Climate Resilient Urban Sanitation in Miami-Dade County

Hardeep Anand, P.E., Deputy Director, Miami Dade Water & Sewer Department
The Miami-Dade Water & Sewer Department (WASD) is the largest water utility in the Southeastern United States, providing high-quality, affordable water & wastewater services to the people of Miami-Dade County.
Encompassing more than 2,000 square miles, Miami-Dade County is larger than the states of Rhode Island & Delaware.

Our utility serves 2.3 million residents & thousands of visitors in Miami-Dade County, which is the most populous county in Florida.

Just 6.5 feet above sea level & prone to severe weather, yet Miami-Dade County’s key economic drivers are weather dependent.

We have the “seagrass” of the Atlantic Ocean and Biscayne Bay to the east, and the sawgrass of the Everglades wetlands to the west.

Encompassing more than 2,000 square miles, Miami-Dade County is larger than the states of Rhode Island & Delaware.
Miami-Dade County’s urban environment is inextricably intermingled with vulnerable natural areas.
Miami-Dade County is increasingly endangered by sea-level rise

The coast of South Florida has seen 12 inches of sea rise since 1870

Since 1994, we’ve experienced 4 inches of sea rise; 2-6 inches is expected by 2030 and 14 inches by 2060

Most of Miami is located just 6.5 feet above sea level

“This is Ground Zero.”

“The combination of aging infrastructure, population growth & potential storm surge magnifies the effects of sea level rise for East Coast utilities.”


Source: U.S. Senator Bill Nelson during a Field Hearing on Sea Level Rise in Miami Beach, April 2014
Miami-Dade County facilities are vulnerable to shocks & stresses accelerated by climate change

Above: Water flows out of the Miami River, flooding a walkway as Hurricane Irma passes through Miami, Florida in 2017.

Below: Three regional wastewater treatment plants are located on the coast, inside the Inundation Zone.
Rain is no longer a prerequisite for flooding in Miami-Dade County: Sunny Day Flooding

Recent examples of Sunny Day Flooding in South Florida
Saltwater migration & intrusion

- Sea-level rise, in combination with increased groundwater pumping can expand saltwater intrusion into groundwater aquifers.

- In South Dade, the salt front has moved significantly inland between 2011 and 2016.

- Saltwater intrusion into groundwater aquifers can increase treatment costs for drinking water facilities or render groundwater wells unusable.

- Miami-Dade County has developed with the US Geological Survey one of the most comprehensive adaptive saltwater intrusion monitoring networks in the world.
Conversion of septic tanks to sewer systems

Density of Septic System Distribution

Septic Systems & Vulnerability

Abutting Properties & Vulnerability
The Miami-Dade Water and Sewer Department (WASD) is currently investing $126 million in General Obligation Bond (GOB) funds dedicated to converting septic systems to County sewer service for more than 1,000 commercial properties in Miami-Dade County.

Current septic to sewer program

SEPTIC TO SEWER GOB BY THE NUMBERS

225,000 LINEAR FEET OF PIPELINE ADDED
To date, 24,000 linear feet of new sewer lines have been installed. By the GOB’s completion, 225,000 linear feet will have been connected to the WASD system.

500,000 GALLONS WASTEWATER REMOVED
By connecting the more than 1,000 properties to WASD’s system, 500,000 gallons of wastewater will be removed from septic systems daily. Minimizing nutrient loading to the groundwater and waterways.

11 NEW PUMP STATIONS
To date, one pump station has been completed and by 2023, 11 new pump stations will have been constructed.

$200 MILLION INVESTMENT
To date, more than $5.7 million has been invested of the allocated $200 million for the combined GOB septic to sewer and water infrastructure upgrades. Local, small businesses are/will design and construct for the 35 projects and by increasing sewage capacity for the five commercial corridors, business expansion/redevelopment will generate increased tax revenues for Miami-Dade County.
The health of Biscayne Bay has reached a tipping point

- In the past, Biscayne Bay has managed to bounce back from shocks and stressors.
  - But it’s becoming evident that Biscayne Bay is losing its ability to recover.

- Improving Biscayne Bay’s water quality will require significant reductions in the levels of pollutants within its watershed. Excess nutrients come from many sources, including seepage from failing septic tanks, which can lead to a shift to an algae-based ecosystem that impacts fish, birds, marine mammals and other marine species’ habitats.

- 21 square miles of seagrass have been lost over the past decade.
- Contaminated waters force beach closings regularly.
- Coral, sponges & other marine life are disappearing.
- Fish populations are on the verge of collapse.
Maximizing use of existing injection wells to provide equivalent cumulative nutrient reduction

Coordination with FPL

Construction of new injection wells & maximizing the use of outfalls during peak flows
Miami-Dade County has partnered with Florida Power and Light to construct a 15 million gallon per day Clean Water Recovery Center

- 4th Largest Reuse Facility in the State of Florida

- The facility will treat wastewater for utilization within FPL facilities, allowing for the re-allocation of groundwater water supplies for environmental purposes

- The facility will serve as a cornerstone of Miami-Dade County’s wastewater reuse program given its expandability

- Reuse will help to contain stormwater intrusion
Collaboration with USDOE

- Formal continuation of SWIFt IIP
  - Keep baseline with 25% reduction target
  - Incorporate WWT & Pump stations
- National Recognition
- Technical Support
  - Technical Account Manager
  - Performance Tools
  - Other federal, state, and local resources
- In-plant Trainings
- CHP Screenings
- Technology Days at National Laboratories
- 207 partners, 3,000 plants, 2.8% avg annual energy intensity improvement rate

- Informal continuation of SWIFt IIP
- National Recognition
- Self-guided approach in 50001 Navigator
  - Planning
  - Energy Review
  - Continual Improvement
  - System Management
- Self-attest to completion
- Measure and improve energy performance over time
FDEP-funded Pilot: Chemergy HyBrTec Technology produces renewable hydrogen, green carbon dioxide and heat from the elimination of biosolid feedstock.
WIFIA Loans

- WASD has received three consecutive Water Infrastructure Finance & Innovation Act (WIFIA) low-interest loans from the EPA
- WASD is the only government agency in the nation to receive a third allocation since the program’s inception
- To date, WASD’s three loans combined total $660 million to:
  - Finance approximately $1.3 billion worth of projects with the Department’s multi-billion-dollar CIP
  - Save ratepayers $210 million in interest loans for the life of these loans when compared to other financing options
  - Create more than 500 jobs

WIFIA Loan funds are being used to construct 14 injection wells at WASD’s three regional sewer plants, among other projects
Thank You