



BIENNIAL REPORT FOR THE YEARS ENDING

DECEMBER 31, 2020, AND DECEMBER 31,
2021

August 31, 2022

Bringing Ingenuity to Life
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August 31, 2022

Thomas Falcone
Chief Executive Officer
Long Island Power Authority
333 Earle Ovington Boulevard, Suite 403
Uniondale, New York 11553

Re: Long Island Power Authority Biennial Report for the Years Ending December 31, 2020, and December 31, 2021

Dear Mr. Falcone,

PA Consulting is pleased to present the Biennial Report for years ending December 31, 2020, and December 31, 2021, in compliance with Section 702(b) of the General Bond Resolution. This report summarized the work we conducted to assess the current state of the Long Island Power Authority's ("LIPA") electrical transmission and distribution systems (including its share of Nine Mile Point 2), its operating and maintenance over the years of interest, adequacy of power supply, rates to fund the continued operations, maintenance and good repair of the system.

Based on the data provided by LIPA, its service provider PSEG Long Island, as well as field data collected by PA Consulting, PA Consulting finds the state of LIPA's Electrical system to be in a state of good repair and sound operating condition. PA Consulting determined that the rates, fees, and charges are sufficient to cover the cost of operations and debt service.

We appreciate the opportunity to work with LIPA, and to provide assistance in this effort. Our work could not have been accomplished without the dedication and efforts of individuals from both LIPA and PSEG Long Island.

We will be happy to discuss the report in more detail with you at your convenience.

Sincerely,



Derek Hasbrouck
Member of PA's Management Group

Statement of Limitations

PA Consulting Group, Inc. ("PA") has prepared this Biennial Report (the "Report") for the use of LIPA solely with respect to the Report in compliance with the General Bond Resolution. PA has agreed that LIPA may share this Report with its indentured trustees, officers, directors and employees; the officers, directors and employees of its subsidiaries; its advisors, and investors. Review or use of this Report by any other party or for any other purpose, including but not limited to use of the Report to which LIPA is not a party, is strictly prohibited and must be authorized by PA in writing. All use and reliance on this Report by any authorized third party is subject to the following terms and conditions.

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- You acknowledge that: (i) some information in the Report is necessarily based on predictions and estimates of future events and behavior; (ii) such predictions or estimates may differ from that which other experts specializing in the electricity industry might present; (iii) the Report is not intended to be a complete and exhaustive analysis of the subject issues and therefore will not consider some factors that are important to a potential investor's decision making. Nothing in the Report should be taken as a promise or guarantee as to the occurrence of any future events.
- To prepare the Report for LIPA for the years ending on December 31, 2020, and December 31, 2021, PA reviewed information provided by both LIPA and its service provider (PSEG Long Island) for the relevant period. The information included LIPA Board Presentations, studies, updates, reports, charts and other presentations, fact sheets, audited financial statements, other financial and statistical information. PA also conducted site visits (both escorted and unescorted) to substations and control centers. PA has no reason to believe the information provided is inaccurate or incomplete and has conducted only a cursory independent review to verify the data. As such, PA cannot guarantee the accuracy and completeness of information provided to us for review.
- Estimates and projections conducted by PA relating to current performance and costs are based on its prior experiences, qualifications, prior knowledge of industry norms and best practices, and judgement as professional consultants. Since PA has no control over weather; future labor costs and availability; productivity; material availability and costs; procurement methods; supply chain related delays; economic conditions, additional or updated regulations and laws; market conditions and other factors that affect the estimates and projections, PA does not guarantee the accuracy of the estimates and projections in this report.
- PA is not acting as a "municipal advisor" for LIPA, within the meaning of Section 15B of the Securities Exchange Act of 1934 ("SEA"), as amended and do not owe a fiduciary duty to LIPA pursuant to the SEA with respect to the information and materials contained in the Report and our communications.
- By reviewing, using or relying on the Report, you release PA from any claims arising from your review, use of or reliance on the Report, including by way of example only, any claim for the negligent provision of information. In no event and under no circumstances shall PA be liable to you for any principal, interest, loss of anticipated revenues, earnings, profits, increased expense of operations, loss by reason of shutdown or non-operation due to late completion, or for any consequential, indirect or special damages.

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Account	Column 1	Column 2	Column 3	Column 4
Notes Payable	32,062	30,653	20,658	13,056
Accrued Expense	112,000	92,756	98,871	75,000
	255,000	175,416	245,600	147,910
	35,260	28,445	30,526	25,600
TOTAL CURRENT LIABILITIES	434,322	327,270	395,655	260,560
NON-CURRENT LIABILITIES :				
Long - Term Loan from Financial Institution	500,000	400,000	500,000	400,000
Debenture	350,000	200,000	350,000	200,000
	850,000	600,000	850,000	600,000
TOTAL NON-CURRENT LIABILITIES	1,284,322	927,270	1,245,655	860,560

1 Introduction

PA Consulting was retained to carry out the Report for the consecutive years ending December 31, 2020, and December 31, 2021 ("the Study period") under Article VII, Section 702 (b) of LIPA's Electric System General Revenue Bond Resolution adopted May 13, 1998. PA Consulting finds the state of LIPA's electrical system to be in a state of good repair and sound operating condition. PA Consulting determined that the rates, fees, and charges are sufficient to cover the cost of operations and debt service. The prior biennial report covering years ending 2018 and 2019 dated August 31, 2020, made recommendations about improving station upkeep (switching to underground grounding wires, maintain / repair station pilings, inspections and repairs for oil filled equipment, and removal of spare / unused parts from substations) and these recommendations appear to have been implemented with very few exceptions. PA Consulting did not observe any large looping grounding wires that were noted as potential tripping hazards. While PA Consulting did note the presence of a limited number of spares / retired equipment at select stations, most of the substations PA Consulting visited appeared to be free of unnecessary equipment. PA Consulting concludes that mitigation actions were taken to address the recommendations from the last report.

1.1 Electrical System Description

The Long Island Power Authority (LIPA, or the Authority) owns the electric transmission and distribution (“T&D”) assets in Nassau, Suffolk, and parts of Queens Counties in New York¹ (“the Service Area”). LIPA’s electrical infrastructure comprises of:

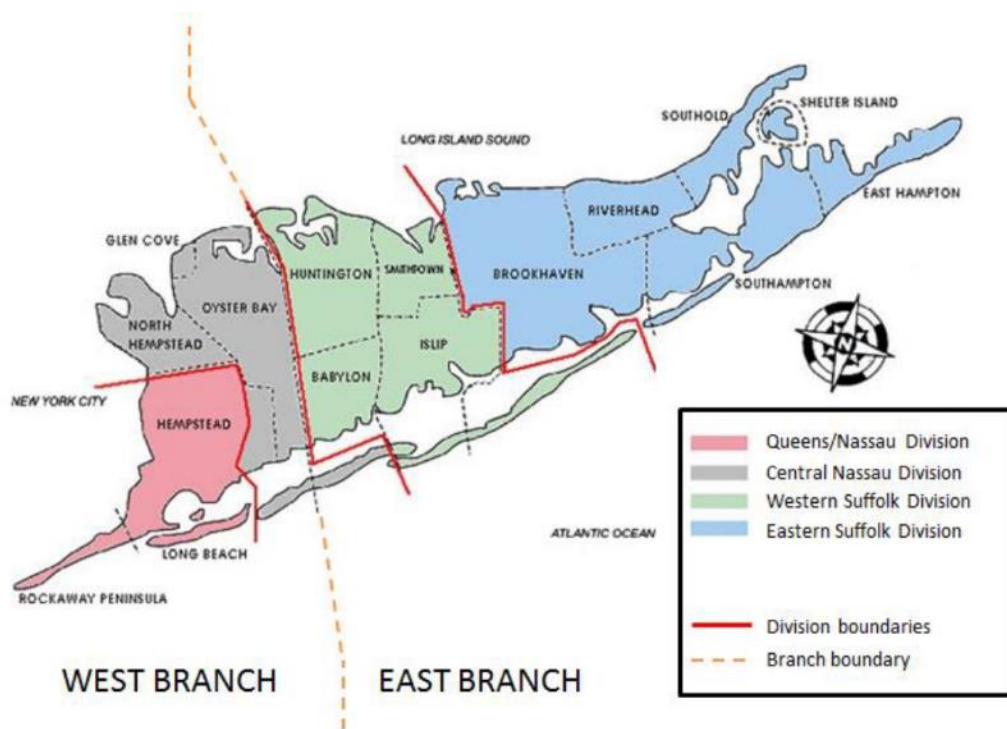
Table 1: LIPA T&D Electrical System²

	Transmission System	Distribution System
Approximate Miles	1,400	14,017 (9,011 Overhead, 5,006 underground)
Substations	41	156

As of December 31, 2021, LIPA served approximately 1.14 million electric customers, comprised of 90 percent residential and 10 percent commercial customers. During 2021, the system peak load was 4,984MW, and LIPA supplied its customers with 19.95 GWh of electricity.

Operationally, LIPA’s electrical system is divided into four divisions: Queens/Nassau, Central, Western Suffolk, and Eastern Suffolk divisions (see Figure 1). LIPA contracts with PSEG Long Island LLC under the PSEG Long Island brand to provide day-to-day operations of the electrical infrastructure, which is managed by the Second Amended and Restated Operations Services Agreement (“OSA”).

Figure 1: LIPA Service Area Map



1.2 Organization and Management

1.2.1 LIPA

LIPA was created under the Long Island Power Authority Act and acquired assets of the Long Island Lighting Company (“LILCO”) in 1998. This included the electrical transmission and distribution systems, certain agreements and contracts

¹Freeport, Rockville Center, and Greenport own their own municipal utilities, and are not considered a part of the LIPA electric system for the purposes of this report.

² Fiscal Year 2021 Annual Disclosure Report of the Long Island Power Authority

for power supply and transmission, 18 percent share of Nine Mile Point Unit 2 (nuclear facility located in Oswego, NY), and certain other assets and liabilities. The LIPA Reform Act of 2013 (the “LIPA Reform Act”) amended certain provisions of the Long Island Power Authority Act and established an office within the DPS to review and make recommendations to the Board, the Authority, and its service provider related to rates and charges, core utility functions including capital expenditures, the methods employed by the service provider for providing safe and adequate service, and the service provider’s emergency response plan.

LIPA has policymaking and oversight responsibilities and obligations for the operation and maintenance of the T&D system consistent with the LIPA Reform Act and OSA.

1.2.2 Operating Agreement

LIPA conducted a competitive procurement process to seek the services of an entity to carry out the day-to-day activities under an OSA. PSEG Long Island won the bid and took over the operations and maintenance of the Long Island electrical system from National Grid starting January 1, 2014. The OSA contains performance compensation aimed to incent PSEG Long Island to deliver certain levels of performance as defined by a set of performance metrics. Beginning January 1, 2015, PSEG Long Island (through an affiliate company, PSEG Energy Resources & Trade LLC) assumed certain power supply management, fuel procurement and related services.

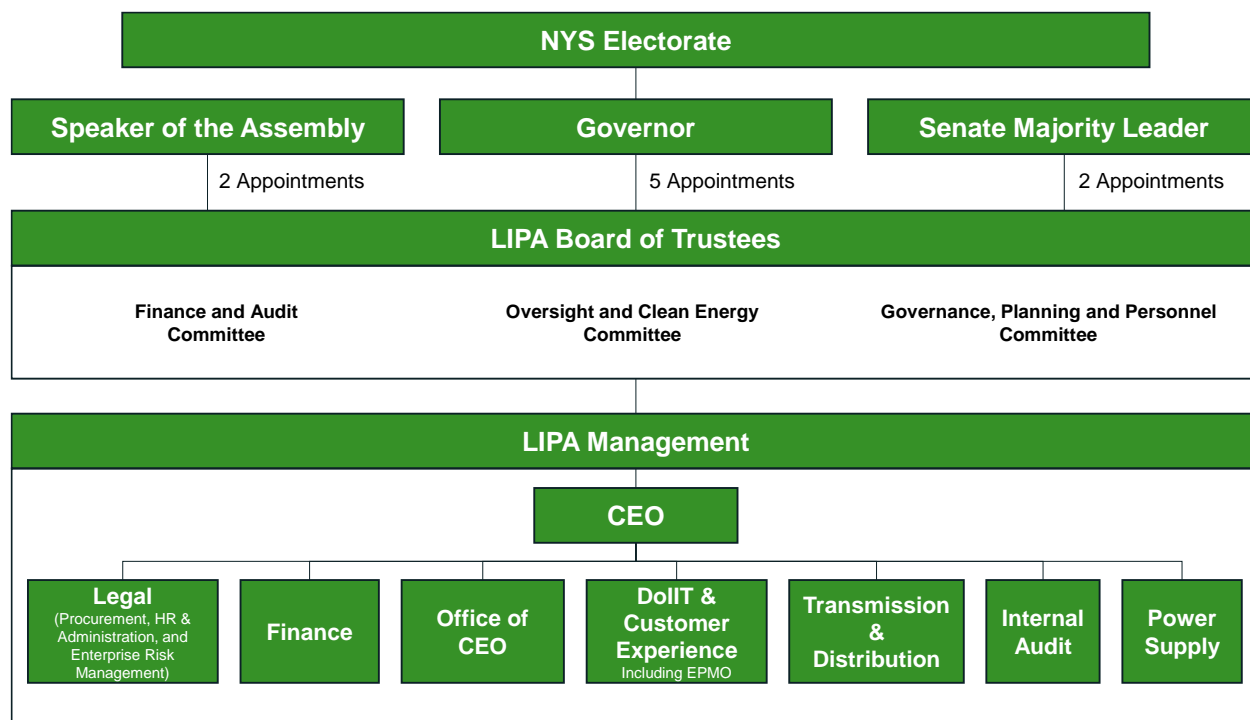
1.2.3 Second Amended and Restated OSA Effective April 2022

After Tropical Storm Isaias impacted LIPA’s service territory in August 2020, there have been a number of changes that culminated in reforms to the OSA (in effect starting April 1, 2022). The Second Amended and Restated OSA increases PSEG Long Island’s annual compensation at risk from \$10 million to \$40 million, subjects PSEG Long Island to up to 110 detailed Performance Metrics set annually by LIPA, includes new and strengthened termination rights and automatic compensation reductions, strengthens PSEG Long Island’s dedicated management team with new positions, ensures that all Long Island employees report to managers dedicated to Long Island operations, requires the separation of all LIPA information technology systems from those of PSEG affiliates, provides LIPA with new rights to independently test and validate the performance of mission-critical IT systems, and eliminates PSEG Long Island’s eight-year term extension option; instead, the OSA will now expire on December 31, 2025.

1.2.4 LIPA organization chart

LIPA is a not-for-profit entity that owns the electrical system on Long Island. For the period covered by this report LIPA was governed by a nine-member Board of Trustees, who sets overall policies and hires certain members of LIPA’s management team. The LIPA Management team oversees operations and services provided under the OSA. Figure 2 shows the LIPA organizational structure, showing the various LIPA departments and their areas of responsibility.

Figure 2: LIPA Organization Chart



1.2.5 LIPA Assets and Descriptions

LIPA Assets comprise mainly the electrical infrastructure (transmission and distribution systems), vehicles, equipment, land parcels, easements, contractual arrangements, and other assets needed to affect transmission and distribution of electricity on Long Island. LIPA also has a minority (18 percent) share of Nine Mile Point unit 2 nuclear generation facility.

- **Transmission System:**

LIPA's transmission system consists of approximately 1,400 miles of overhead and underground transmission, and 41 transmission substations (69kV, 138kV, and 345kV) facilities that fall under the New York Independent System Operator ("NYISO") jurisdiction and sub-transmission (23kV and 33kV) operated under the control of the local transmission operators. There are seven transmission interconnections between Long Island (NYISO Zone K) and neighboring utilities, some of whom fall under other Independent System Operators / Regional Transmission Operator jurisdictions. The interconnections are owned in part, or are under contract to LIPA.

Table 2: LIPA Transmission Interconnections

Interconnection	Off System Termination Location	Interconnecting Utility (ISO/RTO)	Summer Capacity
Dunwoodie to Shore Road (Y-50)	Westchester, NY	Con Edison (NYISO)	656 MW
Sprainbrook to East Garden City (Y-49)	Westchester, NY	Con Edison (NYISO)	637 MW
Northport to Norwalk Cable ("NNC")	Norwalk, CT	Eversource (ISO-NE)	436 MW
Jamaica to Lake Success	Queens, NY	Con Edison (NYISO)	240 MW
Jamaica to Valley Stream	Queens, NY	Con Edison (NYISO)	268 MW
Cross Sound Cable ("CSC")	New Haven, CT	United Illuminating (ISO-NE)	330 MW
Neptune	Sayreville, NJ	JCP&L (PJM)	660 MW

The Con Edison cable extending approximately 18 miles from Dunwoodie to Shore Road (Y-50) was placed in operation in August 1978 and is jointly owned by LIPA and Con Edison. Con Edison's share of the power flowing across the Y-50 Cable is delivered to Con Edison via the two 138 kV cables to Jamaica from Valley Stream and Lake Success, respectively.

The East Garden City to Sprain Brook interconnection (Y-49), installed in 1991, is another major transmission interconnection. The Y-49 Cable comprises submarine and land-based portions totaling approximately 23 miles. This line is owned entirely by NYPA; however, most of the capacity of the Y-49 Cable is used by LIPA under the terms of a contract with NYPA. The Y-49 Cable contract was set to expire in 2020 but was extended to November 2022, pending completion of NYPA's studies of the reliability of the cable and possible options to extend its operating life or replace it. NYPA has now determined that some portions of the onshore cable on Long Island will need to be replaced in the near term. The line outage for replacement work is expected to begin in October 2022 with completion expected by the end of May 2023. LIPA and NYPA will be further extending the contract until the replacement project is being completed.

The cable from Northport to Norwalk Harbor (the "NNC"), which was installed in 2008 to replace the original cable installed in 1969, extends approximately twelve miles under the Long Island Sound from the Northport generating station in Suffolk County, New York to Norwalk Harbor, Connecticut. LIPA owns that portion of the line from Northport to the New York-Connecticut state boundary.

The high voltage direct current ("HVDC") cable from Shoreham to New Haven ("CSC") was constructed under a firm transmission capacity purchase agreement (the "CSC Agreement") signed between LIPA and Cross Sound Cable Company, LLC ("CSC LLC") in 2000 under which LIPA agreed to purchase up to 330 MW of transmission capacity. The CSC is owned by CSC LLC. The CSC Agreement, as amended, expires in 2032. The CSC became operational in June 2004.

In September 2005, LIPA signed a 20-year firm transmission capacity purchase agreement with Neptune Regional Transmission System LLC (“Neptune”) to permit LIPA to import power from New Jersey over an undersea HVDC transmission cable (the “Neptune Cable”) capable of carrying 660 MW of electricity. The Neptune Cable is owned by Neptune, runs from Sayreville, New Jersey under the Atlantic Ocean and connects with LIPA at its Newbridge Road substation in Levittown. The cable became operational in July 2007.

- **Distribution System:**

LIPA distribution system consists of approximately 192,548 line transformers, 9,011 miles of overhead and 5,006 miles of underground facilities, as well as 156 substations (13kV and 4kV). LIPA only owns a fraction of the distribution poles. There is a joint use pole agreement between LIPA and Verizon, and both companies have access to put their own facilities on poles owned by the other utility.

A new 69/13kV substation at Round Swamp was built starting March 2021 to provide additional power to the surrounding area. The substation was energized in June 2022

- **Nine Mile Point 2:**

Nine Mile Point Unit 2 (“NMP2”) is a nuclear generation facility of 1,399 MW name plate capacity located in Scriba, NY (NYISO Zone C). LIPA owns 18 percent of NMP2, and the remainder 82 percent is owned by Constellation Energy who also owns 100 percent of Nine Mile Point unit 1, a 642 MW name plate capacity located in the same complex. NMP2 has been in commercial operation since August 1, 1988, and its Nuclear Regulatory Commission (“NRC”) operating license expires on October 31, 2046.

LIPA is responsible for 18 percent of NMP2’s operations, maintenance, fuel, and capital costs, and is entitled to 18 percent of its energy outputs and generation capacity

- **Constellation Energy spinoff transaction**

In 2021, Exelon spun off the ownership of its nuclear generators entirely to Constellation Energy. Amongst the transferred nuclear generation facilities include James A. FitzPatrick, R.E. Ginna, and Nine Mile Point power stations, whose transfer in ownership was approved in NY Public Service Commission (“NYPSC”) Case 21-E-0130. The transaction closed in 2022. Under the terms of the transaction, Constellation Energy would continue to operate and maintain NMP2 post spin off transaction. There are no changes to the decommissioning and site restoration obligations from the spinoff transaction, and Constellation Energy is committed to providing safe, reliable and carbon free energy to meet New York state needs

- **NMP2 performance:**

NMP2 has performed in line, if not better than the average nuclear facility in the US.

Table 3: NMP2 Plant Performance

Year	Annual Net Generation (MWh)	LIPA share of Generation (MWh)	Annual Net Capacity Factor	Three Year Net Capacity Factor	Industry Average Capacity Factor
2017	11,107,750	1,999,395	97.7%	93.8%	92.3%
2018	10,104,889	1,818,880	88.9%	91.1%	92.5%
2019	11,217,194	2,019,095	98.7%	94.5%	93.4%
2020	10,167,608	1,830,169	89.2%	92.4%	92.4% ³
2021	11,155,917	2,008,065	98.2%	95.4%	91.2% ⁴

1.2.6 Budget and Revenue streams

For the years 2020 and 2021, PSEG Long Island prepared annual estimates of costs and budget requests for LIPA review and approval. This budgeting process takes into consideration historical revenues, expenses, as well as

³ Capacity factor estimate from EIA Monthly Energy Review, July 2022.

⁴ Ibid.

estimated revenues and costs. PA Consulting reviewed the PSEG Long Island prepared 2022 Budget as a part of this process, and concluded the proposed costs are reasonable.

The estimated revenues generated by current rates are sufficient to meet the rate covenant requirement outlined in the General Resolution.

1.3 Assessment Approach

The findings of this report are based on our review of documents provided by LIPA and PSEG Long Island. PA Consulting conducted site visits (escorted and unescorted) to determine the physical conditions of a select number of substations across the entire Long Island service area.



2 Operations and System Conditions Assessment

PA Consulting determined that the overall system is in generally reasonable state of repair. LIPA assets have been kept in reasonable conditions and have been operated and maintained in accordance with utility practices. LIPA has delivered reliable power to its customers in 2020 and 2021.

2.1 Operations

2.1.1 System operations

LIPA has an obligation to secure sufficient capacity to meet its forecasted peak load plus reserve, which it meets with a combination of capacity purchased from National Grid Generation LLC ("GENCO") owned generators located on Long Island, nuclear capacity from NMP2, and other merchant power plants located on and off Long Island. Similar to capacity, the energy consumed on Long Island is procured from GENCO power plants, other on-Island plants, and imports across LIPA's transmission interconnections.

Table 4: Historical Power Loads and Resources

	2017	2018	2019	2020	2021
Annual Summer Peak (MW)	4,945	5,206	5,269	5,203	4,984
Capacity (Summer ICAP MW)					
Nuclear	224	233	232	233	232
Purchased Capacity - GENCO	3,702	3,691	3,702	3,692	3,604
Other Purchased Capacity	1,881	1,838	1,824	1,720	1,619
Total Capacity	5,807	5,762	5,758	5,645	5,455
Reserve Margin					
MW	862	556	488	442	471
Percent of Annual Peak	17.4%	10.7%	9.3%	8.5%	9.5%
Energy (MWh)					
Nuclear	1,947,060	1,822,388	2,021,035	1,842,557	2,022,272

	2017	2018	2019	2020	2021
Purchased Energy - GENCO	3,288,276	4,530,019	3,780,336	4,912,614	5,989,662
Other purchased energy ⁵	14,960,379	14,420,675	14,302,701	13,068,193	11,939,409
Total Energy	20,195,715	20,773,082	20,104,072	19,823,364	19,951,342
Energy Source					
Nuclear	9.6%	8.8%	10.1%	9.3%	10.1%
GENCO	16.3%	21.8%	18.8%	24.8%	30.0%
Other purchased energy	74.1%	69.4%	71.1%	65.9%	59.8%

- COVID-19 Impacts

LIPA has been able to maintain effective communications and carry out its activities without any disruption during the COVID-19 pandemic. PSEG Long Island also has instituted measures to have its workforce work remotely and instituted work practices for field personnel to maintain a safe work environment.

The decline in business activity in LIPA's Service Area resulted in lower commercial customer sales revenues in 2021 and 2020. LIPA's revenue decoupling mechanism ("RDM") recoups revenues for this lower consumption as it compares actual revenues with authorized revenues and credits (or collects) any differences to (or from) customers. However, to aid its commercial customers from a high bill impact, the Board elected to limit the RDM rate to a maximum of 5 percent of delivery service revenues for any customer class with amounts not collected carried forward to subsequent periods. In addition, the economic impact of the pandemic has also resulted in increased arrears balances. LIPA increased its allowance for expected write-offs and LIPA's Board approved a modification to the Delivery Service Adjustment ("DSA") to recover write-offs above amounts budgeted in 2021.

In addition, on March 20, 2020, the Federal Emergency Management Agency (FEMA) announced that federal emergency funds will be made available for certain incremental costs during the recovery efforts related to the COVID-19 pandemic. LIPA has been approved for public assistance; however, as no grant application has been finalized or approved as of December 31, 2021, LIPA's 2021 Consolidated Financial Statements do not include amounts for expected FEMA reimbursement.

2.1.2 Resource planning

Long-range Integrated Resource Planning ("IRP") for Long Island is typically conducted every 3 to 5 years, and includes a study of generation resource adequacy for the near future. The last IRP was completed in 2017, and LIPA and PSEG Long Island are currently working on the next IRP, with an anticipated completion of 2022 Q4. As part of the current IRP, LIPA and PSEG Long Island will determine the least cost mix of generation resources and transmission system upgrades to ensure continuing system reliability, while meeting New York's nation-leading goals for a carbon-free electric grid by 2040. The IRP will develop the analyses needed to determine new clean energy additions to the Long Island electric grid, as well as when units can be shut down without jeopardizing reliability. A draft of the IRP is expected to be available in 2022 Q4. Some of these updates and issues that the IRP will need to address include the recently passed Climate Leadership and Community Protection Act ("CLCPA"), which includes the State's goal to achieve 70 percent of electric generation from renewable sources by 2030 ("70x30 goal").

LIPA has outlined a plan to transition to the CLCPA goal for a carbon-free electric grid by 2040, which builds on the State's 70x30 goal. The LIPA plan to shift towards the carbon-free grid entails shifting away from fossil fuel-based generation sources towards clean sources of energy. LIPA has signed an agreement in 2020 with New York State Energy Research and Development Authority ("NYSERDA") for Renewable Energy Credits ("RECs") to help meet LIPA's clean energy procurement needs. LIPA also plans to purchase offshore wind RECs from NYSERDA in addition to LIPA's own plans to purchase power agreement with the South Fork Offshore Wind Project. Between LIPA and the State, approximately 2,300 MW of offshore wind have been awarded to interconnect into Long Island.

The implementation of CLCPA will fundamentally change the existing generation supply portfolio for the State and Long Island over the next two decades. NYISO's 2021 Comprehensive Reliability Plan noted while the State will be in

⁵ Including sales for resale, LI Choice, Grumman campus, Recharge NY and BNL Hydro, and load modifiers

position to achieve the 70x30 goal and meet reliability requirements, achieving zero-emissions in the electric system by 2040 may require additional transmission capacity, a review of current reliability frameworks, and changes to wholesale electricity market design, to address tightening resource adequacy margins across the New York grid and the risk of extreme weather events driven by climate change.

- **Additional 2022 IRP plan considerations**

The Governor of New York introduced the Green New Deal plan, which was largely incorporated into the CLCPA, which was ultimately signed in July 2019. In 2020, the Energy Planning Board amended its State Energy Plan (“SEP”), originally released in 2015 and coordinates various state energy policy, in light of CLCPA. The amended SEP set the following clean energy and climate targets:

- a 40% reduction in greenhouse gas (“GHG”) emissions from 1990 levels by 2030;
- the State’s 70x30 goal;
- 185 trillion BTU increase in on-site energy savings from 2015 baseline by 2025; (iv) zero emissions electric system by 2040;
- minimum 85% reduction in GHG emissions from 1990 levels by 2050, with a goal of 100% reduction;
- 9,000 MW of offshore wind by 2035;
- 6,000 MW of distributed solar by 2025;
- 3,000 MW of energy storage by 2030; and
- 40% goal, and a minimum target of 35%, of overall benefits from investments in clean energy and energy efficiency to be realized by disadvantaged communities.

The amended SEP added a new initiative to establish a sustainable electric generation facility cessation mitigation program, calling on state entities to advance strategies to mitigate the impact of power plant closures on hosting communities. The Governor has subsequently announced expansions to some of those targets, although the SEP has not been formally amended to reflect this expansion. In December 2021, the Governor announced a goal of 10,000 MW of distributed solar by 2030. In the April 2022 State of the State address, the Governor announced a doubling of the State’s energy storage goal to 6,000 MW by 2030.

The CLCPA requires all State agencies (including LIPA) to consider the impacts of their final agency actions on GHG emissions and disadvantaged communities. Pursuant to Section 7(2) of the CLCPA, all State agencies must consider whether their administrative approvals and decisions “are inconsistent with or will interfere with the attainment of the statewide greenhouse gas emissions limits” established by the NYS Department of Environmental Conservation (“DEC”) pursuant to the CLCPA. CLCPA Section 7(3) requires all State agencies to ensure that their decisions will not “disproportionately burden disadvantaged communities” and to “prioritize reductions of greenhouse gas emissions and co-pollutants in disadvantaged communities”. The CLCPA also requires various State agencies to “promulgate regulations to contribute to achieving the statewide greenhouse gas emissions limits established” by the DEC, although such regulations will not limit DEC’s authority to regulate and control GHG emissions pursuant to CLCPA. To this end, the LIPA Board has updated its policy on Resource Planning and Clean Energy and its policy on Diversity, Equity, and Inclusion to incorporate the achievement of LIPA’s share of CLCPA clean energy, energy efficiency, electrification and environmental justice goals into LIPA policies while upholding its commitments to reliability and affordability.

- **Carbon-free projects**

To help achieve New York’s carbon-free targets, LIPA with PSEG Long Island, Consolidated Edison and the New York State Energy Research & Development Authority completed a study to identify transmission upgrades needed to enable additional wind resources to be connected to the bulk electric grid⁶. As a result of that study, the PSC declared a public policy transmission need to increase Long Island’s capability to export energy generated by offshore wind to the Con Edison system and the rest of New York State. Such need was referred to the NYISO to solicit proposed transmission projects. NYISO is currently evaluating 16 proposals and expects to select a project in early 2023

LIPA currently has the largest battery storage (10MW/80MWh) in New York to date. In April 2021, LIPA has issued an RFP for 175MW of battery storage capacity to be installed by 2025. There are additional plans to incorporate an additional 175MW of battery storage between 2026 and 2030.

2.1.3 Reliability performance – normal or “blue sky” operations

The reliability performance of electric service distribution providers can be measured by:

1. System Average Interruption Frequency Index (“SAIFI”) – measures how many outages there are for the average customer on the system in a given year
2. System Average Interruption Duration Index (“SAIDI”) – measures total outage durations experienced by average customer on the system in a year

⁶ NYSERDA and NYISO’s “New York Power Grid Study”, published in January 2021.

3. Customer Average Interruption Duration Index⁷ (“CAIDI”) – measures the duration of an average outage incident.

There are two sets of reliability performance indices outlined above that can be measured: one set for the “all inclusive” or “all in” where no outages are excluded from consideration (and more reflective of customer’s true outage experiences), and one set that measures utilities’ performance during “blue sky” and minor storm conditions, where outages during major storms and other events outside of utilities’ control are excluded from consideration for purposes of calculating the reliability performance.

PSEG Long Island has continued to deliver safe and reliable power to Long Island customers during normal or “blue sky” and minor storm operating conditions (i.e., excluding major storms).

From 2017 to 2021, PSEG Long Island’s “blue sky” performance is among the leaders in New York State and is in first quartile in the US⁸. PSEG Long Island’s SAIFI and SAIDI have improved on average 8 percent and 5 percent respectively, year over year. Its CAIDI, however, has increased by approximately 3.5 percent, year over year.

Figure 3: Long Island SAIFI, major events excluded

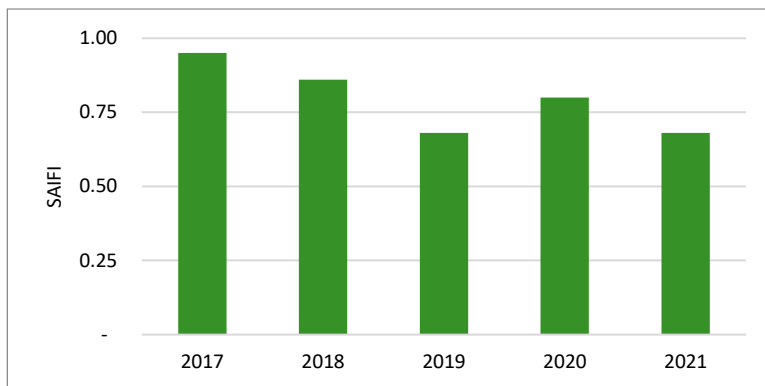
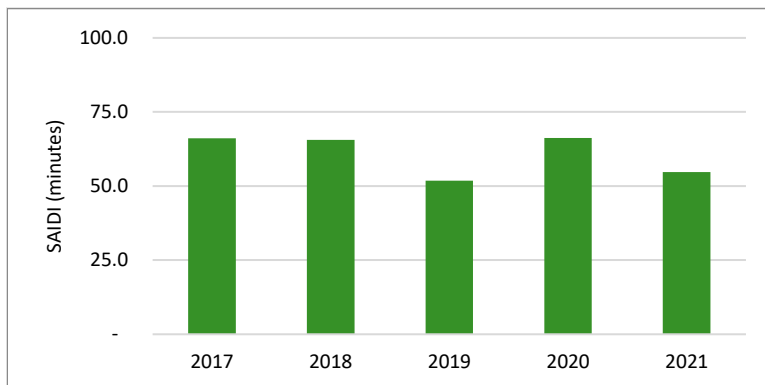


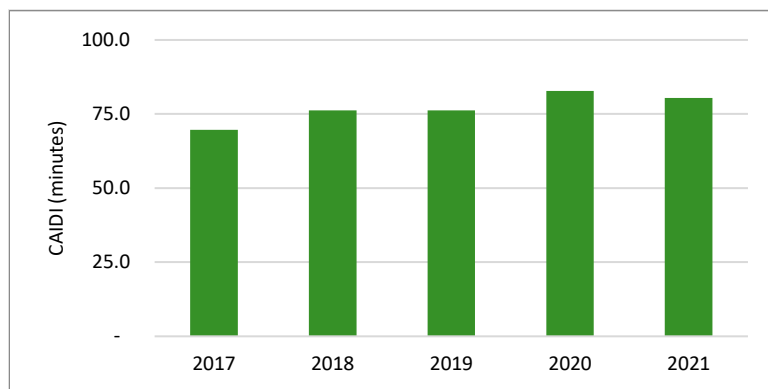
Figure 4: Long Island SAIDI, major events excluded



⁷ Note: CAIDI is the quotient of SAIDI divided by SAIFI.

⁸ Compared to all US utilities with more than 300,000 customers.

Figure 5: Long Island CAIDI, major events excluded



2.1.4 Reliability performance – hurricanes and major events

Tropical Storm Isaias hit the New York Tri-State area in August 2020 and caused up to seven day-long outages for customers. On Long Island, approximately 650,000 customers were impacted, and over 1 million customers reported busy signals when they called to report outages. Post Isaias, an investigation was conducted to determine the root causes and identify areas for improvement. As a result, changes have been made to improve the restoration performance on Long Island, and these initiatives ranged from re-alignment of management incentives, increased transparency and oversight, updated performance metrics, updated restoration processes, enhanced IT systems, grid hardening programs, and enhanced customer experience programs. Initiatives are currently underway to address the study findings.

2.2 Maintenance and Repairs

PA Consulting conducted site visits to assess the conditions of the LIPA electrical system. PA Consulting visited the Transmission control center (responsible for operation of the bulk electric system on Long Island), one of the many distribution control centers (responsible for operation of the electric distribution system), and ten substations that house transformers, circuit breakers, switch gear and other major components that physically make up the electrical infrastructure on Long Island. The substations were selected to be a representative sample for voltage classes and geographies to ensure any variations in terms of voltage classes and operating areas are examined in the field. PA Consulting found the control centers and substations to be in generally good condition, and the recommendations from the prior Biennial report were addressed.

2.2.1 Transmission Control Center

The Transmission Control Center has operational jurisdiction over the bulk transmission system on Long Island, which comprises 23 kV, 33 kV, 69kV, 138kV, and 345kV transmission lines (both overhead and underground), monitoring transmission ties (AC and DC), and generation output (69kV and above). The Transmission Control Center uses legacy tile boards to display the current status of Long Island's bulk electrical system. Leading utilities have replaced tile boards with electronic screens that can be easily updated should system components or topology change. Tile boards, unlike the newer electronic screens, require more effort and work to change, and can convey a more limited amount of information. There is a project underway to design and build a modernized control room for the transmission system. PA Consulting recommends this project to factor in digital technologies and additional tools to further enhance situational awareness for the operators.

The control center is supplied with redundant utility feeds (from multiple sources), has two separate UPS systems (which are located in separate rooms), and is ultimately backed up by a dedicated backup generator. The backup power supplies are tested periodically to ensure the backup systems do indeed function as designed and required. Similarly, communications pathways in and out of the transmission control center are redundant, resilient, and reliable. The tools used by the control room operators are fully redundant as well. Finally, there is an alternate control center which can be utilized in cases of emergency. The failover processes to resume operations at the alternate control center is practiced and drilled at least once a year.

PSEG Long Island operators utilize SCADA, EMS, PI, and other tools to ensure the transmission system on Long Island is properly managed and operated.

While the transmission control center is in an older facility using older tile map displays, it has the necessary tools to properly operate and maintain the transmission system on Long Island.

2.2.2 Distribution Control Center

PSEG Long Island's distribution control centers are geographically spread out across the service territories. Each distribution control center is responsible for a portion of the service area. PA Consulting visited a typical distribution control center to assess the conditions and operations. Distribution control centers are responsible for managing field switching. Operators utilize OMS, CAD, GIS, and monitor SCADA as a part of their job. The distribution control centers track switching moves and planned work both within the OMS system and on printed maps, and they maintain an updated set of maps for all the circuits under their jurisdiction. This allows for a paper-based back-up process, in the event the OMS system suddenly becomes unavailable.

Overall, the distribution control centers have the tools necessary to reasonably operate and maintain the distribution system under their operational jurisdiction. PA Consulting recommends exploring and adopting more digital maps, tools, and further enhance situational awareness capabilities for the distribution control centers.

2.2.3 Substations

Ten substations across the service territory were selected for inspections. PA Consulting entered three substations, and the balance of the substations were examined from outside the fence to get a sense of station health and maintenance. The substations visited are shown in Table 5 below.

Table 5: Inspected Substations

Visited Substations (inspection method)	
2G Rockaway Beach (outside inspection)	6B Halesite (outside inspection)
2L Lynbrook (outside inspection)	7RM Bayport (inside inspection)
3BG Kings Point (inside inspection)	8B Peconic (outside inspection)
4T Ocean Avenue (outside inspection)	8M Miller Place (inside inspection)
4W Roosevelt (outside inspection)	8WR Orient Point (outside inspection)

In general, the substations visited were clean, and kept in good repair. PA Consulting did not observe any tree limbs that overhang the station fence. All station fences were generally well kept, and there were no evident gaps in the fence perimeter. All visited station fences were topped with barbed wires to deter unauthorized entry, and some fences were covered with green plastic screens to be less visibly obtrusive in their surroundings. The Roosevelt substation fence utilized wooden slats to achieve the same effect, while the more remote, and larger stations utilized no visual obstructions in the fence itself. There was some evidence of rust on supporting structures, but no major rust issues were identified on the inspected equipment. The relays, transformers, bushings, breakers, and conductors appeared to be in good operating condition, unless otherwise noted below. Grounding wires were present in all stations visited, and in general, good working order. The stations were in general free of unnecessary equipment (e.g., spare parts of retired equipment) and other general debris. None of the stations visited were overgrown, but a small number of substations did have some vegetation growth that should be removed.

For stations where PA Consulting entered, PA Consulting observed the state of relays, breakers, and batteries to be good. There was a mix of electromechanical and digital relays in these stations. The digital relays were supplied by Schweitzer Engineering Labs ("SEL"), and were generally on the distribution voltage side, and the higher voltage (transmission / sub-transmission) utilized a mix of electromechanical and digital relays. Station batteries were reasonably maintained, and all displayed sufficient voltage and current during the inspection visits.

- Rockaway Beach

Substation appeared to be in a state of good repair and sound operating condition and was generally clean of debris / spare parts. Grounds were present and appeared to be in reasonable condition. There was evidence of slight rusting on select support structures (see Figure 6), as well as transformer equipment cabinet (see Figure 7). Rockaway Beach substation relays and controls were relocated to an elevated structure to protect them against potential floods after Superstorm Sandy.

Figure 6: Rockaway Beach Substation: Rusted Circuit Breaker support structures



Figure 7: Rockaway Beach Substation: Rusted Transformer Cabinet and support structures



- Lynbrook

Lynbrook station is in a state of good repair and sound operating condition. Station grounds were visible, and the equipment appeared to be well maintained. The station is generally clear of vegetation and other debris.

Figure 8: Lynbrook Substation in reasonable condition and generally free of debris and vegetation



- Kings Point

Kings Point station is in a state of good repair and sound operating condition, and generally clean during our inspection. Station batteries and controls equipment were in good shape. No alarms were visible during our visit to the substation. There were indications of minor rusts and oil seepage on the transformer that should be addressed as a part of routine maintenance of the substation.

Figure 9: Kings Point substation battery room is clean and in reasonable condition



Figure 10: Kings Point Substation monitoring equipment in reasonable condition, no alarms present

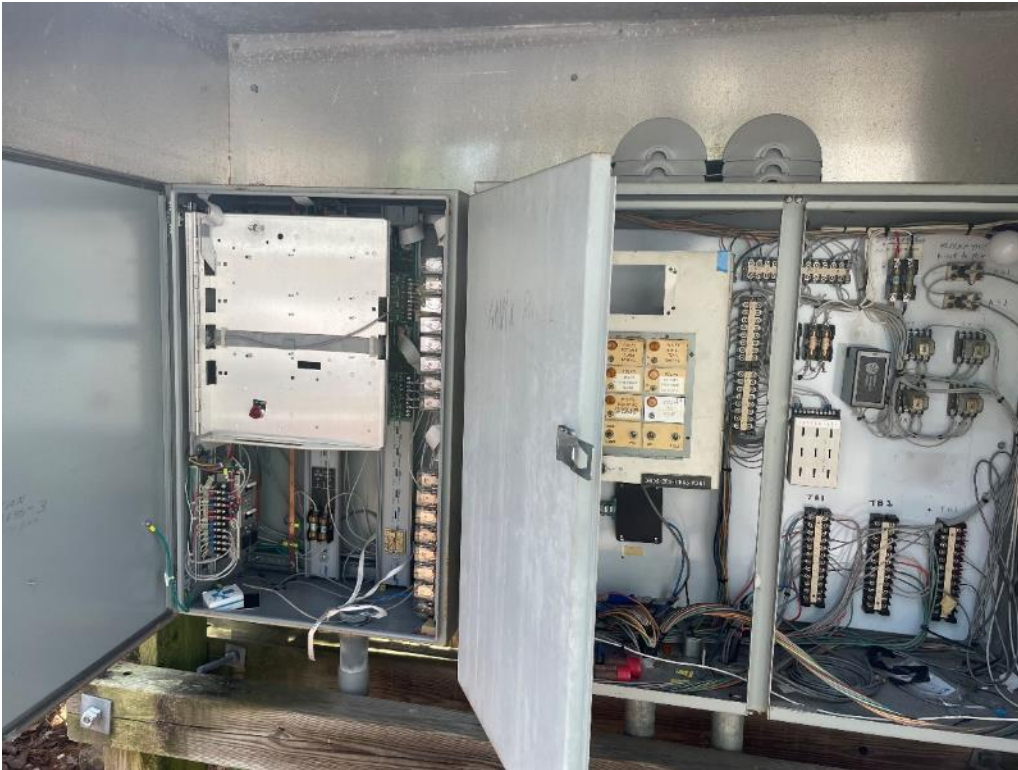


Figure 11: Kings Point Substation transformer showing minor rust and oil seepage



- Ocean Avenue

Ocean Avenue station is in a state of good repair and sound operating condition. Station grounds were visible, and the equipment appeared to be well maintained. The station is generally clear of vegetation, but there was a spare insulator on the ground that should be removed.

Figure 12: Ocean Avenue Substation in reasonable condition



Figure 13: Ocean Avenue Substation has some weeds that should be removed.



- Roosevelt

Roosevelt station is in a state of general good repair and sound operating condition. Station equipment appeared to be reasonably maintained, and station grounds were all visible. However, one of the ground wires appeared to be frayed and should be replaced. Some of the support structure showed evidence of rust. The station is generally clear of vegetation and other debris.

Figure 14: Roosevelt Substation in generally good condition



Figure 15: Roosevelt Substation showing slight rust on supporting structures, as well as a damaged ground wire



- Halesite

Halesite station is in a state of good repair and sound operating condition. Station grounds were visible, and the equipment appeared to be reasonably maintained. The station is generally clear of vegetation and other debris.

Figure 16: Halesite substation in generally good condition



- Bayport

Bayport station is generally in reasonable condition. Station batteries were well maintained and showed sufficient voltage and amperage levels. Station grounds were present and in general good condition. Station equipment appeared to be reasonably maintained, however, Bank 1 transformer and associated supporting structures showed evidence of heavy rust. The station is generally clear of vegetation and other debris.

Figure 17: Bayport substation generally in reasonable condition



Figure 18: Bayport substations utilizes both electromechanical as well as digital relays



- Peconic

Peconic station is in reasonable condition. Station grounds were visible, and the equipment appeared to be reasonably maintained. The station does have some vegetation and structural support elements are showing signs of rust

Figure 19: Peconic substation vegetation and slightly rusted support structures



- Miller Place

Miller Place station is in reasonable condition. Station grounds were visible, and the equipment appeared to be reasonably maintained. Station batteries were well maintained, and showed sufficient voltage and amperage. No alarms were noted during the inspection visit. The station is generally clear of vegetation and other debris.

Figure 20: Miller Place substation is in reasonable condition



- Orient Point

Orient Point station is in a state of good repair and sound operating condition. Station grounds were visible, and the equipment appeared to be well maintained. The station is generally clear of vegetation and other debris, however there were signs of minor rust on some of the support structures.

Figure 21: Orient Point substation equipment in reasonable conditions



Figure 22: Orient Point substation's supporting structure showing minor amounts of rust



2.3 Capital and maintenance programs

LIPA has invested \$4.9 billion in infrastructure since 2016 to improve the reliability and resiliency of the Long Island electrical grid, which is approximately three times the investments compared to a decade ago. LIPA is continuing to invest capital into the electrical grid, with particular focus around improving the grid resiliency to reduce the impact of large storm events (reducing outage occurrences and durations). In conjunction with LIPA's capital programs, it has sufficient budget for operations and maintenance of the existing infrastructure. The reformed OSA outlined several O&M programs performance metrics (such as enhanced vegetation trimming practices) that enables the proper function and maintenance of the grid.



	32,062	30,653	20,658	13,096
from Financial Institution	112,000	92,756	98,871	75,000
Accounts	255,000	175,416	245,600	147,910
Notes Payable	35,260	28,445	30,526	25,600
Accrued Expense	434,322	327,270	395,655	260,560
TOTAL CURRENT LIABILITIES			500,000	400,000
NON-CURRENT LIABILITIES :			350,000	200,000
Long - Term Loan from Financial	500,000	400,000		
Debt	350,000	200,000	850,000	600,000
Debt	850,000	600,000	1,245,655	860,560
TOTAL NON-CURRENT LIABILITIES	1,284,322	927,270		

3 Financial Performance Assessment

PA Consulting observed that the rates, fees and charges are sufficient to cover the cost of operations and debt service.

The final results of the electric system for the two-year period ended December 31, 2021, are provided herein.

3.1 Electric Rates

3.1.1 Electric rate covenant

Section 701. **Rate Covenants; Related Obligations** of the Electric System General Revenue Bond Resolution adopted May 13, 1998, as amended and restated July 22, 2020, mandates that “the Authority shall at all times maintain rates, fees or charges sufficient to pay the costs of operation and maintenance of the facilities owned or operated by the Authority, payments in lieu of taxes, renewals, replacements and capital additions, the principal and interest on any obligation issued pursuant to the Resolution as the same severally become due and payable, and to establish or maintain any reserves or other funds or accounts required or established by or pursuant to the terms of the Resolution. (T)he Authority shall establish and maintain System fees, rents, charges and surcharges sufficient in each Fiscal Year so that Revenues reasonably expected to be produced in such Fiscal Year, will be at least equal to the sum of 110% of Debt Service....., 100% of the Operating Expenses payable in such Fiscal Year, and 100% of the amount necessary to pay other Required Deposits.....; provided, however, that if at any time such fees, rates, rents, charges and surcharges are or will be insufficient to meet the requirements of this Section, it shall not constitute a violation of this Section if and to the extent the Authority promptly takes action reasonably expected by the Authority to cure or avoid any such deficiency or to cause the same to be cured or avoided....”

3.1.2 Regulations and authorizations

The Authority is operated under the direction of the Board of Trustees. The Authority has the power to determine and adjust rates charged without needing approval of the PSC. Under the LIPA Reform Act, that Public Authority Control Board (“PACB”) condition has been superseded by a rate-setting process which provides for DPS review of any future rate proposal that leads to aggregate revenues of the Authority to increase by more than 2.5 percent on an annual basis. Accordingly, the Authority may not impose any permanent increase, nor extend or reestablish any portion of a temporary rate increase, in average customer rates over a 12-month period in excess of 2.5 percent without a positive recommendation from the DPS, following a full evidentiary hearing.

Throughout the study period no rate proposal was submitted to the DPS. However, LIPA provides DPS with the annual budget and rate adjustments.

On November 3, 2021, PSEG Long Island submitted to LIPA proposed rate changes to reflect updates to 2022 electric service rates consistent with the proposed 2022 budget. It is PSEG Long Island’s estimation that the increase to LIPA’s aggregate annual revenues resulting from such changes would not exceed 2.5 percent. The proposed revenue and rates do not reflect changes in the Delivery Service Adjustment, Revenue Decoupling Mechanism, or other cost recovery mechanisms.

LIPA's base retail electric rates generally reflect traditional rate designs and include fixed customer charges for all customer classes, seasonal energy rates for all customer classes except street lighting, and seasonally differentiated demand charges for non-residential customer classes (greater than 7 kW). Economic development and load retention incentives are provided to a small number of commercial customers. Miscellaneous service charges, pole attachment charges, and wireless rental rates are also assessed on a monthly basis. In addition to the base delivery service charges, each customer's bill will be adjusted for the power supply charge, increases in rates and charges to recover PILOT payments, the Shoreham property tax settlement rider, the distributed energy resources cost recovery rate, the New York State assessment factor, revenue decoupling mechanism, the securitization offset charge, and the delivery service adjustment.

LIPA customers are billed for electric service based on rate schedules, tariffs, or contracts that reflect the costs to the utility of providing that service. To design electric rates, customers with similar load and service characteristics are placed in the same rate classification. Qualifying low-income customers are eligible for a fixed discount on their bill.

Following are the individual service classifications for which individual rates have been established. Some of the rate schedules listed below may have further subcategories. In addition, tariffed energy charges per kWh may vary for peak and off-peak usage and seasonal usage among others.

- Residential Service
- Voluntary Large Residential Service with Multiple Rate Periods
- Voluntary Small Residential Service with Multiple Rate Periods
- Voluntary Residential Service with Time of Use Rates
- General Service – Small
- Voluntary Small General Service with Multiple Rate Periods
- General Service - Large
- Voluntary Large Demand Metered Service with Multiple Rate Periods
- Large General and Industrial Service with Multiple Rate Periods
- Traffic Signal Lighting
- Outdoor Area Lighting
- Outdoor Area Lighting – HPS (High Pressure Sodium), MH (Metal Halide), and LED (Light Emitting Diode)
- Public Street and Highway Lighting Energy and Connections
- Back-Up and Supplemental Service
- Advanced Metering Initiative Pilot Service

The Delivery Service Adjustment provides cost recovery for certain items that can vary significantly due to external factors, which items include, among others: debt service (variances in interest rates, capital expenditures and savings derived from UDSA's financings); and storm expenditures (variances from the amounts budgeted for storm restoration expenses in base rates). The Delivery Service Adjustment is expected to be calculated through the end of September each year, which allows for the bill impact to be known in advance of annual budget approval. Any adjustment would be implemented on the following January 1st and reviewed by the DPS.

3.2 Financial results

3.2.1 Operating results

Table 6 presents a summary of revenues, energy sales, and the average revenue per kWh by class for 2020 and 2021. The largest customer in LIPA's service area – the Long Island Railroad – accounts for less than 2 percent of total sales and less than 2 percent of revenues.

Total revenue from sales to electric customers was \$3.9 billion in both 2020 and 2021. Total system energy sales were 18.6 GWh in 2020 and 18.8 GWh in 2021.

Revenues used to calculate the "rate per kWh" are an aggregate of energy charges, demand or service charges, and cost recovery mechanism charges. As such, these calculated rates differ from the "Energy Charge per kWh per month" as shown in the Tariff.

Table 6: Energy Sales and Customers by Class

	2020	2021
Revenue (\$000)		
Residential	2,107,710	2,153,778
Commercial and Industrial	1,715,532	1,700,386
Other	77,479	76,624
Total Revenue	3,900,721	3,930,788
Energy Sales (MWh)		
Residential	9,568	9,535
Commercial and Industrial	8,522	8,782
Other	491	481
Total Sales	18,581	18,798
Revenue/kWh		
Residential	\$0.2203	\$0.2259
Commercial and Industrial	\$0.2013	\$0.1936
Other	\$0.1578	\$0.1593
Total Revenue/kWh	\$0.2099	\$0.2091

“Power Supply” represents LIPA’s largest cost to provide electric service to its customers and includes both the cost of fuel used to generate power as well as the cost of purchased power. In both 2020 and 2021, purchased power was acquired from various Independent Power Producers as shown previously in Table 4. Fuel and Purchased Power costs are adjusted and collected monthly through the Power Supply Charge.

LIPA’s power supply costs as a percentage of revenues were 40.7 percent in 2020 and 45.8 percent in 2021 and are budgeted to be 43.0 percent of operating revenues in 2022.

Table 7: Power Supply Expense as a Percent of Revenue (\$000)

	2020	2021
Revenues	3,900,721	3,930,788
Power Supply Expenses	1,587,356	1,800,933
Revenue less Power Supply Expenses	2,313,365	2,129,855
Power Supply Expenses as a Percent of Revenue	40.7%	45.8%

Table 8 presents LIPA’s Statement of Revenues, Expenses, and Changes in Position for 2020 and 2021. LIPA’s changes in net position were positive - \$18.8 million and \$64.7 million - in both 2020 and 2021, respectively. In 2022, the change in net position is expected to be \$55.2 million. Positive changes in net position further demonstrate the adequacy of revenues to meet the debt service (with depreciation representing principal) and operating expenses in addition to metrics such as fixed obligation coverage ratios.

Table 8: Statement of Revenues, Expenses and Changes in Net Position (\$000)

	2020	2021
Operating revenues – electric sales (net of uncollectible expenses)	3,900,721	3,930,788
Operating expenses:		
Operations – power supply charge	1,587,356	1,800,933
Operations – power supply charge – property taxes	225,754	222,549
Operations and maintenance	642,243	656,852
Storm restoration	389,330	138,731
General and administrative	32,479	38,167
Depreciation and amortization	420,977	425,898
Payments in lieu of taxes and assessments	342,947	346,896
Total operating expenses	3,641,086	3,630,026
Operating income	259,635	300,762
Other income, net	118,180	121,172
Interest on debt	369,797	366,534
Other interest and interest amortizations	(10,802)	(9,291)
Change in net position	18,820	64,691

3.2.2 Adequacy of electric rates

In developing annual revenue requirements and related rate adjustments, LIPA ensures that expected annual revenues are adequate in achieving Board-approved fixed obligation coverage ratio targets.

Effective in 2020, LIPA modified its financial policy related to fixed obligation coverage as a result of the impact of GASB Statement No. 87. The new standard no longer differentiates between capital and operating leases and considers all leases with a term greater than one year to be a financing arrangement. While the new accounting guidance does not change payments under long-term power supply agreements, under the new accounting guidance, these agreements are recognized as right-to-use assets and corresponding lease obligations which impacts LIPA's stated fixed obligation coverage ratio in 2020 and beyond.

In 2020, LIPA's financial policy was updated to modify its financial target to ensure the same cash flow would be generated as the prior lease accounting rules. Effective for 2021 and 2020, LIPA's financial policy established a fixed obligation coverage ratio of 1.35x of debt and lease payments, using the new definition of leases, excluding UDSA, and 1.15x including UDSA.

In order to determine if LIPA meets this requirement on an annual basis, LIPA performs a Fixed Obligation Coverage Ratio calculation to ensure that rates are set at a level to meet operating cash needs plus debt service requirements. For both 2020 and 2021, as shown in the table below, LIPA achieved coverage ratios in excess of these targets. The

2022 Budget reflects fixed obligation coverage of 1.40x for LIPA debt plus leases and 1.26x for LIPA & UDSA debt plus leases, both in excess of the Board targets.

The total revenue of LIPA for the two-year period ended December 31, 2021, included revenue from charges for electric service, wholesale services, as well as miscellaneous revenues from items such as rents, late payment charges, reconnection fees, etc. The revenues generated by the current electric rates have been sufficient to meet the applicable covenants of the General Resolution. In accordance with the General Resolution, LIPA has an external accounting firm perform certain agreed-upon procedures over the Rate Covenant Calculation to assist LIPA in evaluating its compliance.

The target of LIPA's issued debt and leases was 1.35x in 2020 and 2021. When UDSA's restructuring bonds are included, the coverage ratio target was a minimum of 1.15x. LIPA has received four credit rating upgrades in aggregate across all three rating agencies since 2013, achieving Moody's, Standard & Poor's and Fitch bond ratings of A2, A and A, respectively.

Table 9: LIPA Credit Ratings

Rating Agency	2022	2021	2020
Moody's	A2 (Stable) ⁹	A2 (Stable)	A2 (Stable)
S&P	A (Stable) ¹⁰	A (Stable)	A (Stable)
Fitch	A (Positive) ¹¹	A (Positive)	A (Stable)

The UDSA bonds are rated AAA (sf) by Moody's and AAA (sf) by S&P and Fitch for each of the years ended December 31, 2021, and 2020.

The following tables present debt service coverage under the rate covenant calculation and under the fixed obligation coverage ratio.

Table 10: Rate Covenant Calculation (\$000)

Cash Flows	2020	2021
Net Cash Provided by Operating Activities	1,070,965	1,201,173
Interest Income	37,823	23,763

⁹ On August 9, 2022, Moody's assigned an A2 rating to LIPA's Series 2022 Revenue Bonds. These securities will rank on parity with LIPA's A2 rated outstanding senior lien debt. Moody's rationale in assigning this rating is LIPA's monopoly position as a provider of an essential service to a large and diversified customer base with strong service area economic characteristics. Other positive credit factors include a suite of cost recovery mechanisms that support a stable and predictable cash flow profile and LIPA's meaningful size and scale. The rating, however, is balanced by LIPA's highly leveraged balance sheet, financial metrics that are somewhat weak for a mid-A rating category and concerns around the utility's ability to restore service after meaningful storms. The stable outlook reflects LIPA's strong liquidity profile that is expected to remain in excess of \$1 billion.

¹⁰ On August 5, 2022, Standard and Poor's assigned its "A" rating to LIPA's 2022 general revenue bonds. At the same time, S&P Global Ratings affirmed its "A" rating on the authorities existing \$5.3 billion of revenue bonds. The rating reflects the strengths that a large, highly residential, and generally affluent customer base contribute to revenue stability and predictability, along with sound fixed charge coverage and robust liquidity. The stable outlook reflects favorable fixed charge coverage, the availability of several robust pass-through mechanisms for recovering rising costs, and service area income levels that can support the utility's high rates.

¹¹ On August 11, 2022, Fitch Ratings assigned an "A" rating to LIPA's 2022 general revenue bonds. In addition, Fitch affirmed LIPA ratings at "A" for Issuer Default Rating and approximately \$4.8 billion senior-lien electric system revenue and refunding bonds. The rating outlook is positive. The Positive Outlook reflects LIPA's improving leverage ratio and Fitch's expectation that the gradual but consistent deleveraging trend that began in 2015 will continue through 2026. Leverage, measured by net adjusted debt-to-adjusted funds available for debt service improved to 8.3x at YE 2021 from 8.8x three years prior. The improvement is attributable, in part, to LIPA's strategy of budgeting to achieve higher fixed obligation coverage.

Cash Flows	2020	2021
Grant Proceeds	27,448	30,330
Cash Receipts from Interest Rate Swaps	15,022	7,949
Revenues per the Resolution	1,151,258	1,263,215
Less Net Cash Provided by Operating Activities – UDSA	338,304	350,340
Total Available for Coverage	812,954	912,875
Senior Lien Debt	285,211	261,697
Coverage on Senior Lien Debt	2.85	3.49
Senior Lien and Subordinated Debt	285,211	261,697
Coverage on Senior Lien and Subordinated Debt	2.85	3.49
Total Debt Service	285,211	261,697
Coverage on Total Debt (x)	2.85	3.49

Table 11: Fixed Obligation Coverage Ratio (\$000)

	2020	2021
Operating revenues, net of uncollectible expense	3,900,721	3,930,788
Other income	89,765	75,277
Shoreham Settlement & VBA regulatory asset receipts	49,647	52,081
Total revenues and income	4,040,133	4,058,146
Operating expenses	(3,641,086)	(3,630,026)
Additional non-cash expenses / (deduct cash funding):		
Depreciation and amortizations	420,977	425,898
Lease allowance	420,664	407,395
OPEB accrual expense	46,837	45,825
Other interest expense	(29,995)	(41,142)
Total expenses	(2,782,603)	(2,793,050)
Funds Available for Debt Service	1,257,530	1,265,096
Principal and interest - LIPA	255,145	231,631
Principal and interest – UDSA	319,029	367,388
Lease obligations	420,664	407,395
Total Fixed Obligation Debt Service	994,838	1,006,414

	2020	2021
Fixed Obligation Coverage Ratio:		
Excluding UDSA	1.39	1.40
Including UDSA	1.26	1.26

3.3 Debts and Debt Service / Status of Revenue Bonds

Table 12 shows outstanding long-term debt as of December 31, 2020, and 2021. In 2020, long-term debt increased by \$262.1 million compared to 2019; in 2021, long-term debt increased by \$384.4 million compared to 2020. Short-term debt balances as of December 31, 2020, and 2021 were \$417.0 million and \$422.0 million, respectively.

Table 12: Outstanding Debt, Balance as of December 31 (\$000)

Outstanding Long-term Debt	2020	2021
General Revenue Bonds/Notes	4,462,713	4,996,159
UDSA Restructuring Bonds	3,882,775	3,703,356
Plus: Net premium	668,958	688,546
Less: Current Maturities	(258,029)	(247,246)
Total Outstanding Long-term Debt	8,756,417	9,140,815

Table 13 shows scheduled debt service payments for the outstanding bonds and notes of both LIPA and UDSA as of December 31, 2021. The principal and interest and the annual totals are shown. As of December 31, 2021, LIPA and UDSA had a total of \$8.8 billion of outstanding debt principal and a total obligation of \$12.8 billion.

Table 13: Debt Service Schedule (Including UDSA, value in \$000)

Due	Principal ¹²	Interest	Net Swap Payments	Total
2022	247,246	341,433	26,424	615,103
2023	613,475	332,481	26,424	972,380
2024	363,975	318,606	26,427	709,008
2025	630,290	302,889	26,424	959,603
2026	390,125	284,647	26,425	701,197
2027-2031	2,196,795	1,165,690	51,275	3,413,760
2032-2036	1,965,045	701,507	(1,301)	2,665,251
2037-2041	1,447,000	295,199		1,742,199
2042-2046	634,945	77,835		712,780

¹² Future interest on Capital Appreciation Bonds are included in principal maturities.

Due	Principal ¹²	Interest	Net Swap Payments	Total
2047-2051	288,365	9,955		298,320
	8,777,261	3,830,242	182,098	12,789,601

3.4 FEMA Grants

LIPA is eligible to receive public assistance grants through FEMA following major disaster declarations, which provides reimbursement of costs associated with emergency protective measures, and the repair and restoration of damaged facilities. Disaster assistance is subject to eligibility rules applicable to the applicant, facility, work, and cost.

In 2014, LIPA and FEMA signed a Letter of Understanding (“LOU”) under Section 428 of the Stafford Act that totaled approximately \$1.4 billion to assist LIPA in funding the costs associated with restoration efforts after Hurricane Sandy and storm hardening efforts designed to mitigate future damage from weather related events. Projects related to storm hardening and damage caused by Superstorm Sandy are eligible for a 90 percent reimbursement through this grant. LIPA also signed a Community Development Block Grant (“CDBG”) to compensate for the non-federal match of certain other declared weather events.

To date, LIPA has received funding resulting from Superstorm Sandy costs totaling approximately \$1.1 billion. A portion of the FEMA 428 Grant Agreement included funding of future storm hardening and mitigation efforts. LIPA received in advance approximately \$502 million from FEMA which was restricted for storm hardening work on certain LIPA assets. LIPA funds are expended by PSEG Long Island for approved projects, and LIPA reimbursed itself for these approved projects expenditures. LIPA segregated FEMA funds for specific use as required by the FEMA 428 grant agreement.

As of December 31, 2021, the balance in the restricted grant account for the unused portion of the grant proceeds totaled approximately \$2 million. The remaining amounts owed to LIPA under the LOU are expected to be received after the projects are completed.

On August 4, 2020, LIPA’s Service Area suffered significant damage as a result of Tropical Storm Isaias. LIPA filed for recovery of response and storm restoration costs of approximately \$300 million associated with Tropical Storm Isaias. As of December 31, 2021, LIPA received approximately \$0.45 million in grant proceeds. LIPA expects to receive up to 90% of the cost of the storm as the grant continues through the application process.

Account	Column 1	Column 2	Column 3	Column 4
Notes Payable	32,062	30,653	20,658	13,056
Accrued Expense	112,000	92,756	98,871	75,000
TOTAL CURRENT LIABILITIES	255,000	175,416	245,600	147,910
NON-CURRENT LIABILITIES :				
Long - Term Loan from Financial Institution	35,260	28,445	30,526	25,600
Debtenture	434,322	327,270	395,655	260,560
TOTAL NON-CURRENT LIABILITIES	500,000	400,000	500,000	400,000
TOTAL LIABILITIES	350,000	200,000	350,000	200,000
	850,000	600,000	850,000	600,000
	1,284,322	927,270	1,245,655	860,560

4 Conclusions

PA Consulting finds the state of LIPA's Electrical system to be in a state of good repair and sound operating condition. PA Consulting observed that the rates, fees and charges are sufficient to cover the cost of operations and debt service.

PA Consulting conducted field assessments, reviewed documentation, reports, presentations, budgets, estimates and rate estimates that have been provided by LIPA and its service provider PSEG Long Island, for the years ending December 31, 2020, and December 31, 2021.

Based on the information provided, field observations, and analysis PA Consulting conducted:

1. As of the date of this Report, the LIPA T&D system can deliver power to LIPA customers, and is in a state of good repair and sound operating condition.
2. Revenues for the Study period are sufficient to cover operations, maintenance, and repairs for the T&D system, and the rates and rate structures in effect during the Study period provides sufficient revenues to continue to meet operations, maintenance and repairs for the near future / forecast period.
3. LIPA has provided services adequate for operations, maintenance and repair of the LIPA T&D system during the Study period.
4. LIPA's T&D assets are operated and maintained in accordance with US electric utility industry practices.
5. LIPA is expected to continue to deliver adequate services for the near future to operate, maintain and repair its T&D assets in line with the findings of the Study period.
6. LIPA has delivered industry leading reliability performance as measured by SAIFI, SAIDI, and CAIDI for blue sky and minor storm events. There are efforts underway to address the identified shortcomings from Tropical Storm Isaias response to help improve future major event responses.
7. LIPA is continuing to invest in system reliability and resiliency, at a rate that is higher than a decade ago.

APPENDICES

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List of Abbreviations

Abbreviation	Term
CAIDI	Customer Average Interruption Duration Index
CDBG	Community Development Block Grant
CLCPA	Climate Leadership and Community Protection Act
DPS	New York State Department of Public Service
DSA	Delivery Service Adjustment
EMS	Energy Management System
FEMA	Federal Emergency Management Agency
GASB	Government Accounting Standards Board
HVDC	High Voltage Direct Current
ICAP	Installed Capacity
IRP	Integrated Resource Plan
LIPA	Long Island Power Authority
MW	Megawatt
MWh	Megawatt-hour
NYISO	New York Independent System Operator
NYSERDA	New York State Energy Research and Development Authority
OMS	Outage Management System
OSA	Operating Services Agreement
PACB	Public Authority Control Board
PSC	New York State Public Service Commission
RDM	Rate Decoupling Mechanism
REC	Renewable Energy Credit
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SEP	State Energy Plan
UDSA	Utility Debt Securitization Authorization



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