

April 15, 2021

Natural Gas in the Region - Current & Future Role

ACEC/MA: Utilities and Energy Markets



Stephen Leahy
Northeast Gas Association

About NGA

- ◆ Non-profit trade association
- ◆ Local gas utilities (LDCs) serving New England, New York, New Jersey, Pennsylvania
- ◆ Several interstate pipeline companies
- ◆ LNG & CNG suppliers
- ◆ ~ 400 “associate member” companies, from industry suppliers and contractors to electric grid operators
- ◆ www.northeastgas.org



NGA'S ANTITRUST COMPLIANCE PROCEDURES

Adopted by the NGA Board of Directors on June 20, 2018

Objective

The Northeast Gas Association (NGA) and its member companies are committed to full compliance with all laws and regulations, and to maintaining the highest ethical standards in the way we conduct our operations and activities. Our commitment includes strict compliance with federal and state antitrust laws, which are designed to protect this country's free competitive economy.

Responsibility for Antitrust Compliance

Compliance with the antitrust laws is a serious business. Antitrust violations may result in heavy fines for corporations, and in fines and even imprisonment for individuals. While NGA's attorneys provide guidance on antitrust matters, you bear the ultimate responsibility for assuring that your actions and the actions of any of those under your direction comply with the antitrust laws.

Antitrust Guidelines

In all NGA operations and activities, you must avoid any discussions or conduct that might violate the antitrust laws or even raise an appearance of impropriety. The following guidelines will help you do that:

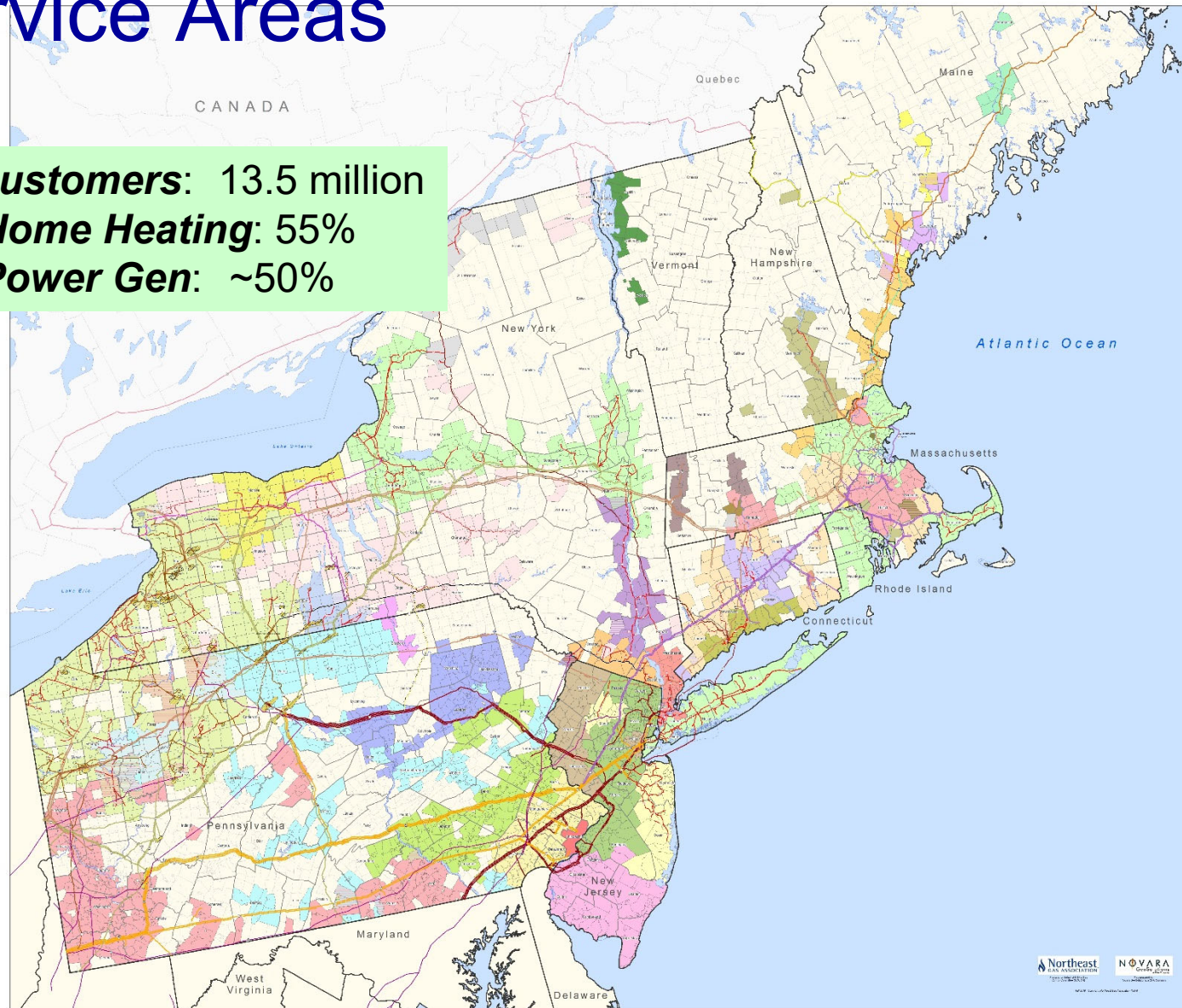
- **Do** consult counsel about any documents that touch on sensitive antitrust subjects such as pricing, market allocations, anti-employee poaching practices, refusals to deal with any company, and the like.

Topics

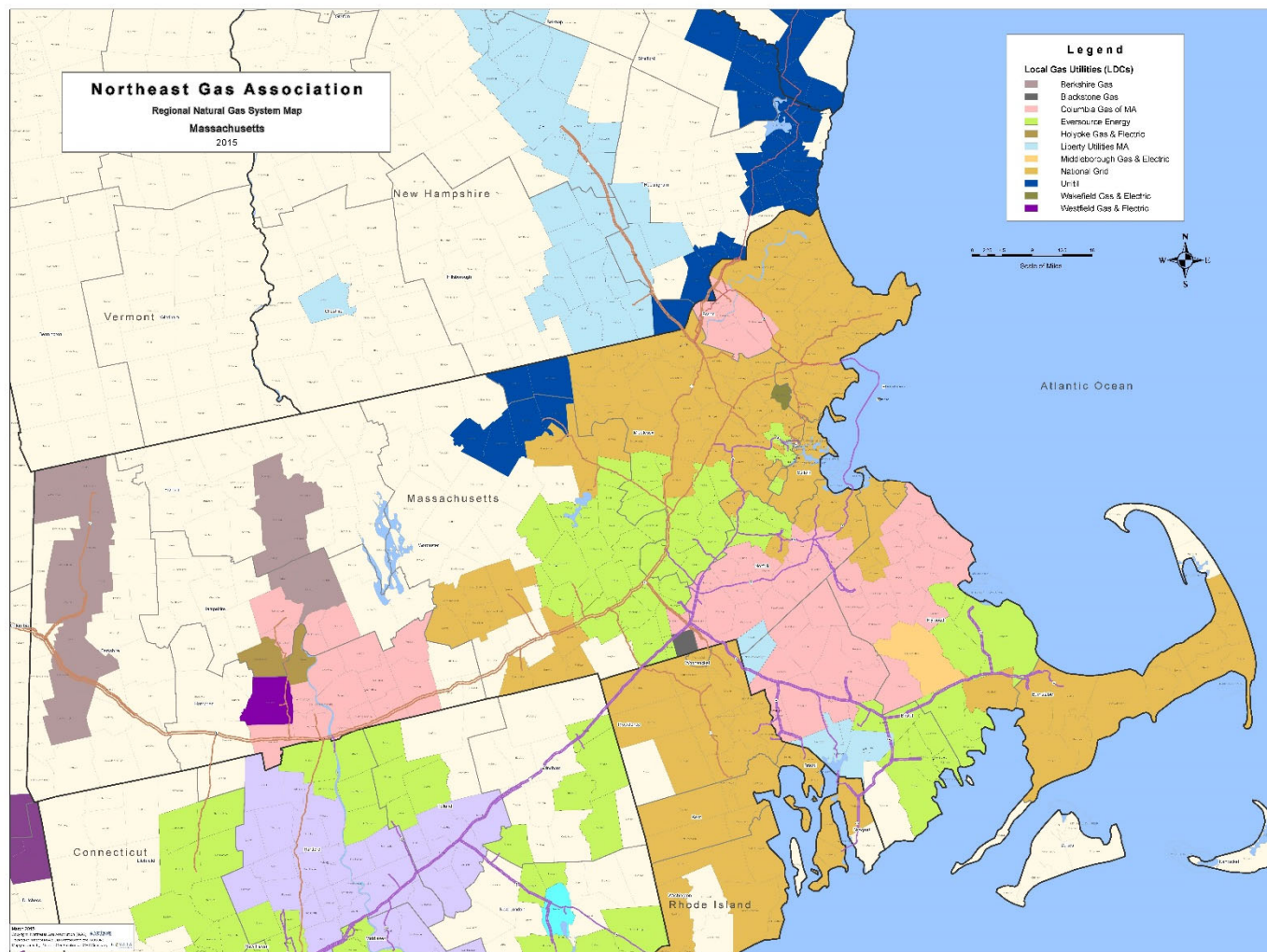
- ◆ System Overview
- ◆ Natural Gas in Massachusetts
- ◆ Utility Approaches to Decarbonization
- ◆ Pathways Forward

Northeast U.S. Natural Gas Service Areas

Gas Customers: 13.5 million
% of Home Heating: 55%
% of Power Gen: ~50%



Massachusetts Natural Gas System



MA

Gas = 52% of home heating

Gas = 60% of power gen

1.7 million natural gas customers

Residential Customer Growth Has Continued in Region



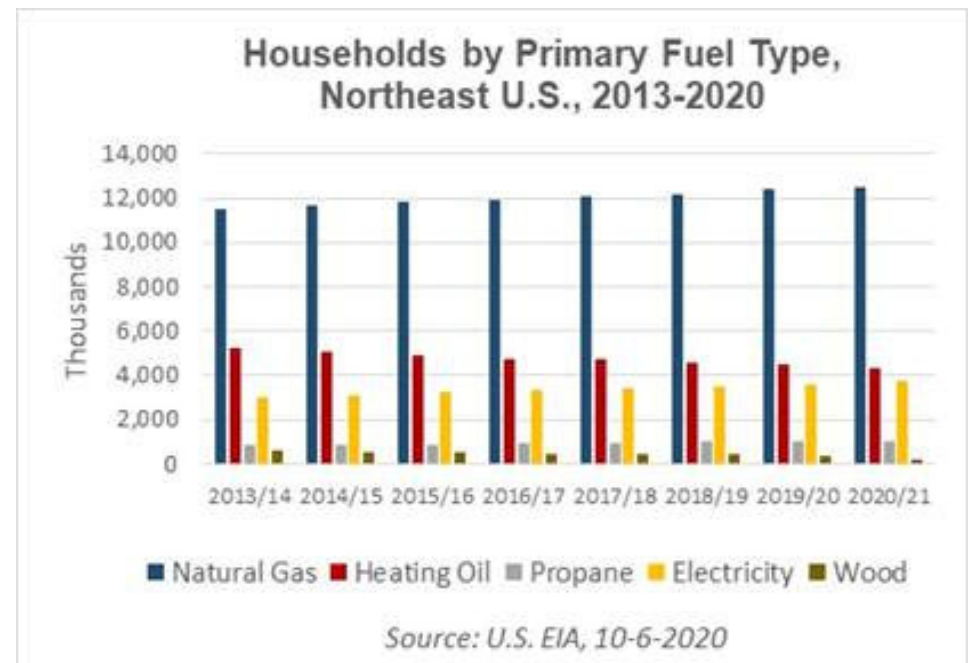
Northeast Homes, Fuel Type %

Natural Gas:	55%
Heating Oil:	20%
Electricity:	16%

New England Homes, Fuel Type %

Natural Gas:	40%
Heating Oil:	34%
Electricity:	15%

Source: 2019 data, U.S. Census

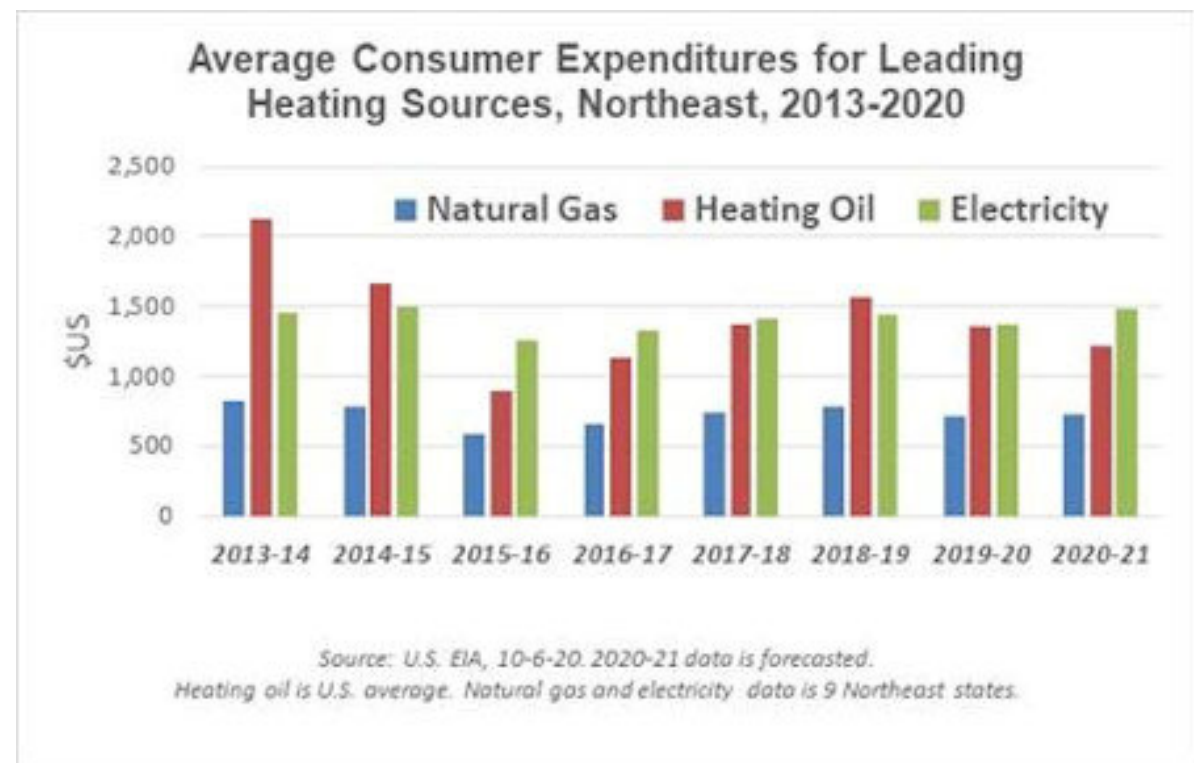


Since 2012, natural gas has added over 1 million new household customers in the Northeast states.

Massachusetts Has Added 175,000 Residential Natural Gas Customers Since 2009



- **Natural gas** currently heats the majority of households in the Commonwealth – at 52%.
- **Heating oil** = 24%.
- **Electricity** = 17%.



Some Recent Additions to Gas Generation Capacity



Footprint Power
Salem Harbor
Salem, MA
674 MWs
Online June 2018



CPV Towantic Energy Center
Oxford, CT
805 MWs
Online June 2018



PSEG Power
Bridgeport Harbor Station 5
Bridgeport, CT
485 MWs
Online June 2019



NRG Canal 3
Sandwich, MA
333 MWs
Online June 2019



Exelon West Medway
Medway, MA
200 MWs
Online June 2019



Cricket Valley Energy
Dover, NY
1,100 MWs
Online Spring 2020

Combined Heat & Power (CHP) / Cogen

Tufts University, Medford, MA



New central energy plant that was fully operational in 2018 - providing energy-efficient cogeneration technology to produce electricity as well as steam, fueled by natural gas. The university noted in fall 2018 that the plant is "Sustainable, cost-efficient, and environmentally friendly... a powerful addition to campus."

Harvard University, Allston, MA



New district energy facility which became fully operational in 2020. Harvard: "It has been designed to be as flexible as possible so emerging technologies can be incorporated over time as the University works towards its climate action goals to be fossil fuel-free by 2050 and fossil fuel-neutral by 2026. The facility currently relies on natural gas because that's the dominant lowest carbon fuel source available for this scale of facilities in the New England region."

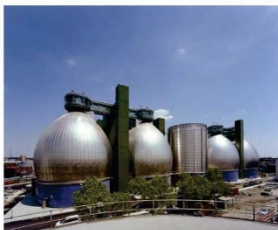
Lowering Carbon Content

“Decarbonizing the gas network”

Natural gas utilities are working to address carbon content, including:

- Efficiency investments;
- Replacement of older pipe systems;
- Renewable natural gas (RNG);
- Hydrogen blending.

Gas
Decarbonization



Biomass



Hydrogen

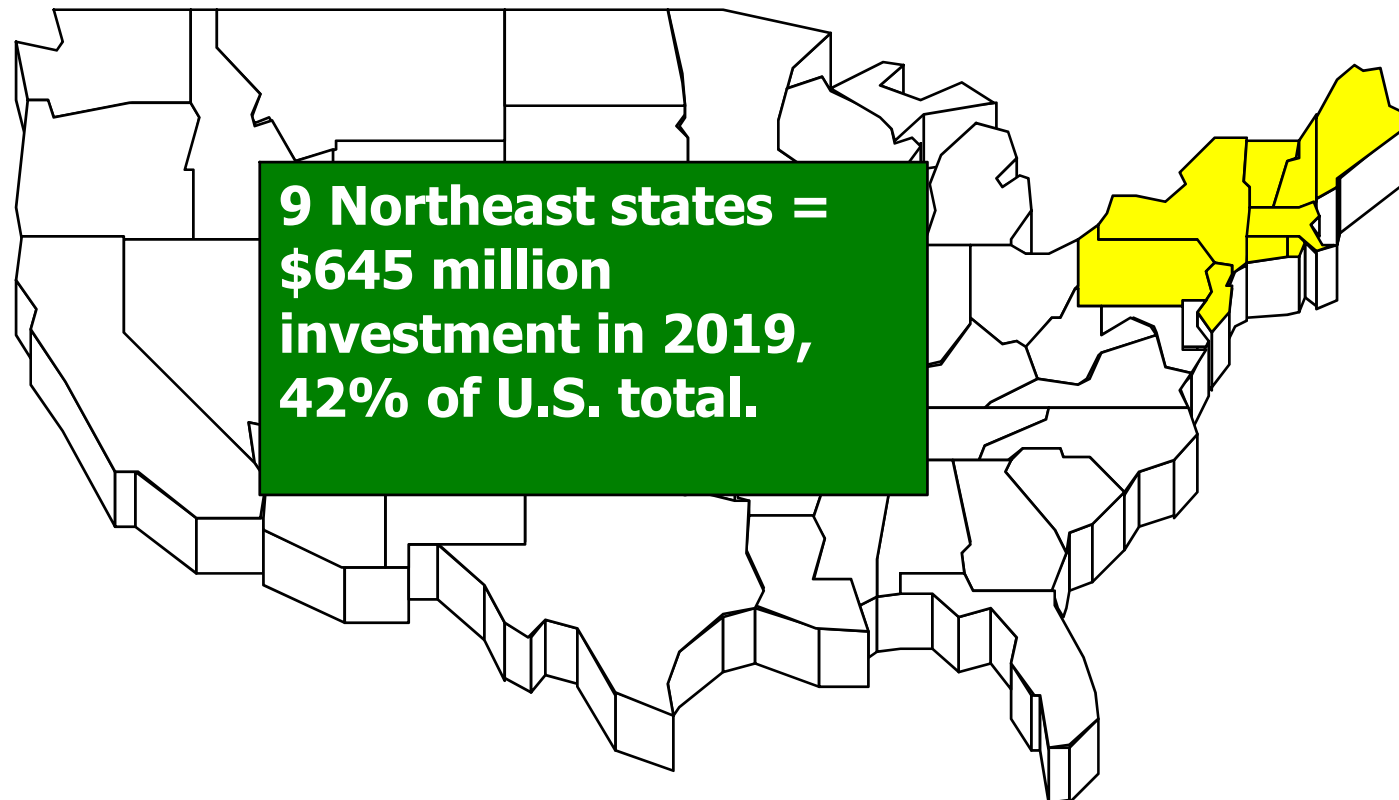


Power-to-Gas
Methane



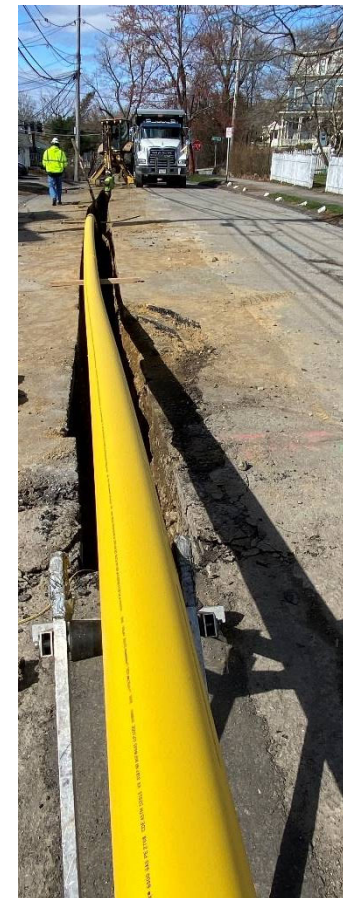
Image: National Grid

Northeast States Lead U.S. in Gas Efficiency Investments



Source: ACEEE, "2020 State Energy Efficiency Scorecard", released Dec. 2020

System Upgrades



Renewable Natural Gas (RNG)

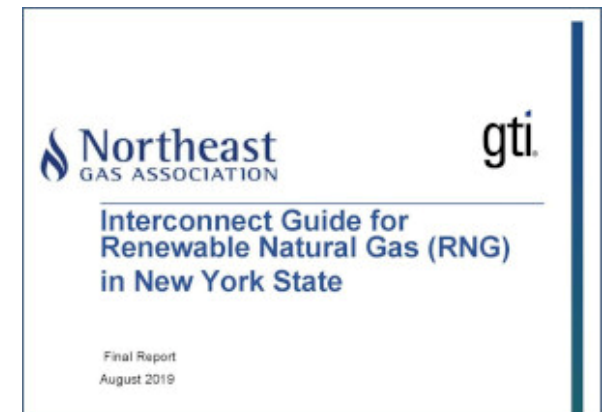
Renewable Natural Gas (RNG), also known as bio-methane or biogas, is pipeline quality gas derived from biomass that is interchangeable with natural gas. The future natural gas network could include renewable gas from dairy farms, waste water treatment plants, landfills, wood waste and food waste plants.



Several gas utilities in the Northeast are looking to incorporate RNG into their supply mix.

NGA & GTI study:

https://www.northeastgas.org/renewable_natural_gas.php



Hydrogen

The Canada Energy Regulator notes there are three methods to produce hydrogen:

- I. **Grey hydrogen** uses an industrial process called 'steam methane reforming', which uses high temperature steam to separate hydrogen from methane - the main component of natural gas.
- II. **Blue hydrogen** uses the same method as grey hydrogen, except it captures and stores the carbon dioxide (CO₂) emissions resulting from the process.
- III. **Green hydrogen** utilizes renewable electricity and a process called electrolysis (passing an electric current through water) to separate and extract hydrogen

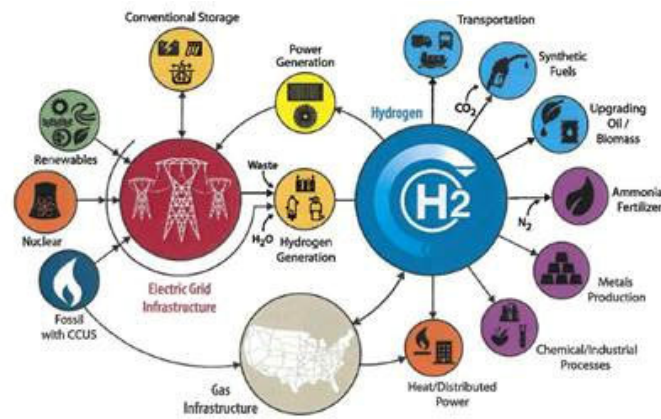


Figure 3. Conceptual H2@Scale energy system²³

Graphic: U.S. DOE,
"Hydrogen Program
Plan," 11-20

Hydrogen Blending

“One way to integrate hydrogen is to mix it with methane in an existing natural gas pipeline. This blending decarbonizes some of the system by displacing a portion of the natural gas with hydrogen. Experiments in the U.K. and France show that a mixture of 80 percent methane and 20 percent hydrogen can be efficiently moved in a natural gas pipeline.”

- Michael Webber, “Can Natural Gas Be Part of a Low-Carbon Future?”, *Scientific American*, April 2021



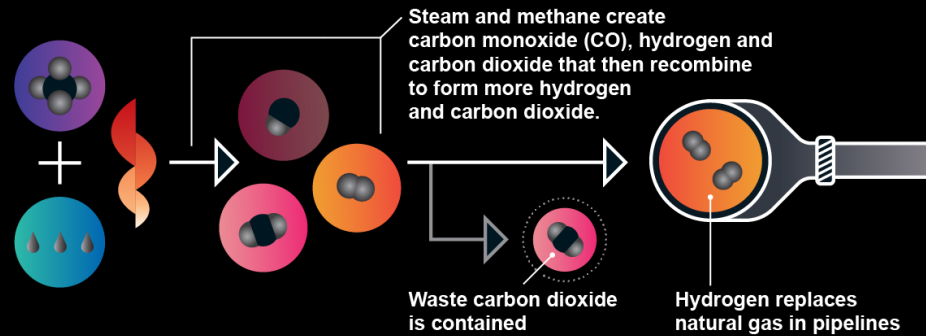
Image: U.S. DOE,
"Hydrogen Program
Plan," 11-20

The Hydrogen Process: Some Examples

STEAM RE-FORMING OF METHANE, WITH CARBON CAPTURE

Heat and water added to methane from a well creates hydrogen and CO₂, which would be captured rather than emitted. Industry already uses this process widely to make hydrogen for refineries and foundries. Clean energy would be required to generate the heat.

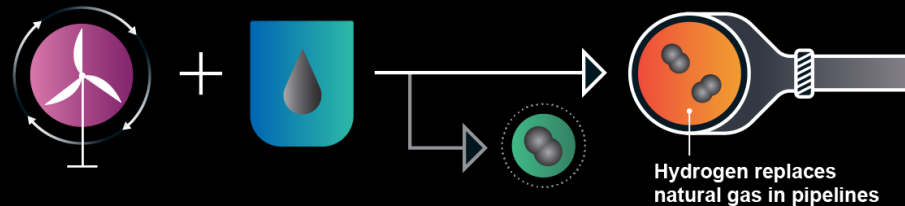
Add **heat** to **methane (CH₄)** and **steam (H₂O)** to create **carbon dioxide (CO₂)** and **hydrogen (H₂)**



ELECTROLYSIS

Renewable electricity splits water to create hydrogen. More energy is needed than for steam re-forming of methane, but the only by-product is oxygen, which is released into the air.

Add **electricity** to **water (H₂O)** to create **oxygen (O₂)** and **hydrogen (H₂)**



Graphic: "Can
Natural Gas Be
Part of a Low-
Carbon
Future?,"
Scientific
American, April
2021

The Road Ahead

- Natural gas has grown to be a preferred fuel for homes, businesses and the power sector in the last 2 decades.
- The region has made significant advances in reducing air pollution...thanks in large measure to gas.
- Going forward, the natural gas industry is working to lower its carbon content and reduce its environmental impact.
- The region's energy system is in transition; the natural gas pathway remains part of the discussion.

