

# Decarbonization with Alternative Fuels & Newtown Creek Project Spotlight

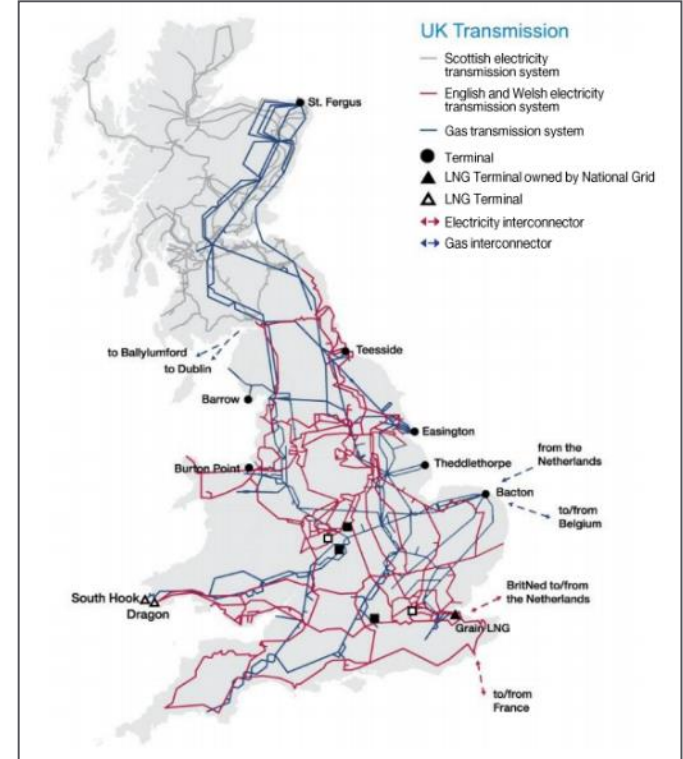
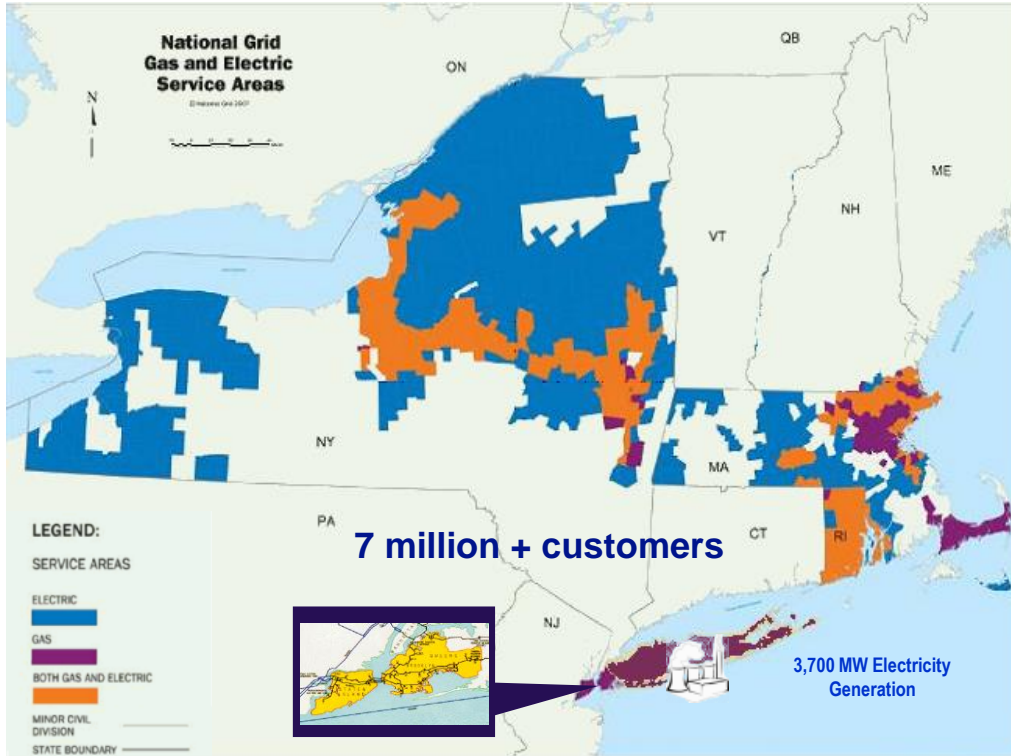
**Brian Barkwill, PE**  
**Lead RNG Engineer**  
**Future of Heat**

04/20/2023

**nationalgrid**



# An International Energy Company with a Local Presence



- Solar (Geronimo Energy & Sunrun)
- Wind
- Energy Storage

# National Grid Net Goal: Net Zero by 2050

- ◆ Reducing demand through energy efficiency and demand response;
- ◆ Decarbonizing the gas network with renewable natural gas and hydrogen;
- ◆ Reducing methane emissions from our own gas network while working with the industry to reduce emissions through the entire value chain;
- ◆ Integrate innovative technologies to decarbonize heat (heat pumps);
- ◆ Interconnecting large scale renewables with a 21<sup>st</sup> century grid;
- ◆ Enabling and optimizing distributed generation;
- ◆ Utilizing storage;
- ◆ Eliminating SF<sub>6</sub> emissions;
- ◆ Advancing clean transportation; and
- ◆ Investing in large scale carbon management;

<https://www.nationalgridus.com/media/pdfs/our-company/netzeroby2050plan.pdf>



# A better way to net zero



## Pillar one

### Energy efficiency in buildings



We will continue to provide programs for our customers to accelerate energy efficiency improvements to buildings, including deep retrofits and measures that reduce peak gas and electric demand; and support more rigorous building codes for new buildings.

## Pillar two

### 100% fossil-free gas network



We will eliminate fossil fuels from our existing gas network no later than 2050 by delivering renewable natural gas and green hydrogen to our customers.

## Pillar three

### Hybrid electric-gas heating systems



We will support our customers by providing them strategies and tools to capture and maximize the benefits of pairing electric heat pumps with their gas appliance.

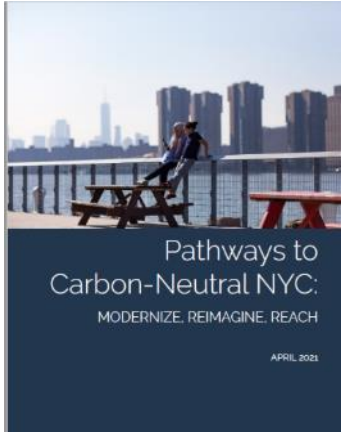
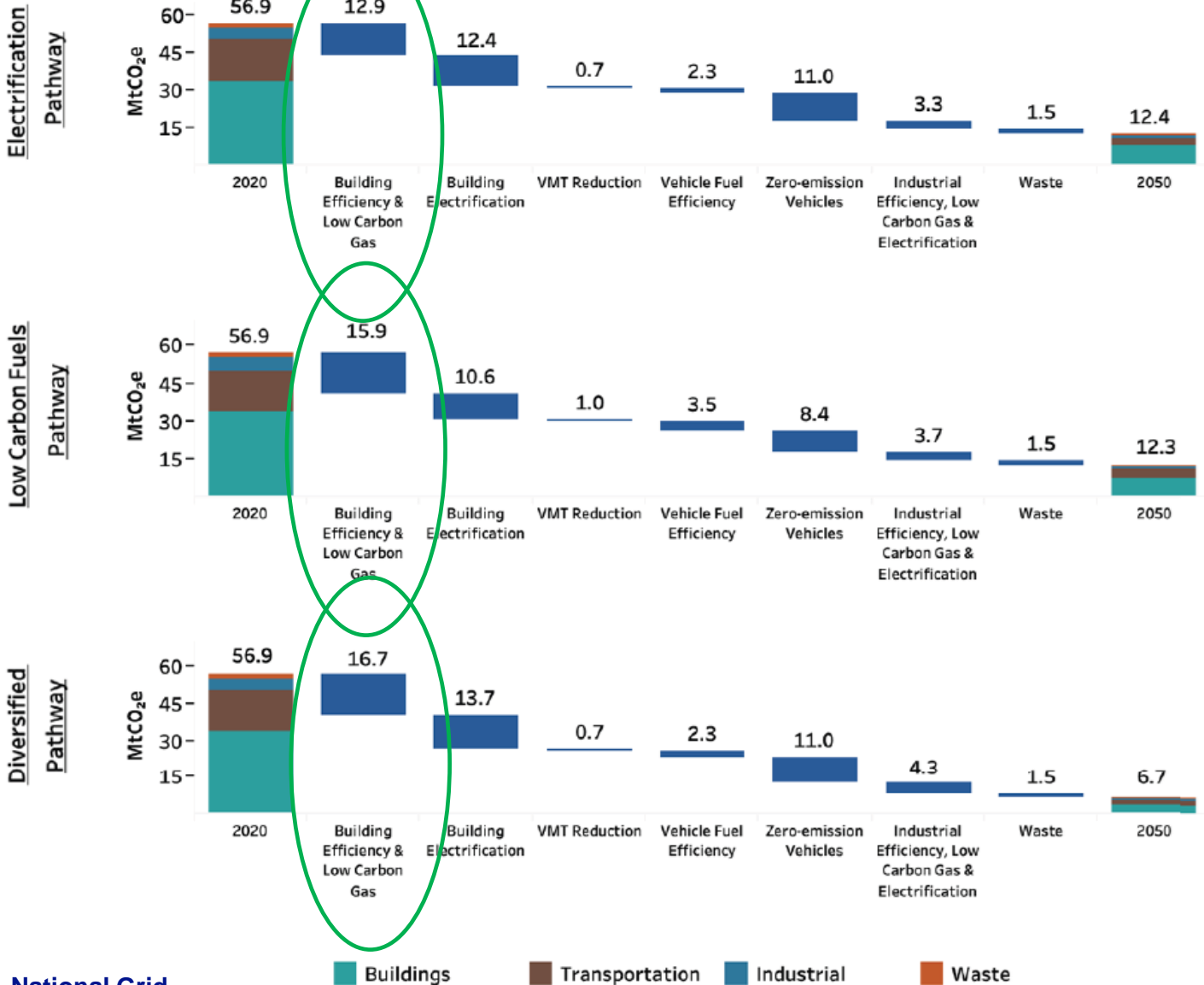
## Pillar four

### Targeted electrification and networked geothermal

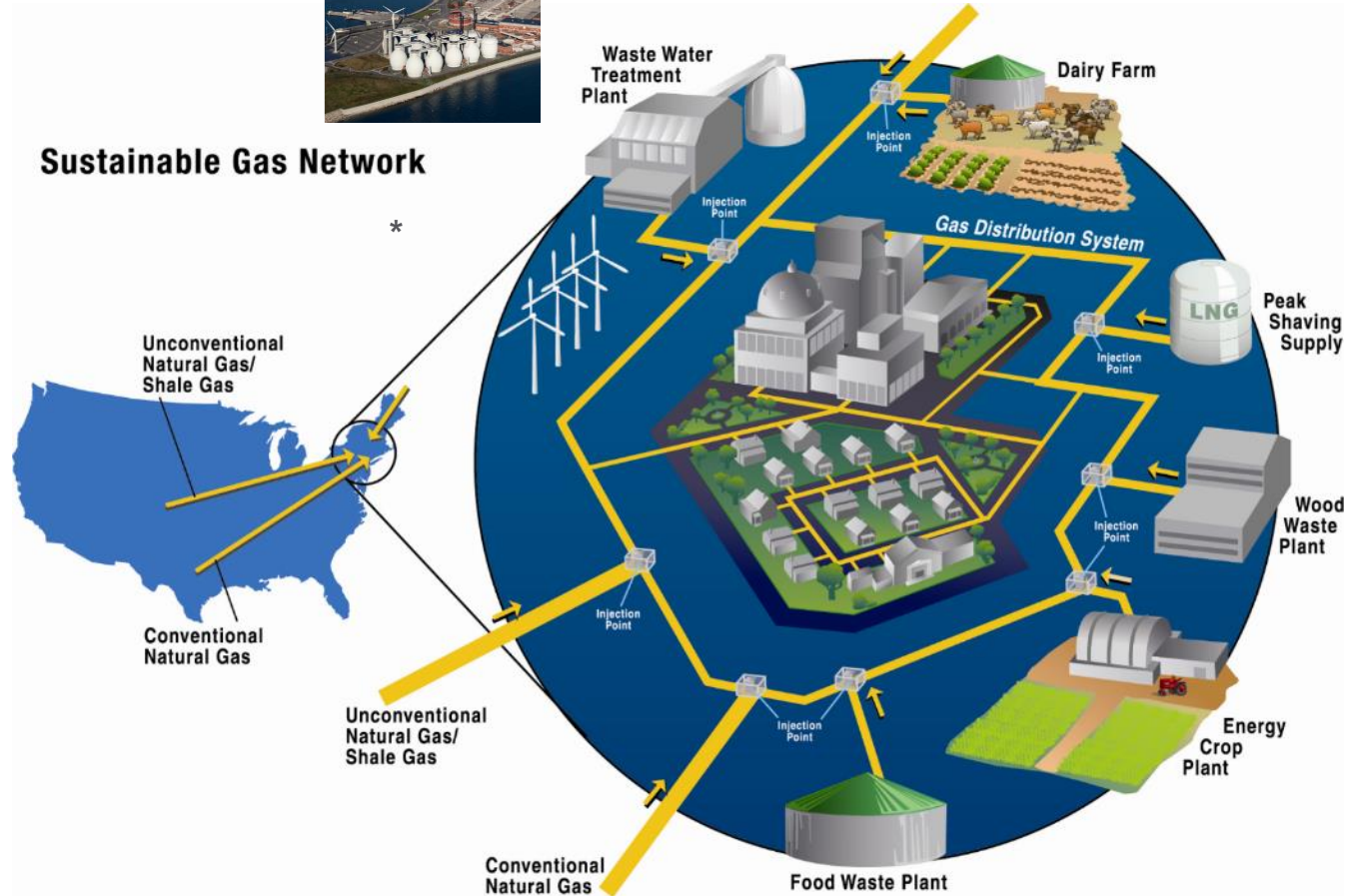


We will support cost-effective targeted electrification on our gas network, including piloting new solutions like networked geothermal. We will support customers who heat with oil and propane with strategies and tools to convert to heat pumps.

# The Potential for Affordable Zerto-Carbon (NYC)



# Vision for a Sustainable Gas Network



**Study by American Gas Foundation (released Sept. 2011)**

**Finding: Under a reasonable long-term scenario, Renewable Gas could be used to meet the natural gas needs of half of all American homes.**

*\*First NY Interconnection Standard for RNG Issued*



# Standard Interconnection Guideline for the State of New York

- One of RNG's biggest barriers is injection into distribution system
  - Most utilities do not understand interconnection or gas quality issues
  - New guideline released earlier this year

## National Grid collaborating with NY utilities to develop a standard interconnection guideline

- ◆ Reduce uncertainty for project developers
- ◆ Streamline the interconnection process
- ◆ First of its kind guideline in the U.S.
  - ◆ Specifies major attributes (e.g. Wobbe No.)
  - ◆ Process to limit trace constituents

## NY PSC is supportive of guideline

- ◆ Issued through the Northeast Gas Association



**Interconnect Guide for Emerging Fuels into Energy Delivery Networks**  
*Introduction of Renewable Natural Gas (RNG) and Hydrogen Enriched Natural Gas (HENG)*

December 2022 Revision

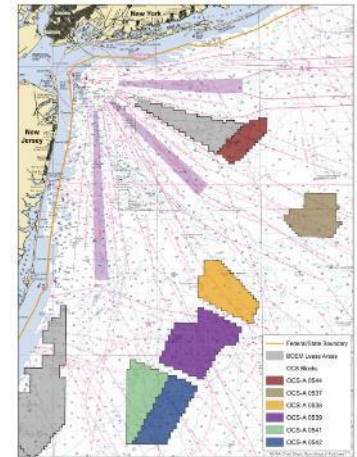
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## Hydrogen Blending – Point Lookout, NY

Blending Hydrogen with Natural Gas provides an opportunity to safely, reliably and affordably decarbonize gas distributions service for heating and other uses through existing and modern underground assets

- ✓ Is part of a flexible and diversified zero carbon strategy when produced from the renewable power planned for Long Island, NY\*
- ✓ Is a very flexible and is the least disruptive zero-carbon energy for Customers
- ✓ Can be highly efficient in production, distribution and use in appliances with no increases in emissions
- ✓ Can provide zero -carbon heating in support of NY’s CLCPA
- ✓ Is safely used around the world and facilities are built to accepted industry standards (Qualitative Risk Assessment of fuelling station performed in July 2012. and *“the societal risks were low”* .
- ✓ Can provide a means of increasing the output of renewable energy systems through the use of existing network infrastructure for hydrogen storage
- ✓ Provides the opportunity for long term use of the gas infrastructure that has already been invested in by consumers



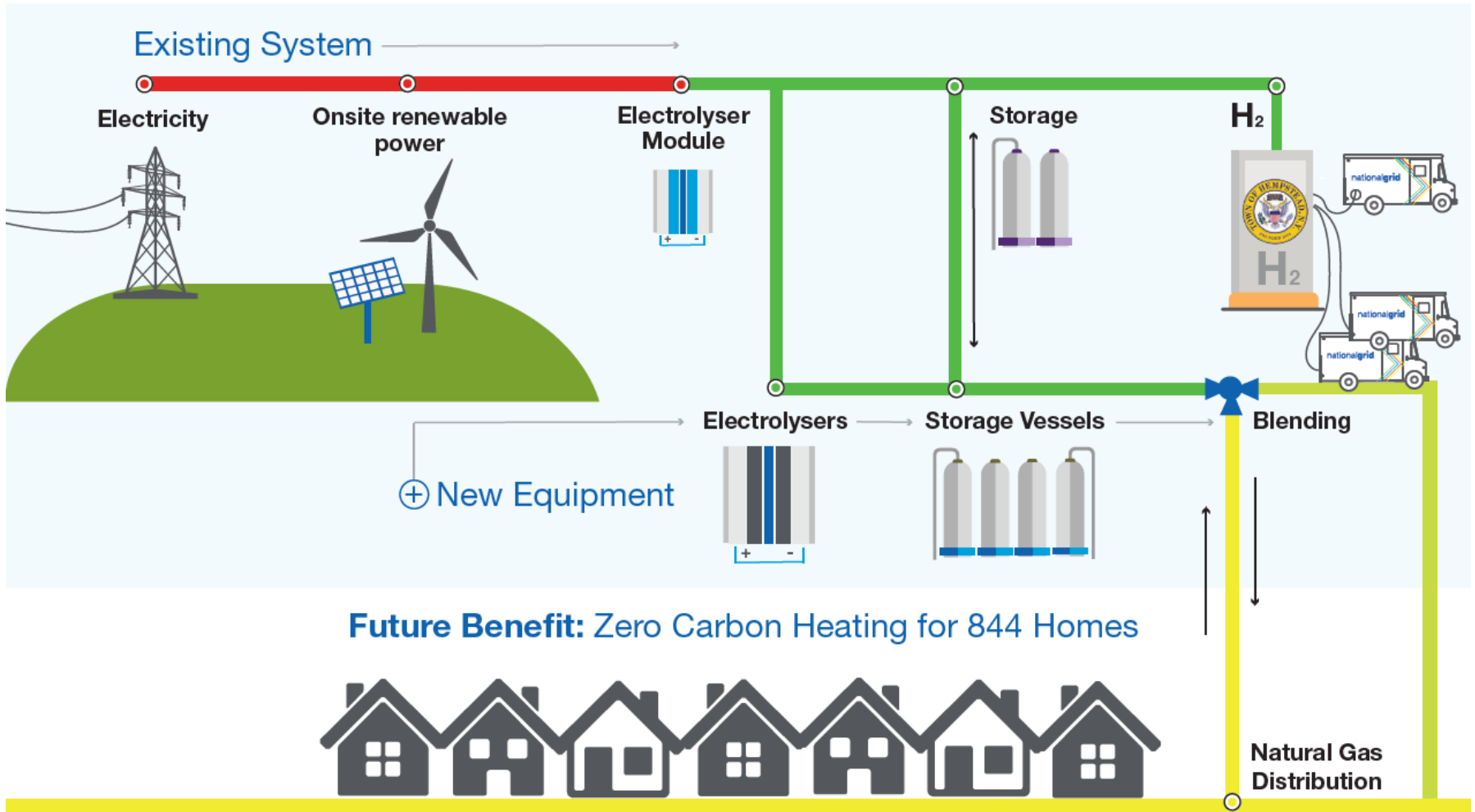
[boem.gov](http://boem.gov)





# HyGrid

## Green Hydrogen Facility Expansion



# Renewable Natural Gas

## Converted NYC's largest wastewater treatment plant into a source of clean energy

- ◆ Partnership with Department of Environmental Protection
- ◆ Processes 250 million gallons/day of wastewater

## Operational Spring 2022

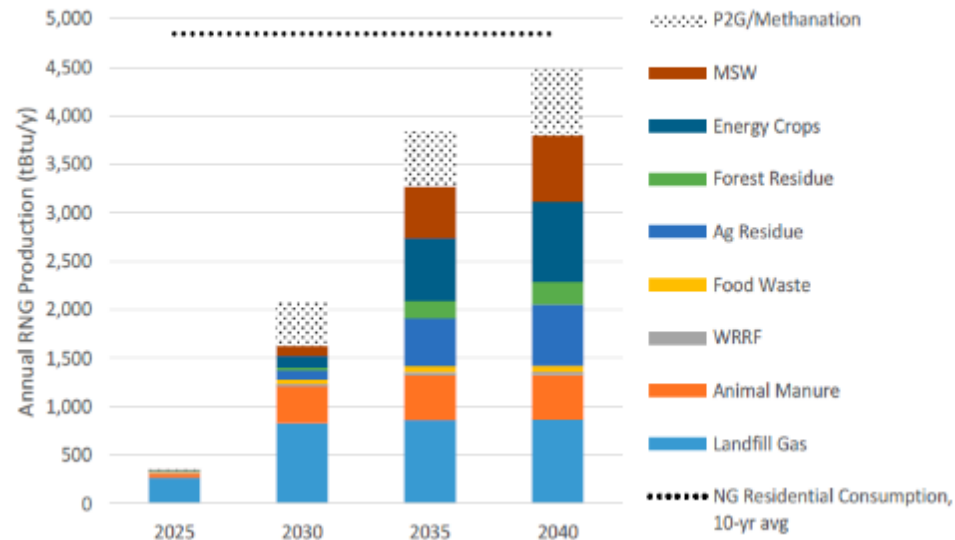
Design Build: **AECOM**

## With the addition of food waste will inject enough RNG to

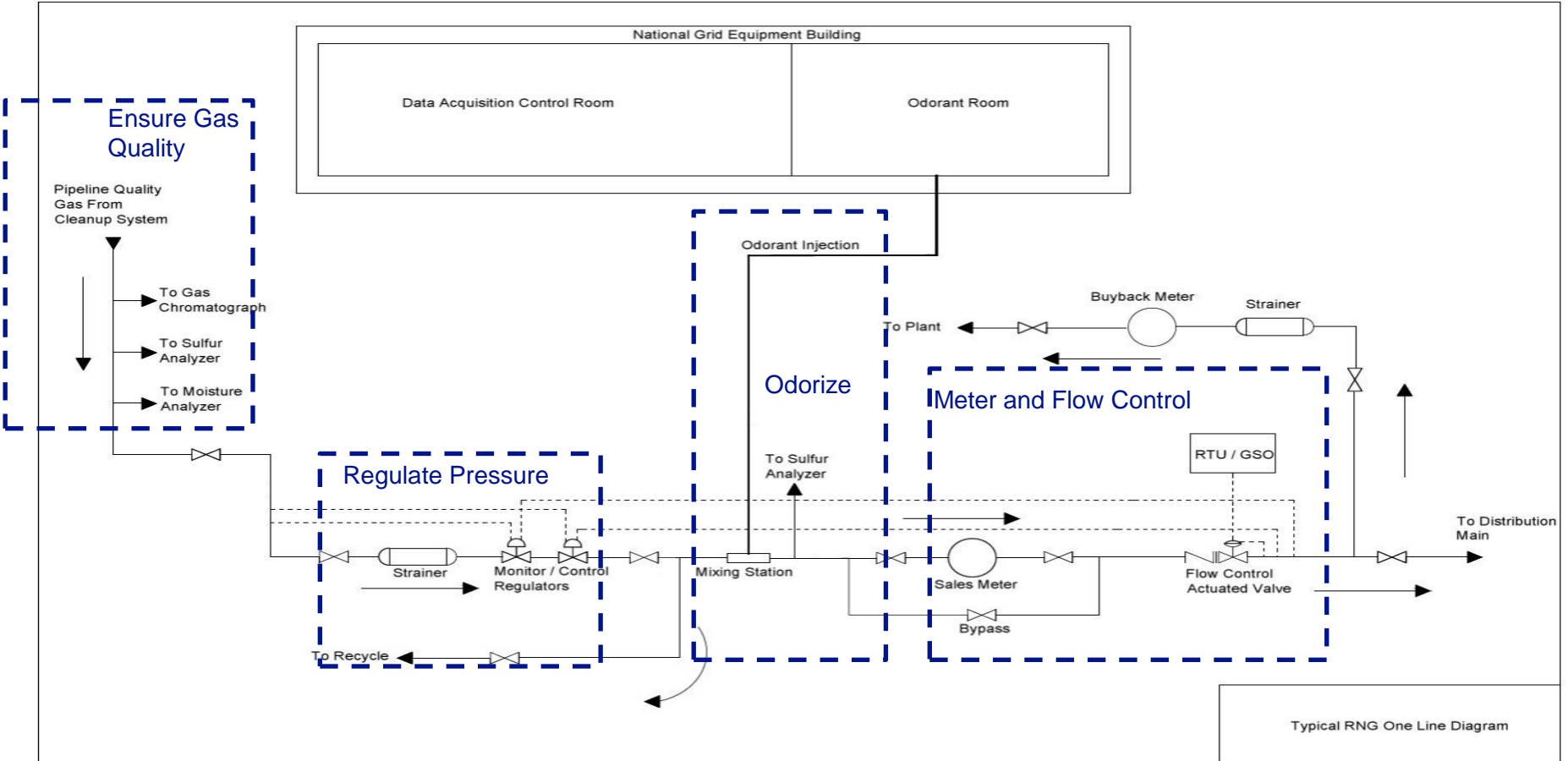
- ◆ Heat ~5,200 homes and
- ◆ Reduce CO<sub>2</sub> emissions by ~90,000 metric tons
- ◆ Equal to emissions of 19,000 cars

National Grid Metropolitan Gas System Operations

Figure 2. Estimated Annual RNG Production, High Resource Potential Scenario, tBtu/y



# National Grid - Typical RNG Interconnection



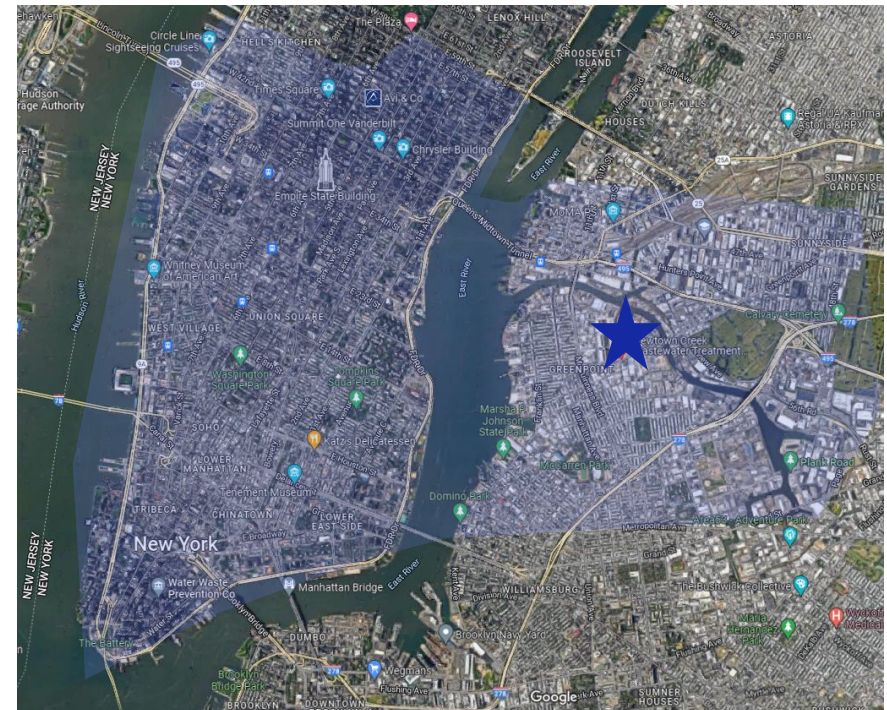
# Project Background

- National Grid and NYC DEP are partners on the project, with National Grid owning and operating the conditioning system while DEP operates the digesters. Waste Management is another partner, who provides engineered biosolids (food waste slurry) to DEP for codigestion
- Newtown Creek WRRF is the largest of New York City's 14 wastewater treatment plants, processing on average 250 million gallons of sewage per day from lower Manhattan, Brooklyn and Queens.
- Newtown Creek operates 8 egg-shaped anaerobic digesters to produce biogas (60-65% CH<sub>4</sub>, 35-40% CO<sub>2</sub>)
- NYC DEP previously used only about 35% of the biogas to fuel onsite boilers for building and process heat. The remaining balance was flared.
- The primary goal of the Newtown Creek RNG project is to beneficially use excess biogas that otherwise would have been wasted. The RNG system is able to inject up to 760 dth/day

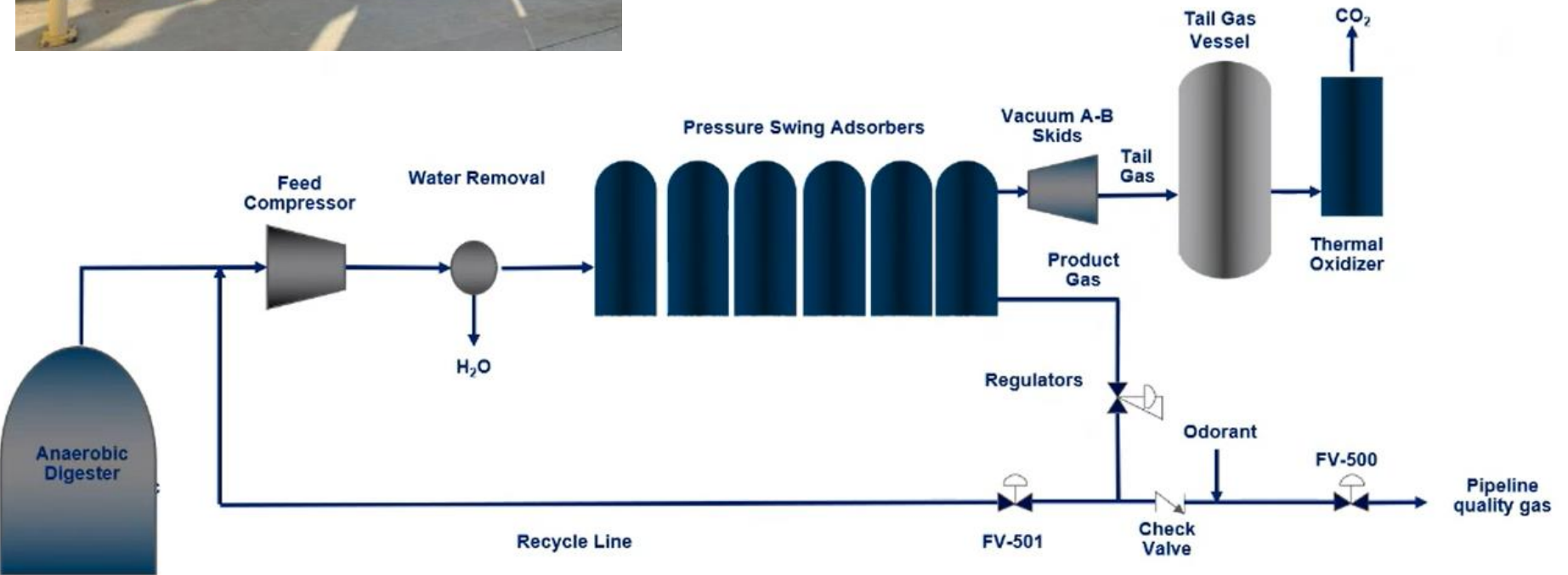
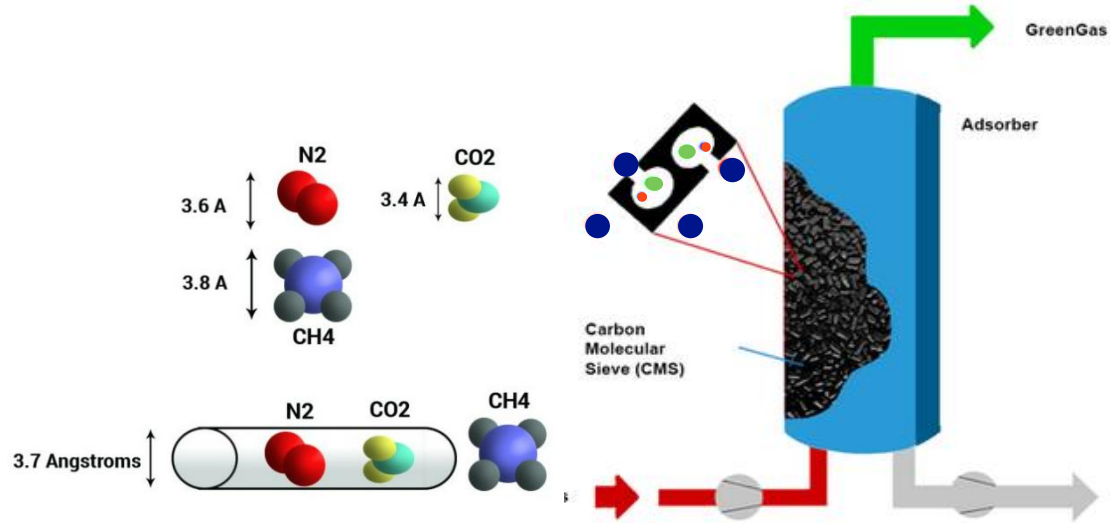


# Project Location

- Excellent access to utilities and biogas source
- Allows thermal oxidizer placement adjacent to facility flares, suitable design conditions
- Use of area consistent with current gas infrastructure use
- Excellent street access for maintenance and response
- Properly secured behind DEP perimeter



# System Breakdown

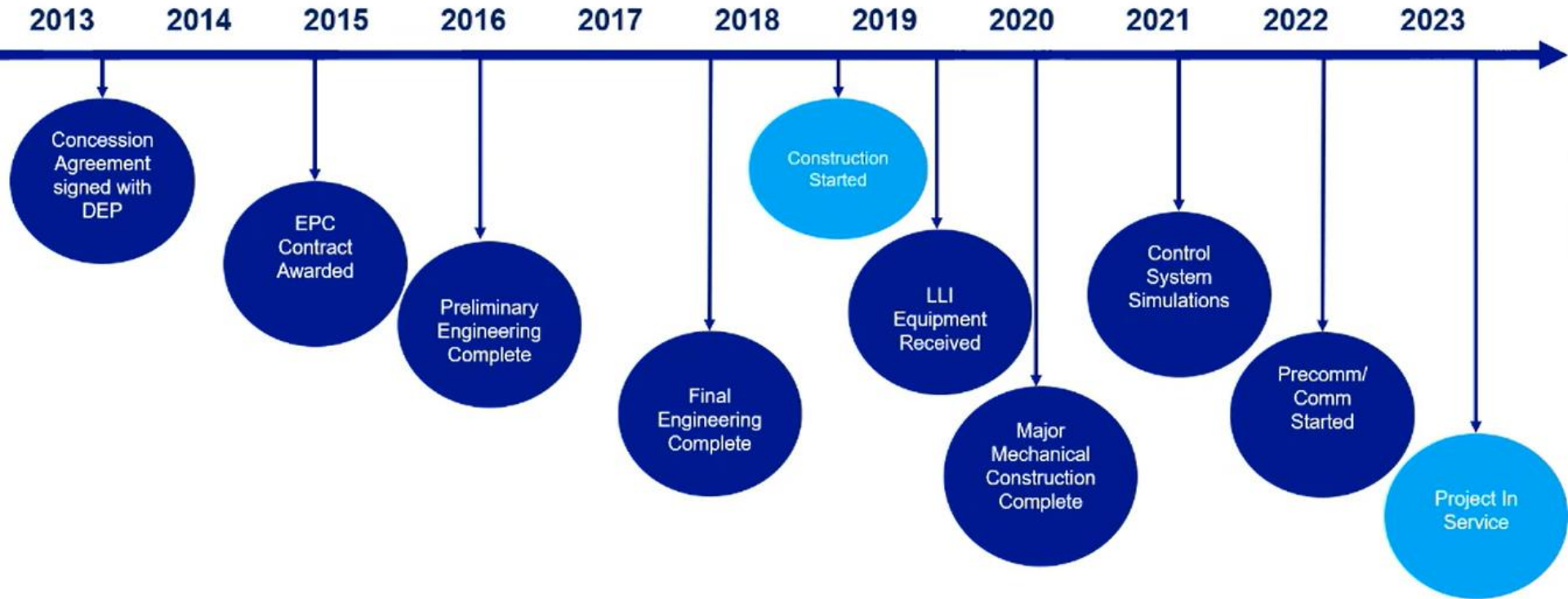


# Commissioning

- **Commissioning of the conditioning system began in August 2022**
- **Send out of on-spec RNG into National Grid's gas distribution system started in October 2022**
- **Commissioning of the odorant system was completed in February 2023**
- **Achieved 24/7 operation in Early March 2023**
- **Conducted a high flow performance test in March 2023**
- **Plant online, all systems in-service March 28, 2023.**



# Project Timeline





# Lessons Learned from Newtown Creek RNG

1. Always consider how you are going to commission a system as you develop the design
2. Redundancy in key assets (N+1) is critical
3. Coordination with Utilities is critical, especially as the system is ready to inject gas. Utilities must prioritize safety and system reliability over everything else, often taking a necessary conservative approach to RNG.
4. Gas Sampling and expedited sampling results are key
5. Avoid pandemics



# Thank You

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