

# Integration of Inverter Based Resources and associated Study Considerations

PSEG LONG ISLAND

SEPTEMBER 13, 2022

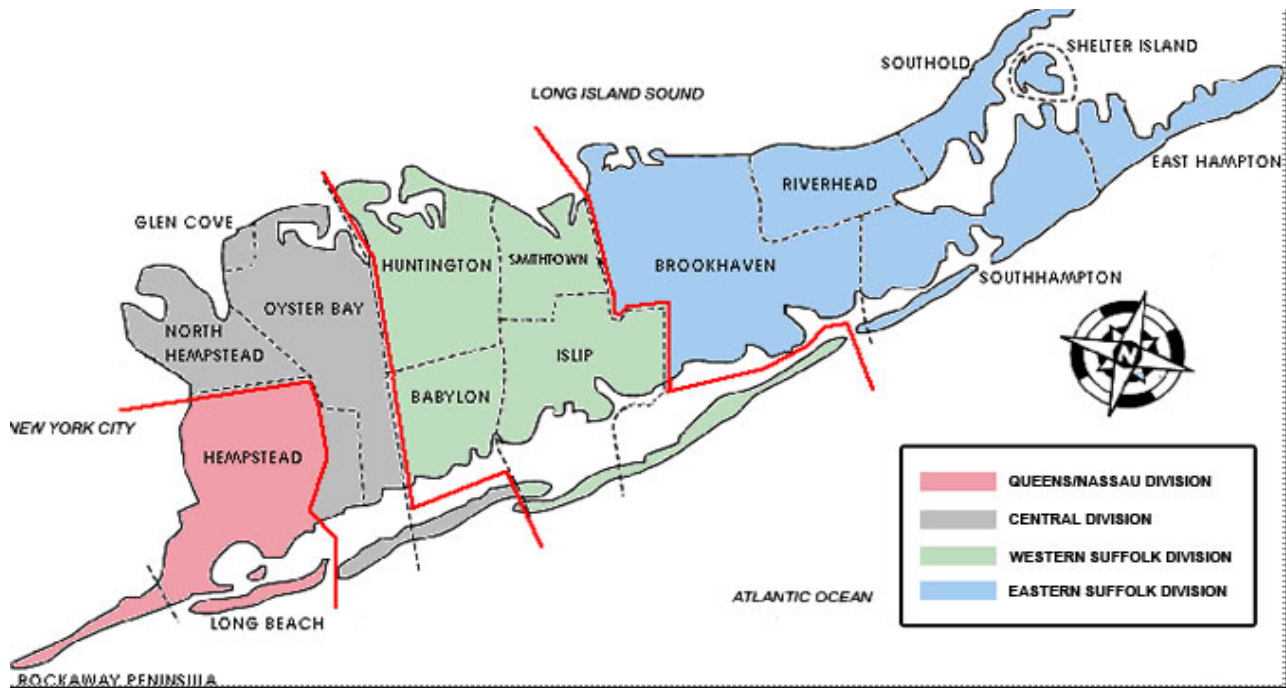


**PSEG** LONG  
ISLAND

*We make things work for you.*

# PSEG Long Island

- Manages Long Island Electric System for Long Island Power Authority (LIPA) under the amended Operations Services Agreement
- Service area includes Nassau County, Suffolk County, and the portion of Queens County known as the Rockaways, in the State of New York
- Serves 1.1 million customers



# Long Island Clean Energy Experience

## Offshore Wind



- New York's first offshore wind farm
- South Fork wind farm (130 MW) scheduled to be complete by the end of 2023
- NYSERDA has awarded 2140 MW of offshore wind (880 MW Sunrise Wind & 1260 MW Empire Wind 2)

## Energy Storage & Solar

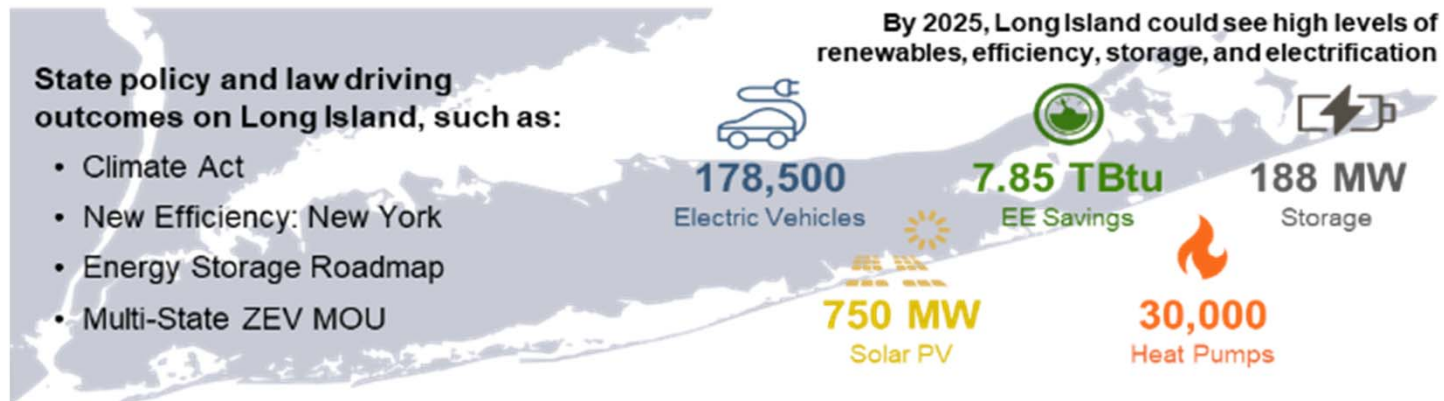


- New York's first utility-scale battery project
- Installed Two 5 MW, 40 MWh batteries
- Installed ~1473 BTM batteries
- ~ 730 MW AC total solar installations



# LIPA System - Changing Landscape

- Integration of Non-Synchronous Resources
- Deactivation of Synchronous Resources
- Intermittent Resources
- Variable Net Load Profile



Offshore Wind



South Fork RFP: South Fork Wind Farm – 130 MW (2023)

NYSERDA Awards: Sunrise Wind (880 MW – 2024), Empire Wind 2 (1260 MW - 2027)

# NYISO Interconnection Queue - LIPA Transmission System Interconnection Statistics

- Currently there are over 80 proposed resource interconnection projects for LIPA transmission System
- All are Energy Storage or Off Shore Wind projects.

Project Stage	Total Projects
Interconnection Request	9
Feasibility Stage	9
System Reliability Impact Study Stage	39
SRIS Complete	14
Current Class Year 2021	9
<b>Total</b>	<b>80</b>

Project Type	Proposed MW
Energy Storage	5707.7
Off Shore Wind	23827
Other	0
<b>Total</b>	<b>29534.7</b>

\*Data compiled from the public NYISO Interconnection Queue status spreadsheet

# Transition of System Studies

## PRESENT ANALYSES

- Load flow – snapshot
- Peak load & light load – driving critical system
- Voltage analysis
- Short circuit analysis
- Rotor angle (transient) stability
- Voltage stability

## FUTURE ANALYSES

- Load flow – hourly
- Need to identify driving critical system condition
- Voltage analysis
- Delta V due to variability
- Transient voltage considerations
- Voltage stability
- Control stability & interactions
- System strength screening
- Short circuit analysis
- Transient & dynamic stability
- Evaluation of impact to facility ratings

# Planning Models/Tools Considerations

- Limitation of positive sequence modeling
  - No phase by phase representation
  - Inability to capture higher frequency instability
- Need for Electromagnetic Transient study models and tools
- Integration of load flow with resource planning tools
- Distribution system representation including DER and load models
- Modeling of Inverter Based Resources (Generic vs Proprietary Models)
- IEEE 2800-2022 requirements and applicable performance verifications for transmission system studies

# Operational Considerations

- Review of existing commissioning test procedures to verify applicable plant capabilities
- Outage Planning and Analysis needs to incorporate intermittency and plant characteristics
- Non traditional power flow patterns
- Maintaining adequate short circuit strength and real time monitoring of inverter based resources
- System Restoration
- Energy Storage Management



# LIPA System Performance Requirements

- Recognizes the impact of increasing penetration of non synchronous resources on LIPA transmission system and implemented performance requirements
- Existing Performance Requirements for Transmission- Connected Non Synchronous Resources can be found on the following link:  
<https://www.psegliny.com/aboutpseglongisland/-/media/787F7080CA8843B482B8F40F69A8C8FD.ashx>
- Aligns with the IEEE 2800-2022 performance objectives

# Conclusion

- Require different models, criteria, conditions and cases
- Consideration of applicable reliability rules
- Longer lead time for studies
- Learning curve on newer models, technology and tools
- Higher dependence on transient studies and resource limitations
- Planning processes and tools need to be adapted to the changing grid
- Consider adoption of IEEE 2800-2022 performance requirements as applicable
- Review regional versus local system applicability of IEEE 2800-2022 performance requirements

**THANK YOU!**