One Utility's Path to Climate Change Readiness

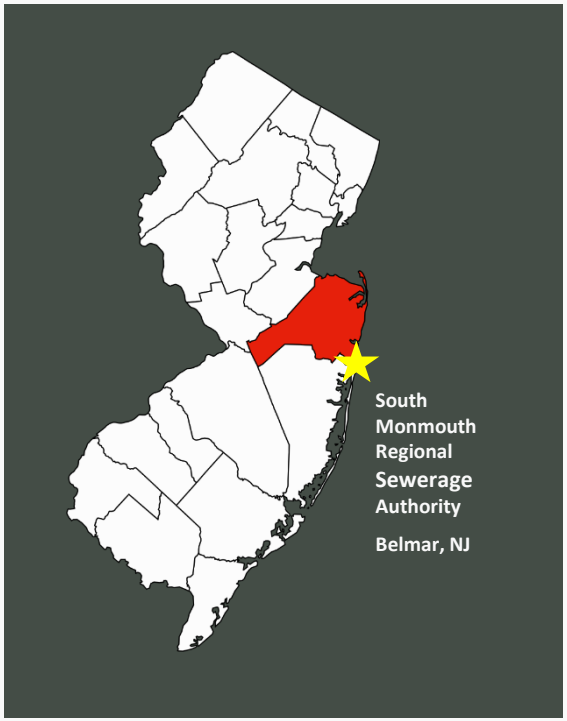
— Michael Ruppel, Executive Director, SMRSA

SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

SMRSA

South Monmouth Regional Sewerage Authority

(SMRSA)



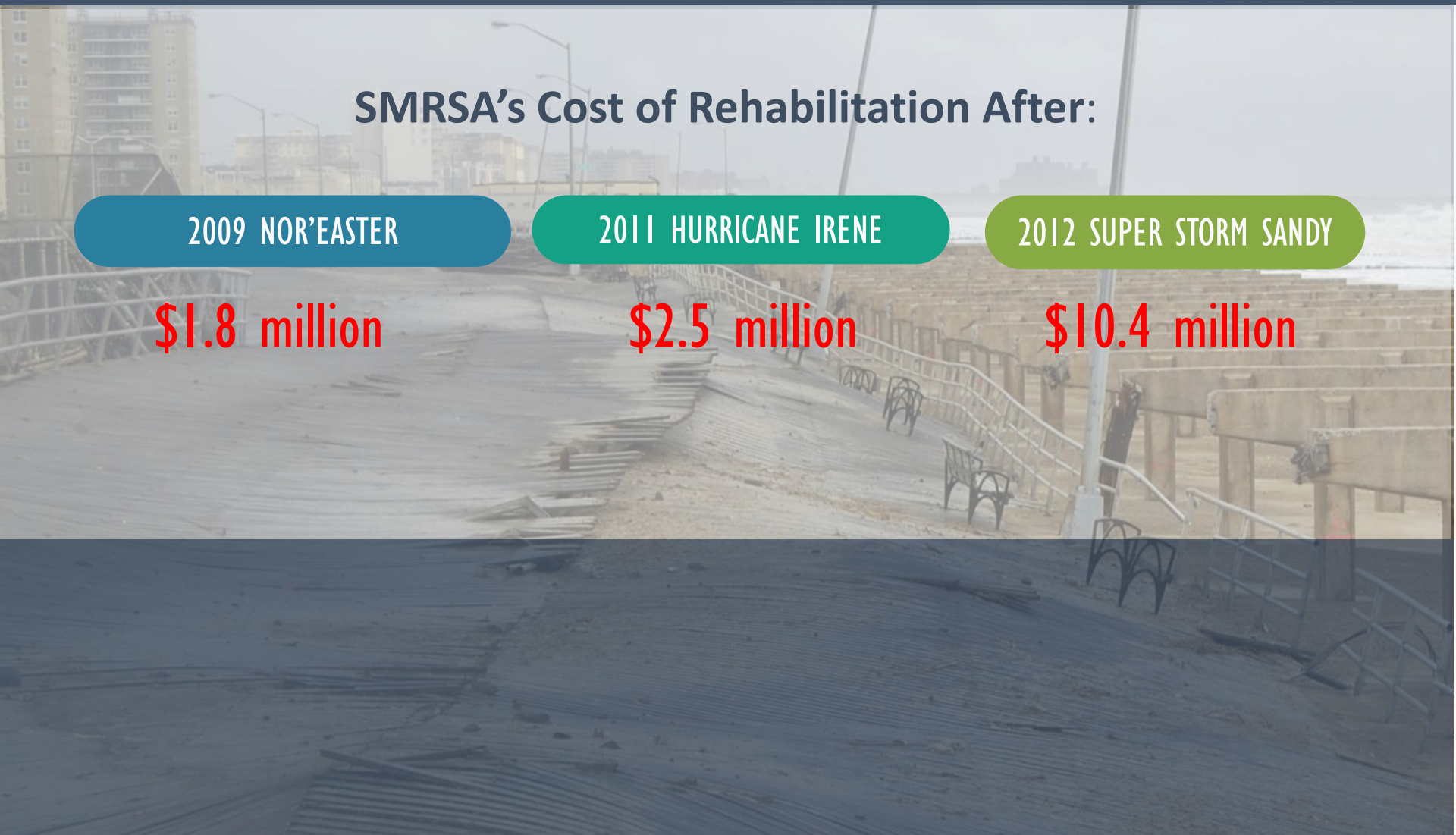
SERVES 8 MUNICIPALITIES

MAJOR ASSETS

- 9.1 MGD Wastewater Treatment Plant
- 11 pump stations
- 12 miles of force main

Climate Drives Projects

Three Major Storm Events



SMRSA's Cost of Rehabilitation After:

2009 NOR'EASTER	2011 HURRICANE IRENE	2012 SUPER STORM SANDY
$1.8 million	$2.5 million	$10.4 million

Climate Related Challenges

Impacts of extreme wet weather events:

- Temporary loss in Sanitary Sewer Service
- Damage to assets, equipment and infrastructure
  - Flooding
  - Wind damage
  - Storm surge
- Power outages
- Potential increase in services rates for customers

SPRING LAKE'S PENNSYLVANIA AVENUE PUMP STATION | SANDY, DAY 8

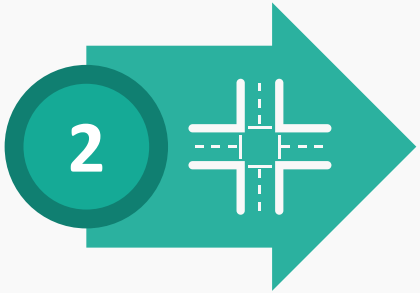
LAKE COMO PUMP STATION | SUPER STORM SANDY

Resiliency Measures for Pump Stations

"The Three Rs"

Raise

Raise equipment in the building to 4ft above the 500 year flood elevation



Relocate

Rebuild Pump Station outside of flood zone

Rapid Response / Recovery

A mobile enclosure that protects critical pump station components that can be relocated before a storm

Resiliency Measures are flexible and unique for each asset.

Rapid Response/Recovery:

Pump Station Mobile Enclosure

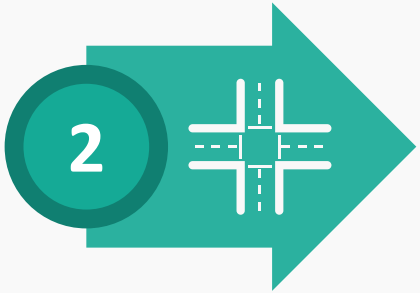
SEA GIRT PUMP STATION MOBILE ENCLOSURE

- The enclosure consists of two rooms
  - One sound-attenuated room for the emergency generator
  - Another climate-controlled room for the electrical equipment including controls, alarm systems, variable speed drives and SCADA System
- Electrical and control connections between the enclosure and the pump station and its equipment are made with cables and plugs that can be opened to permit removal of the enclosure and transport it to a safe location.

Resiliency Measures for Pump Stations

Raise

Raise equipment in the building to 4ft above the base flood elevation



Relocate

Rebuild Pump Station outside of flood zone

Rapid Response / Recovery

A mobile enclosure that protects critical pump station components that can be relocated before a storm

Resiliency should be flexible and unique to each utility and asset.

Climate Resilience Evaluation & Awareness Tool

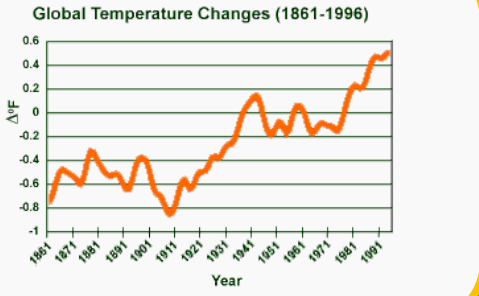
CREAT

When selecting a resiliency option, SMRSA recognized that they needed to understand:

1. LONG-TERM CLIMATE CONDITIONS
2. TIMING OF CLIMATE EVENTS TO PRIORTIZE PLANNING
3. CLIMATE RELATED RISKS IMPACTS COST OF CAPITAL IMPROVEMENTS

re·sil·ience
rəˈzilyəns/
Noun

the capacity to recover quickly from difficulties



Climate Resilience Evaluation & Awareness Tool

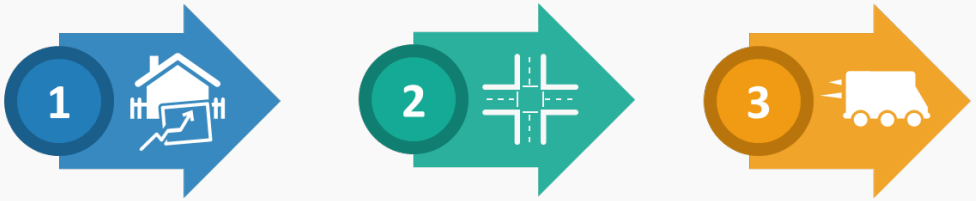
CREAT

CASE STUDY: Belmar Pump Station

- CREAT identified potential climate change threats to the pump station based on location:
  - Storm Surge, Flooding
- CREAT provided multiple future climate scenarios

Climate Resilience Evaluation & Awareness Tool

- Performs **BASELINE RISK ASSESSMENT** of the pump station's current resilience to these threats
  - What is the utility's current level of risk for the pump station?
  - DO NOTHING Scenario
- Provides strategies that build resiliency into projected climate changes
  - Populated CREAT with strategies and associated capital costs



Raise
Raise equipment in the building to 4ft above the 500 year flood elevation

Relocate
Rebuild Pump Station outside of flood zone

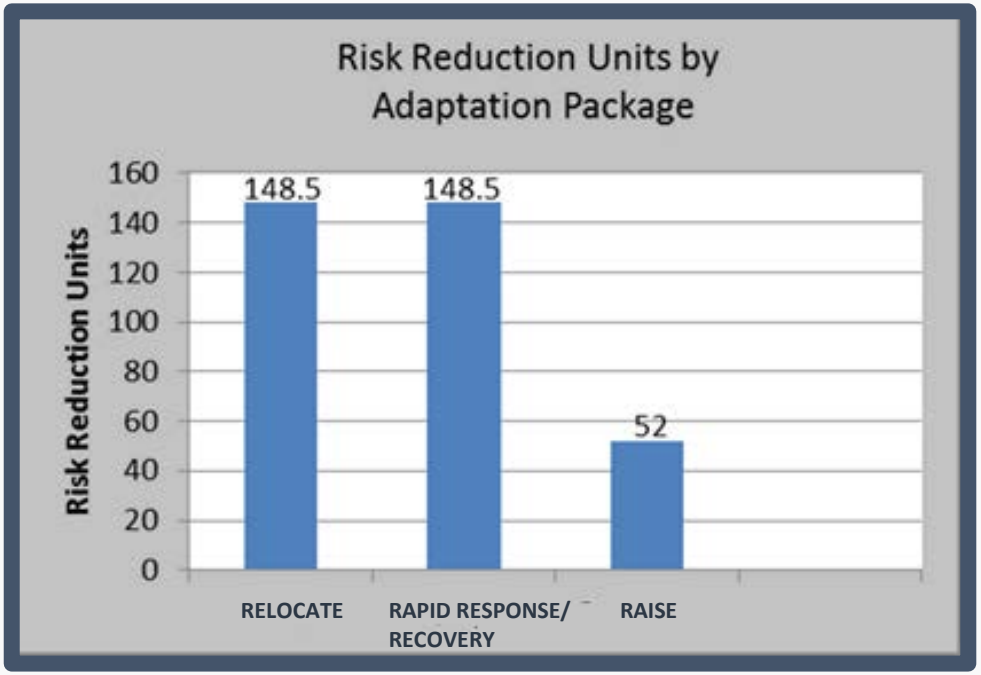
Rapid Response / Recovery
A mobile enclosure that protects critical pump station components that can be relocated before a storm

- Performs a second assessment: **RESILIENCE ASSESSMENT**
  - Risk assuming Raise, Relocate or Rapid Response/Recovery is implemented

Climate Resilience Evaluation & Awareness Tool

CREAT

- CREAT calculates risk reduction based on the difference between baseline conditions and resilience conditions
- The adaptive measures were compared and prioritized on the basis of risk reduction and cost.



$4.4 M **$1.9 M**

AFTER

Mobile Enclosure Version 2.0: Pitney Avenue Pump Station

Adaptive Measures

- Mobile Pump Station
- All electrical equipment above 500 year flood elevation

Cost: $1.6 million

Risk Reduction Units: 101

Mobile Enclosure Version 3.0: Belmar Pump Station

Adaptive Measures

- Mobile Pump Station
- All electrical equipment above 500 year flood elevation
- Submersible pumps

Cost: $1.9 million

Risk Reduction Units: 104.5

AFTER

Lake Como Pump Station

Adaptive Measures

- Relocate building
- Extend force main and sewer line

Cost: $3.2 million

Risk Reduction Units: 145

AFTER

AFTER

Penn Avenue Pump Station

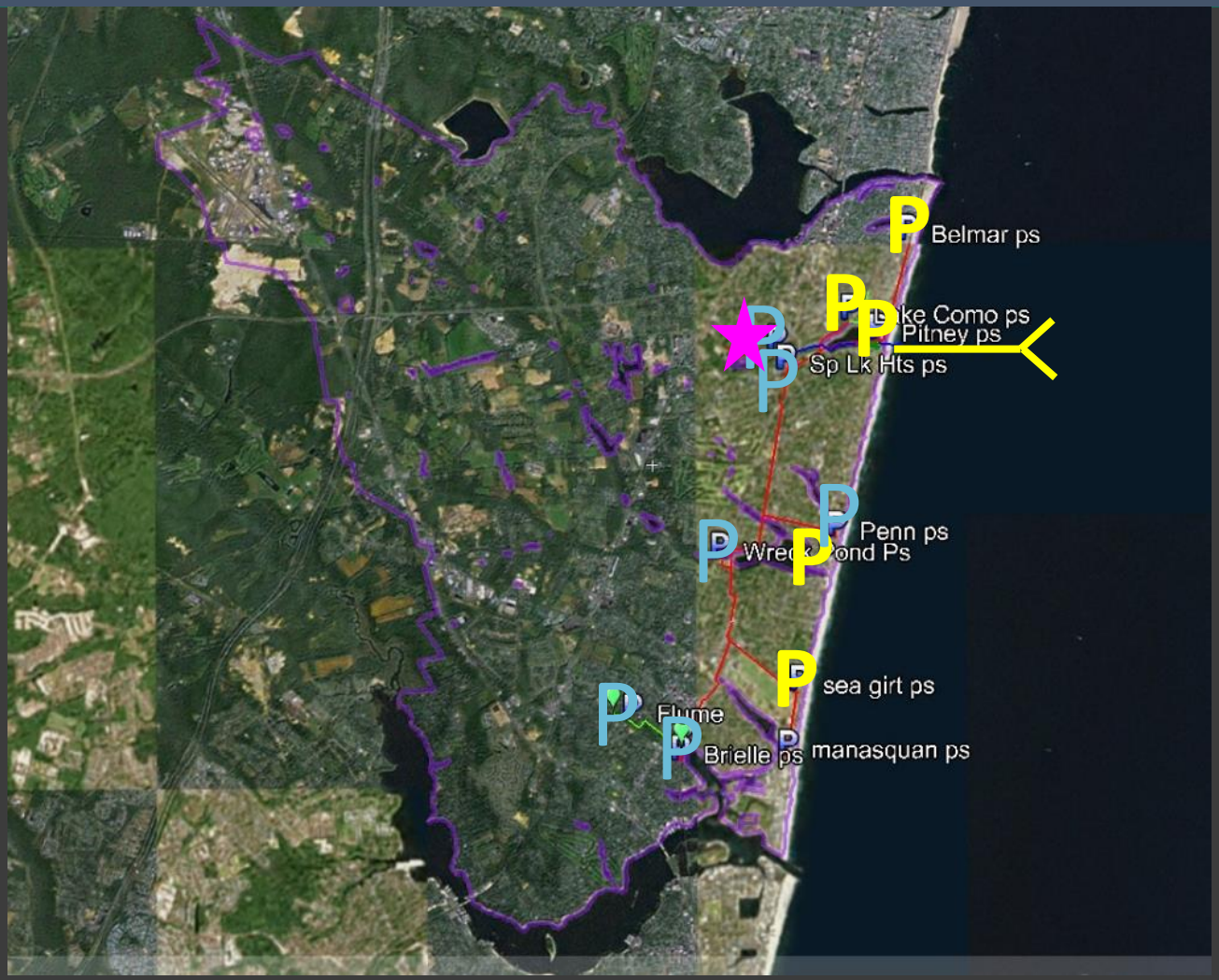
Adaptive Measures

- RAISE
- All electrical equipment raised 4 feet above 500 year flood elevation

Cost: $2.4 million

Risk Reduction Units: 54

SMRSA's Regional Resiliency Plan



P Pending

Climate Ready
Review Pump Stations

P Climate Ready

Pump Stations

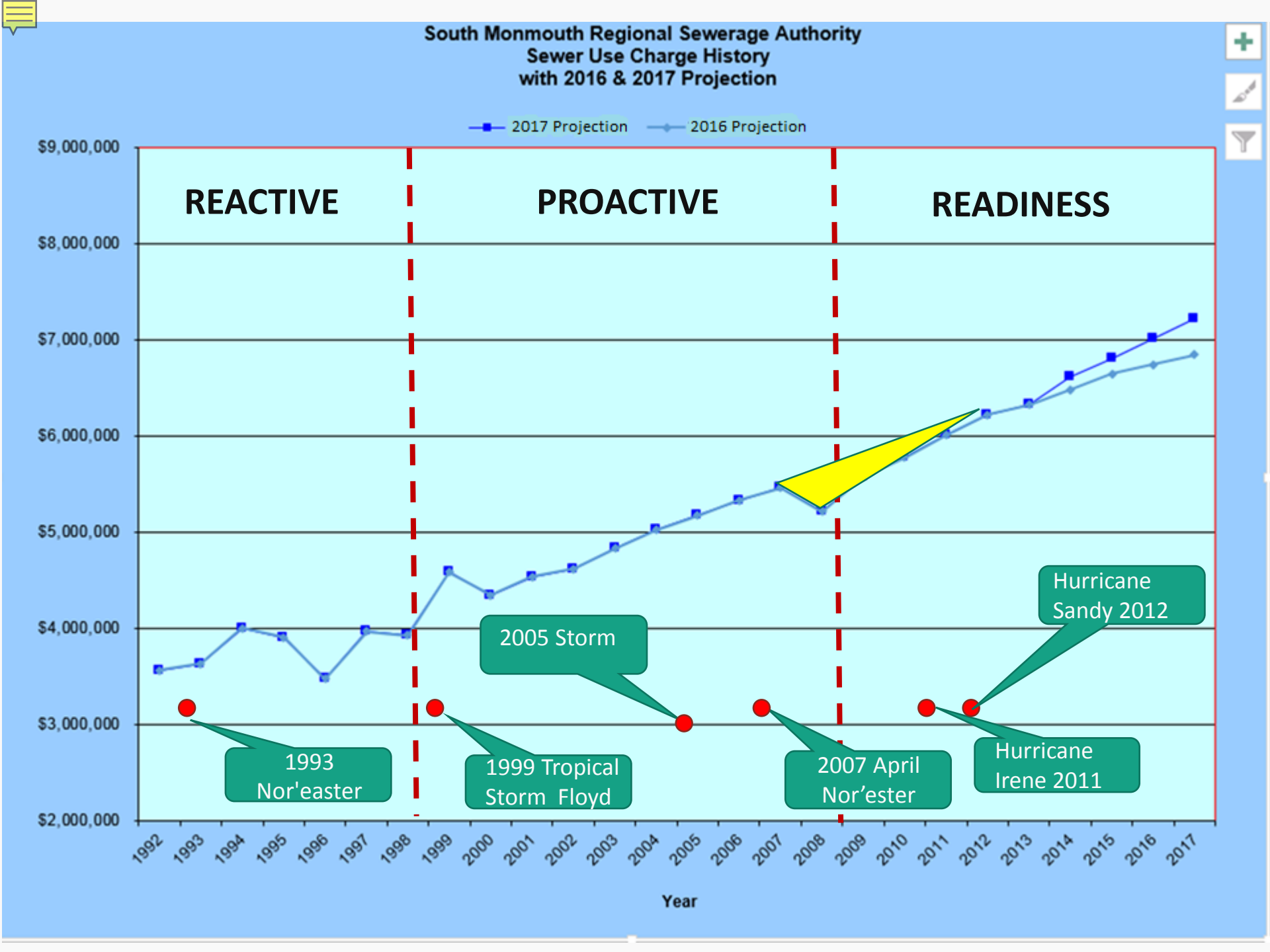
★ WWTP

Outfall

Funding for a Climate Readiness Program

Internal funding mechanisms:

1. Dedicated, set aside funds for
    - Disaster funding
    - Climate Readiness
    - Asset Management
2. Funding for set aside funds is accumulated through an annual rate increase
    - 2-3 percent annually
    - Rate stabilization
    - Predicable, reasonable, necessary strategy
3. Implement capital improvements with a high potential for resiliency


South Monmouth Regional Sewerage Authority
Sewer Use Charge History
with 2016 & 2017 Projection
2017 Projection
2016 Projection
REACTIVE
PROACTIVE
READINESS
$9,000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
1992
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2012
2013
2014
2015
2016
2017
Year
1993 Nor'easter
1999 Tropical Storm Floyd
2005 Storm
2007 April Nor'ester
Hurricane Irene 2011
Hurricane Sandy 2012

Mobile Enclosure Version 3.0: Belmar Pump Station

FUNDING:

- **State funded**
- **NJEIT**
- **SAIL Program**
- **19% Principal Forgiveness Loans**
- **Authority Reserves**

Mobile Enclosure Version 2.0: Pitney Avenue Pump Station

FUNDING:

- **90% FEMA**
- **Authority Reserves**
- **NJEIT**
- **SAIL PROGRAM**

Lake Como Pump Station

FUNDING:

- **90% FEMA**
- **Authority Reserves**
- **NJEIT**
- **SAIL PROGRAM**

Penn Avenue Pump Station

FUNDING:

- **100% Authority Reserves**

Always tell your story…

Financial Strategies

- Consistent, persistent dialogue with state and federal agencies
- Be prepared to support your proposal with data
- Transparency with customers

Climate Change Readiness for the Wastewater Treatment Plant Cogeneration System

Cogeneration

WWTP Emergency Response Plan

When there is a power outage…

- The cogeneration system produces approximately 42-52% of the electricity
- Auxiliary Generators provide the balance
  - 1,200 kW Primary Generator
  - 500 kW Secondary Generator

Cogeneration – Future Operations

Normal Operation:

- Cogen system provides about 60% of the plant's energy
  - Utilize 270 kW Dual Fuel Engine
- Authority will purchase 40% of remaining required energy

During a Power Outage:

- Cogen system provides about 100% of the plant's energy
  - The plant becomes a "Island"
  - Utilize 270 kW Dual Fuel Engine
  - Utilize the two 160 kW Dual Fuel Engines
- Utilize auxiliary generators

Funded by New Jersey Energy Resiliency Bank

- Total Project Cost : $3,390,000
- Total Grant Portion: $2,847,674
- Loan Portion: $1,070,326

Conclusions

- The resiliency measures selected provide a high level of resiliency and risk reduction
- Resiliency should be flexible and unique to each utility and asset.
- The CREAT model continues to serve as a proactive approach to identify other weak links in the utility's planning philosophy.
- The use of an EPA recognized program bridged communication gaps with the customers
- Positioned the utility to maximize the return from federal grant monies

Contact Information

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