Summer 2021
PJM Reliability Assessment

Pennsylvania Public Utility Commission

May 2021

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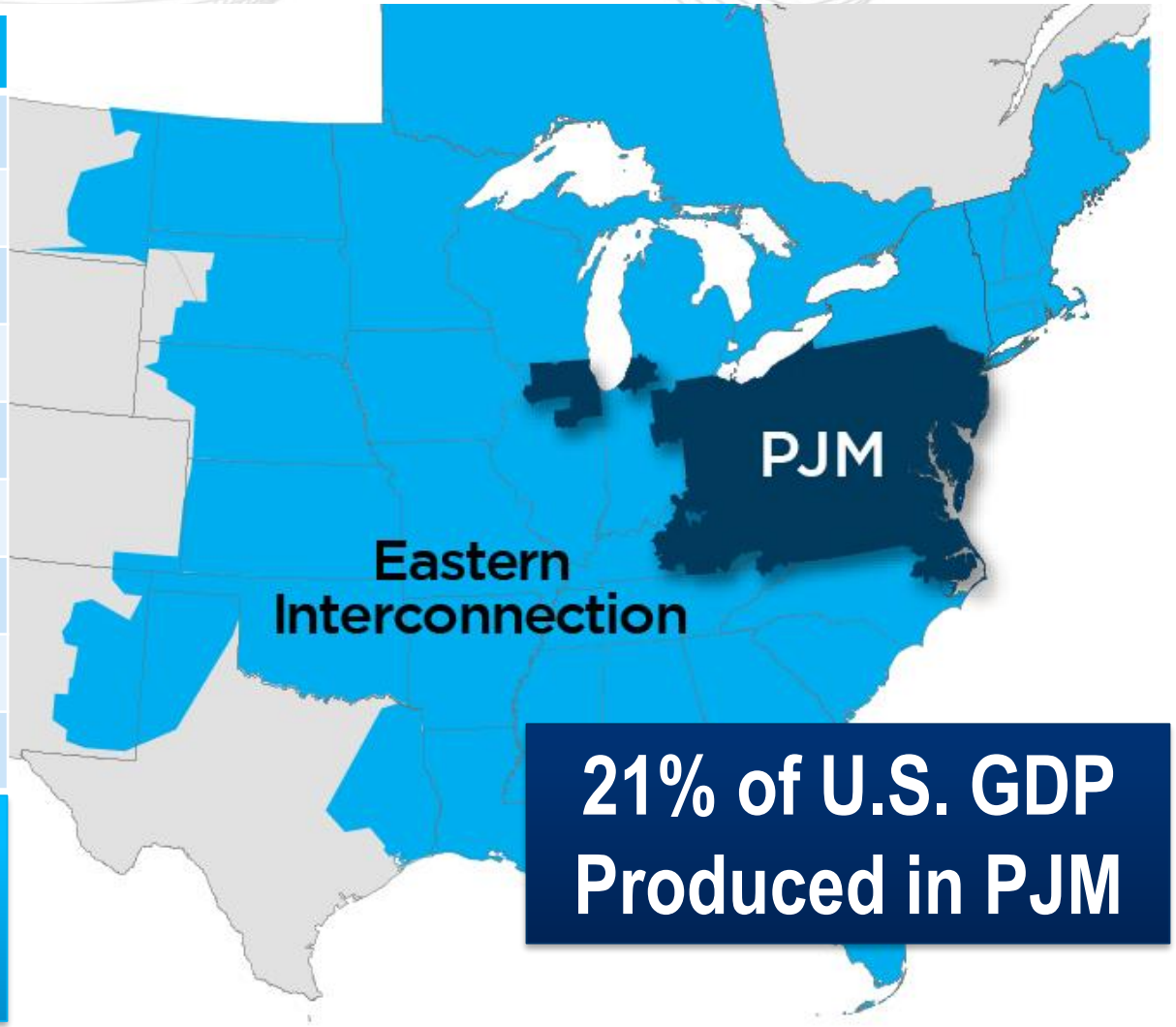
PJM as Part of the Eastern Interconnection

Key Statistics	
Member companies	1,040+
Millions of people served	65
Peak load in megawatts	165,563
Megawatts of generating capacity	185,378
Miles of transmission lines	85,103
2019 gigawatt hours of annual energy	757,284
Generation sources	1,424
Square miles of territory	369,089
States served	13 + DC

- 26.4% of generation in Eastern Interconnection
- 25.4% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection



As of 2/2021

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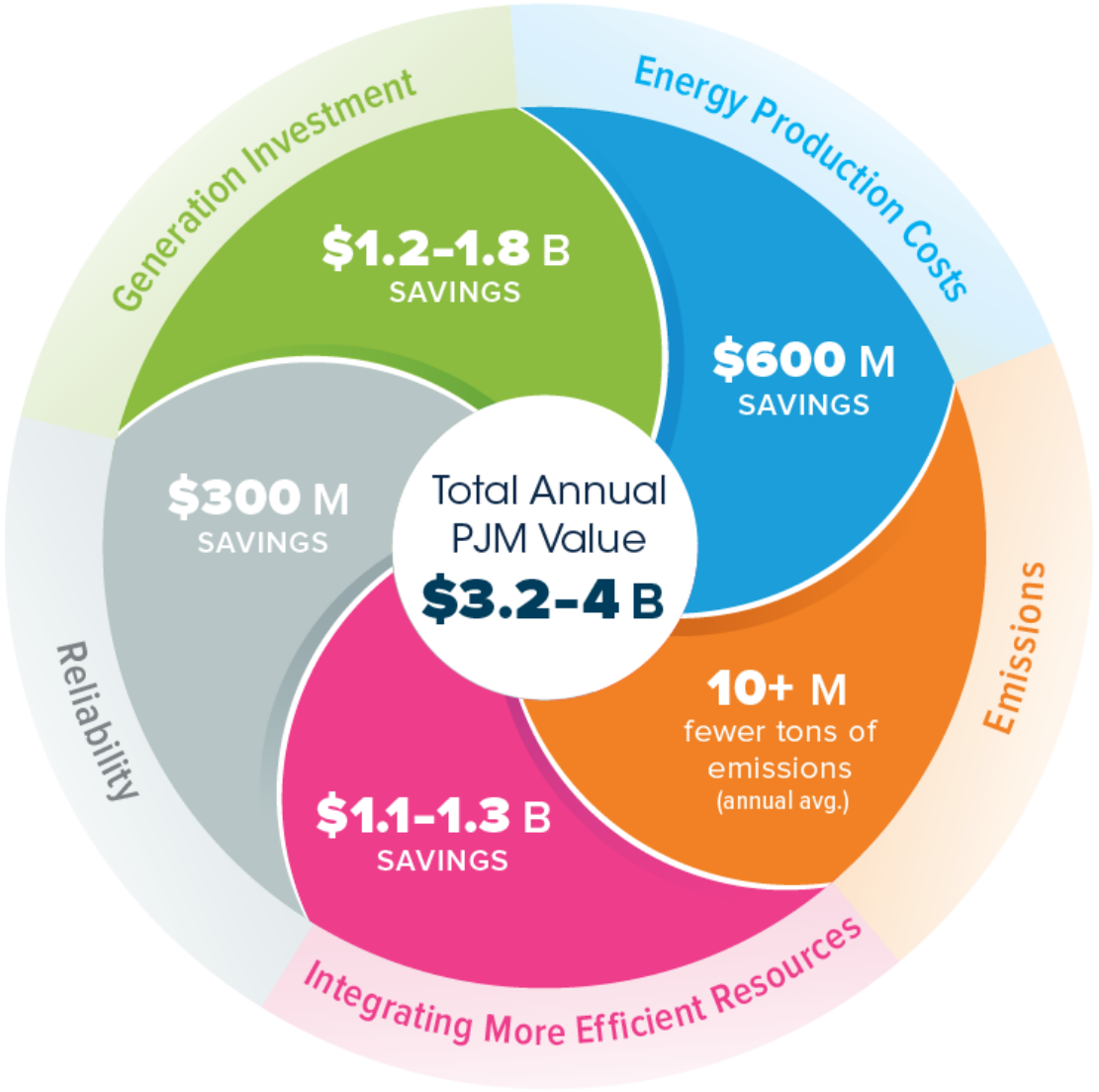
Value Proposition



All numbers are estimates.

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Pennsylvania Overview

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Pennsylvania Overview

- **Existing Capacity:** Natural gas represents approximately 44% of the total installed capacity in the Pennsylvania service territory, while coal represents approximately 21.3% and nuclear 19.4%. In PJM natural gas and coal are 43.4% and 27.5% of total installed capacity, while nuclear represents 17.7%.

- **Interconnection Requests:** Solar represents 54.6% of new interconnection requests in Pennsylvania, while natural gas represents approximately 32% of new requests.

- **Deactivations:** 78.3 MW in Pennsylvania gave notification of deactivation in 2020.

- **RTEP 2020:** Pennsylvania's 2020 RTEP projects total approximately $752.7 million in investment. Approximately 85.3% of that represents supplemental projects. These investment figures only represent RTEP projects that cost at least $5 million.

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Pennsylvania Overview

- **Load Forecast:** Pennsylvania's summer peak load growth is projected to range between 0.2% and 0.9% annually over the next 10 years, based on the service territory. The overall PJM RTO projected load growth rate is 0.3%.
- **2022/2023 Capacity Market:** No Base Residual Auction was conducted in 2020. For the most recent auction results, please see the 2018 Pennsylvania State Infrastructure Report.
- **Jan. 1, 2020 through Dec. 31, 2020 Market Performance:** Pennsylvania's average hourly LMPs were slightly below the PJM average hourly LMP.
- **Emissions:** 2020 carbon dioxide, sulfur dioxide and nitrogen oxides emissions all decreased from 2019 levels.

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Pennsylvania – Net Energy Import/Export Trend

(Jan. 2020 through Dec. 2020)

Positive values represent exports, and negative values represent imports.

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2021 Weather Outlook

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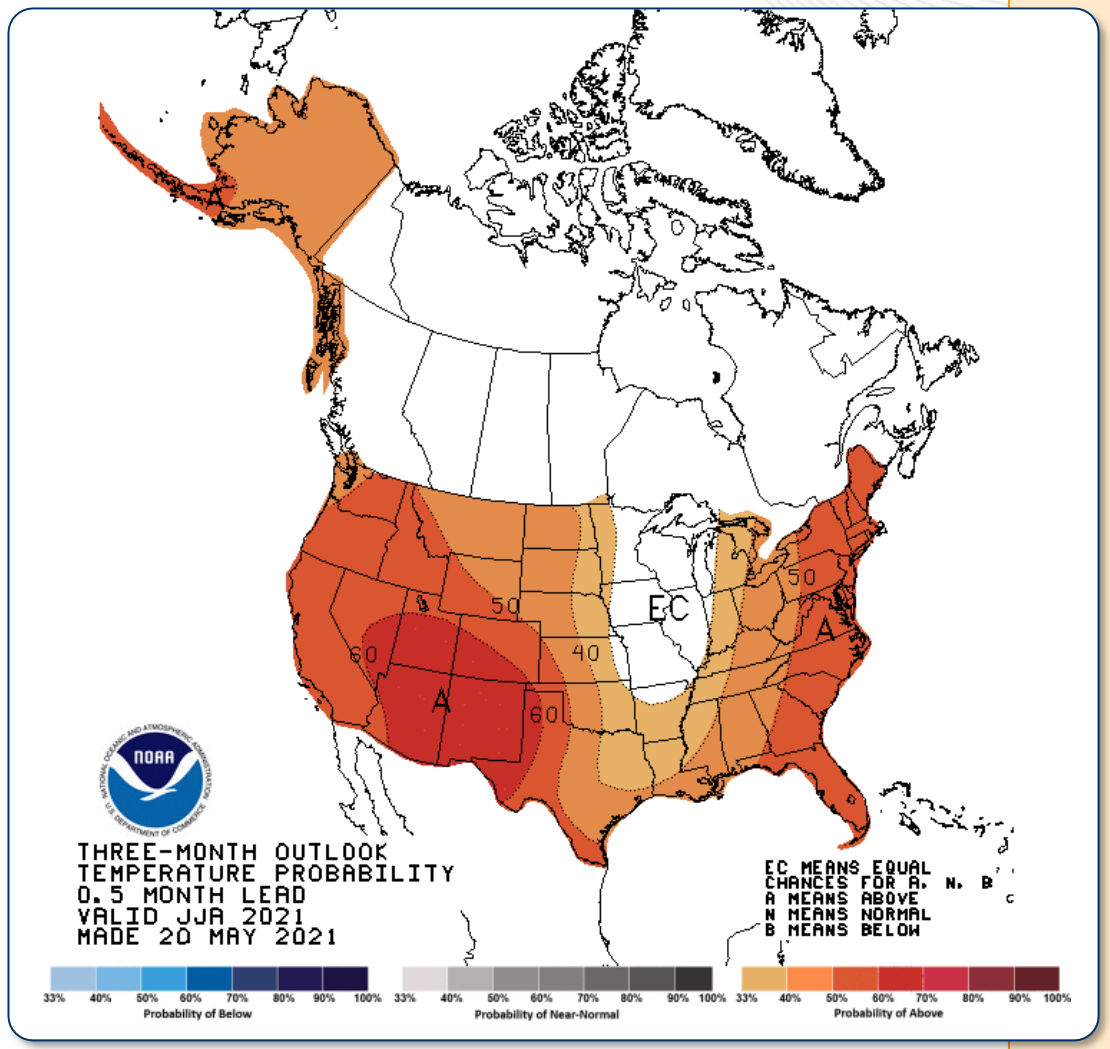
Summer Outlook – Temperature



- Above-normal temperatures are likely this summer, especially in the eastern half of PJM
- Forecast influenced by warm ocean waters in Atlantic and western Pacific
- Recent trends support a warmer-leaning forecast
  - Nationally, 10-year average ~11% hotter (more population-weighted CDDs) than 30-year average
  - Haven't had a below-normal summer since 2009

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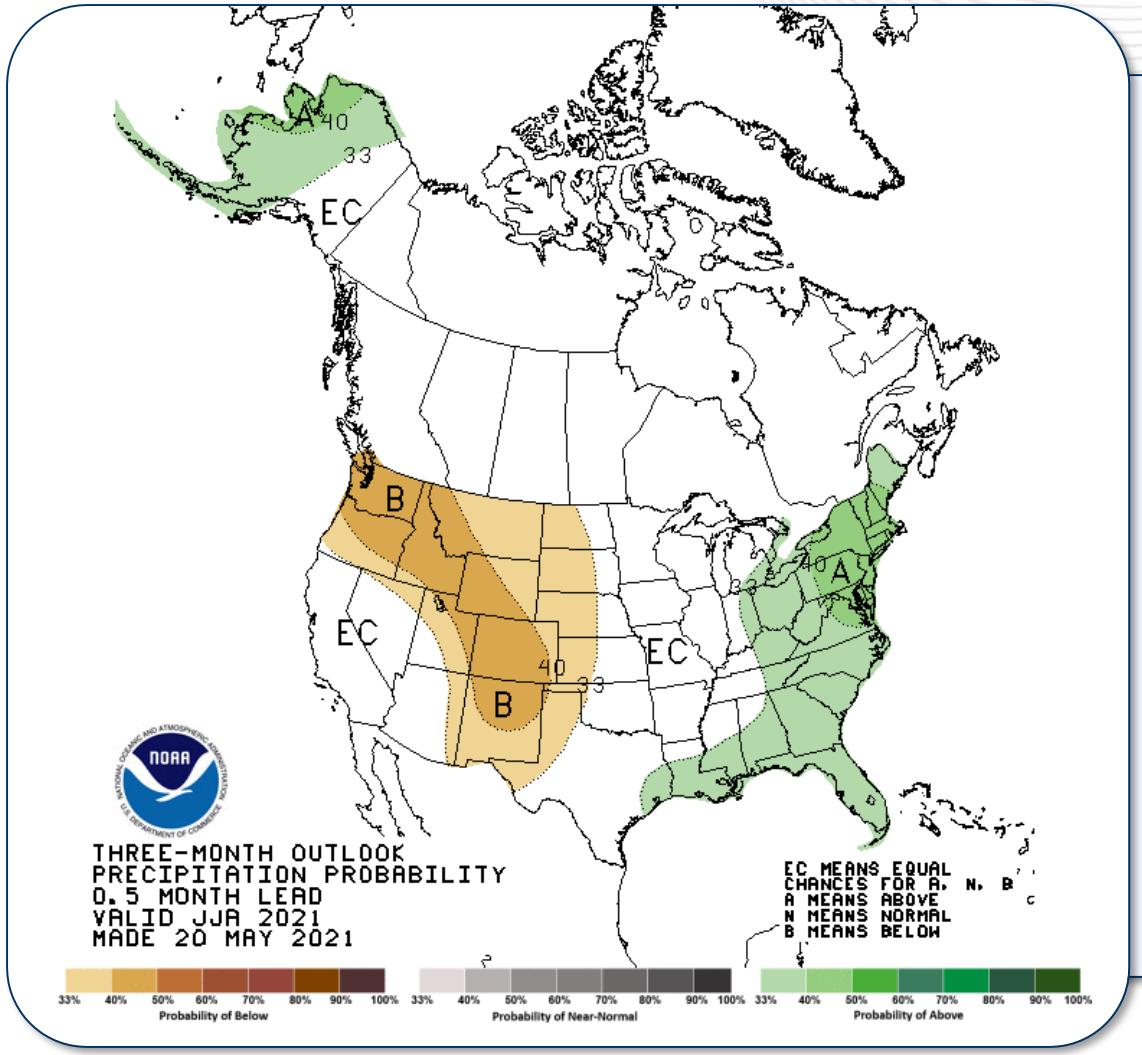
Summer Outlook – Precipitation



- May see wetter-than-normal weather along the East Coast
  - Not expecting drought conditions to develop
  - Hints at increased humidity, which impacts comfort level/AC usage
- Not necessarily indicative of tropical storm activity

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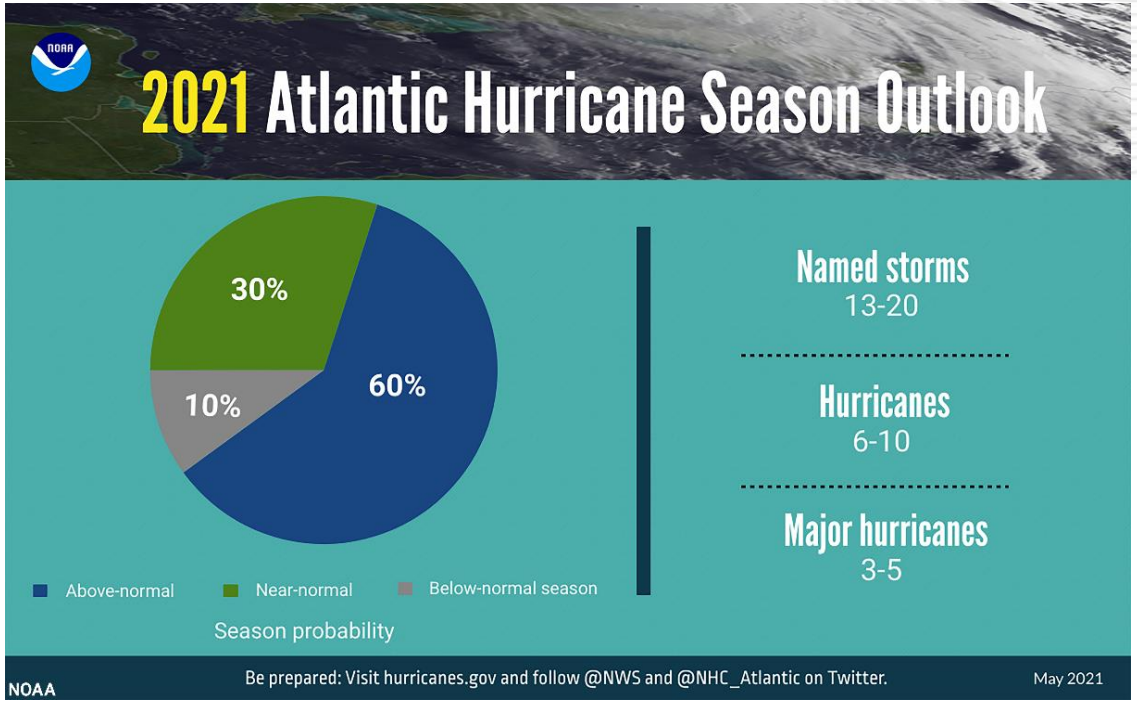
Tropical Season Forecast



- Not expecting the record-breaking year that was 2020
- Conditions favor hurricane development
  - Warm Atlantic waters
  - Low wind shear due to neutral or La Niña phase of the El Niño Southern Oscillation (ENSO)

"Although NOAA scientists don't expect this season to be as busy as last year, **it only takes one storm to devastate a community**."
(Ben Friedman, acting NOAA administrator)

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Load Forecasts

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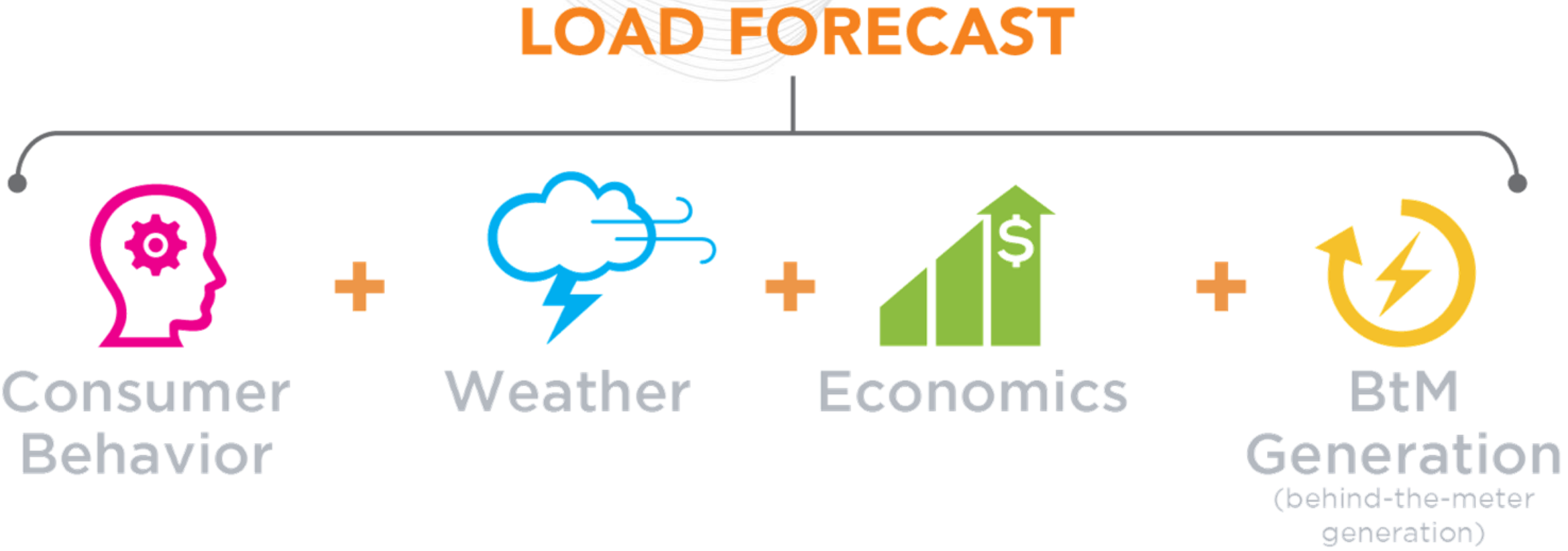
Load Forecast



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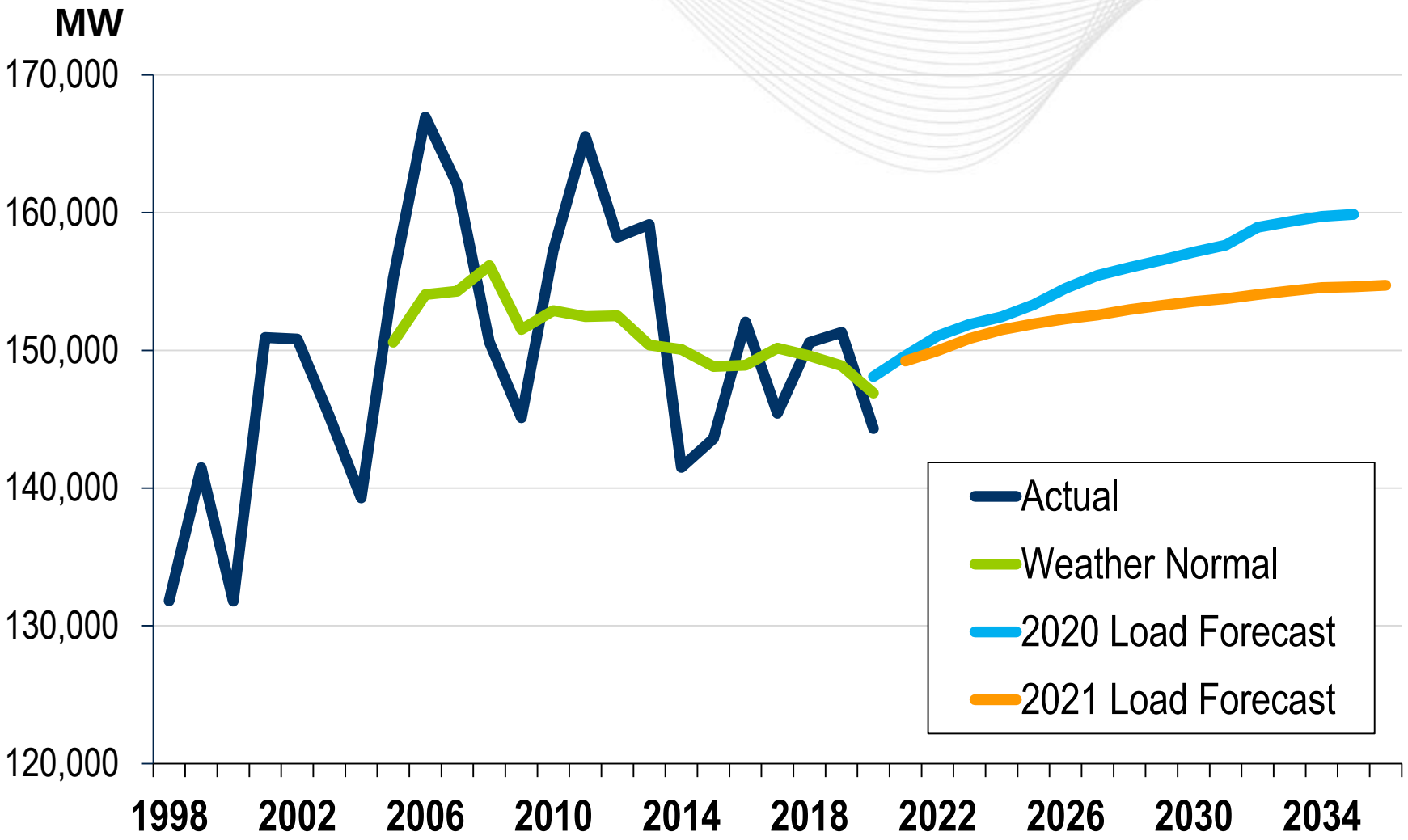
2021 PJM RTO Summer Peak Forecast



15-year Annualized Growth Rate

Load Growth

2020	2021
0.5%	**0.2%**

Select Year Comparisons

Load Forecast:
2021 vs. 2020

2023	2025	2035
0.7%⬇	**0.9%⬇**	**3.3%⬇**

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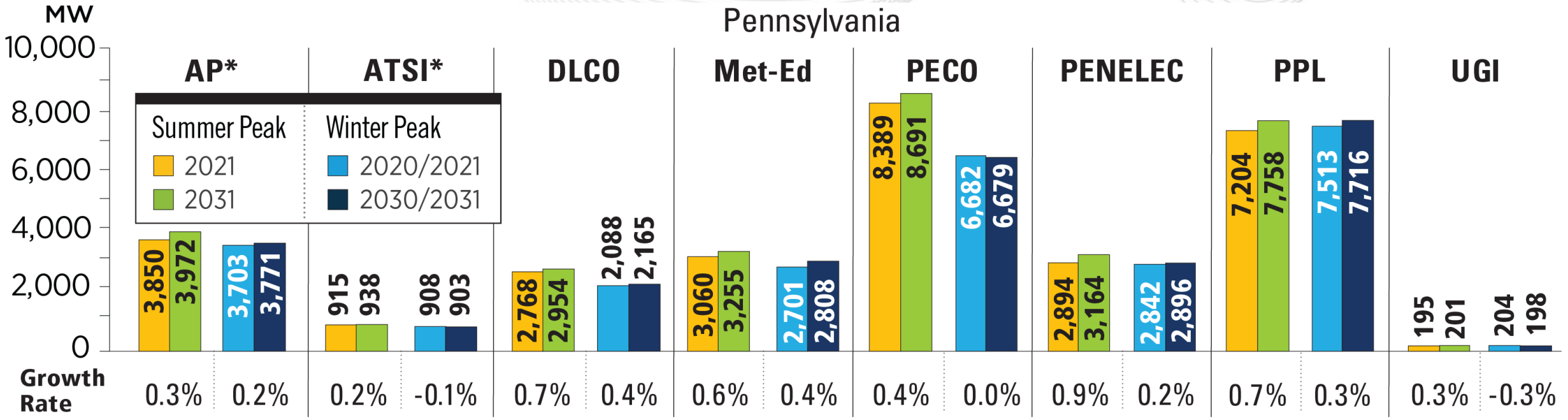
Pennsylvania – 2021 Load Forecast Report



*Serves load outside PA

PJM RTO Summer Peak

2021	2031
148,092 MW	157,132 MW

Growth Rate 0.6%

PJM RTO Winter Peak

2020/2021	2030/2031
131,287 MW	139,970 MW

Growth Rate 0.6%

The summer and winter peak megawatt values reflect the estimated amount of forecasted load to be served by each transmission owner in the noted state/district. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load in those areas over the past five years.

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2021 Operations Assessment Taskforce (OATF)

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PJM Preparation for Summer 2021

Perform a summer reliability assessment to include any additional sensitivity analysis required

Coordinate summer assessments with neighboring systems (NYISO, MISO, TVA and VACAR)

Conduct emergency procedures drill to prepare PJM staff and PJM stakeholder staff for any emergency operations

Ongoing pandemic planning, coordination and communication

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PJM Is Prepared for Summer Demand

Summer 2021	DEMAND			PJM Installed Capacity
	Forecast Summer	Summer Study Average	Summer Study High	
	~149,000 MW	155,000 MW	158,000 MW	> 185,000 MW

Relative Peaks	2020 Summer Peak (July 20)	All-Time Summer Peak (2006)
	~144,000* MW	165,563 MW

** Total energy use during the summer of 2020 was dampened due to impacts surrounding the COVID-19 pandemic.*

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50/50 Non-Diversified Peak Load Base Case

LAS Load Forecast	Preliminary RTO Net Interchange	PJM RTO Installed Capacity	Discrete Generator Outages
155,113 MW	**5,575**** MW *(Exporting)*	**185,515** MW *(preliminary)*	**12,706** MW

*** 5,575 MW of net interchange is modeled in the OATF base case and accounts for historical and forecasted Pseudo Tie data.*

PEAK LOAD ANALYSIS

No reliability issues identified.

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50/50 Peak Load Study Results

- No reliability issues identified for base case and N-1 analysis.
- Re-dispatch and switching required to control local thermal or voltage violations in some areas.
- All networked transmission voltage violations were controlled by capacitors. All other voltage violations were caused by radial load.

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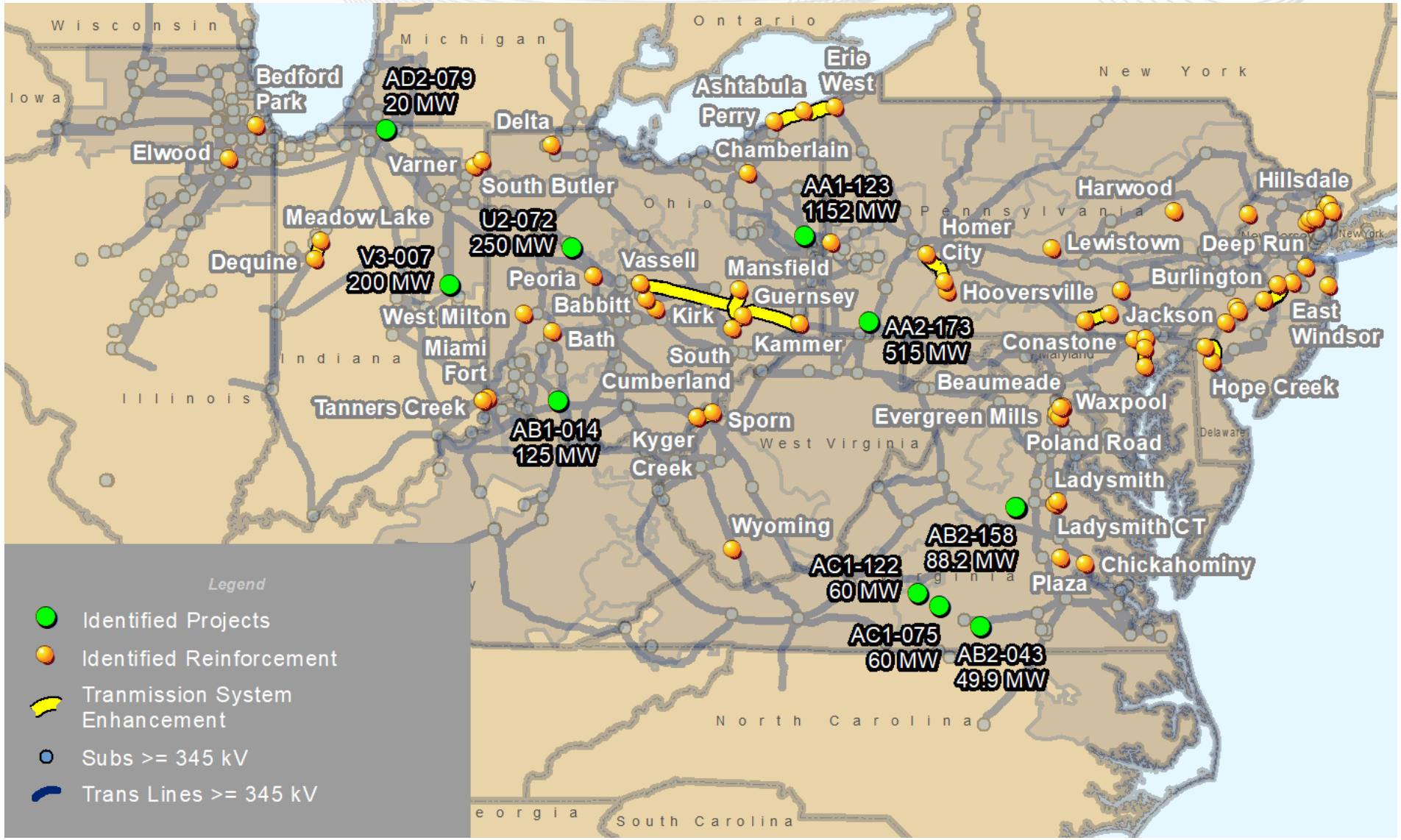
Topology Changes



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2021 Summer Study – Sensitivities

Sensitivity Studies	Impact
▪ External contingencies that could impact PJM reliability	No reliability concerns
▪ N-1-1 Relay trip conditions	No cascading outage concerns identified *All networked transmission overloads were controlled pre-contingency*
▪ Max-Cred Contingency Analysis	No reliability concerns
▪ Transfer Interface Analysis	No reliability concerns
▪ BGE/PEPCO Import Capability	No reliability concerns
▪ 90/10 Load Forecast study (158,305 MW)	No uncontrollable or unexpected issues observed at the elevated load levels

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Resilience and Cybersecurity

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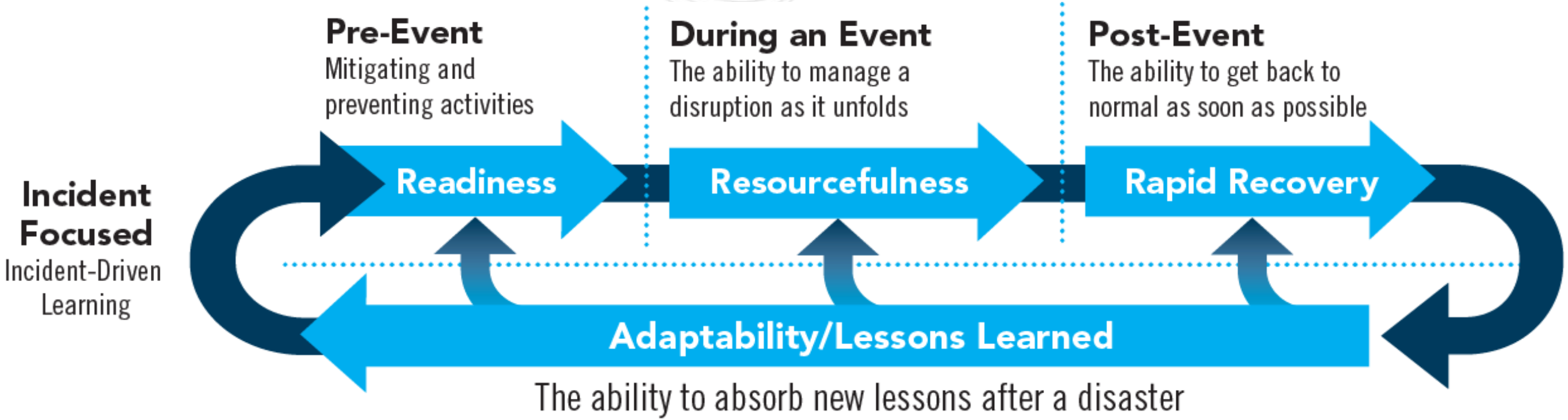
What Is Resilience?



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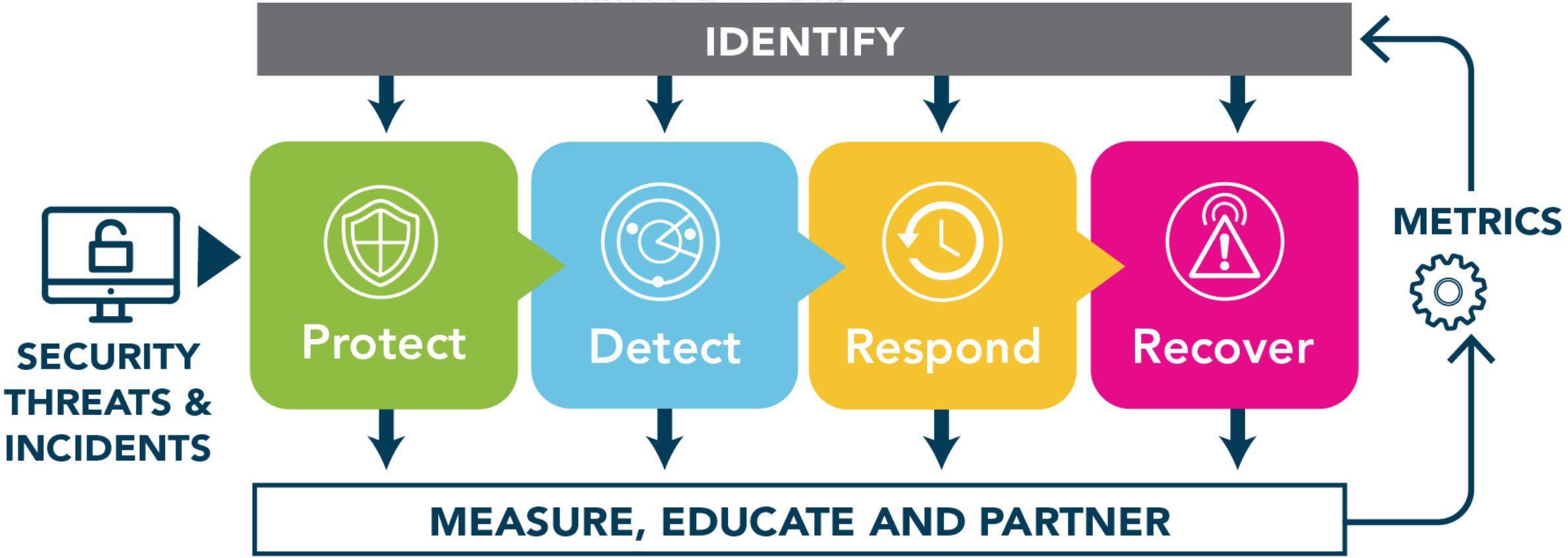
Managing Security Threats



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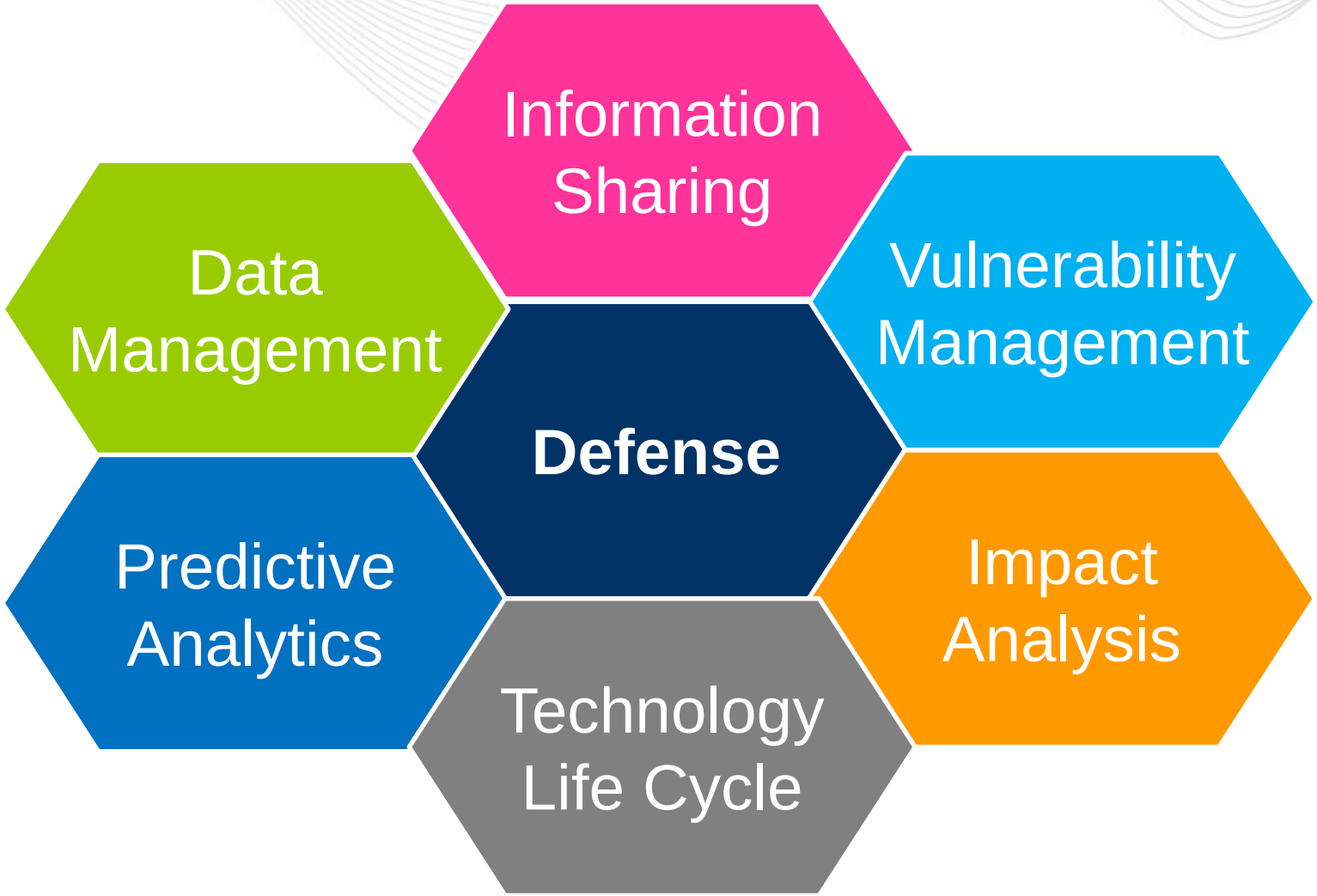
Defense



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Cyber Resilience With Eyes Wide Open

Prevention

- Build security into the design
- Implement traditional controls
- Improve security controls

Resilience

- Focus on incident response
- Enhance scenario planning
- Plan and drill restoration scenarios

Collaboration

- Coordinate response plans
- Develop and maintain government relationships
- Leverage industry relationships
- Share best practices

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Current Status

- PJM has pushed its Return-to-Campus Plan to September.
- All stakeholder meetings will remain virtual through the end of 2021.
- The Member Training Program will continue with virtual delivery in 2021.

Public Information Available
https://www.pjm.com/committees-and-groups/pandemic-coordination.aspx

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Additional Information

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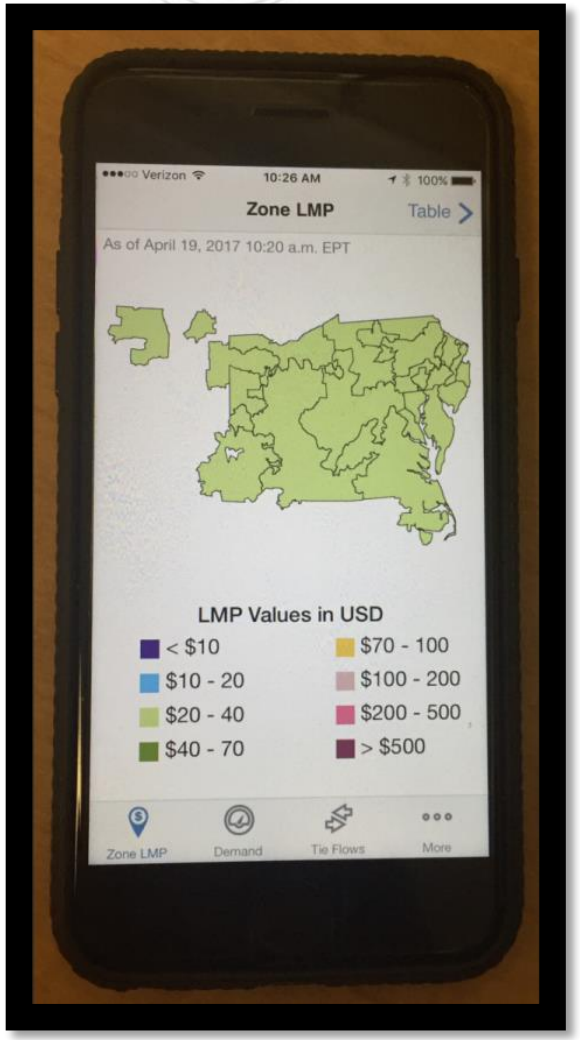
PJM Now App Available



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