One Utility’s Path to Climate Change Readiness

— Michael Rupple, Executive Director, SMRSA

SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY
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**: $1.8 million
- **2011 HURRICANE IRENE**: $2.5 million
- **2012 SUPER STORM SANDY**: $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
Resiliency Measures for Pump Stations

“The Three Rs”

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

2. **Relocate**
   Rebuild Pump Station outside of flood zone

3. **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

- 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

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

2. **Relocate**
   Rebuild Pump Station outside of flood zone

3. **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.
When selecting a resiliency option, SMRSA recognized that they needed to understand:

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

Re·sil·ience
rəˈzilyəns/
Noun

the capacity to recover quickly from difficulties
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

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

$4.4 \text{ M} \quad \$1.9 \text{ M}$
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
Lake Como Pump Station

Adaptive Measures
– Relocate building
– Extend force main and sewer line

Cost: $3.2 million
Risk Reduction Units: 145
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

- Climate Ready
  - Pump Stations
- Pending
  - Climate Ready
  - Pump Stations
  - WWTP
  - Outfall
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

Funding for a Climate Readiness Program
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

GOALS:
• Establish a greater footprint for climate change resiliency
• Reduce operating costs

GAS CONDITIONING SYSTEM:
- Removes water, hydrogen sulfide, siloxanes

INTERNAL COMBUSTION ENGINES
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
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.
MICHAEL J. RUPPEL
Executive Director
South Monmouth Regional Sewerage Authority
exdir@smrsa.org
732.681.0611
www.smrsa.org