# A RESILIENT ENERGY VISION FOR THE EAST SHORE OF STATEN ISLAND

June 29th, 2016


# Agenda

## Part 1: Introduction to the Project Team

## Part 2: Description of Staten Island East Shore

- ❑ Physical location and issues
- ❑ Electrical grid location and issues

## Part 3: Proposed Concept for the Staten Island East Shore

- ❑ Facilities involved
- ❑ Technologies proposed
- ❑ Infrastructure upgrades proposed

## Part 4: Cost and Benefits Analysis

- ❑ Explanation of results

## Part 5: Potential Project Structure for Implementation

- ❑ Look-ahead to potential project development needs

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# The Stage I Analysis and Sponsor Team

Northwell Health℠

- One of the nation's largest healthcare systems
- Cares for people at every stage of life at 21 hospitals and about 450 outpatient physician practices throughout the NY Metropolitan area
- Founded in 1861 as the Smith Infirmary, Staten Island University Hospital (SIUH) is one of the nation's oldest healthcare institutions

ANBARIC MICROGRID

- Energy Infrastructure Developer
- Large projects in State of NY (>$3 Billion)
- Dedicated to renewables transmission and microgrids

Louis Berger

- Founded in 1953, one of the world's foremost consulting engineering firms
- Extensive planning and permitting experience on Staten Island
- Retained by the Governor's Office of Storm Recovery (GOSR) to help develop resiliency plans for Staten Island

Sega®

- Multi-discipline power and energy engineering firm
- Expertise in infrastructure and utility-scale and distributed generation

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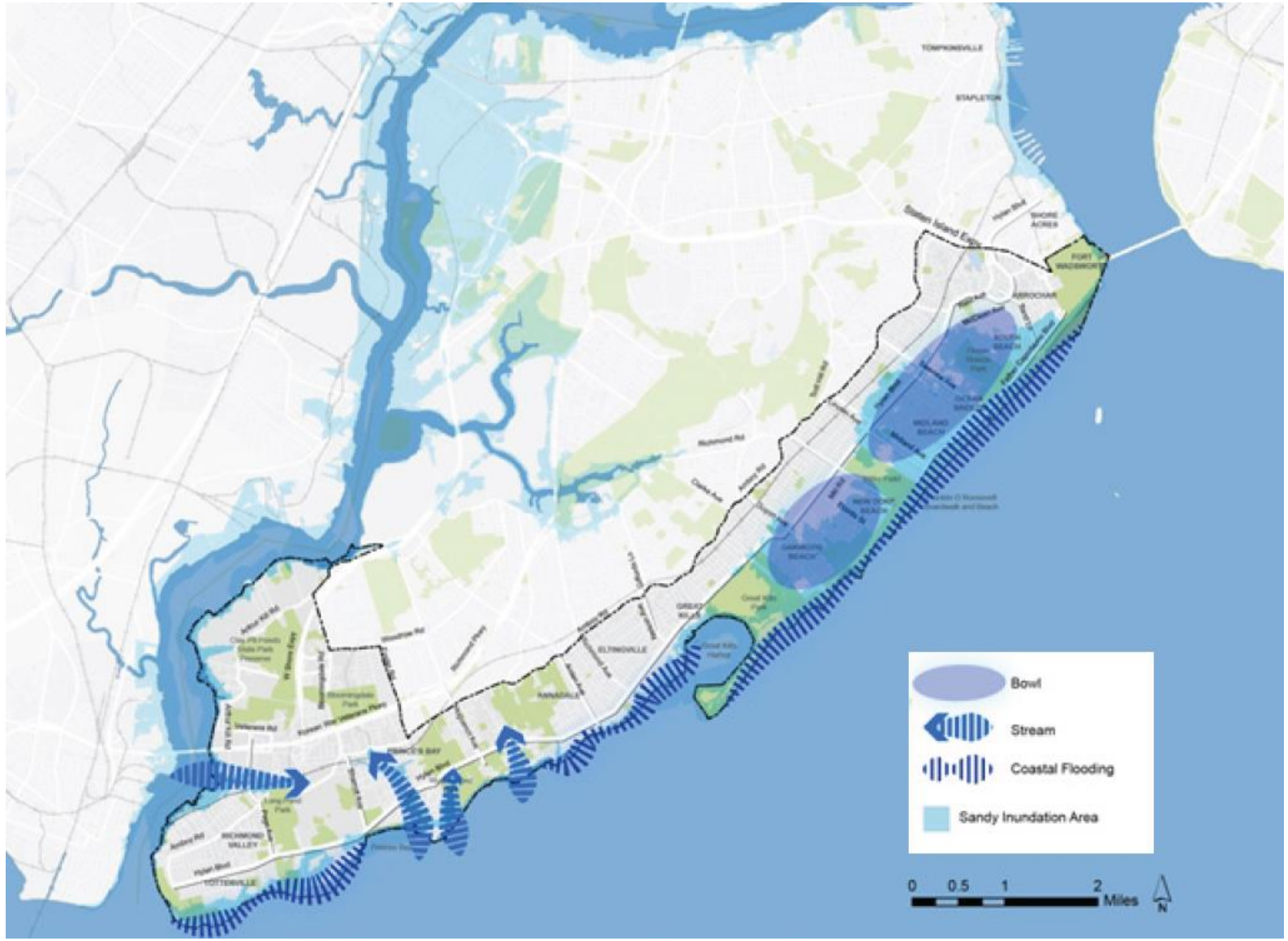
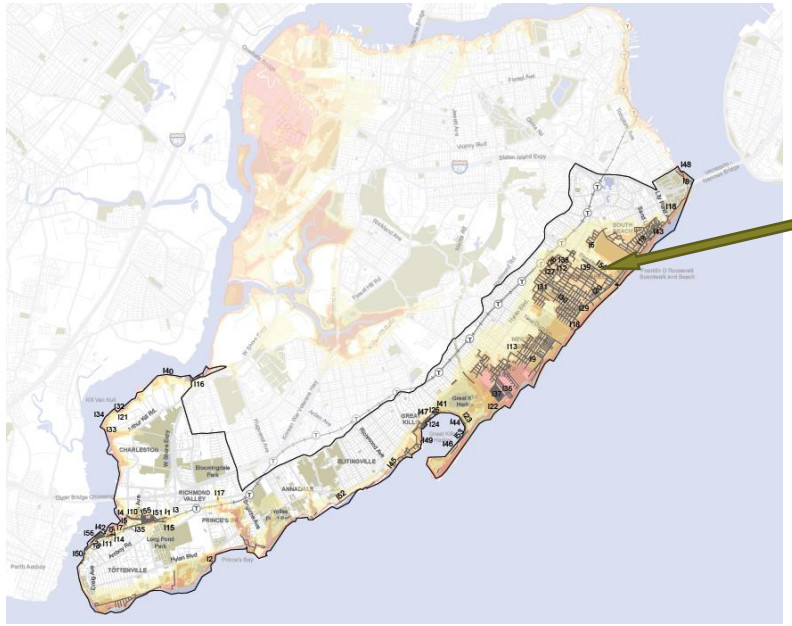
# Physical location and issues Electrical grid location and issues




- **Key causes of damage from Superstorm Sandy**

# Con Edison – Seaside Substation

- Con Edison typical distribution circuits are networked; fed from both ends from separate substations
- Seaside substation (33kV) in area is one of a very few in system that have “radial” distribution feeders; they are fed from a single end
- Radial feeders are inherently more prone to outages and are not “self-healing”




Electrical Distrib. Network

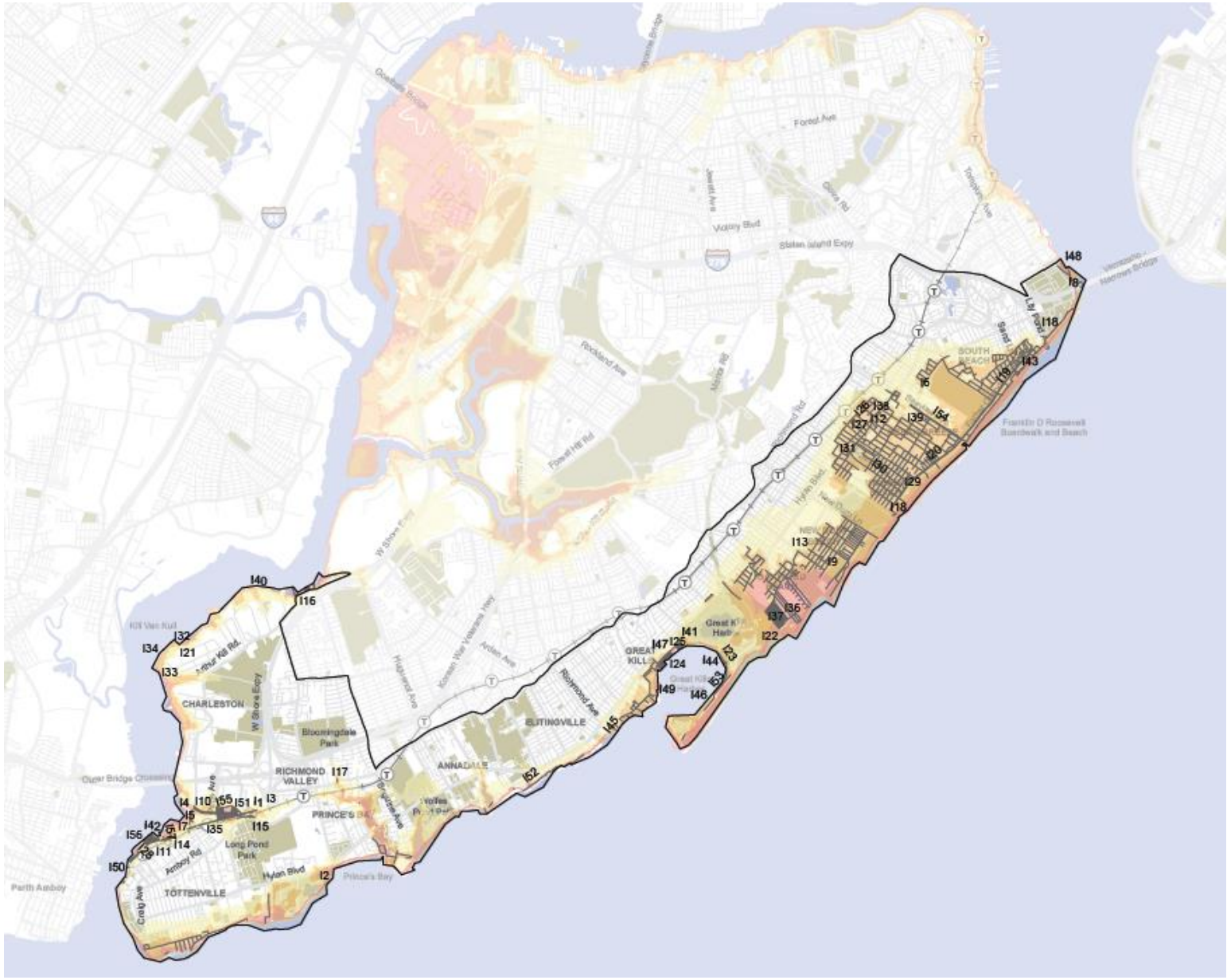
# Physical location and issues Electrical grid location and issues


- Grid Repairs Post-Sandy

Physical location and issues
Electrical grid location and issues


- Community Vision for Staten Island: ISLAND / INFRASTRUCTURE

# Physical location and issues Electrical grid location and issues

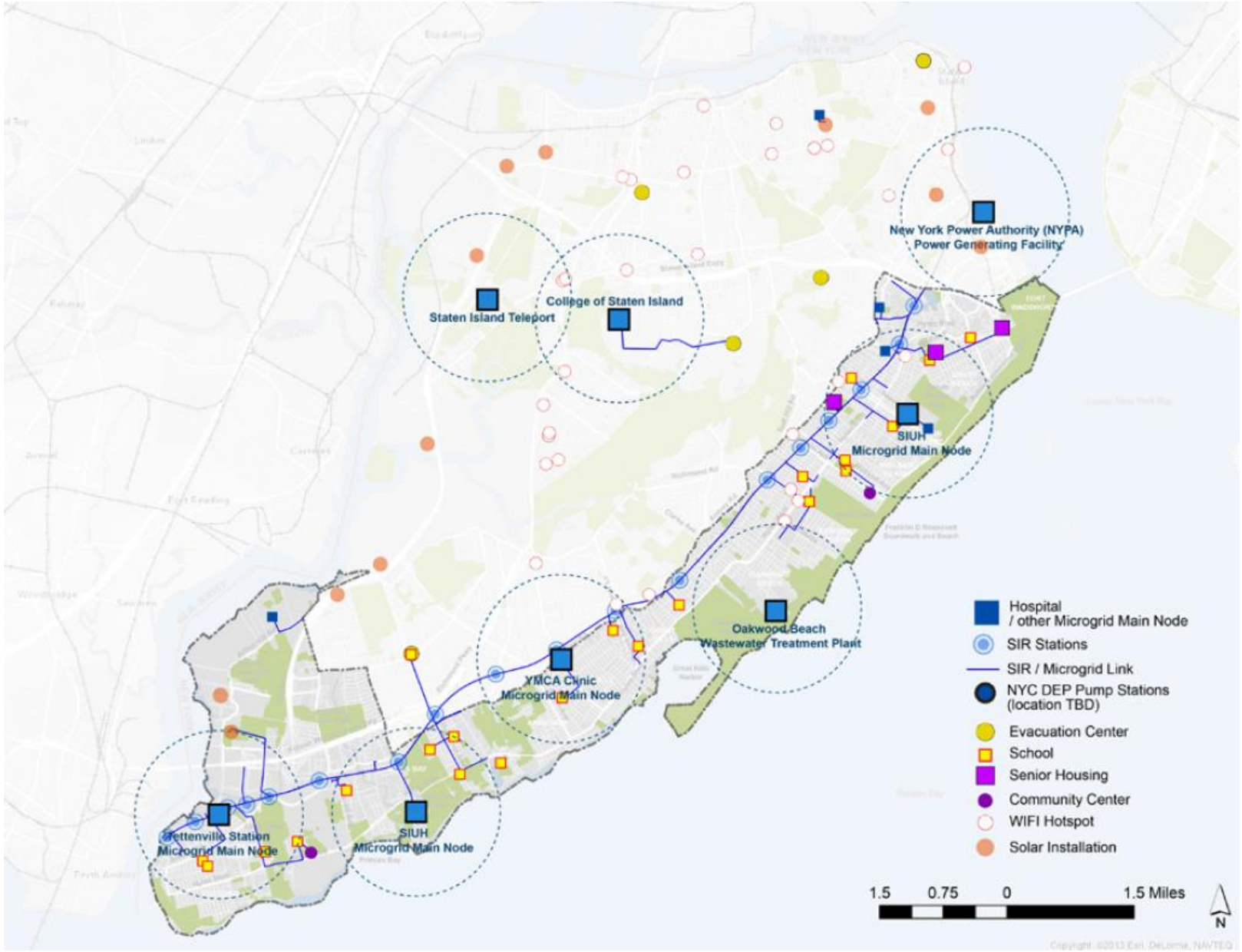



- **Staten Island Community Infrastructure Assets At Risk**

# Physical location and issues Electrical grid location and issues


- Staten Island University Hospital – Critical Facility in a Critical Community

# Physical location and issues Electrical grid location and issues




- One of three Microgrid Proposed Projects Under NY Rising

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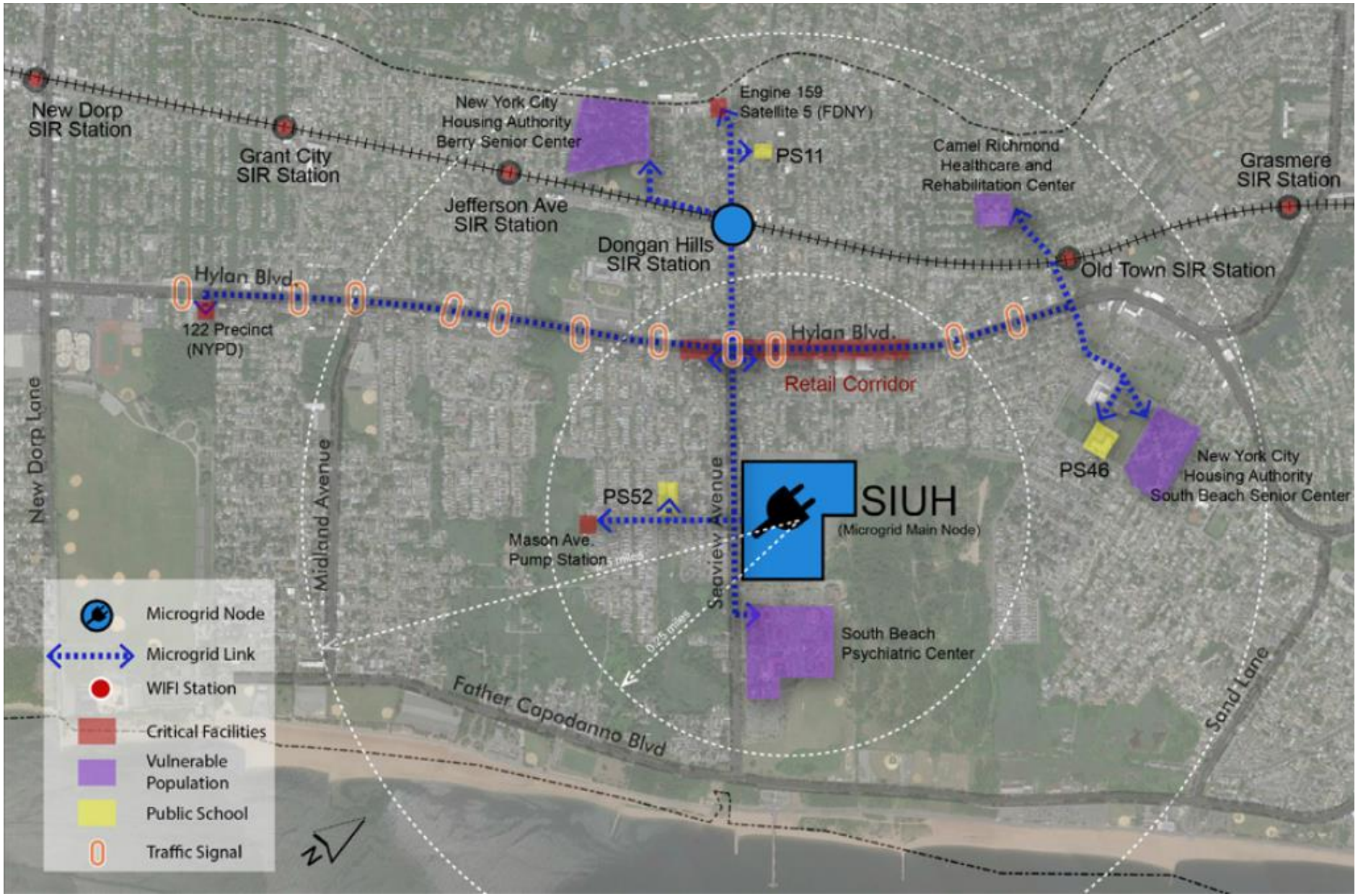


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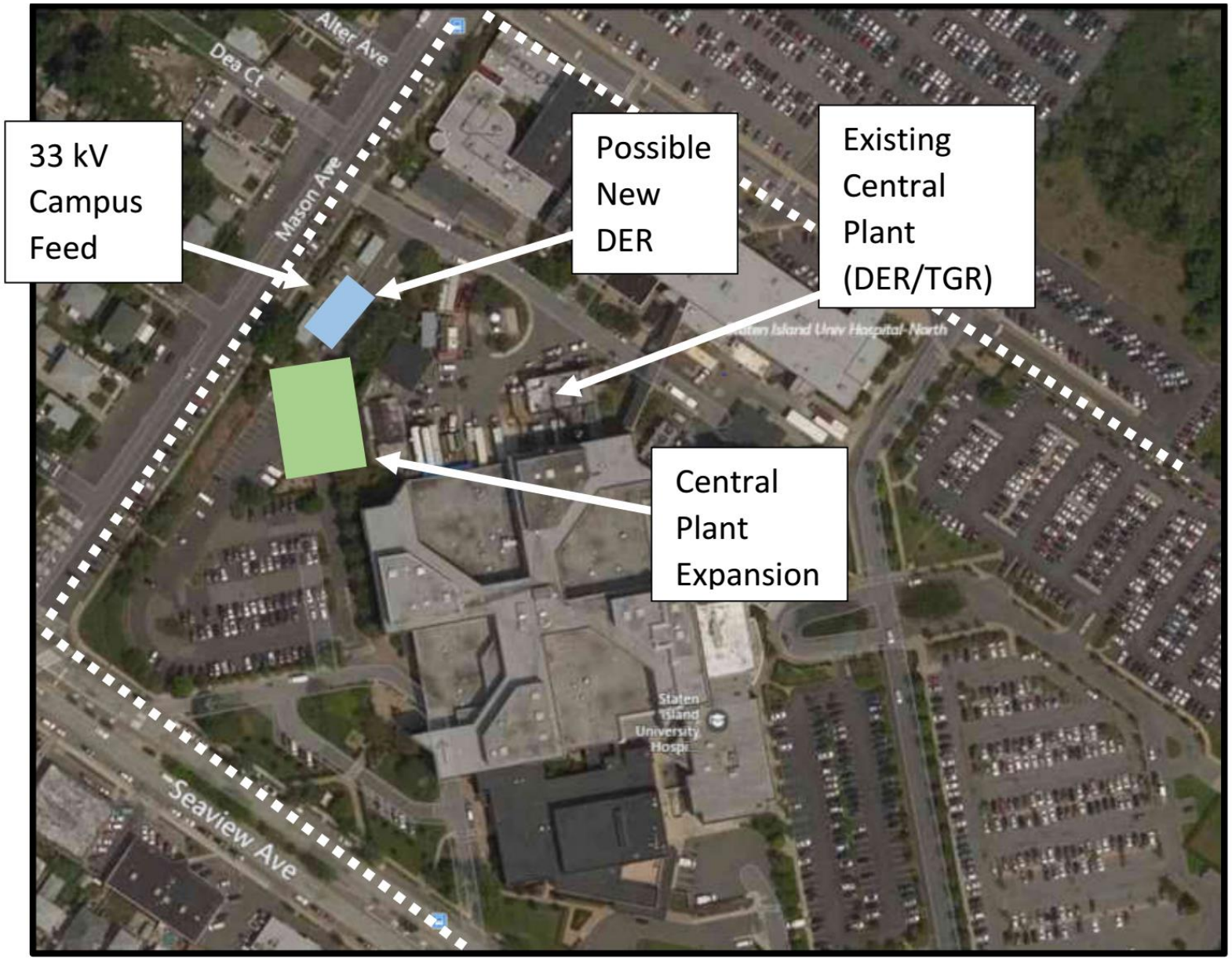
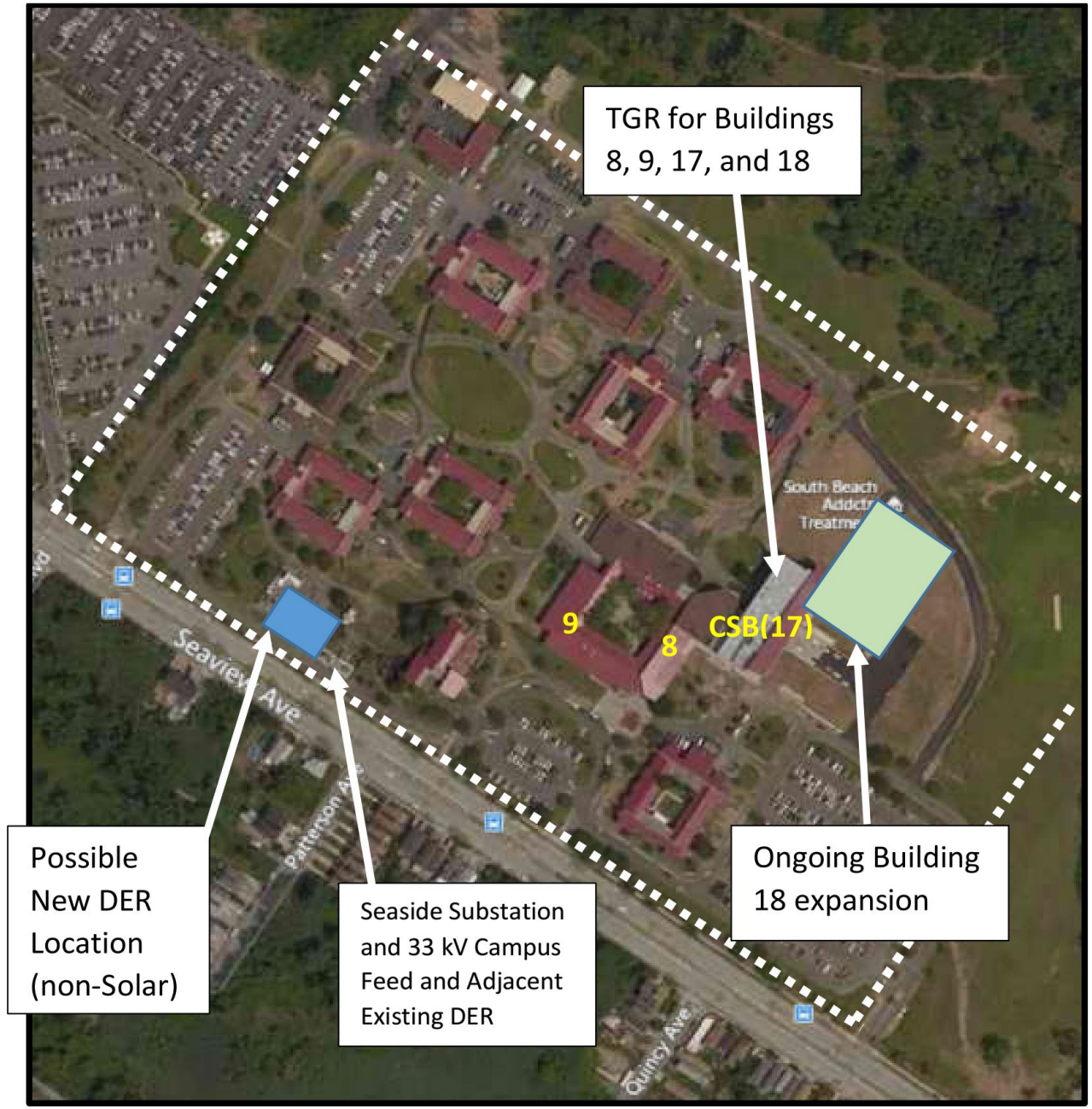
# The Proposed Concept:

# SIUH Campus Distributed Generators



# The Proposed Concept:

# OMH South Beach Campus Facilities



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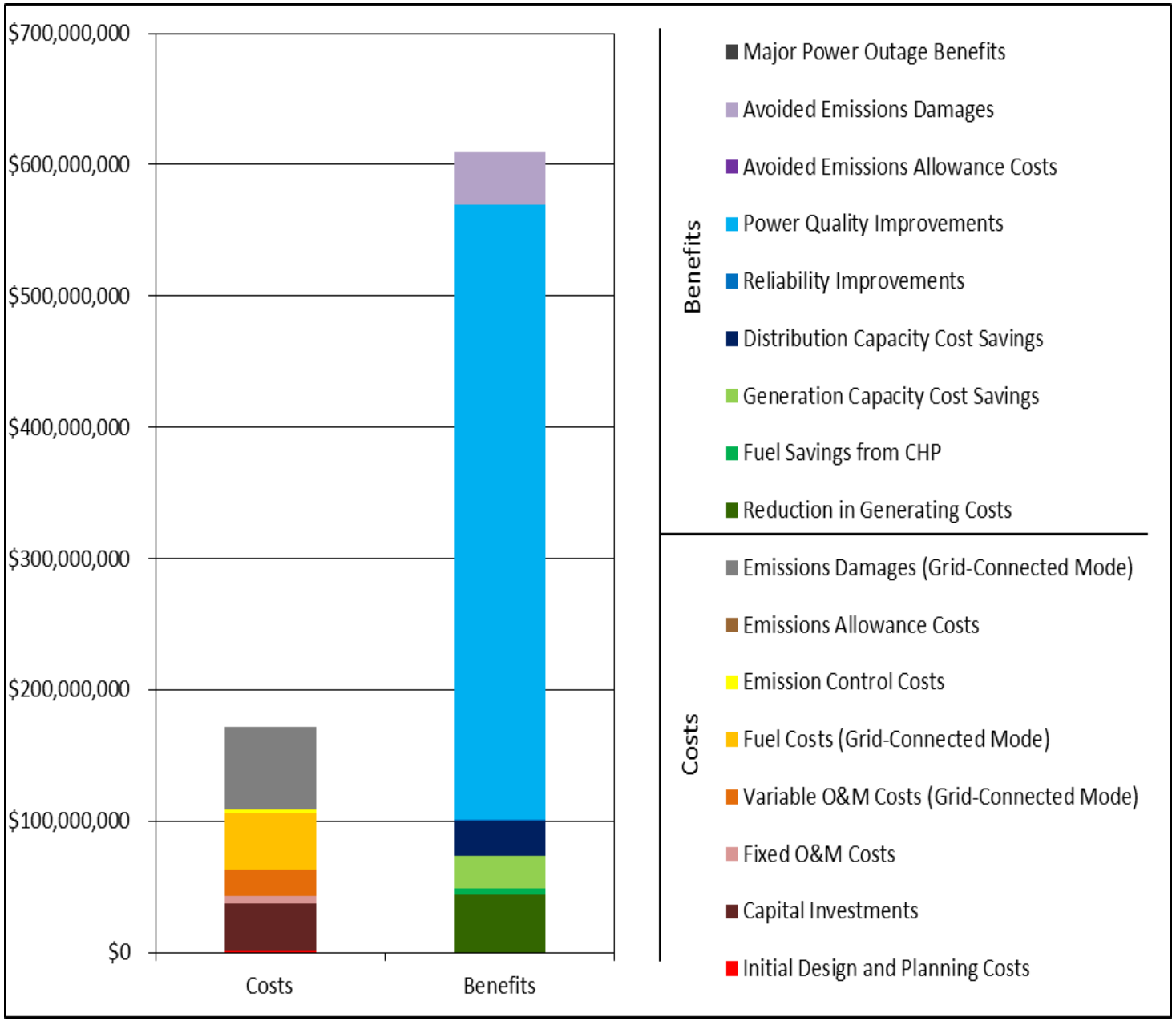
# Benefits and Costs




**Benefit:Cost Ratio of 3.6**

## Benefits and Costs:

## IEc Breakdown

| COST OR BENEFIT CATEGORY | PRESENT VALUE OVER 20 YEARS (2014$) | ANNUALIZED VALUE (2014$) |
|---|---|---|
| Costs | | |
| Initial Design and Planning | $1,000,000 | $88,200 |
| Capital Investments | $36,400,000 | $2,930,000 |
| Fixed O&M | $5,670,000 | $500,000 |
| Variable O&M (Grid-Connected Mode) | $20,400,000 | $1,800,000 |
| Fuel (Grid-Connected Mode) | $42,300,000 | $3,730,000 |
| Emission Control | $3,310,000 | $292,000 |
| Emissions Allowances | $4,020 | $355 |
| Emissions Damages (Grid-Connected Mode) | $62,600,000 | $4,090,000 |
| Total Costs | $172,000,000 | |
| Benefits | | |
| Reduction in Generating Costs | $44,400,000 | $3,910,000 |
| Fuel Savings from CHP | $4,260,000 | $376,000 |
| Generation Capacity Cost Savings | $25,300,000 | $2,230,000 |
| Distribution Capacity Cost Savings | $26,100,000 | $2,310,000 |
| Reliability Improvements | $813,000 | $71,800 |
| Power Quality Improvements | $469,000,000 | $41,300,000 |
| Avoided Emissions Allowance Costs | $24,400 | $2,150 |
| Avoided Emissions Damages | $39,800,000 | $2,600,000 |
| Major Power Outage Benefits | $0 | $0 |
| Total Benefits | $609,000,000 | |
| Net Benefits | $438,000,000 | |
| Benefit/Cost Ratio | 3.6 | |
| Internal Rate of Return | N/A | |

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Business Model Going Forward

# Potential Recovery of Capital Costs

- CHP supply to OMH under retail Power and Thermal Sales Agreements
- Peaking generation capacity under regional capacity supply contract with local utility (similar to LIPA procurement in Long Island South Fork and the Western Nassau load area)
- Infrastructure improvements recovered through agreed-upon development coordination between Con Edison and microgrid developer

# Potential Business Models

Business Model Going Forward

- Private microgrid developer to EPC the construction of all microgrid generation and control facilities
- Developer owns, operates and sells CHP energy to host and thermal energy (when dispatched) to utility
- Depending on results of further commercial due diligence, developer may also purchase existing CHP facility at SIUH and include in the portfolio
- Commercial discussions between Con Edison and developer need to take place to determine business structure around generation and infrastructure improvements (grid upgrades, switching) – who makes the infrastructure modifications, how are parties compensated