

NYS RESILIENCY INSTITUTE FOR STORM EMERGENCIES (RISE)

SUB-TASK 2.2

ELECTRIC POWER SYSTEM PERFORMANCE

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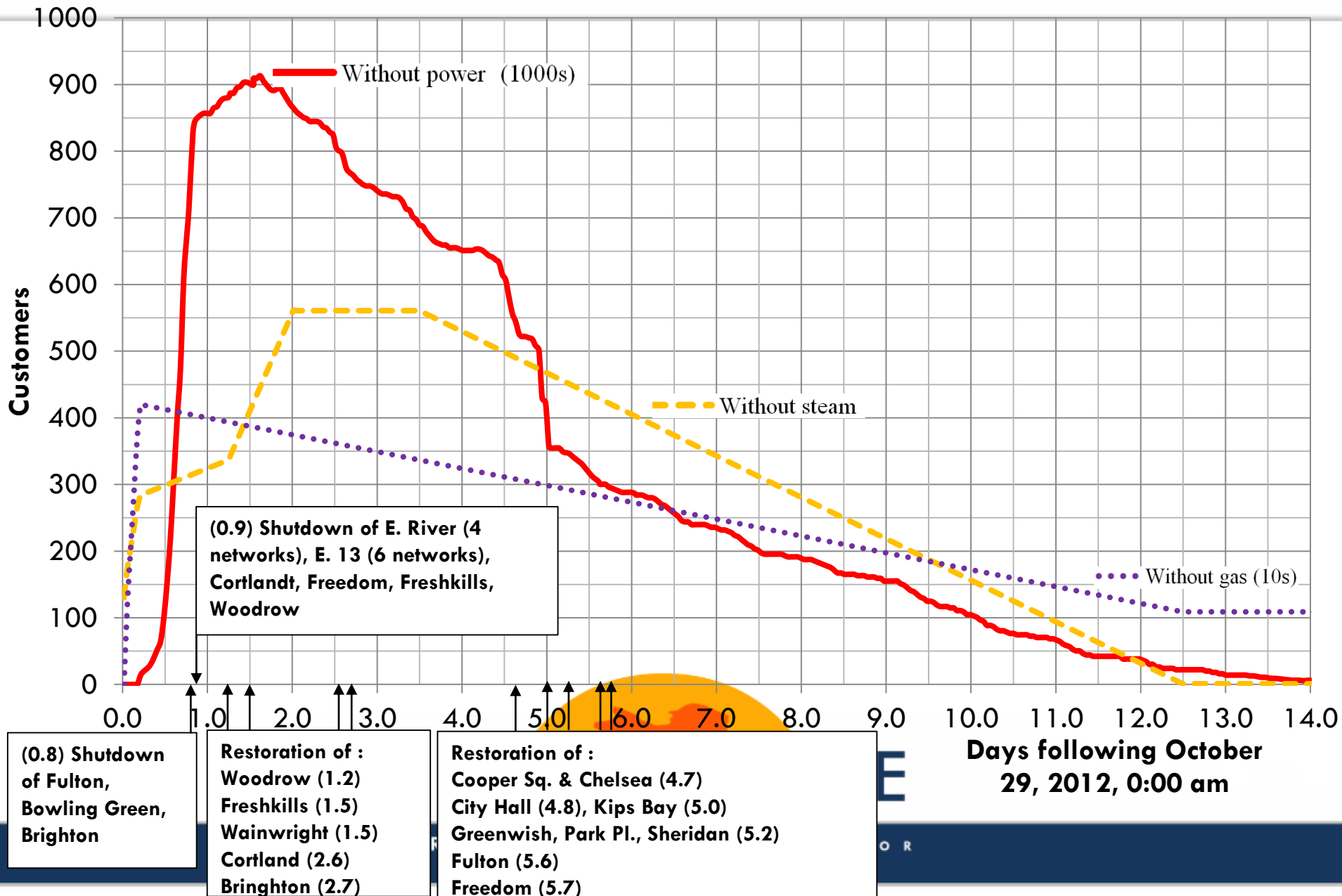
ELECTRIC POWER SYSTEM PERFORMANCE

Project Objective: To evaluate the performance of the NYC electrical distribution system and areas of vulnerability disclosed by Hurricane Sandy, including interactions between electric power and water bodies (flooding and surge).

System improvements will be proposed to increase resiliency, which may include reinforcing substations against flooding, microgrids, combined heat and power, distributed generation, smart grid technologies, and energy storage.



AFFECTED CUSTOMERS (CON EDISON)



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Location	Customers left without power
Staten island	473
Old Howard Beach, Queens	153
Broad Channel, Queens	108
Seagate, Brooklyn	17
Gerritsen Beach, Brooklyn	159
Red Hook, Brooklyn	23
Brighton Beach and Sheepshead Bay, Brooklyn	47
Manhattan Beach, Brooklyn	17

Location	Broken Poles	Destroyed Transformers	Cables [miles]
Bronx and Westchester	699	718	72.06
Brooklyn and Queens	209	93	60.63
Staten Island	64	111	10.76
TOTAL	972	922	143.46



SUMMARY(CON EDISON)

Location	Customer outages
Bronx	75,406
Brooklyn	+ 143,088
Manhattan	+ 235,451
Queens	+ 160,893
Staten Island	+ 179,530
NYC total	= 794,368
Westchester	+ 320,926
Con Edison System TOTAL	= 1,115,294
<i>Non-network total</i>	834,640 (70% of it)
<i>Network total</i>	280,654

Capital and removal:	\$81 million
Straight-time labor:	+ \$12 million
Incremental costs (overtime, mutual assistance, other outside support):	<u>+ \$217 million</u>
Electric operations total:	= \$310 million
Steam operations:	+ \$5 million
Gas operations:	<u>+ \$3 million</u>
Total cost:	= \$318 million



LIPA: TOTALS (NON-NETWORK SYSTEM)

- Power outages: 1.1+ million
(restored to all who could accept service)
- Poles: 4,500+
- Transformers: 2,100+
- Wire replaced: ~400 miles
- Substations affected: 44
- Cost: \$800-850 million
(Nov. 14, 2012)



SEWAGE SPILLS: OVERVIEW

Location	Gallons	Type	Duration
All of North-East	11 billions	Untreated or partially treated	Weeks
NYC	100+ million x 6 1+ million x 28	Both	Weeks
Long Island's Bay Park: largest in NYS, 2 nd in N-E	100 million 2.2 billion	Untreated Partially treated	44 h 44 days (till Dec. 21)
Westchester's Yonkers: 3 rd largest in N-E	49 million 1.2 billion	Untreated Partially treated	14 h 4 weeks



SEWAGE SPILLS: POWER LOSS AS CAUSE

- **Primary cause:**
 - 98 million gallon
 - PA, NY, MA
 - 3 amongst 25 largest
 - 1 in NY (Staten Island's Port Richmond): 30 million gallons, partially-treated
- **Secondary cause: Yonkers' plant**
 - Data given just before
 - Primary cause: flooding
- **Consequences of power loss**
 - 14th largest in N-E:
 - 26th Ward-Van Siclen, East NY, Brooklyn
 - 89 million gallons
 - Partially treated
 - Primary cause: storm surge and flooding
 - NYC Dep. of Env. Protection cut power to the plant
 - 16th largest in N-E:
 - Owls Head, Bay Ridge, Brooklyn
 - 76.2 million gallons
 - Partially treated
 - Same primary reason
 - Lost power to its main pumps
 - Secondary systems remained online: partially-disinfected sewage.