



Storm Hardening Talking Points

Board of Trustees Meeting
Uniondale, NY
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www.lipower.org

LIPA Storm Hardening Plan

- LIPA adopted a proactive storm hardening policy in 2006 to address the threat of severe storms including hurricanes...

“[LIPA] has launched a long-term program anticipated to cost up to \$500 million over 20 years to improve the capability of the electric system on Long Island to withstand the impacts of hurricanes and other severe storms, and to shorten the time required to restore service to customers when outages occur due to storms.”

- Policy incorporates 3 areas of focus

- Durability - *“minimize damage caused by severe storms”*
- Resilience - *“minimize impact of storm damage”*
- Restoration - *“minimize outage times”*

- The NYS Energy plan also addresses the need for utilities, including LIPA, to withstand damage resulting from severe storms...

“LIPA to implement a \$500 million, 20 year program to reduce electrical transmission and distribution system exposure to severe storms.”

LIPA Storm Hardening Plan - Key Components

- \$20 million per year for storm hardening initiatives
 - Specific programs/projects to address critical infrastructure
 - Specific projects to address flood prone/surge areas
 - Incremental spend on system reinforcement projects to increase strength of infrastructure
 - Reinforced foundations to support critical equipment and structures
 - Higher strength steel infrastructure
 - Higher strength poles
 - Equipment repositioning to mitigate flooding issues
 - Selective undergrounding
- \$5 million per year for right of way improvements
 - Removal of dangerous trees adjacent to lines
 - Accelerated tree trim cycles in areas
 - Increase annual tree trimming mileage targets
 - Expand transmission right of ways to provide additional clearance

LIPA Storm Hardening Plan – Improve Durability and Resilience



- Installation of new underground circuits
- Replace deteriorated poles
- Protect substations from flooding and storm surges
- Reinforce substation foundations and structures to withstand higher wind speeds
- Increase strength of selected transmission pole lines to withstand higher wind speeds and storm related flooding
 - Along LIRR corridors
 - At major road crossings
- Prioritize Transmission Lines for hardening
- Increase strength of selected distribution pole lines to withstand higher wind speeds
 - Distribution circuit supply points
 - Key automated circuit sectionalizing points
 - Major equipment poles
- Increase tree trimming clearance and removal of hazardous trees/limbs outside clearance zones

LIPA Storm Hardening Plan – Improve Restoration

- Continue to expand distribution automation across the system
- Improve Damage Assessment process
 - Allows field damage reports to be analyzed and entered into the OMS
 - Enables job level information and estimated restoration times to be given to customers much sooner following a major storm
- Upgrade the Outage Management System (OMS)
- Implement a comprehensive resource control system to manage field personnel during restoration (Resources on Demand)
- Expand mobile substation capabilities
 - Purchase of new emergency replacement equipment
 - Mobility for use across the system
- Expand mobile generator capabilities
 - In-house capability up to 300 kVA
 - Contracts in place for unique circumstances

LIPA Storm Hardening Plan - Development

- Numerous policies and specifications have been developed to implement the Storm Hardening Plan
 - LIPA Withstanding Severe Storms Policy and Programs Summary – 2006
 - Summary of programs targeted to achieve improvements in system durability, resilience, and restoration
 - Transmission Line Prioritization Criteria - 2007
 - Summary of transmission circuits targeted to be storm hardened based on a variety of factors
 - LIPA Storm Hardening Initiative Overhead Transmission Design Guidelines – 2008
 - Design Criteria for constructing new transmission (and upgrade existing) to withstand Category III hurricane
 - Storm Hardiness Improvement Treatise - Substations and Equipment – 2008
 - Design Criteria for constructing new substations (and upgrading existing) to withstand Category III hurricane
 - Mobile Substation Specification Developed (2011) - Budget 2012
 - Purchase equipment to replace an exit feeder should it become affected by weather or failure events

Storm Hardening Plan – Progress To Date (Projects)

- Numerous major projects have included storm hardening components to increase the durability and resilience of the system
 - Improved interconnections result in additional flexibility
 - New Neptune HVDC intertie (connection to NJ)
 - Northport to Connecticut Cable Upgrade
 - Improved local generation (i.e. Caithness)
 - Enhanced substation reliability
 - Installation of 6 new substations
 - Ring Busses at Riverhead and Plainview
 - New flood resistant substation equipment
 - 5 Fire Island stations, Barrett, and Long Beach
 - Upgrades of transmission lines such as...
 - Syosset - Oyster Bay, W. Floyd - Yaphank/W. Yaphank, Pinelawn - W. Babylon
 - New underground transmission lines
 - Southampton - Bridgehampton, EGC - Newbridge, Newbridge - Ruland Rd
 - New underground distribution lines
 - Great Neck, Pt. Washington



Barrett Control House - Photo courtesy of National Grid

Storm Hardening Plan – Progress To Date (Programs)

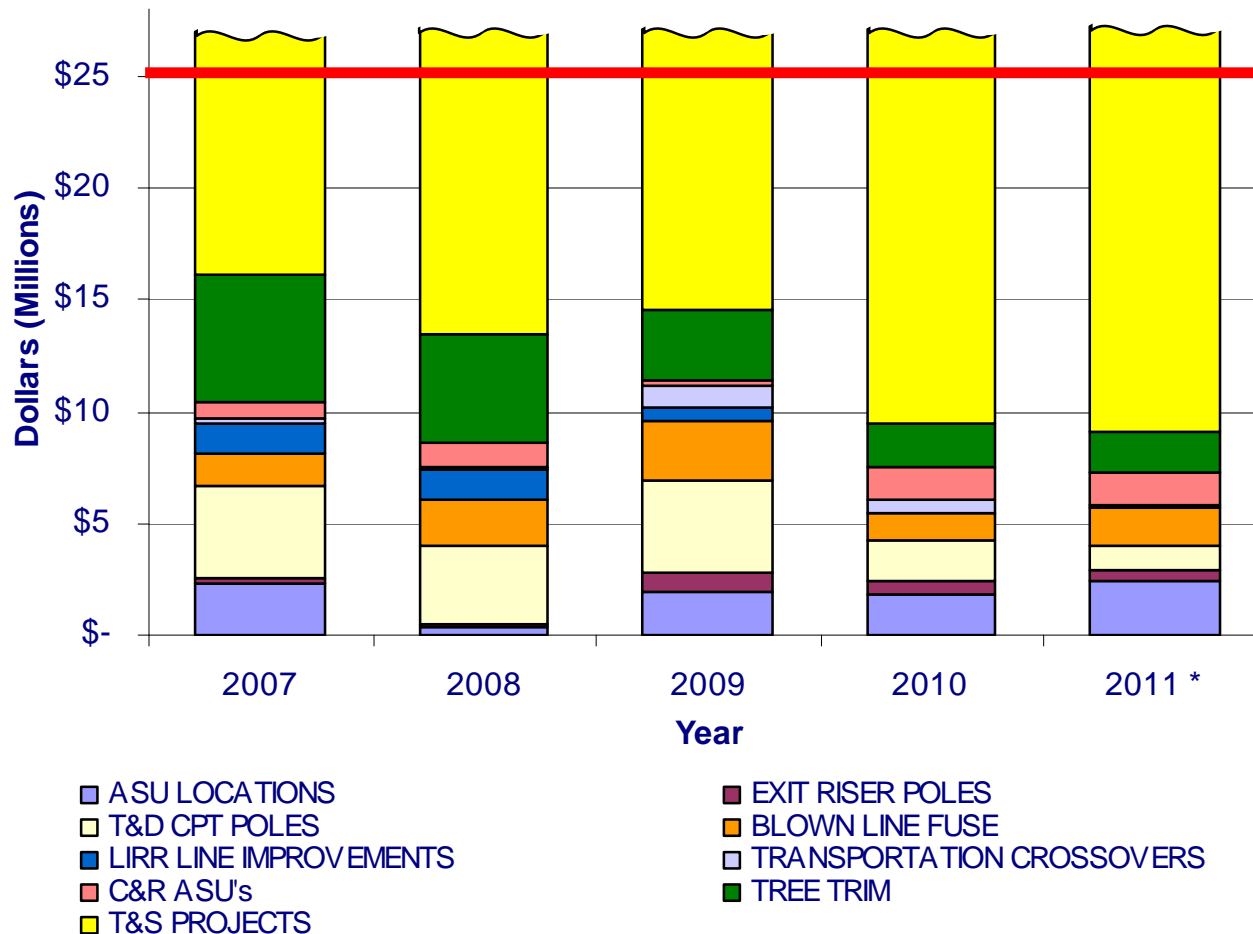


- Numerous programs have been and are being executed to improve the hardening of the system
 - Distribution Automation Sectionalizing Points Hardening Program
 - 32% of locations have been hardened (Highest priority locations)
 - Pole Replacement Program
 - Distribution circuit supply points Hardening Program
 - 99 exit riser poles have been hardened
 - Reinforcement of T&D crossings over major roadways Program
 - 40% have been hardened
 - Blown Line Fuse Program
 - Investigation of repeat outages and additional sub-fusing installed
 - 80 blown line fuse locations have been rectified
 - Annual Circuit Trim and Hazardous Tree Removal Program (since 2007)
 - 204 miles of transmission circuit trim completed annually
 - 1800 miles of distribution circuit trim completed annually
 - 5700 removals of hazardous tree / limb conditions annually

Storm Hardening Plan – Progress To Date (Dollars)

Efforts to date have resulted in an investment of over \$125 million since 2007 to improve the durability, resilience, and restoration of the LIPA system

Expenditures through November 2011



LIPA Storm Hardening Plan – How well have we done? Hurricane Irene - August 26-27, 2011



- Up to 65 mph sustained winds
- Wind gusts up to 91 mph
- Up to 6 inches of rainfall in some areas
- Storm surge up to 7 feet in some areas
- 36 hours of heavy rain and wind
- 523,000 customer outages
- Restoration over a 6 day period
- Post-Storm Damage results
 - 61 Transmission Circuit outages
 - 175 Distribution Circuit outages
 - 3847 wire down locations
 - 22 Substation Outages
 - 900 damaged poles



Source: National Weather Service, lipower.org
Photos courtesy of National Grid

LIPA Storm Hardening Plan – How well have we done? Assessing the effects of Irene



- In comparing the effects hurricanes have had on Long Island over the last 30 years, Irene ranks second to Gloria in 1985 in terms of the number of customers affected
- Our overall capital investment over the last 10 years has been significant in helping the system withstand the effects of storms
- The number of substation outages were significantly less in Irene than Gloria (12% vs. 30%), some of which can be credited to efforts accomplished over the last 10 years
 - Increased ROW clearance
 - Hazardous tree removals
 - Substation bus design enhancements
- The number of feeder lockouts were significantly less in Irene than Gloria (19% vs. 74%), the direct result of actions taken related to the installation of automated circuit sectionalizing devices (ASU's)
- The percent of poles damaged during Irene was approximately *half* of those that were damaged during Gloria
- The number of transmission circuit trips during Irene was roughly *half* of those that tripped during Gloria

LIPA Storm Hardening Plan – How well have we done?

Assessing the effects of Irene



■ **Overall as a result of Irene:**

- No storm hardened ASU poles experienced damage
- No downed wires involving hardened highway road crossings
- No damaged hardened feeder exit poles
- No substations experienced storm surge related flooding damage or wind related damage

LIPA Storm Hardening Plan – Going Forward

- Projects - Continue to invest in projects that provide storm hardening benefits
 - Transmission
 - Orchard - Locust Valley 69 kV (2014) – Steel pole line along LIRR
 - Great Neck - Port Washington (2012 design – schedule 2013/14)
 - Wildwood - Riverhead upgrade to 138 kV (2014)
 - EGC - Herricks 69 kV (2012)
 - Substation
 - Valley Stream 138 kV (components) (2012)
 - Holtsville 138 kV (2013)
 - New South Rd 69 kV (2013)
 - South Manor 69 kV (2013)

LIPA Storm Hardening Plan- Going Forward

- Programs - Continue to invest in programs that provide storm hardening benefits
 - Distribution circuit supply points (Exit Riser Poles) - Storm hardened for new construction or replacement
 - Distribution Automatic Sectionalizing Units (ASU's) – Continued hardening
 - Reinforcing critical transportation crossings - On target for 2014 completion
 - Pole Inspection and Assessment Program
 - Hazardous Tree Removal Program
 - Selective undergrounding of distribution (Neighborhood feeds, RR crossings)
- PSC Review of LIPA Planning and Response to Irene
 - Review of all utilities in New York
 - Development and incorporation of best practices into plan
- EPRI Initiative on Storm Hardening (2012 initiative)
 - Sharing of practices amongst utility members
 - Incorporation of best practices into our storm hardening plan
 - Finding out that many utilities are not as far along in storm hardening

LIPA Storm Hardening Plan- Conclusions/Takeaways



- LIPA has implemented a multi-faceted program to storm harden the system to address severe weather events (including hurricanes) and enhance LIPA strategic performance
- LIPA's overall capital investment over the last 10 years has played a large impact on the improvements seen in the reliability of the power system
- Storm hardening of LIPA's infrastructure plays a large role in further enhancing the strength and resilience of the transmission and distribution system to withstand severe weather events
- LIPA's annual capital improvement program incorporates storm hardening components , adding to the reliability of the system and minimizing interruptions to the customers
- LIPA will continue to invest the \$500 million outlined in the 20-year Storm Hardening Plan, with over \$125 million spent to date
- LIPA will continue to improve its Storm Hardening Plan to incorporate best practices from other utilities (through the PSC review and through involvement with EPRI)