



Gas Decarbonization Study Update

March 26, 2024

AGENDA

- Charlottesville Gas
- Office of Sustainability Input
- Decarbonization Study and Timeline
- Residential Survey
- Legal Review
- Environmental Stewardship Approach
- Energy Efficiency Evaluation
- Methane Leak Assessment
- Emerging Technologies & Applications
- FY25 Recommendations

CHARLOTTESVILLE GAS

- **City-owned gas system** - one of three municipal natural gas utilities in Virginia
- **Gas operation established in 1876**



21,050
CUSTOMERS
SERVED



11,700
IN THE
CITY



9,350
IN THE
COUNTY



18,700
RESIDENTIAL



2,334
COMMERCIAL



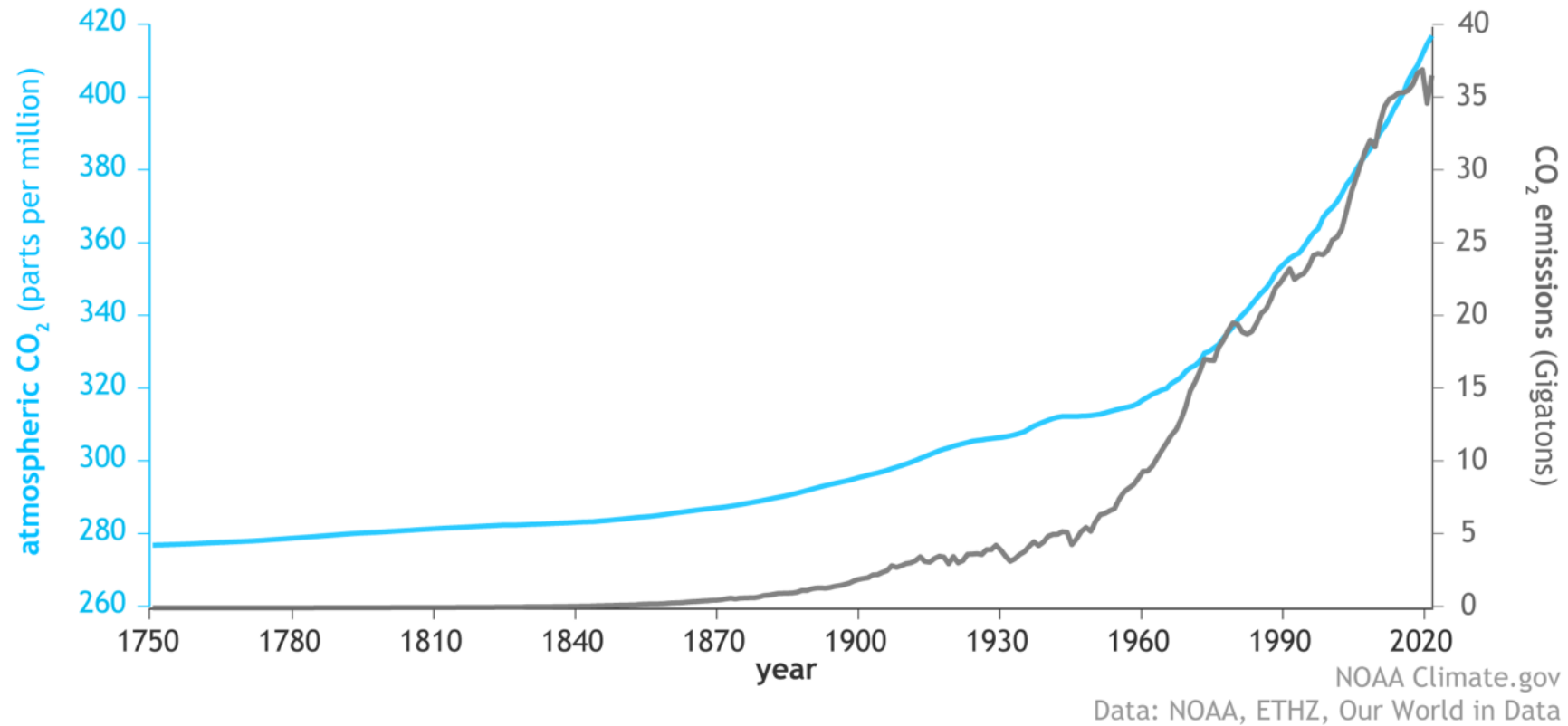
16
INDUSTRIAL

Office of Sustainability Input

Climate, Natural Gas, and the Community

GLOBAL CLIMATE CONTEXT

Atmospheric carbon dioxide amounts and annual global emissions (1750 – 2021)



GLOBAL CLIMATE CONTEXT

Headline Statements from the most recent Intergovernmental Panel on Climate Change (IPCC) Report:

- Human-caused climate change is already affecting many weather and climate extremes in every region across the globe...has led to widespread adverse impacts and related losses and damages to nature and people.
- Continued greenhouse gas emissions will lead to increasing global warming. Every increment of global warming will intensify multiple and concurrent hazards.
- Limiting human-caused global warming requires net-zero CO₂ emissions.
- All global modeled pathways that limit warming involve rapid and deep and, in most cases, immediate greenhouse gas emissions reductions in all sectors this decade.

Key Takeaway from the 5th National Climate Assessment (2023):

- All the science says we need to decarbonize rapidly and stop burning fossil fuels.

2023 Global Conference of Parties (COP28) Call:

- Transitioning away from fossil fuels in energy systems, in a just, orderly, and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science.

LOCAL CLIMATE CONTEXT

Charlottesville's Greenhouse Gas Emissions are approximately:

95%

Community

5%

Municipal

RESIDENTIAL GHG

30%



COMMERCIAL GHG

30%



TRANSPORTATION GHG

30%



WASTE GHG

5%



LOCAL CLIMATE CONTEXT

- 2019 – Charlottesville adopted climate goals of 45% reduction by 2030 and carbon neutrality by 2050
- 2023 – Charlottesville adopts the Community Climate Action Plan

From Chapter 7 of the Climate Action Plan:

Strategy: Promote energy efficiency programs and continue to explore avenues to reduce natural gas consumption, meet carbon neutrality goals, and mitigate climate change.

Key Action: Complete the Decarbonization of Gas Utility Study and share results of the study with City Council

Key Action: Work with BP to better understand its carbon offset program, evaluate its reliability, and be able to compare its benefits to other emissions reduction actions

Key Action: Consider a commitment to make Charlottesville Gas fully carbon neutral – throughout its service territory – by 2050

Key Action: Review the Gas Main Extension Policy for opportunities to align with climate action commitments

Key Action: Evaluate additional funding and enhancements for energy efficiency property upgrade rebates and the Charlottesville Gas Energy Efficiency Program (CGEEP)

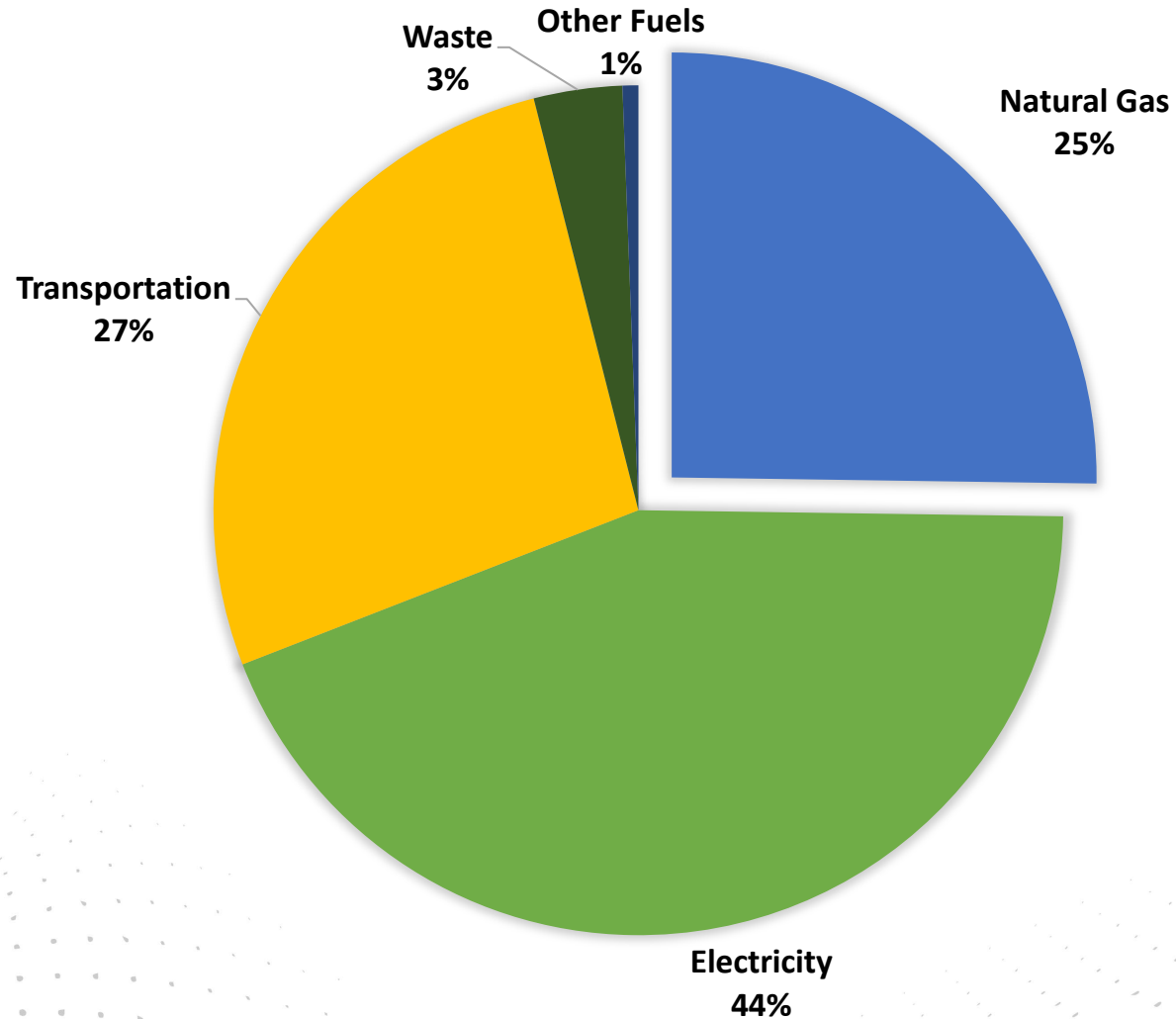
Key Action: Evaluation of a carbon fee for gas customers



CHARLOTTESVILLE
Acting on Climate Together

GAS USAGE IN A COMMUNITY CONTEXT

- 25% of Charlottesville's current emissions come from gas usage
- Electricity supply will be zero-carbon by 2045 in Dominion territory under Virginia Clean Economy Act
- Transportation decarbonization accelerated by Advanced Clean Cars 2, in combination with VCEA
- Gas usage is last remaining large wedge, no legislative guidance on decarbonizing this sector



ADVOCACY COMMUNITY INPUT

Concerns/Topics received over the past 2+ years include:

- Health effects of gas stoves
- Carbon tax or fee
- Electrification
- Community solar
- Redirect carbon offset funding to local energy improvements
- Eliminate no-cost installation of gas connection / lines
- Shrinking customer base and burden of infrastructure maintenance
- Pending disconnection of gas service
- Public component to the study
- Existing gas system's fugitive methane emissions

ADVOCACY COMMUNITY INPUT

Community Climate Collaborative (C3) - recent blog series

- Is Charlottesville on Track to Decarbonize?
 - Entire gas service territory should be included, not just customers within the City limits
- What's Driving Natural Gas Use?
 - Include UVA and their decarbonization goals
 - Determine rapidly growing use categories and develop targeted reduction strategies
 - Understand drivers of the Utility's expansion & analyze the legality of stopping expansion
 - Study residential gas use patterns to determine households that are “low hanging fruit” for energy efficiency and electrification, especially LI households
- Why is Gas Leaking and Who's Affected?
 - Research best practices
 - Forecast leak reductions when the last remaining cast iron pipes is replaced
 - Conduct an in-depth analysis of the geographic distribution of leaks to understand and address inequitable exposure to leaks
 - Calculate and create mechanisms for regularly reporting the cost of leaks to Charlottesville Gas ratepayers
 - Include community engagement throughout the study process

“The Charlottesville Gas decarbonization study is an excellent opportunity to compile and create more data, analyze it meaningfully, and develop actionable solutions.”

OFFICE OF SUSTAINABILITY INVOLVEMENT

- Provided input on the RFP development
- Part of the project team
- Responding to data requests
- Reviewing/commenting on deliverables
- Conducting related research
- Studying the various strategies being explored
- Bringing global and local climate lens to this work
- Participating in community engagement (initiated)

Decarbonization Study and Timeline

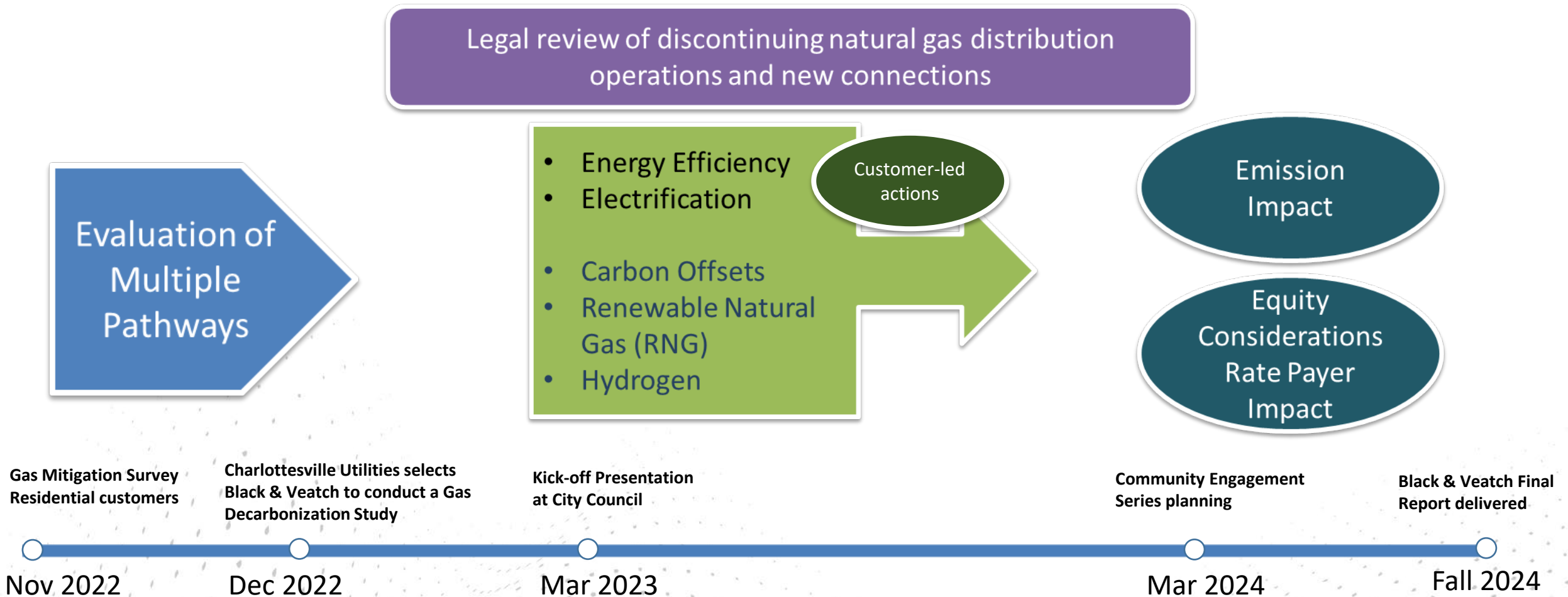
Residential Survey

Legal Review

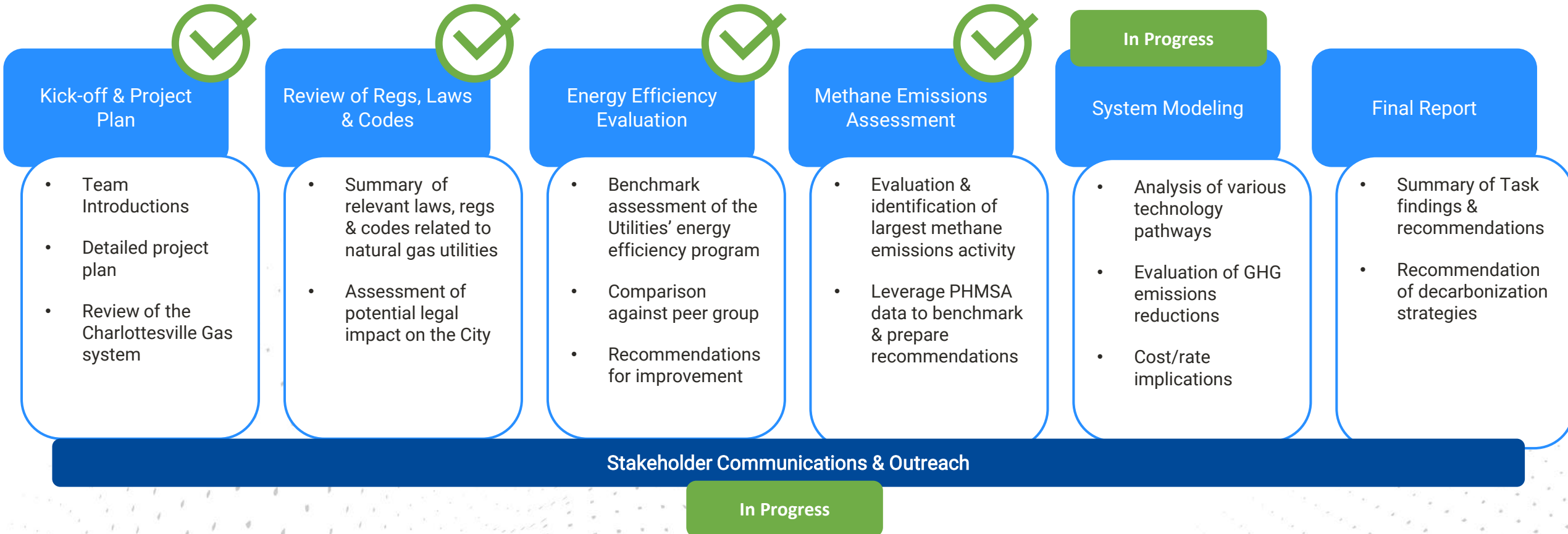
Data Collection and Key Trends

DECARBONIZATION STUDY

Timeline

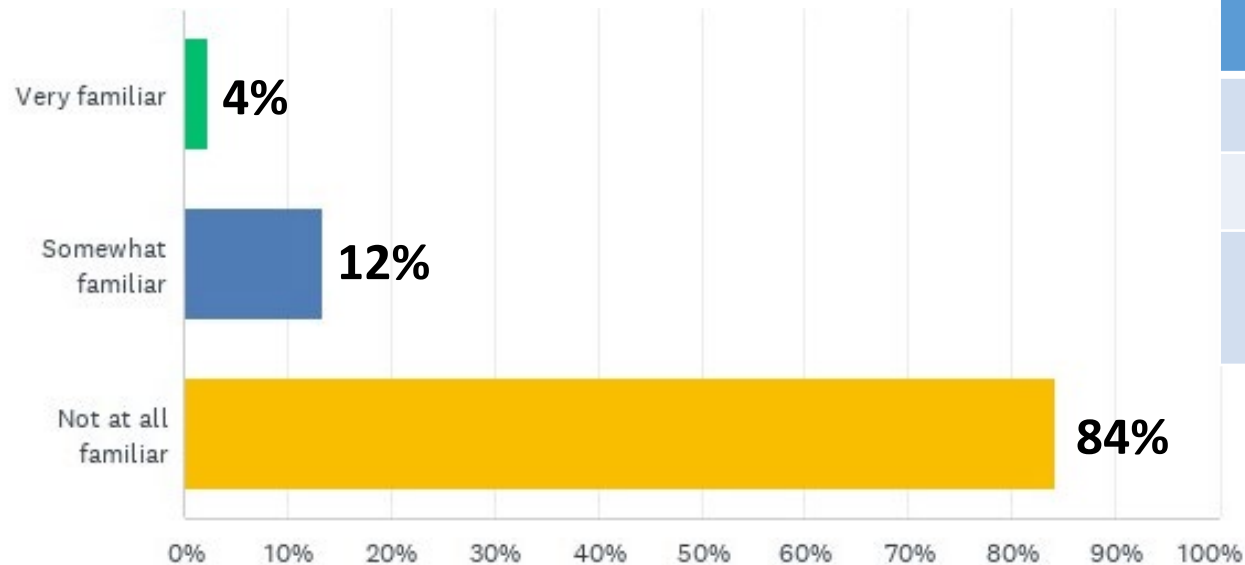


DECARBONIZATION STUDY



PUBLIC ENGAGEMENT

How familiar were you with Charlottesville Utilities' Decarbonization Study?*



Date	Public Engagement
November 2022	Residential Survey
March 2024	Business Focus Group
Spring-Summer 2024	Community Listening Sessions (Virtual and in-person)

* Department of Utilities Customer Satisfaction Survey - Survey Monkey - February 2024

RESIDENTIAL SURVEY

Introduction

- UVA's Center for Survey Research (CSR) surveyed the Charlottesville community to understand views toward natural gas and sustainability goals
- 303 BeHeardCVA panelists participated (49% Albemarle and 51% Charlottesville residents)
- Survey results have been weighted to align more closely with the demographic composition of the local population

Do you usually think of yourself as a Republican, a Democrat, an Independent, or Other?

F3	N	Percent
Republican	12	5%
Democrat	133	51%
Independent	90	34%
Other	25	10%

Which of the following best describes the status of your primary home?

A1	N	Percent
I have natural gas service at my home	139	46%
There is natural gas service on my street, but I am not a customer	36	12%
There is no natural gas service available on my street	67	22%
I'm not sure if there is natural gas service on my street or not	61	20%

46% gas customers

www.coopercenter.org/beheardcva-results



RESIDENTIAL SURVEY

Lessons Learned – Conflicting Views

How important is it to have natural gas available to your home?*

A2	N	Percent
Extremely important	70	51%
Very important	39	28%
Somewhat important	24	17%
Not at all important	5	4%

96%

In my view, global climate change is...*

A11	N	Percent
A very serious problem	114	84%
Somewhat serious	13	10%
Not too serious	6	4%
Not a problem	2	2%

94%

*Gas Customers

RESIDENTIAL SURVEY

Lessons Learned – Existing Energy-Efficiency Programs

How familiar are you with the Attic Insulation Rebate Program? (Homeowners)

B2	N	Percent
Familiar and I have applied for the rebate in the past	42	24%
Familiar but I have not applied for the rebate	14	8%
Not at all familiar	116	68%

How familiar are you with the Programmable Thermostat Rebate Program? (Homeowners)

B4	N	Percent
Familiar and I have applied for the rebate in the past	20	12%
Familiar but I have not applied for the rebate	53	31%
Not at all familiar	97	57%

How familiar are you with the Free Home Weatherization Program?

B6	N	Percent
Familiar and I have already participated in the program	12	4%
Familiar but I don't meet the requirements	111	38%
Familiar but I don't know if I meet the requirements	23	8%
Familiar and I meet the requirements, I haven't participated yet	1	1%
Not at all familiar	143	49%

Low awareness of our current energy efficiency programs

RESIDENTIAL SURVEY

Lessons Learned – Existing Programs

Support for existing
carbon offset program

I believe the carbon offset program should be...

C3	N	Percent
Greatly expanded	119	43%
Slightly expanded	77	28%
Should continue as is	34	12%
Slightly reduced	6	2%
Greatly reduced	9	3%
Completely eliminated	32	12%

83%

RESIDENTIAL SURVEY

Lessons Learned – Electrification

How likely would you be to voluntarily convert all your gas appliances to electric ones in the next 10 years? (Gas Customers)

D2	N	Percent
Very likely	19	17%
Somewhat likely	19	17%
Neither likely nor unlikely	15	13%
Somewhat unlikely	17	15%
Very unlikely	44	39%

What would be the barriers to converting your appliances to electric? Please select all that apply.*

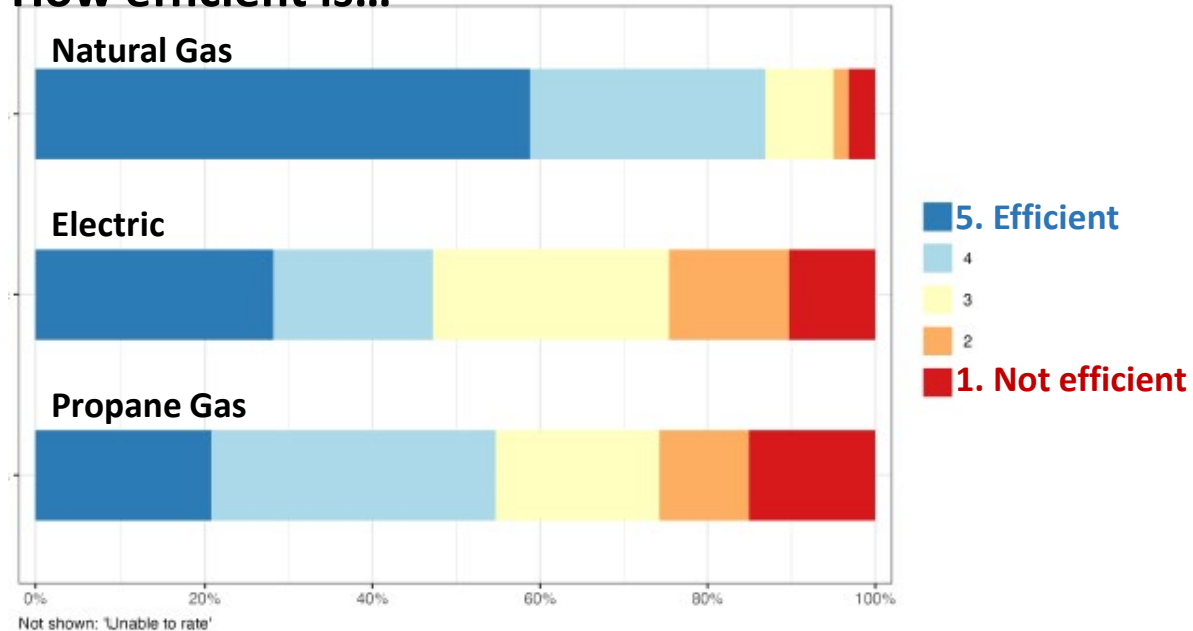
D3*	N	Percent
Cost of new appliances/equipment	41	68%
Prefer natural gas appliances/equipment	38	63%
Reliability of the electric grid	37	61%
Price of electricity	30	49%
Cost of upgrading my home's electric supply	26	42%
Other	10	17%

*Note: This question was only asked of respondents who indicated (in response to Question D2) that they were unlikely to convert their appliances to electric.

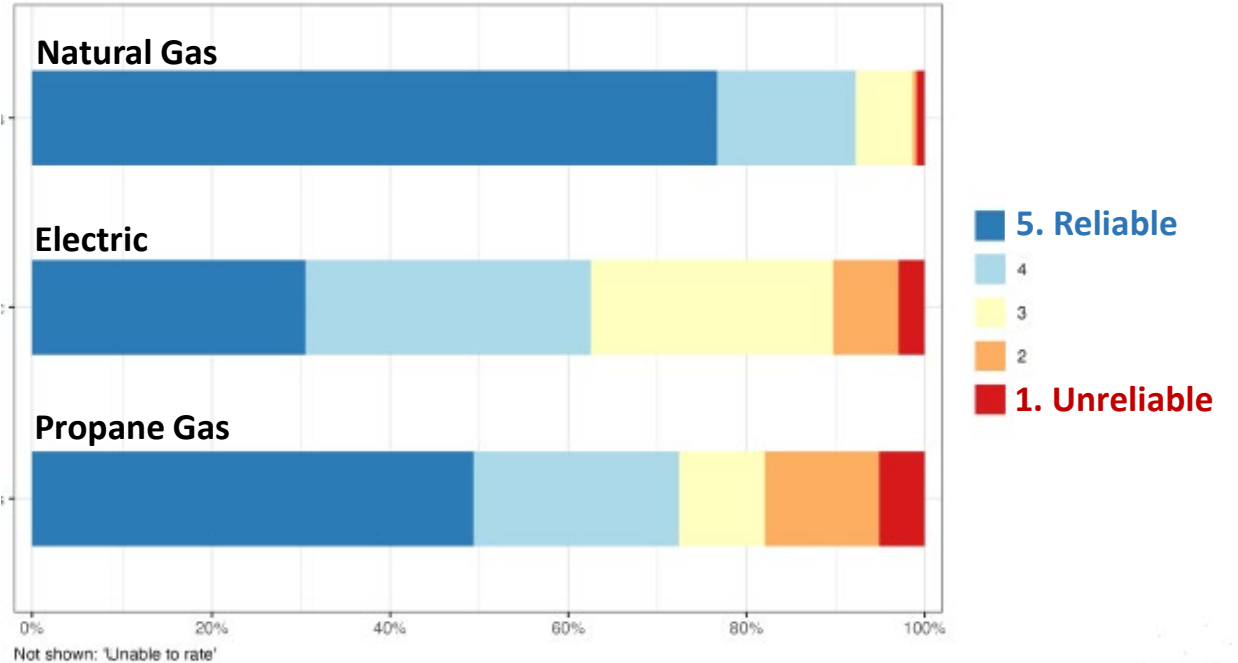
RESIDENTIAL SURVEY

Lessons Learned – Respondents Fuel Ratings

How efficient is...



How reliable is...

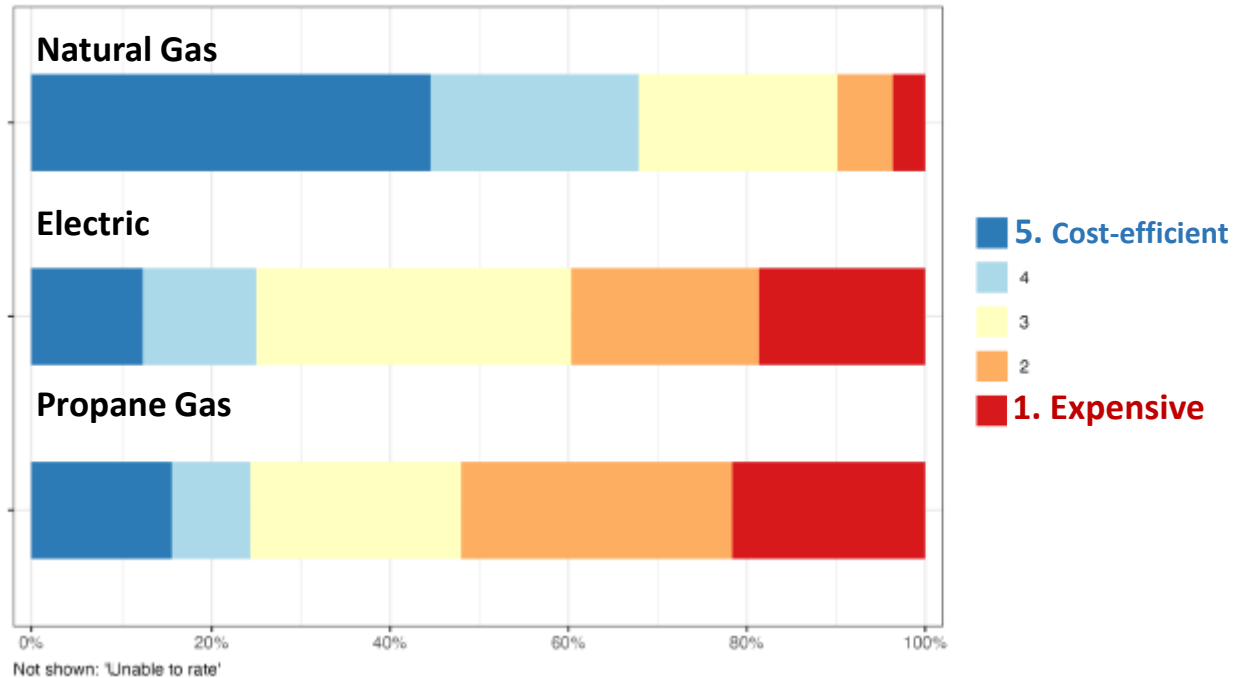


This data is from the Gas Mitigation Survey participant's ratings of different fuel sources (including gas and non-gas customers)

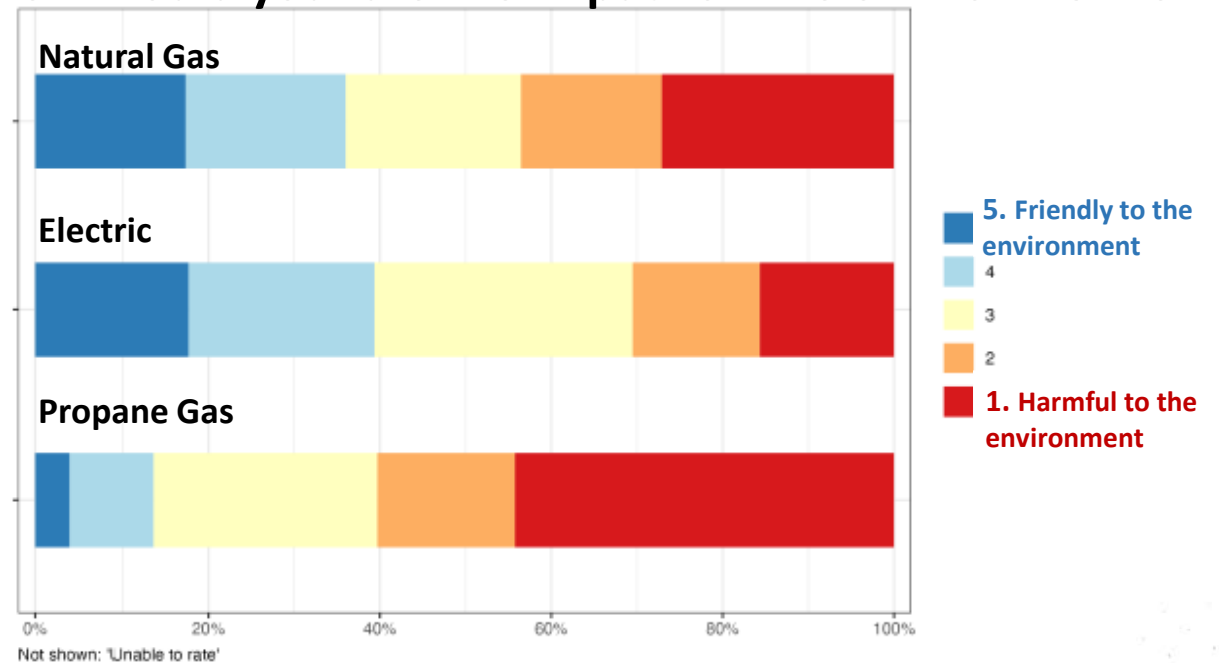
RESIDENTIAL SURVEY

Lessons Learned – Respondents Fuel Ratings

How cost-efficient is...



How would you rate the impact on the environment of...



This data is from the Gas Mitigation Survey participant's ratings of different fuel sources (including gas and non-gas customers)

LEGAL REVIEW

Decommissioning of natural gas operations

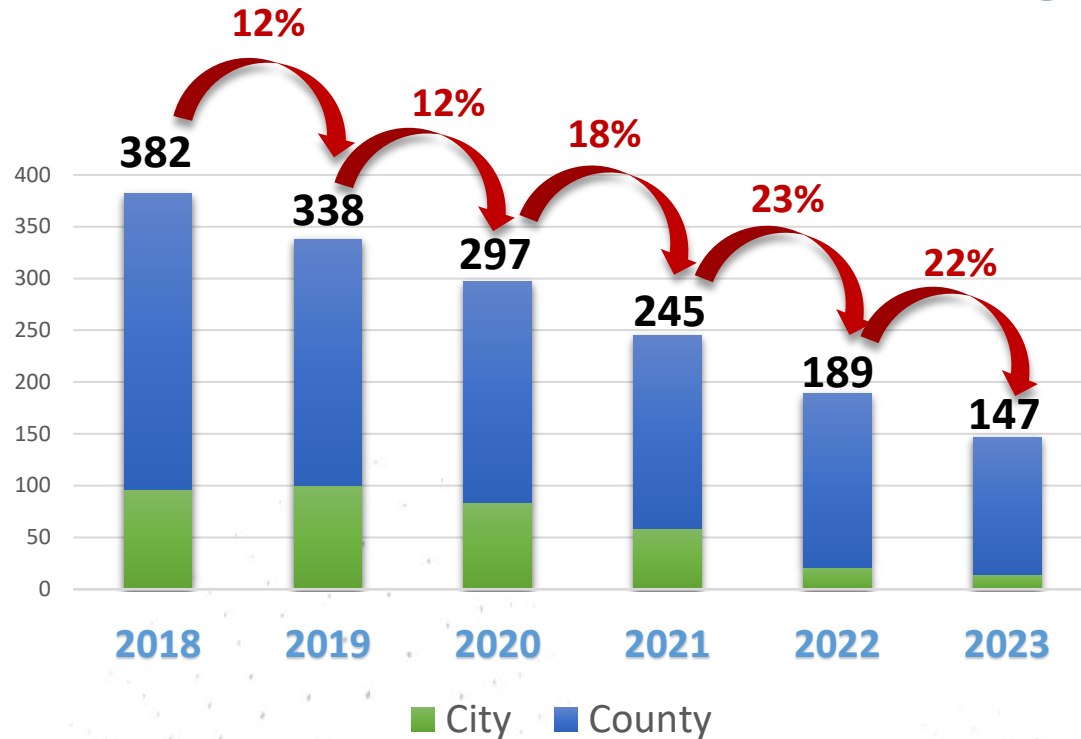
- City Charter
 - ✓ Council super majority vote (4 out of 5 councilors)
 - ✓ Public referendum
- and
- 2022 State law: 56-265.4:7
 - ✓ Bipartisan (conference amendments)
 - ✓ “Natural gas customer protection” bill
 - ✓ Clear path to transfer ownership to private gas company

Natural gas new connection ban

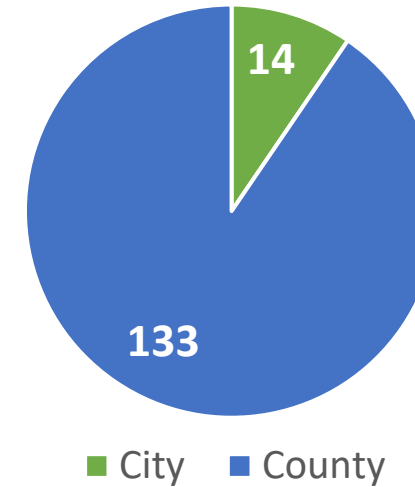
- Dillon Rule - powers have to be expressly granted to localities by the state
- No city in Virginia has implemented new gas connection ban
- New connection bans are being challenged in other states (Berkeley, CA ruling)
- Requires changing of City Code
- Natural decline in requests for new connections

GAS INSTALLATION TREND

Decline in new gas connection requests



62% decline in new gas connection requests from 2018 to 2023



Gas Connection Requests in the City in 2023

6	Commercial customers
1	Existing residential customer (pool heater)
7	New homes (no heating load – tankless water heater /fireplace/range/generator)

Environmental Stewardship Approach

What We Are Doing

ENVIRONMENTAL STEWARDSHIP APPROACH

Current Programs

Carbon Emission Reduction Initiatives

- Energy Efficiency Programs
Rebates & Free Home Weatherization



Carbon Capture Program

- Arbor Day Energy Saving-Trees Program



Carbon Offsets

- 25% of Natural Gas Emissions



ENVIRONMENTAL STEWARDSHIP APPROACH

Carbon Emission Reduction Initiatives



Programmable Thermostat

\$100 Rebate

2,279 rebates redeemed since 2001

Utility Investment: \$206,000



Tankless Water Heater

\$200 Rebate

122 rebates redeemed since 2015

Utility Investment: \$24,000

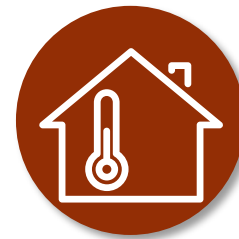


Attic Insulation

\$300 Rebate

48 rebates redeemed since 2020

Utility Investment: \$13,000



Charlottesville Gas Energy Efficiency Program

Partnership with LEAP

179 participants since 2019

20% average reduction in gas consumption during the winter months

Utility Investment: \$221,000

QUALIFYING INCOME LEVELS AT OR BELOW:

Family of 1	Family of 2	Family of 3	Family of 4	Family of 5	Family of 6
\$62,200	\$71,050	\$79,950	\$88,800	\$95,950	\$103,050

QUALIFYING INCOME LEVELS IF THE ACCOUNT HOLDER IS 60 OR OLDER

Family of 1	Family of 2
\$75,584	\$98,842

ENVIRONMENTAL STEWARDSHIP APPROACH

Carbon Capture Program



FREE TREES

PLANT A TREE TODAY.
Enjoy benefits that last a lifetime.

Charlotteville Utilities, in partnership with the Arbor Day Foundation's Energy-Saving Trees® program, is offering a limited number of FREE trees to customers beginning March 4.

By planting the right tree in the right place, you can reduce energy consumption by up to 20% each year. But the benefits don't stop there. Trees improve air and water quality, help relieve stress, and make yards more enjoyable.

- Trees help clean our water by reducing stormwater runoff and keeping chemicals, oil, and pollutants out of water supplies.
- Studies have shown that children and youth living in greener neighborhoods are calmer and healthier.
- Trees absorb carbon dioxide and filter airborne pollution.

Beginning March 4, reserve your free tree at www.arborday.org/Charlotteville

ENERGY-SAVING TREES
An Arbor Day Foundation Program

Utilities
City of Charlottesville



Results Spring 2022 and 2023



450
TREES PLANTED



\$22,500
INVESTED



1,325,480 lbs
CARBON SEQUESTERED/
AVOIDED*



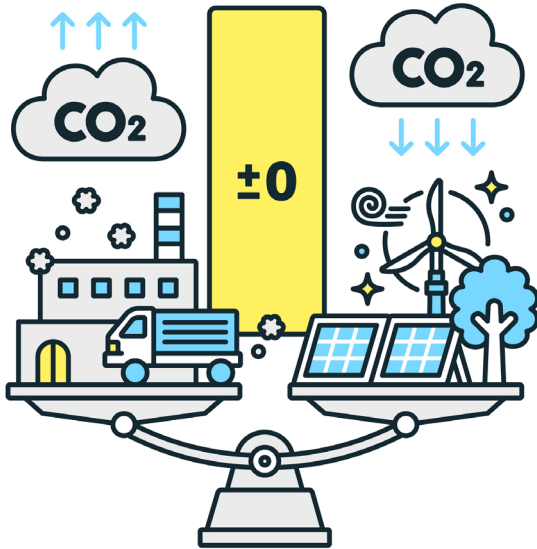
\$160,398
IN COMBINED ENERGY
AND COMMUNITY BENEFITS*

* Projected 20-year cumulative values
Information provided by the Arbor Day Foundation



ENVIRONMENTAL STEWARDSHIP APPROACH

Carbon Offsets



Carbon offsetting is a reduction of GHG emissions to make up for emissions that occur elsewhere

- Presented to City Council June 2021
- 5-year contract executed November 2021
- Equivalent of 25% of gas system emissions

ADDITIONAL

Incremented to what would have happened without the offset

VERIFIABLE

By a qualified independent third party

REAL

Represent GHG reductions in metric tons of CO2e that can be reliably estimated

ELIGIBILITY & VERIFICATION

PERMANENT

Any reversal should be accounted for and compensated

Projects can use both nature-based and technology-based methods to remove or prevent carbon emissions, such as sustainable forest management in Tennessee and the installation of solar energy power plants in India.

Energy Efficiency Evaluation Methane Leak Assessment *Peer Benchmarking*

ENERGY EFFICIENCY EVALUATION

Regional Peer Group Comparison

Operator Name	State	Miles of Distribution Mains	Number of Services	Services per Mile of Mains
City of Charlottesville	VA	339	20,594	60.82
Lake Apopka Natural Gas District	FL	984	28,514	28.98
Greater Dickson Gas Authority	TN	846	19,658	23.24
Powell Clinch Utility District	TN	845	18,162	21.49
Elk River Public Utility District	TN	796	21,297	26.79
Clinton-Newberry Natural Gas Authority	TN	786	17,626	22.42
Greenville Utilities Commission*	NC	750	26,279	35.02
Gibson County Utility District	TN	640	12,712	19.86
Chester County Natural Gas Authority	SC	604	10,117	16.76
City of Rocky Mount Municipal System*	NC	559	19,545	34.99
City of Lexington Gas Department*	NC	518	12,218	23.59
City of Shelby Gas Department*	NC	511	10,719	20.99
City of Monroe Gas Department*	NC	471	13,507	28.67
Albany Water Gas & Light Commission*	GA	420	16,748	39.88
City of Wilson Gas Department*	NC	409	15,144	37.03
Orangeburg Public Utilities	SC	399	10,038	25.16
City of Cartersville Gas Department*	GA	360	11,561	32.08
Fountain Inn Natural Gas System	SC	351	11,683	33.31
City of Leesburg*	FL	349	16,504	47.26
Warner Robins Gas System	GA	343	13,194	38.44
City of Danville*	VA	339	16,047	47.40
City of Sugar Hill Natural Gas System	GA	195	12,174	62.41
Average		537	16,093	29.97



The peer group represents 21 similarly-sized municipal gas utilities in the Mid & South Atlantic



The same peer group used in the Methane Assessment

NOTE: Utilities with an (*) denote those with electric service in addition to gas service.

ENERGY EFFICIENCY EVALUATION

Gas-Only Utility Rebates

	Cooking	Space Heating	Water Heating	Building Envelope	Other (Dryer, Generator, etc.)
City of Charlottesville		\$100 Thermostat	\$200 Electric or Gas	\$300 Attic Insulation	
Lake Apopka Natural Gas District	\$50-100	\$50-300 Fireplace or Furnace	\$100-300		\$100
Powell Clinch Utility District		\$400 Furnace	\$250		
Elk River, TN Public Utility District	\$100	\$150-600	\$100-400		\$100
Clinton Newberry Natural Gas Authority			\$100	\$100	
Gibson County, TN Utility District		Free Service Line	\$350		
Chester County, SC Natural Gas Authority		\$50-150 Fireplace or Furnace	\$100-150		
Orangeburg, SC Public Utilities	\$150	\$250 Fireplace or Furnace	\$200-250		\$100-250 Dryer or Gas light
Warner Robins, GA Gas System	\$50	\$150 Furnace	\$200		\$50

Key Takeaways



Many rebates focus on increasing natural gas usage via conversion from other fuels



Rebates for new gas appliances are beneficial, as new gas appliances are more efficient than old gas appliances

ENERGY EFFICIENCY EVALUATION

Rebate Comparison

	Cooking	Space Heating	Water Heating	Building Envelope	Other (Dryer, etc.)
City of Charlottesville		✓	✓	✓	
Lake Apopka Natural Gas District	✓	✓	✓		
Greater Dickson Gas Authority					
Powell Clinch Utility District		✓	✓		✓
Elk River, TN Public Utility District	✓	✓	✓		✓
Clinton Newberry Natural Gas Authority			✓		✓
Greenville, NC Utilities Commission*		✓			
Gibson County, TN Utility District		✓	✓		
Chester County, SC Natural Gas Authority		✓	✓		
City of Rocky Mount, NC Municipal System*	✓	✓	✓	✓	✓
City of Lexington, NC Gas Department*	✓	✓	✓		✓
City of Shelby, NC Gas Department*	✓	✓	✓		✓
City of Monroe, NC Gas Department*		✓	✓		
Albany, GA Water Gas & Light Commission*		0% Loan Program			
City of Wilson, NC Gas Department*					
Orangeburg, SC Public Utilities	✓	✓	✓		✓
City of Cartersville, GA Gas Department*	✓	✓	✓	✓	✓
Fountain Inn, SC Natural Gas System					
City of Leesburg, FL*		✓	✓		
Warner Robins, GA Gas System	✓	✓	✓		✓
City of Danville, VA*	✓	✓	✓	✓	✓
City of Sugar Hill, GA Natural Gas System					

- ✓ Gas Incentives
- ✓ Gas & Electric Incentives
- ✓ Electric Incentives Only

NOTE: Utilities with an (*) denote those with electric service in addition to gas service.



ENERGY EFFICIENCY EVALUATION

Municipal Gas Utilities in VA

	Cooking	Space Heating	Water Heating	Building Envelope	Other
Charlottesville		\$100 Thermostat	\$200 Electric or Gas	\$300 Attic Insulation	
Danville	\$100 Gas Range	\$145-200 Central AC \$350-500 Heat Pump	\$450 Gas Furnace \$1,250-1,650 Dual Fuel	\$200 Gas \$0.10-0.45/ft ² Attic, Wall, or Floor insulation	\$50-200 Gas Dryer, Gas Logs, EV Charger
Richmond	No energy efficiency incentives				

Key Takeaways



Danville offers a wide range of gas and electric rebates (dual-fuel utility)



Richmond has no publicly marketed energy efficiency incentives



Charlottesville's program is a leader among this group for income-qualifying programs, despite Richmond being a much larger city & utility

	Income-Qualified Assistance Programs
Charlottesville	✓ Charlottesville Gas Energy Efficiency Program – free home energy efficiency improvements in partnership with LEAP ✓ Local Gas Assistance Program
Danville	✓ Heating and cooling assistance funded by city and donations from partnership with local United Way
Richmond	✓ Heating assistance up to \$500 in partnership with local agencies

ENERGY EFFICIENCY EVALUATION

Decarbonization Considerations



No or Unknown Decarbonization Targets

- Municipalities in the peer group do not have climate commitments*
- Charlottesville is the only utility in the peer group pursuing a gas utility decarbonization initiative*
- Publication of Charlottesville energy-efficiency program metrics is unique in the peer group



Emphasis Remains on Natural Gas Usage

- Several utilities in the peer group offer larger rebates for new natural gas appliances
- Only two of the nine municipal gas-only utilities provide energy savings tips to reduce gas usage



Dual-fuel utilities have an advantage in efficiency solutions

- These utilities can offer rebates to incentivize fuel-switching to benefit the electric utility

*Based on information collected on the peer group from public data sources as of March 2024

ENERGY EFFICIENCY EVALUATION

Recommendations



Adjust high-efficiency appliance rebate program to encourage high-efficiency natural gas appliance technologies

- ✓ Remove any incentives for electric to gas switching



Offer more tailored incentives to target customer segments and expand eligibility of existing programs

- ✓ Expand custom rebate offerings to the residential and commercial segments
- ✓ Consider custom commercial, industrial and multifamily energy efficiency programs
- ✓ Expand partnerships with local organizations



Utilize lessons learned from large utilities in marketing and stakeholder engagement

- ✓ Expand customer engagement to promote energy efficiency
- ✓ Expand notification types and advertising periods to market and engage customers with custom insights

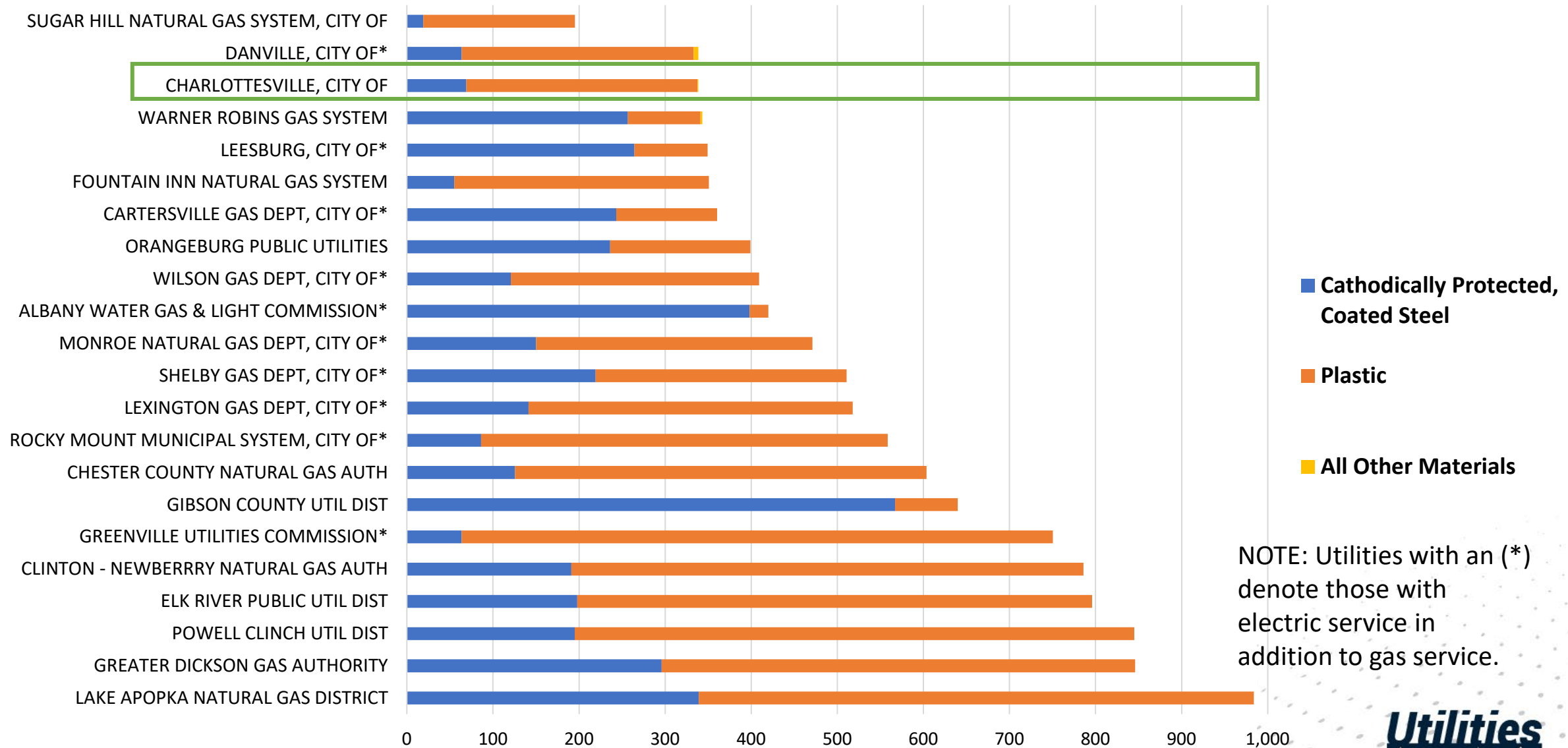


Consider expanding building envelope incentives & evaluate oil/propane to gas incentives

- ✓ Explore offering incentives that further increase building efficiency such as ductwork and other insulation rebates.

METHANE ASSESSMENT

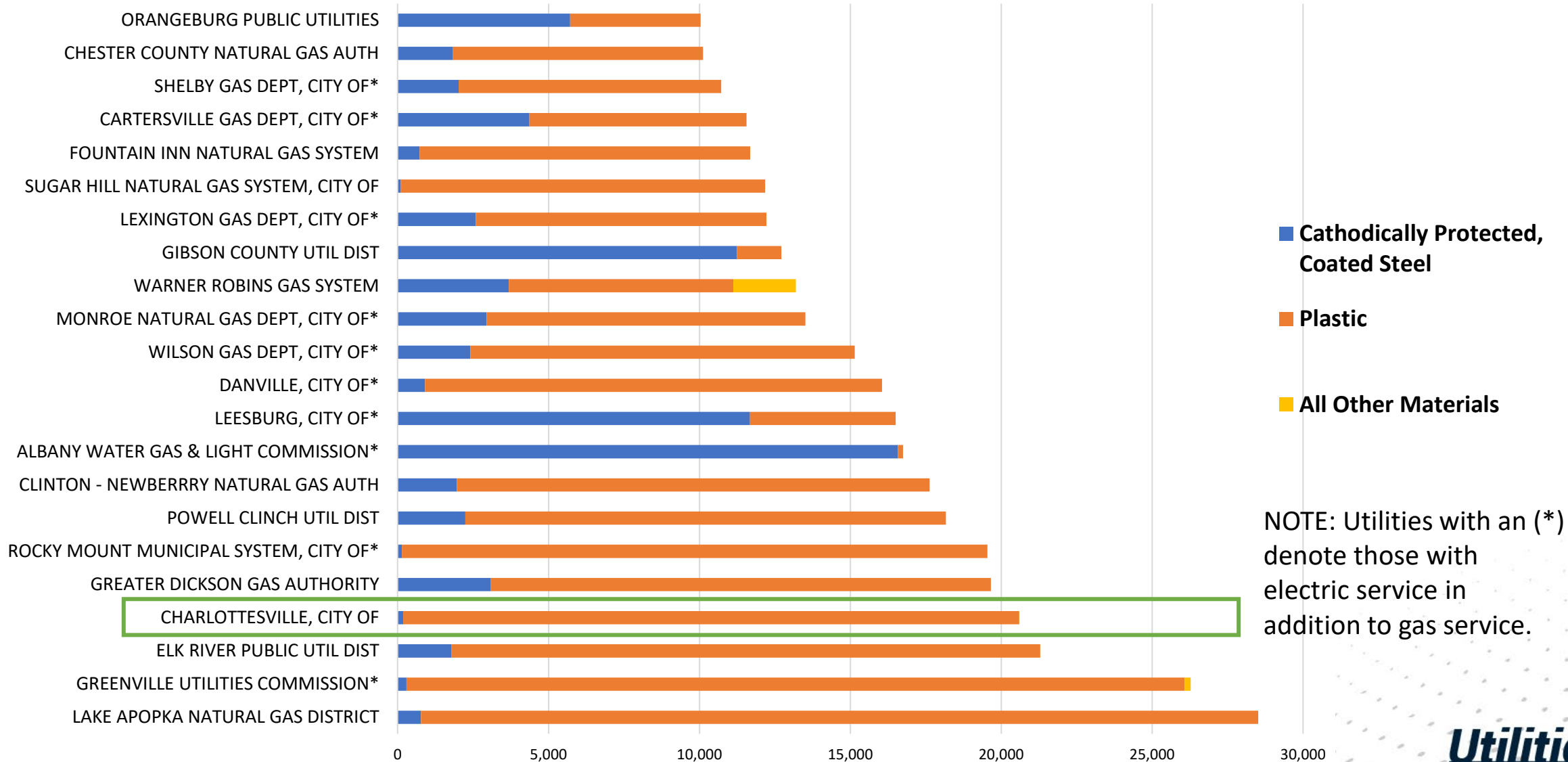
Peer Group Comparison – Distribution Mains



NOTE: Utilities with an (*) denote those with electric service in addition to gas service.

METHANE ASSESSMENT

Peer Group Comparison – Distribution Services

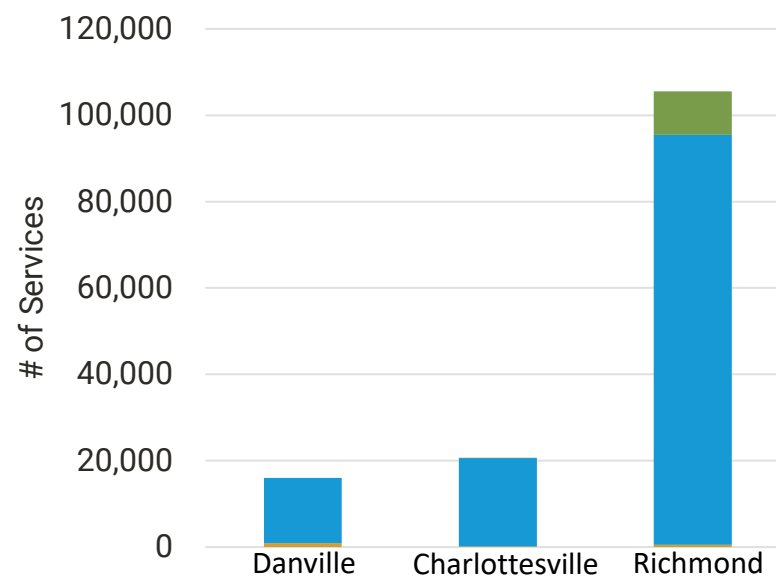
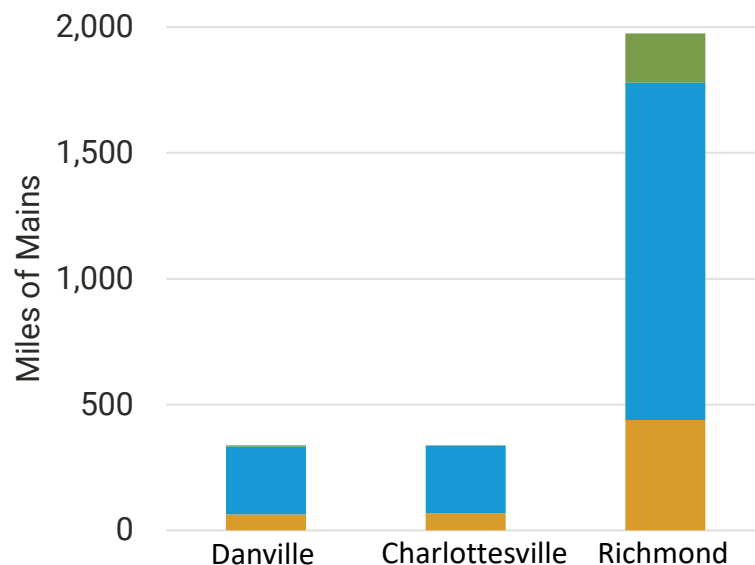


METHANE ASSESSMENT

Virginia Municipal Utilities Comparison

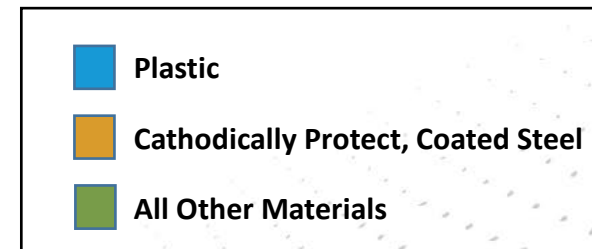
Operator Name	Miles of Distribution Mains	Number of Services	Services per Mile of Mains
Charlottesville	339	20,594	60.82
Danville*	339	16,047	47.40
Richmond	1,974	105,518	53.45

*Dual-fuel utility



Distribution System Comparison

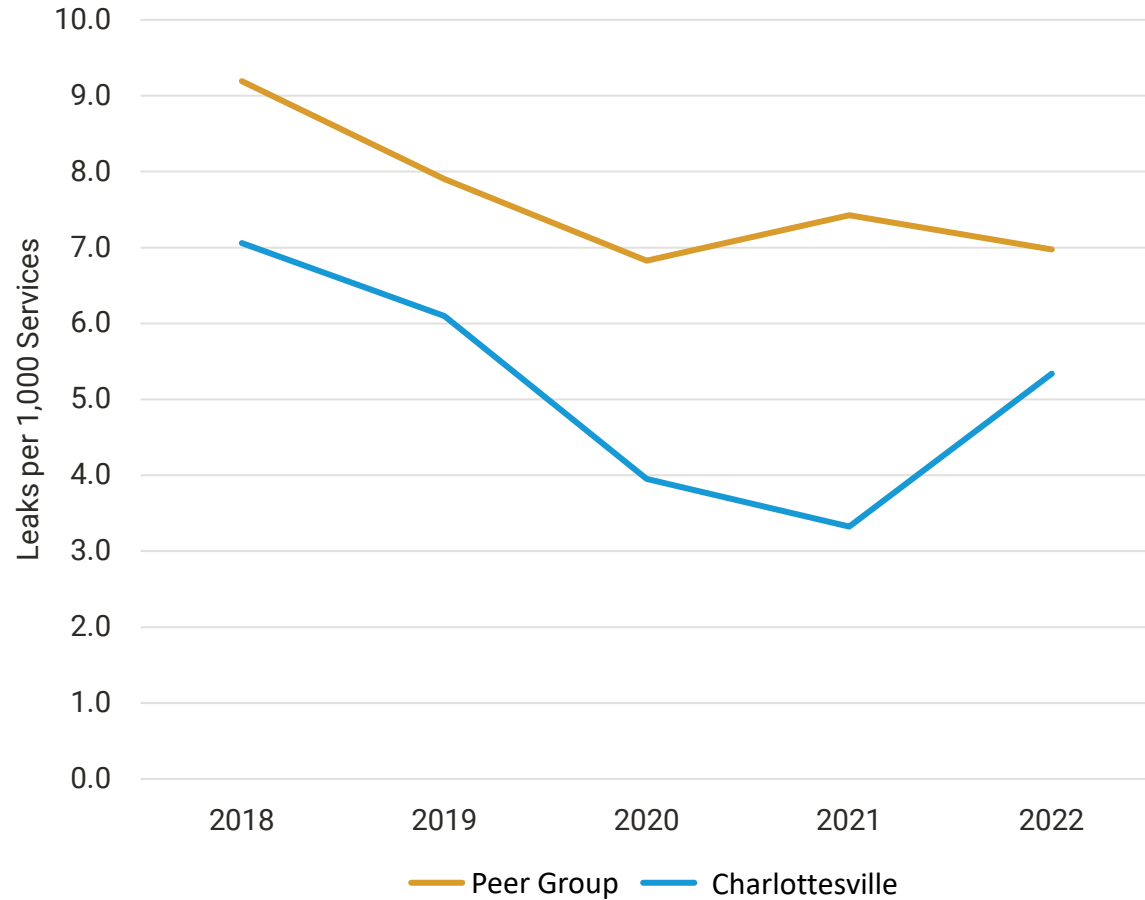
- Richmond has 6x the mileage of distribution mains and 5x the number of services as Charlottesville
- Charlottesville and Danville have a higher proportion of plastic main and service lines than Richmond
- Richmond's number of **main line leaks is over 10x** that observed for Charlottesville
- Richmond's number of **service line leaks is 4x** that of Charlottesville



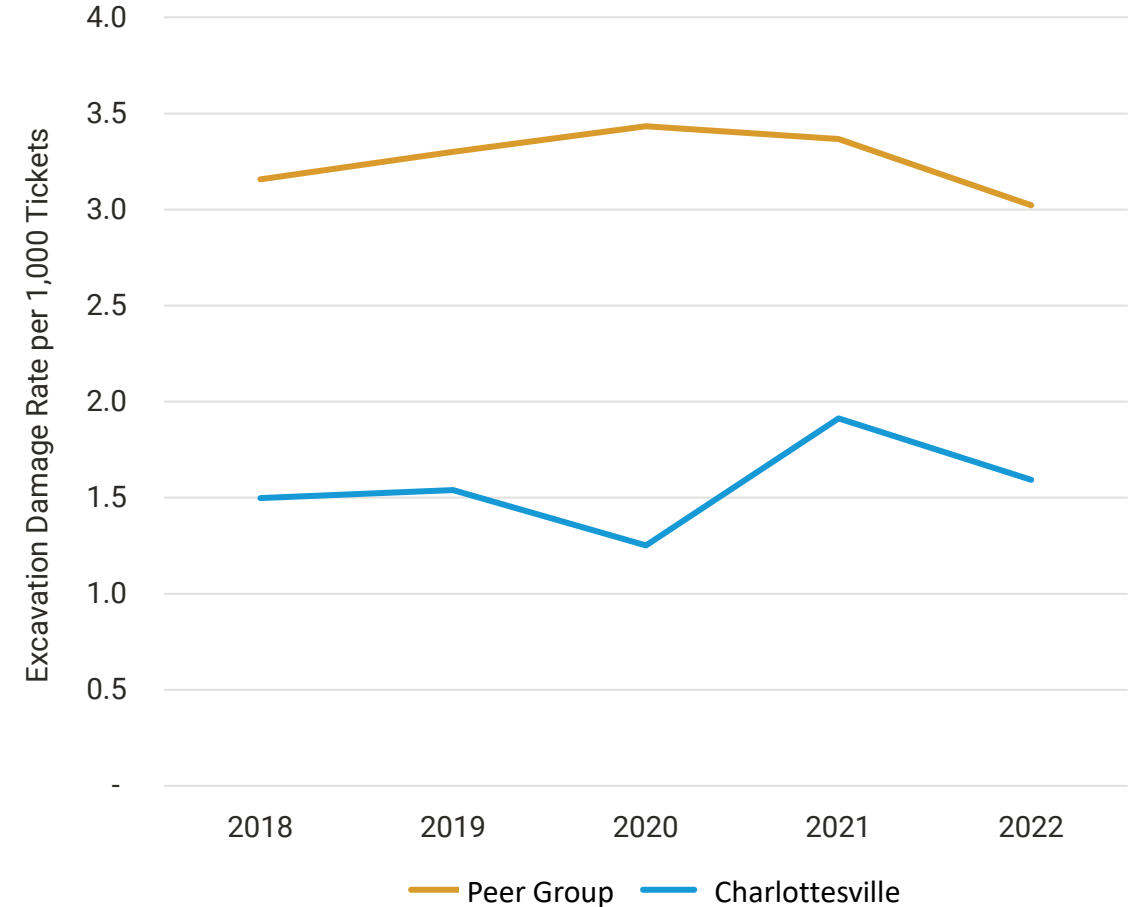
METHANE ASSESSMENT

Peer Group Comparison – Leak Rates & Damages

Services Leak Rate Comparison

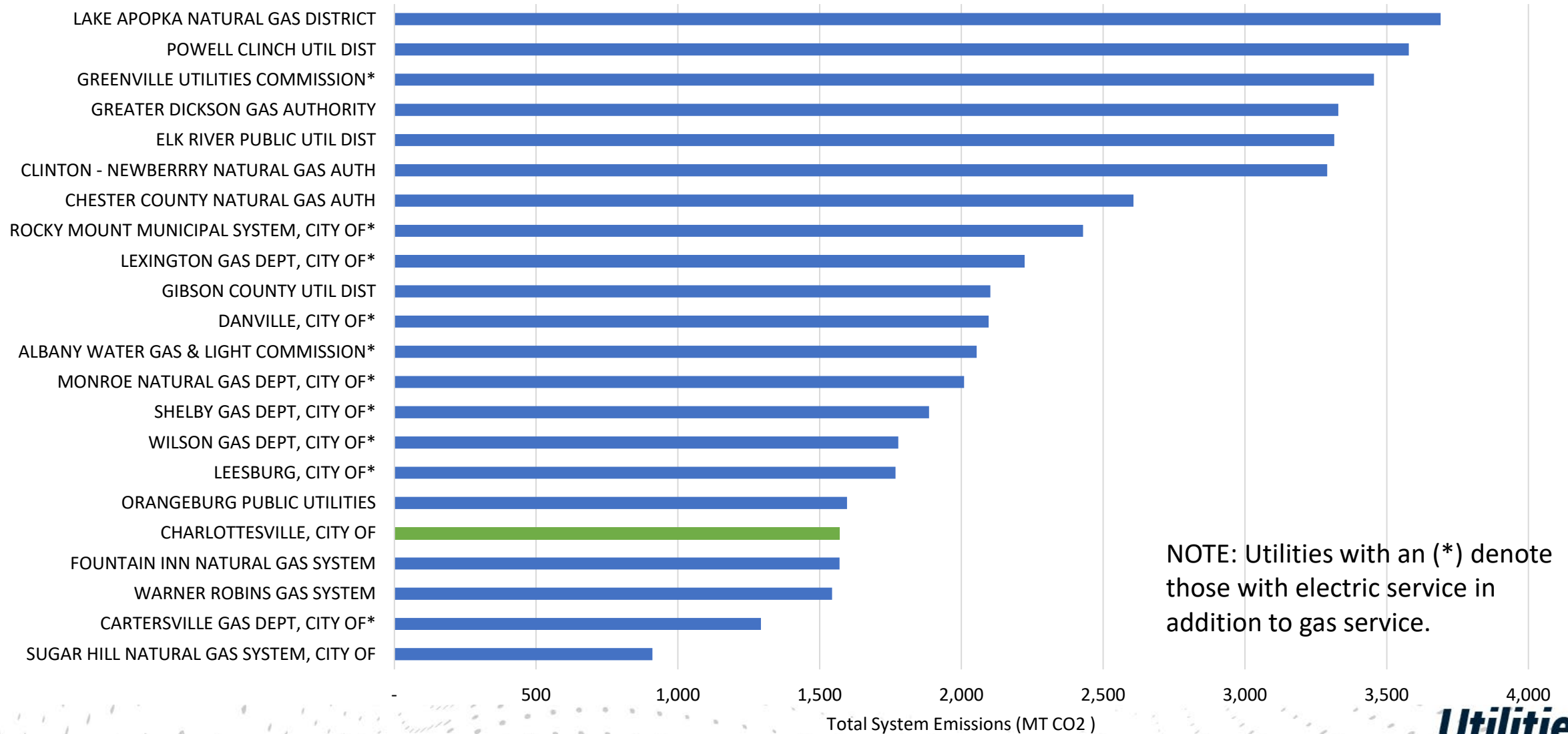


Excavation Damage Rate Comparison



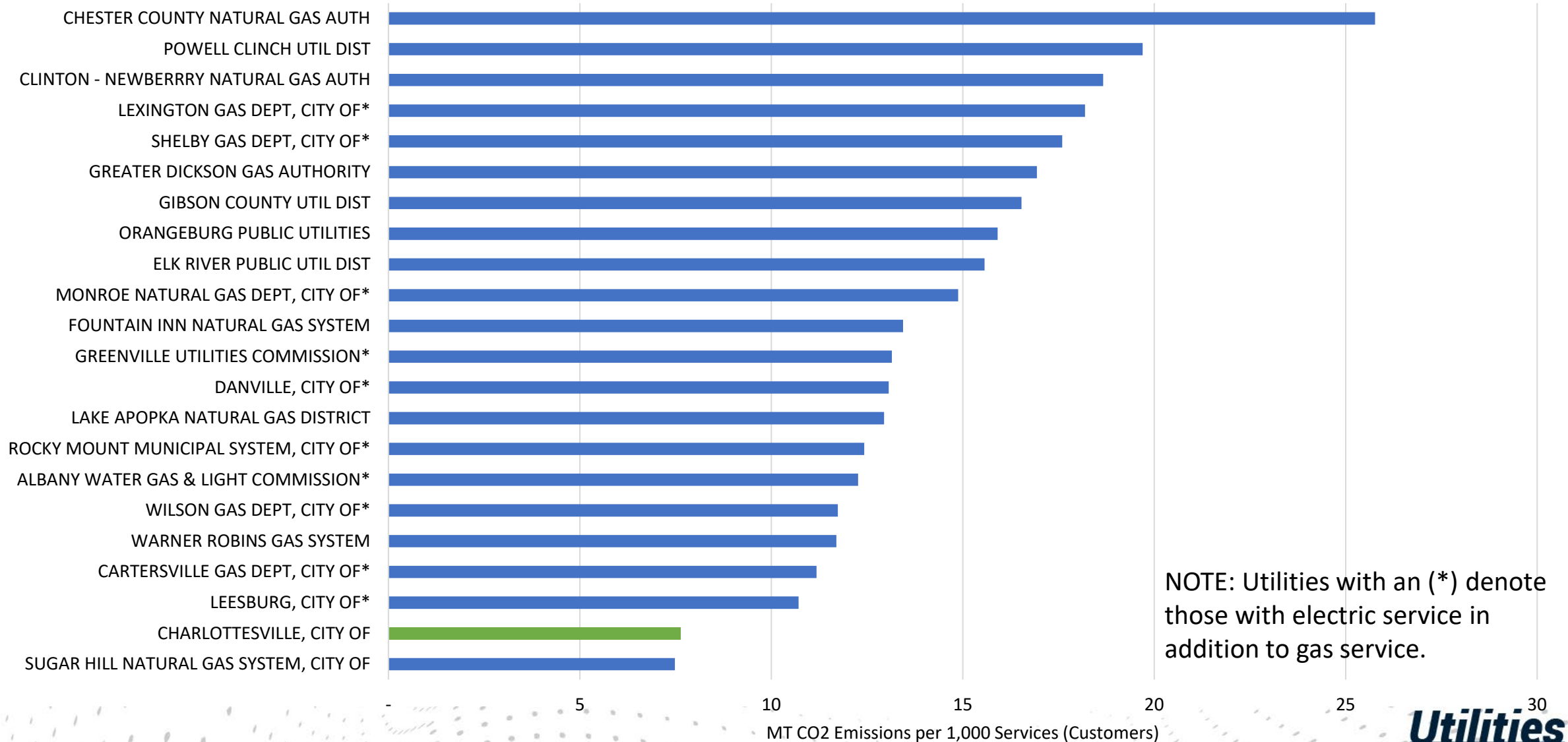
METHANE ASSESSMENT

Peer Group Comparison – System Methane Emissions



METHANE ASSESSMENT

Peer Group Comparison – Methane Emissions by Services



METHANE ASSESSMENT

Recommendations



Continue to complete **leak surveys** of the residential gas system every 3 years, which is more frequent than the required PHMSA 5-year interval



Install **Excess Flow Valves** on service lines which shut when a service line is severed during excavation damage.



Develop and implement preemptive pipeline and equipment **maintenance or repair**.



Continue investing in the **Public Awareness Program** to prevent 3rd party excavation damage leaks, especially important in plastic systems



Continue to emphasize the existing **training and the Operator Qualification Program**

These measures are already being implemented by Charlottesville

Emerging Technologies & Applications

DECARBONIZATION TECHNOLOGIES & FUELS



Renewable Natural
Gas



Renewable Natural Gas (RNG) is a pipeline quality biogas developed using sources from landfills, livestock operations, wastewater treatment plants, food waste, and other organic waste



Hydrogen



Hydrogen is created through electrolysis or steam methane reformation

DECARBONIZATION TECHNOLOGIES & FUELS

Renewable Natural Gas



Renewable Natural
Gas

Renewable Natural Gas (RNG) is a pipeline quality biogas developed using sources from landfills, livestock operations, wastewater treatment plants, food waste, and other organic waste

Estimated Current Fuel Cost Range: \$8.4 – \$23.1/MMBtu (varies by source)

Commercialization



Commercialized low-carbon fuel being used today



Access to supply is currently limited by source availability



Fuel unit costs are still far higher than natural gas, but expected to decline in the mid to long term

Considerations



Emissions vary by source, but still lower than traditional natural gas



Charlottesville already exploring opportunities with Rivanna Water & Sewer Authority

DECARBONIZATION TECHNOLOGIES & FUELS

Hydrogen



Green Hydrogen

Green hydrogen is created from electrolysis powered by renewable energy

Estimated Current Fuel Cost Range:
\$30.3- \$48.3/MMBtu



Blue Hydrogen

Blue hydrogen is created from steam methane reformation (SMR) with carbon capture

Estimated Current Fuel Cost Range:
\$20.2 - \$37.2/MMBtu

Commercialization & Considerations



Commercialized low-carbon fuel being used in small volumes today



Currently hydrogen can be blended up to 15% by volume directly into the natural gas pipelines with minimal disruption to end-users



Fuel prices are significantly higher than natural gas prices but expected to decline dramatically in approximately 10 years

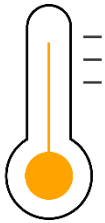


In October of 2023, DOE awarded \$7 Billion USD for 7 hydrogen hubs across the U.S. Hubs are expected to be operational between 2030 – 2037.

DECARBONIZATION TECHNOLOGIES & FUELS

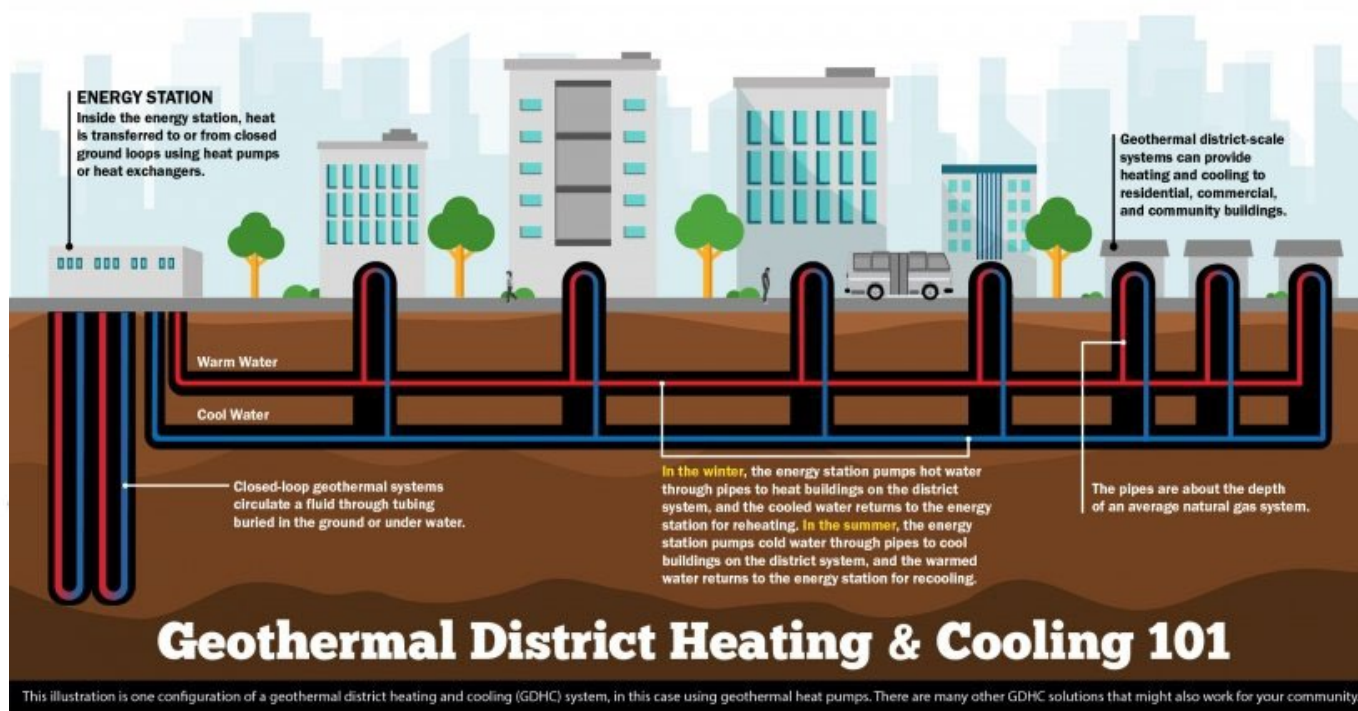
Networked/Community Geothermal

Geothermal heat pumps use the earth's constant temperature to heat and cool buildings, transferring heat from the ground (or water) into buildings during the winter and the reverse the process in the summer (EIA)



Geothermal heat pumps are currently the most efficient heating & cooling systems available

11 federally-funded pilot programs are underway across the country



Networked/Community Geothermal connects multiple customers with differing energy requirements, lowering capacity requirements and total costs to serve

Source: The U.S. Department of Energy

FY25 RECOMMENDATIONS

Proposed Actions

- Establish a new fee structure to disincentivize new gas connections – revenue source will fund the expansion of new Utilities' energy efficiency programs
- Develop a new weatherization program
- Evaluate existing rebates
- Partner with the Office of Sustainability to select annual carbon offset projects
- Increase the frequency of the Energy-Saving Trees Program (Spring and Fall)

QUESTIONS?

Date	Public Engagement
November 2022	Residential Survey
March 2024	Business Focus Group
Spring-Summer 2024	Community Listening Sessions (Virtual and in-person)

To sign up, please scan the QR code.

