The Future of Heat: How the Natural Gas System Can Support Decarbonizing the Building Sector in New England

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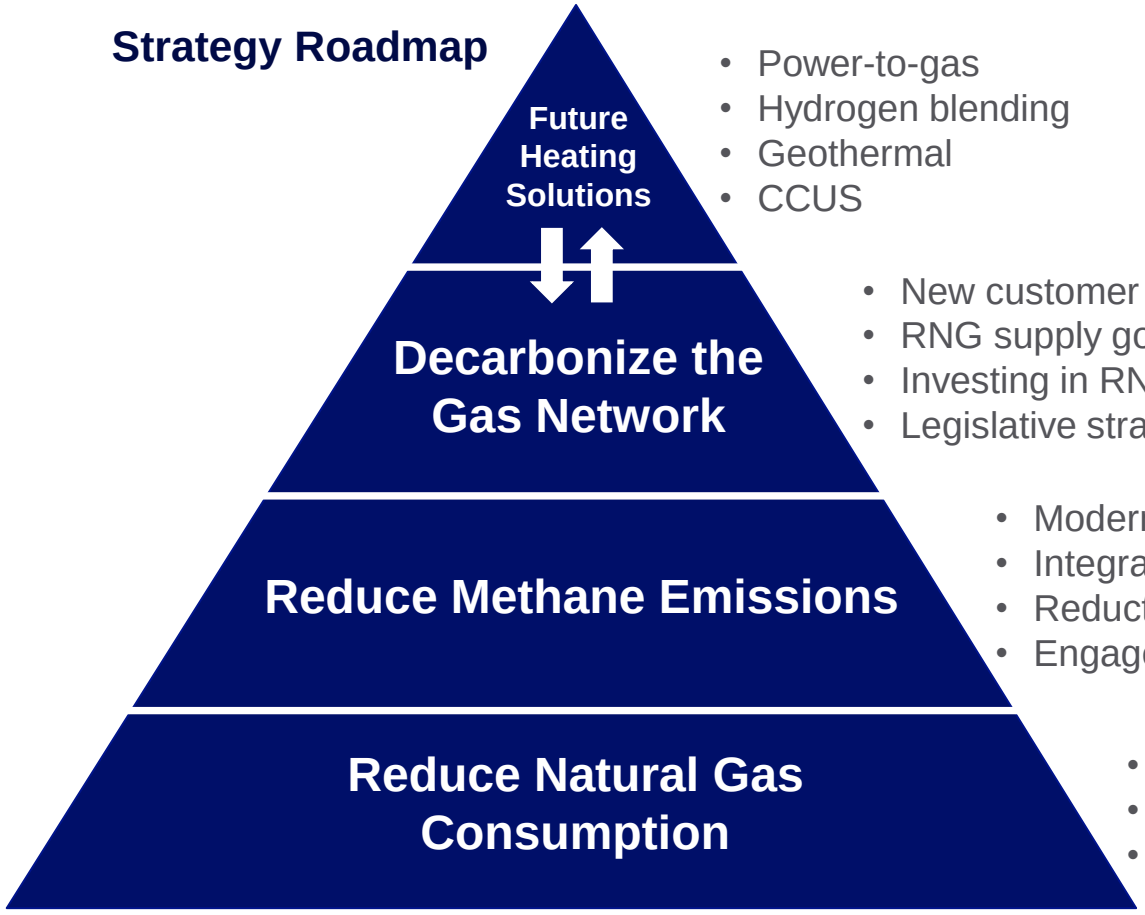
National Grid's Northeast Decarbonization Pathway

Elements of the National Grid Northeast Decarbonization Pathway

	40% x 2030	Deep Decarbonization - 2050
Power	▪ 67% zero-carbon electricity supply, supported by a large increase in renewables (vs. 45% in 2017)	▪ 100% zero-carbon electricity supply, utilizing: - Large-scale renewables - Zero-carbon "firm" capacity, e.g. hydro, nuclear, gas with carbon capture and storage and interconnections (Quebec) - Inter-seasonal energy storage
Transport	▪ >10 million light-duty (passenger) electric vehicles on roads (vs. <75k in 2017)	▪ >20 million light-duty (passenger) vehicles (100% of the fleet) ▪ Low-carbon technology use in medium and heavy duty vehicles (electric or natural gas) ▪ Efficiency improvement in aviation, shipping
Heat	▪ 2x rate of energy efficiency retrofits ▪ 3x rate of oil-to-gas heating conversions ▪ 10x scale up of oil-to-electric heating conversions	▪ Tapestry of solutions required: - Energy efficiency investment, esp. insulation - Zero/low carbon molecules – hydrogen, RNG/biomethane - Hybrid heat - natural gas/heat pump including geothermal - Carbon negative technologies/offsetting

How the Gas Network Will Help Us Achieve Our Goals

Strategy Roadmap



- Power-to-gas
- Hydrogen blending
- Geothermal
- CCUS

- New customer products
- RNG supply goal
- Investing in RNG projects
- Legislative strategy & policy framework

- Modern infrastructure, replace LPP
- Integrate advanced leak detection
- Reduction goal, ONE Future
- Engage entire value chain

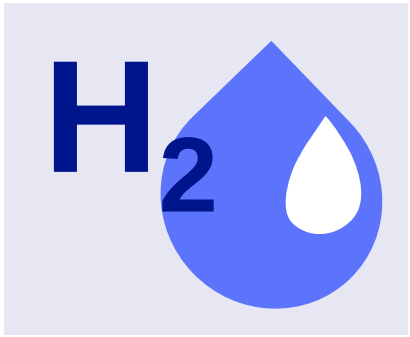
- Accelerate EE & DR programs
- “No regrets” electrification
- Geothermal / electrification investments

Heating Sector Emissions Toolkit

Energy Efficiency

Gas Decarbonization

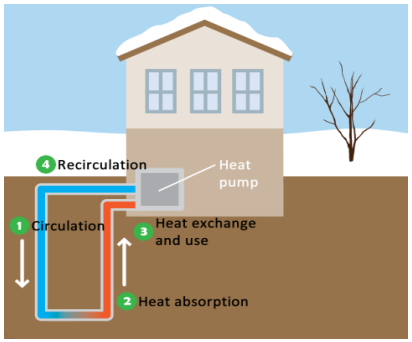
RNG/Biomass



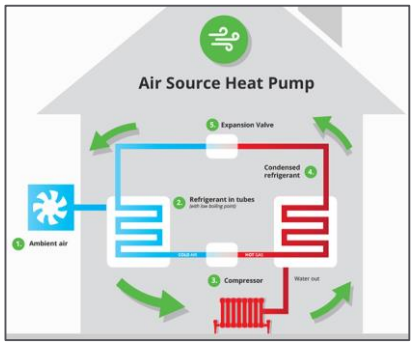
Hydrogen

Power-to-Gas Methane

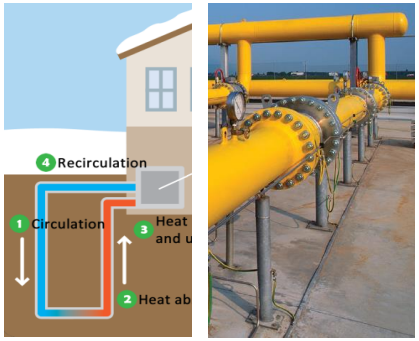
Heat Pumps (with renewable power)



Geothermal Heat Pumps



Air Source Heat Pumps



Hybrid Heat Pumps

ASHP Image Source: Ways2GoGreen Blog 2017
Insulation Image Source: REenergizeCO

Pending New York Proposals*

Goals	Proposed Programs/Products/Demonstrations
Offer customers clean heating solutions	Green Gas Tariff
	Geothermal Utility Ownership Demonstration
Encourage RNG development to decarbonize the gas network	RNG Interconnection Proposal
	Future of Heat Engineering Group
Drive gas decarbonization innovation	Power-to-Gas Demonstration Evaluation
	Hydrogen Blending Study
Develop incentives (EAMs) that align state decarbonization goals	System Efficiency, Carbon Reduction, Energy Efficiency

**Proposals pending before NY PSC as part of KEDNY/KEDLI rate case.*

New York Clean Energy Goals

- **Continuing emphasis on clean energy policies.**
  - Reducing GHG from the energy sector 40 percent (from 1990 levels) by 2030.
  - Longer-term goal of decreasing total carbon emissions 85 percent by 2050.
  - Renewable energy goal that 100 percent of electricity consumed in New York be carbon neutral by 2040.
- **Challenges: Meeting growing customer demand for service in ways that advance NY state clean energy goals.**
  - Long Term Natural Gas Capacity Supplemental Report (May 2020).
    - Six public meetings with over 800 participants and over 7,000 comments filed.
    - Updates included revised demand/supply scenarios, new risk impact analysis and updated cost numbers including cost of carbon and customer cost impact.
    - Two recommendations were presented: (1) enhancements to existing infrastructure combined with incremental EE and DR with potential low-carbon solutions including geothermal, RNG, and hydrogen; and (2) infrastructure solution.

New York Gas Planning Proceeding

- **NYPSC Gas Planning Proceeding [Case 20-G-0131]**
  - Proceeding on Motion of the Commission in Regard to Gas Planning Procedures filed March 2019.
  - "Conventional gas planning and operational practices adopted by natural gas utilities have not kept pace with recent developments and demands on energy systems" . . . Planning must be conducted in a manner consistent with the recently enacted Climate Leadership and Community Protection Act (CLCPA).
  - The transparency of planning practices also merits reexamination.
  - Reviews role of gas EE, demand response, electrification, and NPAs in meeting planning needs and minimize infrastructure investment.
- **Three Key LDC Deliverables**
  - 90 Day Filing (June 17) – analysis of constrained areas of each LDC's systems.
  - 120 Day Filing (July 17) – Supply and demand analysis for each utility's entire service territory; proposal for criteria for reliance on peaking services and moratorium management issues.
  - 150 Day Filing (August 16) - demand reducing measures including energy efficiency, electrification, demand response, non-pipe solutions, and other measures to address identified areas of supply/demand imbalance.
- **NYPSC Staff will issue a proposal to modernize the gas system planning process in New York (August 16)**
  - Comprehensive proposal for modernizing gas planning process; forward-looking, focused on policy needs, designed to minimize total lifetime costs, and inclusive of stakeholders.
  - Adopting uniform planning and moratorium management criteria; uniform processes and procedures for manage future moratoria; proposals will undergo a public comment.

Rhode Island

Governor's Executive Order 19-06 (July 2019):

- The goal of the Heating Sector Transformation (HST) Initiative was to "advance RI's development of clean, affordable, and reliable heating technologies" while reducing emissions.
- Two agencies, Office of Energy Resources and the Division of Public Utilities and Carriers, were tasked by the Governor to lead the initiative.

HST Report (April 2020):

- Focused on three decarbonization solutions: (1) increased energy efficiency; (2) fuel decarbonization including RNG and potentially hydrogen for industrial heating; and (3) decarbonized electrification including air source heat pumps and geothermal.
- Transformation will need a mix of solutions which should be technology-agnostic, and there is a need to develop and demonstrate promising, carbon-reducing technologies, while enabling consumer adoption of decarbonized heating solutions.
- Next steps were unspecified; however, themes to guide a ten-year policy roadmap include: (1) ensuring increased efficiency and reduced carbon content of all fuels; (2) learning from data collection, R&D, and pilots; (3) informing and educating stakeholders about pros/cons of options; (4) enabling deployment with incentives; and (5) expanding planning horizons.

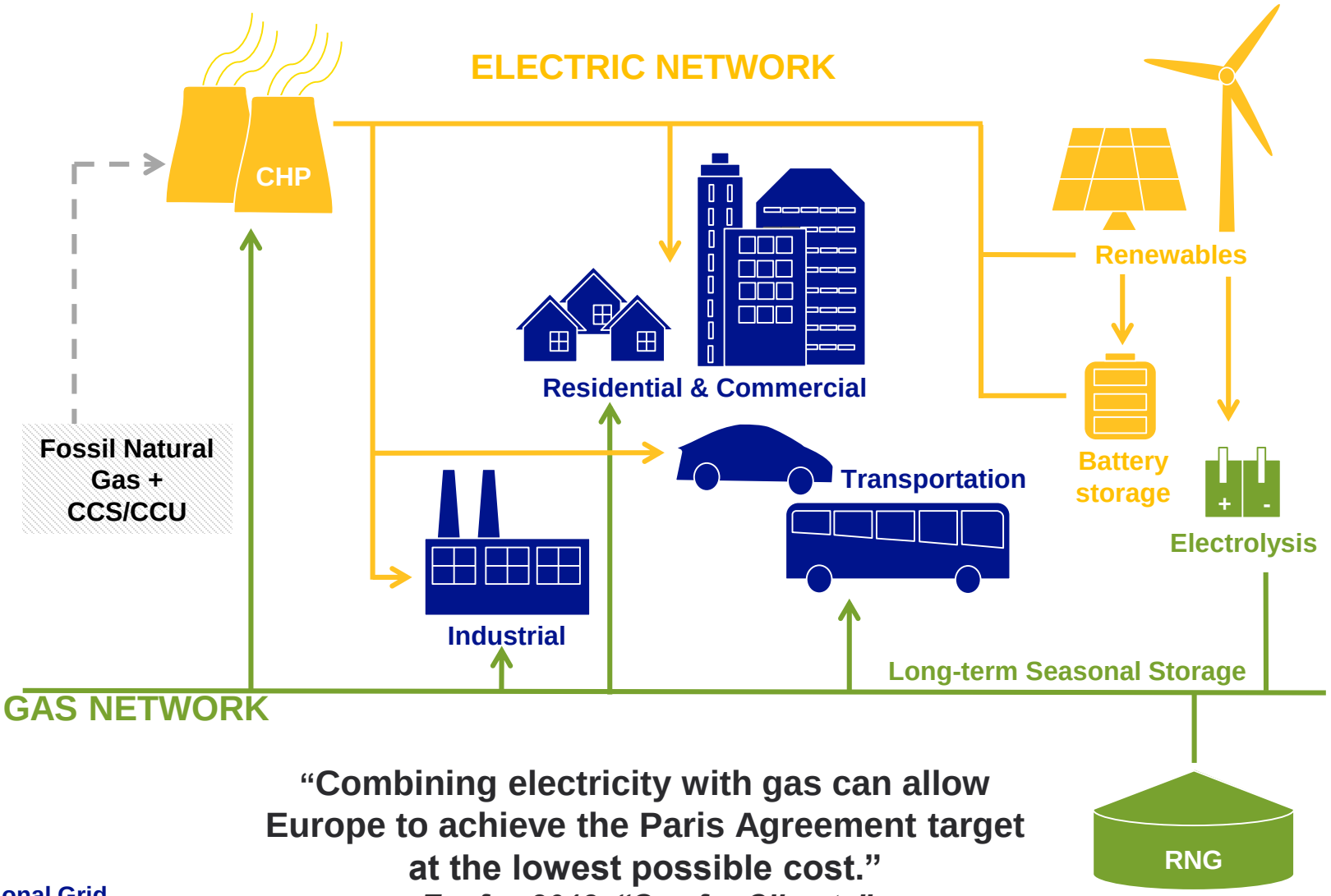
Massachusetts

Rapidly Evolving Landscape

- August 2008: MA Global Warming Solutions Act (GWSA) adopts 2007 International Panel on Climate Change (IPCC) reduction target resulting in 80x50 emissions limits.
- October 2018: IPCC calls for countries to achieve net zero emissions by 2050.
- November 2019: Brookline bylaw bans gas in new buildings and renovations. Other communities consider potential bans.
- January 2020: Governor Baker announces net zero target.
- February 2020: Executive Office of Energy & Environmental Affairs (EEA) public comment period announced for net zero goal.
- April 2020: EEA Secretary issues formal determination setting net zero (or emissions no greater than 85% x 2050) as legal limit under GWSA.
- June 2020: AG Healey files petition with DPU requesting an investigation into the future of natural gas utilities.
- Late 2020: Massachusetts Gas rate case future of heat proposals position company for a net zero future: hydrogen integration; RNG procurement; and geothermal deployment.

Our Vision: A Holistic Energy System

A deeply decarbonized gas & electric system is integrated & complementary



"Combining electricity with gas can allow Europe to achieve the Paris Agreement target at the lowest possible cost."

Ecofys 2018, "Gas for Climate"

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