

National Fuel Gas Distribution Corporation

Informational Session Case Nos. 20-G-0131 & 22-G-0610 November 16, 2022

Meeting logistics (Agenda, Q&A, etc.)



National Fuel Gas Distribution Corporation (National Fuel or the Company) is hosting this Informational Session to share background information regarding its natural gas system and the natural gas system generally to enable stakeholders' effective participation in the longterm planning process.

There will be two presentations in this program. The first will describe the natural gas industry generally. The second will describe important features of the National Fuel system specifically, including its service territory, operations, and other issues that facilitate an understanding of the Company's Long-Term Plan (LTP).

Q&A will follow each presentation to address matters related to the material presented.

Please use the "raise hand" feature of the meeting platform so that we know when there are questions to address. (We will answer questions in the order they are received.)





NATURAL GAS INDUSTRY OVERVIEW

Mark Cattrell & Melissa Bartos



What is Natural Gas? Where Does it Come From?

Natural Gas Resource Pools



Source: https://www.eia.gov/energyexplained/natural-gas/

North American Natural Gas Production





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Natural Gas: Units of Measure

- **BTU** (British thermal unit) measures the *heat value* of natural gas. One BTU is the amount of heat energy required to raise one pound of water by 1°F.
- **CCF** (one hundred cubic feet) measures the *quantity* or volume of gas.
- Gas utilities typically bill customer usage by either "therms" (*heat value*) or by cubic feet (volume).
 - 1 natural gas "therm" = 100,000 Btu
 - "MCF" and "CCF" are both common volume units. 1 MCF = 10 CCF

0.01 CCF =0.01 MCF = 0.01 Th 1 CF 1.000 Btu = 0.001 Dth 0 001 MMBtu = 100 CF =1 CCF =0.1 MCF ≡ 100,000 Btu = 0.1 Dth =1 Th 0.1 MMBtu = 1,000 CF = 10 CCF = $1 \text{ MCF} \equiv$ 1,000,000 Btu = 1 Dth =10 Th 1 MMBtu =

Assumes BTU factor is 1 (i.e., 1,000 BTU/CF of natural gas). Actual BTU conversion (based on heat content of gas) varies by region by month.





How is Natural Gas Used?

- Electric power generation
 - Power plants
 - Distributed generation
 - Fuel cells, engines, and turbines
 - Secondary generators, typically used when primary power sources fail
- Industrial customers
 - Fuel for industrial processes
 - Feedstock for chemical processes and products
- Residential customers
 - Heating, cooking, air conditioning, etc.
- Commercial customers
 - Space heating, water heating, food preparation
- Transportation/Vehicle consumption
 - Compressed natural gas (CNG)
 - Liquefied natural gas (LNG)



The U.S. consumed ~30 trillion cubic feet (Tcf) of natural gas in 2021, which is roughly 32% of U.S. total energy consumption

Source: https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php



Comparison of Natural Gas to other fossil fuels used for power generation



Fossil-based Generation: CO² Emissions Density

Power Density (W/m²)



Source: (1) World Nuclear Association; (2) van Salk, Behrens (Energy Policy, August 2018)



The Natural Gas Value Chain



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How is Natural Gas Transported?

The Interstate Natural Gas Pipeline System:

- The predominant mode of transportation for natural gas in the U.S
- Subject to <u>safety</u> regulation by the Dept. of Transportation, Pipelines and Hazardous Materials Safety Administration (PHMSA)
- <u>Economic regulation</u> by the Federal Energy Regulatory Commission (FERC)

Interstate pipelines are highly pressurized, with compression systems at various intervals to maintain pressure and flow **U.S. Interstate Natural Gas Pipelines**



Source: Congressional Research Service



How is Gas Stored?

Above ground storage

 Some natural gas utilities use above ground storage facilities located on the distribution system

Underground Natural Gas Storage Facilities

Geologic storage facilities take the form of reused oil and gas wells

Fundamental Storage Concepts

- Production area
- Market Area
 - Storage provides some protection from price volatility
 - Serves a reliability purpose as well

Natural Gas Underground Storage



Sources: https://atlas.eia.gov/datasets/natural-gas-underground-storage/explore?location=37.824831%2C-97.089969%2C5.oo



How Does the Distribution System Operate?



Gas travels from the upstream interstate pipeline system to the "city gate," the point where interstate and distribution pipelines connect

- Pressure is reduced
- Local odorant is applied to the gas (for safety)

Subsequent operational functions ensure distribution system reliability

- Distribution system design/construction
- Metering services
- Supply management



Distribution systems involve a complex set of infrastructure components



Natural gas travels from the city gate station to gas companies and finally, to end users

- Distribution lines are often referred to as "mains" and "services"
- Regulators control each distribution system, and maintain optimal gas pressure to ensure safe practices and enhance efficiency
- As gas travels closer to end-users, the "mains" connect to smaller pipes called "services"
 - Pipe diameter and gas pressure decrease as the distribution system gets closer to end-use customers



Piped to Homes and Businesses through a Reliable, Underground Network

- Natural gas is transported to ~70 million homes and businesses
- Natural Gas service is not prone to weather events to the degree other infrastructure is
- As a result, delivery is <u>extremely</u> reliable (typically well above 99%)
- Underground network has safety advantage, with certain risks as well





Sources: (1) Dept. of Transportation, Pipeline & Hazardous Materials Safety Administration; (2) Interstate Natural Gas Association of America (INGAA)



What are a Local Distribution

Company's Key Accountabilities?



A local distribution company (LDC) owns and operates the infrastructure in the natural gas distribution supply chain *Primary objectives:*

- Operate a safe, reliable, and resilient system at a reasonable cost
 - Safety oversight until end-use consumption
 - LDCs monitor gas flow rates and pressure gauges at checkpoints throughout system
 - Zero-tolerance for service interruptions
 - Regimented planning necessary to protect system reliability
- Other accountabilities include:
 - Forecasting gas demand to meet seasonal needs
 - Implement programs to manage and meet peak demands
 - Energy efficiency, demand response, peak-adjustment programs
 - Ensuring transportation capacity is sufficient to meet demand
 - Mitigate risk of price volatility to the degree reasonable



Robust LDC gas procurement practices can mitigate the effect of market volatility on customers



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Alternative forms of natural gas have use in certain scenarios





- *Liquefied* Natural Gas (LNG)
 - Natural Gas cooled to -260°F
 - Distribution-sited LNG facilities, in most cases with onsite pressurization
- <u>Compressed</u> Natural Gas (CNG)
 - Highly pressurized methane (~3,000 psig)
 - Compression shrinks the gaseous volume by a factor of approximately 100
 - The compressed state increases transportation
 efficiencies
 - For example, a flatbed CNG truck can transport several 20" diameter tubes containing gas

Alternatives & **Decarbonization**

Alternatives to conventional natural gas

- Renewable Natural Gas (RNG)
 - Can serve as a drop-in ("like for like") replacement for natural gas using existing infrastructure
 - Significant potential for near-term decarbonization
- Hydrogen (H₂)
 - H2 as a potential decarbonization tool has attracted significant research and development capital
 - The extent to which H_2 can replace or complement natural gas continues to be evaluated

Alternatives have the potential to make material contributions to decarbonization.

Renewable Natural Gas and hydrogen resources



Source: https://www.eia.gov/energyexplained/biomass/landfill-gas-and-biogas.php



Transportation,





What are the components of a typical monthly gas utility bill?

- 1. Customer charge/meter charge/service charge
- 2. Distribution system usage charge
- 3. Upstream delivery service charges
- 4. Supply charges ("pass through" charges, subject to market price volatility)
- 5. Surcharges/special-purpose charges
- 6. Taxes and Fees

Account #:	XYZ-1234-9876		Public	Service	e Compan	y, Inc.
Invoice #:	22-0701-L					
Invoice Date:	08/06/2022			A		
Service Dates:	07/03/2022 - 08/03/2022			t t		
Total Amount D	ue by 09/06/2022:	\$134.97	1	4		
Amount Due aft	er 09/06/2022:	\$139.02]			
Service for:			Previous Balance:			\$130.36
Joseph Q. Traveler		Payment (07/30/2022):			\$130.36	
1234 Main Street		Balance Forward:			\$0.00	
Springfield, CA 9	90210			Units	Rate	Charge
Meter #:	8187961673		Customer Charge:			\$12.50
Days on Bill:	31		Usage Charge:	50 ccf	\$0.193940	\$9.70
Usage:	50 ccf		Interstate Trans. Charge:	35 ccf	\$0.062300	\$2.18
			Interstate Trans. Charge:	15 ccf	\$0.056000	\$0.84
70	1.1.1.1		Natural Gas C1	35 ccf	\$2.052300	\$71.83
50			Natural Gas C2	15 ccf	\$1.907840	\$28.62
30			Energy Assistance Charge			\$0.50
10 10 20			Energy Efficiency Prog. Charge			\$0.35
⊃ 10			Other Surcharges			\$1.3
e a	Oct Jan Jan Aar fay Jul		Subtotal:			\$127.87
-, 0)	2 2 2 2 2 2 7 2 7		Franchise Fee		3.00%	\$3.84
			City Occupation Tax		0.80%	\$1.02
			Sales Tax			\$2.25



How is the Natural Gas Industry Regulated?



<u>Safety regulations</u> at the federal, state, and local level apply to the entire natural gas value chain, from well-head to delivery service that reaches homes and businesses around the country



<u>**Competition**</u> is introduced where possible (*e.g.*, customers are often able to shop among competitive natural gas commodity suppliers)



State and federal regulators apply *Economic regulation* when competition is not feasible.

Regulatory compact: in

exchange for providing safe and reliable service to all customers, a regulated utility has the opportunity to earn a just and reasonable rate of return on its capital investments.



Overview of NY LDCs & Service Territories

Investor-Owned Utilities, Municipal Gas Utilities, and Utility Cooperatives

- Includes single-service and combined utilities, which provide gas and electric services
- For example, National Fuel Gas Distribution Corporation is a single-service LDC that provides natural gas



Source: Northeast Gas Association





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2	Customer Demographics, Usage Trends and Demand Forecasting	Janine Ward Senior Manager of Rates & Regulatory Affairs
3	Gas Supply Procurement, Transportation, and Storage	Chris Cej General Manager of Gas Supply & Transportation Services
4	Distribution System Engineering and Operation	Mark Thornton Asst. General Manager of Engineering Services
5	Utility Emissions	Joe Hartleb Senior Engineer in Risk Management
6	Pathway to Decarbonization	Randy Rucinski Chief Regulatory Counsel



National Fuel Gas: Company Background





NFG Overview



Williamsville, NY

Williamsville, NY



1902 Incorporated in 1902



2,101 Full-time Employees

1,035 Union Employees





NFG Overview







NFG: Upstream Overview



Seneca Resources Corporation

- ✓ 7th largest natural gas producer in Pennsylvania
 - ~1.2 million acres of shale mineral rights
 - ~ 1Bcf daily production (gross)
- ✓ Largest producer to certify 100% of production as Responsibly Sourced Natural Gas in Appalachia







NFG: Midstream Overview



National Fuel Midstream

- ✓ Operates 4 distinct gathering systems in PA
- ✓ 350+ miles of pipeline

National Fuel Gas Supply Corp and Empire Pipeline

- ✓ Rates regulated by FERC
- \checkmark 2,652 miles of interstate pipelines in NY and PA
- ✓ 30 underground storage areas with ~77 Bcf of capacity
- \checkmark NFG utilities are a customer of Supply and Empire

NFG Supply & Empire Pipeline Throughput (Bcf)





National Fuel Gas: Distribution Corporation





National Fuel Gas: Distribution Corporation





National Fuel's Guiding Principles







ENVIRONMENTAL STEWARDSHIP



COMMUNITY





SATISFACTION



TRANSPARENCY

Providing safe, adequate and reliable natural gas utility service at affordable rates



Safety & Reliability





Safety & Reliability: No Matter The Conditions







regim: Erie County's hordes-hit ones fromsted by nåndess som 1848 av init Along 250 can and trucks memorial for more than 25 hours on the Thrussay Bette as

A WALL OF SNOW



Hardest-hit areas can expect more lake effect



Western New Yorkers prove yet again

their resilience when it's stormiest

parts assessed of space

have ar lower \$ dead

WEATHER #100 0000 00000 00000 (1)









32 (1) The Buffalo News (2) https://www.fox61.com/article/news/local/snowvember-buffalos-best-social-media-posts-of-historic-snowfall/520-6c58ff62-c22d-4c0c-842b-108bc45ab364

Safety & Emissions Reductions

National Fuel NY Utility Leak-prone Pipeline Replacement Program



Investments in Pipeline Replacement Program Enhance System Safety While Also Significantly Reducing GHG Emissions (primarily methane)



Affordability

National Fuel New York Average Residential Winter Bill⁽¹⁾

EIA Gas Utility Affordability Rankings⁽²⁾



34 (1) Average bills are normalized for weather.

(2) Based on analysis of EIA residential natural gas sales price data from calendar 2021 (the most recent available data)

Affordability

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Customer Service










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Customer Demographics, Usage Trends and Demand Forecasting

Janine Ward Senior Manager of Rates & Regulatory Affairs

Who Are Our Customers in New York?

National Fuel serves a variety of customers in New York with Residential customers using more than half the actual throughput

Customer Type	Average Customers
Residential	505,561
Commercial	32,902
Industrial	444
Public Authority	<u>2,407</u>
Total	541,314

Percentage of Annual Throughput





Our Residential Customers





40 **Source:** 2021 Residential Market Study performed by JRB Insights on National Fuel Residential service territory. Housing data obtained from the U.S. Census Bureau American Community Survey 2019. Median income obtained from the U.S. Census Bureau (July 2019).

Residential Demographics





Source: 2021 Residential Market Study performed by JRB Insights on National Fuel Residential service territory. Housing data obtained from the U.S. Census Bureau American Community Survey 2019. Median income obtained from the U.S. Census Bureau (July 2019).

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Understanding Low Income Customers

	Buffalo-Niaç	U.S.		
	Buffalo Region City			
Median Household Income	\$58,358	\$39,677	\$64,994	
Poverty Rate	12.5% 28.3%		11.4%	
Unemployment Rate	3.3%	3.9%		
Lower median household income and higher poverty				

ower median household income and higher poverty rate than the U.S. average.

Payment Assistance (000's)			
Total SLIP Discounts (74,629 customers)	\$10,036		
Home Energy Assistance Program (HEAP) Grants	\$30,119		
Emergency Grants	\$1,743		
Regular Arrears Supplement (RAS)	\$21,514		
Emergency Rental Assistance Program (ERAP)	\$1,282		

Multiple Communities Identified as Disadvantaged by NYSERDA





Understanding Our Commercial Customers

Examples of Customers Served					
Hospitals/Healthcare Nursing Homes Garbage Disposal Service					
College/Universities	CNG Stations	Casinos			
Hydroponic Greenhouse	Building Materials	Asphalt Contractor			







Understanding Our Industrial Customers

Examples of Industries Served					
Spice and Extract Manufacturing	Milk and Cheese Manufacturing	Dog and Cat Food Manufacturing			
Asphalt Manufacturing	Iron and Steel Mills	Hazardous Waste Disposal			
Power Generation	Flour Milling	Tire Manufacturing			







Forecasting Methodology





Forecast Drivers- Weather

- Winter weather is a material driver for customer usage
- Temperatures vary greatly across New York State
 - NOAA 30-Year Average Winter
 Temperature = A below freezing average winter temperature.



Forecast Drivers-Weather

- Winter weather is a material driver for customer usage
- Forecast based on 30-year Normal Heating Degree Days (HDD) from NOAA (National Oceanic and Atmospheric Administration)
 - Degree day = compares the mean (average of the high and low) outdoor temperatures recorded for a location to a standard temperature, usually 65 degrees Fahrenheit
 - HDD = measure of how cold the temperature was on a given day or during a period of days
 60 HDD = 65 degrees 5 degrees



5-Year Forecast

Forecasted Annual Consumption





Forecasted Design Peak Day





Energy Efficiency Programs

- Conservation Incentive Program (CIP) is designed to reduce customers' energy usage and is comprised of the following programs:
 - Equipment Replacement Programs
 - ✓ Residential Rebate Program
 - ✓ Non-residential Rebate Program (NRCIP)
 - ✓ Weatherization Programs
 - Low Income Usage Reduction Program (LIURP)
 - Outreach and Education
 - Educate customers about their usage habits
 - ✓ Promote energy efficiency and programs

Program	Gross Savings (mcf)			
Residential	2,858,805			
NRCIP	463,668			
LIURP	<u>470,660</u>			
Total	3,793,133			

The Company's Conservation Incentive Program has resulted in a cumulative total reduction of approximately 1.8 million metric tons of carbon dioxide emissions.





Gas Supply Procurement, Transportation, and Storage

Chris Cej General Manager of Gas Supply & Transportation Services

Natural gas is measured two ways

CUBIC FEET CLASS 175-250 489

Volume



Energy Content



Units: Dekatherms (Dth)

Units: Cubic Feet (cf) Thousand Cubic Feet (Mcf) 100,000 cf = 100 Mcf

> Convert Volume (Mcf) to Energy Content (Dth): Multiply the volume by BTU* Factor to = Energy Content

Example: 100 (Mcf) x 1.030 (BTU) = 103 (Dth)

*British thermal unit (Btu) is a measure of the heat content of fuels or energy sources.



Total Design Peak Day Requirements = 1,026,576 Dth

Winter 2022-2023







Heating degree day (HDD)

A measure of how cold the temperature is on a given day

The colder the temperature, the higher the number of degree days

Historical Buffalo Winter HDD & Temps

Date	Day	HDD	Mean Temp	
January 17, 1982	Sunday	74	-9	
February 15, 2015	Sunday	71	-6	
February 23, 2015	Monday	67	-2	
February 13, 2016	Saturday	67	-2	
February 16, 2015	Monday	66	-1	
February 19, 2015	Thursday	66	-1	



Buffalo's Design Day

Humid climate that is strongly influenced by the Great Lakes Snow typically covers the ground from late-December to early-March



Frigid Temperatures throughout our service territory

541,000 customers throughout WNY's region



Notable Low Temperatures

City	Date	Low Temp (°F)		
Olean	January 23, 2022	-22*		
Wellsville	January 23, 2022	-19		
Wellsville	February 17, 2015	-24*		
Jamestown	February 17, 2015	-31*		
Batavia	February 14, 2016	-15		
N. Tonawanda	February 14, 2016	-15		
* Record Low Temperature				

Source: NOAA National Weather Service



Winter Challenges



Winter Challenges

NFGDC Heating Degree Days (HDD) Buffalo, NY – Winter 2021-2022 (8.6% WTN)





Reliability Through Diversification

- Utilize firm pipeline and storage capacity
- Access to numerous supply sources & suppliers

Emphasis on Low Emissions

- Purchase within US's lowest emitting production basins.
- Deliver to customers through low emitting delivery & storage systems.

Meeting Customer Demand

Focus on Cost

- Balance least cost procurement with operational demands
- Manage market volatility





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National Fuel Gas Distribution Corporation's Customers

Serving 541,000 customers throughout WNY region





Purchasing Natural Gas Supplies throughout the Appalachian Basin





Integrated network of pipeline and storage assets



Pipelines and Storage Service Providers

- Eastern Gas Transmission and Storage, Inc (EGTS)
- Empire Pipeline, Inc (Empire)
- Millennium Pipeline Company, Inc. (Millennium)
- National Fuel Gas Supply Corp. (NFGSC)
- Stagecoach Pipeline & Storage Co. (Stagecoach)
- Tennessee Gas Pipeline Company, LLC (TGP)
- Transcontinental Gas Pipeline Co. (Transco)



Integrated network of pipeline and storage assets





Utilizing Capacity Assets during the Winter Season





Accessing numerous trading hubs





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Focus on Cost

Aligning Capacity with Market Regions



	NFGDC and Marketer Provided into NFGSC						
	Transco	TGP	Empire	Eastern Gas	Eastern Gas	NFGSC	NFGSC
Markets					Storage	Storage	Citygate
Niagara County	✓	✓	✓				✓
Grand Island			✓				✓
New York Other	✓	✓	~	✓	~	✓	✓
Nashville/Dunkirk		✓				✓	✓



Focus on Cost

Managing Price Volatility

- Gas Cost Management Plan mitigates market volatility through purchase price diversification
 - Summer gas purchases are injected into storage for winter delivery
 - Winter Fixed Price gas is purchased during the prior summer for winter delivery





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Emphasis on Low Emissions

Purchasing 100% from Appalachian Basin







Emphasis on Low Emissions

Purchasing 100% of supplies from the lowest emission production basin in the USA





Emphasis on Low Emissions



BHE PIPELINE GROUP.





KINDER



Reducing emission across the value chain



Transmission & Storage




Meeting Customers' Demand

Reliability Through Diversification

- Utilize firm pipeline and storage capacity
- Access to numerous supply sources & suppliers

Emphasis on Low Emissions

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Meeting Customer Demand

Focus on Cost

- Balance least cost procurement with operational demands
- Manage market volatility





Distribution System Engineering and Operation

Mark Thornton Asst. General Manager of Engineering Services

National Fuel's Distribution System





Where is National Fuel's Distribution System?



76 https://www.peoplesgas.com/4b0286/globalassets/files/content/naturalgasdeliverysystem.pdf

How does the distribution system receive gas?



National Fuel®

77 https://www.peoplesgas.com/4b0286/globalassets/files/content/naturalgasdeliverysystem.pdf

What makes up the system on your street?





How do we determine where to replace pipe?









How do we determine where to replace pipe?

- Systematic Replacement planning in the fall after annual leak surveys.
- Use GIS to identify areas of concentrated leakage.
- Public safety drives determination of priority for replacements.
- Consider reliability, corrosion activity, emissions, and road work conflicts.
- Three types of projects depending on scope:
 - Smaller projects completed by Company crews
 - Mid-size projects assigned to blanket contractor crews
 - Larger projects competitively bid to a pool of qualified contractors.



Investing in Safety





Installing and maintaining the complex system

A Reliable Below Grade Network of Pipes







Bringing fuel to your meter





Modernizing vintage pipes and services

Annual Miles of Utility Main Pipeline Replaced



Annual Vintage Customer Services Replaced





How has National Fuel's Distribution System Changed?





How has National Fuel's Distribution System Changed?





What this modernization means







Utility Emissions

Joe Hartleb Senior Engineer in Risk Management



Distribution System – Reducing Emissions

How are Greenhouse Gases Classified?

Scope 1 – Direct Emissions from Company Owned & Controlled Resources

- Mains & Services
- Metering & Regulations Stations
- Combustion Units
- Fleet Vehicles

Scope 2 – Indirect Emissions released from consumption of purchased electricity

- Corporate & Field Offices
- Measurement & Regulations Stations
- Corrosion Systems

Scope 3 – Indirect Emissions from non-company owned upstream and downstream entities

- Production & Transmission
- Customer Usage/Combustion
- Employee Commuting & Business Travel









Distribution System – Reducing Emissions (Scope 1)



UTILITY EPA SUBPART W EMISSIONS



Distribution System – Reducing Emissions (Scope 1)



UTILITY EPA SUBPART W EMISSIONS

Vintage Steel Protected Steel Plastic



Distribution System – Reducing Emissions (Scope 1)







Sourcing Lower Emission Gas (Scope 3)

Purchasing Gas from the lowest emission production basin in the USA



June 2021. Available at: https://www.sustainability.com/thinking/benchmarking-methane-ghg-emissionsoil-natural-gas-us



Helping our customers reduce emissions (Scope 3)



Cumulative CO2e Reductions By Year – Rebate Incentive Program





Pathway to Decarbonization

Randy Rucinski Chief Regulatory Counsel

Balancing the CLCPA Goals and Customer Impacts

National Fuel believes the best emissions reduction pathway is a balanced approach that provides both environmental and economic sustainability, ensures a safe, reliable and resilient energy system, and offers options for more affordable carbon reduction measures.

CLCPA Goals and Objectives	Customer Impacts	
70% Renewable Energy by 2030	Safety and Reliability	
100% Zero-emission Electricity by 2040	Resiliency and Delivery Security	
85% GHG Reduction by 2050	Energy Affordability	
"All-of-the-above" Carbon Reduction Approach		



National Fuel's Pathway to Decarbonization







National Fuel's Pathway to Decarbonization



Our Approach to Climate Change



Reducing our Operational Emissions

National Fuel has established greenhouse reduction targets for all of its business units We continue to invest in our infrastructure and rations to reduce emission



National Fuel is studying the feasibility and potential development of projects focused on renewable natural gas (RNG), hydrogen, and carbon capture utilization and storage (CCUS).



Advancing Energy Conservation

National Fuel is focused on helping its customers improve the energy efficiency of their homes and businesses. By using less, our consumers can play a pivotal role in lowering emis

Transparency and Stakeholder Engagement

National Fuel is committed to improving and enhancing its ESG initiatives, including its climate-related disclosures. We will continue to focus our efforts on these important disclosures and related stakeholder engagement efforts.

Climate-Related Opportunities

TCFD Category	Climate-Related Opportunities
Resource Efficiency	Modernize existing equipment to minimize emissions
	 Install low-emissions technology on new facilities
	Minimize freshwater consumption and usage
	Promote customer efficiency
	Use more efficient distribution and production processes
Energy Source	Leverage alternative energy sources and efficiency initiatives to reduce the Company's energy usage
Products and Services	Leverage our existing infrastructure to transport renewable natural gas
	Explore alternative low-carbon fuel sources, such as blue and green hydrogen
	Explore carbon capture utilization and storage opportunities
Markets	Access to capital for best-in-class ESG performers
	Access to markets seeking responsibly sourced natural gas production
Resilience	 Improved efficiencies for natural gas development and gathering operations within contiguous acreage position



National Fuel's Pathway to Decarbonization



Figure 3-2. Emissions Reduction from 1990 to 2050, by Sector, NFGDC Territory

The Selective Electrification scenario offers additional benefits, particularly related to the crucial elements of the reliability and resilience of the energy system. With high technology adoption, both the High Electrification and Selective Electrification scenarios can achieve the Climate Act's emissions reduction requirements.





National Fuel's All-of- the-Above Pathway

A more affordable and practical way to meet the State's goals for WNY homeowners and businesses





Facilitating Energy Efficiency

We can help customers implement efficiency measures such as weatherization and higher efficiency equipment to reduce their energy needs

loss

home

distributes fresh

air throughout the

Se∆led **MyHEAT**

Improving Building Shells



Promoting Efficient Use of Energy High Quality Double Air Sealing: Insulation : reduces largest reduces heating source of heat and cooling demand **Heat Recovery** Ventilation:

Tankless Water Heater: used for efficient water heating

Hybrid ASHP & HE Furnace



Promoting a Hybrid Future

Hybrid heating systems provide a cost-effective and reliable emission reduction option in a colder upstate climate





Leveraging Existing Natural Gas Infrastructure

We can utilize the existing storm-resistant, underground natural gas network to deliver low- and no-carbon fuels into the region, mitigating an anticipated enormous electric infrastructure build-out

Renewable Natural Gas (RNG)

- Biogas generated from livestock operations, landfills, water treatment facilities, etc.
- Significant volumes will be available in and around NY
- Lower carbon intensity with similar operational and performance characteristics to natural gas (a "drop-in" energy source)
- Near term decarbonization potential

Hydrogen

- Hydrogen offers enormous potential as a source of clean energy
- 10 million metric tons (MMT) of hydrogen is currently produced in the United States
- Up to a 20% blend of hydrogen by volume into the natural gas stream may be feasible
- Hydrogen is particularly useful to decarbonize hard to electrify sectors
- Focused on the development of potential hydrogen projects through NYSERDA-led Regional Clean Hydrogen Hub consortium







*Image Source: GTI Energy

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An All-of-the-Above Pathway

National Fuel's "All-of-the-Above Pathway" is a more affordable and practical way to meet the State's goals for WNY homeowners and businesses



Figure 3. Reduction in Energy Use and GHG Emissions from Selective Electrification Example: Single-family home, NFGDC territory, switching from natural gas to dual-fuel heat



Average WNY Household GHG Emissions





Continually Pursuing Decarbonization Opportunities

Developing a Geothermal Pilot Project

Utility Thermal Energy Network and Jobs Act (July 5, 2022)

New York PSC Order on Developing Thermal Energy Networks (September 15, 2022)





Next Steps for the Long-Term Planning Process

- Initial Long-Term Plan will be filed on December 15, 2022
- Multiple opportunities for stakeholder comments (verbal and written)
- Final revised Long-Term Plan will be filed in July 2023
- Annual reports filed May 31st each year between plan filings





Questions?



Thank you