assumptions example[1]

Snapshot	Hours	PV Availability Assumption
Summer Daytime Peak	9 AM to 5 PM	40% of nameplate*
Summer Evening Peak	7 PM to 10 PM	10% of nameplate for Hour Ending (HE) 7PM and 0% of nameplate for HE 8PM or later**
Winter Evening Peak	4 PM to 10 PM	0% of nameplate (peak expected after sunset)

Snapshot	Hours	Offshore Wind Availability Assumption
Summer Daytime Peak	9 AM to 5 PM	5% of nameplate**
Summer Evening Peak	7 PM to 10 PM	5% of nameplate**
Winter Evening Peak	4 PM to 10 PM	40% of nameplate (discussed in the next slide)

1) https://www.iso-ne.com/static-assets/documents/2021/12/draft_2050_transmission_planning_study_scope_of_work_for_pac_rev2_clean.pdf

2) Develop three scenarios for transmission needs in years 10 and 20

d) Extreme Weather Sensitivities recommendation

Benchmark Case

- Use extreme heat and cold events over last 10 years to develop the benchmark case
  - Temp dependent forced outage rates for all resource types
- Use info from other RTOs extreme events to guide load/generation modeling
- Gas/electric infrastructure coordination

Study Case

- Develop load/generation profile to simulate future extreme weather events
- Frequency of the event (TBD)
- Duration of the event (TBD)
- Establish contingencies for extreme weather such as large cloud cover and/or low wind events

Refer to following links on Extreme Weather Modeling and Analysis
https://www.esig.energy/wp-content/uploads/2024/06/ESIG-Interregional-Transmission-Resilience-methodology-report-2024.pdf
https://www.nrel.gov/docs/fy22osti/78394.pdf
https://www.sciencedirect.com/science/article/pii/S0306261919321117

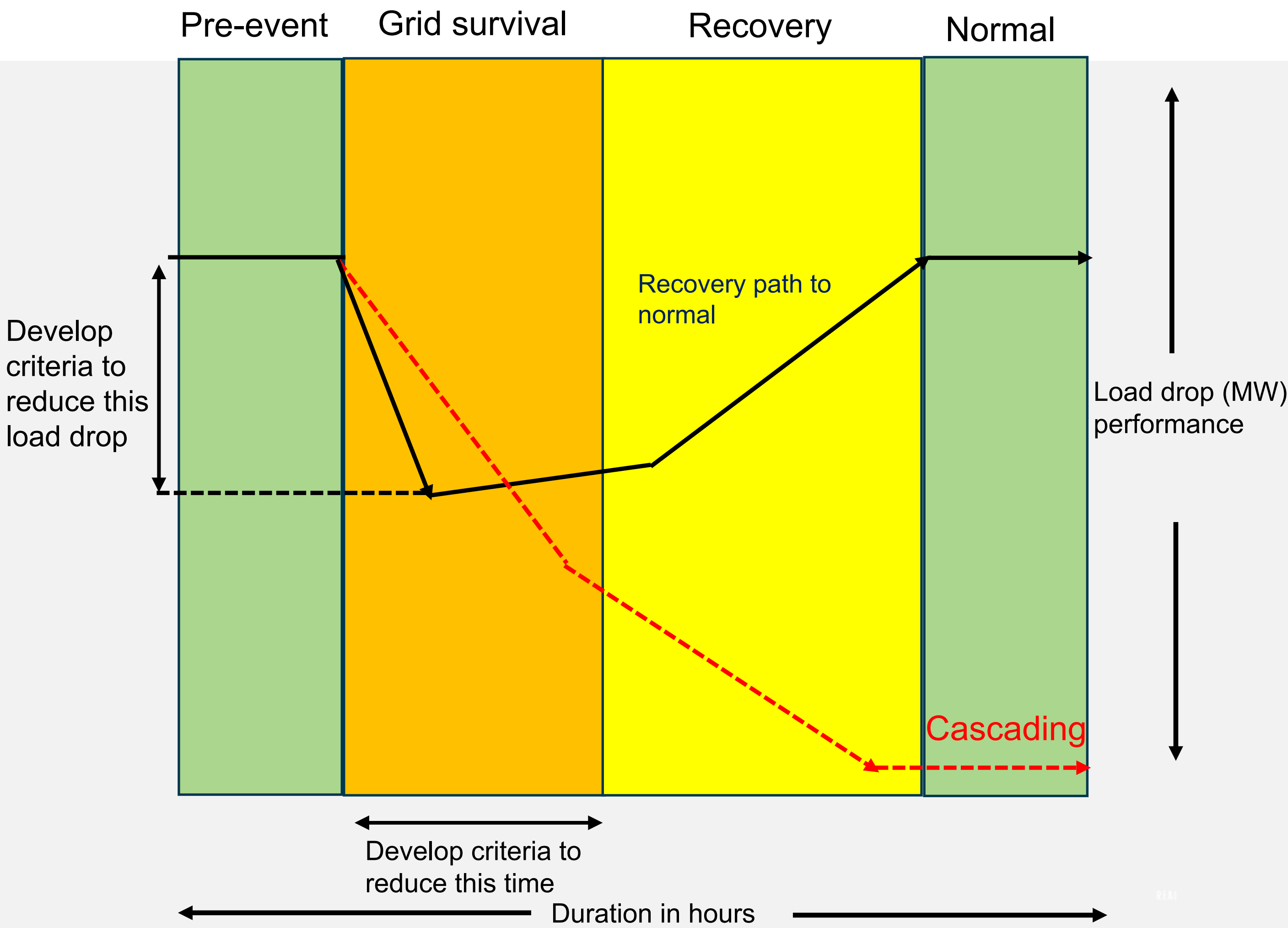
2) Develop three scenarios for transmission needs in years 10 and 20

f) Identify extreme weather needs

- Develop extreme weather criteria to prevent grid cascading during extreme weather events. Some examples:
  - Identify needs before grid reaches UFL level 1 trigger point
  - Develop LOLE criteria (TBD) for extreme weather situations
- Synchronize extreme weather analyses with neighboring RTOs to make sure they can meet respective needs during the extreme weather events

Recommendation from 2023 DOE report[1]

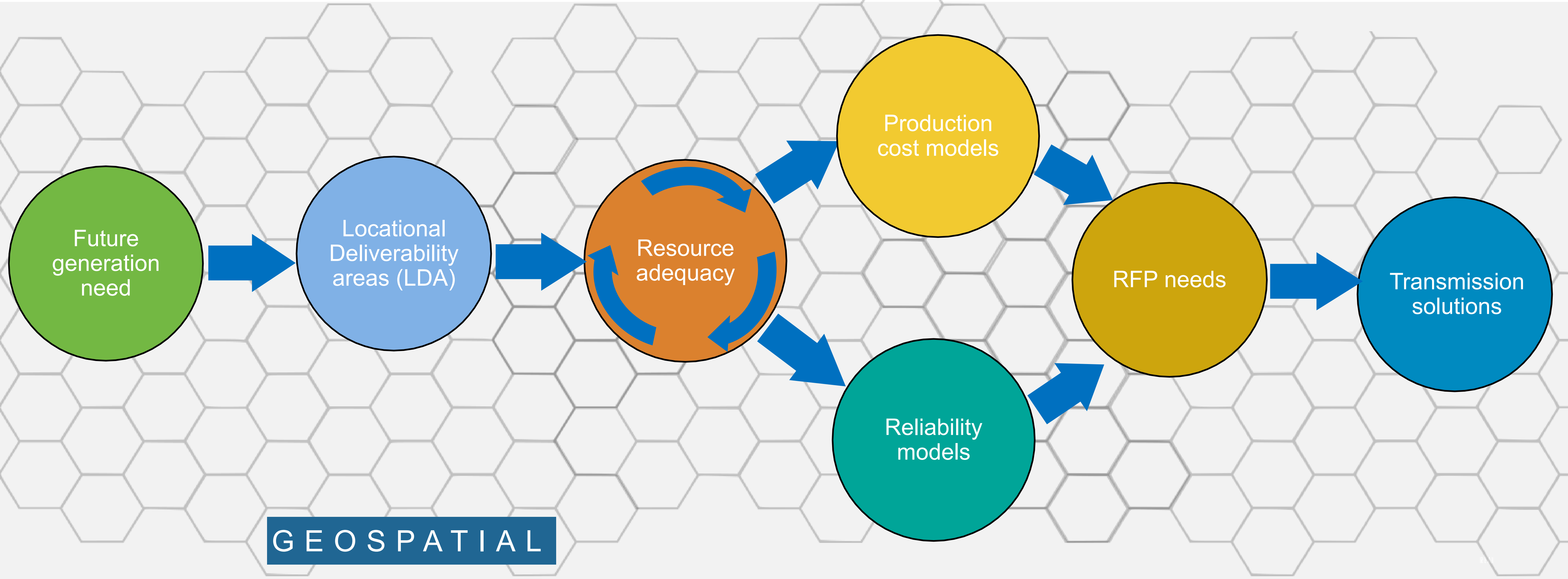
- 28 to 51.7 GW of additional transfer capacity will be needed to meet the moderate load growth and high clean energy future



1) https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf , MidAtlantic Region fact sheet on page 191

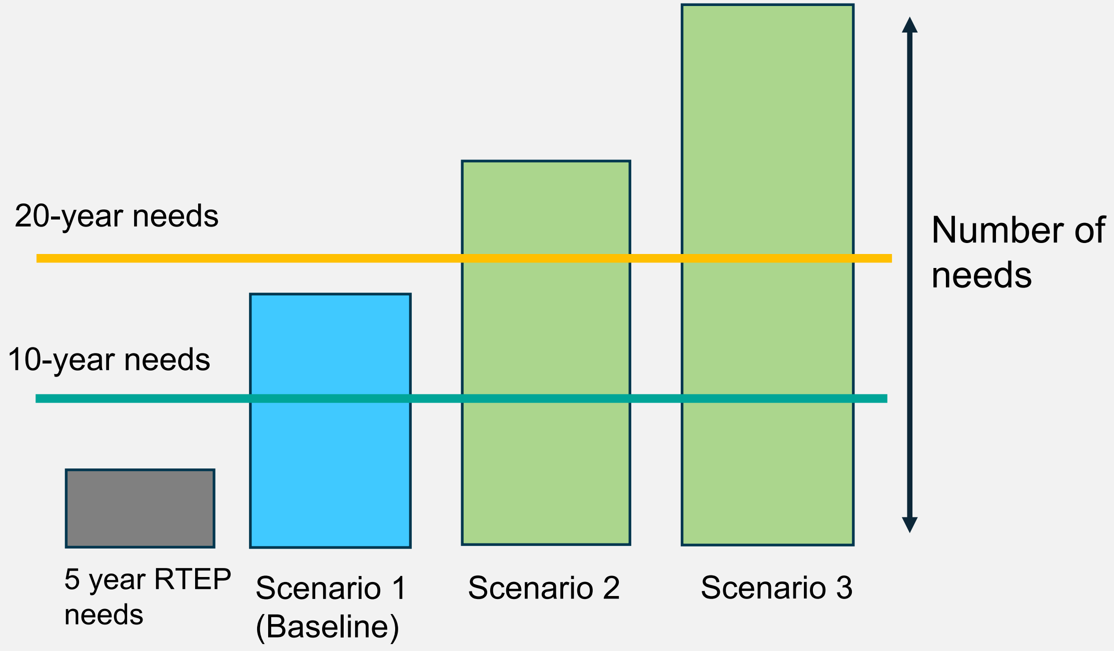
2) Develop three scenarios for transmission needs in years 10 and 20

e) Iterative analytical process to maximize benefits across all scenarios, conditions, and years



3) Develop transparent criteria to identify needs for transmission RFP

- Develop transparent criteria to identify transmission needs from all three scenarios
- Solicit portfolio of projects that can be sequenced to address the 10 and 20 year out needs
- Use 1920 assessment to inform current five-year RTEP project selection



4) Develop repeatable and transparent project selection metrics

Establish benefits calculation and selection criteria based on FERC Order 1920 requirements

NEXTera ENERGY TRANSMISSION

1) Reliability benefits
    - Thermal, voltage, and transfer (Year 20 longevity test)
    - Ability to meet extreme weather event need
    - Avoided or deferred aging transmission infrastructure replacement
2) Production cost benefits
    - Calculate B/C ratio for comparative analysis
        - Congestion and production cost savings
        - Reduction in transmission losses
        - Reduction in congestion due to outages
3) Resource adequacy
    - LOLE and unserved energy benefits
4) Public policy benefits
    - RPS, carbon reduction, electrification, etc.

4) Develop repeatable and transparent project selection metrics

Update the Production Cost Benefit calculation to apply consistently regardless of the project voltage

- PJM's current method for calculating Market Efficiency benefits is unintentionally biased towards estimating more benefits for 345 kV and lower kV solutions

- The method should be revised to ensure that benefits are calculated using the same process regardless of the voltage class

4) Develop repeatable and transparent project selection metrics

Benefits calculation and project selection example

Target needs	Benefits type	Criteria	Example Project 1	Example Project 2
Thermal and Voltage issues on 230 kV and above system	Reliability	Provide enough margin to past year 20 test	100% solves year 10 test but fails year 20 test	100% passes both year 10 and year 20 test
Loss of Load Expectations (LOLE)	Resource Adequacy in PJM	TBD	Met	Met
Inter RTO transfers	Reliability/Extreme Weather	TBD	90% meet the criteria	100% meet the criteria
Production Cost Saving	Market Efficiency	B/C Ratio	2	4
% of RPS goal met	Public Policy	Respective State Target	40%	100%
% of electrification achieved	Public Policy	Respective State Target	Meets statutory requirements	Meets both statutory and regulated requirements


NEXTera ENERGY TRANSMISSION
Thank You!