Future of Gas Utilities

VIRTUAL SYMPOSIUM

DAY ONE: DECEMBER 7, 2021

Brattle

Housekeeping Items

- Please note that the Symposium will be recorded
  - Recordings and materials will be shared

- Please direct all questions to the Q&A widget located at on the bottom of the Zoom toolbar
  - Questions will be posted at the end of each panel/presentation
  - Questions can be asked anonymously; “upvote” questions of interest

- For technical questions or issues
  - Please email ellen.paal@brattle.com

- Don’t forget to register for Day Two!
  - https://www.brattle.com/future-of-gas-utilities-symposium/

Introductory Session

NATURAL GAS' CHANGING LANDSCAPE

PRESENTED BY: FRANK GRAVES

Brattle

Symposium Structure

1

Laying out the risky context: decarbonization driven by electrification

2

Issues in forecasting the exposure and opportunities

3

Designing the business strategies: new assets, new services, new roles for gas companies

4

Adjusting the regulatory framework for the new requirements and "rules of the road"

A Harder Problem Than Usual

This problem appears harder than past regulatory and business challenges for the industry.

- It involves a strong, mostly negative pressure on gas (previously the hero of efficiency and decarbonization!) – at first glance with little upside (though we will question that)
- It requires changes throughout the whole economy, not just a sector – with lots of uncertainty about what other pieces of the puzzle will do
- What have previously been second-order exogenous concerns for corporate planning (like uncertainty over demand or technology and fuel costs) are now first-order, endogenous concerns that will depend in part on what you do

New Planning Methods and Criteria Needed

New planning methods may be needed, starting with tools to forecast the path and pace of change to anticipate

- **"Pathways" models** – Most studies find similar dramatic changes, but lots of different speeds and priorities possible for how to get there
- **Power system and other infrastructure development models** – LOTS of money needed!
- **Customer adoption models**
- **Financial tools** – possibly with dynamic feedbacks

Also **new planning criteria** – the new and difficult questions are not so much about "least cost" but about what net benefit could there be from taking new kinds of development risks

We hope to learn how players in the industry are attacking the risk analysis and planning, in terms of tools or methods, horizons, scope of analysis, key assumptions, etc.

Market Structures Not Enough

We need all the competitive market can offer, but…

- Decarb is not a problem for which we have the luxury of letting competitive forces gradually experiment to find the best techs for those customers who want to adopt the innovations
- Instead we need to pursue all techs (at least initially) and then get virtually 100% adoption at a pace not driven by normal customer tastes.

So there is likely to be a critical, necessary, facilitative role for utilities

- Solving "chicken or egg" problems and jumpstarting technology demos
- Serving LMI customers or certain hard to reach locations (dense neighborhoods?) where the utility might have a natural advantage

This also presents the possibility of new kinds of partnerships with developers:

Not "us vs. them" but "both, maybe in collaboration"

Two Gas Industry Transition Challenges

An embedded important question is: "how to down-size gracefully?"

- A proportional shrinkage is likely to be a disaster, not avoiding any system costs, nor facilitating improved energy services for customers, and creating resistance to decarbonization.
- How are utilities thinking about something more targeted, based on geography, avoidable costs, types of customers and their ease of conversion, or stranded costs?

How much to expect from clean fuels is another difficult question.

- They seem expensive and limited now, but they may be essential for hard-to-electrify industries, as well as to resilience of clean electric power itself.
- Thus, gas companies cannot "go away" even in the most draconian outlooks.
- But what is the potential feasibility, availability, and economics of lots of RNG or H2? CCS? What can be done to get pilot projects funded and authorized?

A Revised Regulatory Compact?

We pose the hypothesis that the process (for both gas and electric utilities) will require lots of regulatory change, even a new regulatory compact.

This will be needed to support adequate capital recovery and pricing with lower volumes, plus allow participation in new lines of business that facilitate decarbonization. It will also tolerate taking more risk in new ways, and it may redefine the relationship between utilities and other companies.

- **Short run:** Mechanisms like decoupling, EE capitalization, or methane leak reduction incentive rates will be very helpful, but not likely to get more than part way to the finish line
- **Long run:** Requires investment in emerging technologies, shorter depreciation lives, risk protections from efforts that don't pan out as well as hoped (except insofar as they help map the terrain for others)
  - May need new pricing of carbon savings
  - Targeted utility sponsorship of some customer-premise appliances
  - Reconsider the boundary between gas and electric utilities?

A Path-Dependent Future

Notwithstanding the ambitious political momentum for decarbonization, the policy milestones and goals are usually pretty broad and not fully codified as to mechanisms (incentives, subsidies, or mandates, or assigned responsibilities) nor intermediate pacing, even in states with strong goals and structures in place (NY, CA).

- The gas industry is likely to be given target GHG reductions in the next few years

But the **future is still "open"** in the sense not just of being uncertain but being malleable in an important way: **path-dependence**. The things you get done early can significantly shape where it ends up, in terms of who is providing what kinds of solutions.

- It is not too early to start; the changes will take all the time you have.

We have more questions than answers, but daring approaches to getting started are key!

Panel One

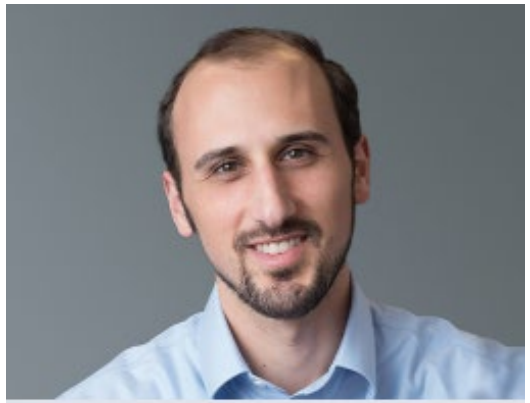
HOW ARE GAS UTILITIES ANTICIPATING THE PUSH TO ELECTRIFY?

MODERATED BY: MICHAEL HAGERTY

Brattle

Panel 1: How are Gas Utilities Anticipating the Push to Electrify?

Michael Hagerty
SENIOR ASSOCIATE
The Brattle Group



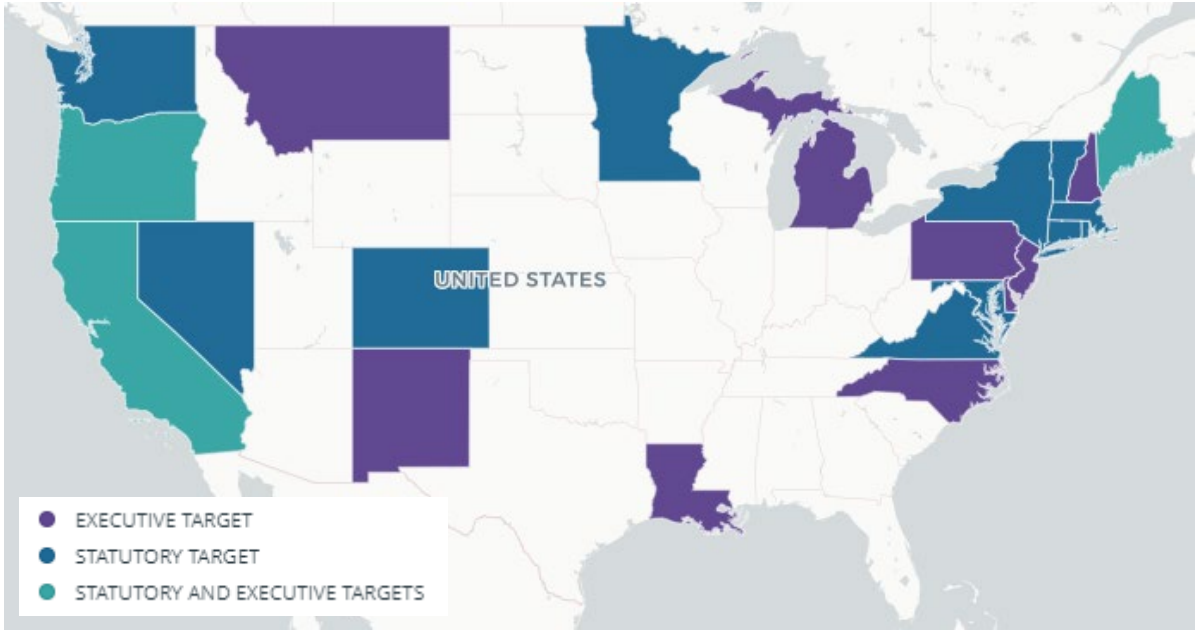
Andy Lubershane
SR. VICE PRESIDENT, RESEARCH & STRATEGY
Energy Impact Partners

Gregory Caldwell
DIRECTOR, UTILITY HYDROGEN STRATEGY
ATCO Gas

Diane X. Burman
COMMISSIONER
New York State Public Service Commission

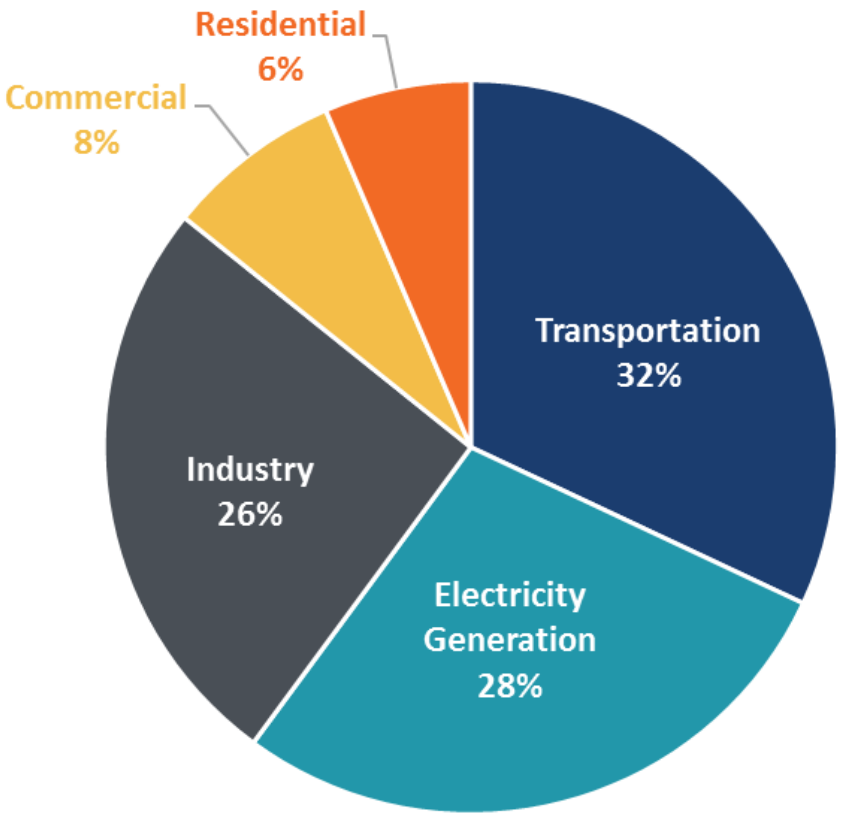
Reduction GHG Emissions

State Decarbonization Targets



Source: Center for Climate and Energy Solutions

U.S. 2019 GHG Emissions Inventory



Source: EPA Greenhouse Gas Inventory Data Explorer

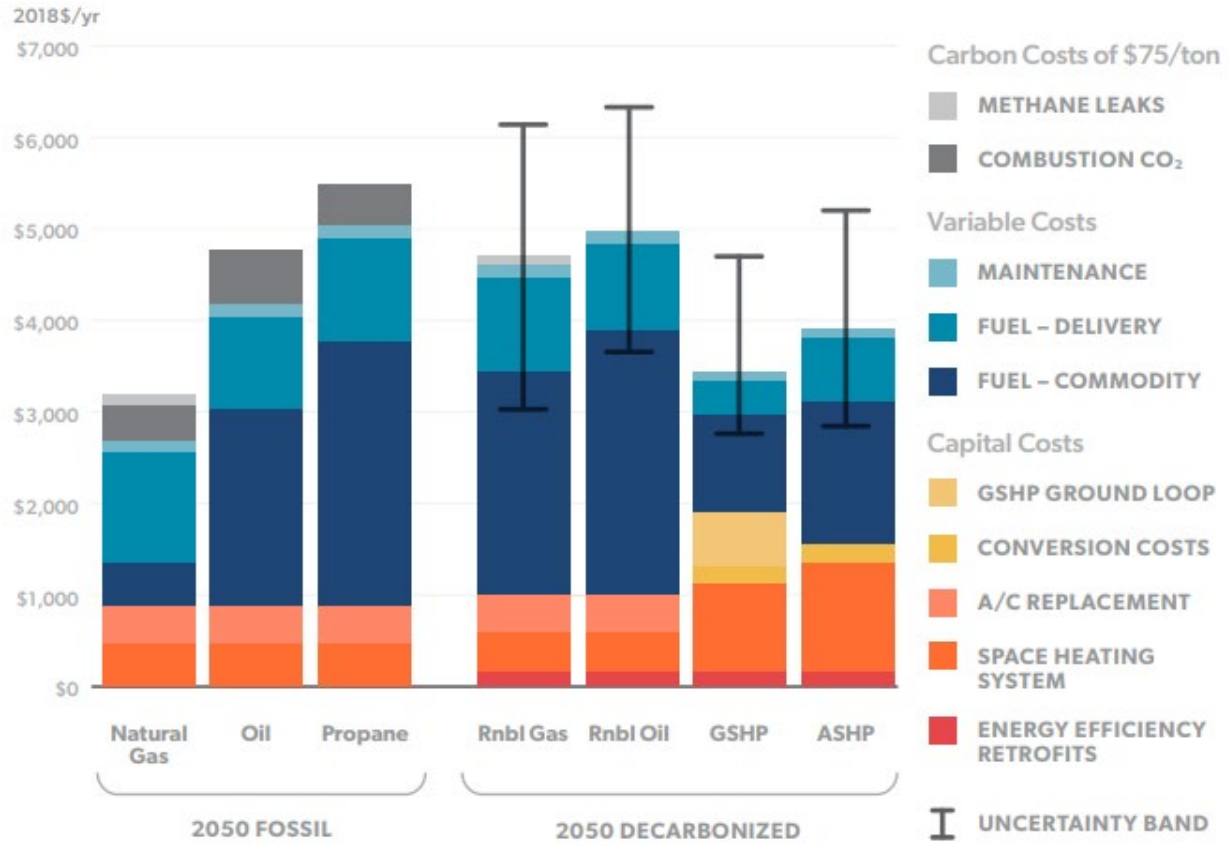
Approaches to Decarbonizing Fuel Demand

Pathway	LDV Transportation	Building Heating
Reduce through Efficiency	Federal CAFE Standards	Utility Efficiency Programs
Refuel with Cleaner Fuels	Biofuels (i.e., ethanol)	H2 and RNG
Replace with Electrification*	**Electric Vehicles**	Heat Pumps and Resistance Heating

*Combined with continued reductions in power sector GHG emissions

Rhode Island Heating Sector Transformation Study

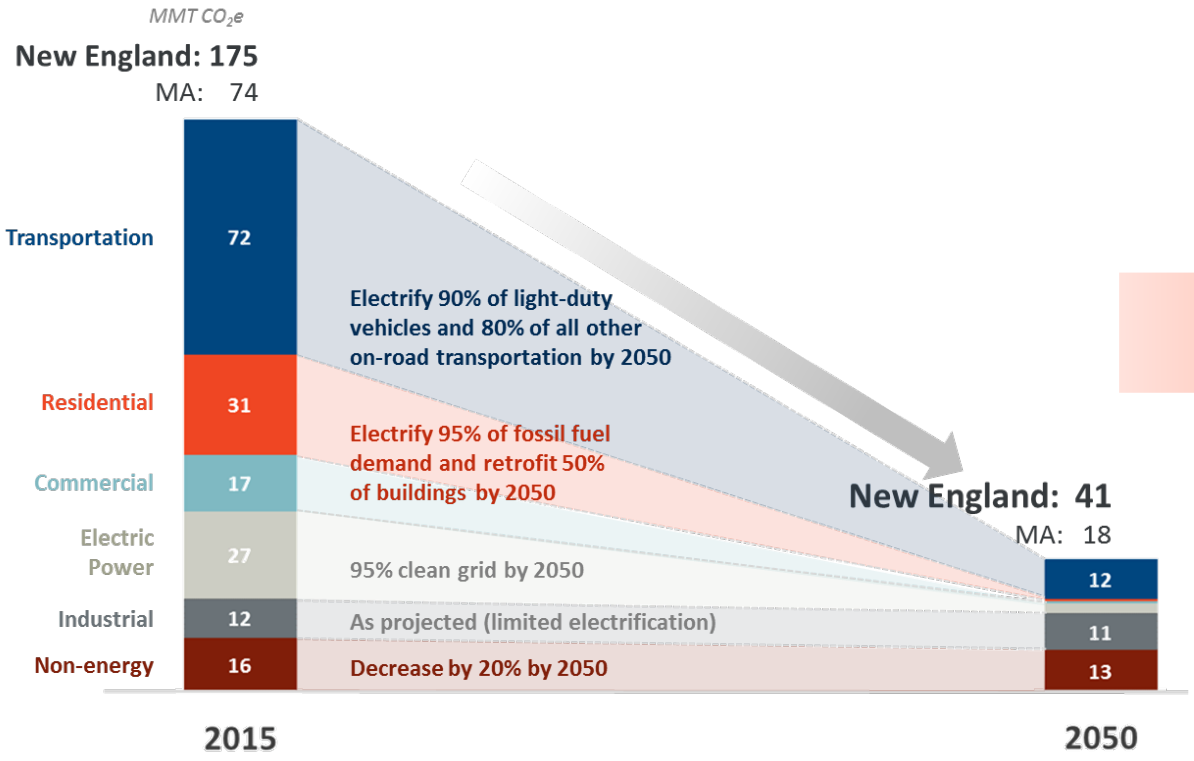
Annualized Cost of Space Heating in 2050 for a Representative Rhode Island Single-Family Home



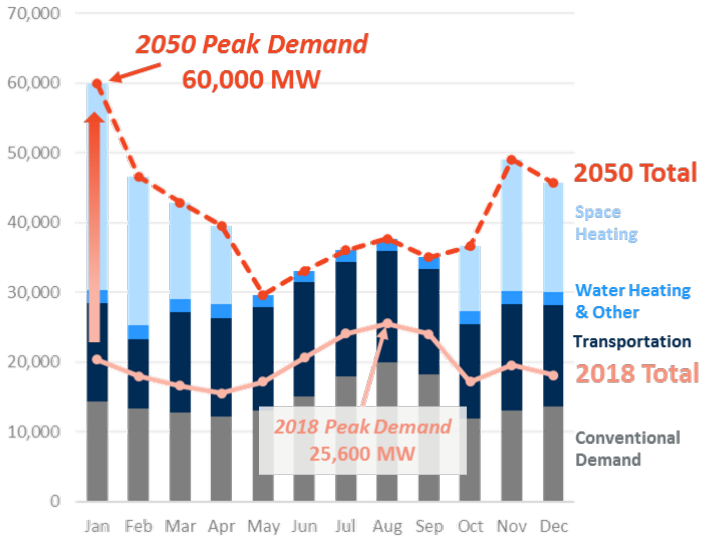
Source: Heating Sector Transformation in Rhode Island: Pathways to Decarbonization by 2050

New England 80x50 Study

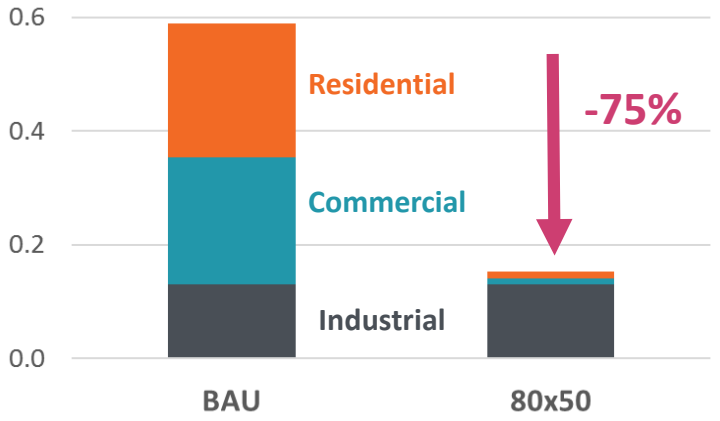
High Electrification Decarbonization Path



Projected 2050 New England Monthly Peak Demand (MW)

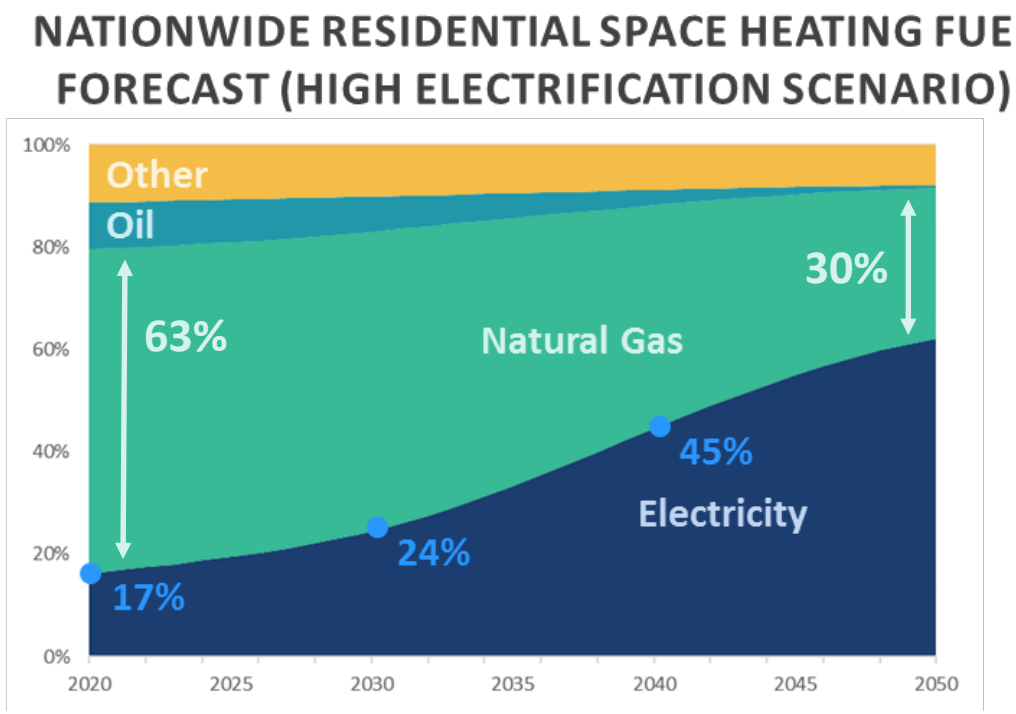


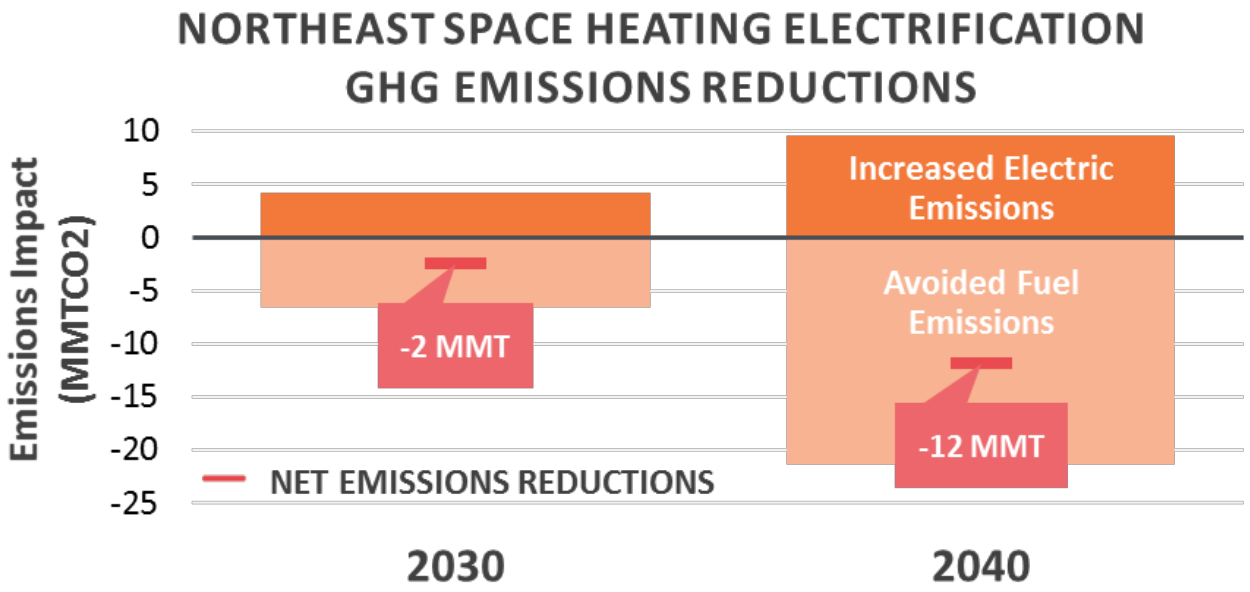
Projected 2050 New England Natural Gas Demand (Quads)



Source: Achieving 80% GHG Reduction in New England by 2050: Why the region needs to keep its foot on the clean energy accelerator

Oracle Customer Action Pathway Study

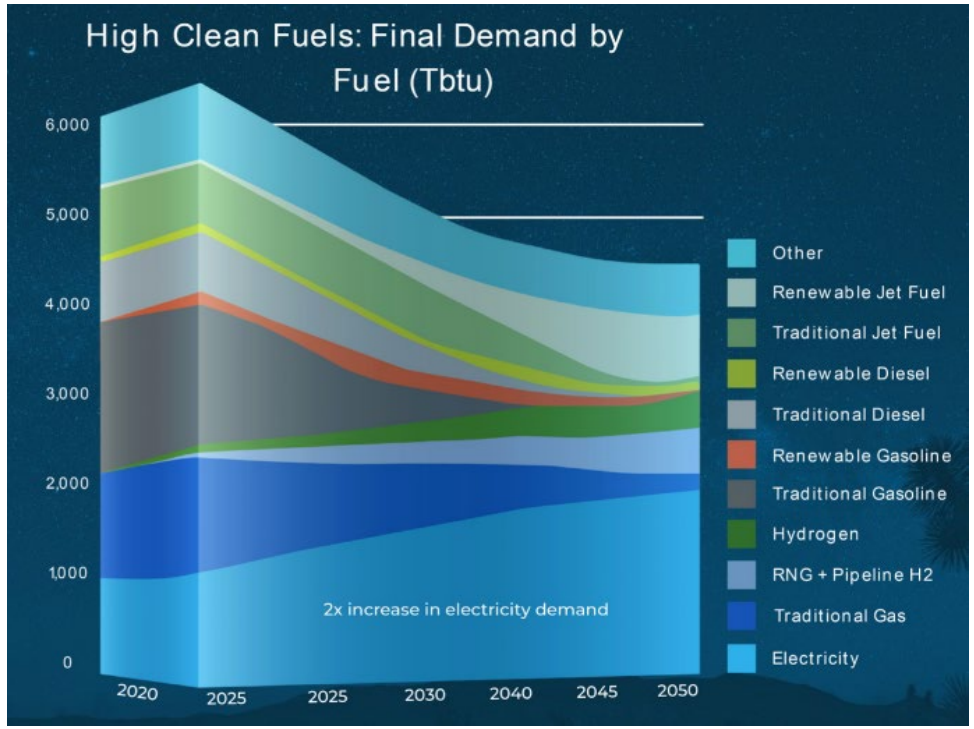




Source: [The Customer Action Pathway to National Decarbonization]

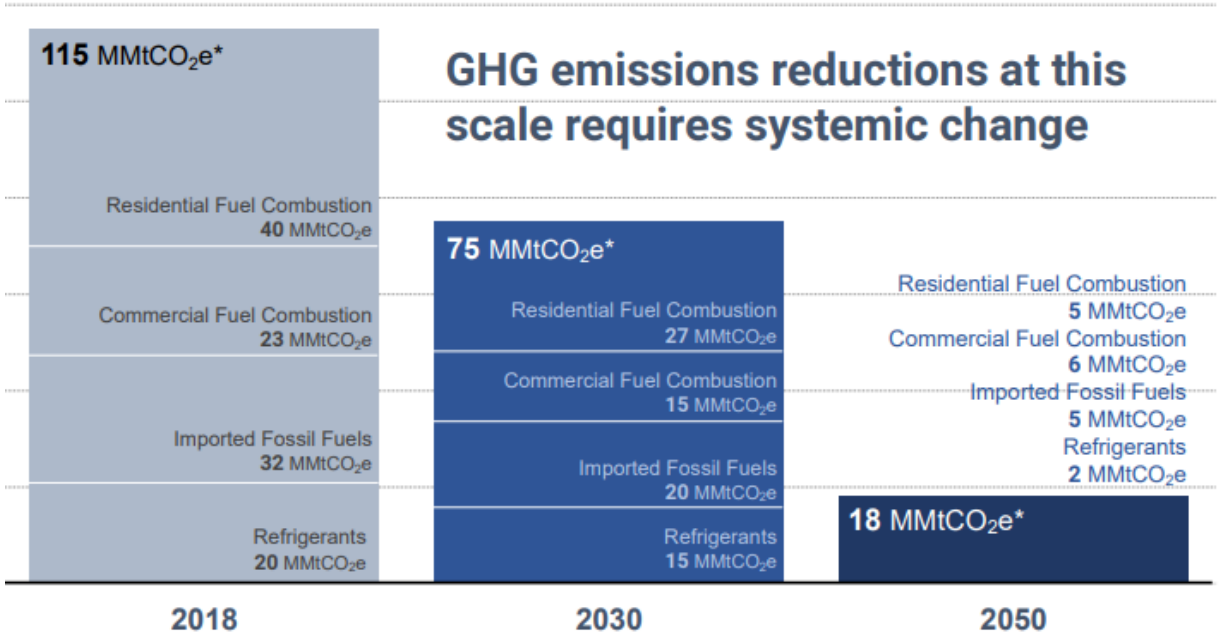
Recent Studies of Impacts on Gas Demand

SoCalGas Clean Fuels Report
(50-100% Electrification of Gas Appliances)



Source: SoCalGas The Role of Clean Fuels Report

NYSERDA Carbon Neutral Buildings
(84% Reduction in Gas Emissions)



Source: NYSERDA Carbon Neutral Roadmap

Questions to Address

While the potential impacts on natural gas demand are likely 10 years away, key decisions about maintaining and upgrading gas assets that will last 30+ years require addressing these issues today

- How significant of an issue are these trends for natural gas utilities?
- To what extent is the industry starting to address these issues?
- What is the time horizon in which the industry will need to respond?
- What policy, regulatory, or customer pressures are you expecting will emerge to achieve decarbonization reduction targets?

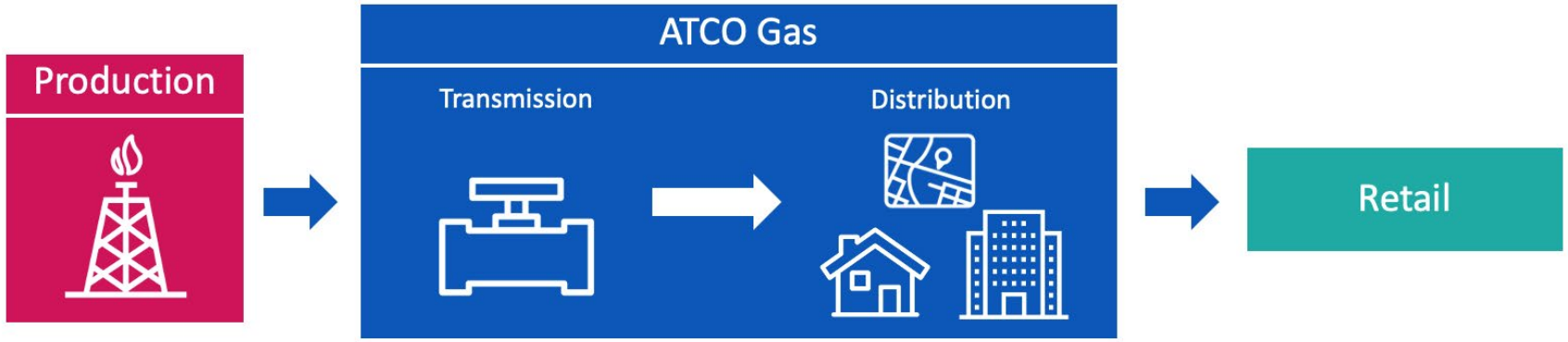
GAS CO-OPS H2 PRESENTATION

December 01, 2021

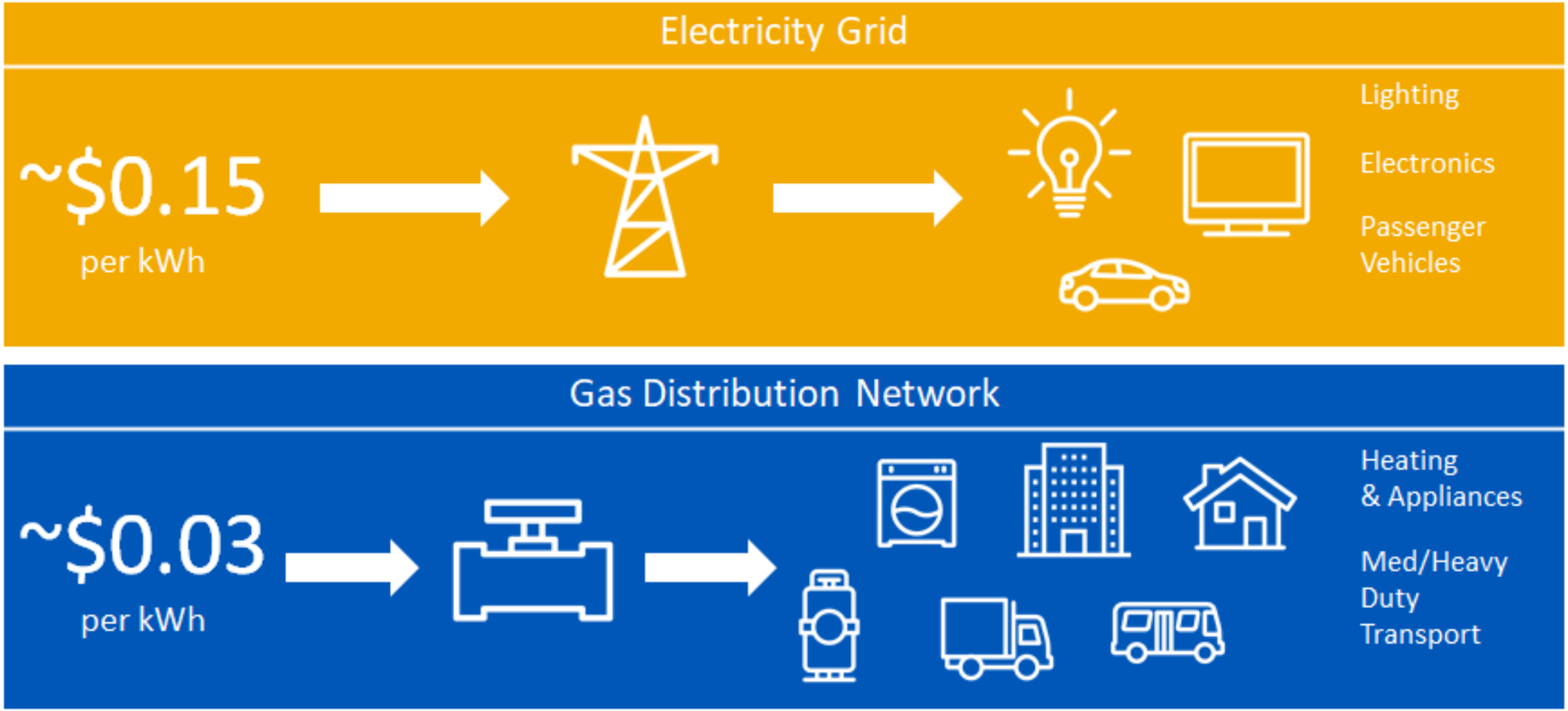
OUR NATURAL GAS BUSINESS IN ALBERTA

We deliver safe, reliable and cost-effective natural gas to homes and businesses

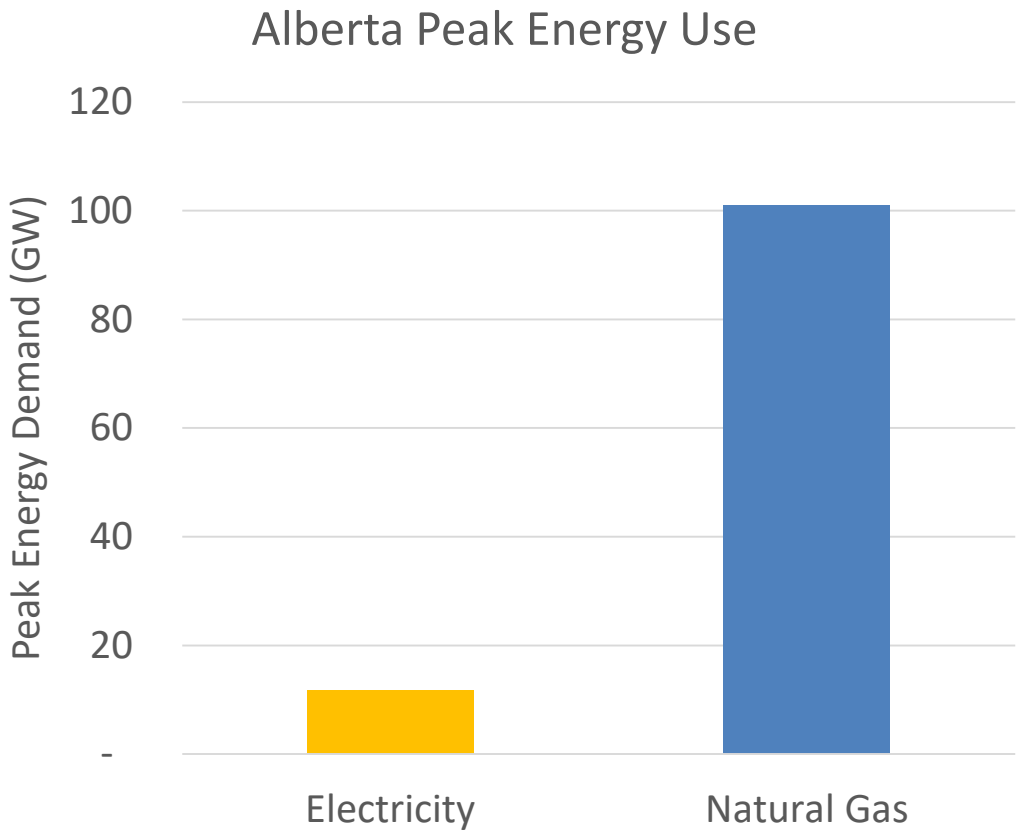
- Over 1.2 million customers in nearly 300 Alberta communities
- Build, maintain and operate more than 40,000 km of natural gas distribution pipelines and 9,100 transmission pipelines in Alberta

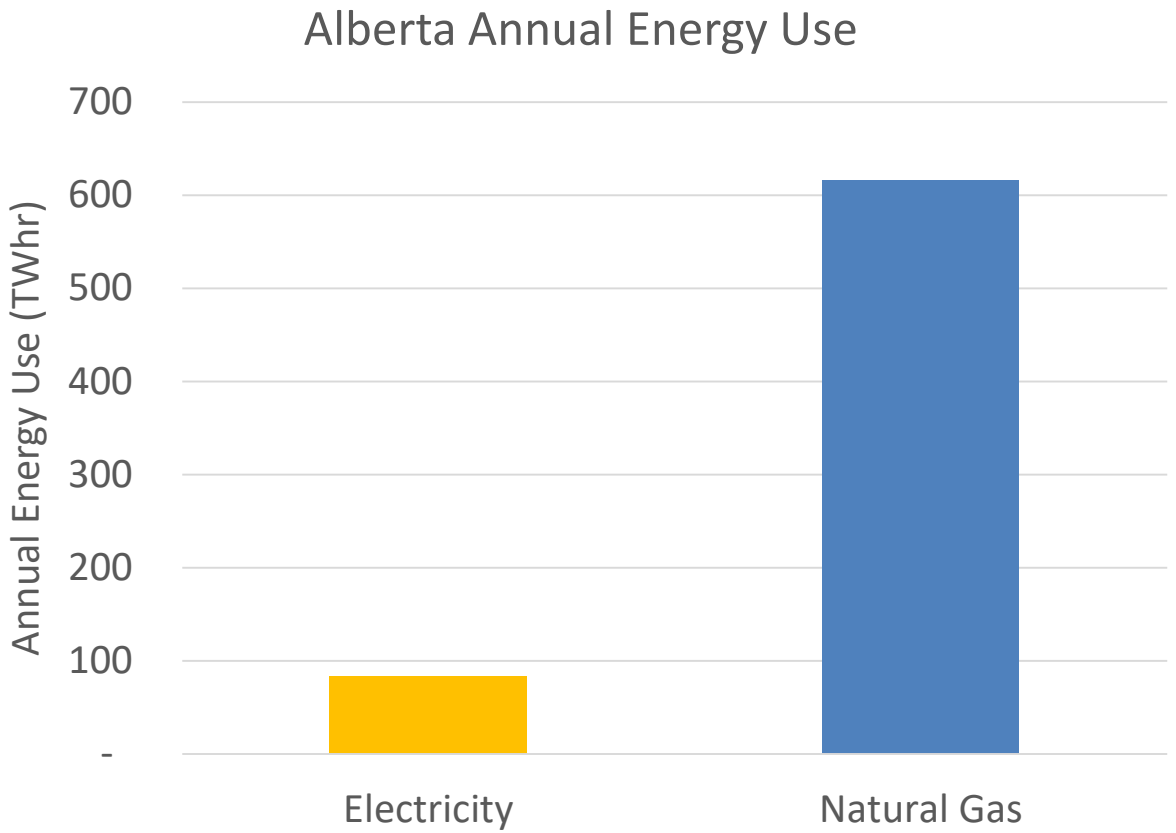


APPROPRIATE FUEL CHOICE

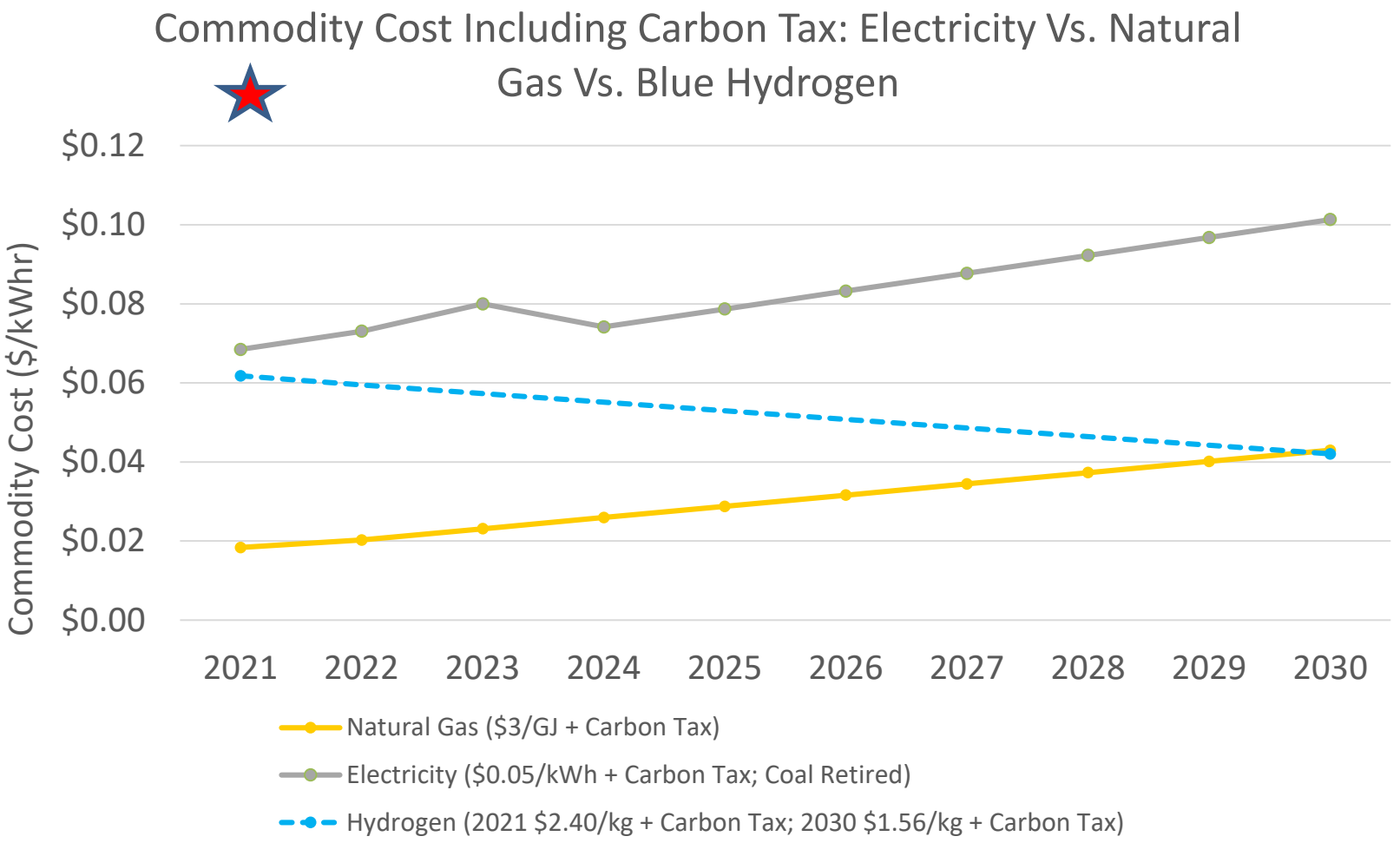


ENERGY USE IN ALBERTA



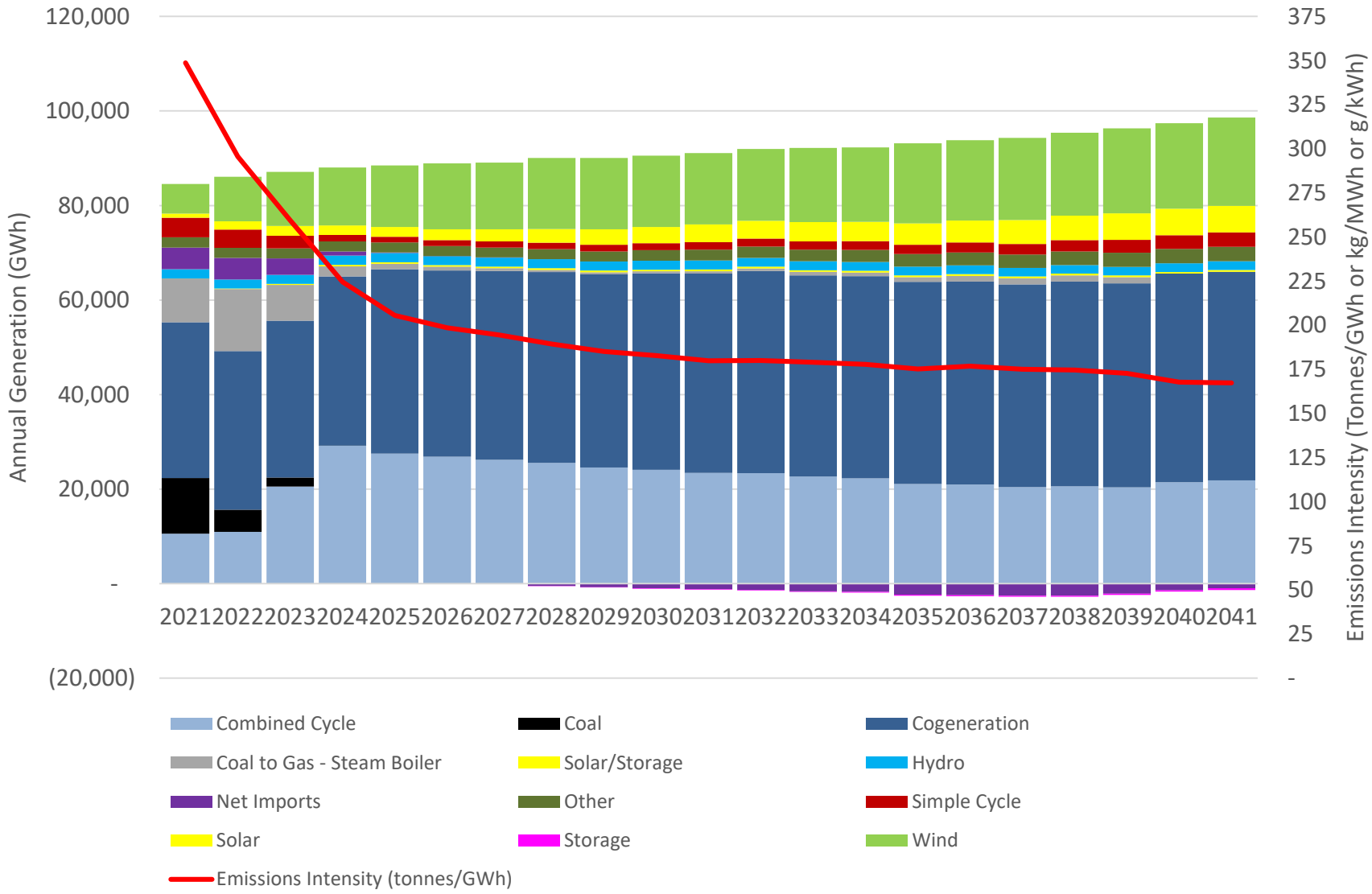


COMMODITY COST



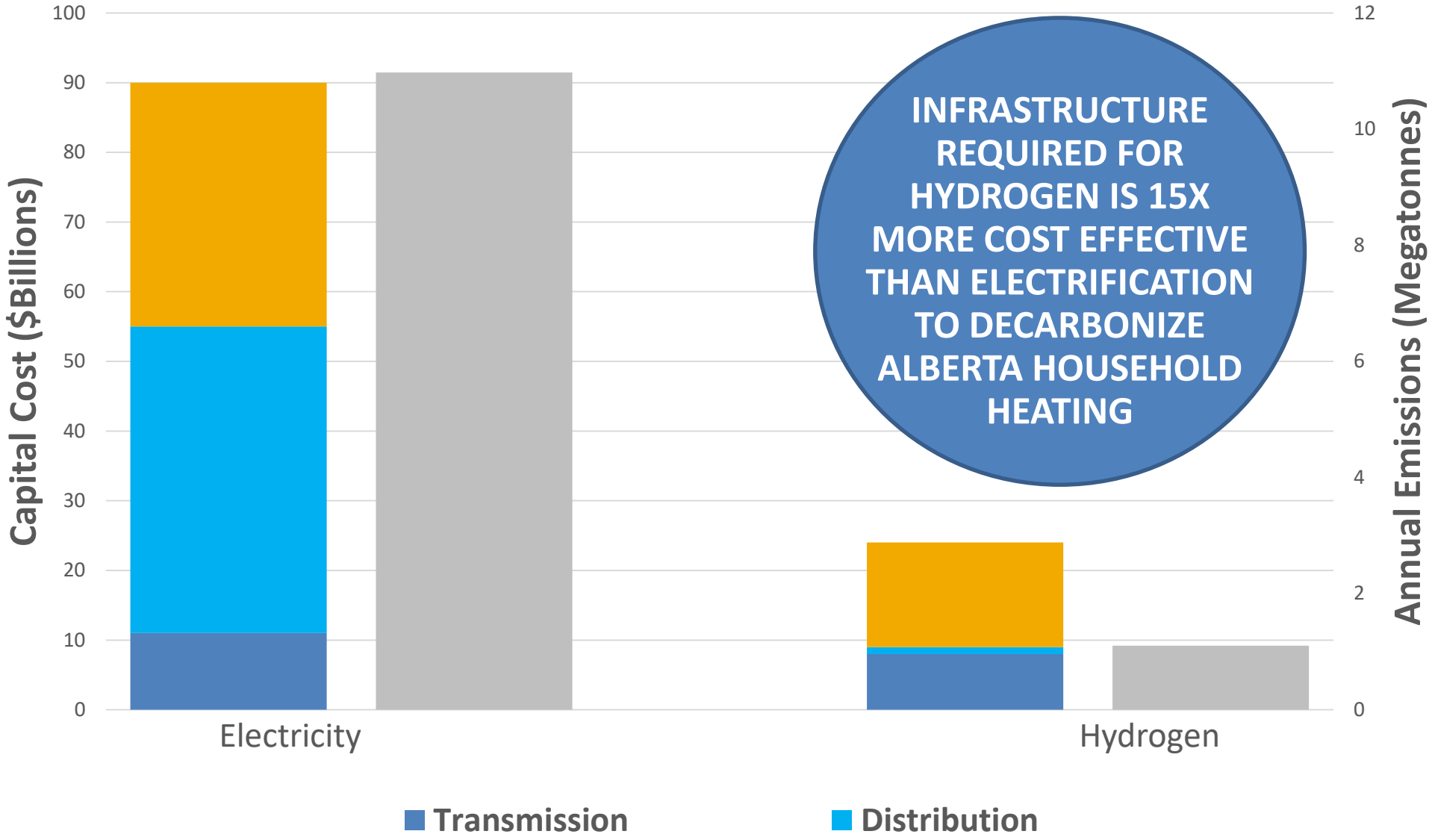
- Blue hydrogen is lower cost than electricity and competes with natural gas by 2030 without subsidy.
- Monthly pool price was $0.12/kWh or greater in February/June/July of 2021.
- Electrification of transportation, increasing demand, and carbon tax will continue to put upward pressure on electricity prices.

AESO FORECAST TO 2041: CLEAN TECH SCENARIO



- Grid emissions intensity in 2040 roughly equivalent to natural gas combustion in 2021
- Low grid emissions intensity reliant on waste heat from high emitting industrial activity (co-gen)
- Large peaks associated with heating require high emitting simple cycle

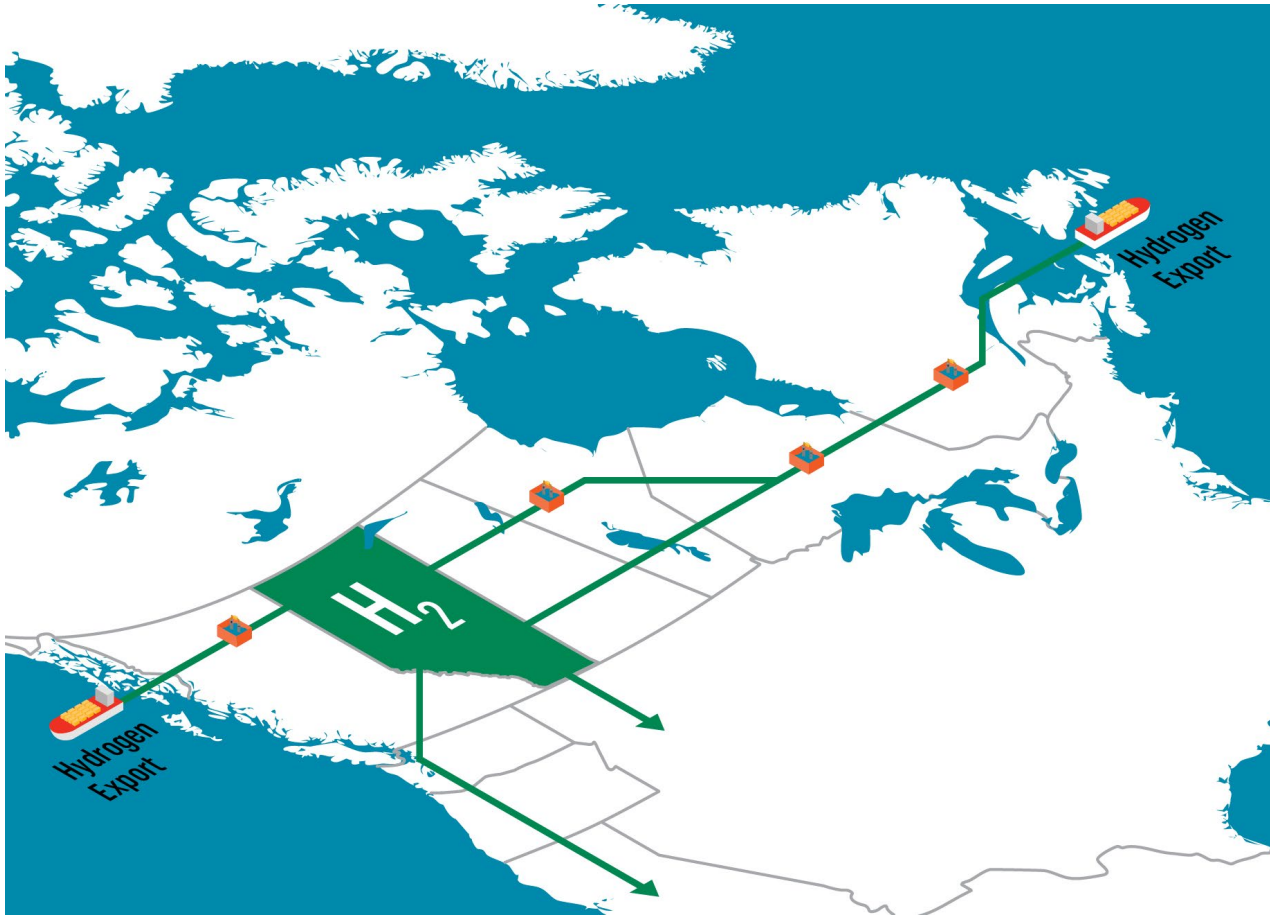
PATH TO NET ZERO: HYDROGEN VS. ELECTRICITY



THE ALBERTA ADVANTAGE

Alberta is a logical hydrogen hub in Canada:

- Lowest cost hydrogen production and carbon capture assets
- Abundant supply of natural gas
- Large industrial demand



THANK YOU

Panel Two

ASSESSING RISKS & OPPORTUNITIES

MODERATED BY: JOSH FIGUEROA

Brattle

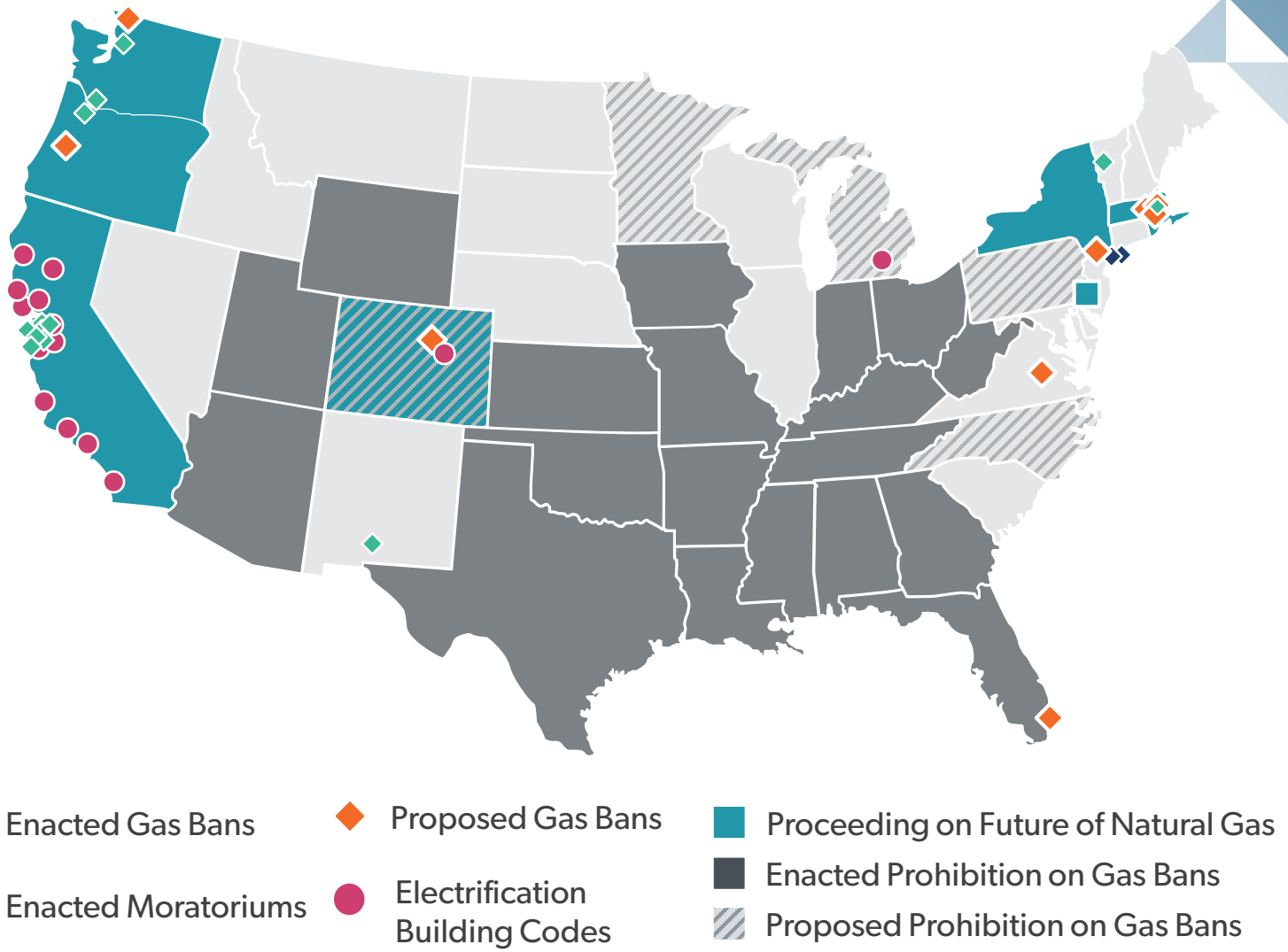
The Debate on the Future of Natural Gas Is Widespread

Traditional gas utility business models face increasing risks as more states and locales challenge the long-run role natural gas could play in meeting climate and energy policy goals.

Pressure is increasing to **ban new gas uses** and gradually **"electrify everything."**

However, as a countervailing force, a growing number of states have **prohibited the enactment of bans on new gas** connections.

Regardless of bans, **cost reductions from innovation and scale**, as well as supportive policies, will increase electrification.

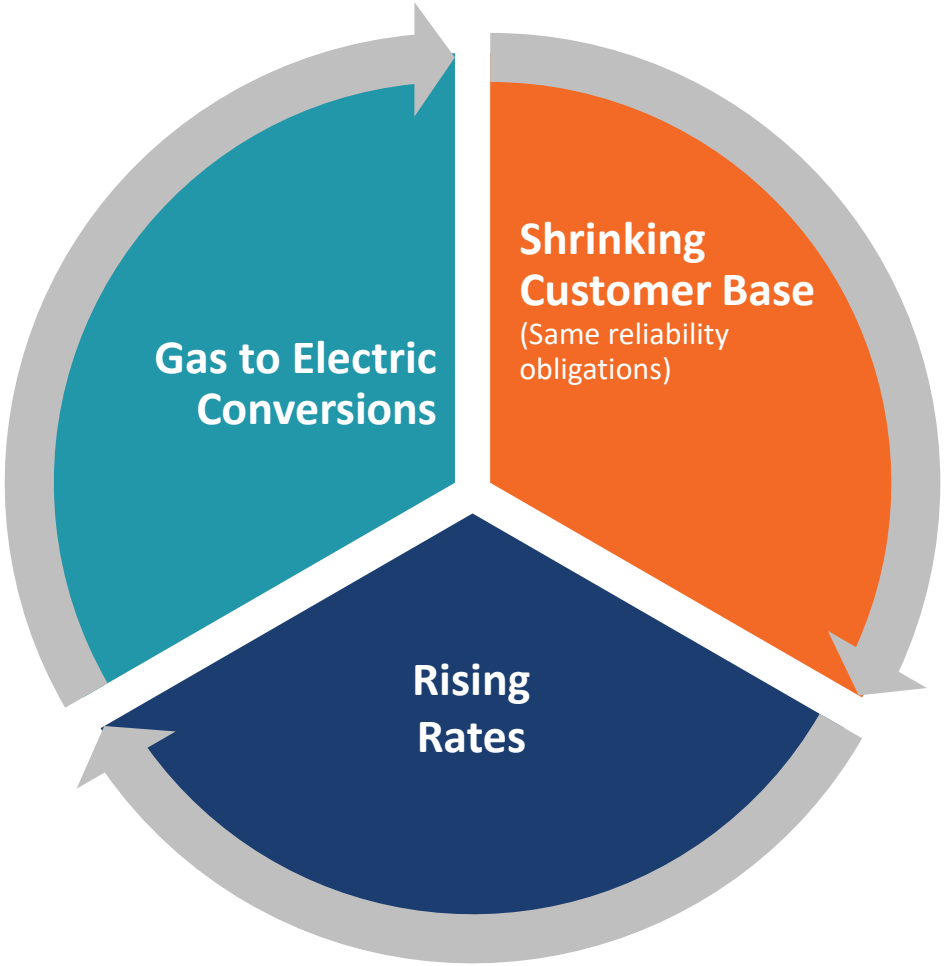


Source: S&P Market Intelligence, The Brattle Group research

Gas Utilities Can Participate in a Decarbonized Future to Mitigate a Potential Death Spiral and Control Customer Costs

1. As states pursue degasification policies and homes convert to electric heating, **utilities risk losing customers and load.**
2. Utilities will likely continue investing in their existing system for safety and reliability but need to **recover costs from a shrinking customer base over a shorter time**.
3. This will **increases rates for remaining customers** creating **"death spiral" feedbacks** pushing more customers to electrification.

About half of existing gas infrastructure assets could be at risk of partial stranding; nearly all new assets are at risk of under recovery.



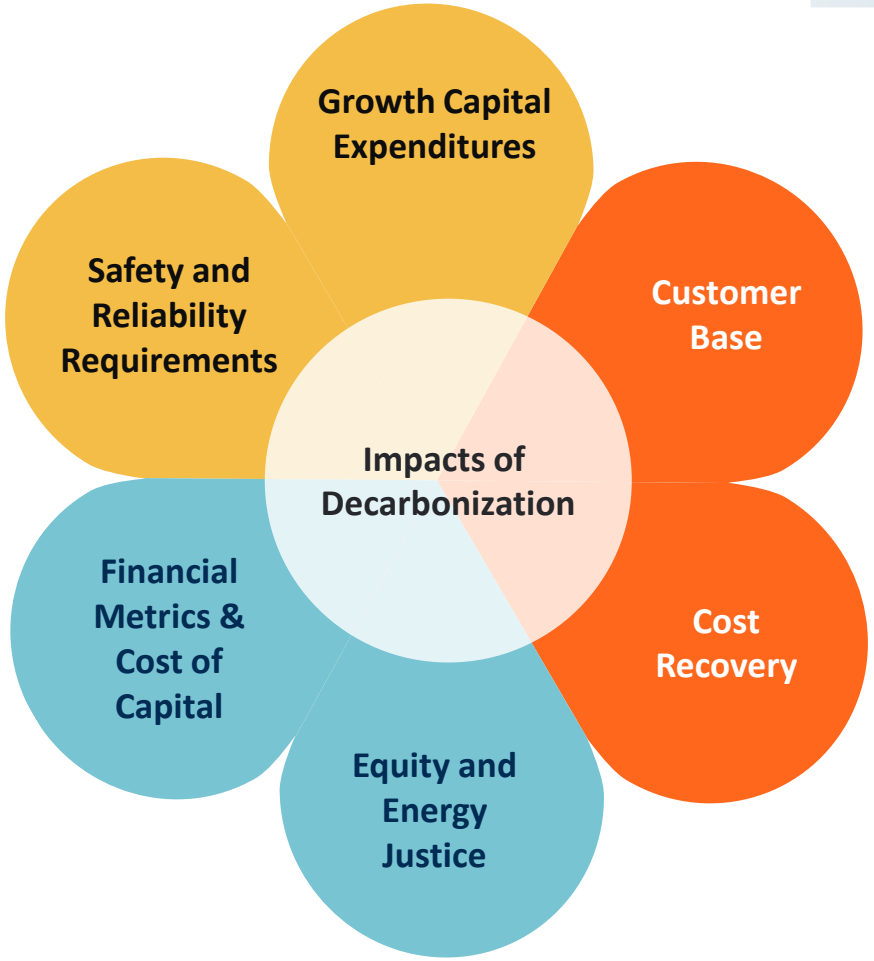
Gas Utilities' Risks and Opportunities with Decarbonization

Proposed decarbonization pathways challenge the traditional business model of natural gas utilities.

Without proactive adjustments, utilities face increasing **cost recovery risks from capital investments** to grow the gas system or to maintain safety and reliability requirements.

There are offsetting but early-stage opportunities, such as:

- **Alternative fuels** (RNG, hydrogen) are a viable alternative for end-uses that lack cost-effective electrification options.
- Long-run deep decarbonization and degasification appears to be expensive to achieve, requiring gas utilities to persist via **investment in clean performance of existing assets**.
- Utilities could **own and rate base gas replacement infrastructure**, earning a return on these decarbonization assets – RNG, H2, CCS, even end-use equipment.



The speed and breadth of transition is uncertain, depending on factors such as technology costs, regulatory and legislative mandates, and customer adoption incentives. Gas utilities should evaluate a suite of scenarios for different pace and drivers of the process.

Turning Increasing Risk into Opportunity

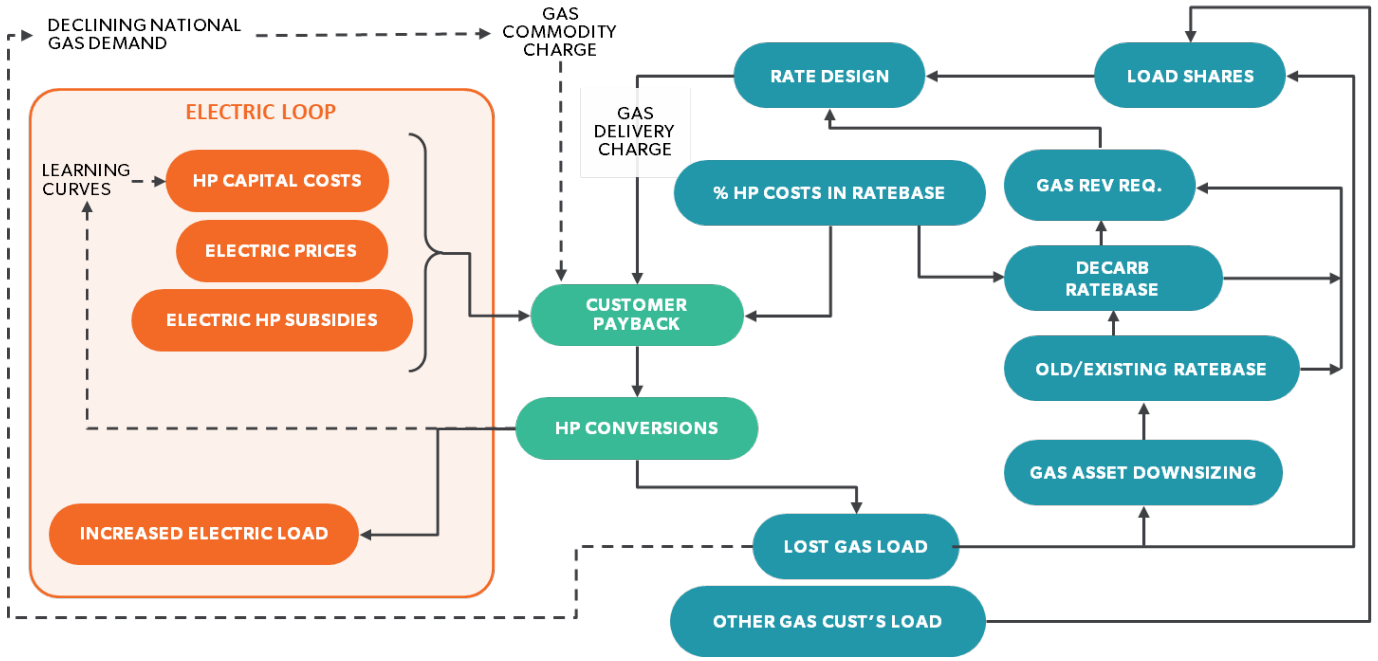
Gas utilities need **adaptive, long-term business plans that anticipates** the pathways, drivers, accelerators, and decelerators of the transition and identify the type and timing of impacts.

Long-term modeling tools can help:

Economy Decarbonization Models: How different might the pace and means of decarbonization be? There are many enabling technologies and policy "knobs" yet to be turned or applied. What are these pathways, and how can they be realized or adjusted?

Distribution System Planning Models: How can gas distribution investments, operations, pricing, and financing be altered so that utilities not only survive but grow in the face of the transition's long-term effects?

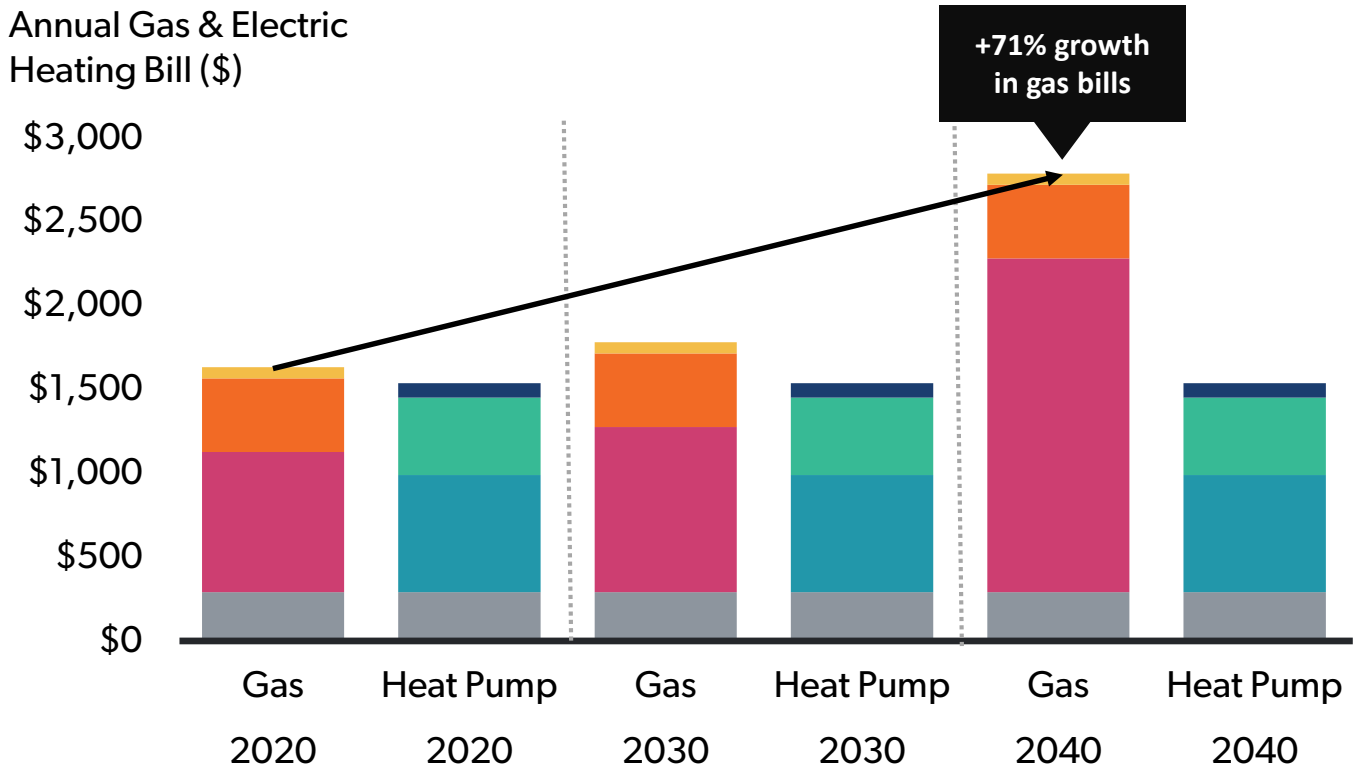
SYSTEM DYNAMICS MODELING



System Dynamics Modeling can help utilities analyze the complex feedbacks and interdependencies associated with risks and opportunities of the transition.

Risk Analysis for Gas Utilities: An Illustrative Example

RATES IMPACT FOR GAS AND ELECTRIC CUSTOMERS
– GAS UTILITY NO-ACTION "DEATH SPIRAL" SCENARIO



Source: CCIS NYISO forecast and The Brattle Group analysis. | Note: Rate impacts for a gas furnace and air source heat pump customer.

The default path will be for allocated costs to remaining gas customers, increasing their propensity to switch to electric.

Impacts are likely to fall unequally on LMI customers, requiring utility interventions or offsets.

Gas utilities may stabilize and even reverse this problem if they quickly innovate to become part of the solution to a decarbonized future.

Closing Remarks

PRESENTED BY: VERONICA IRASTORZA

Brattle

Symposium Structure

DECEMBER 7

1

Laying out the risky context: decarbonization driven by electrification

2

Issues in forecasting the exposure and opportunities

DECEMBER 8

3

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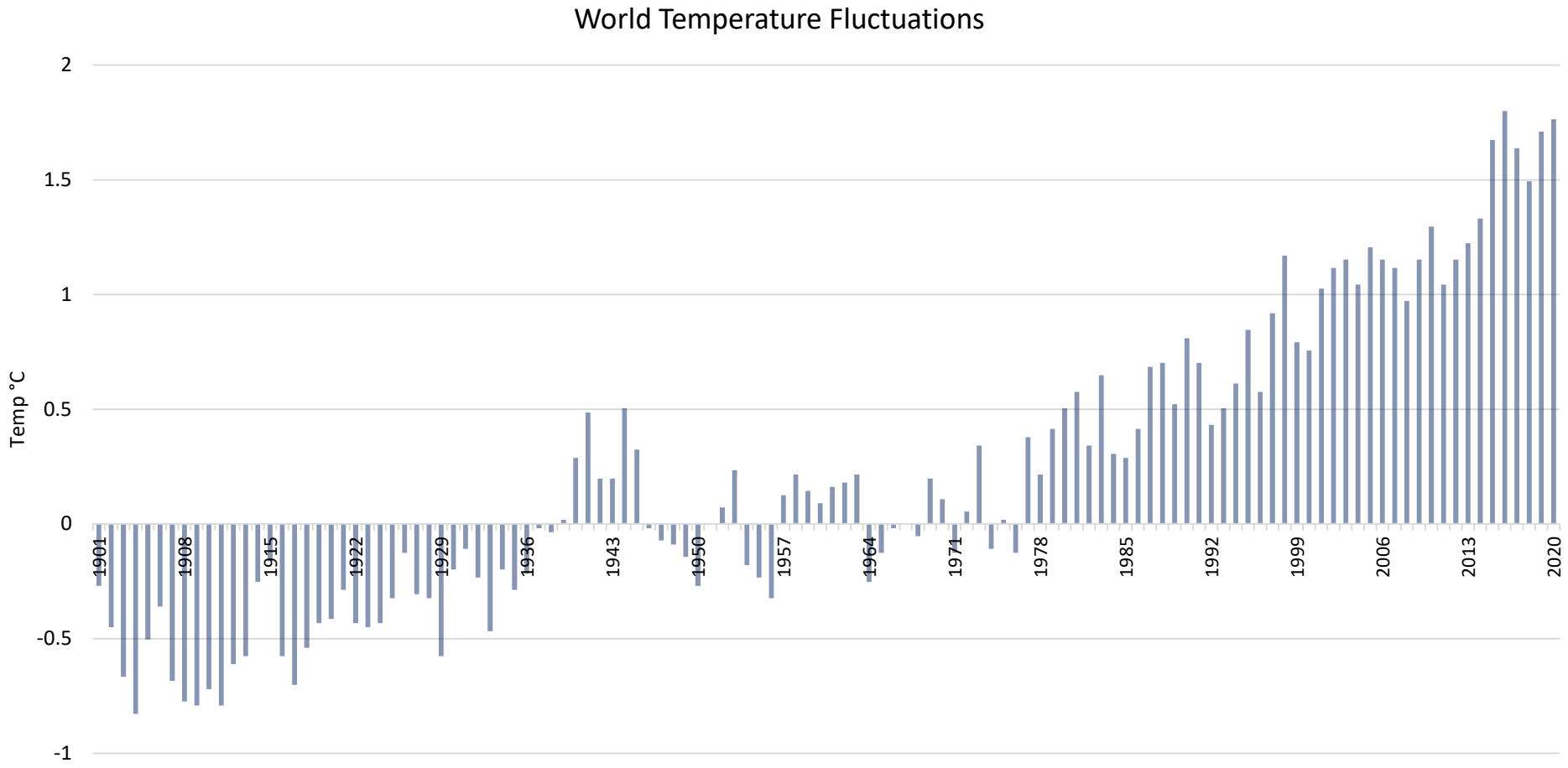
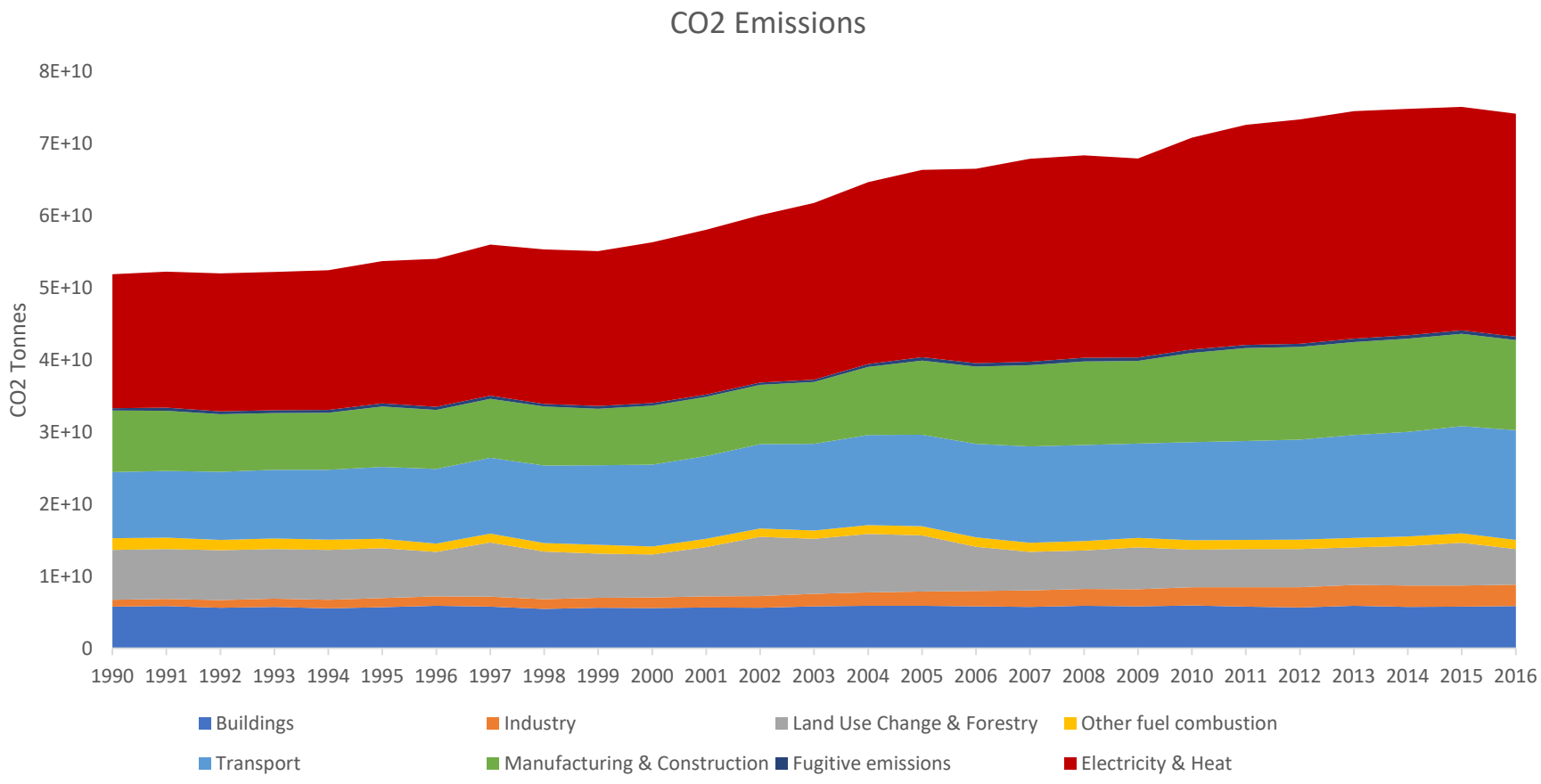
Climate Change is a **World Problem**



Source: National Centres for Environmental Information

Electricity & Heat Generation account for more than 50% of CO_2 emissions



Source: Ritchie, Hannah y Roser, Max (2017) *CO2 and other Greenhouse Gas Emissions,* Our World in Data from IEA and the World Bank

Changing Landscape: Frank Graves

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He sees a possibility of new kinds of partnerships with developers: Not “us vs. them” but “both, maybe in collaboration”

Two important questions are: “how to down-size gracefully? And How much to expect from clean fuels?

A new regulatory compact is needed

The future is path dependent

Symposium Structure

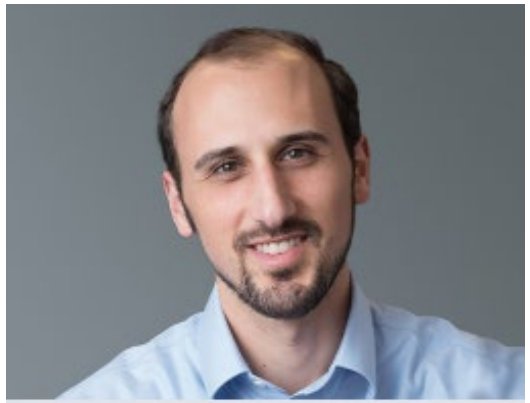
DECEMBER 7

1

Laying out the risky context: decarbonization driven by electrification

Panel 1 - How are Gas Utilities Anticipating the Push to Electrify?

Michael Hagerty
SENIOR ASSOCIATE
The Brattle Group



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Issues in forecasting the exposure and opportunities

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Pressure is increasing to **ban new gas uses** and gradually **"electrify everything."**

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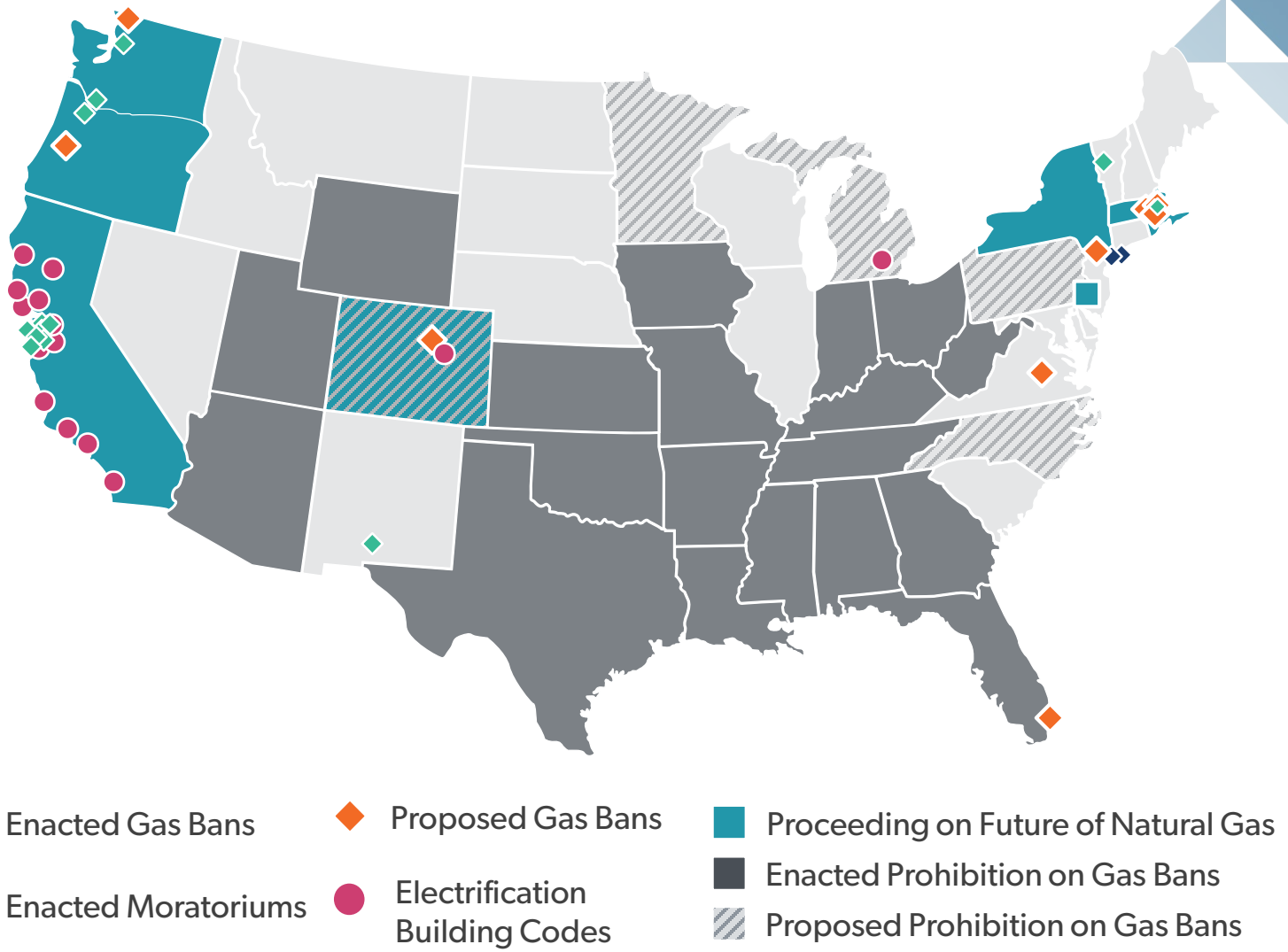

Source: S&P Market Intelligence, The Brattle Group research

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Panel Three

STRATEGIES TO TRANSITION GAS UTILITIES TO A DECARBONIZED FUTURE

MODERATED BY: KASPARAS SPOKAS

Brattle

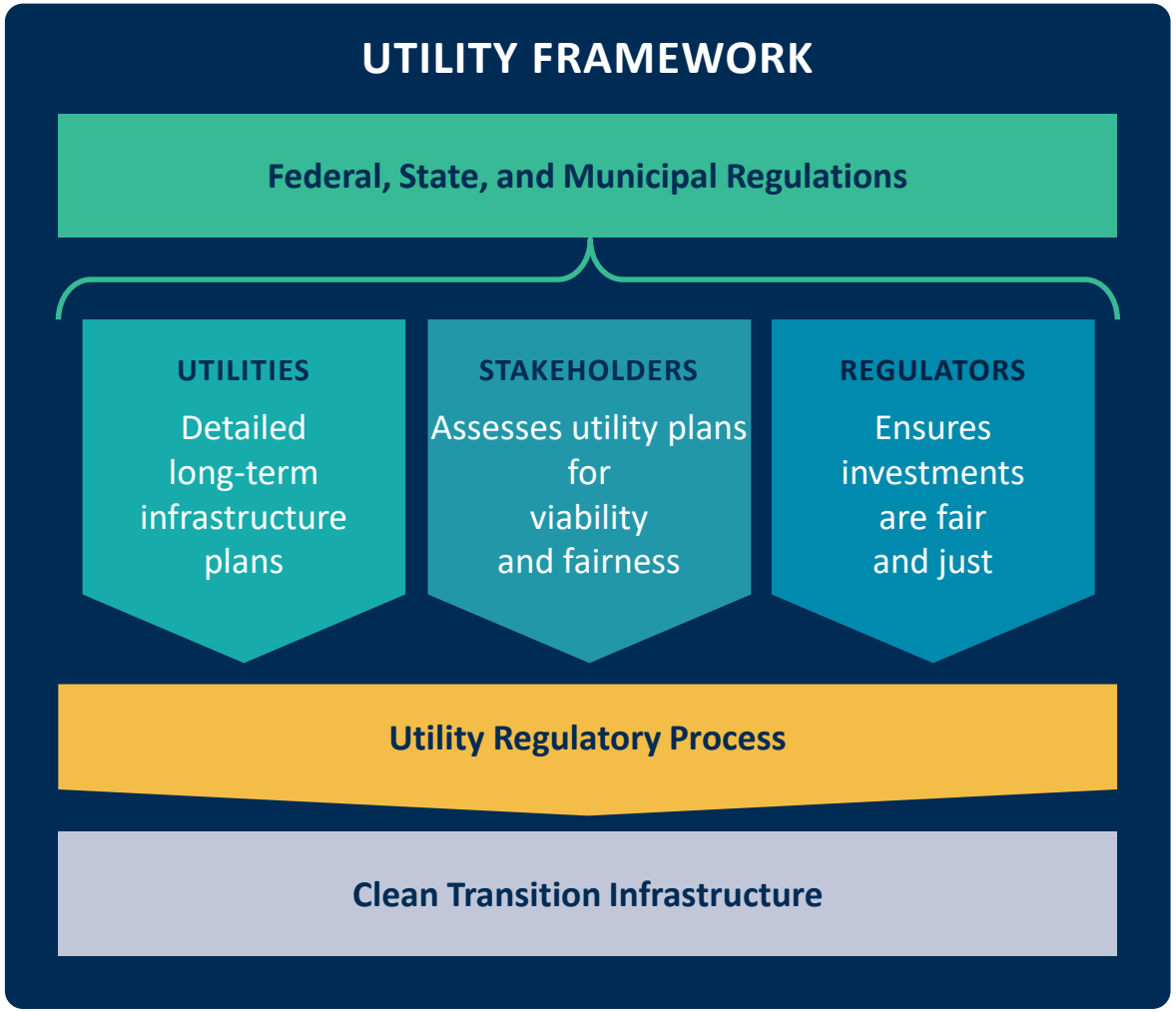
Utilities are Well-Suited to Help Build Out a Clean Transition

Utilities are intrinsically positioned to plan and implement large infrastructure transitions.

Key characteristics include:

- **Long-term infrastructure planning that considers societal goals and costs**
- Access to **capital through financial markets**
- **Regulatory and public oversight**

However, regulatory innovations are needed for **utilities to invest in a transition**.



A New Regulatory Framework is Critical to Enable a Successful Transition

Regulation is a fundamental part of business strategy; without appropriate approvals and pricing mechanisms, no utility business plan is adequately specified.

Utilities must work with regulators to evolve regulation and shape the transition, instead of reactively responding to new policies and regulations as they emerge (most of which may require but often do not incentivize planning for net-zero).

Guiding principles that can help regulators and utilities establish a new framework:

1. **Establish the scope of needs and requirements for utilities to participate more directly in a clean transition** by mid-century.
2. **Set clear targets, criteria, and measureable metrics** by which progress can be tracked and rewarded, taking care to ensure they also incentivize long-term goals and customer cost reduction.
3. Allow utilities and markets **flexibility on how to achieve targets** efficiently.
4. Provide **fair and just incentives to enable utilities to plan** for an uncertain future while managing customer costs, including fair treatment of assets that must be stranded to achieve policy goals.

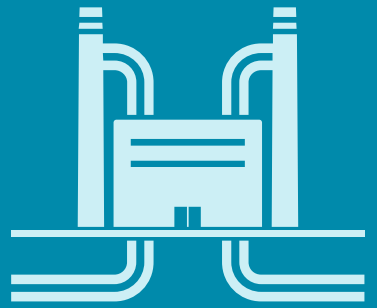
With these principles, utilities can evaluate strategies to pursue a successful transition (see next section).

Strategies to Decarbonize While Growing Business

A broader regulatory framework can enable utilities to decarbonize while growing their businesses. The early steps should be for utilities and regulators an "all-of-the-above" evaluation of options to facilitate their development, assess which can be economically and technologically viable and identify where utilities have comparative advantages.

Expanded Regulatory Framework That Enables Solutions

STRATEGIES TO DECARBONIZE WHILE GROWING BUSINESS



ONE

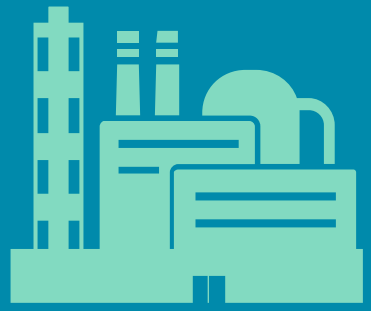
Increase Performance of Existing Infrastructure and Reduce Stranded Asset Risk

TWO

Own and Rate Base Gas Replacement Infrastructure

THREE

Secure Financial Life of Infrastructure



FOUR

Decarbonize Supply for Future Gas Demand

FIVE

Long-Term Business Solutions

Utilities Will Need to Understand Risks and Evaluate Solutions

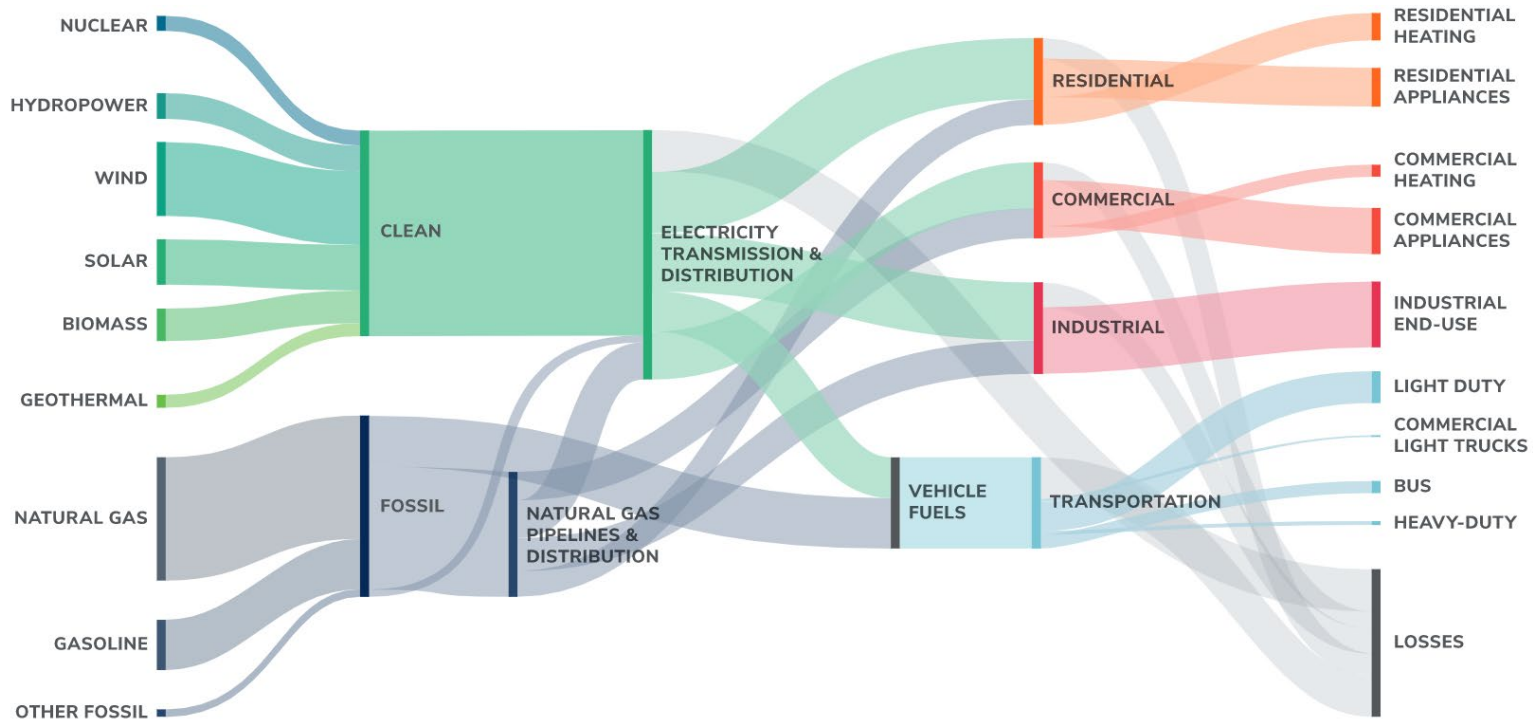
The industry is transition to whole-economy planning, which will require understanding:

- The uptake of technologies and impact on gas consumption
- The roles of efficiency, electrification, and fuel-switching
- The utility and customer costs of specific technology pathways

Utilities planning will need to capture the long-term planning impacts and the interactions of:

- Technology adoption
- Decarbonization policies
- Macroeconomic conditions
- Supply and demand

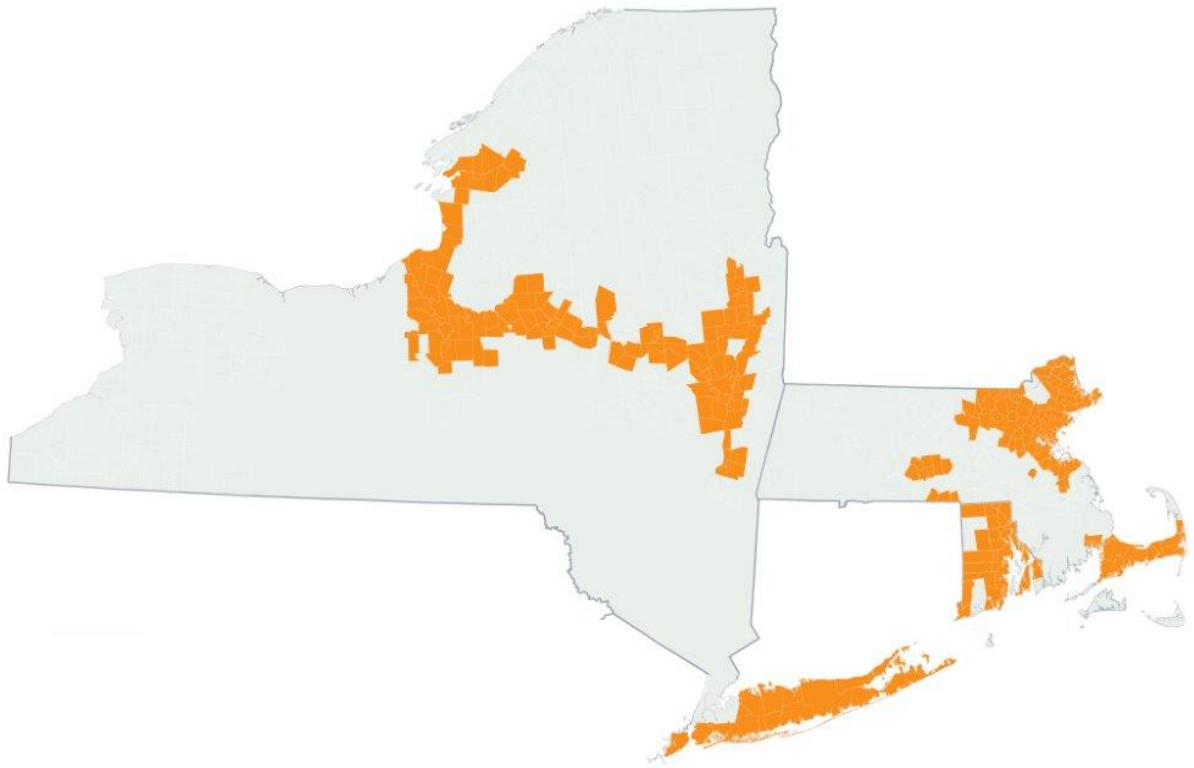
DECARBONIZATION, ELECTRIFICATION & ECONOMIC PLANNING (DEEP) MODEL

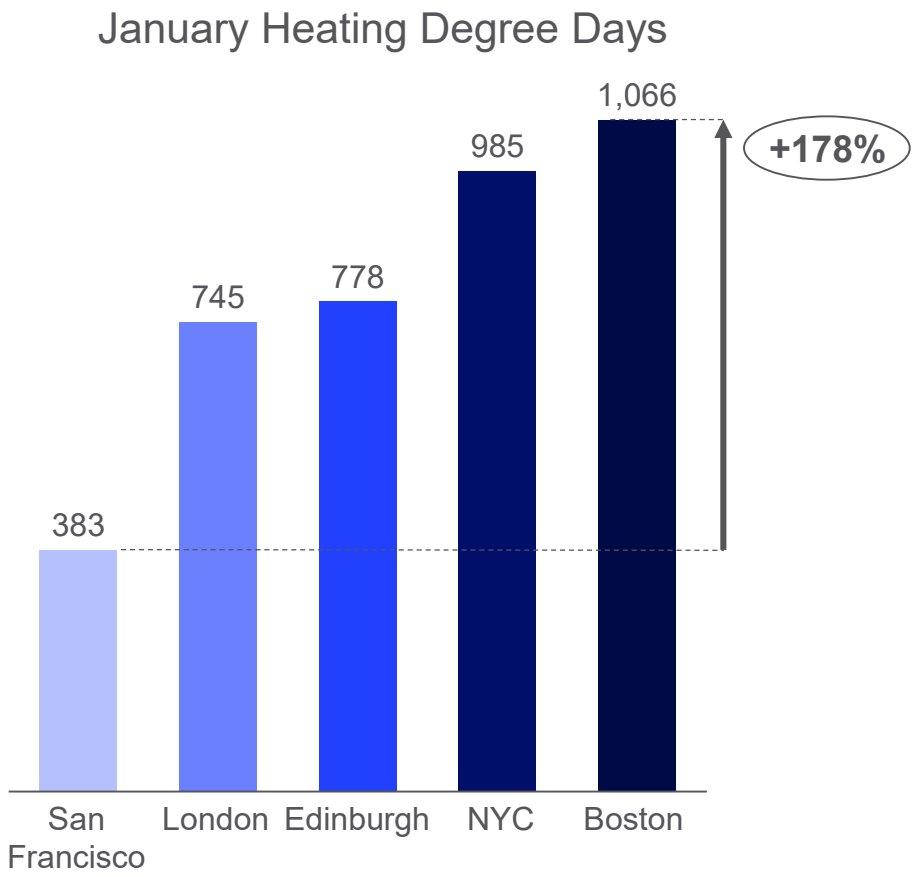


The model can be run in (1) **planning mode** and **(2) optimization mode** to meet client-specific needs.

National Grid's US Gas business overview

3.6 million
Gas accounts





Fahrenheit-based 5-year-average (2013 to 2017) heating degree days for January (base 65F). Source:www.degreedays.net (using temperature data from www.wunderground.com)

Delivering on New York and Massachusetts heat decarbonization goals

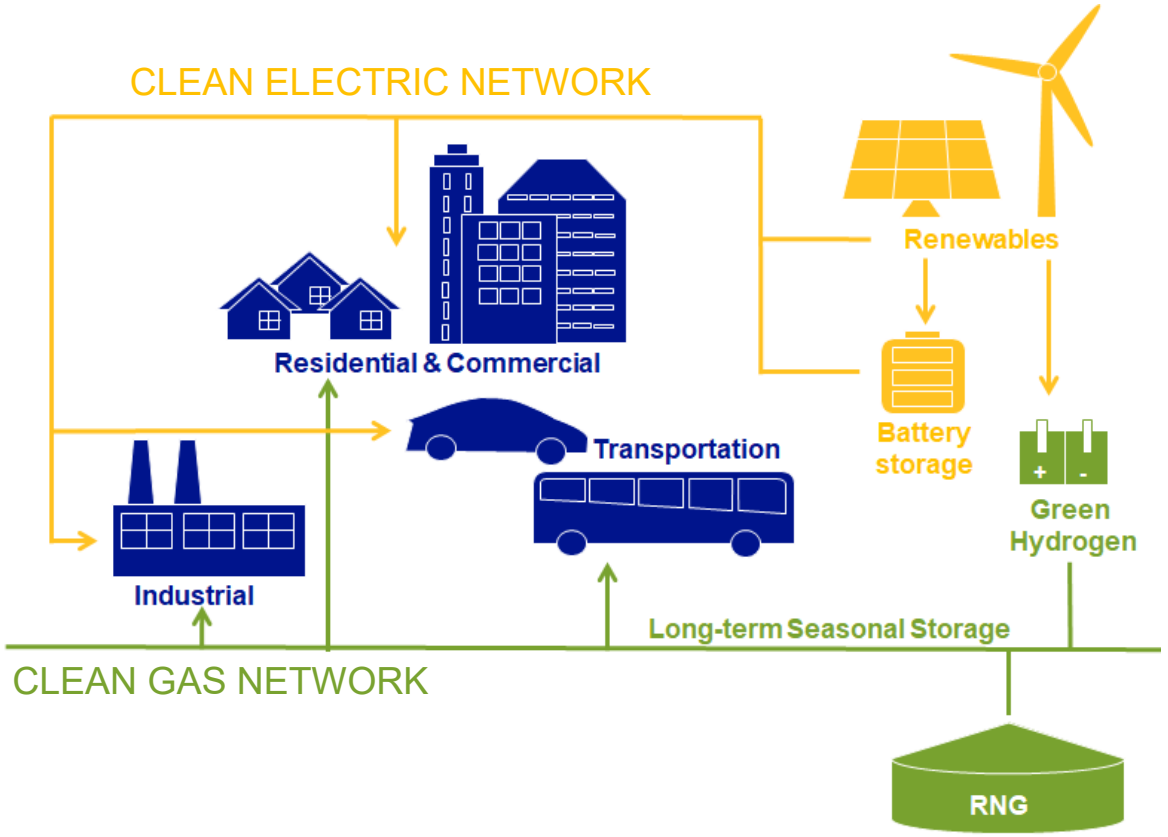
Emerging analysis indicates that a **hybrid approach to heat decarbonization** can achieve net zero **most affordably, feasibly, and reliably,** relying on three key building blocks.

Building blocks

Widespread energy efficiency
Prioritizing building envelope improvements

Low carbon fuels
RNG from across the eastern US plus hydrogen blending

"Dual-fuel" heating + electrification
A mix of customers that fully electrify their heat and those that rely on gas on coldest days



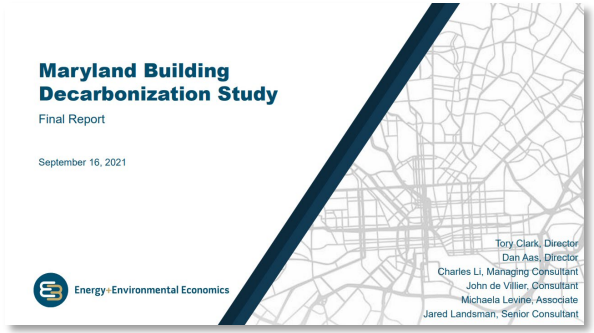
Recent efforts support a hybrid approach to heat decarbonization

Heat Decarbonization

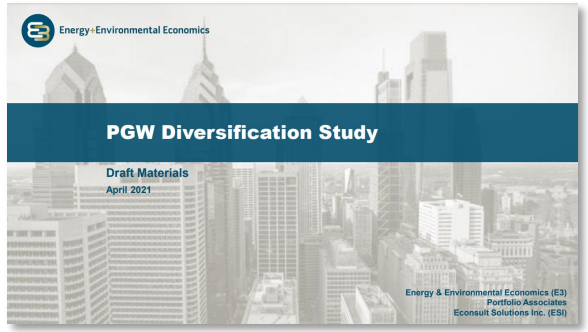
Emerging signposts from the region and abroad are pointing toward dual fuel decarbonization strategies for building heat**.**

A **hybrid approach balances cost, reliability, and practicality**, while **lowering barriers to the rapid deployment** of heat pumps.

Coupled with **low-carbon gas**, a hybrid approach meets net zero with **higher reliability** for **$500-1000 lower cost per year compared to "full" electrification.**



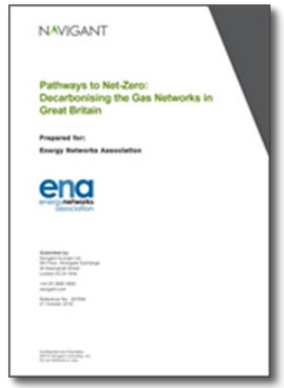
Maryland Building Decarbonization Study



Draft Philadelphia Gas Works Diversification Study

Hydro-Québec and Énergir partnership

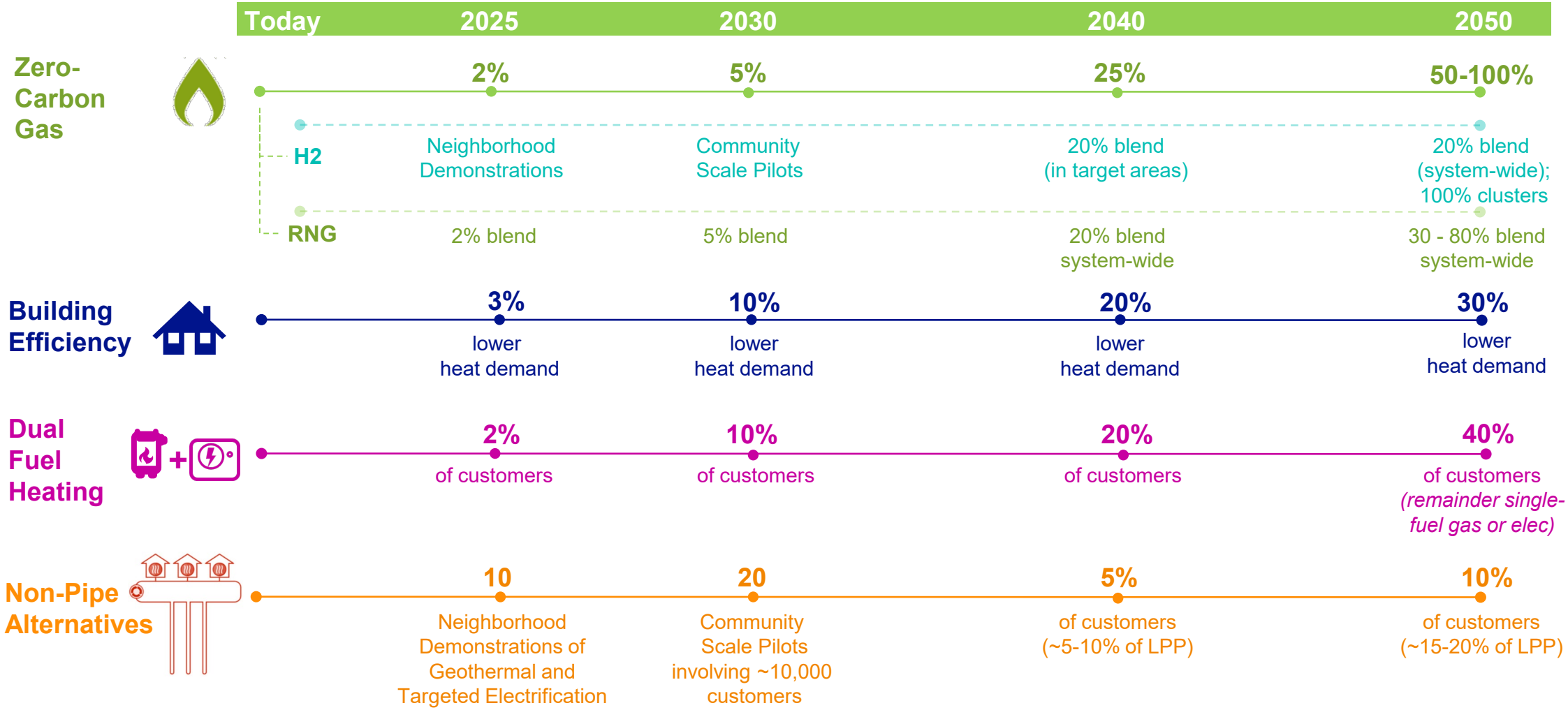
CLASP Hybrid Heat Homes report



Pathways to Net-Zero: Decarbonising the Gas Networks In Great Britain

Hybrid Net Zero Pathway at a Glance

Net zero strategy targets key energy and customer milestones



Natural gas in our network is reduced by >80% with potential for 100% zero fossil

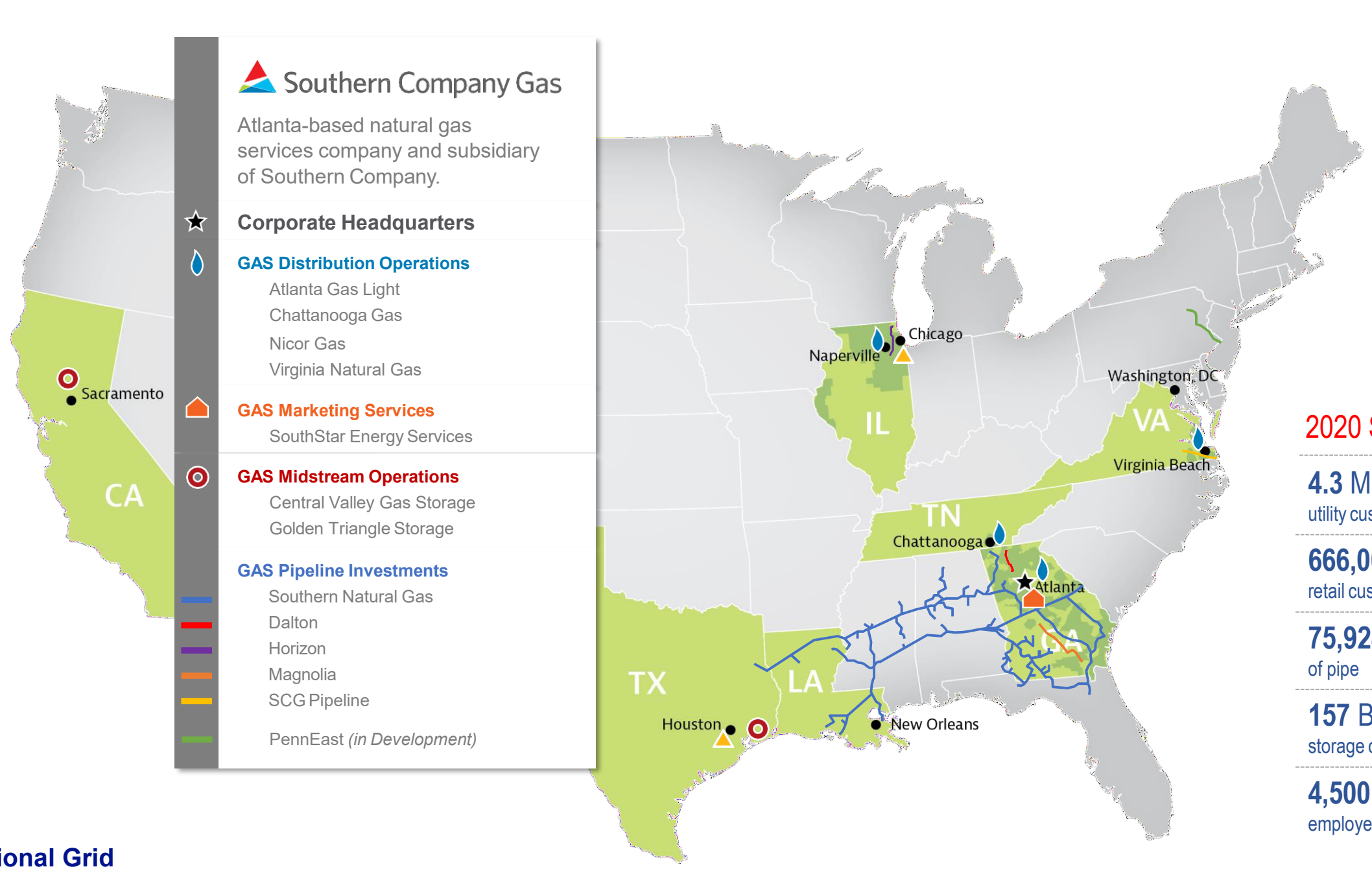
Putting the pieces in place

We have an opportunity to **build the policy and regulatory frameworks**

1. Expanded Energy Efficiency Programs / Building Codes
2. Renewable Heating Fuel Standard
3. H2 Blending Innovation and Deployment
4. Dual-Fuel Heating (Building Codes, Rate Design, DSM Program Design
5. Non-Pipeline Alternatives & Networked Geothermal
6. Whole Energy System Optimization

Renewable Natural Gas

Southern Company Gas | RNG



2020 Stats

4.3 Million
utility customers

666,000
retail customers

75,924 Miles
of pipe

157 Bcf
storage capacity

4,500
employees

Southern Company Gas is committed to a clean energy future.

We support efforts to reduce emissions from our business and beyond.

Southern Company has established a goal to reduce its carbon emissions 50% from 2007 levels by 2030 and a long-term goal of net-zero carbon operations by 2050. This is inclusive of Southern Company Gas operations.

We are also focused on opportunities to support emissions reductions across the natural gas value chain - targeting upstream, operational and end-use emissions.

Methane Emissions Reductions in Operations

Supply Options Differentiated Gas, RNG and Hydrogen

NGVs

Energy Efficiency

Customer Empowerment Products

R&D Investment

Panel Four

IMPLEMENTATION OF REGULATORY FRAMEWORKS AND STRATEGIES

MODERATED BY: LONG LAM

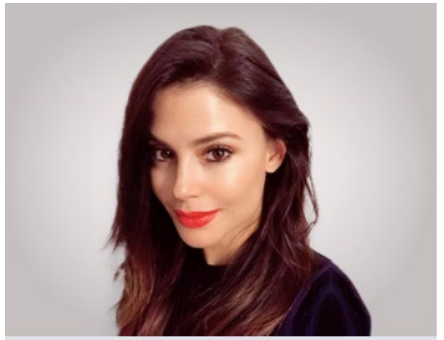
Brattle

A Panel of Distinguished Speakers

Megan Gilman
COMMISSIONER
Colorado Public Utilities Commission

Mark Kahrer
SENIOR VICE PRESIDENT
Regulatory Affairs, Marketing and Energy Efficiency, New Jersey Natural Gas

Jay Balasbas
COMMISSIONER
Washington Utilities and Transportation Commission

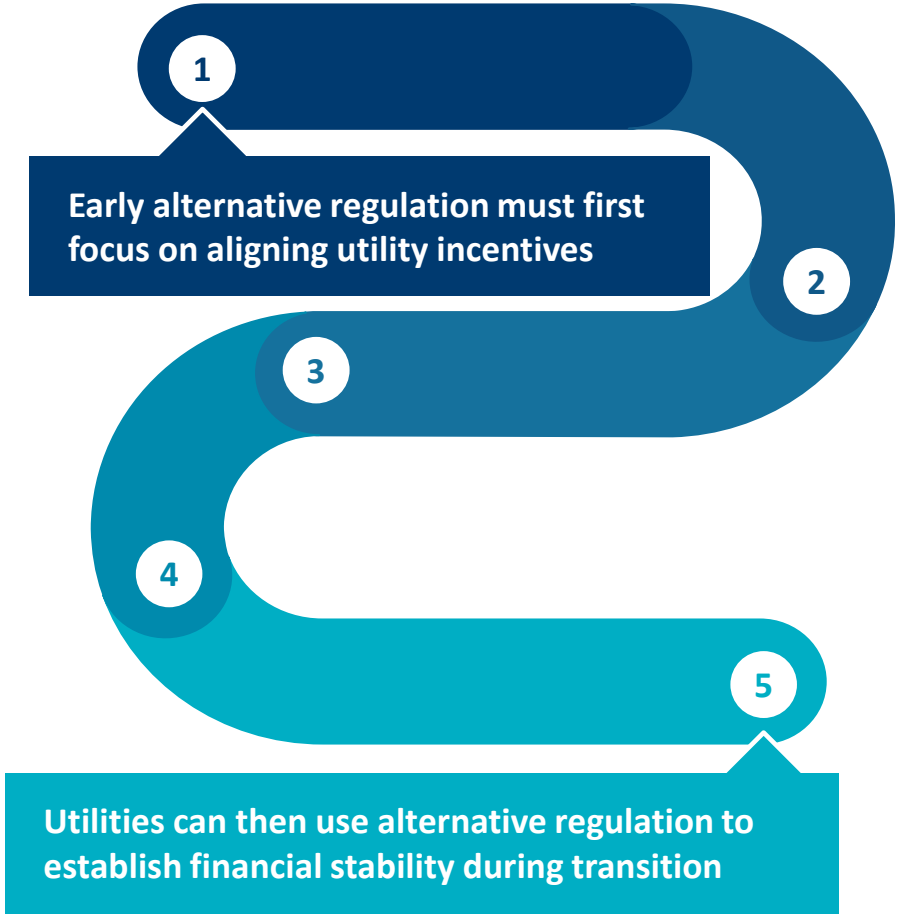


Despina Niehaus
DIRECTOR OF STRATEGIC PLANNING
SoCalGas

Put Solutions into Action with a 3-Step Action Plan

1. SHORT TERM Pilot Projects and Experimentation	2. MEDIUM TERM Bridge Solutions	3. LONG TERM New Ways of Doing Business
TODAY, utilities should request that regulators approve pilot projects for demand-side programs and demonstrations of emerging alternative gas technologies.	**OVER THE NEXT 10 YEARS,** utilities should work with regulators and stakeholders to expand traditional cost-of-service regulation to accommodate new planning criteria, participation rules, and pricing for achieving decarbonization goals.	**LONGER TERM,** pilot technologies and exploratory services can become full-fledged business lines for gas local distribution companies (LDCs) operating in a rapidly decarbonizing future.

A Smooth Transition Begins with Where You Are Today



1. **PROGRAM COST RECOVERY**
   Recover costs associated with the implementation of decarbonization programs

2. **DECOUPLING/LOST REVENUE ADJUSTMENT MECHANISM**
   Recover fixed costs that were not collected due to lower natural gas sales levels driven by demand-side programs

3. **RATE OF RETURN INCENTIVES**
   Earn an authorized rate of return on demand-side/decarbonization programs (similar to supply-side expenditures)

4. **SHARED NET BENEFITS**
   Share cost savings from decarbonization programs between the customers and the utility

5. **PERFORMANCE INCENTIVE MECHANISMS (PIMS)**
   Earn a higher rate of return when meeting a pre-determined decarbonization goal

New Business Lines Require Paradigm-Shifting Changes

Update evaluation metrics for new investments A

Update traditional cost-benefit frameworks to include broader system and societal benefits and costs.

Gain permission to selectively own non-delivery assets B

Own non-gas assets that will help decarbonize sectors (e.g., for LMI customers or those in dense urban areas) with new energy delivery systems

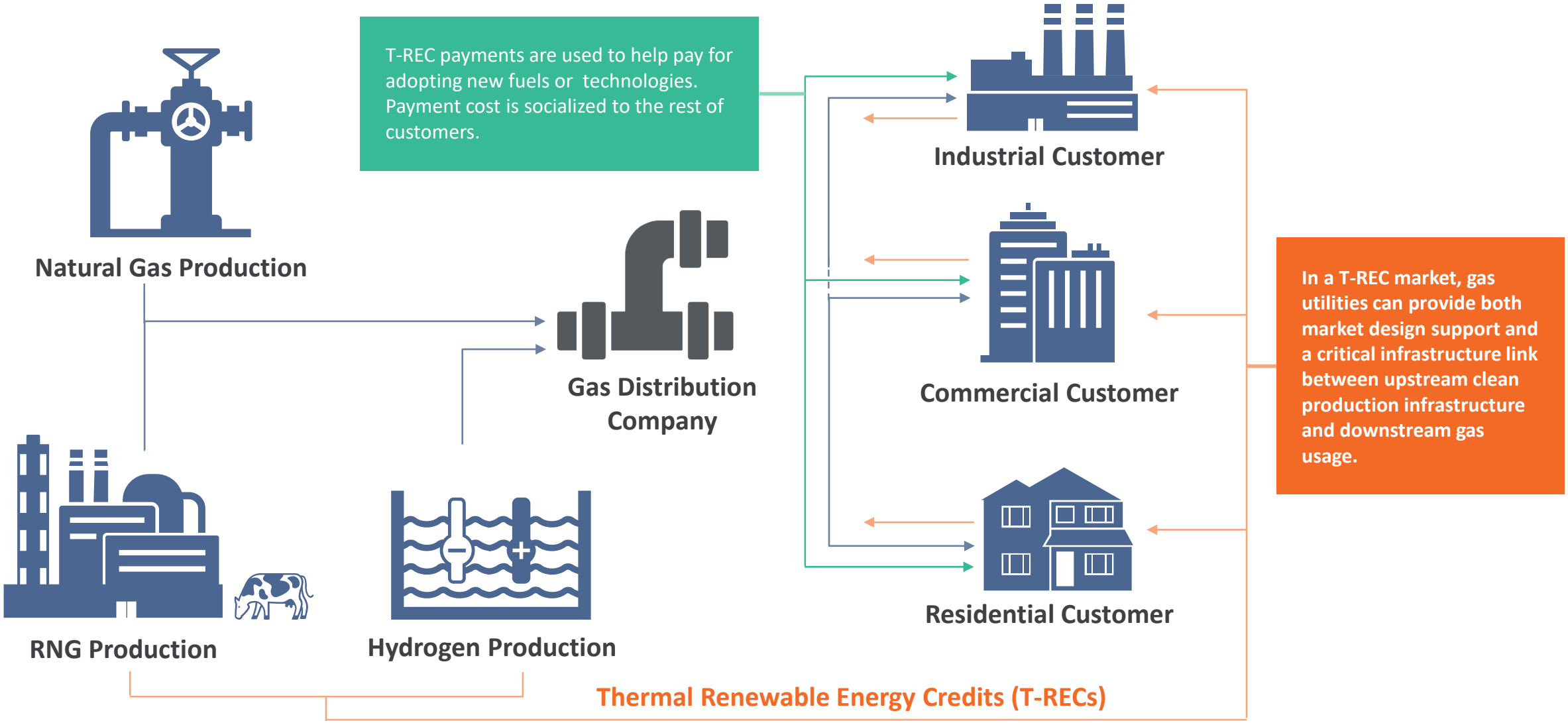
Coordinate decarbonization efforts with electric business or electric utilities C

Scale the wall that traditionally separates electric and gas business and operations

Expand to less regulated markets where utilities can facilitate market development D

Facilitate early or targeted market development in less regulated or underdeveloped areas (by offering alternative financing mechanism or investment incentives)

T-RECs as a Market Incentive for Investments in Alternative Gas



LDC Decarbonization & Updated Gas Regulations

Megan Gilman, Commissioner

The views expressed in this presentation are those of the presenter and do not necessarily reflect the views of the Colorado Public Utilities Commission or any other individual Commissioner.

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HB19-1261 Established Statewide GHG Targets

Reduce from 2005 baseline:

26% by 2025

50% by 2030

90% by 2050

Air Quality Control Commission tasks with implementing policies and rules

Colorado Energy Office has roadmap showing intended pathways for each sector

PUC will review and approve Clean Energy Plans for electric utilities – targeting 80% reduction by 2030 and transportation electrification plans

2021 Legislation

- Clean Heat Plan for NG Utilities – 4% reduction by 2025, 22% reduction by 2030, 2035+ targets still TBD
- Updates to Gas DSM calculations including SCM
- Requirement for Beneficial Electrification Plans

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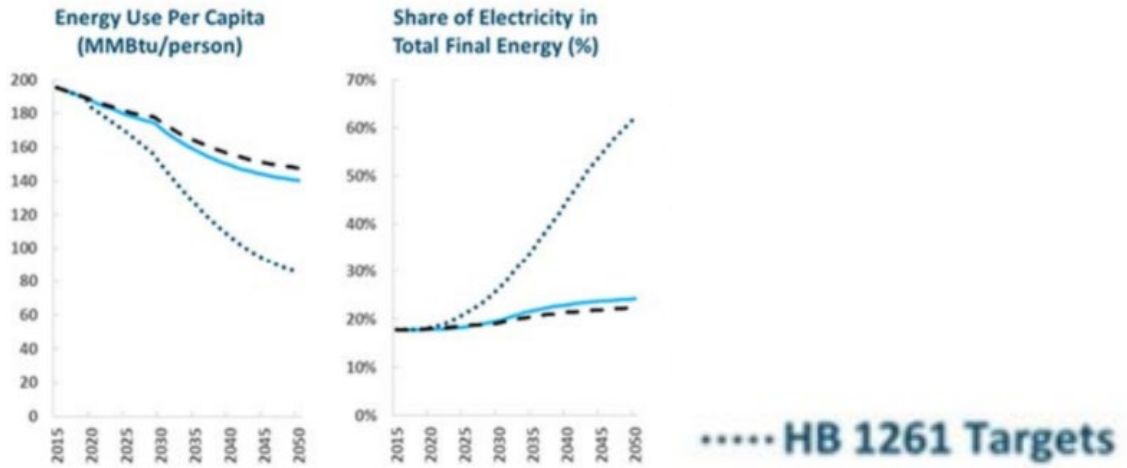
Commissioner Megan Gilman

What are the state's expectations?

- Energy use per capita expected to reduce from just below 200 MMBtu/person today to around 155 MMBtu/person in 2030 and down to around 85 MMBtu/person in 2050.
- Share of electricity in total final energy expected to rise from approximately 19% today to nearly 30% by 2030 and above 60% by 2050.



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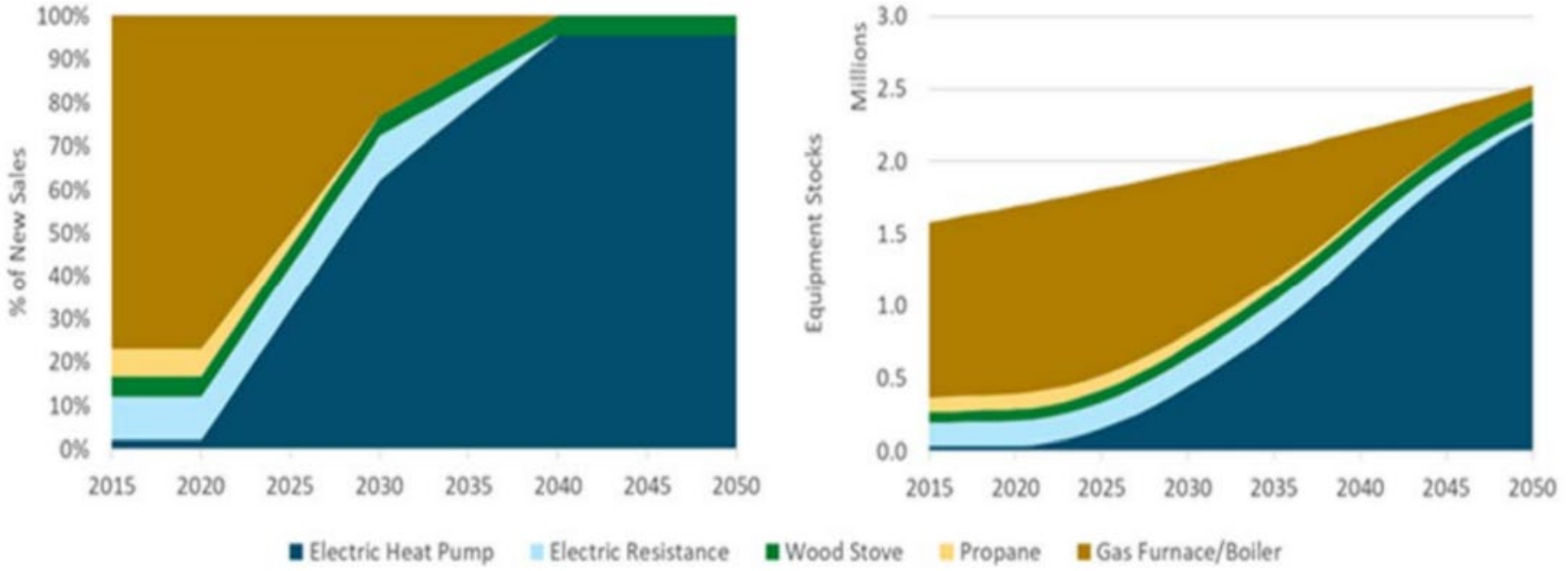
Commissioner Megan Gilman

What are the state's expectations?

- Electric water heating and space heating assumes a 60% sales share by 2030. Show 0% new sales share for gas furnace/boiler before 2040.



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Proceeding 20M-0439G

Investigation into Retail NG Industry GHG Emissions in Light of Statewide Emission Reduction Goals Adopted in House Bill 19-1261

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Procedural History

- October 2020 – Opened
- November 2020 – Public meeting with other state agencies to discuss NG role in emission reductions and expected reductions in gas sold
- February 2021 – Public meeting on fugitive emissions – measurement and monitoring
- March 2021 – Public meeting on alternative pipeline fuels – biomethane and hydrogen
- May 2021 – Public meeting on aligning gas planning with state climate goals

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Proceeding 21R-0449G

Rulemaking – Clean Heat Plans and Broader Gas Planning

Clean Heat Plan Rules

- NOPR issued October 1, 2021
- Brand new
- To implement clean heat statute

- GHG Targets – Reductions of 4% by 2025 and 22% by 2030, 2035+ targets to be set by PUC later
- GHG Emissions from "city gate to customer end use combustion"
- Reductions must come from eligible clean heat resource – DSM, beneficial electrification, green hydrogen, recovered methane (only a portion of reductions may come from recovered methane)
- Utility to submit multiple scenarios – some that meet price cap (2.5%), but some need not
- First plan in 2023 –adjudicated process

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Proceeding 21R-0449G

Rulemaking – Clean Heat Plans and Broader Gas Planning

Gas Planning Rules

- Included at the direction of the Commission to provide a comprehensive look at future of the gas system and to enable PUC to better plan for any changes seen coming in the industry

- Comprehensive reporting of localized load forecasts, inclusive of state and local action
- Projection of localized future expenditures on the system, inclusive of safety/integrity work, capacity
- Introduction of requirement to analyze non-pipeline alternative solutions
- Adjustments to line extension policy language
- Longer term rate projections
- First plan may be non-adjudicated (2023), then these may be litigated
- Will hold many workshops and public meetings, wrap rulemaking in late 2022

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Decarbonization of the Gas Supply:

A key to a low cost, reliable Clean Energy Future

2021 Brattle Webinar
December 8, 2021
Mark G. Kahrer, Senior Vice President, NJNG

New Jersey Resources

New Jersey Natural Gas

- Largest Subsidiary of New Jersey Resources (NJR)
- Founded in 1952
- Nearly 565,000 customers across five counties
- Over 7,500 miles of distribution and transmission pipeline
- J.D. Power Highest Customer Satisfaction with Residential Natural Gas Service in the East Among Large Utilities*, 6 years in a row

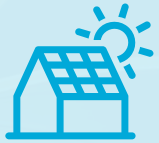
*For J.D. Power 2020 award information, visit jdpower.com/awards

Fundamental Beliefs That Guide Our Strategy

Energy markets, the U.S. and N.J. are **shifting towards low carbon and renewables**

Natural gas will continue to perform a vital role in supplying reliable energy, supporting economic growth and specifically in-home heating

Existing infrastructure will become more valuable as new storage and transportation assets are harder to build and as we decarbonize the natural gas supply



Solar power is core to public policy and generation cost will continue to decrease allowing companies with a clear strategy to compete with reduced subsidies

New Jersey Resources

Most Environmentally Sound Natural Gas System in the State*

Committed to reducing and minimizing methane emissions from distribution system and providing decarbonized supply to our customers

> $2.3 Billion
invested in natural gas delivery system infrastructure in last decade

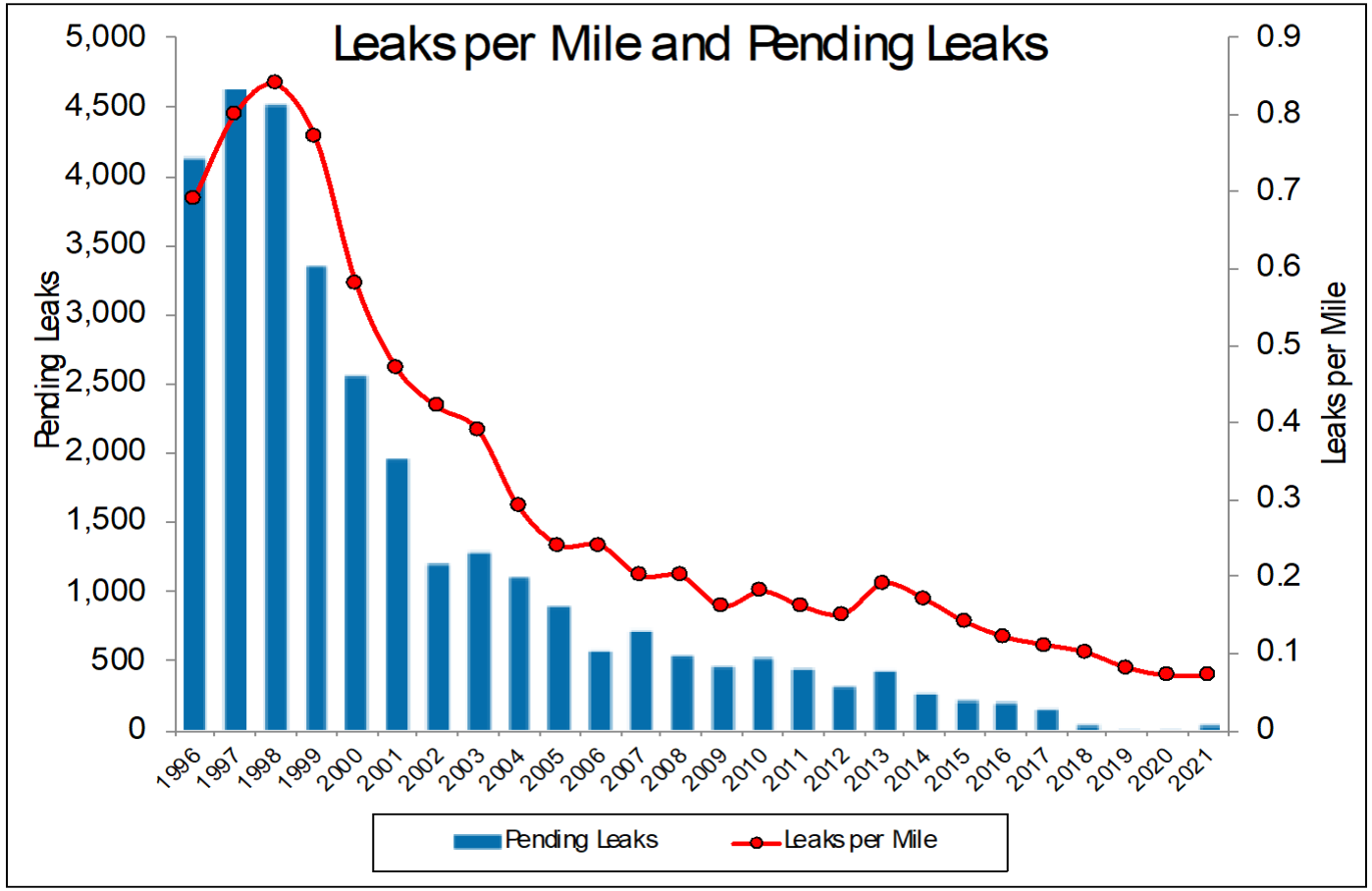
Reduced methane emissions by
>900 metric tons
in past five years

1st natural gas utility in N.J. to **fully replace cast iron pipes**

1st N.J. utility expected to replace the bare steel in its system by end of 2021

99% of distribution system plastic or protected steel

>50% reduction in operational emissions in New Jersey from 2006 levels



Investments to remove cast iron and bare steel drive leak reduction

*As measured by leaks per mile

New Jersey Resources

Positions NJNG to safely deliver Green Hydrogen to our customers.

The Value of our Natural Gas Infrastructure

An asset in the clean energy transition

Today, our pipeline network can integrate and deploy low and zero carbon fuels, such as Renewable Natural Gas and hydrogen, driving lower emissions without a massive, costly buildout of new infrastructure

New Jersey's Pipeline Network

$17 Billion Already Invested[1]

35,000 Miles of Underground Delivery Pipeline[2]

>75% of Residents Rely on Gas Home Heating[3]

70x Fewer Outage Events than Electric Grid[4]

Compatible with Zero-Carbon Fuels

Sources:
1 - Aggregated from 2020 NJ gas utility annual reports filed with BPU
2 - US Dept of Transportation; Pipeline and Hazardous Materials Safety Administration database
3 - EIA, New Jersey State Energy Profile, Accessed 11/12/21
4 - GTI, Assessment of Natural Gas and Electric Distribution Service Reliability

New Jersey Resources

Howell Green Hydrogen Project

First project on the east coast to deliver green hydrogen through a utility distribution pipeline to heat customers' homes and businesses

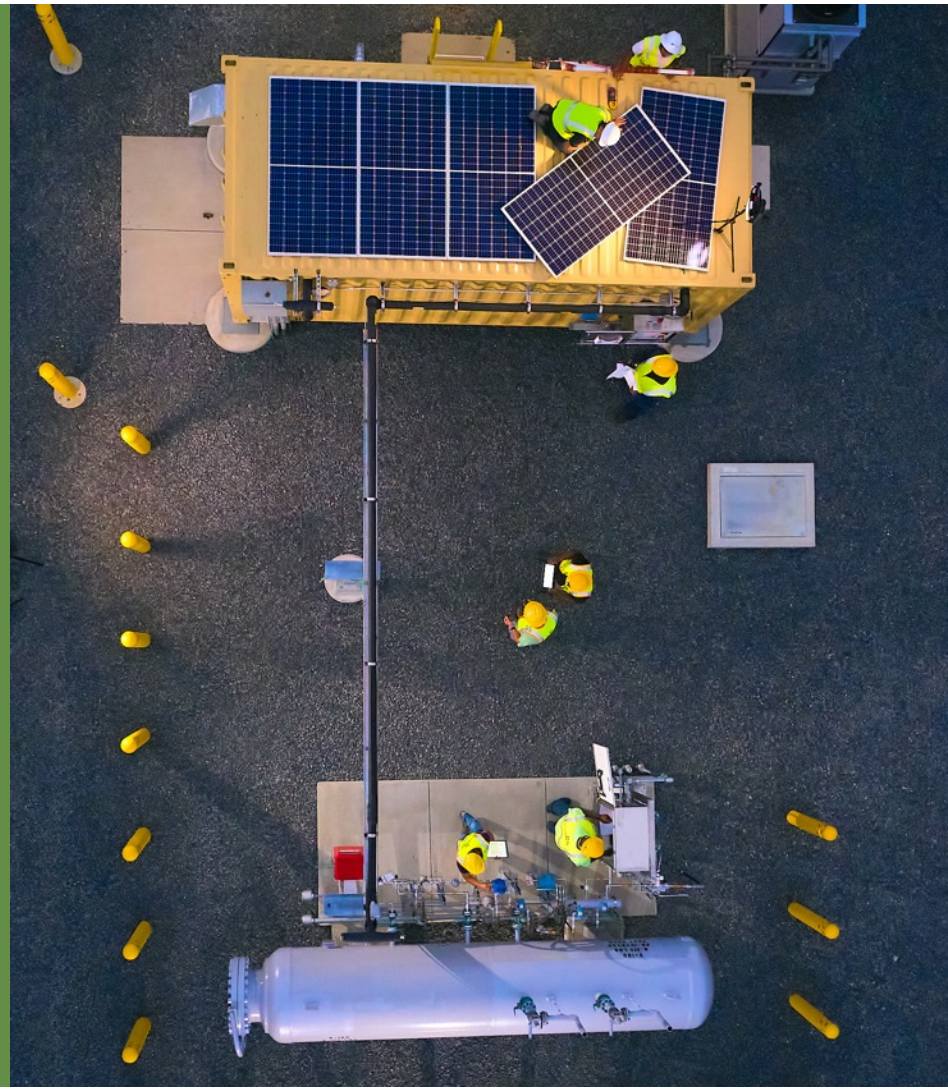
Project Status

- Commercial operation achieved October 2021
- Entire project located within NJNG's Howell facility
- System expected to offset ~180 US tons of CO2 per year

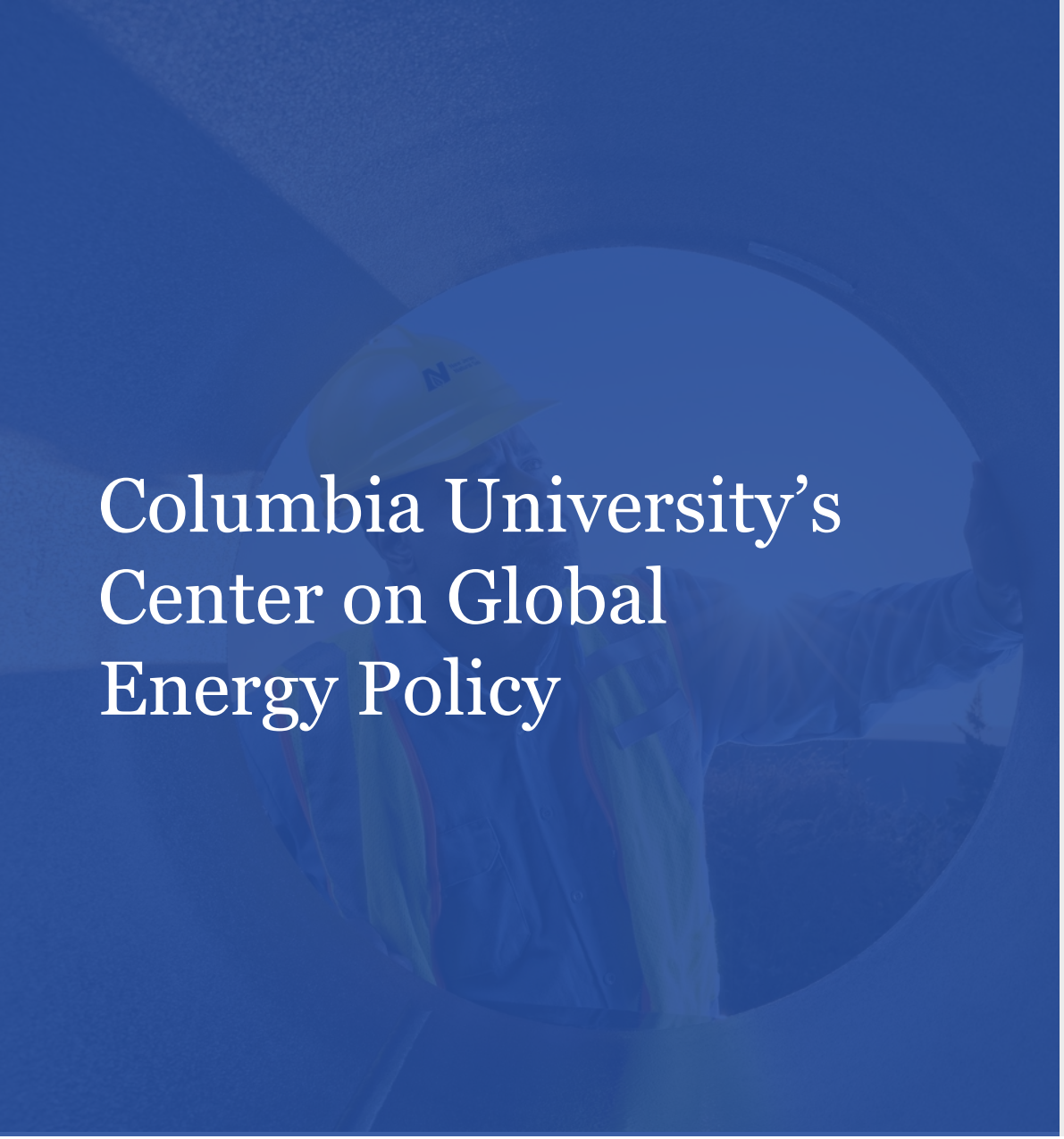
Renewable Electricity

Powers Electrolysis Creating Zero-Carbon Hydrogen Gas

Blended into Distribution Pipeline and Delivered to Customers



New Jersey Resources



Columbia University's Center on Global Energy Policy

"Retrofitting and otherwise improving the existing pipeline system are **not a choice between natural gas and electrification or between fossil fuels and zero-carbon fuels**.

Rather, these investments in **existing infrastructure can support a pathway toward wider storage and delivery of cleaner and increasingly low-carbon gases while lowering the overall cost of the [clean energy] transition** and ensuring reliability across the energy system."

Source: INVESTING IN THE US NATURAL GAS PIPELINE SYSTEM TO SUPPORT NET-ZERO TARGETS, Columbia University Center on Global Energy Policy, April 2021

Key Takeaways

- Decarbonized fuels through gas infrastructure represents a clear path forward to achieve a safe, reliable, low-cost result for meeting both customer and climate objectives
- Accelerated cost recovery infrastructure mechanisms support replacement of Cast Iron, Unprotected Steel and Pre-70's cathodically protected steel pipes will ensure safe delivery of decarbonized fuels as we work to achieve future targets
- Regulatory mechanisms to provide for recovery of and on investments in RNG processing and Hydrogen production as well as the purchases of these commodities from third party developers will enable the US to achieve targets sooner
- Hydrogen research continues and cost recovery of these expenditures through rates will help fund these critical studies to find the best solutions for customers
- The correct answer for the clean energy future is one that provides safety, reliability and resiliency of energy service at the lowest possible cost that achieves the climate objectives. As more research evolves, and the facts are becoming more clear, collaboration between electric and gas initiatives create best long-term solution for customers

New Jersey Resources