

# Working Group #1: Cast Iron Pipe Rehabilitation – Con Edison & NYSEARCH

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# CECONY and O&R Gas Franchise Areas

## Con Edison Service Area

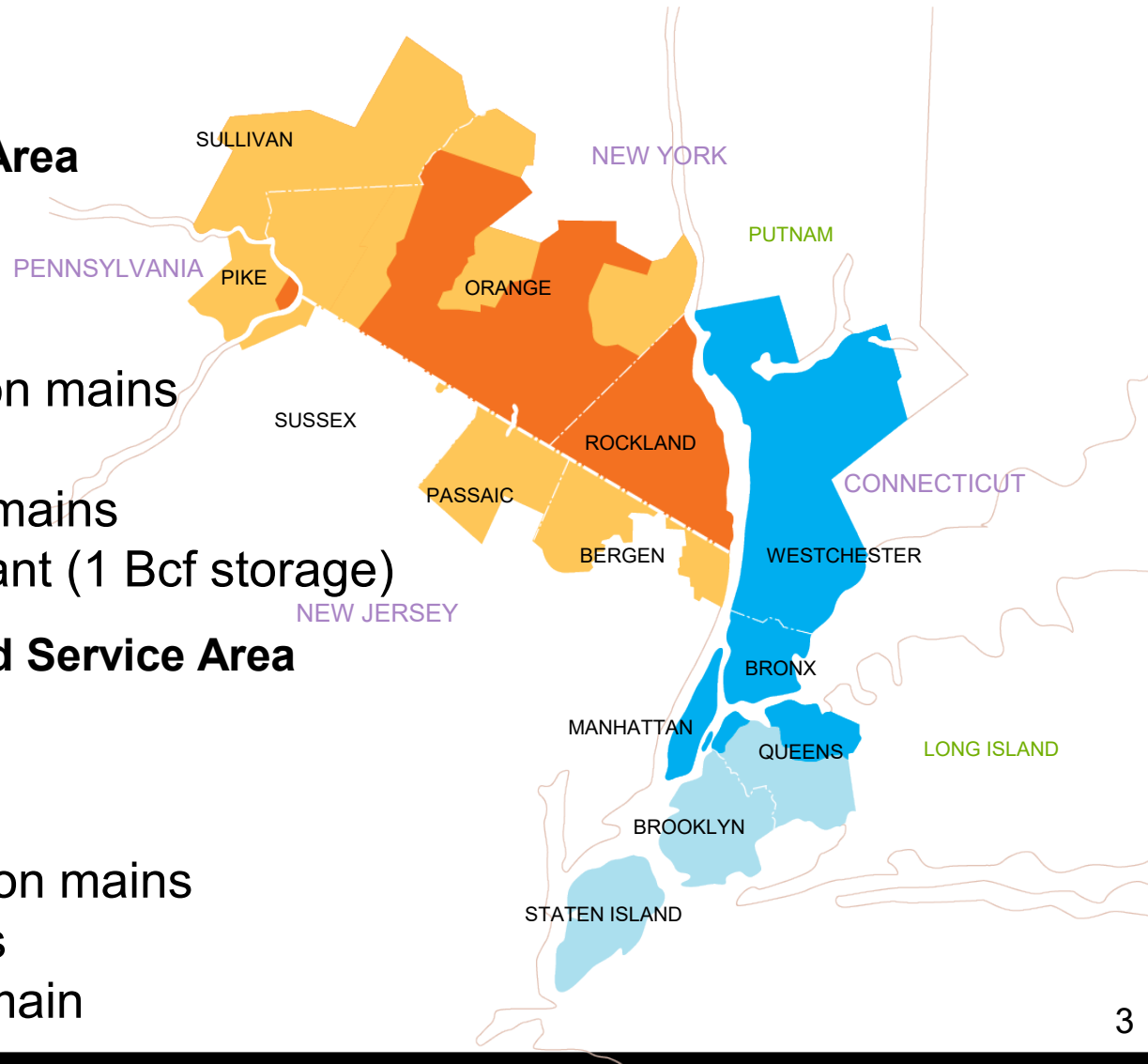
-  Gas Service Areas
-  Other Service Areas

- 1.1 M customers
- ~4,400 miles distribution mains
- ~375,000 gas services
- 94 miles transmission mains
- 1 LNG peakshaving plant (1 Bcf storage)

## Orange and Rockland Service Area

-  Gas Service Areas
-  Other Service Areas

- 135,000 customers
- ~1,870 miles distribution mains
- ~105,000 gas services
- ~1 mile transmission main



# Application of Technology In Urban Environments Pose Challenges



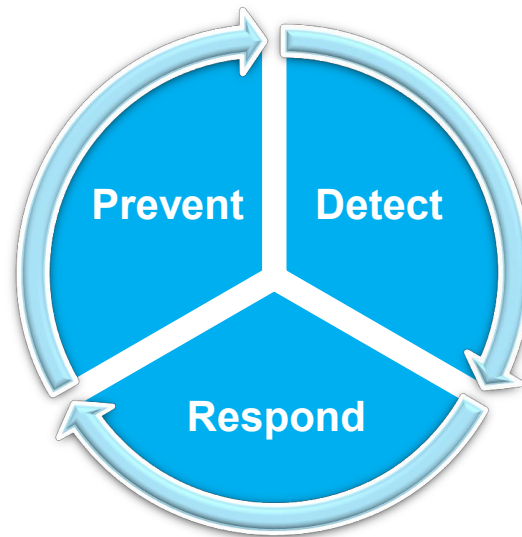
# Application of Technology In Urban Environments Pose Challenges



# Prevent - Detect - Respond

Our daily operations and long-term planning are focused on improving gas safety through the effective prevention, detection and response to gas leaks

- Pipeline Safety Management System (API 1173)
- Compliance & Quality
- Damage Prevention
- **Main Replacement Program – incl CI  $\leq 12''$  dia.**

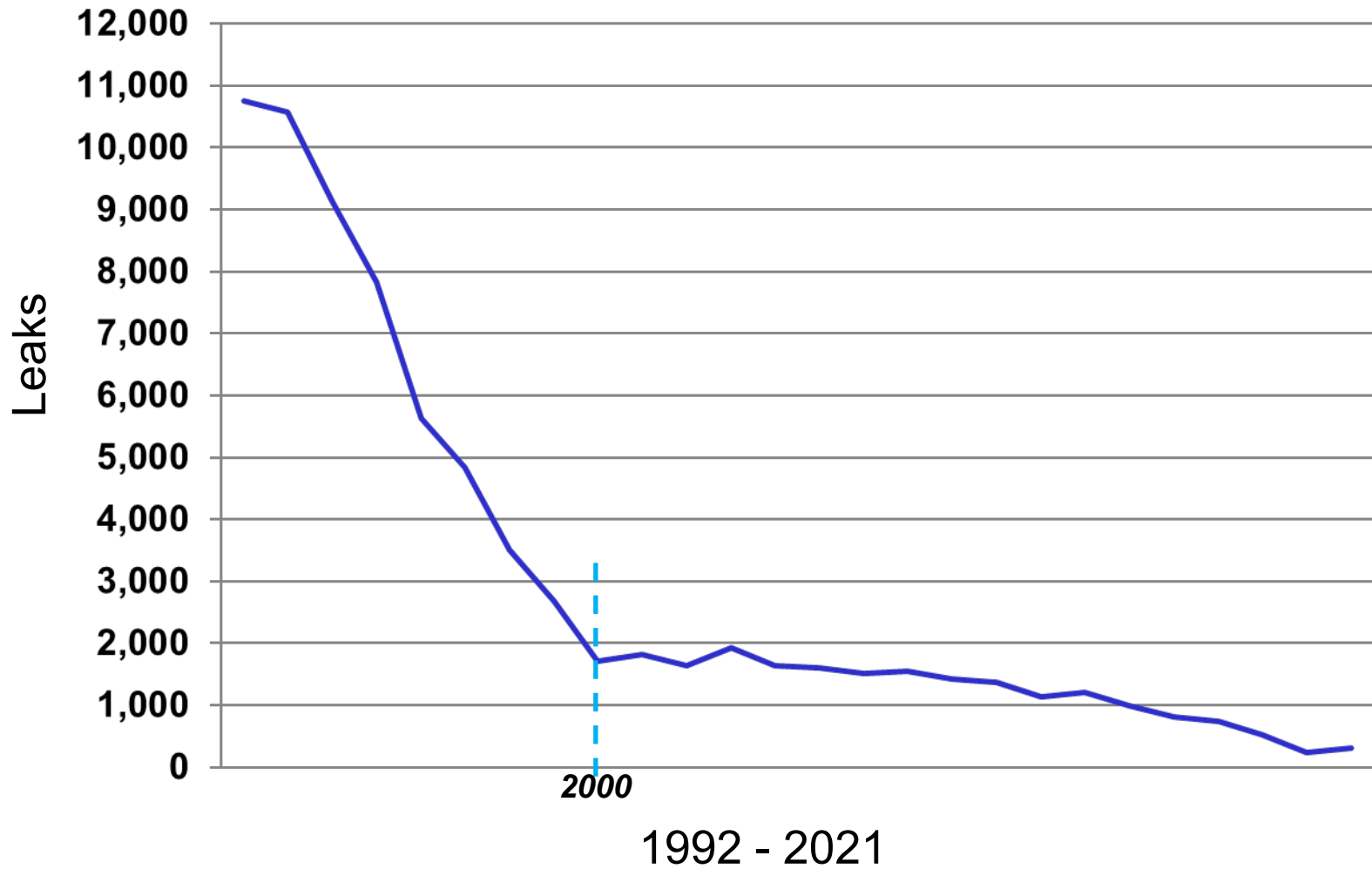


- Leak Management
- Leak Survey Programs and Approach
- *AMI Capable Natural Gas Detectors*
- System Sensors: Valve alarms, cathodic protection monitors...

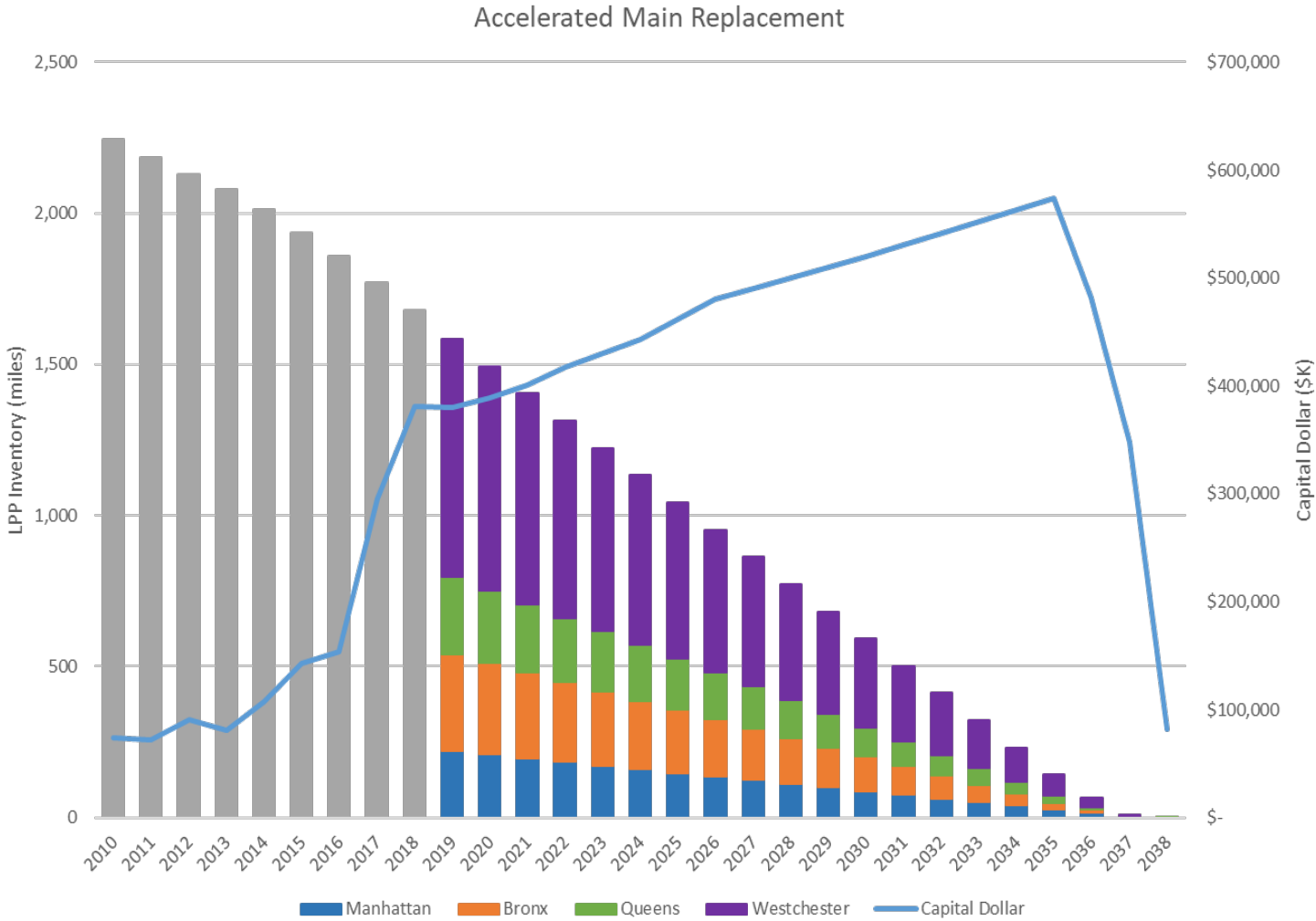
- Leak Response
- ***Leak Repairs***



# Respond: Reduction of Gas Leak Backlog



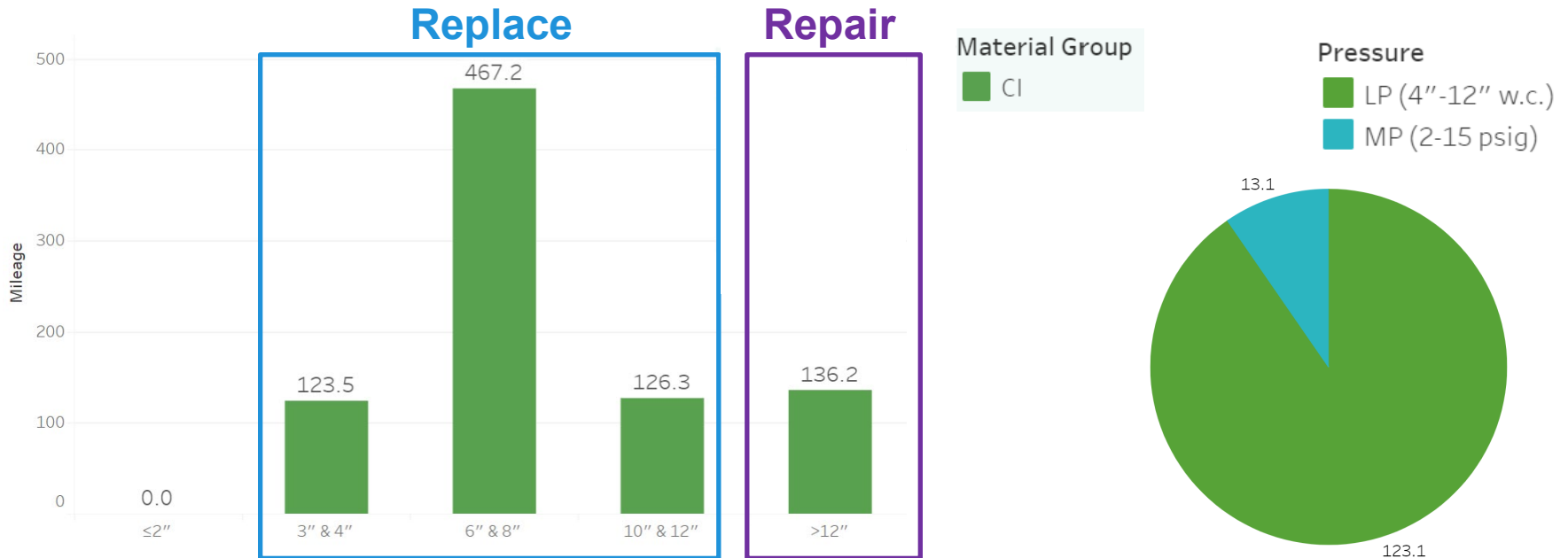
# Prevent: Gas Distribution Main Replacement Programs





# Prevent: CI Replace and Repair

Size (group)	Size	Manhattan	Bronx	Queens	Westchester	Grand Total
>12"	16"	24.1	4.0	4.3	12.2	44.6
	18"	2.1			0.2	2.3
	20"	35.8	5.1	4.8	1.8	47.5
	24"	9.4	5.4	3.4		18.2
	30"	12.8	4.5	0.7		18.0
	36"	3.2	2.5			5.6
	Total	87.4	21.5	13.1	14.2	136.2
Grand Total		87.4	21.5	13.1	14.2	136.2



# Costs of Options Need to be Realistic



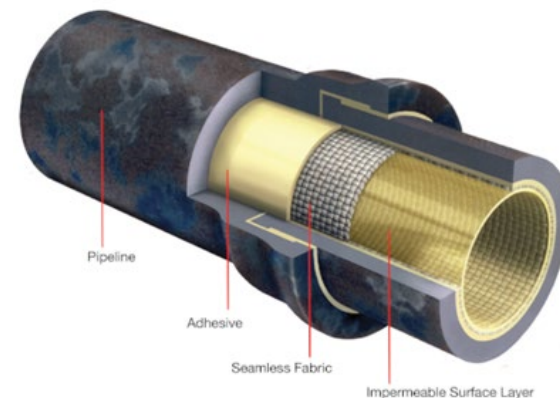
# Introduction to NYSEARCH RD&D Program

- NYSEARCH is a sub-organization of NGA that conducts voluntary RD&D on behalf a consortium of utilities located in North America.
- We focus on technologies that advance safety, improve cost effectiveness and productivity, and improve the environment.
- Our program areas reflect the benefits that our members are seeking. NYSEARCH members work to implement R & D products in their companies.



# Cured in Place Liner (CIPL) solutions for CI rehabilitation

- CIPL is a three-component system, referred to as an elastomer-fabric-adhesive structure.
- The synthetic fabric jacket provides the strength characteristics for resistance to internal and external pressure, soil movement, and radial expansion.
- The elastomer skin provides the impermeable barrier that prevents the escape of gas.
- The adhesive is a two-part resin that bonds to form the composite and adheres the fabric jacket to the pipe wall.



# NYSEARCH – Studies in Durability and Longevity of CIPL systems

- In 2015 NYSEARCH completed testing CIPL performance testing with Cornell University.
- Lined 6” and 12” CI pipes that had been in service to 10 to 16 years.
- Subjected to mechanical aging testing:
  - Flexure testing to simulate vehicular traffic
  - Additional Bending to simulate undermining/backfill events
  - Thermal contraction/expansion cycling to simulate effects of seasonal variations
- Material property characterization tests on the mechanically aged liner system:
  - Residual tensile properties to assess effects of field and mechanical ageing on durability
  - Characterize the residual liner/CI pipe adhesion strength and assess durability of the bond strength
- Liners maintained pressure integrity.

# NYSEARCH – Studies in Durability and Longevity of CIPL systems

- NYSEARCH completed a second study in 2019 to confirm displacements driven by thermal expansion/contraction will not cause fiber damage.
- Two excavated lined 12” host pipes and two newly lined steel pipes.
- Subjected to thermal cycling to simulate slow cooling driven by seasonal variations in the field.
- Temperature Cycle & associated nominal displacements based on design temperature changes due to seasonal variation in the Northeastern US.
- Results noted clean debonding and no fiber damage in all tests.
- Liners maintained pressure integrity.
- Through a combination of the 2015 study, and the follow up 2019 study, NYSEARCH’s body of work provides experimental verification of the longevity and durability of CIPL liners for CI and steel pipe repair and rehabilitation.





# NYSEARCH – Potential Gaps

- Standardization of Criteria for Liner Deployment
  - Host pipe suitability conditions assessment criteria
- Specific test cases for liner performance testing
  - Expansion Joints
  - Others as needed