BUREAU OF ENERGY AND TECHNOLOGY POLICY

Slides for the morning and afternoon sessions are in separate decks. This is the **afternoon** deck.

December 8, 2022

Methane/Natural Gas Distribution Planning and Policies

Technical Session 7

CT 2022 Comprehensive Energy Strategy

Session is being recorded

Today's Agenda – Morning

Slides for the morning session are in a separate deck

Welcome & Introduction	9:00-9:05 am
Public Comment	9:05-9:35 am
Topic Introduction	9:35-10:10 am
Reducing the Carbon Intensity of Gas - Approaches & Benefits	10:10-11:45 am
Q&A	11:45-12:00 pm
------------------------------LUNCH--------------------------------	12:00-1:00 pm

Today's Agenda – Afternoon

Click on an agenda section heading to jump to the relevant slides

Challenges of Decarbonizing Gas & Existing Gas Infrastructure	1:00-2:05 pm
Q&A	2:05-2:20 pm
What Other States are Doing	2:20-3:55 pm
Q&A	3:55-4:10 pm
Public Comment	4:10-4:40 pm
Wrap Up	4:40-4:50 pm

The Challenges of Decarbonizing Gas & Existing Gas Infrastructure

Nikki Bruno & Eric Soderman – Eversource Energy

Mike Borea & Bengt Anderson – Avangrid

Mark LeBel – Regulatory Assistance Project (RAP)

Sarah Steinberg – Advanced Energy Economy (AEE)

Lara Owens – MiQ/RMI

Sarah Krame – Sierra Club

Click on an agenda section heading to jump to the relevant slides

(speaker order may vary)

BUREAU OF ENERGY AND TECHNOLOGY POLICY

Eversource

CT Comprehensive Energy Strategy
Technical Session # 7

The Challenges of Decarbonizing Gas & Existing Gas Infrastructure

December 8, 2022

Decarbonization Pathways

EVERSOURCE

Leak Reduction

Renewable NG

Power to Gas

Hydrogen

Near Term

- *Emission Leaks*
- *Pilot Alternatives (Geothermal)*
- *Continued Gas Energy Efficiency*
- *Demand Response Programs*

Mid Term

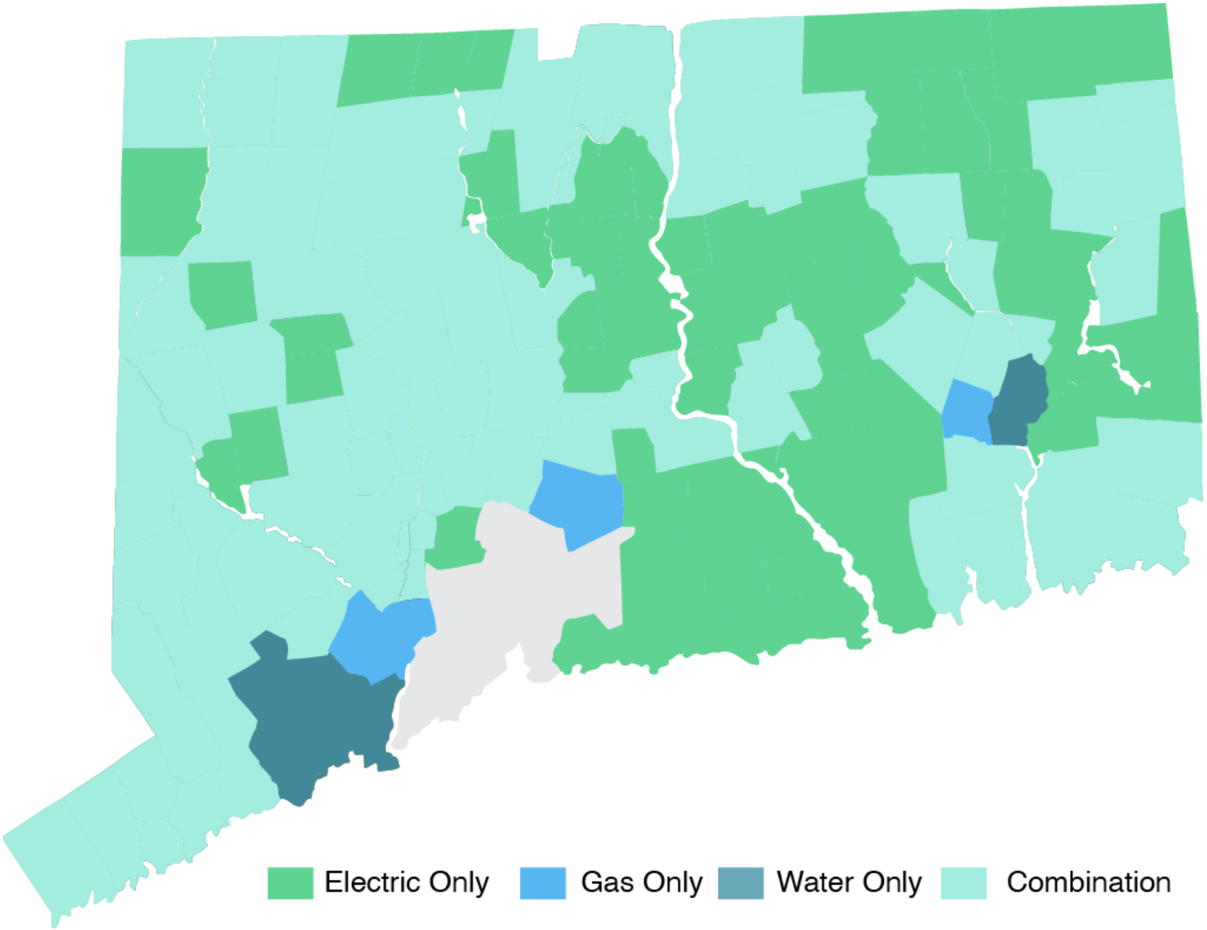
- *Cleaner Physical Gas*
- *Electrification*

Future

- *Energy Storage*
- *Integration of Renewables*
- *System Asset Utilization*
- *Electrification*

What to consider for decarbonization challenges?

- Eversource gas service territory is non-contiguous and there are significant differences in population density throughout
- Gas and electric customers are served by both the affiliated electric company as well as other entities (AVANGRID and municipal utilities)
- There is a varying blend of residential, commercial and industrial load across the territory
- The relationship between electricity and gas services is highly relevant because extensive coordination is required between the gas and electricity services and the respective load serving entities.
- This coordination may be particularly relevant around ensuring electricity resource adequacy, which requires attention to the long-time frames involved with expanding electrical grid capacity as continued gas resource adequacy.



What affects the scale, scope and pace?

The scale, scope and pace of the energy transition will depend on numerous, challenging factors that will be necessary to overcome to succeed:

- **Affordability**
- **Safety & Reliability**
- **Customer Preferences, Choice, and Experience**
- **Workforce Requirements**
- **Constructability/Ease of Siting**
- **Technology Risk**

Avangrid

Presented by: Bengt Anderson & Mike Borea

December 8, 2022

Challenges of Transition and Avangrid's Gas Business Strategy

Challenges of Transition – Economic Considerations

- Cost impacts to customers
    - Cost of electric higher to those that convert early (both conversion costs and electric supply cost)
    - Cost of gas higher to those that convert late (both delivery rates and gas supply cost)
    - Cost to develop and connect clean energy technology

- Economic impacts of transition
    - Utilities expected to provide safe and reliable service to customers
    - O&M and investment in replacing aging infrastructure that is obsolete
    - Traditional depreciation versus possible new depreciation models
    - Taxes paid by utilities

- No comprehensive assessment of cost to transition nor costs after transition

Challenges of Transition – Public Policy Considerations

- Customers' preference for natural gas
    - Cost of natural gas versus alternative heat/fuel sources
    - Cost effective ability to convert (i.e. new industrial loads and all existing building types)

- Tariff requirements to provide service to new and existing customers

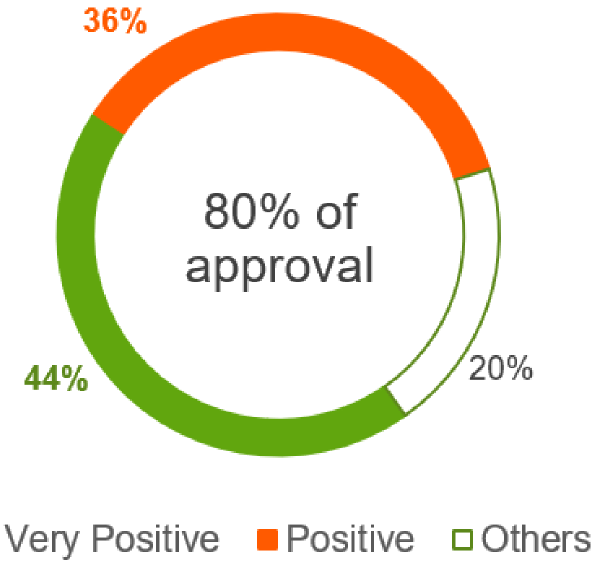
- Public building policies
    - Reduce emissions and/or improve efficiency of natural gas use
    - Programs including policies and cost support for transition

- How and who to fund?
    - Utility costs, customer transition costs, gas system decommission costs

Natural Gas – What we know

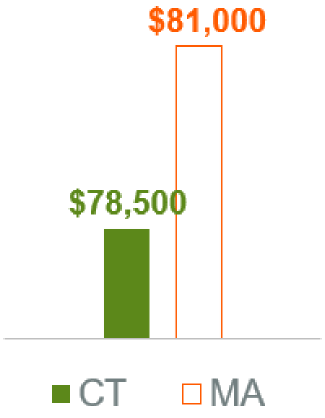
What we know

AVANGRID CUSTOMERS PREFER NATURAL GAS

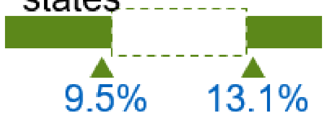


LMI COMMUNITIES NEED COST EFFECTIVE ALTERNATIVES

Median Income



Poverty rates in NE states



Cost to Convert to Electric

$6 - $35K

(existing and new construction)

Natural Gas – Business Strategy

Overall Strategic Approach

Vision: Deliver sustainable and exceptional customer value through investment in efficiency, innovation, and infrastructure as part of a clean energy future

Short Term
<2 years

- Cast Iron/Bare Steel
- Increase Compliance
- Communicate/Advocate
- Rate Cases
- RNG RECs/RNG Blend
- Certified Gas
- Clean Energy Technology Team
- Advanced leak detection

Mid-Term
2-5 years

- Tariffs
- Hydrogen Blend
- R&D Investment
- Project Pilots (Large Customer)
- Geothermal
- Increase RNG Blend to 5%

Longer-Term
>5 years

- Hydrogen installations
- Carbon Capture
- Advanced Methane Detection

COMMUNICATIONS AND ADVOCACY

Thank You

Regulatory Assistance Project (RAP)

December 8, 2022

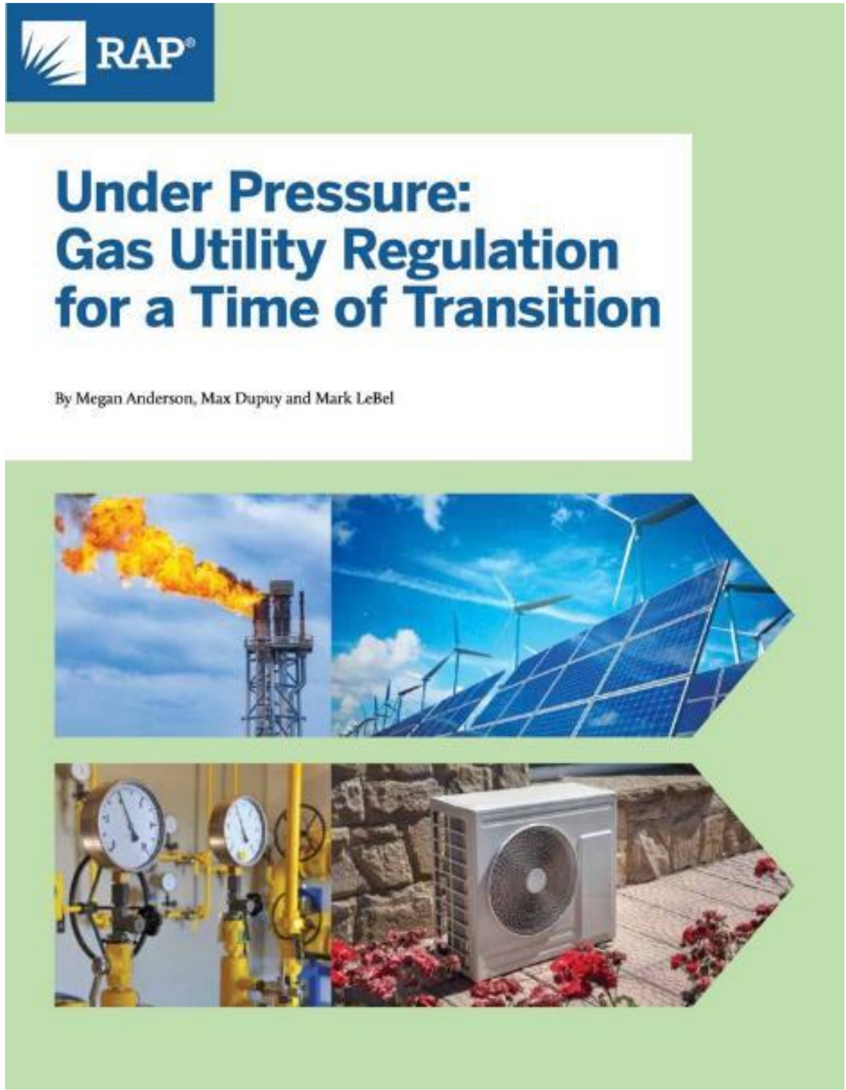
Gas Utility Regulation for a Time of Transition

Connecticut Department of Energy and Environmental Prot.

Comprehensive Energy Strategy Technical Session #7

Mark LeBel, Senior Associate
mlebel@raponline.org

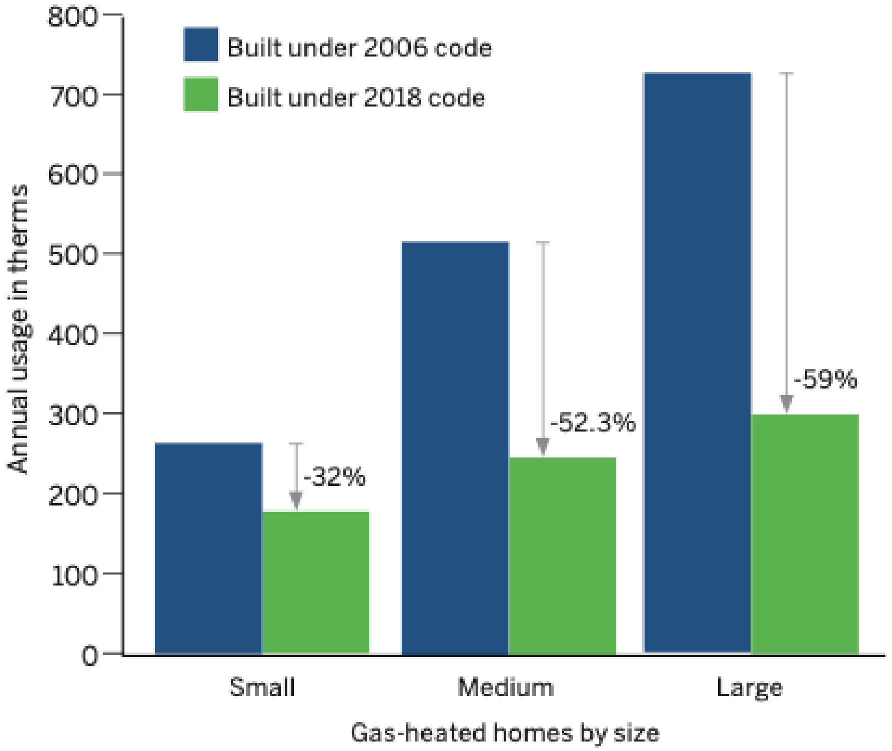
The Regulatory Assistance Project (RAP)®



https://www.raponline.org/knowledge-center/under-pressure-gas-utility-regulation-for-a-time-of-transition/

Efficient Appliances and Building Shells

Decline in home gas consumption under revised Washington state energy codes



Source: Based on Odum, H., Spielman, S., Banks, A., Kintner, P., Frankel, M., Reddy, D., & Peng, J. (2020, September). *Modeling the Washington State Energy Code: 2006 & 2018 Baseline Energy Consumption*

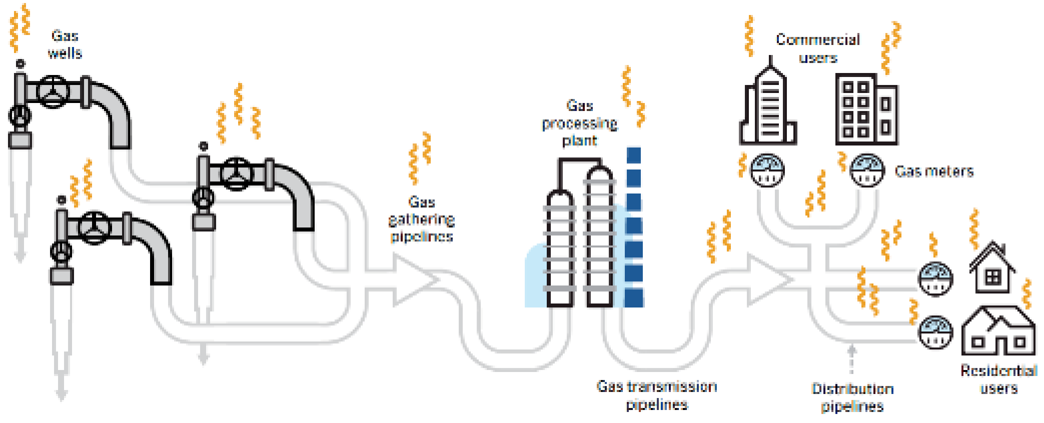
Efficient Heating Electrification

Pollution and Safety Concerns

THE WHITE HOUSE

FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies

Building on Past U.S. Leadership, Including Efforts by States, Cities, Tri
Territories, the New Target Aims at 50-52 Percent Reduction in U.S. Gre
Gas Pollution from 2005 Levels in 2030



Note: Methane is colorless, but for purposes of illustration, leakage is represented in yellow.

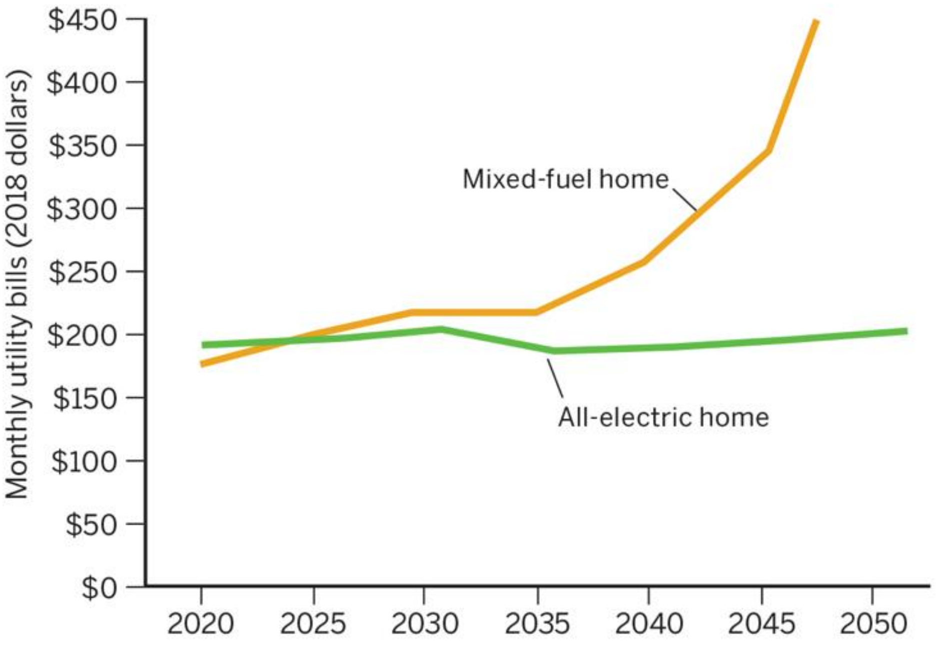
Source: The Gas Index. (2020). *The United States' Natural Gas System Has a Serious Problem: It Leaks*

Alternative Gas Issues

- Biomethane – replacement for fossil methane
  - Supply and cost
  - Cleaning the gas and air quality issues
- Hydrogen – combusted or used in fuel cell
  - Rainbow of colors – each with GHG implications and cost implications
  - Major T&D system investments needed at higher blending levels
  - End-use conversion costs
  - Air quality and safety issues

Infrastructure Costs Spread Across Fewer Customers = Higher Rates

Projected increase in gas consumers' bills under high electrification



Source: Aas, D., Mahone, A., Subin, Z., Mac Kinnon, M., Lane, B., & Price, S. (2020). *The Challenge of Retail Gas in California's Low-Carbon Future: Technology Options, Customer Costs, and Public Health Benefits of Reducing Natural Gas Use*

What Policymakers Need to Keep in Mind

- A transition is happening, and it will require an elevated, revitalized focus on gas utility regulation
- Impact of changes will be major:
  - 70 million residential customers
  - 5.7 million C&I customers
- PUCs will need to:
  - Avoid unneeded investment
  - Give customers alternatives
  - Evaluate alternatives based on evidence
  - Protect gas customers in short- and long-term

Equity Is Integral

- Robust and inclusive processes to ensure that everyone’s needs are considered and planned for
- Programs that are accessible and put disadvantaged communities at the forefront of the transition to clean energy
- Reforms to planning and ratemaking can mitigate risk of unsustainable rate increases and avoid unfair bill impacts on low-income customers

A Framework for Policymakers

Revitalize Gas Utility Planning

Enhance EE and Electrification Programs

Reform Gas Rate-Making

Process and Planning

- Require robust and inclusive stakeholder process
- Develop shared understanding of current gas system and customers
- Modernize gas planning

Modernize Gas Planning

- Current planning
  - Focused on gas product portfolio; hedging strategy, spot market, firm contracts
  - Gas energy efficiency main "alternative" resource
  - Safety and expansion of infrastructure
- Future planning
  - Emissions limits
  - Expanded resource alternatives
    - RNG, H2, BE, district energy
  - Risks from declining load
  - Integrated multi-fuel planning

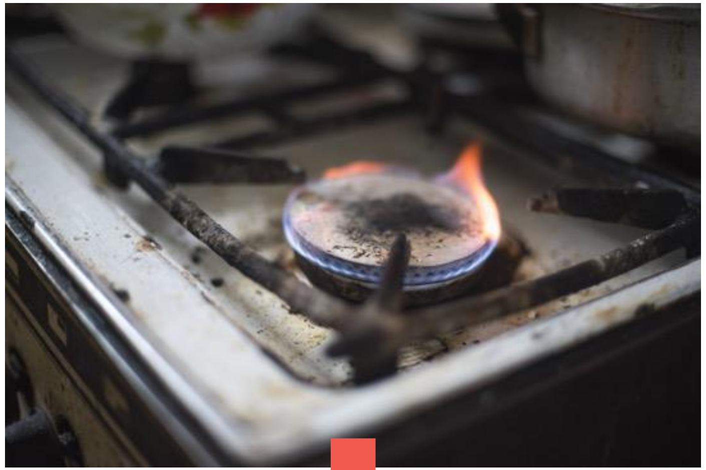
Planning Examples

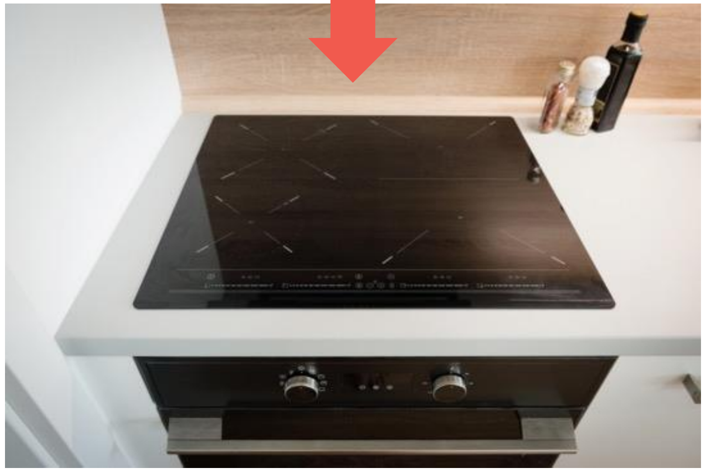
- CA - required CPCN for large investments
- NY - new supply and demand forecasting requirements
- OR and WA have examined gas rates and demand in the context of GHG requirements

Let Programs Work for Electrification

- Set goals in terms of primary energy or in terms of emission reductions

- Allow gas utilities to earn credit for contribution to electrification goals

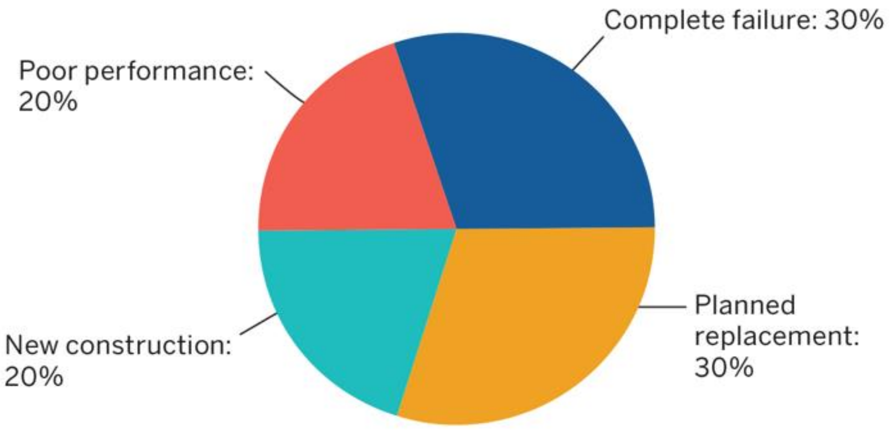




Coordinate Programs With Consumers’ Lives

- Target soon-to-retire gas appliances
- Improve building shells alongside heating upgrades

Reasons for purchasing a water heater

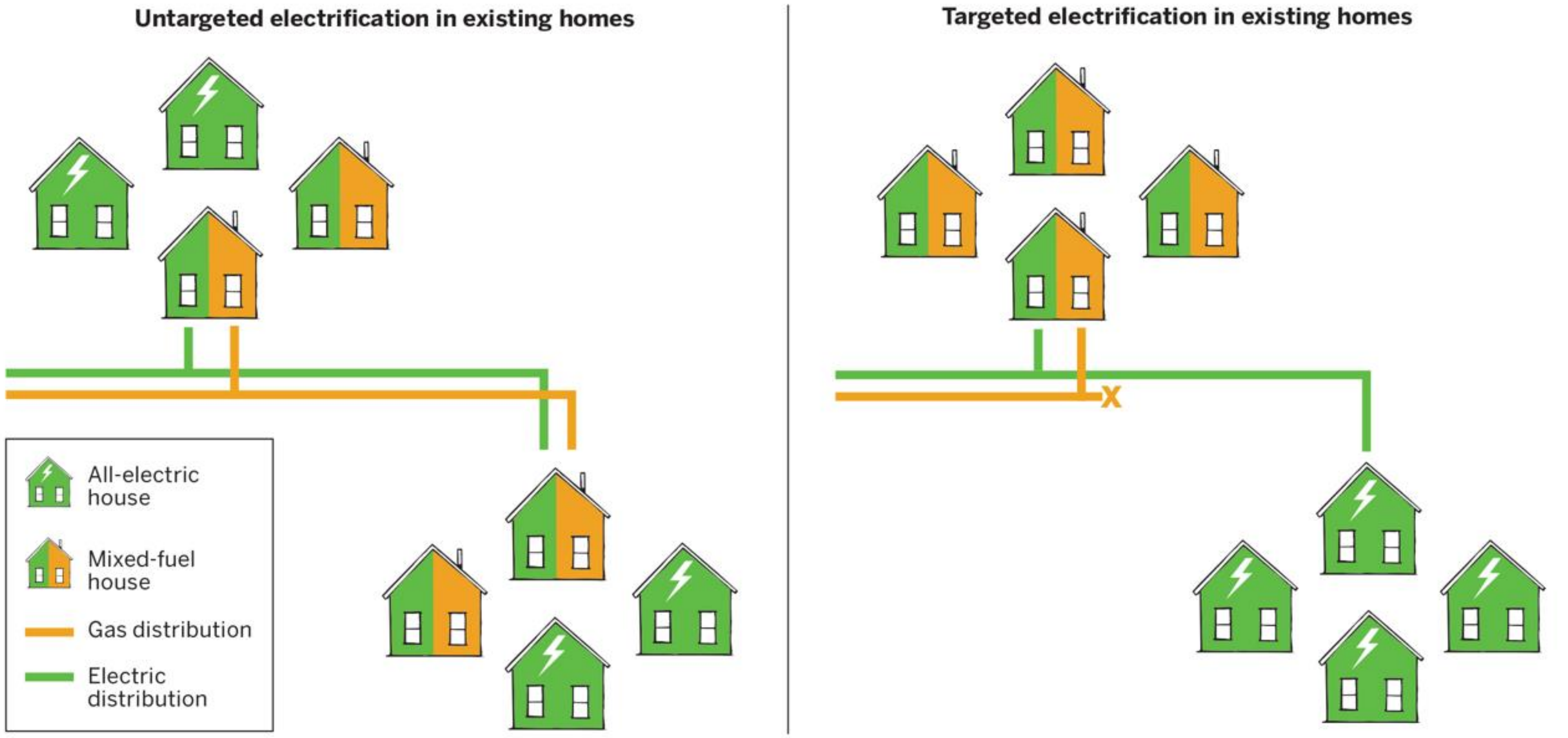


Source: U.S. Department of Energy. (2009). *New Technologies, New Savings: Water Heater Market Profile*

Go for Non-Pipeline Alternatives

- Address capacity limitations or pressure concerns
- Develop criteria and processes to evaluate options, capturing all benefits and costs

Target Neighborhoods for Full Electrification



Source: Graphic concept inspired by Aas, D., Mahone, A., Subin, Z., Mac Kinnon, M., Lane, B., & Price, S. (2020). *The Challenge of Retail Gas in California's Low-Carbon Future: Technology Options, Customer Costs, and Public Health Benefits of Reducing Natural Gas Use*; graphic modified by RAP.

State Program Examples

- MA is defining efficiency goals in fuel-neutral manner and incorporating GHG externalities
- NY non-pipeline alternatives policy
- California Energy Commission pilots on “tactical decommissioning” of gas system segments

Key Rate-Making Principles

- Effective recovery of revenue requirement
- Customer understanding, acceptance and bill stability
- Equitable allocation of costs
- Efficient forward-looking price signals
- Achievement of public policy goals
    - Efficient competition and control of monopoly pricing
    - Reliable provision of service
    - Societal equity (e.g., universal access and affordability)
    - Environmental and public health requirements

Lower Rate Base and Decrease Risk of Long-Term Rate Impacts

1. Increase customer contributions to line extensions
2. Accelerate depreciation timelines
3. Improve planning and decision criteria for new investments (and contracts)
4. Explore alternative funding sources or authorization for securitization

Equitable Cost Allocation

- Customer-related costs should be determined using the basic customer method, not the minimum system method
- Recovery of shared capacity costs should be balanced between energy throughput and peak demand based on load patterns
- Program costs can be allocated based on the benefits provided by the investments
  - For some programs, a split between electric customers and gas customers is appropriate when feasible

Efficient Rate Design

- Higher prices in peak seasons are appropriate
- Even higher prices or incentives to reduce on peak days are appropriate for many customers
- Inclining block structures with higher levels of inexpensive usage in the winter can balance efficiency and concerns about bill impacts for low-income gas heating customers

	Summer	Winter
First 20 therms	$0.50 per therm	N/A
First 60 therms	N/A	$0.50 per therm
Additional usage	$1.29 per therm	$1.29 per therm

Change Utility Incentives

- Adopt decoupling using overall revenue target, not revenue per customer
- Implement performance-based regulation
  - Multi-year rate plans
  - Eliminate unnecessary trackers
  - Scrutinize base ROE
  - Performance incentives for achieving important consumer and public policy outcomes
- Consider whether broader structural reforms for the gas utility will be necessary
  - Networked geothermal pilots in MA and soon NY

The Bigger Picture on Gas Utilities

- Often part of broader energy conglomerate
  - Tradeoffs across corporate entities may differ by conglomerate and types of utility
- Many potential revenue sources for program purposes or to deal with stranded costs
  - Taxes
  - Shareholders
  - Securitization
  - Electric customers
  - Exit fees

Ratemaking Examples

- NY
  - Changed decoupling structure
  - Required depreciation studies from gas utilities
- WA
  - Reduced line extension allowances
- OR
  - Stepped reduction in line extension allowance over time for Northwest Natural Gas
- CA
  - Eliminated line extension allowances

A *safe* transition is a *planned* transition.

An *affordable* transition is a *planned* transition.

An *equitable* transition is a *planned* transition.

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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Advanced Energy Economy (AEE)

Challenges of Decarbonizing Gas & Existing Gas Infrastructure:
A multi-state perspective

Sarah Steinberg
Advanced Energy Economy
December 8, 2022

Natural Gas: A wicked regulatory environment

Four characteristics of wicked regulatory environments: TUNA.

Turbulence.

Increasing speed of change in unstable market conditions.

Uncertainty.

Unpredictability, leading to difficult decision making processes.

Novelty.

New technologies, new values and new business models disrupt traditional industries.

Ambiguity.

Data and information might be contradictory and rules or patterns might not exist yet.

Source: University of Oxford, Oxford Scenarios Program (OSP)

STRATEGEN

States across the country are grappling with this challenge.

- **Arizona:** Docket No. G-01551A-19-0055 (new spinoff process)
- **California:** Docket No. R20-01-07
- **Colorado:** Docket No. 21R-0449G
- **Hawaii:** Docket No. 2022-0009
- **Massachusetts:** Docket No. 20-80
- **Minnesota:** Docket No. 21-565 and Docket No. 21-566
- **Nevada:** Docket No. 21-05002
- **New York:** Docket No. 20-G-0131 and 12-G-0297
- **Oregon:** Docket No. UM-2178
- **Rhode Island:** Docket No. 22-01-NG
- **Washington:** Gas IRPs here; Decarbonization Pathways Docket No. U-210553
- **Washington D.C.:** Docket No FC-1167
- **Wisconsin:** Docket No. 5-FE-104

Big, unanswered questions

Preventing stranded assets	How can we prevent over-investment in today's system while maintaining safety and reliability?
Equity	How can we mitigate the effects of gas decarbonization on vulnerable communities?
Alternative Fuels	What will the role of alternative fuels be?
Interactions with the Electric System	How are we preparing the electric system for new load?
Modernizing Regulatory Frameworks	How must gas utilities evolve to maintain financial health during an era of load decline?

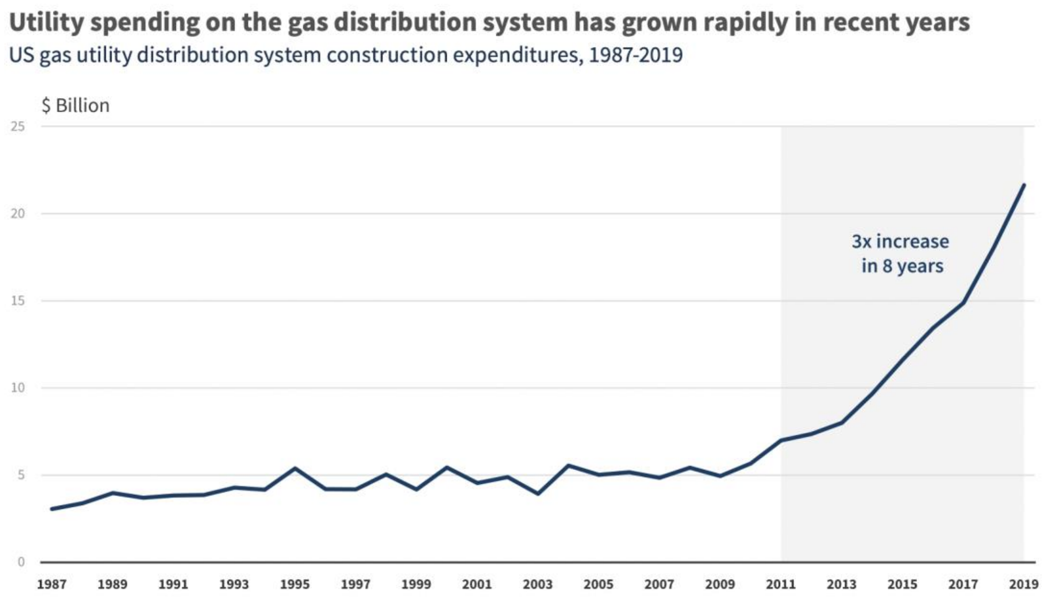
Preventing Stranded Assets

Revising line-extension policies

- California
- Colorado
- Washington

Set up long-term, transparent gas infrastructure planning frameworks

- California
- Colorado
- New York



Source: American Gas Association, https://www.aga.org/research/data/construction-expenditures/

Preventing Stranded Assets

PUC FRAMEWORK FOR IMPLEMENTING NPAS

- Use a technology-neutral, competitive solicitation process (e.g. Request for Proposals) to identify innovative solutions that require minimal capital investment in traditional infrastructure
- Design project solicitations around specific system needs (e.g. location, load size and duration)
- Encourage procurement of multiple solutions to meet system needs if they yield greater net benefits
- Establish a robust benefit cost analysis (BCA) methodology to assess proposals (e.g. guiding principles established in the National Standard Practice Manual[1])
- Require bidders to include detailed assessment of factors like community and environmental impacts, risks, barriers and challenges, and non-energy benefits (e.g. benefits to low-income customers) associated with the proposed NPAs
- Set verification milestones for NPAs, including possible fees for underperformance
- Consider implementing a shared-savings mechanism that allows gas utilities to retain some of the savings associated with NPAs

https://info.aee.net/hubfs/NPAs.pdf

Non-Pipeline Alternative (NPA) frameworks

Consolidated Edison

- Using NPAs to alleviate supply constraints and reduce winter peak load

NYSEG

- Using NPAs to avoid traditional infrastructure

European Union

- Gas Demand Reduction Plan

Equity

Mitigating rate impacts

Financial support & programming

Defining roles & coordination across entities

Utility
(e.g. SMUD)

Federal
(e.g. Inflation Reduction Act)

State/County/Local
(e.g. City of Denver)

Alternative Fuels

Use of RNG and H2 face technical limitations.

RNG	Hydrogen
• Achievable potential for RNG production in the U.S. is limited to ~30% of today's gas sector demand by 2040* • RNG supply and access varies by geography • RNG may face eventual competition from higher value uses in industry, aviation, shipping, or plastics	• Hydrogen blends beyond 20% require costly pipeline retrofits and replacements of customer appliances • Large-scale clean hydrogen production requires substantial generation of renewable energy and water resources • Near-term hydrogen supply is likely limited as industry scales up

*American Gas Foundation & ICF

Alternative Fuels

EVALUATING UTILITY RNG/HYDROGEN PROPOSALS CHECKLIST

- Does modeling acknowledge and evaluate limitations to RNG supply?
- Does the cost assessment include system retrofits needed to accommodate high hydrogen blends?
- Do plans direct RNG and hydrogen to the highest-value use cases?
- Are the costs of decarbonizing industrial customers included in the modeling scope?
- Is there a plan to meet gaps between RNG/hydrogen supply and total gas demand with cost-effective, zero-emission resources through other means (e.g. efficiency, electrification)?
- Do plans confirm a firm, long-term supply of the RNG and hydrogen fuels that will be used to meet projected demand?
- Do overall plan costs include the costs of any required carbon offsets?
- Are interconnection points for RNG and hydrogen focused on areas of the system that minimize stranded asset risk (e.g. near hard-to-electrify end users or self-contained distribution systems that can be disconnected from the main system)?

https://info.aee.net/hubfs/AlternativeFuels.pdf

STRATEGEN

Interactions with the Electric System

Today

Largely independent gas and electric planning

Today/Near-term

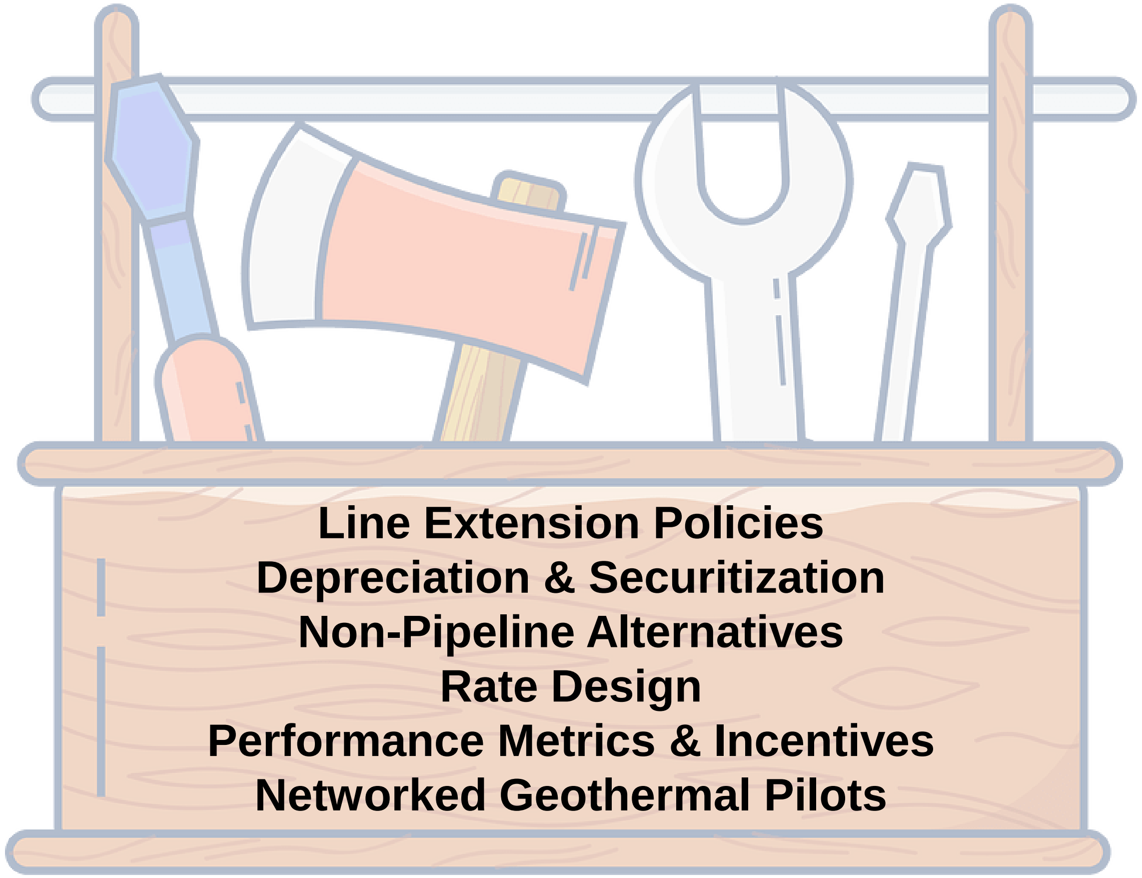
- Re-imagining load forecasting
- Sharing planning assumptions & timelines
- Doubling down on energy efficiency
- Building up flexible grid resources
  (e.g. demand response, vehicle-to-grid, time-varying rates)

Longer-term

Integrated, system-wide gas and electric planning with resource and cost optimization

Modernizing Regulatory Frameworks

The existing regulatory structure biases gas utilities towards capital expenditures and system expansion.



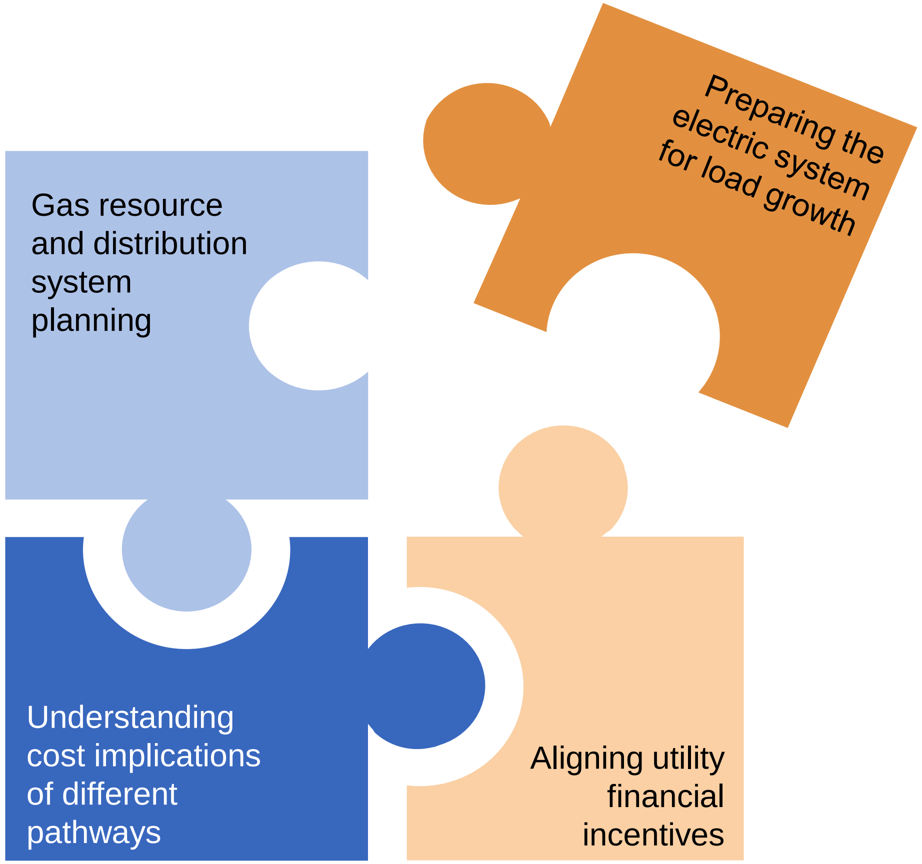
The biggest challenge is being proactive.

States agencies have **varying degrees of authority** without additional legislative or executive action.

State governments and public utility commissions may have to begin **parallel processing.**

The gas transition implicates many **more actors** in state government and across levels of government.

Managing the transition to a decarbonized built environment



Thank you!

- Sarah Steinberg, ssteinberg@aee.net

MiQ/RMI

ABOUT MiQ

- **MiQ** is an independent, **not-for-profit** foundation established by RMI & SYSTEMIQ with the aim of **accelerating** methane emissions reduction in the oil & gas sector through **certified gas**
- We are a team of international experts from across energy **trading**, **science**, **policymaking and engineering**
- Started in 2020, MiQ is certifying 17 bcf/day in the US, 5% of global gas production

MiQ pioneering methane certified gas

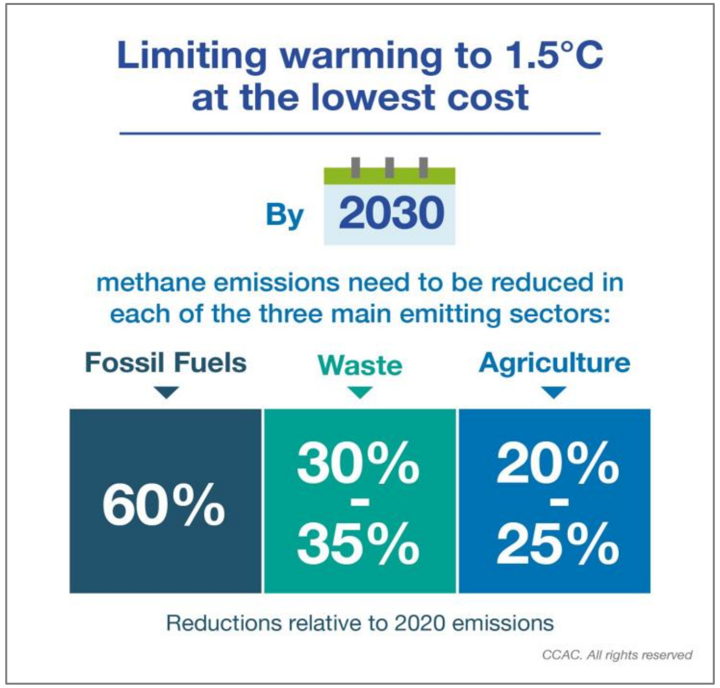
MiQ

RMI ENERGY. TRANSFORMED.

SYSTEMIQ

METHANE EMISSIONS – A SIGNIFICANT CONTRIBUTOR TO GHG EMISSIONS

A 45% reduction of methane emissions by 2030 is needed to put the world on a path consistent with the Paris Agreement goal to limit warming to 1.5°C *



Methane emitted by the oil and gas industry
= 84 million tonnes CH_4
= 7 billion tonnes CO_2 equivalent **

8x the CO_2 emissions from the global aviation sector

More than **1.2x** the US' annual CO_2 emissions

* and above table from CCAC & UNEP Global Methane Assessment 2021 Global Methane Assessment (full report) | Climate & Clean Air Coalition (ccacoalition.org)
** Data 2019 (IEA) GWP20☹IPCC). GWP 20 year = 84x

CHALLENGES TO DECARBONIZING THE NATURAL GAS SUPPLY CHAIN

- Credible Standards to differentiate Methane Emissions Performance
- Accuracy of Methane Emissions Accounting
- Understanding comparative use of Advanced Leak Detection Technologies
- Tracking of Upstream Emissions from multiple segments
- Establishing Credible Market Incentives

CREDIBLE STANDARDS TO GRADE OPERATIONS ON METHANE PERFORMANCE

1

Calculated **Intensity**

$$= \frac{\text{Methane emitted}}{\text{Natural gas produced}}$$

2

Extensive **Monitoring Technology Deployment** on Facility- and Source-Level

3

Company Practices
Policies and procedures for methane emissions management

Third-party accredited Auditors: audit, verify and report

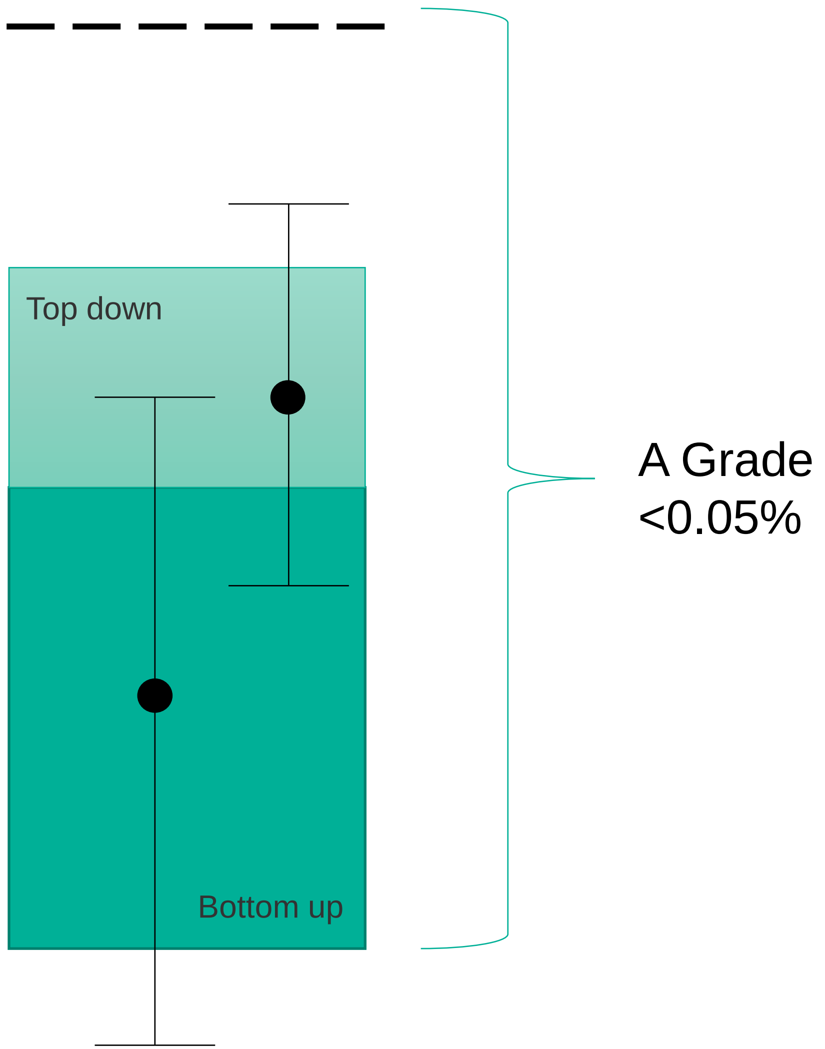
	gCH_4/MMBtu			
≤ 0.05%	10	Quarterly	Stringent	A
≤ 0.10%	19	Semi/Tri-annually	High	B
≤ 0.20%	38	Semi-annually	Medium	C
≤ 0.50%	95	Annually*	Mandatory minimum	D
≤ 1.00%	190	Annually*	Mandatory minimum	E
≤ 2.00%	381	Annually*	Mandatory minimum	F

** Source-level only*

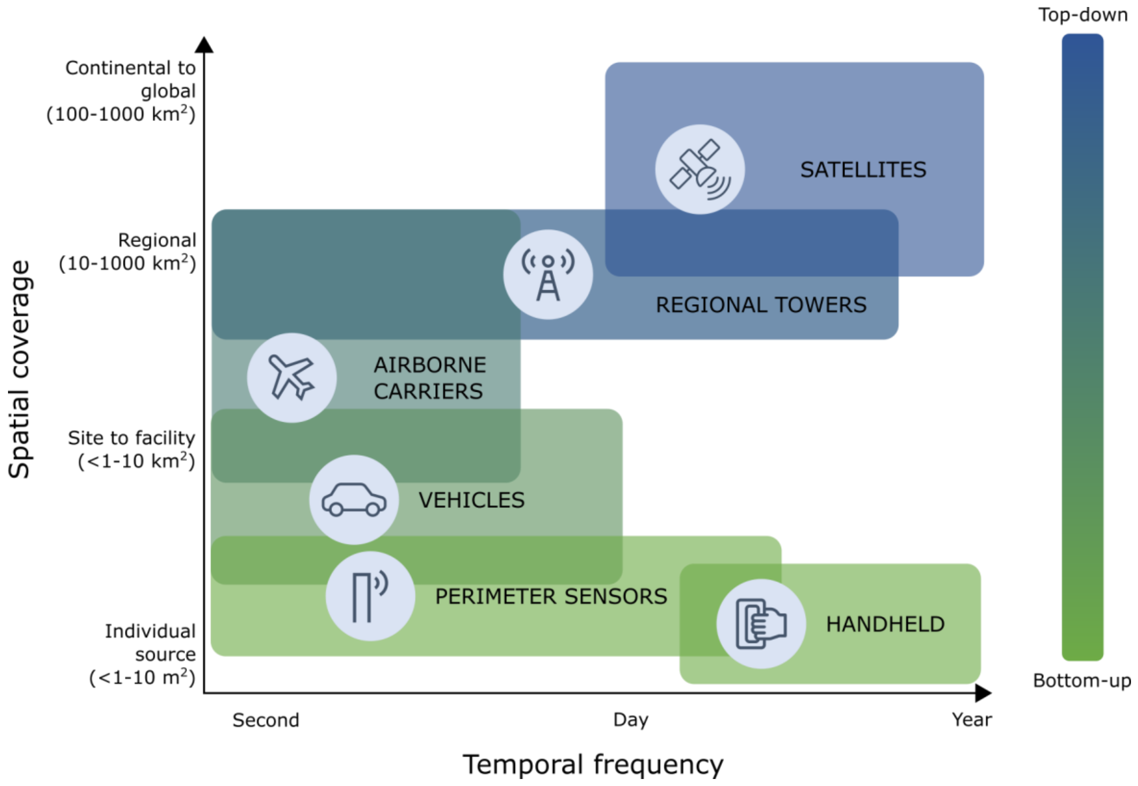
1. MiQ Standard is public and transparent, open for scrutiny. **No black box**
2. MiQ **certifies at Basin level**, not pad level – no cherry picking
3. MiQ Standard evolves dynamically as methane **research** improves.
4. Central trusted authority: certificates held in **MiQ Digital Registry**
5. **Independent Auditors**

ACCURATE EMISSIONS ACCOUNTING

- More complete emissions inventory necessary to calculate Methane Intensity
- Bottom-up Inventory, using minimum emissions accounting Criteria
  - Minimum Facility-specific emission factors and engineering calcs
- Reconciliation of Quantified Top-down Detections
- Measurement & Reconciliation Protocols incentivized
  - GTI Project Veritas
  - OGMP2.0
- MiQ Grade Bands calibrated to uncertainty of accounting methods and number of detections

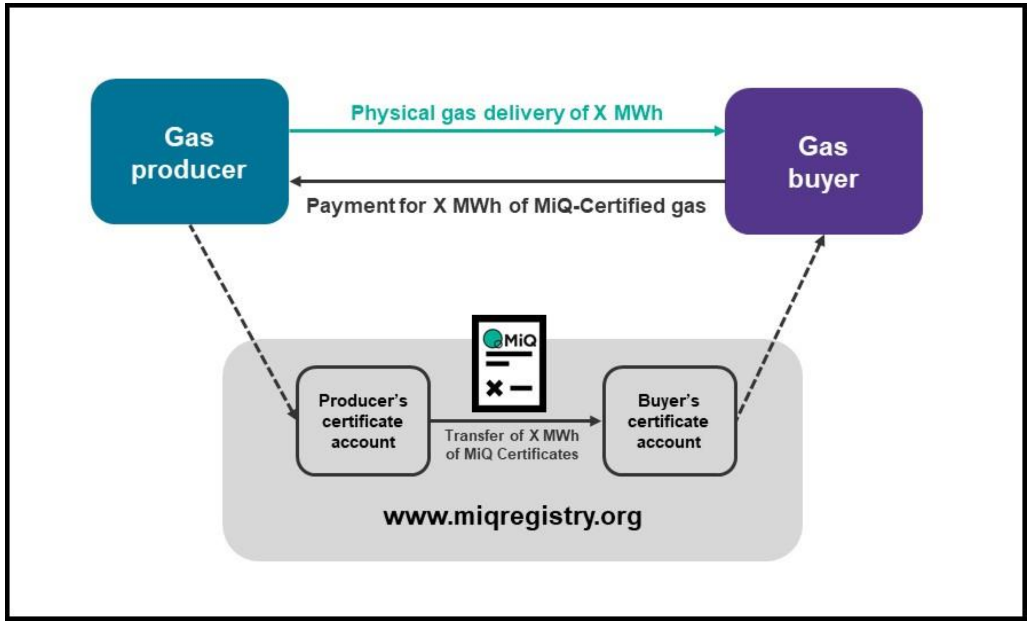


NO SILVER BULLET ADVANCED LEAK DETECTION TECHNOLOGIES

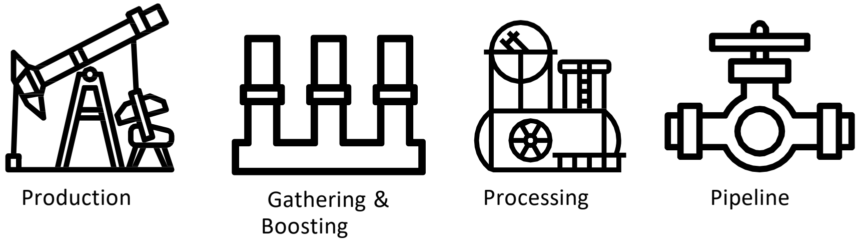


- **Facility Scale:**
  - Screen to pad level for follow up
  - Single blind, controlled-released testing to determine MDL & POD
- **Source Level:**
  - Must detect to component for repair
  - Differentiate methane slip from exhaust

MIQ REGISTRY CREDIBLY TRACKS A “CERTIFIED SUPPLY CHAIN” METHANE INTENSITY



	North America
US Production - MiQ Cert	B (0.06)
US Gathering/Boosting	A (0.02)
US Processing	B(0.1)
US Transmission	B(0.1)
"CSC" For US GRID to BUYERS	**(0.28)**



*Gas buyers seeking certified gas would reduce from ~1.5% to 0.28% against Scope 3

MARKET TO CLAIM FOR EMISSION REDUCTIONS

- **OPERATOR GHG profile**
  - Scope 1
    - **Demonstrated Lower Methane Emissions using MiQ certification**
    - Electrification
    - Energy Efficiency Projects
    - Use of EVs
  - Scope 2
    - Renewable Energy Usage in operations (purchased RECs)

- **BUYER GHG profile**
  - Scope 1
    - RNG or Biogas
    - Energy Efficiency Projects
    - Use of EVs
  - Scope 2
    - Renewable Energy Usage (RECs)
  - Scope 3
    - **MiQ Certified gas demonstrating lower Methane Emissions**

CERTIFICATION FUNDAMENTALS

Transparent, Robust Standards

- Published Standards
- Robust Methane Intensity Metrics
- Auditable, Reproducible, Calibratable
- Compares Gas Apples to Apples

Third-Party Audits

- Auditors Independent from Operator and buyer
- Auditors Independent from Certifier
- Auditors Independent from Data or Technology Provider
  - Subject Matter Experts

Facility-Wide Certification

- Basin-scale certification
- Avoids cherry picking best assets
- Attributes represent gas from entire facility

Marketability

- Registry to track, trade and retire certificates
- Avoids double counting
- Technology Neutral enables innovation + scalability
- Covers entire supply chain

THANK YOU !

www.miq.org

follow us on LinkedIn/Twitter

Lara Owens, Director Science and Tech
lara.owens@miq.org

Sierra Club

Gas Distribution Planning and Policies: Challenges

Connecticut Comprehensive Energy Strategy
Technical Meeting 7: December 2022

SIERRA CLUB

GWSA

- GWSA requires GHG emissions reduction of 45 percent below 2001 levels by 2030, and 80 percent below 2001 levels by 2050.

- Non-electric thermal load from the buildings sector contributes 30 percent of Connecticut's total GHG emissions.

- Methane is a potent greenhouse gas—84 times more potent than carbon dioxide in first 20 years, 28-36 times as potent after 100 years.

- In order to meet the requirements of the GWSA, we have to stop burning gas in the buildings sector.

Planning for Transition

- Coordinated planning for transition off of fossil fuels in buildings sector is critical.

- Must stop expansion of gas system and addition of new customers– expansion risks stranded assets and is inconsistent with decarbonization goals.

- Policy suggestions:
    - Eliminate incentives for gas infrastructure
    - Require all-electric new construction
    - Emissions standards (similar to CA) to phase out sale of gas appliances
    - Prioritize funding for low-income weatherization and electrification
    - Plan for targeted decommissioning of gas system

Gas Infrastructure Challenges

- 8,395 miles of gas main in Connecticut–1,087 miles of leak-prone cast iron, 119 miles of leak-prone bare steel.
  - Data from New York shows average cost per mile to replace leak-prone pipe ranges from $1.3 million per mile for a less urban service territory and $8.7 million/mile for a service territory in NYC.
  - CT likely on lower end of that spectrum → $1 billion in in leak-prone pipe replacement costs outstanding in CT.
- Aging distribution system is increasingly leak prone.
  - 2019 study of methane leaks in Hartford estimated 4.3 methane leaks per road mile, up from 3.4 methane leaks per road mile observed in 2016. Study also found 3.6 leaks per road mile in Danbury.
  - Increase despite significant investment from utilities to replace leaking gas lines.
- Targeted electrification avoids significant costs of leak prone pipe replacement.

Equity Challenges

- Maintaining the gas system will become increasingly expensive for ratepayers as the system ages as costs to safely operate and maintain the system rise.
- Rising infrastructure costs will coincide with declining demand due to energy efficiency and transition away from fossil fuels.
- Fixed costs will be spread among fewer customers as households with the means to do so electrify, leaving low-income ratepayers with an even higher energy burden.
- Policies necessary to ensure that low-income households are able to transition off the gas system and are not left behind → prioritize funding for low-income weatherization and electrification.

Alternative Fuels Challenges

- CT cannot continue to expand the gas system based on the false promise of building decarbonization through alternative fuel blending.

- RNG and hydrogen should be reserved for hard to decarbonize end uses—not for buildings, which are easily and more efficiently decarbonized through electrification.

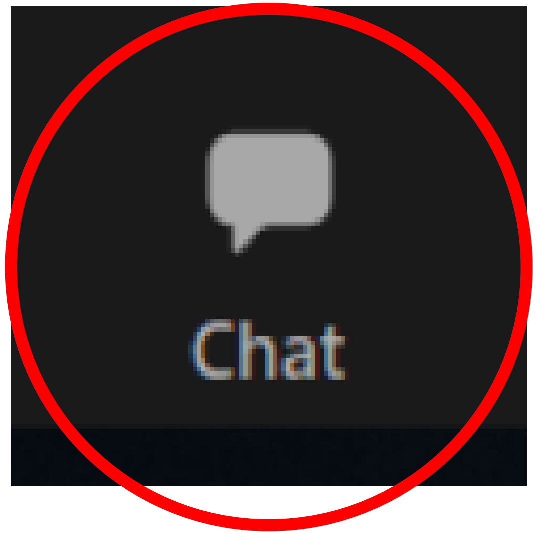
- RNG:
    - No viable pathway to decarbonize the buildings sector using RNG due to limited quantity available, high cost, and lack of climate benefits when injected into leak-prone distribution system.

- Hydrogen:
    - Not a reasonable replacement for methane in the buildings sector—low energy density, low emissions reduction potential, pipe embrittlement, infrastructure costs, leaks/indirect GHG, safety concerns.

Planning Process Challenges

- Case study: Massachusetts
  - Utilities in charge of the future of gas process → truly independent consultant necessary
  - Flawed assumptions in analysis, not addressed sufficiently when raised by stakeholders
  - Lack of sensitivity analyses
  - Limited opportunities for stakeholder dialogue with consultants
  - Lack of process (i.e. discovery, witness direct testimony and cross-examination, briefing)
  - Utilities not required to specifically demonstrate plans comply with decarbonization targets

Questions



At the conclusion of each panel DEEP will hold a brief question and answer period.

If you have a question for a presenter, please drop it into the chat to **Jeff Howard**. DEEP will pose as many questions as time allows to the speakers. Clarifying questions will be prioritized. Leading questions will not be accepted.

What Other States are Doing

Joanna Troy – Massachusetts Department of Energy Resources (DOER)

Keith Hay – Colorado Energy Office

Erin Murphy – Environmental Defense Fund (EDF)

Kiera Zitelman – National Association of Regulatory Utility Commissioners (NARUC) Center for Partnerships and Innovation (CPI)

Priya Gandbhir – Conservation Law Foundation (CFL)

Sam Lehr – Coalition for Renewable Natural Gas

Asa Hopkins – Synapse Energy Economics

BUREAU OF ENERGY AND TECHNOLOGY POLICY

Click on an agenda section heading to jump to the relevant slides

(speaker order may vary)

Massachusetts Department of Energy Resources (DOER)

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES
Patrick Woodcock, Commissioner

Future of Gas - Massachusetts

Massachusetts Department of Energy Resources

2050 Decarbonization Roadmap

- Commissioned by the Executive Office of Energy and Environmental Affairs (EEA), the 2050 Decarbonization Roadmap Study (Roadmap) was designed to support the Commonwealth in achieving Net Zero greenhouse gas (GHG) emissions by 2050
- Goals included
  - provide the Commonwealth with a comprehensive understanding of the necessary strategies and transitions in the near- and long-term to achieve Net Zero by 2050 using best-available science and research methodology
  - understand the tradeoffs across different pathways to reach the levels of deep decarbonization required by that limit
- The Roadmap used on an integrated, regional, cross-sector energy system pathways analysis consisting of results from eight differing high-level pathways

Pathway	Research Question	Defining Assumptions	Key Finding
All Options	Under the most likely assumptions, what is the least-cost deployment of energy system technologies that achieves deep decarbonization?	This is the "benchmark compliant" decarbonization pathway, using midpoint assumptions across most technical parameters.	Deep electrification and broad renewable buildout create a reliable energy system that is only marginally more expensive than today.
Limited Efficiency	What are the energy, resource, and transmission & distribution needs that arise from deferring investments in efficiency?	Efficiency gains are reduced to about one-third of those achieved in the All Options pathway in buildings and aviation.	Limiting efficiency gains results in a higher demand for zero-carbon electricity and fuel resources. Costs increase significantly.
Pipeline Gas	What are the impacts of continued reliance on natural gas in buildings? What role can a decarbonized gas product play in a Net Zero MA?	Building electrification is mostly limited to conversion from oil in the near term, with slower rates of gas-to-heat pump conversion in the long term.	Requires a substantial increase in imported low-carbon fuels, possibly above technically feasible quantities. Most of this fuel goes to high-value sectors to compensate for continued emissions from buildings using a fossil/clean fuel blend. Costs increase significantly.

All the Roadmap pathways achieve net-zero emissions with some pathways exploring the trade-offs associated with the building sector

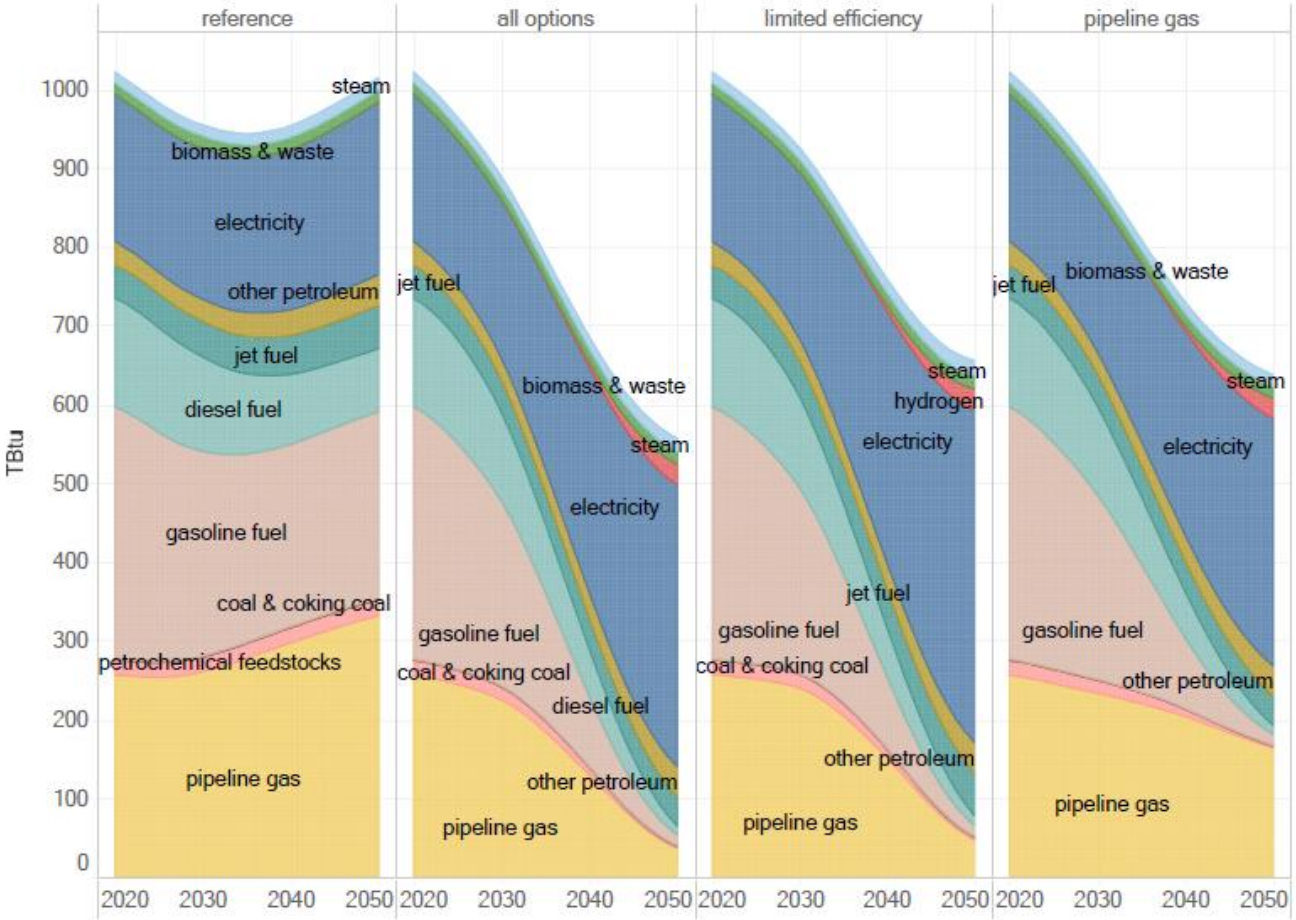
Key Findings on Electrification and Pipeline Gas

Transition Needed for Decarbonization:

- Electrification of space and water heating is a low-risk, cost-effective strategy for decarbonizing the majority of the Commonwealth's building stock.
- A limited amount of decarbonized fuels may be available and appropriate strategy for some buildings, but in order to achieve Net Zero, the use of gas for building heat must start to decline in the near term.
- Under all pathways examined in the Roadmap Study, including one specifically designed to explore the potential for "at scale" blending of zero-carbon gas into the pipeline, increasing penetration of electrified thermal technologies in up to 95% of buildings reduced economy-wide costs.

Energy Demand through 2050

Figure 10 Annual final energy demand for Massachusetts by fuel type.



In both the All Options and Pipeline Gas pathways, there is a significant reduction in the use of pipeline gas to achieve net-zero GHG emission.

There is a significant role for the local distribution companies (LDCs) in achieving a decarbonized future

Future of Gas Investigation

- On October 29, 2020, the Massachusetts Department of Public Utilities (DPU) issued an order opening an investigation into the role of local natural gas distribution companies (LDCs) in the Commonwealth’s goal to achieve net zero greenhouse gas emissions by 2050.
- DPU explored strategies to enable the Commonwealth to move into its net-zero GHG emissions energy future while simultaneously safeguarding ratepayer interests; ***ensuring safe, reliable, and cost-effective natural gas service***; and ***potentially recasting the role of LDCs*** in the Commonwealth
- As part of this investigation, the DPU solicited utility and stakeholder input and develop a regulatory and policy roadmap. The DPU directed the LDCs to:
  - Work with an independent consultant that will identify potential additional strategies not included in the Roadmaps
  - Initiate a joint request for proposals (“RFP”) for an independent consultant to conduct a study and prepare a **report**
    - The Consultants would review the Roadmaps, identify any pathways not examined in the Roadmaps, and perform a detailed study of each LDC that analyzes the feasibility of all pathways
  - Submit a **proposal** to the Department that includes the LDC’s recommendations and plans for helping the Commonwealth achieve its 2050 climate goals, supported by the Report

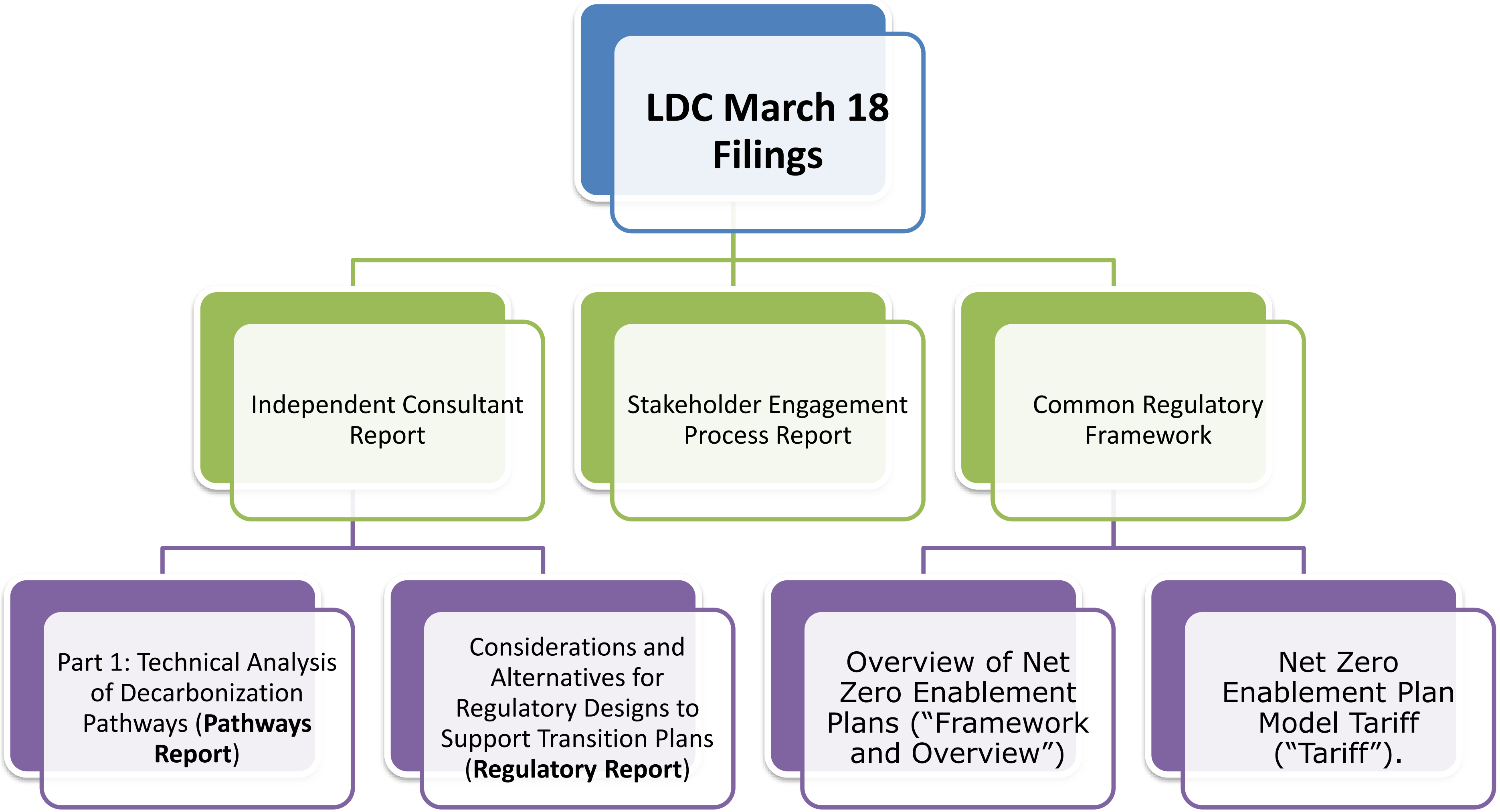
Stakeholder Engagement Process

- The stakeholder engagement process was designed, coordinated, and facilitated by ERM
- ERM hosted 12 stakeholder meetings, a scenario design workshop, and additional technical hours
- Through the Future of Gas website, a dedicated email and phone line, and LDC-hosted customer webinars, ERM's SEP solicited 1,293 feedback submissions from stakeholders over eleven months.
- There were several goals of the stakeholder process, including encouraging broad and diverse stakeholder engagement, facilitate inclusion of disproportionately impacted communities, and assure that the applicable information and material is accessible to and understandable by non-experts.
- In response to stakeholder feedback, the Independent Consultant agreed to model a 100% electrification pathway.

http://www.thefutureofgas.com/

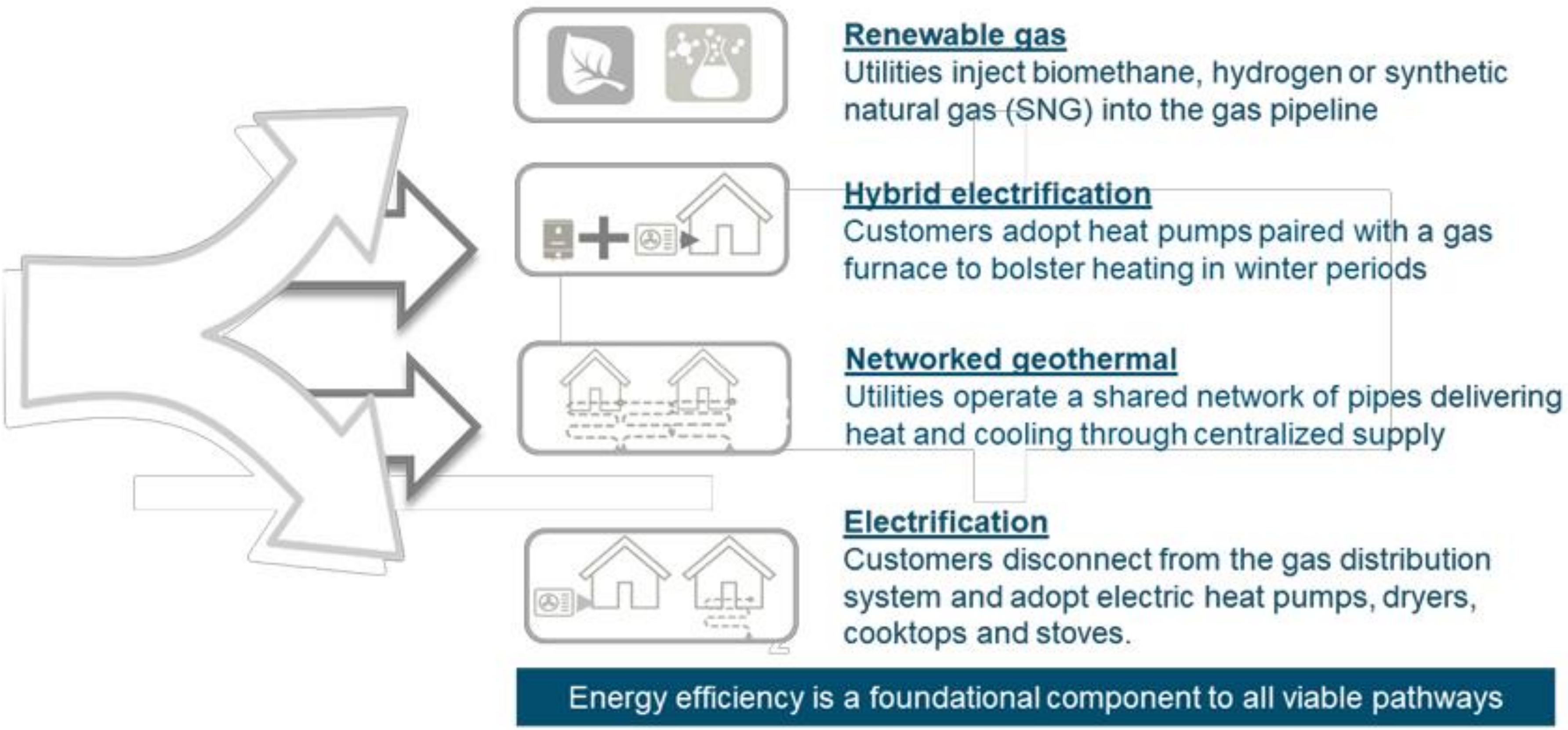
Massachusetts Department of Energy Resources

LDC Filings



Pathways Report

Figure 7. Common decarbonization strategies.



Pathways Report

Decarbonization Pathway	Summary Narrative	Key space heating technologies deployed[1]						
		Air Source Heat Pump	Ground Source Heat Pump	Hybrid Heat Pump	Networked Geothermal	Standard Gas Furnace	High Efficiency Gas Furnace	Gas Heat Pumps
High Electrification *Inspired by Roadmap “All Options” Scenario*	Building sector electrifies >90% of buildings, primarily through the adoption of Air Source Heat Pumps.	●						
Low Electrification *Inspired by Roadmap “Pipeline Gas” Scenario*	Building sector electrifies 65% of buildings through the adoption of ASHPs; gas customer count declines by 40% compared to today.	●				●		
Interim 2030 CECP *Inspired by 2020 version of Interim 2030 CECP*	Building sector electrifies at an accelerated pace following goals outlined in the Interim 2030 CECP.	●						
100% Gas Decommissioning *Stakeholder Proposed*	Building and industrial sectors fully electrify by 2050. +/- 25% of the building sector converts to networked geothermal systems.	●	●		●			
Targeted Electrification *Stakeholder & LDC Proposed*	>90% of buildings are electrified through a combination of technologies. LDC customers converting to ASHPs do so in a “targeted” approach.	●	●	●				
Networked Geothermal *Stakeholder & LDC Proposed*	LDCs evolve their business model and convert +/- 25% of the building sector to networked geothermal systems. Remaining gas customers use renewable gas as their main source of heating by 2050.	●	●		●	●		
Hybrid Electrification *Stakeholder & LDC Proposed*	>90% of buildings electrify through ASHPs paired with renewable gas back-up (hybrid heat pumps) that supply heating in cold hours of the year.			●				
Efficient Gas Equipment *Stakeholder & LDC Proposed*	Building sector largely adopts high-efficiency gas appliances supplied by a combination of renewable gases by 2050. The	●					●	●

DOER Massachusetts Department of Energy Resources

DOER Comments on LDC Filings

- **The Department's investigation into the future of gas is essential to meeting the Commonwealth's clean energy goals.**
  - The building sector accounts for almost a third of statewide GHG emissions, driven by the combustions of fossil fuels such as fuel oil, propane, and natural gas
  - Even with continued energy efficiency, the Massachusetts LDCs are forecasting an increase in demand for natural gas largely from new construction and existing customer conversions
- **The LDCs' Technical Report complements the Decarbonization Roadmap as identifying possible pathways to 2050 but does not define a preferred or required pathway.**
  - **Key Similarities**: E.g. each pathway in the 2050 Roadmap and the Pathways Report identifies building electrification and energy efficiency as no-regret decarbonization strategies.
  - **Key Differences**: E.g. the 2050 Roadmap concluded that decommissioning the gas system that accompanies targeted electrification ultimately reduces costs more than what is assumed possible through incremental decline in the Pathways Report.
- **The Department should require additional detail and consistency to the LDC three-year NZEPs and corresponding metrics**
  - The LDCs should demonstrate how immediate or ongoing regulatory actions and program results are guiding long-term planning
  - DOER recommends that the NZEPs and associated reporting include the following features:
    - (1) a **geographic mapping and marginal cost analysis** to demonstrate the interaction of multiple strategies and identify cost-effective strategies for specific areas
    - (2) a demonstration of **cost** considerations, and
    - (3) enhanced proposals for **regulatory actions** to support decarbonization, and
    - (4) **metrics** as a tool to evaluate successful strategies.

Next Steps and Continued Work

- **DOER Final Comment to the Department**: The Department should identify immediate actions for the LDCs to make meaningful progress towards decarbonization and address key uncertainties identified in the pathways report
  - Demonstration projects and investments should include a demonstration of strategic decommissioning
  - Awaiting Department Finding
- **Commission on Clean Heat**
  - Final Report released on November 30, 2022
  - Commission Report advises the Administration on a framework for long-term greenhouse gas emission reductions from heating fuels
  - Commission has explored options to accelerate the deployment of energy efficiency programs and clean heating systems in new and existing buildings and transition existing distribution systems to clean energy
- **Clean Energy and Climate Plan for 2050**
  - January 1st, 2023 - deadline for the adoption of the 2050 emissions limits and sublimits, as well as the release of a comprehensive plan to achieve those limits.
  - CECP will provide details on the actions the Commonwealth will undertake to put the Commonwealth on a pathway to achieve net zero greenhouse gas emissions by 2050

DOER
Massachusetts Department of Energy Resources

THANK YOU!

Colorado Energy Office

Colorado Clean Heat Planning

December, 2022

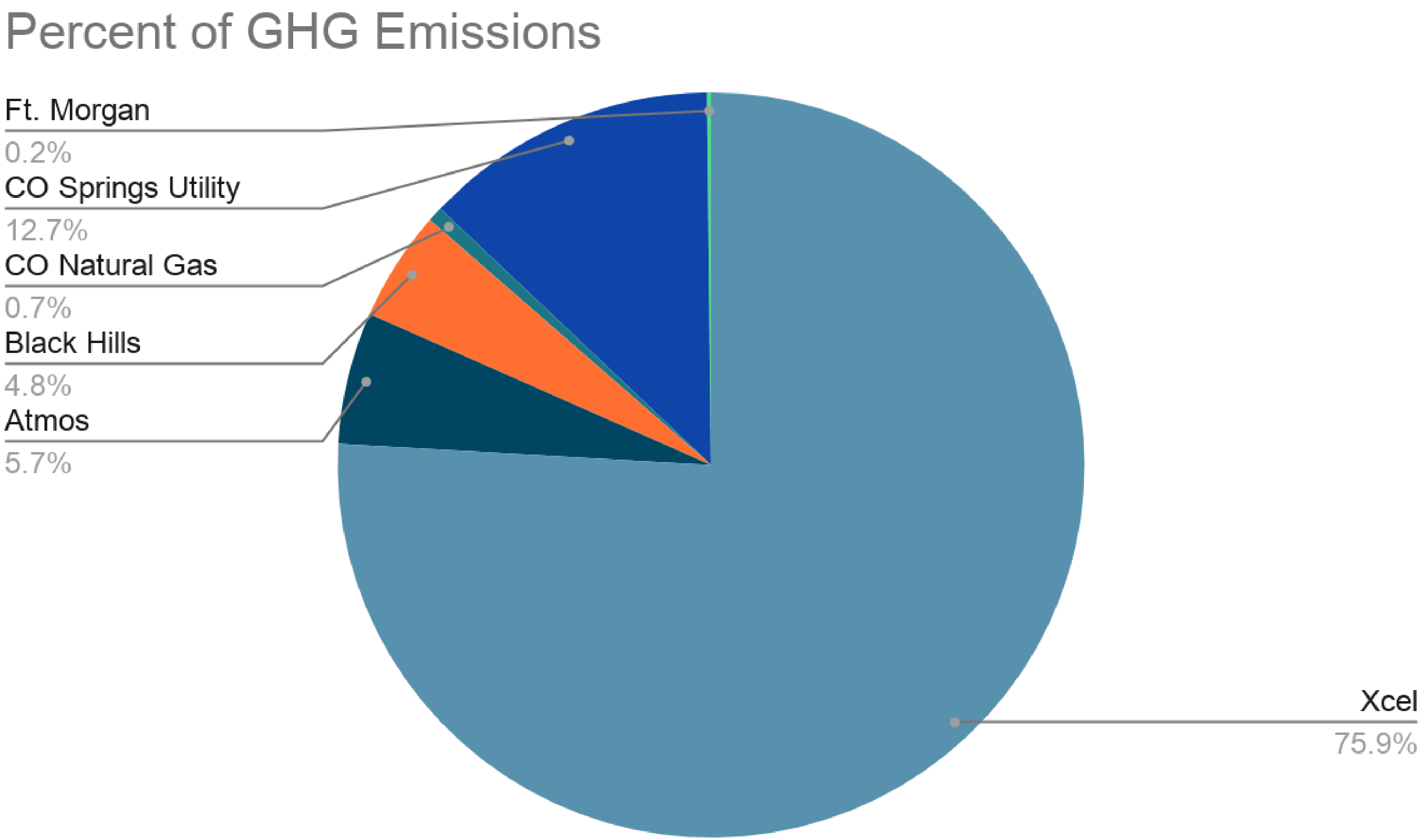
COLORADO Energy Office

Key Colorado Building Decarb Legislation

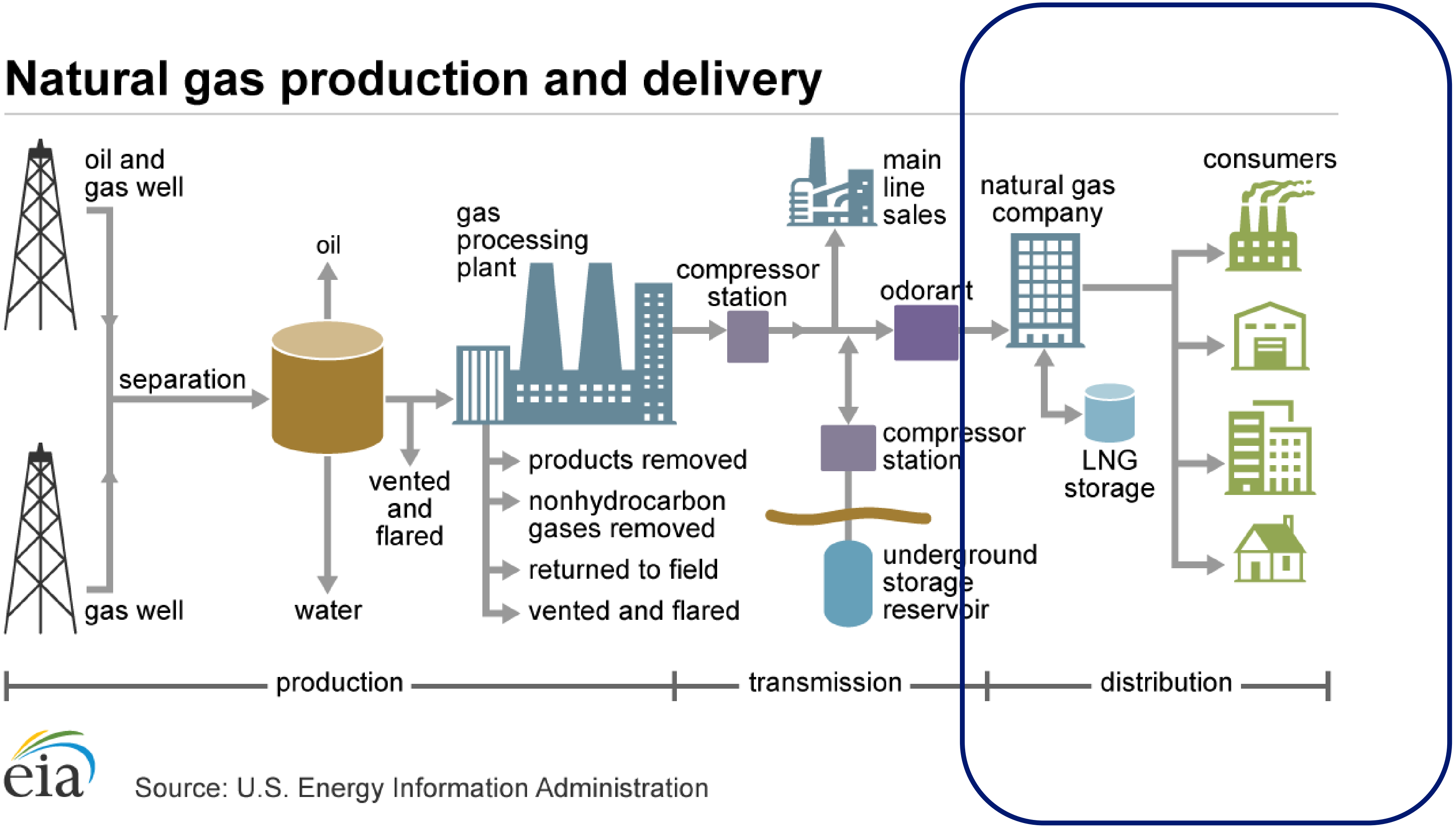
State GHG Targets

- **Enhanced Gas DSM**
  HB 21-1238
- **Clean Heat**
  SB 21-264
- **Beneficial Electrification**
  SB 21-246

Colorado Gas Utilities



Clean Heat



Natural gas production and delivery
oil and gas well
gas well
separation
oil
water
vented and flared
gas processing plant
products removed
nonhydrocarbon gases removed
returned to field
vented and flared
compressor station
main line sales
odorant
compressor station
underground storage reservoir
natural gas company
LNG storage
consumers
production
transmission
distribution
eia
Source: U.S. Energy Information Administration

Senate Bill 21-264

Recovered Methane

Future Targets

Rulemaking

Clean Heat Plans

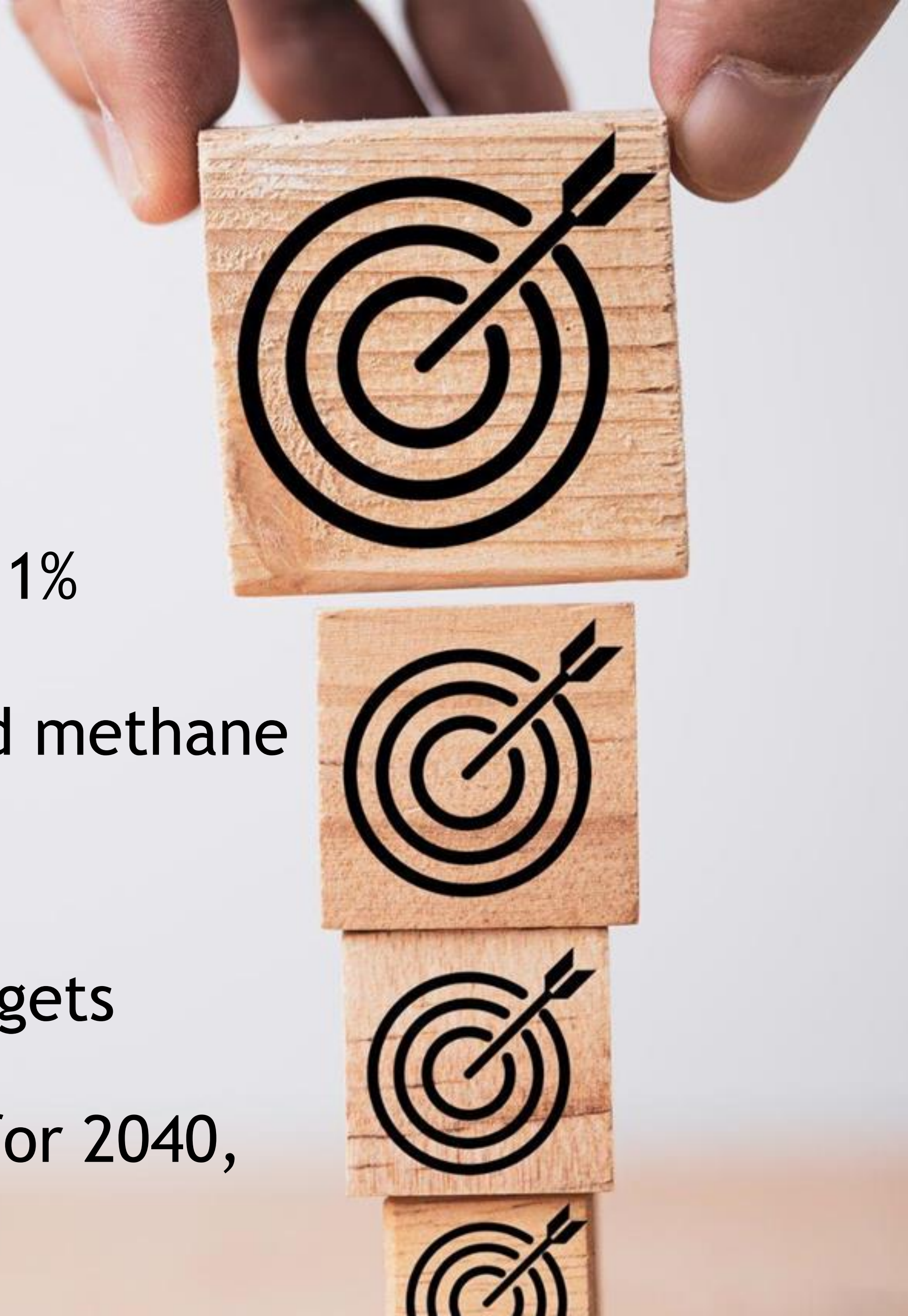
Emissions Targets

Clean Heat Approach

- Gas utilities with more than 90,000 customers
- Develop comprehensive clean heat plans designed to achieve greenhouse gas emission reduction
- Technology-neutral & outcome based
- Recovered methane protocols
- PUC rules to implement Clean Heat

Clean Heat Targets

- 2015 baseline
- Two Compliance years
  - 2025 is 4% in with no more than 1% recovered methane
  - 2030 is 22% in with 5% recovered methane
- Future Targets
  - By 2024 PUC will adopt 2035 targets
  - By 2032 PUC will adopt targets for 2040, 2045, 2050



Clean Heat Plans

- DSM "Strategic issues" applications every 4 years starting in 2022 to assess cost-effective energy savings targets
- Allows utilities to seek cost recovery for Clean Heat Plans subject to a 2.5% cost cap on annual gas bills
- Requires at least 25% of residential gas program expenditures to be targeted to income-qualified households (15% for smaller utilities)
- Requires utilities to include federal social cost of carbon and methane in determining cost-effective plans
- Allows any combination of clean heat resources

Clean Heat Resources

- Demand side management programs
- Recovered methane
- Green hydrogen
- Beneficial electrification
- Pyrolysis of tires
- Other resources approved by the PUC

State Agency Roles

PUC

- Establishes rules for utilities to file clean heat plans
- Adjudicates cases when utilities file clean heat plan applications
- Adjudicates requests for cost recovery

APCD

- Technical Working Groups
- GHG Accounting Workbook
- Recovered Methane Protocol Rule
- Recovered Methane Credit Database

PUC Rules in 21R-0449G

DSM
- Increased goals
- Energy and demand reductions

Clean Heat
- Long-range forecasting
- Portfolios of Resources

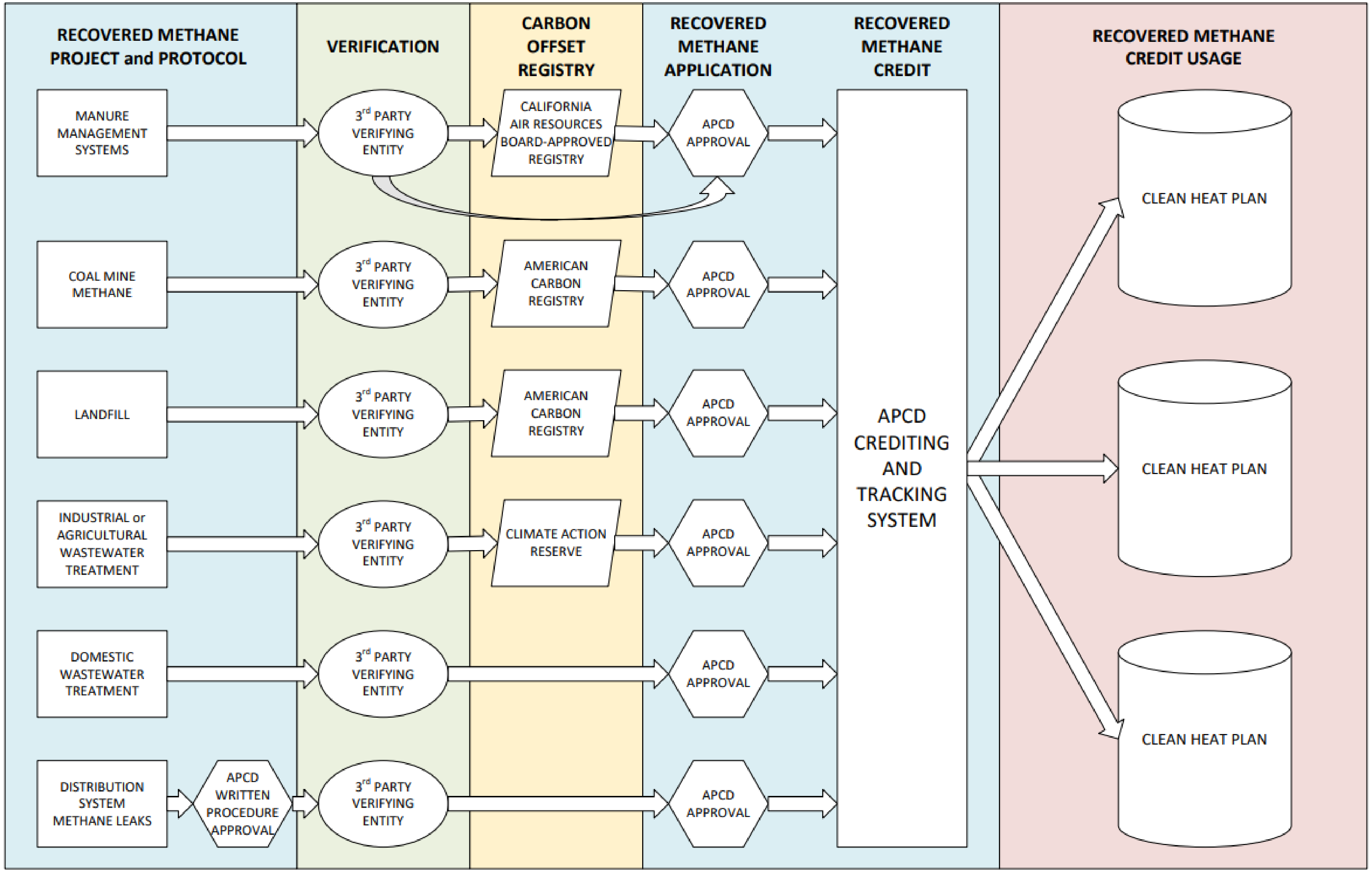
GIP
- Understanding of current gas system
- Define and approve planned projects
- Future of the gas system

PUC - Lowest Reasonable Cost

“Lowest Reasonable Cost” means a reasonable-cost mix of clean heat resources that meet the clean heat targets as determined through a detailed analysis of available technologies and includes:

- Resource costs
- Market volatility risks
- Risks to ratepayers
- System operations costs
- Infrastructure costs
- Environmental justice goals
- Social cost of carbon and methane in comparing alternatives
- Other costs and benefits as determined by the Commission See § 40-3.2-108(2)(k), C.R.S.

Recovered Methane and Clean Heat



Colorado Gas and Building Decarbonization Study

What are the impacts and trade-offs of various long-term approaches (efficient electrification of all buildings, efficient electrification of new buildings, portfolio approaches that also include low carbon gas, dual fuel solutions, and offsets) to meeting state emissions reduction targets from space and water heating in residential and commercial applications?

Keith Hay
Senior Director of Policy,
Colorado Energy Office

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720-527-2765

Environmental Defense Fund (EDF)

Recent Oil & Gas Methane Developments

Environmental Defense Fund

Erin Murphy, Senior Attorney

Edwin LaMair, Attorney

EDF ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

EPA Methane Regulations

Overview

- Proposed Nov. 2021; Supplemental Proposal Nov. 2022
- Comment period open until Feb. 13, 2023; Final Rules in 2023
- Apply to new/modified and existing sources, including:
  - Well sites and production facilities
  - Compressor stations
  - Gas processing plants
  - Storage facilities
- New sources regulated directly by EPA; immediate compliance
- Existing sources regulated through State/Tribal/Federal plans; compliance w/n ~4 years

Standards

- Fugitive Monitoring
  - Leak inspections and repair w/ gas imaging cameras 2x-6x/year
  - Well sites, production facilities, compressor stations, gas processing plants
  - Alternative advanced technology option (continuous monitors, drones, aerial, other)
- Pneumatic Devices
  - Zero emission requirement across supply chain
- Flaring
  - Requirement to capture gas unless technically infeasible or unsafe
- Storage Tanks
  - Those with potential emissions over 20 tons per year must install controls

Inflation Reduction Act:

Methane Emissions Reduction Program

Overview

- Waste Charge
  - Establishes fee on emissions exceeding intensity thresholds ($900-$1500)
  - Begins in 2024; complements and reinforces EPA regulations
- Methane Reporting
  - Fee assessed on emissions reported to EPA's Greenhouse Gas Reporting Program
  - EPA updating reporting protocols for accuracy and based on measurement data
- Appropriations
  - $1.55 billion for communities, states, and others to drive down methane

Certification of Differentiated Natural Gas

Certification of Differentiated Natural Gas - Challenges

- Lack of measurement, reporting, and verification (MRV) standards
- Limited participation in voluntary certification schemes
- Cherry-picking within company portfolios

Certification is not a substitute for comprehensive, across-the-board standards to reduce methane emissions.

Natural Gas Certification Design Criteria

1. Certification should require and verify that best practice work practice standards are met
2. Certification must be based on high-integrity monitoring and reporting consistent with Oil and Gas Methane Partnership (OGMP) 2.0 Level 5.
3. Certification must be accompanied by verification from a credible and independent third party
4. Certification must be based on an intensity standard that is no greater than the Oil and Gas Climate Initiative's (OGCI) metric of 0.20% and declines over time.
5. Companies must specify which assets they are certifying, the share these assets represent relative to their entire portfolio, the emissions intensity of the certified assets, and report a company-wide emissions intensity.

Source: EDF Whitepaper on Certification of Natural Gas

Certification of Differentiated Natural Gas - Challenges

What we're seeing in states:

Gas utilities charging ratepayers for "certified" gas products

The Company has finalized contracting for its initial CG purchases, as described below. This report represents a revision to the initial contracting terms contained in the Company's September 9, 2022 filing on this matter. The gas will flow November 2022-March 2023.

Begin Confidential

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

End Confidential

source

More State Issues

- Question: Whether certified gas products should “count” towards state GHG emission reduction targets, if those targets account for upstream emissions.
- Research continues to demonstrate that methane leakage from gas utility systems is significant and ongoing.
  - Utilities should deploy advanced leak detection to find and fix more methane leaks.
  - Improved gas utility leak reporting could help address equity concerns.
- Comprehensive long-term planning is needed to ensure gas utility investments are consistent with state climate goals

Thank you!

ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

National Association of Regulatory Utility Commissioners (NARUC) – Center for Partnerships & Innovation (CPI)

CT DEEP Technical Session 7: Methane / Natural Gas Distribution Planning & Policies

State Approaches to Natural Gas Regulation under Decarbonization

Kiera Zitelman

Technical Manager, National Association of Regulatory Utility Commissioners – Center for Partnerships & Innovation

December 8, 2022

Background

- NARUC: membership organization for state PUCs in all 50 states, DC, and U.S. territories
- Grant-funded technical assistance office for state PUCs provides resources and peer sharing platforms
- Winter – Spring 2022: series of “regulators’ roundtables” with states pursuing decarbonization goals
- December 2022: *Potential State Regulatory Pathways to Facilitate Low-Carbon Fuels*

Roundtable Objectives

- Explore the potential impacts of emerging state decarbonization policies on utility infrastructure planning;
- Assess the scope of challenges faced by utility regulators in overseeing ratepayer investments in utility infrastructure to reduce the risk of conflict with long-term decarbonization goals and the potential for stranded assets; and
- Facilitate peer-sharing among state utility regulators regarding commission processes, information needs, and strategies.
- Three sessions held with small group of regulators and staff

Roundtable 1: The Challenge

- Decarbonization targets applying outside of the electricity sector to include natural gas
- Differences in electric and gas utility regulation; risk aversion
- Communicating the risk of stranded assets
- Two paths forward: electrification and low-carbon fuels
- PUC needs: staff and consultants to expand bandwidth, stakeholder engagement, clarity on costs and benefits of pathways, strategies to protect LMI ratepayers, data on energy demands

Roundtable 2: Data and Stakeholders

- Understanding sources of carbon emissions and in-state resources
- System-level and granular data on infrastructure and energy use
- Lack of combined gas-electric planning
- Participation by new stakeholders
- Consideration of historically disadvantaged / underserved communities

Roundtable 3: Paths Forward

- Entrenched utility positions on electrification vs. low-carbon fuels
- Imperative to move quickly
- Establish expectations, build shared understanding of responsibilities
- Taking incremental steps forward

Potential State Regulatory Pathways to Facilitate Low-Carbon Fuels

- Report to be published this month
- Background information on hydrogen and renewable natural gas, decarbonization potential, current market size and infrastructure, barriers to growth
- Comparison of state PUC actions
  - Investigatory dockets
  - Supplier tariffs
  - Customer tariffs
  - Procurement targets
- Questions for PUCs

Questions for Regulators

- Barriers to voluntary transactions
- Cost allocation
- Accounting for decarbonization potential
- Making decisions under uncertainty

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www.naruc.org/cpi

Conservation Law Foundation (CLF)

Building a Successful Future of Gas Proceeding

Priya Gandbhir, Staff Attorney

Conservation Law Foundation, MA

conservation law foundation

Stakeholder Process for MA DPU 20-80

- Investigation vs. adjudication
- Maintaining the record
- Agency involvement

conservation law foundation

What We Hope Comes Next

- 2022 MA legislation requires adjudication
- Working groups
- Additional technical review
- Centering of environmental justice concerns

conservation law foundation

Updates from Rhode Island

- RI PUC meeting on Dec 7, 2022
- Engaged with stakeholders as to scope of proceeding

conservation law foundation

Coalition for Renewable Natural Gas

Renewable Gas Policy Overview

What are other jurisdictions doing?

PRESENTED BY: Sam Lehr

12.08.2022

About RNG Coalition

- The leading advocacy and education voice for RNG in North America
- We advocate for the sustainable development, deployment and utilization of renewable natural gas so that present and future generations will have access to domestic, renewable, clean fuel and energy
- 370+ members including: RNG developers, marketers, financiers, technology providers, consultants, utilities and labor coming together
- 98%+ of the RNG supply in North America

Organic Waste-to-X

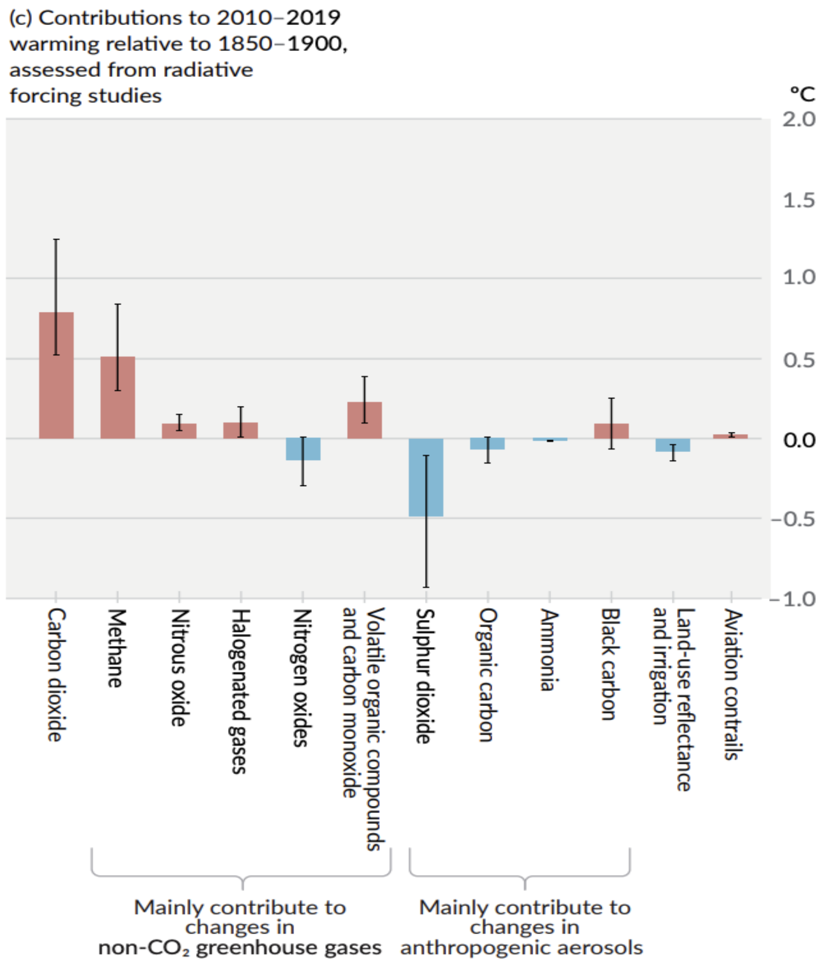
- Thermal
- Transportation
- Electricity
- Hydrogen
- Bio-based Products

Inflation Reduction Act

Contains beneficial tax policies advocated for by RNG Coalition:

- Biogas property, including cleaning and conditioning equipment, as qualifying equipment for purposes of the Section 48 energy credit
    - Transitions to technology-neutral energy tax credit
- Extension of alternative fuel tax credit
    - Applicable to all transportation-quality fuels
- New clean hydrogen tax credit that allows for the use of RNG and other biologically-derived feedstocks
- 45Q carbon oxide sequestration credit
    - Important for carbon negative RNG and hydrogen pathways

Intergovernmental Panel on Climate Change (IPCC) Says that Reducing Methane in the Near-Term, Clean Fuels are Key



- Methane in the atmosphere continues to grow rapidly
- Second most impactful greenhouse gas (GHG) after carbon dioxide (CO_2)
- Methane is short-lived (relative to CO_2) but has a very strong warming impact (80x) in the first 20 years
- Sectors producing the largest methane emissions globally: fossil fuel production and distribution, agriculture and waste management

- **"Because some applications (e.g., aviation) are not currently amenable to electrification, it is anticipated that 100% renewable energy systems will need to include alternative fuels such as hydrogen or biofuels."**
- **"Most production routes for biofuels, biochemicals and biogas generate large side streams of concentrated CO2 which is easily captured, and which could become a source of negative emissions."**

Denmark's Green Gas Strategy Outlines Comprehensive Role for RNG

- Expects to achieve 100% biomethane around 2030
- Plans to shut down fossil gas production in North Sea, ramp up biomethane production headed to 2050
- Switch from NG system to multi-gas system over time
- Recognizes role of biomethane, hydrogen, e-fuels, and CO_2 transport

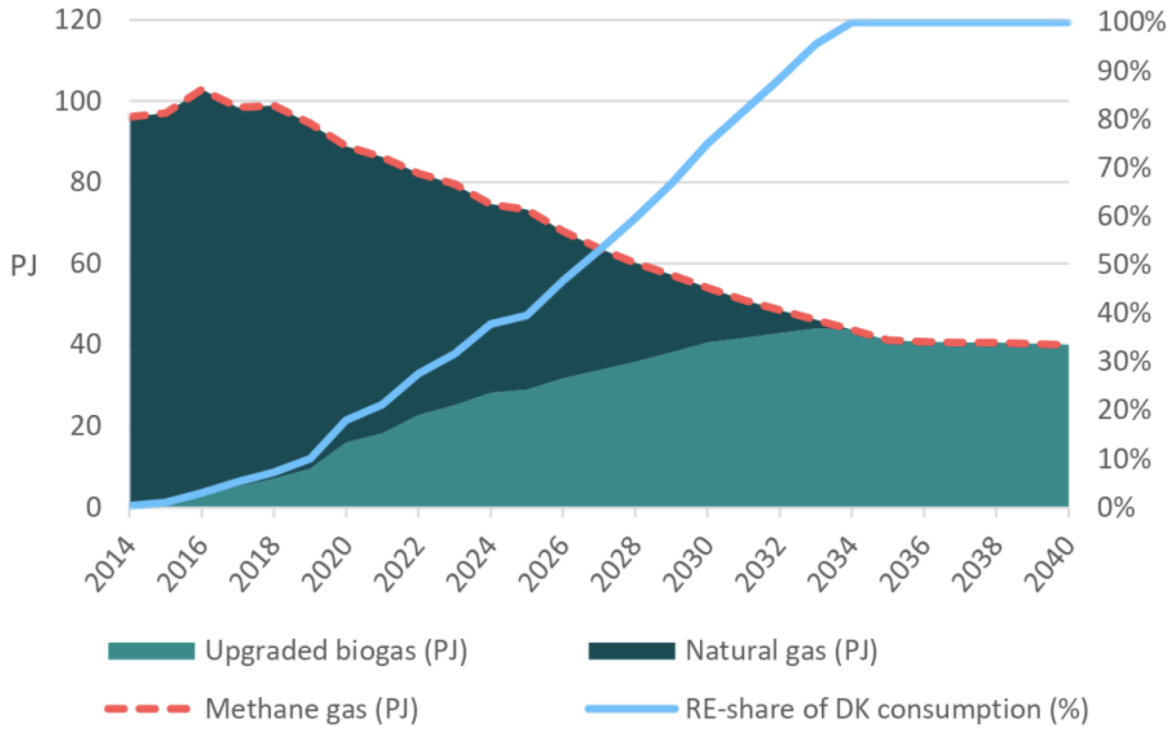
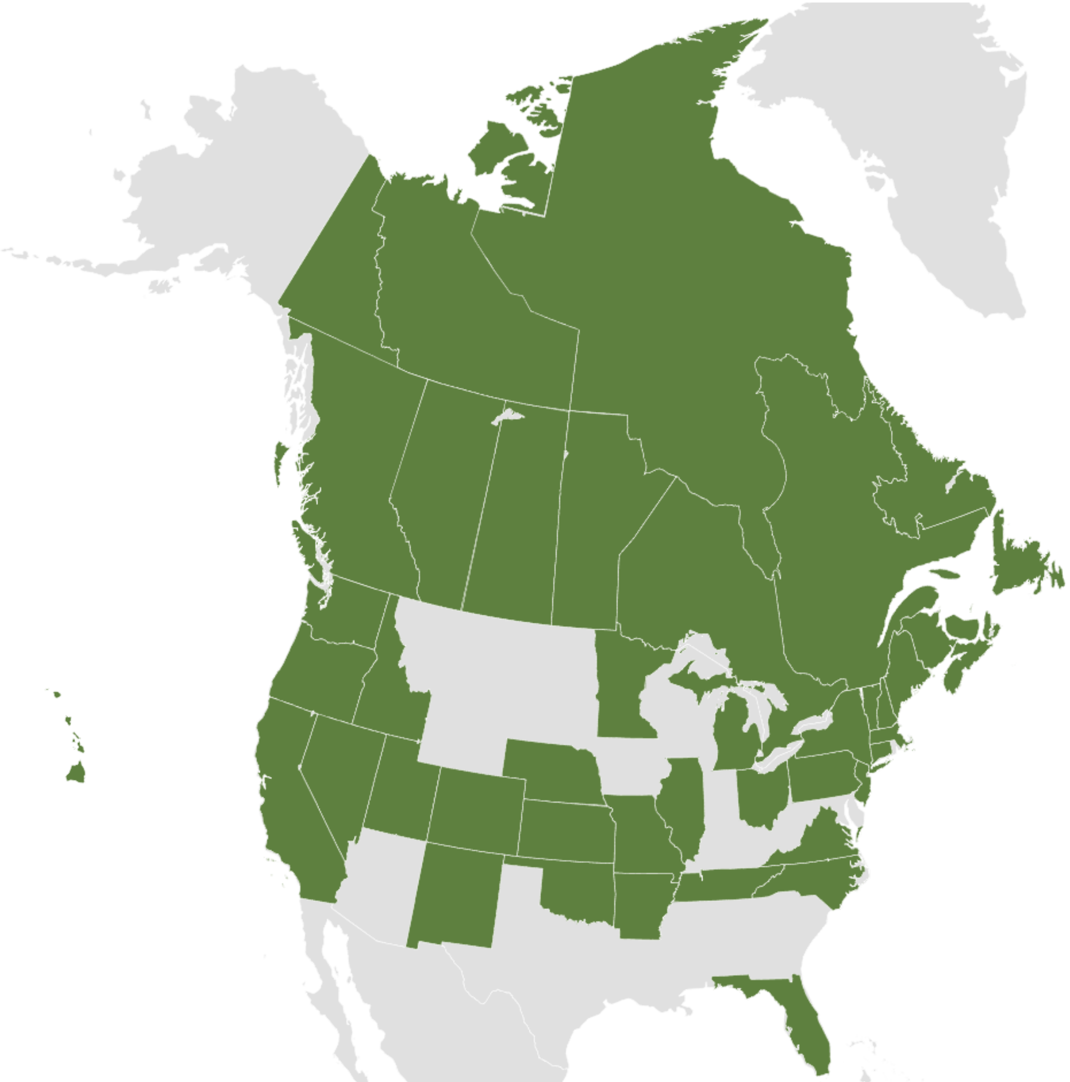


Figure 3: Consumption of methane gas by energy type and share of renewable energy in gas consumption. Source: The Danish Energy Agency's 2021 Analysis Assumptions for Energinet (AF21).

- European Commission targeting 35 bcm of biomethane by 2030
- Equal to 20% of lost Russian gas demand
- Ability to expand to 100+ bcm, covering 30-50% of total EU gas demand in 2050

Status of Procurement Policy



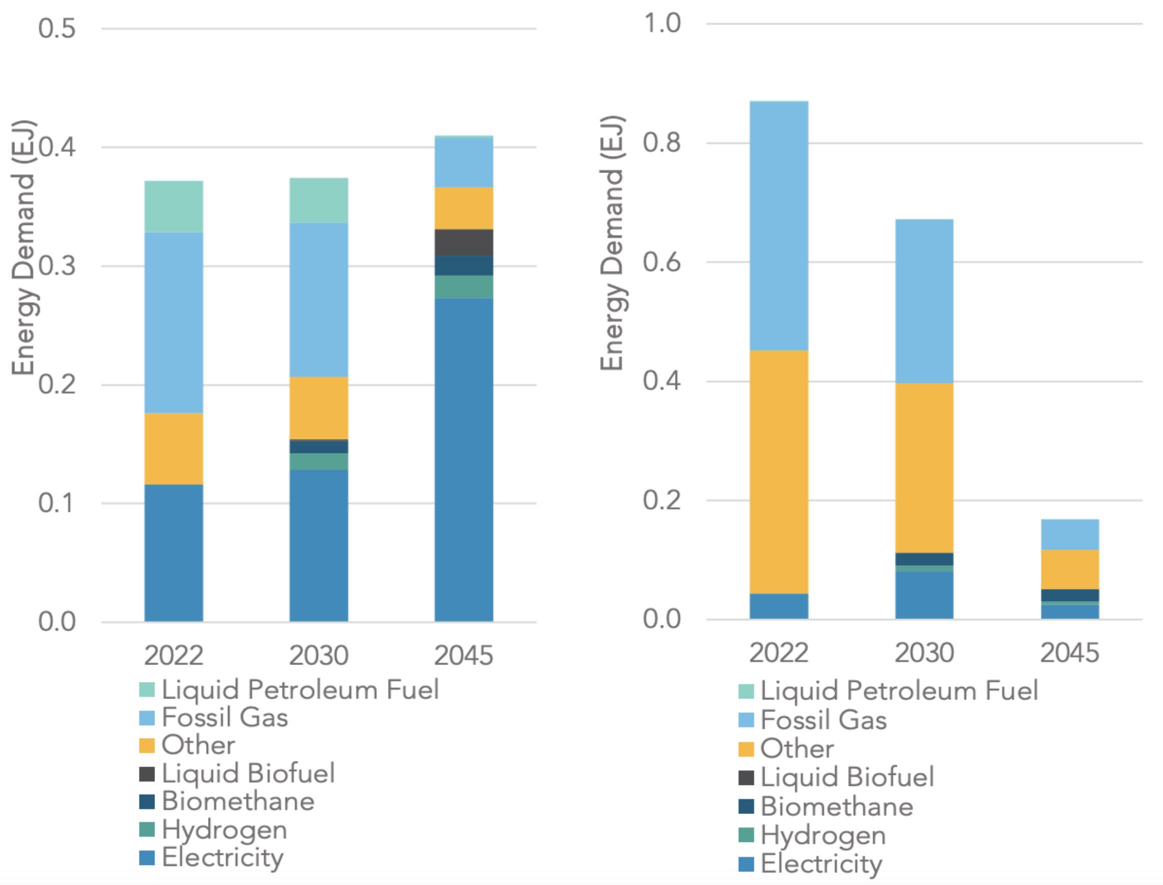
RNG at a Glance:

- Mandatory, voluntary, and other enabling policies in 44 states and provinces
- 94.8 tBtu/yr production capacity
- 82.7 tBtu/yr planned
- 1,425.3 – 4,300 tBtu/yr from AD achievable by 2040

California Air Resources Board (CARB) Says that RNG and Clean Hydrogen Will Be Necessary in Near- and Long-Term

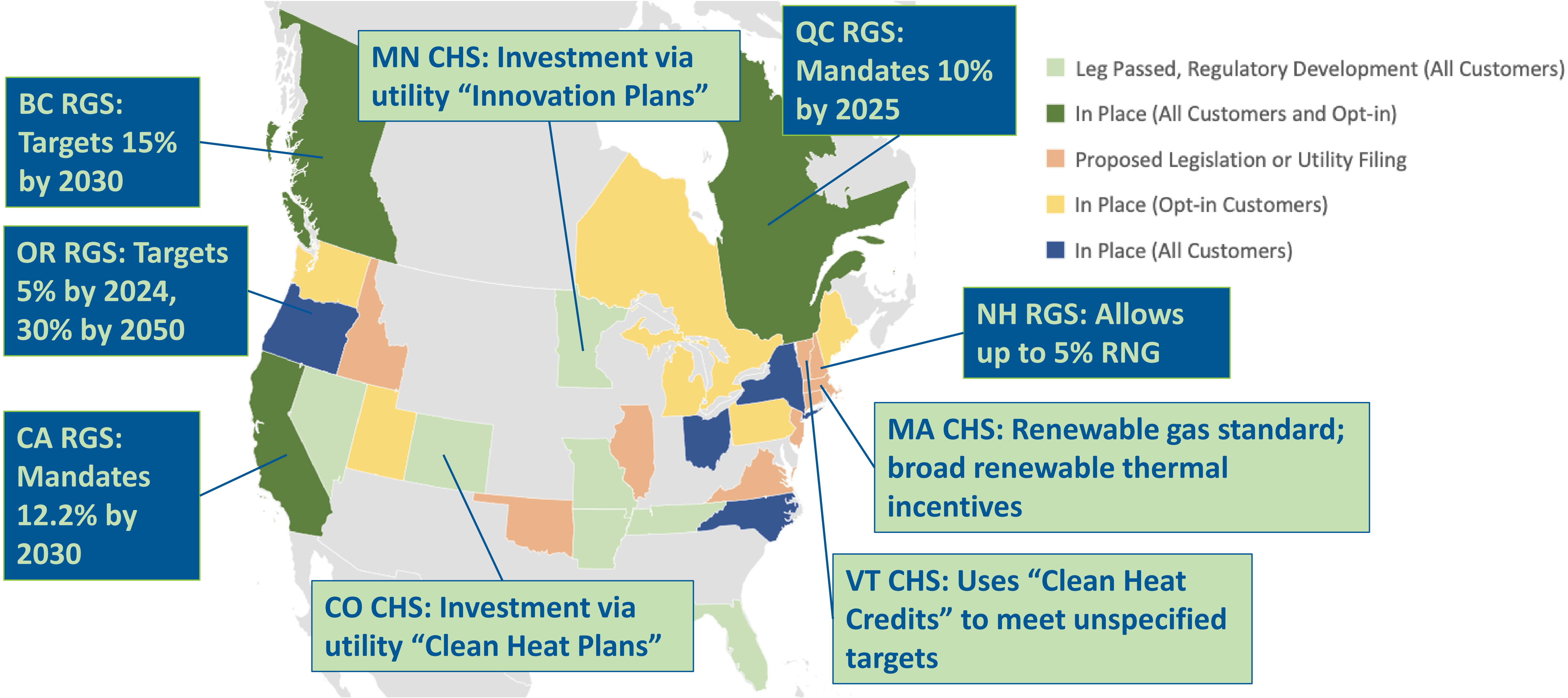
Example illustrates projected energy use in industry category:

Figure 4-7: Final energy demand in industrial manufacturing (left) and in oil and gas extraction and petroleum refining (right) in 2022, 2030, and 2045 in the Scoping Plan Scenario[383]



- Focus on "reducing fossil fuels wherever they are currently used" including by scaling up renewable hydrogen and RNG
- Targets increased RNG and hydrogen blending in existing gas system
- Use of RNG to create renewable hydrogen
- Utilizes RNG in industry, transportation, and buildings through 2045 (end of report timeframe) to achieve carbon neutrality

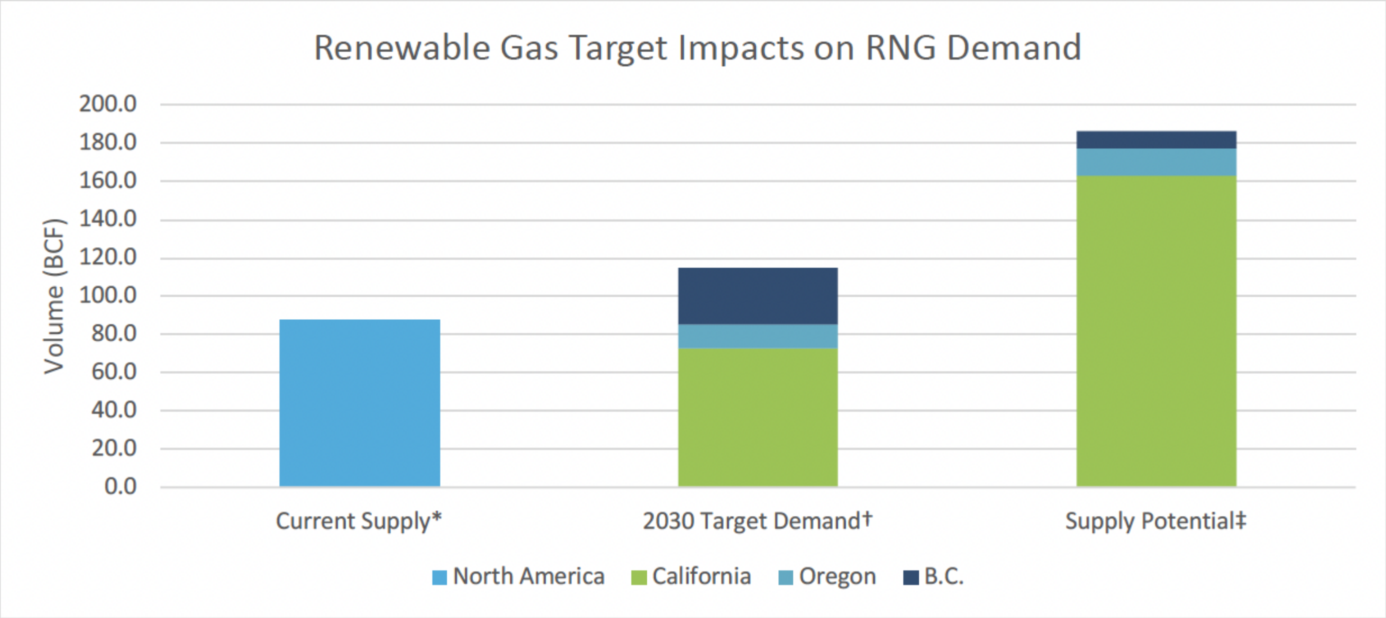
Renewable Gas and Clean Heat Standards



California's Renewable Gas Standard

CPUC's adopted Decision sets the following mandatory RNG procurement targets for California's gas utilities:

- A short-term target of 17.6 BCF/year by 2025, sourced primarily from anaerobic digesters which utilize organic waste diverted from landfills
- A mid-term target of 72.8 BCF/year by 2030 and beyond—equal to approximately 12.2 percent of total annual statewide gas IOU core customer consumption in 2020

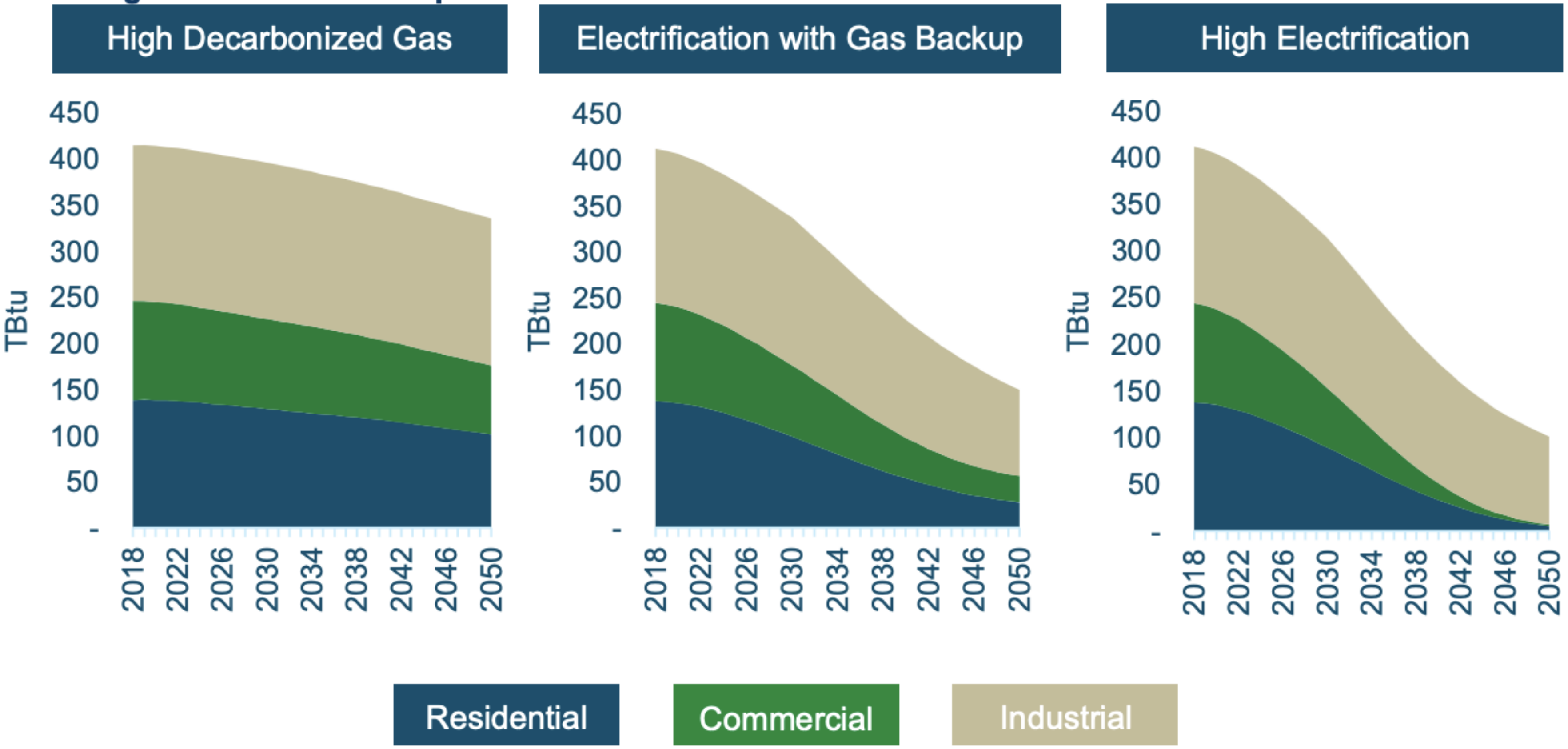


*California's RGS is designed to achieve broader environmental goals in the state's waste management, energy, forestry, and transportation sectors

Minnesota's Natural Gas Innovation Act (Clean Heat Standard)

- Allows gas utilities to invest in "innovative resources"
- Includes RNG, hydrogen, electrification, geothermal, efficiency, etc.
- In pursuit of Minnesota's decarbonization goals; but no set targets under program
- Minnesota-specific pathways show significant gas demand in 2050 regardless of pathway

Figure 6. Gas consumption in each scenario



Low Carbon/Clean Fuel Standards Continue to Expand, Existing Programs Focusing on Increases in Ambition

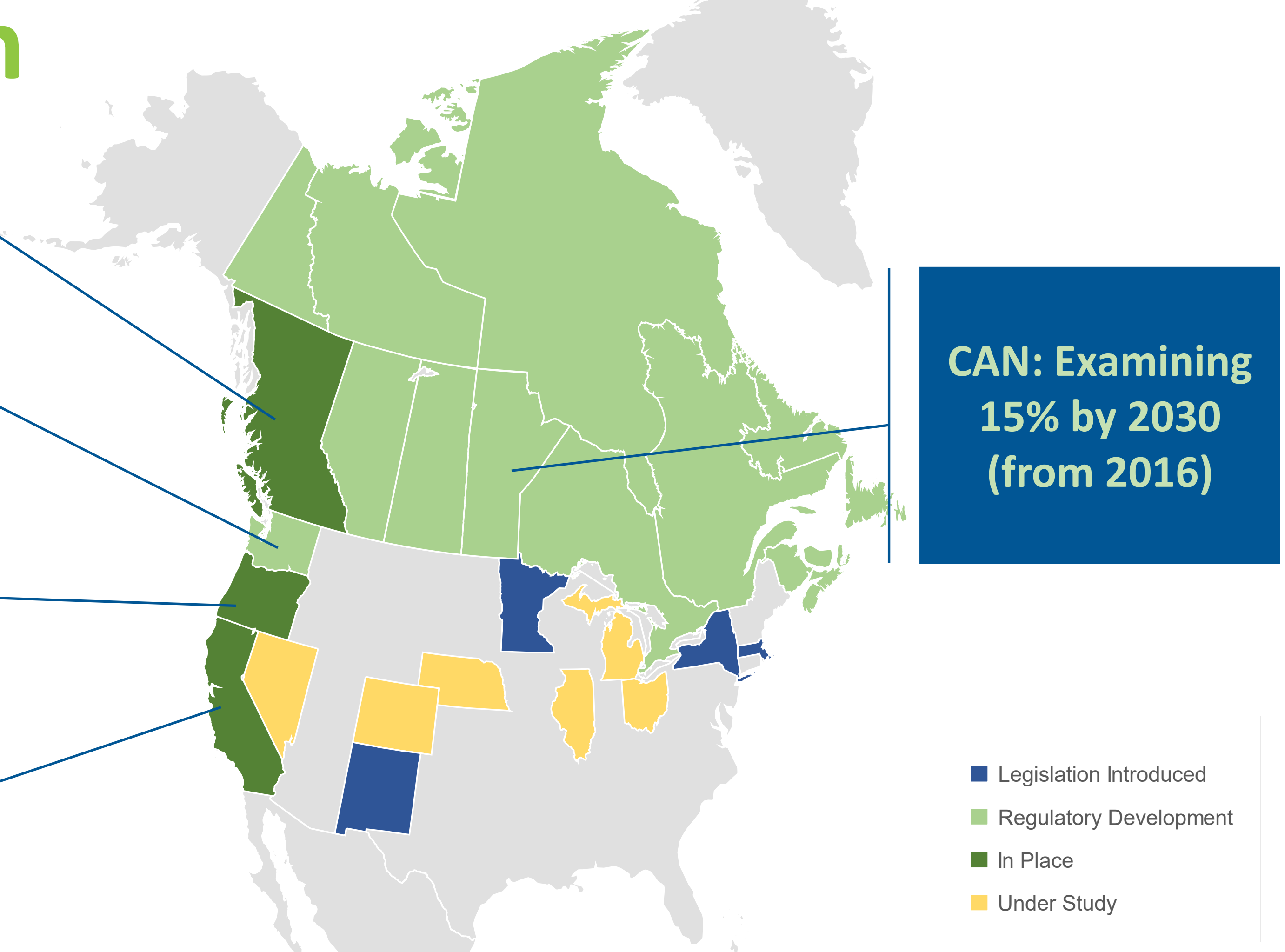
BC: Committed 30% by 2030 (from 2010)

WA: Examining up to 20% by 2034 (from 2017)

OR: Examining 20% by 2030, 37% by 2035 (from 2015)

CA: Examining at least 25% by 2030, 54% by 2035 (from 2010)

CAN: Examining 15% by 2030 (from 2016)



Renewable Energy Tracking and Certification Underpins Procurement

M-RETS

- Primary RNG verification system
- Includes CI, feedstock, vintage, location, etc.
- Voluntary buyers
- Compliance markets including OR, WA CFS, etc.

Green-e (Center for Resources Solutions)

- Sustainability certification
- Analogous to Green-e renewable power
- Pairs with M-RETS (optional)

Evolving Role of Renewable Gas

Near-Term: Reduce Methane Emissions

- Build RNG facilities immediately to reduce methane from organic waste streams as quickly as possible
- Adopt a Clean Fuel Standard, Renewable Gas Standard, and/or Clean Heat Standard Standard to incetivize project development and begin to decarbonize the gas system

Mid-Term: Begin to Prioritize RNG Use in Hard to Decarbonize Sectors

- RNG facilitites that are pipeline injected offer a flexible resource which can be sent to the sectors that most need it over time (i.e., those which are best served by gaseous fuels rather than other decarbonization methods)
- This choice becomes more important when remaining gas demand is closer to RNG supply

Long-Term: Manage Transition to H_2 with CCS

- When hydrogen transport infrastructure develops, consider transitioning bio feedstocks to the hydrogen molecule as the energy carrier (especially for non-AD feedstocks)
- Couple H_2 production with Carbon Capture and Sequestration to achieve carbon negative outcomes

Speaker Info

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Synapse Energy Economics

Gas Utility Policies and Planning in Other States

Connecticut Comprehensive Energy Strategy Technical Session #7

December 8, 2022

Dr. Asa S. Hopkins

Synapse Energy Economics

- A Synapse team is providing technical support to DEEP in the preparation of the buildings/thermal aspects of the CES
- We build custom scenarios and analyze energy, emissions, and economic impacts to help our clients create roadmaps and develop policies toward decarbonized buildings.
- Founded in 1996 by CEO Bruce Biewald
- Leader for public interest and government clients in providing rigorous analysis of the energy system
- Staff of 40+ includes experts in energy, economic, and environmental topics

Taxonomy of State Progress on the Future of Gas

Not engaged

- Most states' energy and utility policymakers have not deeply engaged with building decarbonization or the future of gas utilities
- 20 states have passed laws limiting municipal authority to limit the use of gas (NH, WV, OH, IN, KY, TN, MS, Al, GA, FL, LA, AR, MO, IA, KS, OK, TX, WY, UT, AZ)

Exploring options

- Exploring technology pathways to building decarbonization
- Direction often contested, generally with advocates pushing electrification and gas utilities arguing for other courses
- These states have not generally started taking policy action clearly in any direction
- Includes RI, MD, MN, OR, NV

Nominally fuel neutral actions

- Colorado has set up policies for building decarbonization, with roles for both electric utilities (advancing electrification) and gas utilities (required "clean heat" actions that could include bioenergy)

Clear direction

- Have set clear direction regarding technology pathways, although they differ on details
- All selected electrification as the primary mechanism for building decarbonization
- Variation in this group: policy approaches, timing, and policy/program maturity
- Gas utilities not always fully on board in these states yet, and many regulatory questions remain
- Includes MA, VT, NY, DC, WA, CA

A Tour, from Northeast to West

- Other speakers have covered Massachusetts and Colorado, so our tour will skip over them
- Rhode Island
- New York
- Washington, DC
- Western states:
  - Oregon
  - California

Rhode Island

- *Act on Climate,* enacted in 2021, requires net zero emissions by 2050 and all state agencies to account for this law
- RI Public Utility Commission opened Docket 22-01-NG on "Investigation into the Future of the Regulated Gas Distribution Business in Rhode Island in Light of the *Act on Climate*" on June 9, 2022
- PUC Staff published a proposed scope and solicited public feedback
- PUC Staff recently published their revised scope, which will go to the PUC to be formally considered, with three phases:
    - *Policy analysis*: Analyze the requirements of the Act, and how they relate to utility regulation
    - *Technical analysis*: Utility is required by an earlier settlement to conduct a study, and this analysis will inform the scope of that study; this phase also allows other analysis that parties may present
    - *Policy development*: Solicit and apply goals and principles to the outcome of the technical analysis, develop recommendations for implementation

New York

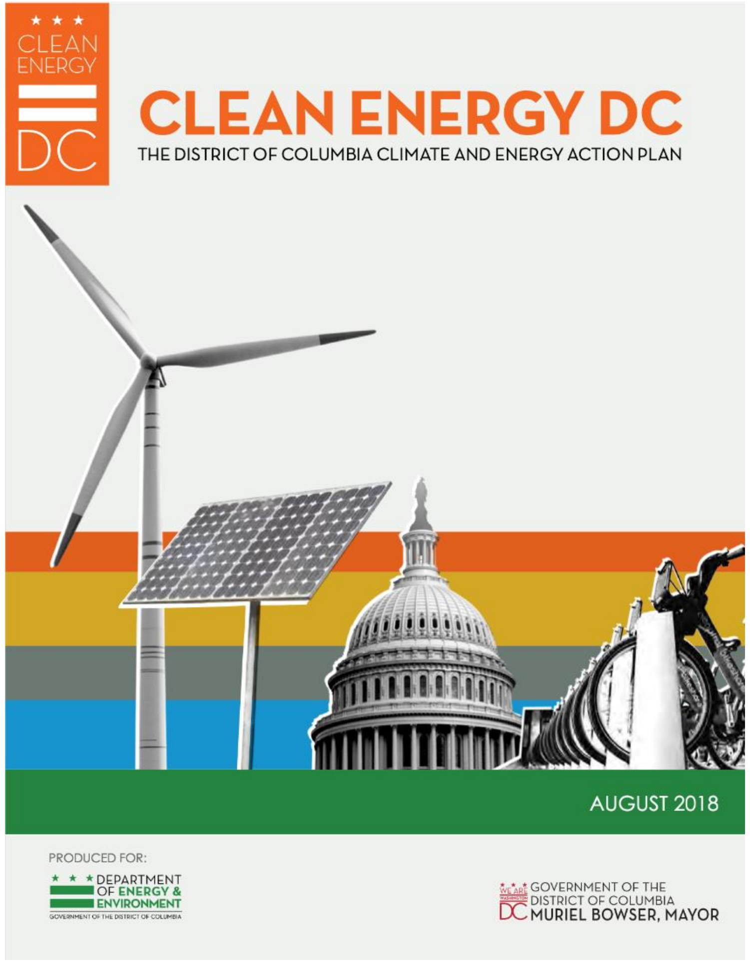
- *Climate Leadership and Community Protection Act* (CLCPA) requires net zero emissions by 2050
- Several strands of resulting action related to thermal/gas emissions:
  - PSC gas planning proceeding
  - Ratepayer-funded programs promoting electrification
  - Legislation allowing pilots of networked geothermal systems
  - Utility changes in approach to leak-prone pipe replacement
- PSC gas planning proceeding
  - Spurred by gas connection moratoria linked to limited pipeline capacity, as well as the CLCPA
  - Gas utilities required to file long-term plans
    - Forecast supply and demand over 20 years; reliability metrics to identify future issues
    - Must include a “no infrastructure” option w/ no traditional capital projects (i.e., with non-pipeline alternatives)
    - Compare alternatives using a standardized benefit-cost framework, including scenarios with different treatments of asset depreciation and continued asset use
  - Collecting data on the “100-foot rule” that requires socialized line extension costs

New York

- Ratepayer-funded programs
  - Electric utilities have performance incentives for beneficial electrification programs measured in tons of CO_2 avoided
  - Offering incentives for heat pumps for space and water heating
- Thermal Energy Networks
  - *Utility Thermal Energy Network and Jobs Act* passed in 2022
  - PSC proceeding is considering "the appropriate ownership, market and rate structures for thermal energy networks and whether the provision of thermal energy by gas and/or electric utilities is in the public interest."
  - Utilities required to propose 1-5 pilot projects, including at least one in a disadvantaged community
    - Pilot proposals were filed in October 2022
- Leak-prone pipe innovations
  - In the gas planning proceeding, the PSC ordered utilities to annually identify pipe segments that could be abandoned in favor of non-pipeline alternatives, and to take a "neighborhood approach"
  - In its ongoing rate case, Con Edison has proposed retiring leak-prone pipes in addition to replacing segments

Washington, DC

- *Clean Energy DC* and *Sustainable Energy DC*
  - Plan to meet 50% GHG reduction from 2006 levels by 2032
  - Also 50% energy use reduction in buildings
- Building Energy Performance Standard (BEPS)
  - Building performance required w/ 6-year compliance period; increasing performance each cycle
  - First period covers buildings > 50,000 sq ft; threshold falls in each subsequent cycle (25,000 then 10,000)
- New construction
  - *Clean Energy DC* called for net zero building code
  - *Clean Energy DC Building Code Amendment Act of 2022* requires net zero code and explicitly restricts gas use
  - Construction Codes Coordinating Board has approved all-electric residential code and is considering a commercial code with very limited gas use



Washington, DC

- DC Public Service Commission opened Formal Case 1167 in 2020
  - “to consider whether and to what extent utility or energy companies under our purview are meeting and advancing the District of Columbia to achieve its energy and climate goals and then take action, where necessary, to guide the companies in the right direction.”
  - Pepco (electric) and WGL (gas) each filed climate plans, with conflicting visions and associated actions
    - Pepco proposed an electrification-focused approach, including utility make-ready investments
    - WGL proposed an approach with gas heat pumps, hybrid/dual-fuel heating, and renewable/non-fossil gas
      - Includes sketch of proposal for gas utility cost recovery from all energy users, to “recoup the avoided cost of overbuilding peak electricity and associated storage from electric utilities, which is made possible by gas service.”
  - DCPSC considering the near-term plans, long-term visions/plans, and associated regulatory actions needed
- DC Sustainable Energy Utility, which runs ratepayer-funded EE programs:
  - “[I]n preparation for FY 2022 and beyond, in August the DCSEU announced it would no longer be offering rebates on natural gas heating equipment and raised rebates on electric heat pumps and heat pump water heaters as the District seeks to decarbonize” (DCSEU *2021 Annual Report*).

Oregon

- Climate Protection Program (CPP), starting in 2022, sets a declining cap on emissions from each gas utility, falling to 80% below 2017-19 average emissions by 2050
- Natural Gas Fact Finding proceeding (UM 2178)
  - "analyze the *potential natural gas utility bill impacts* that may result from limiting GHG emissions of regulated natural gas utilities under the [CPP] and to *identify appropriate regulatory tools* to mitigate potential customer impacts" (emphasis added)
  - Process with multiple workshops and scenario analysis
  - Findings include:
    - Momentum increasing for both limiting gas expansion <u>and</u> gas supply innovations
    - Costs and risks to gas customers range from manageable to rather substantial
    - CPP compliance issues much better understood
    - Regulatory tools are available to shape and manage policy risks (including planning, programs, and ratemaking)
    - Optimizing across the energy system required to best use all regulatory tools. Coordination will be required.

Oregon

- Senate Bill 98, enacted in 2019, allows gas utilities to procure an increasing amount of renewable natural gas, even when it is not the least-cost resource
  - 5% through 2024, increasing by 5% every 5 years, to 30% for 2045-2050
- Line extension changes
  - In a recent Northwest Natural rate case, the PUC ordered the Line Extension Allowance to be reduced from a maximum of $2,875 to $2,300, with a set trajectory for further reductions unless an intervening proceeding sets a new level
  - PUC finds “that the current methodology, which assumes customers remain on the system for 30 years with a predictable throughput, is likely too optimistic of an assumption given the changes in the industry that are identified by the parties” (Oregon PUC Order 22-388 in Docket UD 435).

California

- 2022 building energy code (“Title 24”)
  - Sets heat pumps as the baseline technology for space and water heating
  - Requires “electric-ready” buildings where they are not already all-electric
- Gas line extension allowances
  - CA Public Utilities Commission eliminated gas line extension allowances, a 10-year refundable payment option, and a 50-percent discount option, effective July 1, 2023.
- Electric rate design
  - CA electric utilities have had little to no fixed charges, and high variable rates
  - 2022 CA state budget provision requires CPUC to institute income-based fixed charges
  - Would allow lower variable rates (which could encourage electrification), and lower overall bills for low-income residents
- SoCal Edison proposed electrification programs
  - SCE has filed a proposal with the CPUC for $677 million in ratepayer program spending on incentives for heat pumps and electrical panel upgrades, with associated in-home assessments
  - Make-ready and panel upgrades would be added to rate base

Contact Info

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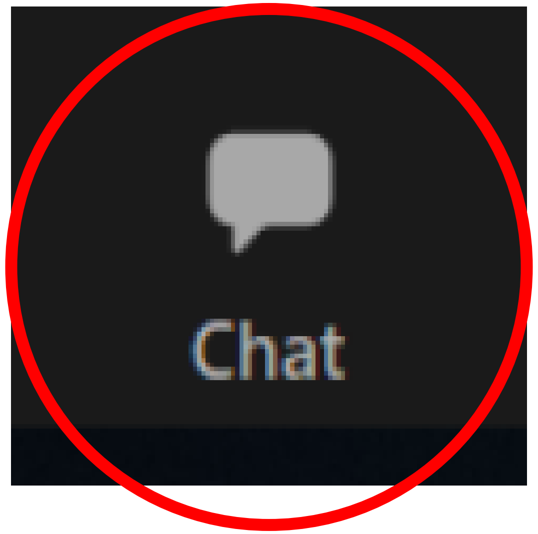
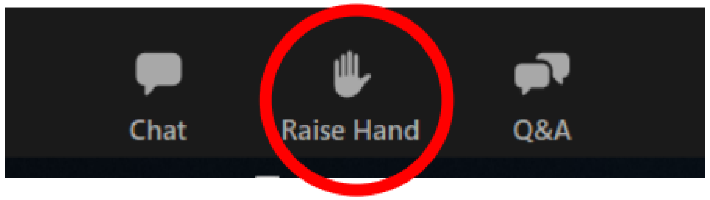
Questions

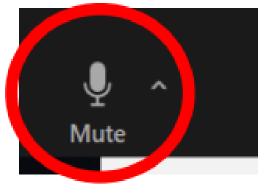


At the conclusion of each panel DEEP will hold a brief question and answer period.

If you have a question for a presenter, please drop it into the chat to **Jeff Howard**. DEEP will pose as many questions as time allows to the speakers. Clarifying questions will be prioritized. Leading questions will not be accepted.

Public Comments





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If you would like to make a comment during the public comment periods:

- Please use the “Raise Hand” feature if you would like to speak
- After any interested elected officials have provided their comments, you will be invited to provide your comment in the order the hands were raised
- Please unmute yourself, state your name and affiliation
- Given time limitations, please limit your comment to 2 minutes.
- After your comments, please remember to click the “Mute” button

General Public Comment

BUREAU OF ENERGY AND
TECHNOLOGY POLICY

WRAP UP

Thanks for joining our technical session today!

A notice soliciting **written comments** related to this session will be posted by Monday. All written comments related to the Comprehensive Energy Strategy can be submitted to:

1. BETP's Energy Filings web page – or –
2. Via email to DEEP.EnergyBureau@ct.gov

All information on upcoming Comprehensive Energy Strategy technical sessions and written comment opportunities can be found on the CES webpage

This slide deck and a recording of this session will be posted on the CES webpage

Written Comments related to this technical session will be due

Friday, January 6, 2023, at 5:00 p.m. ET

BUREAU OF ENERGY AND TECHNOLOGY POLICY

Thank you for joining!

Questions? DEEP.EnergyBureau@ct.gov

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