PSEG LONG ISLAND

LOCAL TRANSMISSION PLAN

Presentation to NYISO / Interested Parties

November 21, 2023

Transmission Planning

LTP Contents: Topics that will be Covered

- **Overview of LIPA Transmission and Distribution**
  - Background
  - Transmission System
- **Key Factors Considered**
- **Planning Horizon**
- **Data and Models Used**
  - Data Sources
  - Models – Major Tools Used
- **Transmission Planning Studies**
  - Planning Process
  - Study Overview
  - NYISO Interconnection Requests/Ongoing Efforts
  - PSEG – LI Definition of a “Firm” Project
  - Long Island Load Pockets
  - Projects Being Considered

Background

- LIPA owns electric Transmission and Distribution (T&D) system on Long Island
- Acquired from LILCO in 1998
- Power Supply Agreement to meet capacity and energy needs for LIPA system with National Grid renewed in 2013, out to 2028
- Operation Service Agreement to manage electric operations for LIPA's system for 12 years starting January 2014 with PSEG Long Island.
- LIPA, by and through its agent, PSEG Long Island LLC, provides electric service to approximately 1.1 million LIPA customers
- LIPA service area includes Nassau County, Suffolk County, and the portion of Queens County known as the Rockaways, in the State of New York

Transmission System

LIPA's transmission system is designed to provide adequate capability between generation sources and load centers.

- Over 1,390 miles of transmission (345 kV, 138 kV) and sub-transmission lines (69 kV, 34.5 kV, 23 kV), delivering power through over 187 substations in its electric system.
- **Interconnections**:
  - **Two 345 kV**
    - Con Ed: Y49 (NYPA) 637 MW, East Garden City to Sprain Brook (NYISO-BPS)
    - Con Ed: Y50 (LIPA/Con Ed) 656 MW, Shore Road to Dunwoodie (NYISO-BPS)
  - **Three 138 kV**
    - ISONE: NNC (LIPA/ES) 436 MW, Northport to Norwalk Harbor
    - Con Ed: 300 MW Wheel - (903) Lake Success to Jamaica & (901) Valley Stream to Jamaica
  - **Two HVDC**
    - PJM: Neptune 660 MW, Newbridge Road to Sayreville
    - ISO-NE: CSC 330 MW, Shoreham to New Haven

Key Factors Considered

- **Load Growth**

- **Transmission Planning Criteria**
  - PSEG LI Transmission Planning Criteria:
    - PSEG Transmission Planning Criteria 2022

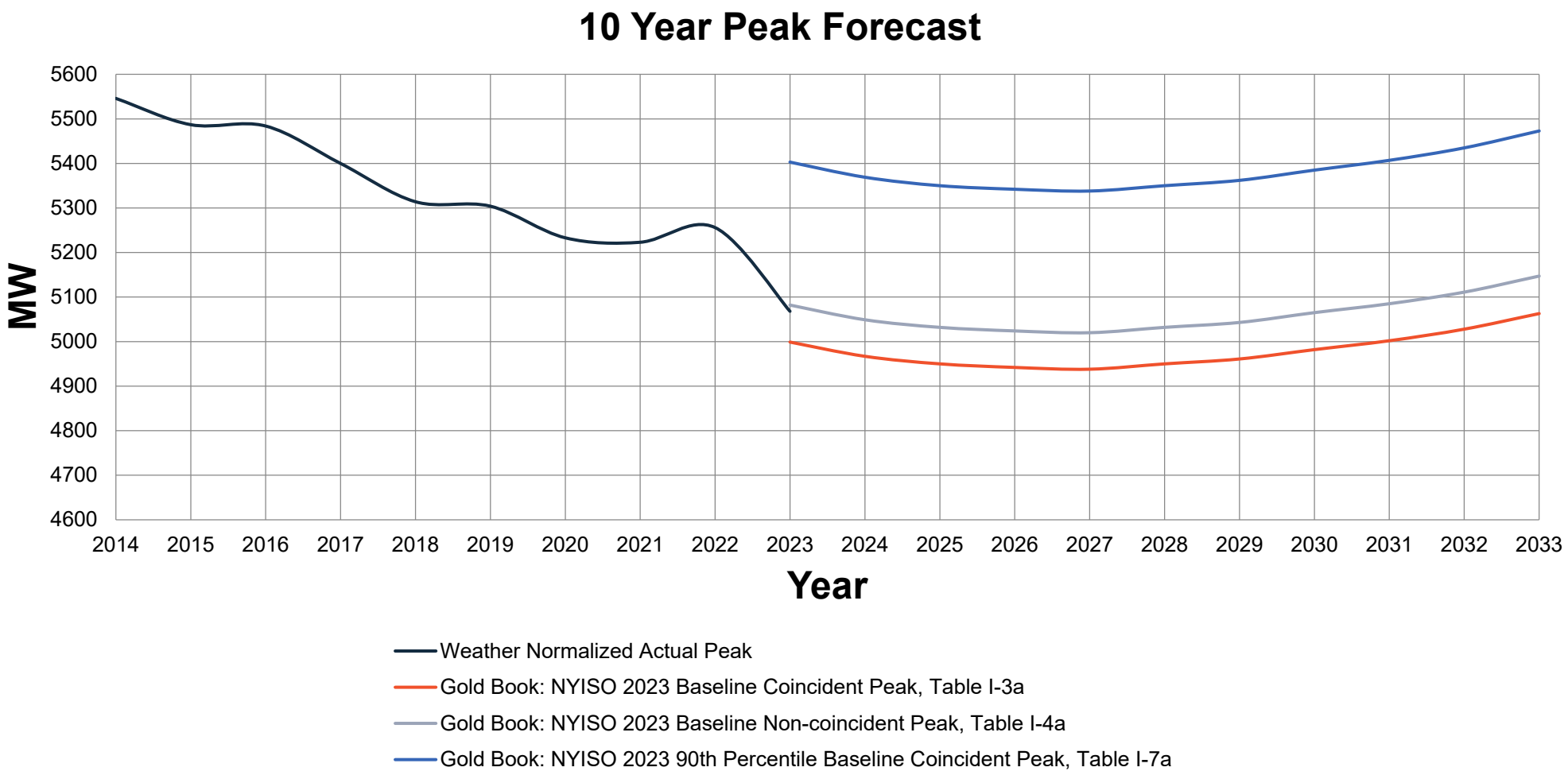
  - Ensure that electric system will meet applicable reliability requirements (NERC/NPCC/NYSRC)
  - PSEG LI performance requirements for Transmission-Connected resources using non-synchronous generation

- **Targeted Resource Additions**
  - South Fork Projects

- **Local Dispatch Guidelines**
  - Gas Burn Reliability Rules & Transient Recovery Voltage
  - Load Pockets

- **Public Policy Needs**
  - NYISO Public Policy Transmission Planning Process (PPTPP)
  - Coordinated Grid Planning Process (CGPP)

Zone K Load Forecast



Data Sources

- **Load Forecast**
- **NYISO - The Major Source of Base Cases used in Modeling**
  - Load Flow
  - Fault Duty
  - Stability
- **Generator Owners/HVDC/FACTS Developers**
  - MW/MVAR Capability
  - Modeling Characteristics
- **Internal Sources**
  - EMS Data – PI Historian
  - Equipment Characteristics (e.g., Engineering, Operations)

Models – Major Tools Used

- **Thermal / Voltage Analysis**
  - **PSS®E** : Siemens Power Technologies International's (PTI) Power System Simulator - *Transmission system load flow; thermal, voltage under normal and contingency conditions*
  - **TARA** : PowerGEM's steady state power flow software tool - *Load flow studies, N-1-1 power flow analysis and system operating limits analysis*
  - **MAPS™** : General Electric's (GE) Multi-Area Production Simulation
- **Fault Duty**
  - **ASPEN™** : Advanced Systems for Power Engineering, Inc. - Short circuit analysis program/ Breaker fault duty analyses
- **Stability**
  - **PSS®E** : Siemens Power Technologies International's (PTI) Power System Simulator - System Dynamic Simulation
  - Additional Complex Load Model used for Transient Voltage Recovery Studies
- **Other**
  - **Python**: Software language utilized for automation of various analysis and data management

Planning Process

- The planning process for the T&D System begins with the load forecast.
- Transmission System Studies: Identify transmission system limitations and recommend reinforcements for an area of the system.
    - Results in the development of major transmission capital projects.
    - Coordinates with other ongoing Transmission Planning Initiatives
- Limiting load level and year at which this load level is reached are critical factors
- Distributed Energy Resource(DER) penetration is captured in the substation load forecast.
- Potential Risk Factors
    - Generator unavailability
    - Generator Deactivations
    - Higher Load Levels
    - Potential BPS upgrades to meet NPCC criteria
    - Light Load

Study Overview

- **Seasonal Studies**
  - **System Operating Studies** (Summer & Winter) – Highlight system limits/ deficiencies and recommend solutions for the upcoming peak season
  - **Operating Guidelines** – Provide information to Transmission Operations to address thermal, voltage, local reliability rule, or short circuit constraints
- **Short Term, Near Term, & Long Term Studies** (Current year, Five year, and 10 year assessments)
  - **Area Studies** –Identify area constraints and recommend solutions
  - **Ten year Transmission development plan** – Ensure the design of the LIPA transmission system conforms with applicable reliability criteria over the planning horizon
- **Compliance Studies**
  - Studies to address requirements of NERC reliability standards (NERC TPL-001-5.1, TPL-007, FAC-014 and FAC-002)

Study Overview – Other Major Studies

- **NYISO Interconnection Process**
  - To assess the impact on the LIPA transmission system of proposed new generation or transmission interconnections
- **Short Circuit Study**
  - Ensures that there are no overstressed circuit breakers
- **Angular Stability Study**
  - Ensures that electric system will meet system stability design criteria
- **Voltage Recovery Evaluation**
  - Impact of load types and resource dispatch
- **NYISO coordination efforts**
  - RNA, Deactivation studies, etc.
- **New York State Policies / Public Policy Initiatives**
  - Clean Energy Standard, Offshore Wind Master Plan, Large-Scale Renewable Program, PPTPP, CGPP, and DEC NOx “Peaker” Rule

NYISO Interconnection Requests / Ongoing Efforts

Queue Pos.	Owner/Developer	Project Name	Date of IR	SP (MW)	WP (MW)	Type/ Fuel	County	Interconnection Point	Last Update	Proposed In-Service	Proposed Initial-Sync	Proposed COD
1093	Con Edison Transmission, Inc.	New York Clean Energy Transm	9/10/20	1300	1300		Oneida	Marcy - Rainey 345kV	9/30/20	10/2025	N/A	N/A
0487	LI Energy Storage System, LLC	Far Rockaway Battery Storage	3/9/15	20	20	ES	Nassau	Far Rockaway Substation 69kV	8/31/20	10/2021	11/2021	12/2021
0535	sPower Development Company, LLC	Riverhead Expansion	2/23/16	36	36	S	Suffolk	Edwards Substation 138kV	1/31/20	07/2021	08/2021	10/2021
0612	Deepwater Wind South Fork, LLC	South Fork Wind Farm	2/14/17	96	96	W	Suffolk	East Hampton 69kV	11/30/19	01/2022	08/2022	11/2022
0649	CR Fuel Cell, LLC	Clare Rose	8/3/17	13.9	13.9	FC	Suffolk	William Floyd Substation 69kV	10/31/19	12/2020	12/2020	12/2020
0650	BRT Fuel Cell, LLC	Brookhaven Rail Terminal	8/3/17	18.5	18.5	FC	Suffolk	W. Yaphank - Yaphank 69kV	11/30/19	04/2022	01/2022	05/2022
0678	LI Solar Generation, LLC	Calverton Solar Energy Center	10/26/17	22.9	22.9	S	Suffolk	Edwards Substation 138kV	7/31/19	10/2020	11/2020	12/2020
0680	Anbaric Development Partners, LLC	Long Island Offshore Wind	11/7/17	700	700	W	Suffolk	Ruland Rd. 138kV	5/31/20	07/2025	11/2025	12/2025
0695	Deepwater Wind, LLC	South Fork Wind Farm II	2/16/18	40	40	W	Suffolk	East Hampton 69kV	11/30/19	01/2022	08/2022	12/2022
0738	Equinor Wind US LLC	El Melville	6/12/18	816	816	W	Suffolk	Ruland Rd. Substation 138kV	9/30/19	06/2023	02/2024	12/2024
0746	Energy Storage Resources, LLC	Peconic River Energy Storage	7/30/18	150	150	ES	Suffolk	Brookhaven - Sills 138kV	4/30/20	03/2022	03/2022	04/2022
0751	Calpine Mid Atlantic Development, LL	Stony Brook Storage	8/14/18	24	24	ES	Suffolk	8LR substation 69kV	7/31/20	01/2021	03/2021	06/2021
0765	Bay State Wind LLC	NY Wind Brookhaven	9/28/18	880	880	W	Suffolk	Brookhaven 138kV	6/30/19	01/2023	05/2023	01/2024
0766	Bay State Wind LLC	NY Wind Holbrook	9/28/18	880	880	W	Suffolk	Holbrook 138kV	3/31/20	01/2023	05/2023	01/2024
0792	Anbaric Development Partners, LLC	Long Island Offshore Wind Connection	1/29/19	300	300	W	Suffolk	Ruland Road 138kV Substation	12/31/19	07/2025	11/2025	12/2025
0816	LIPA	NNC TTC Increase	4/5/19	N/A	N/A	AC	Suffolk	Northport Substation 138kV	9/30/20	12/2023	N/A	N/A
0825	Setauket Energy Storage, LLC	Setauket Energy Storage	4/15/19	76.9	76.9	ES	Suffolk	Port Jefferson - Terryville 69kV	5/31/20	10/2023	11/2023	12/2023
0911	Dimension NY 1 LLC	Southold BESS	10/1/19	20	20	ES	Suffolk	Peconic - Southold 69kV	5/31/20	05/2022	05/2022	05/2022
0912	Hecate Grid Intrepid 1 LLC	Intrepid Storage 69	10/2/19	50	50	ES	Nassau	EF Barrett 69kV Substation	7/31/20	10/2021	10/2021	10/2021
0918	Hecate Grid Intrepid 1 LLC	Intrepid Storage 138	10/9/19	250	250	ES	Nassau	Barrett Substation 138kV	8/31/20	10/2021	10/2021	10/2021
0925	Hecate Grid Clermont 1 LLC	Clermont 1	10/17/19	100	100	ES	Suffolk	West Babylon 69kV Substation	4/30/20	10/2021	10/2021	10/2021
0939	National Grid Generation LLC	Far Rockaway Power Station	11/5/19	30	30	ES	Queens	Far Rockaway Substation 69kV	6/30/20	10/2022	10/2022	12/2022
0940	National Grid Generation LLC	Glenwood Power Station Batt	11/8/19	50	50	ES	Nassau	Glenwood Substation 138kV	8/31/20	10/2022	10/2022	12/2022
0941	National Grid Generation LLC	Southampton Power Station E	11/8/19	30	30	ES	Suffolk	Southampton Substation 69kV	10/31/20	10/2022	10/2022	12/2022
0942	KCE NY 21, LLC	KCE NY 21	11/8/19	60	60	ES	Suffolk	Pulaski Substation 69kV	7/31/20	05/2022	05/2022	06/2022
0949	National Grid Generation LLC	Port Jefferson Power Station E	11/19/19	100	100	ES	Suffolk	Port Jefferson Substation 138kV	7/31/20	10/2022	10/2022	12/2022
0956	Holbrook Energy Storage	Holbrook Energy Storage	12/10/19	294.9	296.4	ES	Suffolk	West Bus Substation 138 kV	5/31/20	03/2023	04/2023	05/2023
0957	Holtsville Energy Storage	Holtsville Energy Storage	12/10/19	109.8	109.8	ES	Suffolk	Holtsville Patchogue 69kV	5/31/20	03/2023	04/2023	05/2023
0958	Equinor Wind US	El Oceanside	12/10/19	1000	1000	W	Nassau	Barrett 138 kV Substation	4/30/20	06/2024	08/2024	12/2024

Reference: Area K: NYISO Interconnection Queue 10/31/2023
https://www.nyiso.com › documents › NYISO-Interconnection-Queue.xlsx

NYISO Interconnection Requests / Ongoing Efforts

Queue Pos.	Owner/Developer	Project Name	Date of IR	SP (MW)	WP (MW)	Type/ Fuel	County	Interconnection Point	Last Update	Proposed In-Service	Proposed Initial-Sync	Proposed COD
0957	Holtsville Energy Storage	Holtsville Energy Storage	12/10/19	109.8	109.8	ES	Suffolk	Holtsville Patchogue 69kV	5/31/20	03/2023	04/2023	05/2023
0958	Equinor Wind US	El Oceanside	12/10/19	1000	1000	W	Nassau	Barrett 138 kV Substation	4/30/20	06/2024	08/2024	12/2024
0959	Equinor Wind US	El Oceanside 2	12/11/19	1500	1500	W	Nassau	Barrett 138 kV Substation	4/30/20	06/2024	08/2024	12/2024
0961	Calpine Mid Atlantic Development,	Bethpage Battery Energy Stor	12/18/19	20	20	ES	Nassau	LIPA 69 kV substation 5J Grumma	6/30/20	01/2021	03/2021	06/2021
0965	Yaphank Energy Storage, LLC	Yaphank Energy Storage	12/21/19	76.8	77.6	ES	Suffolk	William Floyd - Brookhaven 69kV	6/30/20	03/2023	04/2023	05/2023
0966	Suffolk County Energy Storage, LL	Suffolk County Storage	12/21/19	55	55	ES	Suffolk	West Babylon - Lindenhurst 69kV	7/31/20	03/2023	04/2023	05/2023
0971	Savion, LLC	East Setauket Energy Storage	1/10/20	297.9	293.5	ES	Suffolk	Holbrook-Miller Place 138kV	10/31/20	03/2024	04/2024	05/2024
0973	Wildwood Energy Storage, LLC	Wildwood-Riverhead Energy S	1/13/20	297.9	297.9	ES	Suffolk	Wildwood-Riverhead 138 kV	4/30/20	03/2024	04/2024	05/2024
0982	National Grid Generation LLC	West Babylon Power Station I	1/22/20	50	50	ES	Suffolk	Holbrook 138V Substation	7/31/20	10/2022	10/2022	12/2022
0987	Bay State Wind	NY Wind Holbrook 2	1/29/20	924	924	W	Suffolk	Holbrook 138kV	5/31/20	01/2023	04/2024	05/2024
0994	KCE NY 22, LLC	KCE NY 22	2/12/20	90	90	ES	Suffolk	Holbrook-Sills Road 138kV	6/30/20	05/2022	05/2022	06/2022
1008	KCE NY 26, LLC	KCE NY 26	4/28/20	60	60	ES	Suffolk	Peconic 69kV	9/30/20	09/2022	10/2022	10/2022
1011	Vineyard Wind	Vineyard Wind II	4/30/20	1403	1403	W	Suffolk	Pilgrim Substation	10/31/20	07/2026	11/2026	12/2026
1012	Suffolk County Energy Storage II	Suffolk County Storage II	5/4/20	76.86	76.86	ES	Suffolk	Southold 69 kV Substation	10/31/20	01/2024	03/2024	05/2024
1020	Equinor Wind US	El Fort Salonga	5/21/20	1300	1300	W	Suffolk	Northport 138 kV	8/31/20	12/2026	03/2027	11/2027
1021	Equinor Wind US LLC	El East Shoreham	5/27/20	1300	1300	W	Suffolk	Shoreham 138 kV	8/31/20	12/2026	03/2027	11/2027
1022	Equinor Wind US LLC	El Glenwood Landing	5/27/20	1300	1300	W	Nassau	Shore Road 345 kV	8/31/20	12/2026	03/2027	11/2027
1023	KCE NY 27, LLC	KCE NY 27	6/2/20	50	50	ES	Suffolk	Tiana - Quogue 69kV line	8/31/20	09/2022	10/2022	10/2022
1045	Bay State Wind	NY Wind Holbrook 2	7/3/20	1050	1050	W	Suffolk	Holbrook 138kV	8/31/20	01/2023	04/2024	05/2024
1046	Island Park Energy Center, LLC	Barrett Energy Storage Center	7/6/20	200.0	200	ES	Suffolk	Barrett Substation 138 kV	9/30/20	05/2023	09/2023	12/2023
1049	Clean Energy Generation, LLC	Holbrook Energy Center	7/14/20	150	150	ES	Suffolk	Holbrook 138 kV	8/31/20	05/2023	09/2023	12/2023
1050	Clean Energy Generation, LLC	Holtsville Energy Center	7/14/20	150	150	ES	Suffolk	Holtsville 138 kV substation	8/31/20	05/2023	09/2023	12/2023
1056	Bay State Wind	NY Wind - East Garden City	7/27/20	1325	1325	W	Nassau	East Garden City 138kV	8/31/20	01/2026	07/2026	04/2027
1058	Bay State Wind	NY Wind - Pilgrim	7/27/20	1325	1325	W	Suffolk	Pilgrim 138kV	8/31/20	01/2026	07/2026	04/2027
1081	KCE NY 28, LLC	KCE NY 28	8/27/20	45	45	ES	Suffolk	Riverhead substation 69kV	9/30/20	10/2023	10/2023	11/2023
1085	Juno Power Management LLC	Oyster Shore BESS	8/28/20	500	500	ES	Nassau	Shore road 345kV substation	9/30/20	08/2023	08/2023	10/2023
1087	East Wind LLC	East Wind 1	8/31/20	1200	1200	W	Nassau, Kings	E.F. Barrett 138kV	9/30/20	02/2028	02/2028	12/2023
1097	Juno Power Management LLC	Hicksville Storage	9/16/20	200	200	ES	Nassau	Newbridge Road 138kV	9/30/20	10/2022	10/2022	12/2022

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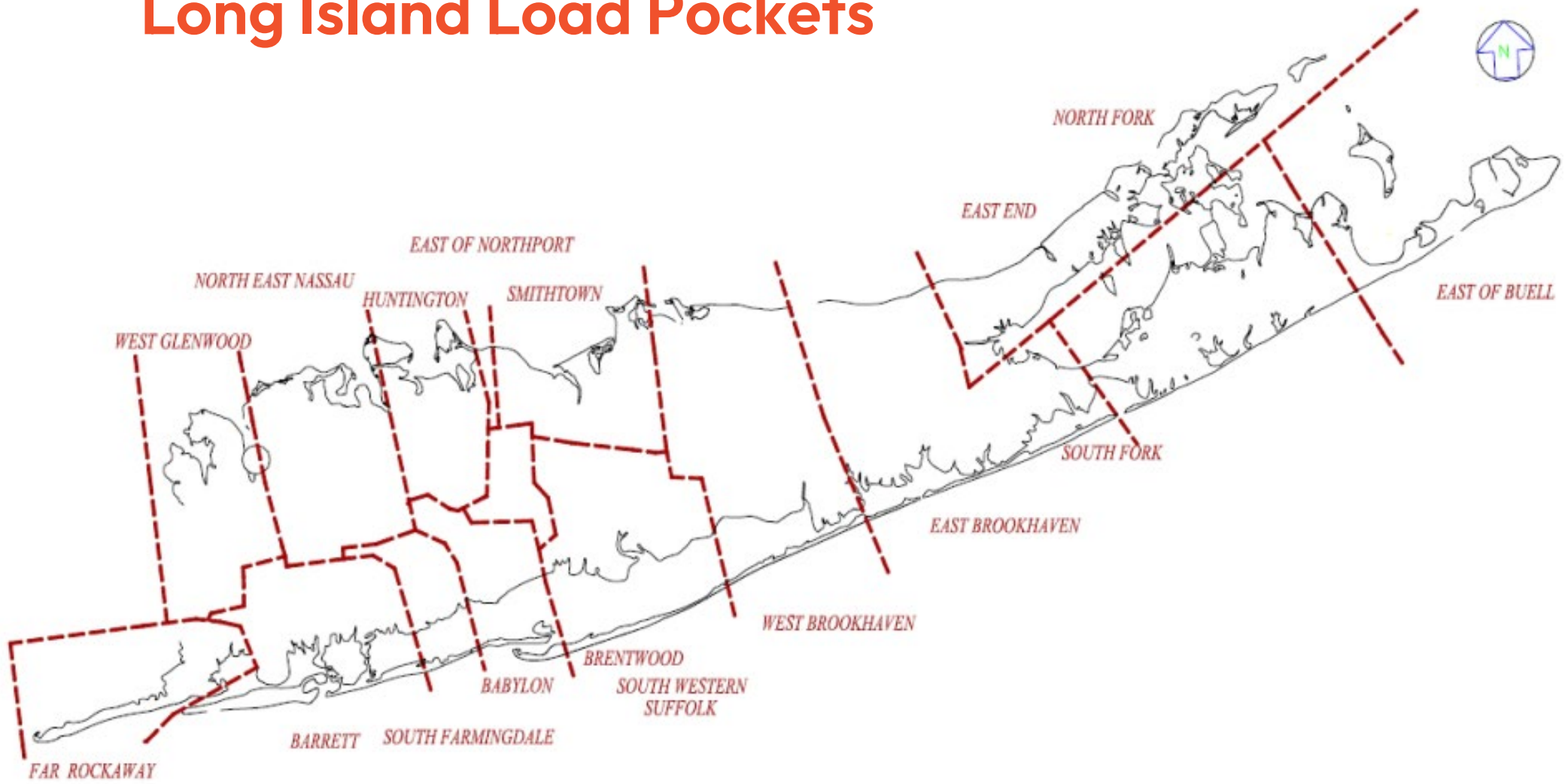
PSEG-LI Definition of a “Firm” Project

- In general, for a project to be considered “**Firm**” it must meet the following criteria:
  - Full **budget** approval through internal review
  - Preconstruction external **outreach** completed, stakeholder feedback obtained and addressed (if necessary)
  - Project Management has a defined **scheduled** start and completion date that is within the current or next year’s cycle
  - Operating Committee **approved** System Impact Study (SIS) if applicable
  - For projects subject to **Article VII**, have a determination from NYPSC that Article VII application is in **compliance**
- Any project that does not meet the above criteria will be considered “Non-Firm”, unless the project(s) is part of a Public Policy Transmission Need solicitation, and is designated as “Firm” by the NYISO

Long Island Load Pockets



Projects Being Considered

The following slides summarize projects that are currently under consideration as part of the on-going planning process.

These projects are continually being reviewed and considered as non- firm at this time. As such, the need, timing of, and/or the actual project recommendation may change.

Summary of Projects – 100kV & above

Firm 100kV and above

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
Barrett	Valley Stream Upgrade Relays at 138kV Substation	PPTN Upgrade	Firm	Complete	N/A	2030
	Barrett Upgrade Relays at 138kV substation	PPTN Upgrade	Firm	Complete	N/A	2030
West Glenwood	Lake Success 3AF Upgrade Relays at 138kV substation	PPTN Upgrade	Firm	Complete	N/A	2030
	East Garden City Install Reactors on circuits 138-462/463	PPTN Upgrade	Firm	Complete	N/A	2030
	East Garden City Install Reactor on 138-262 Ckt to Valley Stream	PPTN Upgrade	Firm	Complete	N/A	2030
	East Garden City Upgrade Relays at 138kV substation	PPTN Upgrade	Firm	Complete	N/A	2030
North-East Nassau	Syosset Reconfigure UG 138-675 Ckt to Oakwood	PPTN Upgrade	Firm	Complete	N/A	2030
	Syosset Replace UG section of 138-676 circuit to Greenlawn	PPTN Upgrade	Firm	Complete	Pending	2030
	Newbridge Replace 138kV Breaker 1460	PPTN Upgrade	Firm	Complete	N/A	2030
	Newbridge Convert 138kV Ckt 138-467/567 to 345kV	PPTN Upgrade	Firm	Complete	Pending	2030
East of Northport	Northport Install new 138kV Phase Angle Regulator	PPTN Upgrade	Firm	Complete	N/A	2030
Babylon	Ruland - Install Series reactors on 138-561 and 138-562 Ckt to Newbridge	PPTN Upgrade	Firm	Complete	N/A	2030
West Brookhaven	Holbrook Replace 138kV Switch 1322 with a breaker	PPTN Upgrade	Firm	Complete	N/A	2030

Summary of Projects – 100kV & above

Non-Firm Projects - 100 kV and Above	Proposed In-Service Date
Southampton to Deerfield New 138kV Circuit (Operated at 69kV)	2028

LIPA Long Term Plan (LTP) – Projects Being Considered

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
Far Rockaway	33 kV Arverne to Rockaway Beach New Circuit	Install a new 33 kV circuit between the Arverne substation to the Rockaway Beach substation.	Firm	N/A	N/A	June 2024
West Glenwood	Upgrade 33kV Belmont to 69kV	Upgrade Belmont substation to 69kV with two new 69kV circuits from Lake Success and Whiteside substations	Non-Firm	N/A	N/A	June 2025
South West Suffolk	23kV Ocean Beach to Fire Island Pines Substation New Circuit	Install a new 23kV circuit between the Ocean Beach and Fire Island Pines Substation	Non-Firm	N/A	N/A	June 2026
East Brookhaven	Install Series Reactor at Moriches	Install 2 Ohm Reactor	Non-Firm	N/A	N/A	June 2028
	Moriches - Rebuild 69kV Circuit to South Manor (69-855)	Transmission Upgrade on 69kV circuit	Non-Firm	N/A	N/A	June 2030

LIPA Long Term Plan (LTP) - Projects Being Considered

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
South Fork	East of Buell 23 kV to 33 kV Conversion	Convert the Hero, East Hampton, Buell, Amagansett, Hither Hills, Navy Road, and Culloden Point substation from 23 kV to 33 kV	Firm	N/A	N/A	June 2024
	New 69kV circuit between Bridgehampton and Buell substations	Install a 69kV circuit between Bridgehampton and Buell substations	Non-Firm	N/A	N/A	June 2025
	Reconfigure 69kV circuits between Canal and Deerfield substations	Parallel two OH 69kV transmission circuits between the Canal and Deerfield substations	Non-Firm	N/A	N/A	June 2028
	New 69kV circuit (138kV construction) Between Southampton and Deerfield substations	Install a new 138kV circuit to be operated at 69kV between the Southampton and Deerfield substations	Non-Firm	Pending	Pending	June 2028

Questions?

Document Posted on PSEG Long Island Web site

https://www.psegliny.com/aboutpseglongisland/legalandregulatory

Questions?

Please send any comments you may have to

LTP-PSEGLongIsland@pseg.com

PSEG LONG ISLAND

Thank *you*