

2024-2028 CLEAN HEAT PLAN

Public Service Company
of Colorado



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1. INTRODUCTION AND OVERVIEW

Overview

With this inaugural Clean Heat Plan (“CHP”), Public Service Company of Colorado (“PSCo” or the “Company”) brings forward a comprehensive package of tools and strategies to reduce greenhouse gas (“GHG”) emissions from its natural gas local distribution company (“LDC”) business. This first-of-its-kind filing begins a discussion regarding two questions: (1) what emissions reduction actions should the LDC take in the near-term (2024-2028); and (2) how should the state approach the long-term future of the LDC looking forward to a net-zero 2050. In this proceeding, the Commission needs to resolve only the first question. The second is just the beginning of a longer term, multi-part, collaborative conversation.

This CHP aims to reduce GHGs 30% below current levels by 2030, and to build a platform to continue reductions beyond 2030 and towards 2050. The CHP will utilize a comprehensive portfolio of options including electrification, energy efficiency, potential hydrogen projects, renewable natural gas, upstream emissions reductions, and other beneficial measures to drive the most emissions reductions across multiple sectors at the lowest price point.

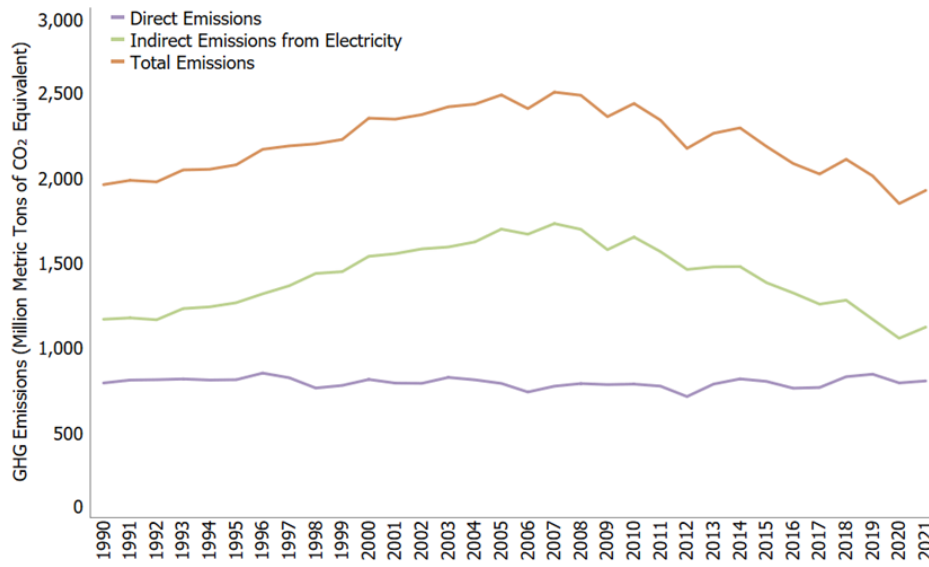
The Next Challenge

Reducing GHG emissions associated with gas LDC service is one of the defining challenges for utilities, regulators, and other stakeholders today. The challenge is significant and fundamental. Gas LDCs deliver predominantly fossil-based molecules to provide essential space and water heating services 24 hours a day to millions of customers.

While the U.S. power sector has reduced GHG emissions nationally through changing generation sources while maintaining reliability, affordability, and enhancing the customer experience, the gas LDC sector has only just begun to drive toward this type of change. Figure 1 shows that the GHG emissions from the use of electricity by U.S. homes and businesses have declined for approximately 15 years, yet direct emissions, which chiefly arise from consumption of natural gas, have been essentially flat for three decades. The contrast between the power sector and the LDC is apparent here in Colorado as well. As of 2020, Public Service has reduced its emissions from the power sector by 46 percent

since 2005. The GHG emissions from PSCo’s natural gas business have increased by 15% since 2015, however, due to the growth of Colorado’s population and economy.

Figure 1: U.S. Greenhouse Gas Emissions from Homes and Businesses, 1990-2021



U.S. Environmental Protection Agency (2023). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021

In the power sector, innovation has been a key factor in reducing emissions. Twenty years ago, wind was a very small fraction of U.S. and Colorado generation; in 2022, it supplied 36% of PSCo’s electricity. Large-scale solar generation was one of the most expensive resources; today, it is one of the cheapest. And battery storage did not exist at scale; now, standing alone or in combination with renewable resources, storage is viewed as an essential capacity resource in modern resource planning.

Affordable LDC emissions reductions opportunities will also depend on technological innovation. While we are in the early years of that evolution, GHG-reducing innovation is accelerating in the gas LDC sector, ranging from the increasing adoption of air-source heat pumps (“ASHPs”), increased federal and private funding to scale up clean hydrogen production and use, advances in methane leak detection and mitigation, and new markets to develop biomethane. However, the key technologies, practices, products, policies, and plans necessary to reduce GHGs *at scale and affordably* are not yet clear. One might reasonably consider today’s gas LDC sector to be at a point similar to where the power sector was 20 years ago, when the ability of clean energy and storage to reduce emissions at scale was not yet proven.

The State of Colorado is driving change and innovation in this dynamic and challenging environment. Senate Bill 21-264 is among the first state laws in the U.S. that require comprehensive planning around GHG emissions reductions for gas LDCs. The Commission has followed suit with comprehensive infrastructure and GHG emissions reduction planning rules. In step and in partnership with the state, Xcel Energy too has sought to lead by developing its Net Zero Vision that seeks to achieve zero-net-GHG emissions for its gas LDC service by 2050.

The next major step is this filing, the Company's first Clean Heat Plan. This plan is among the first comprehensive GHG emissions reduction plans developed by an investor-owned gas utility in the U.S. The CHP seeks to reverse the trend of growing gas LDC emissions and achieve the State's aggressive 22% reduction from 2015 levels by 2030, and to do so affordably. This in turn is a critical part of Colorado's sector-specific plan to reduce economywide GHG emissions 50% by 2030 and achieve net-zero emissions statewide by 2050.¹ This CHP also follows upon the Company's inaugural Gas Infrastructure Plan filed in May, with both filings together marking the beginning of a new era in gas planning across both infrastructure investments and emissions outcomes.

Analyzing the Near-Term Future of the LDC

This CHP includes robust analyses that, for the near-term, cover a variety of pathways reflected in the table below. These pathways include: (1) progressing towards the emissions targets set by the General Assembly using Clean Heat Resources; (2) a cost-constrained approach that manages to a statutory cost target; (3) a pathway that includes a heavy reliance on electrification; and (4) an approach that uses Clean Heat Resources and other available emissions reduction measures to progress towards the Clean Heat Targets more affordably. We learned through extensive analysis that meeting the Clean Heat Targets is neither easy nor inexpensive. Therefore, the discussion as this case unfolds must balance emissions reduction and affordability in the near-term, while positioning the Company and ultimately the State of Colorado for policy success in the long-term.

¹ PSCo's electric sector emissions are planned to be 85% below a 2005 baseline by 2030. PSCo is also seeking to reduce emissions in the transportation sector through its Transportation Electrification Plans.

Table 1: Near-term LDC Emission Reduction Pathways

Near Term Pathway	Portfolio Elements	2028 Reductions (Million Metric Tons) ²	Average Annual Program Cost (\$M, 2024-2028) ³
Emissions Target	EE, BE, RNG, H2	1.4 MMT	\$227
Cost Target	EE, BE, RNG, H2	0.37 MMT	\$34
Electrification Focus	EE, BE	1.5 MMT	\$472
Clean Heat Plus	EE, BE, RNG, H2, CNG, Multisector Reduction	1.6 MMT	\$163

In the Company’s efforts to analyze the cost and feasibility of various CHP portfolios, we worked with the consultancy Energy and Environmental Economics, Inc. (“E3”), a leading modeler of cleaner gas system options. Through that work, we found the costs of portfolios creating a pathway to the 2030 emissions target could be over \$1 billion over the course of the five-year plan, significantly higher than the cost target that Senate Bill 21-264 puts into place of approximately \$34 million annually or a total of \$170 million over the five-year plan. Our modeling shows that meeting both the statutory emissions target and the statutory cost target is likely not possible in the same scenario, creating a challenge for the Commission, the Company, and stakeholders in deciding how to proceed.

Across pathways, the role of electrification will be a central consideration in this proceeding, and has been a focus of the analysis. The Electrification Only approach assumes a rapid transition away from existing gas infrastructure. In doing so, it also incurs the greatest programmatic costs. Moreover, under all electrification-focused strategies, customers would incur personal costs to electrify their gas appliances and homes. These costs can be in excess of \$20,000 per home before incentives for a residential customer retrofitting an existing home to all-electric heating. Depending on the scale of the electrification initiatives, total customer personal costs could be additional billions of dollars, even after rebates.⁴ High electrification scenarios also drive incremental electric

² 2028 emissions reductions differ slightly between Emissions Target, Electrification, and CHP Plus due to their respective modeling trajectories to the 2030 statutory target level reduction of approximately 2 MMT.

³ For comparison purposes here, Average Annual Program Cost does not include some additional costs for Market Transformation (i.e., demonstration projects) that we address in our CHP to stimulate technology development. The Market Transformation portfolio and costs are described in Company witness Mr. Ihle’s Direct Testimony and the CHP Plan document.

⁴ Personal costs are an important part of evaluating the approaches in Clean Heat Plans. These costs are highly customer-specific, and must consider the full cost of electrification, any rebates or other incentives, and potentially costs that would have been incurred to replace gas equipment, irrespective of rebates or other incentives.

system investments to ensure that all customers have the power they need. As we move forward and consider pathways for the 2024-2028 period and an approach to the longer term out to 2050, we believe this full cost picture should be part of the discussion.

A Pragmatic, Innovative, and Affordable Plan

We recognize that affordability for all customers must be a central part of the discussion, as we begin the Clean Heat journey. To strike a balance between emissions reductions and affordability, the Company is presenting a near-term approach that uses Clean Heat Resources plus other available emissions reduction measures to progress towards the Clean Heat Targets, entitled Clean Heat Plus. Clean Heat Plus blends emissions reduction achievement and cost constraints. Indeed, the Company's preferred portfolio can achieve emissions reduction in line with the 2030 targets, but with greater affordability. Additionally, Clean Heat Plus creates a platform for a future of successful emissions reduction under a variety of strategies, depending on how technologies and markets develop.

Clean Heat Plus uses both the Clean Heat Resources enumerated in Senate Bill 21-264 and two additional measures that result in further emission reductions. One is the use of certified natural gas ("CNG") that can cost-effectively reduce emissions in the production and processing sectors upstream of our gas LDC infrastructure.⁵ This tool can expand the "reach" of the CHP into influencing the supply chain of natural gas that will be purchased for years to come, with multi-sector emissions reduction benefits. The second is the use of carbon offsets. This tool similarly can expand the reach of the CHP to obtain more diverse, and lower cost, ways to reduce emissions. The proposed use of offsets also helps to ensure a verifiable and robust offset market continues to form to the long-term benefit of state, regional, and national emissions reduction and overall climate policies. Clean Heat Plus is projected to achieve the 2030 Clean Heat Target, while at the same time saving our customers \$100 million per year through 2030 when compared to a portfolio that omits CNG and offsets. Figure 2 below provides key statistics regarding Clean Heat Plus; in turn, Figure 3 shows the projected emission reductions from each of the different strategies across the diverse approach.

⁵ The acronym CNG is sometimes also used for compressed natural gas, but in this filing the acronym is used for certified natural gas.

Figure 2: Summary of Key Clean Heat Plus Statistics by 2030

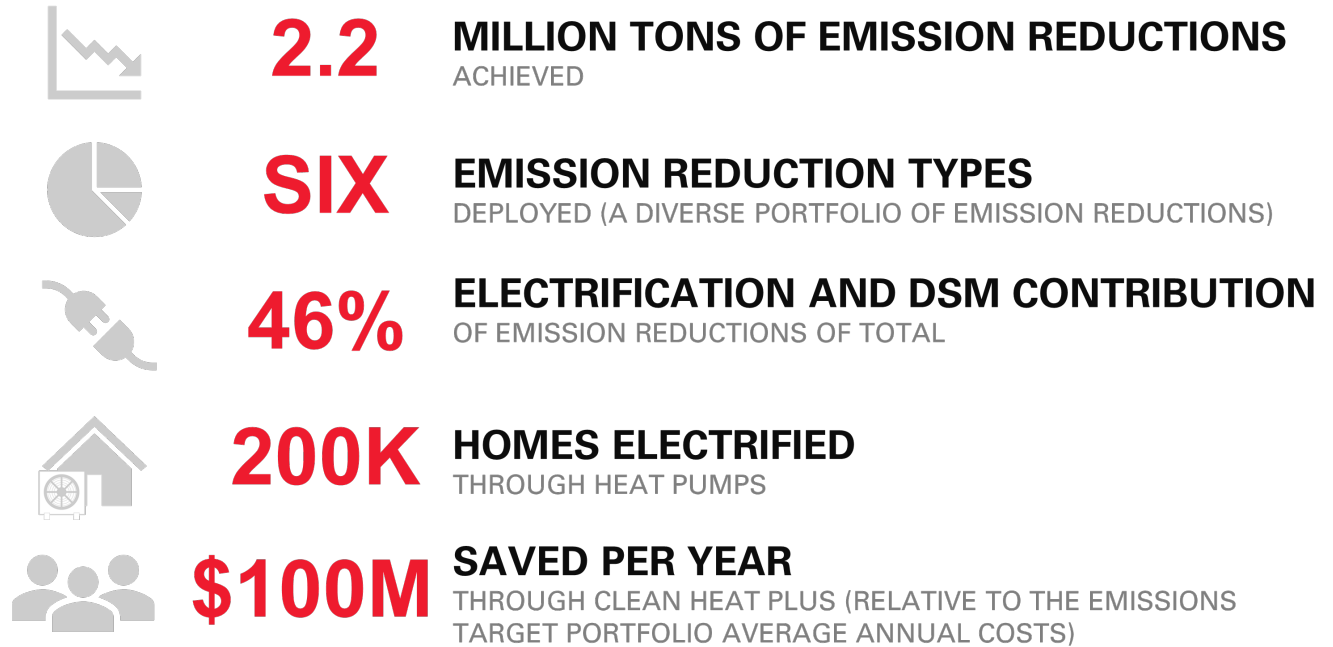
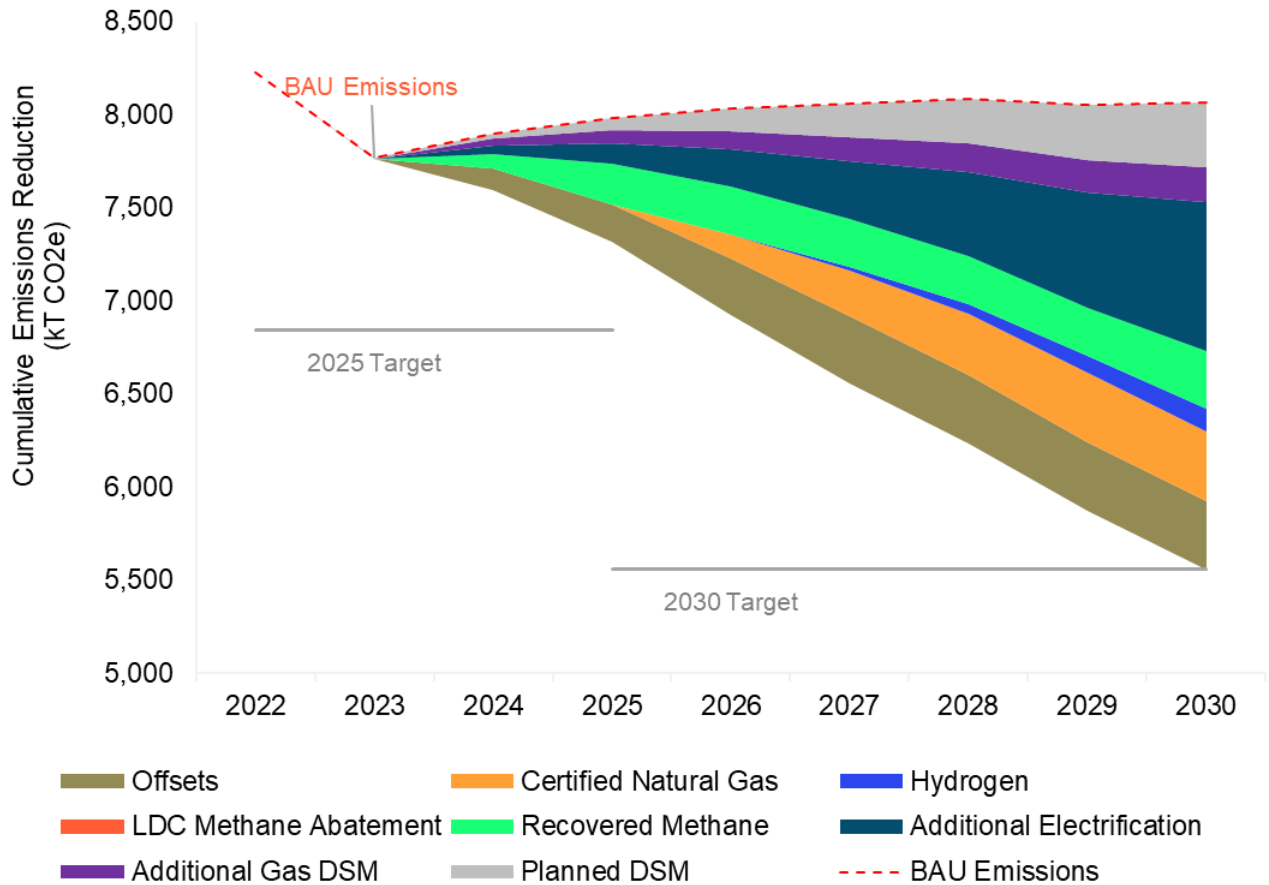


Figure 3: CHP Plus - A Diverse and Innovative Portfolio of Emission Reduction Strategies



Another lens closely considered in the decision to advance Clean Heat Plus is the inherent uncertainty in the implementation of these options. Clean Heat Plus is designed to support electrifying hundreds of thousands of households (multiplying by several fold the levels of electrification and gas demand-side management (“DSM”) recently approved by the Commission in the Company’s recent DSM Strategic Issues Proceeding), launching a new era of clean hydrogen production in Colorado, and greatly increasing the scale of support for nascent Colorado markets in renewable natural gas, CNG, and carbon offsets. While we strongly believe in the potential of the Clean Heat Plus plan, there are very real questions about the pace, scale, feasibility, and costs of the planned initiatives. Simply put, we cannot guarantee the pace, scale, and costs of the implementation of these initiatives will occur as we have modeled. But we propose to start, and we propose a plan that can grow into a pathway to reach the emissions targets

that are the heart of Senate Bill 21-264 and contribute to Colorado’s economywide GHG emissions reduction goals.

Given the uncertainties and the costs of the emissions reduction options, part of our Clean Heat Plus strategy is a flexible system to monitor, provide feedback, and adapt as appropriate as we learn by doing across these new initiatives and grow into a long-term emissions reduction pathway for our Colorado LDC. We propose:

- Budget levels across the emissions reduction options;
- Appropriate flexibility between the budget levels;
- Annual reporting on cost and progress across the emissions reduction options;
- Supplemental “readouts” to the Commission following annual reports; and
- Mechanisms to adjust the CHP as appropriate as we gather more data about the success of the emissions reduction tools.

Innovation will be critical to success on this journey. As we have seen in the power sector, innovation coupled with long-term commitment to that innovation are the key ingredients that can reconcile challenging emissions reduction goals with affordability. Toward that end, we propose a set of demonstration projects advancing our understanding of the emissions reduction options as part of a “Market Transformation Portfolio.” These projects will enhance technology and business model development and provide critical learnings about the details of implementing the Clean Heat Plus measures.

The Company is pleased to present our inaugural CHP to the Commission, our customers, our communities, and Colorado. The Clean Heat Plus approach employs a cost-effective combination of tools to affordably drive emissions reductions across multiple sectors. By doing so, it simultaneously drives early emissions reductions, manages cost and adoption risk, enables new technologies to gauge their success, and creates a solid near-term foundation as we collectively evaluate the best pathways toward a net-zero system by 2050. The Company brings Clean Heat Plus forward as its statutorily required “preferred option” based upon extensive modeling and analysis—but we welcome debate and competing ideas. This proposal is designed to begin a conversation about the future of the Colorado energy landscape that is grounded in both data and transparency and is agnostic when it comes to technology and fuel-type.

2. HISTORICAL TRENDS AND FORECASTS OF GAS LDC USAGE

Key Takeaways of This Section

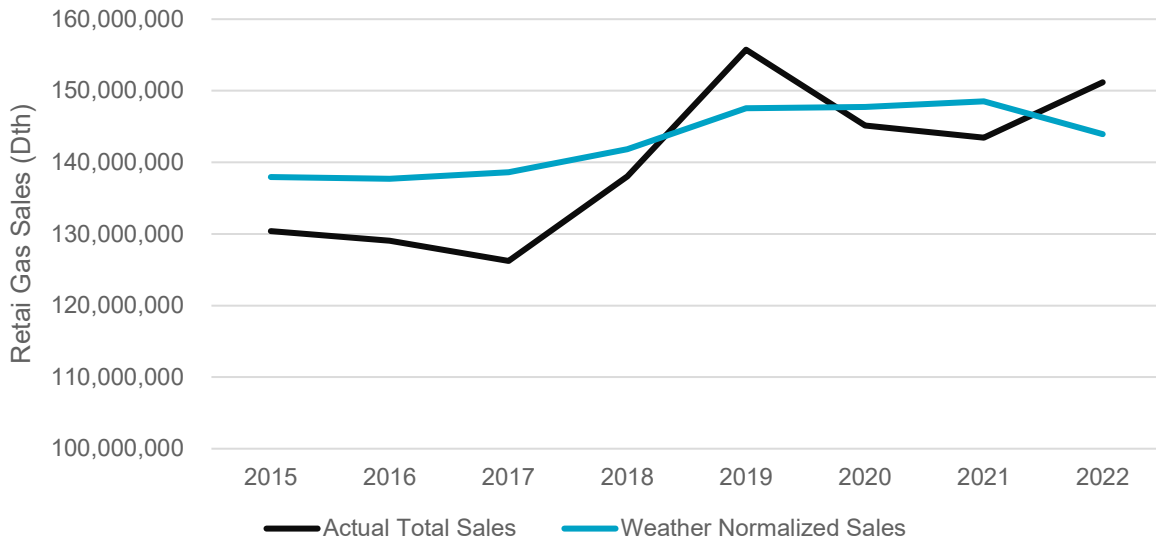
- Between 2015 and 2022, total retail customer gas usage has increased by approximately 4% on a weather normalized basis and 16% on an actual basis primarily due to population growth.
- The majority of gas retail sales throughput (approximately 70%), and in turn emissions, is from residential customer usage.

Approximately 97% of the 2015 baseline emissions covered under the Clean Heat Statute result from the sale and ultimate end-use combustion of geologic gas from full-service customers. As discussed in Section 3, almost 70% of retail sales throughput is from residential customer usage; residential customer usage drives a commensurate majority of emissions on the Company's system. Therefore, the Company's gas sales forecast is a critical starting point for determining the Company's 2015 LDC emissions baseline and 2025 and 2030 emission reduction goals. These calculations leverage a combination of the historical sales data and the Company's long-range sales forecast developed by the Company's Energy and Demand Forecasting team as described further in the Direct Testimony of Company Witness Goodenough.

HISTORICAL GAS SALES AND 2015 BASELINE

Figure 4 presents the Company's historical retail gas sales on both an "actual" basis as well as a "weather normalized" basis. 2015 was a particularly warm year, and the Company sent out approximately 7.5 million less dekatherms than it might have under more typical weather conditions. There were 5,479 heating degree days ("HDDs") in 2015 compared to 5,975 HDDs in an average year. Total retail customer gas usage has increased by approximately 4% on a weather normalized basis between 2015 and 2022, primarily due to population growth, but the warm temperatures in 2015 mean that increase translates to a 16% increase on an actual basis. One important impact of the warmer 2015 weather is thus that the baseline emissions against which Clean Heat Plans are measured are lower than would be the case under a more typical weather year, therefore increasing the total emission reductions required to meet the target levels. Section 4 of the plan discusses the impact of this atypical weather from an emissions reduction perspective.

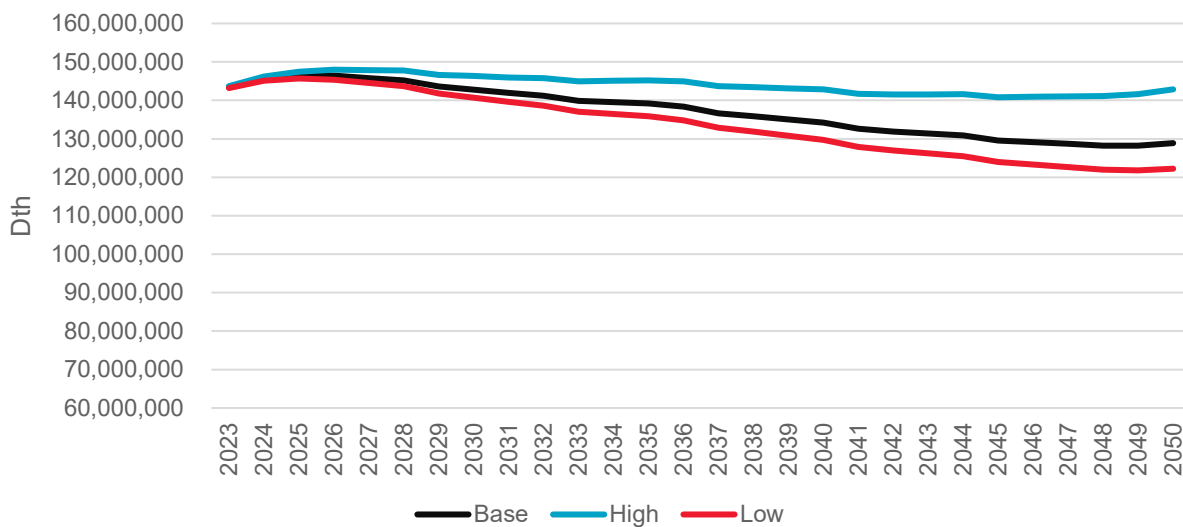
Figure 4: Historical Gas Sales - Actual and Weather Normalized



LONG-TERM GAS SALES FORECAST

The Company’s Energy and Demand forecasting team prepares a long-term gas sales forecast and forecast of customer counts through 2050. For the purposes of the Clean Heat Plan, high sales and low sales forecast sensitivities were also prepared as shown in Figure 5. Importantly, for the Clean Heat Plan action period of 2024-2028, the sales sensitivities have a modest impact on gas sales relative to the impacts through 2050.

Figure 5: 2023 - 2050 Retail Gas Sales Forecast and Sensitivities



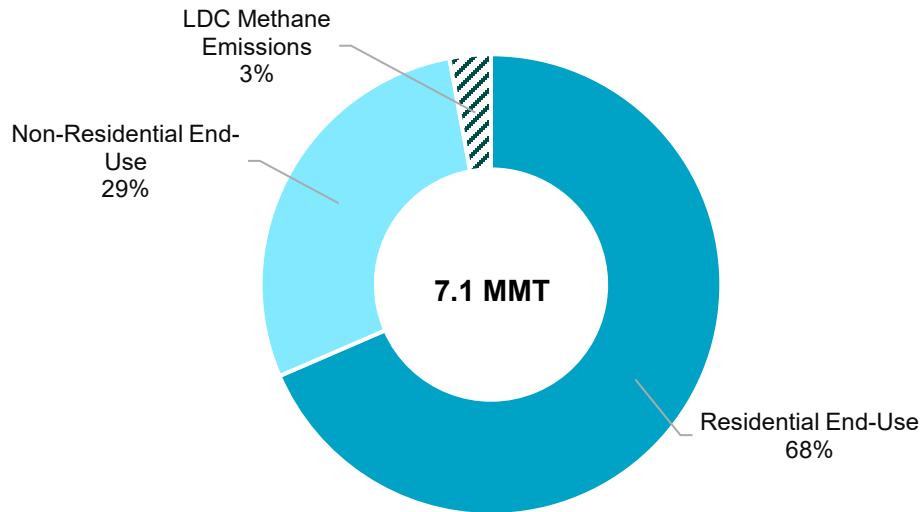
3. CLEAN HEAT TARGETS AND COVERED EMISSIONS

Key Takeaways of this Section

- While the Clean Heat targets require a 4% and 22% reduction below a 2015 baseline on a “nominal” basis, the impact of customer growth since 2015 and weather make these targets approximately 14% and 28% on a “real” basis.
- Accounting for customer growth and weather, the 2025 and 2030 targets translate to an emission reduction requirement of approximately 1.1 million MT of CO₂e in 2025, and 2.2 million MT of CO₂e in 2030.
- End-use combustion emissions of geologic gas, and specifically, residential end use from home heating accounts for the largest percentage of emissions covered under Clean Heat. This means that significant adoption of emission reduction measures targeted at electrification for residential customers (e.g., heat pumps and water heaters) will be critical to achieving the Clean Heat targets.
- LDC System methane emissions less than 3% to clean heat baseline emissions and therefore represents a limited opportunity for emission reductions relative to other emission sources.

Senate Bill 21-264 establishes a target of a 4% and 22% reduction in Gas LDC GHG emissions from end use combustion and LDC methane emissions by 2025 and 2030, respectively, relative to a 2015 baseline. As indicated by Figure 6, end use combustion accounts for approximately 97% of all covered emissions.

Figure 6: 2015 Emissions by Source (MMT CO₂e)



END USE COMBUSTION

To determine the emissions reduction baseline and targets associated with customer end use combustion, the Company multiplied the 2015 actual sales data by the emission rate of natural gas combustion (117 lbs/MMBtu) and converted into metric tons (“MT”) of carbon dioxide equivalent (“CO₂e”). The 2025 and 2030 targets therefore represent a 4% and 22% reduction, respectively, from 7.1 million metric tons (“MMT”) as indicated in Table 2.

Table 2: Covered Emissions – 2015 Baseline and 2025 and 2030 Targets – MT CO₂e

	2015 Baseline	2025 Target	2030 Target
End Use	6,921,255		
LDC Leakage	206,286		
Total	7,127,541	6,842,439	5,559,482

It is also important to note the relative contribution of the residential sector to LDC end-use emissions. From 2015 through 2022, residential customers accounted for an average of 70% of all retail sales and corresponding emissions.

LDC SYSTEM METHANE EMISSIONS

Consistent with the Clean Heat verification workbook created by the Colorado Department of Public Health and Environment’s Air Pollution Control Division (the “Division”), the Company used the Environmental Protection Agency’s Subpart W reporting to establish a 2015 baseline for LDC system emissions. LDC system emissions represented less than 3% of the total emissions baseline, thus presenting a more limited opportunity for emission reductions relative to other emission sources. However, we propose to improve our inventory of emissions using advanced leak detection.

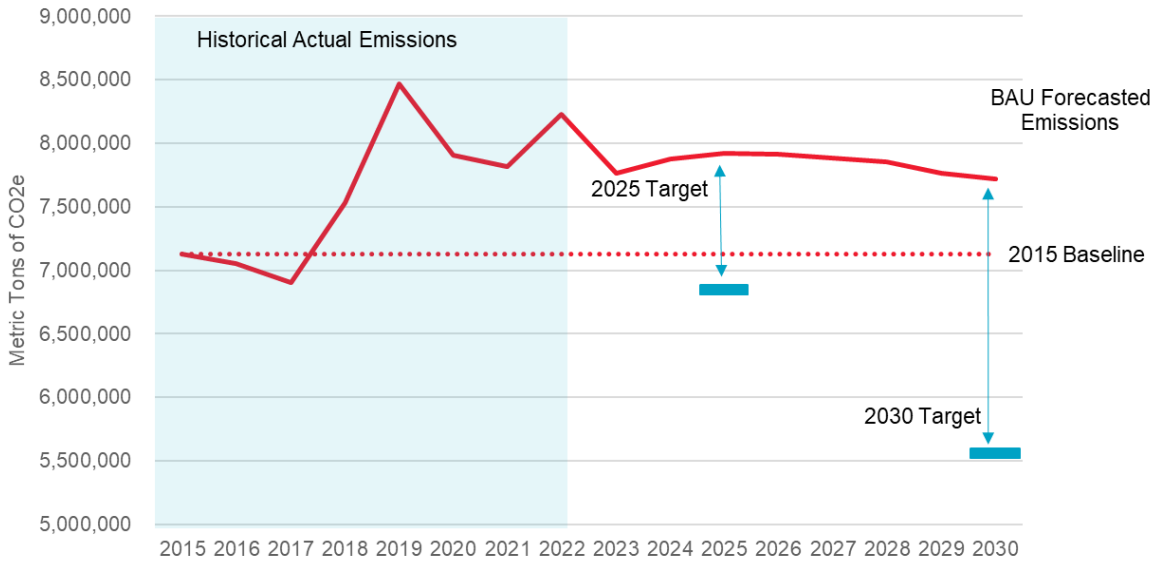
IMPACT OF CUSTOMER GROWTH AND WEATHER ON BASELINE AND EMISSION REDUCTION TARGETS

There are two important points regarding the emission reduction targets. First, the Company has observed significant growth in gas sales since 2015. On a weather normalized basis, sales have increased 4.3% since 2015, while actual, non-weather normalized sales have increased by approximately 16%.

Second, the 2015 baseline against which Clean Heat targets are measured is not weather normalized. Indeed, the Division’s Commission-approved verification workbook does not permit the use of a weather normalized 2015 baseline. This was affirmed by the Commission in Decision No. C22-0760.⁶ The combination of these two factors significantly increases the real emission reductions required to achieve the 2025 and 2030 target as indicated by Figure 7. The resulting emission reduction targets are approximately 1.1 MMT in 2025 and 2.2 MMT in 2030 from BAU forecasted emissions. These targets are a 4% and 22% reduction below a 2015 baseline on a “nominal” basis in 2025 and 2030, respectively. Given the impact of customer growth since 2015 and weather, however, these targets approximately 14% and 28% on a “real” basis. Market forces and the Company’s existing DSM and BE programs, in combination with slowing economic growth, are expected to begin to bend the emissions curve beyond 2025, even in the absence of any additional measures implemented through Clean Heat. These dynamics are insufficient, standing alone, to meet the emission reduction targets.

⁶ “Significantly, we agree with the Division that SB 21-264 does not call for normalization of the baseline data year to any parameters such as weather or customer growth.” Decision No. C22-0760, ¶ 143, in Proceeding No. 21R-0449G (Dec. 1, 2022).

Figure 7: Covered Emissions and 2025 and 2030 Targets



TREATMENT OF PREVIOUSLY PLANNED DSM AND BE

Because the Company’s base sales forecast already includes the anticipated impact of proposed and approved DSM and BE programs (i.e., it is a forecast net of reductions from DSM and BE), the Company added back these reductions to the base forecast. The purpose of this exercise was to be able to accurately reflect the contributions of DSM SI and DSM Plan activities relative to other modeled emission reduction measures. This effectively increases the sales forecast presented in Figure 7, which means that the gas dekatherms expected to be reduced from DSMI SI and DSM Plan activities needs to be added back to the forecast before applying other Clean Heat Measures. In the absence of this step, it would result in double counting of approved DSM SI and DSM Plan activities. Notwithstanding this interim accounting step, the ending amount of emission levels that need to be reached for 2025 and 2030 to achieve the targets remain the same (6.8 MT and 5.5 MT in 2025 and 2030 respectively).

While the contributions of DSM SI and DSM Plan activities will contribute to emission reductions that help achieve the Clean Heat targets, the costs of these programs are not included in the Clean Heat program costs. This is because these costs and budgets have been previously approved through separate DSM proceedings.

4. MODELING POTENTIAL PORTFOLIOS TO 2030

The Company retained E3 to model potential pathways to achieving the legislative directives and emission reduction targets of the Clean Heat Statute. The model developed by E3 is a cost-optimization framework that selects from demand-side (e.g., electrification, energy efficiency, etc.) and supply-side (e.g., recovered methane, hydrogen, etc.) emissions abatement options. A detailed description of the modeling methodology and assumptions, and discussion of results and findings, is provided by Company witness Mr. Aas of E3.

Key Takeaways from this Section

- While the 2030 target of 2.2 MT is technically achievable under all scenarios except for the cost target scenario, meeting these targets will require customers to implement electrification and demand-side measures at a pace and cost that will be significant.
- In all scenarios which meet the 2030 target, the rate of adoption of electrification is greater than that in the 2021 Colorado Greenhouse Gas Roadmap.
- Electrification and DSM will compose the largest fraction of emission reduction measures in *all* portfolios.
- In order to achieve the ambitious 2030 emission reduction target, annual program costs are expected to exceed the 2.5% retail cost cap by approximately 6 to 17 times, depending upon the portfolio.
- The levels of Electrification and DSM required by 2030 represent a substantial increase from current, approved levels.
- Depending on the portfolio, approximately 15% to 30% of all residential single family homes will need to be at least partially electrified by 2030 – using a combination of hybrid and cold climate heat pumps.
- Relying on a diversity of emission reduction measures reduces the cost of achieving the emission reduction targets.

MODELED CLEAN HEAT PORTFOLIOS

E3, with direction from the Company, modeled four core Clean Heat portfolios, including two portfolios which are required by statute (the “cost target” scenario and the “emissions target” scenarios). The Company instructed E3 to focus on modeling the achievement of the 2030 goals across these four core Clean Heat Portfolios. While the 2025 Clean Heat targets are an important interim goal, given the timing of the Company’s filing of this inaugural Clean Heat Plan, the likely timing of a final Commission decision, and the

necessary time to ramp up programmatic DSM and BE beyond current levels, achievement of the 2025 target will be extremely uncertain. As a result, achieving the 2030 goals is the appropriate focus of the modeled Clean Heat Portfolios.

A description of each of the core portfolios is provided below. The Cost Target, Emissions Target, and Electrification Only portfolios are composed only of enumerated Clean Heat Resources, while the Clean Heat Plus portfolio supplements these resources with CNG and carbon offsets. Company witness Mr. Jack Ihle explains the rationale for including these additional measures and the Commission's authority to approve them under Senate Bill 21-264 as part of a diverse portfolio.

- **Cost Target:** This scenario includes a least-cost portfolio of enumerated resources, subject to the Clean Heat cost cap of 2.5% of annual gas bills (established by Senate Bill 21-264) for all full-service customers. The scenario does not meet the emissions targets in either 2025 or 2030.
- **Emissions Target:** This scenario includes a least-cost portfolio of enumerated resources, subject to meeting the 2030 emissions reductions target. The scenario exceeds the cost target.
- **Clean Heat Plus:** This scenario achieves the 2030 emissions reduction target using enumerated Clean Heat Resources and additional measures but exceeds the cost target.
- **Electrification Only:** This scenario relies on electrification using electric-only heat pump appliances and related DSM (e.g. building shell) measures to achieve the Clean Heat targets. The scenario is constrained to achieve the emissions targets, and it exceeds the cost target.

E3 also modeled several additional sensitivities which are discussed further in Hearing Exhibit 102 – Attachment DRS-1.

CORE PORTFOLIO MODELING RESULTS

A summary of the 2030 modeling results is provided as Figure 8.

E3's analysis indicates that achieving the 2025 goal is extremely unlikely. Given the timing of this Clean Heat Plan, we also believe that focusing programmatic spend and the scaling up of emissions reduction tools with an eye towards 2030 represents the best path forward. In addition, actions taken as part of the 2024 – 2028 Clean Heat Action Plan period will be an important down payment on achieving the cumulative emission reductions required to achieve the 2030 goal.

The Cost Target portfolio falls well short of meeting the 2030 Clean Heat emissions reduction target. The Emissions Target portfolio using only enumerated Clean Heat Resources meets the target, but at significant cost to customers. The Electrification Only portfolio comes in at an even higher cost, and relies on a faster assumed pace of electrification than the Emissions Target Portfolio. As discussed in the next section, the Clean Heat Plus portfolio achieves the 2030 target at a lower cost to customers.

Figure 8: Summary of Portfolio Emission Reduction vs Annual Program Costs

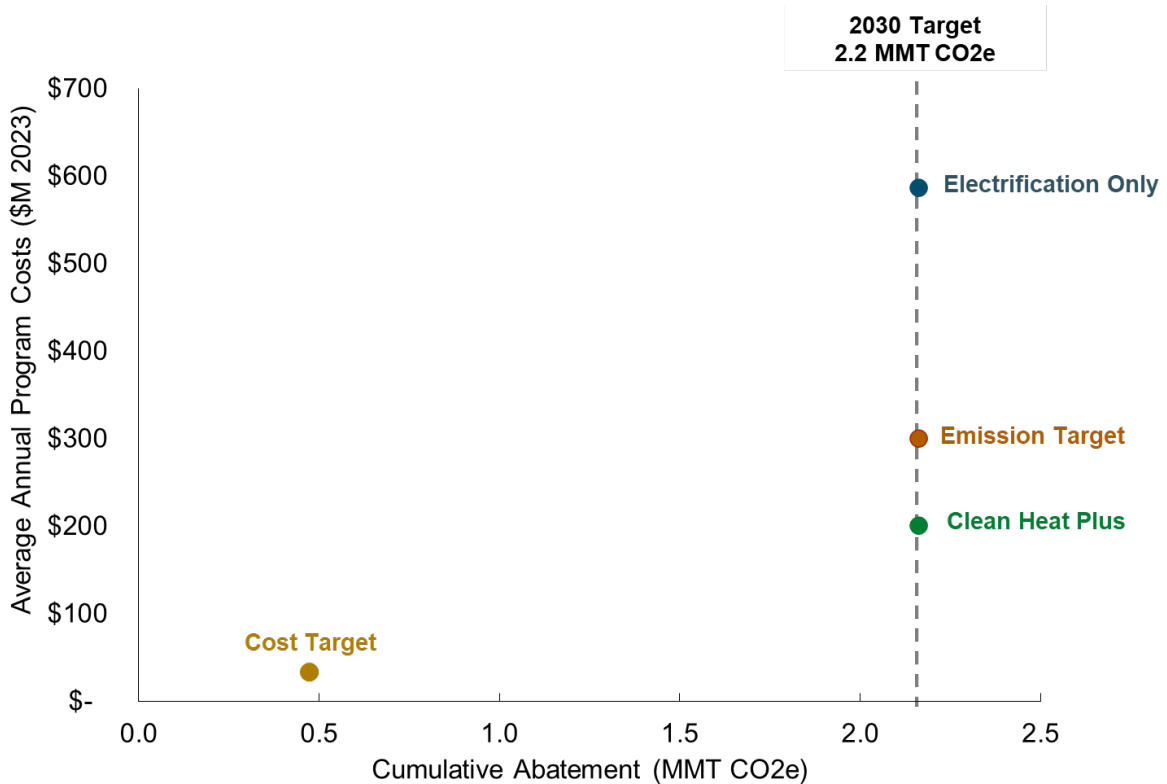
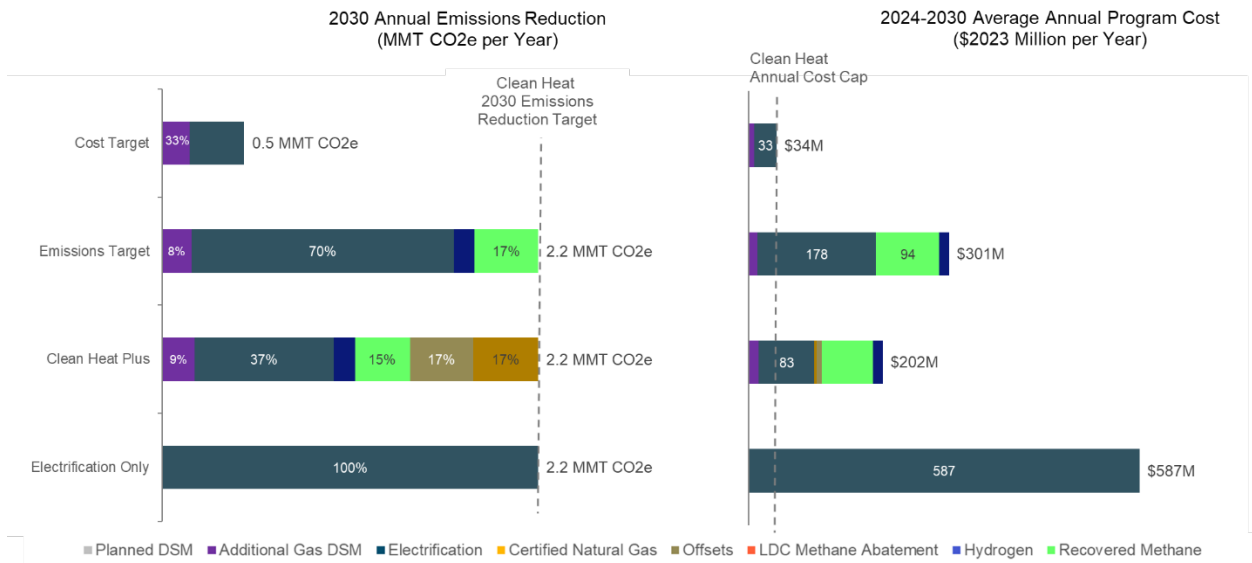


Figure 9: CHP Portfolios – Emission Reductions Achieved and Annual Program Cost



5. CLEAN HEAT PLUS - THE PREFERRED OPTION

Key Takeaways

- The Company is proposing as its preferred option a portfolio of Clean Heat Resources and Additional Measures that further diversifies the set of tools we will use to reduce GHG emissions.
- The Clean Heat Plus portfolio will save customers \$100 million per year on average through 2030, or a total of \$694 million cumulatively through 2030, when compared to the Emissions Target portfolio that does not include the Clean Heat Plus Additional Measures, i.e., CNG and offsets.
- The largest amount of emissions reductions under the Clean Heat Plus portfolio results from BE and DSM, which accounts for about 49% of spending through 2030.
- To balance affordability and emission reductions, the Company seeks Commission approval of 1.4 MMT of emission reductions from Clean Heat Resources and 0.74 MMT of emission reductions from Additional Measures. Collectively, these emission reduction strategies compose our Clean Heat Plus plan.
- Clean Heat measures will account for 65% of emission reductions through 2030, while Additional Measures will account for the remaining reductions.

Given the analytical backdrop described in the previous section, the Company has developed, and is advancing as its preferred option, a combination of emissions reduction measures that balances emissions reduction achievement and customer affordability. The Company's preferred portfolio can achieve the 2030 targets but with greater affordability than the other portfolios that do so, using a diverse mix of resources that will stimulate the markets for various emissions reduction technologies, particularly when viewed in combination with the proposed Market Transformation Portfolio described later in this Plan. Figure 10 demonstrates the emissions trajectory and portfolio composition across six different emission reduction resources – DSM (both planned and incremental), electrification, recovered methane, hydrogen, certified natural gas, and offsets.

Figure 10: Emission Reduction Trajectories of Clean Heat Plus

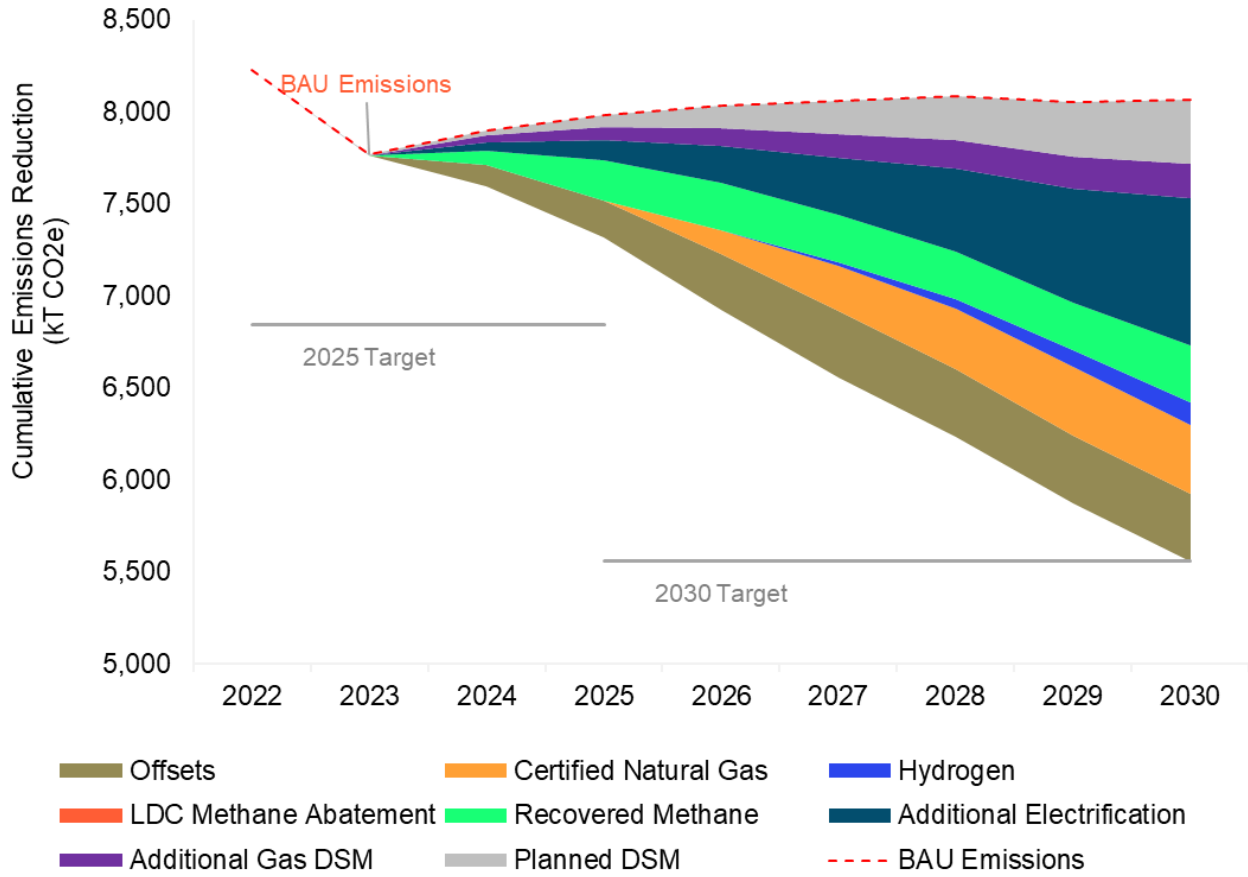
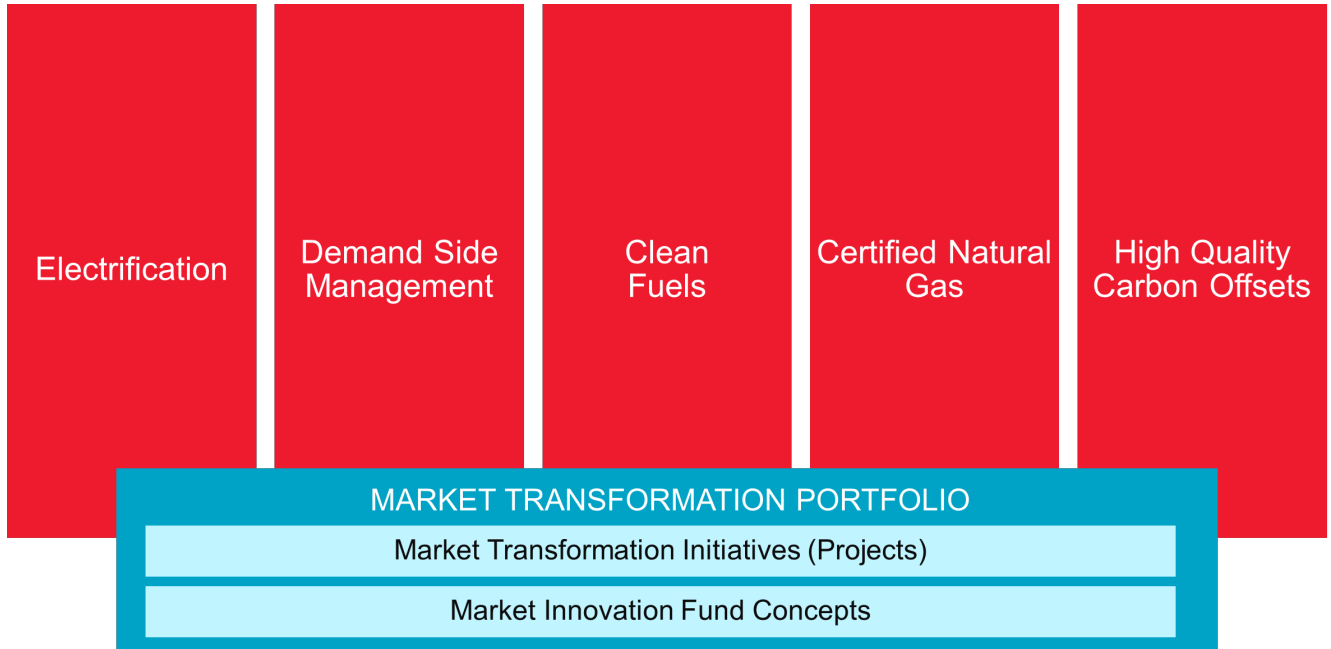


Figure 11: Key Components of Clean Heat Plus



As indicated by Figure 11, Clean Heat Plus is a portfolio that proposes to utilize a comprehensive set of emissions reduction options, including both the Clean Heat Resources enumerated in Senate Bill 21-264 and additional cost-effective emission reduction measures.

To be more specific, Clean Heat Plus advances a robust set of Clean Heat Resources – electrification, efficiency, recovered methane, and hydrogen. As demonstrated in Table 3, it achieves 0.9 MMT of emissions reductions in 2028 through these options. Then, to drive more emissions reduction with an eye toward affordability and programmatic flexibility, it adds two the two more options – CNG and carbon offsets. These tools, which we refer to as “Additional Measures,” add a further 0.7 MMT of reduction in 2028, for a total of 1.6 MMT. The 2030 emissions target requires 2.2 MMT of reduction, and Clean Heat Plus is projected to reach that target in 2030.

Table 3: Clean Heat Plus Emission Reductions

	2024 – 2028 Emission Reductions (MT)	2030 Emission Reductions Achieved (MT)
Clean Heat Resources		
Electrification	453,436	799,987
Demand Side Management	152,292	187,339
Recovered Methane	256,438	315,014
Hydrogen	53,723	121,274
Thermal Energy	N/A	TBD ⁷
Total Clean Heat Resources	915,889	1,423,614
Other Emission Reduction Measures		
Certified Natural Gas	329,147	373,226
Carbon Offsets	365,000	365,000
Total Other Emissions	694,147	738,226
Clean Heat Plus Total	1,610,036	2,161,840

CLEAN HEAT PLUS BUDGET

The budget for the Clean Heat Plus portfolio is \$816 million for the action plan period of 2024-2028, or \$163 million annually (for programmatic costs). Table 4 shows this budget broken down across the different components of the Plan.

Table 4: Clean Heat Plus and Market Transformation Budget - \$2023

Cost Category	2024	2025	2026	2027	2028
Additional Gas DSM	\$15.6	\$15.4	\$16.2	\$16.8	\$17.1
Electrification	\$19.9	\$35.0	\$57.7	\$83.9	\$106.2
Certified Natural Gas	-	-	\$2.4	\$4.6	\$6.2
Offsets	\$2.3	\$4.2	\$6.7	\$8.7	\$9.3
LDC Methane Abatement	-	-	-	-	-
Hydrogen	-	-	-	\$5.7	\$20.1
Recovered Methane	\$13.2	\$80.9	\$89.2	\$89.2	\$89.2
Clean Heat Plus Program Costs	\$51.1	\$135.6	\$172.2	\$209.0	\$248.2
Market Transformation Projects	\$10.5	\$20.8	\$11.9	\$5.3	\$3.9
Market Transformation Fund	\$2.5	\$2.5	\$2.5	\$2.5	\$2.5
Market Transformation Cost Total	\$13.0	\$23.3	\$14.4	\$7.8	\$6.4
Total Clean Heat Plan Costs	\$64.1	\$158.9	\$186.6	\$216.8	\$254.6

⁷ House Bill 23-1281 includes Thermal Energy as a Clean Heat Resource for the Company’s next Clean Heat Plan.

In addition, the Company is requesting approximately \$13 million per year to support the Market Transformation Initiatives, for a total Clean Heat budget of \$176 million per year on average.

COSTS NOT REFLECTED IN THE CLEAN HEAT PLUS BUDGET

This budget represents the programmatic costs for the Clean Heat Plan. We recognize that customers will need to incur other costs as they electrify their appliances and homes. This will be true under any Clean Heat portfolio, not just the Clean Heat Plus portfolio. These costs can be as much as \$20,000 per home for a residential customer retrofitting an existing home to all-electric heating, although incentives will bring that cost down for some customers. Depending on the scale of the electrification initiatives, total customer personal costs could be an additional billions of dollars, even after rebates.

INFRASTRUCTURE REQUIREMENTS

Regardless of the specific plan, implementing a Clean Heat Plan will also require additional electric-side investments needed to power the electrified buildings. Again, this is true under any portfolio that focuses on electrification as an emissions reduction strategy. Please see Company witness Mr. Jack Ihle's Direct Testimony – Hearing Exhibit 101 for additional discussion.

COST RECOVERY

Consistent with the Clean Heat Statute, Senate Bill 21-264, as well as Senate Bill 21-246, the Company is proposing recovery of the costs of implementing its Clean Heat Plan using a Clean Heat Support Gas Adjustment ("CHSGA") and a Clean Heat Support Electric Adjustment ("CHSEA"). Current recovery of Clean Heat costs, rather than deferring and accumulating costs for eventual recovery in a general rate case, will provide rate stability to customers from Clean Heat efforts, provide timely recovery to the utility, fairly distribute costs among customers recognizing the cross-business benefits of Clean Heat Plans, and provide transparency to customers for Clean Heat Plan costs on their electric and gas bills. Rate stability, regulatory support, and transparency are fundamental components of a cost recovery structure that can drive Clean Heat Plan activities in an affordable and clear manner for our customers. The CHSGA and CHSEA represent the foundation of a framework that provides regulatory support, but the discussion about stability, affordability, and support is broader than just the Clean Heat Plan and encompasses Gas Infrastructure Plans and other filings. This is a multi-faceted discussion, as the directives and considerations in the recently enacted House Bill 23-1252 illustrate. Robust planning, starting with this Clean Heat Plan, will be informed by the direction that the Commission ultimately chooses to take both for the action period

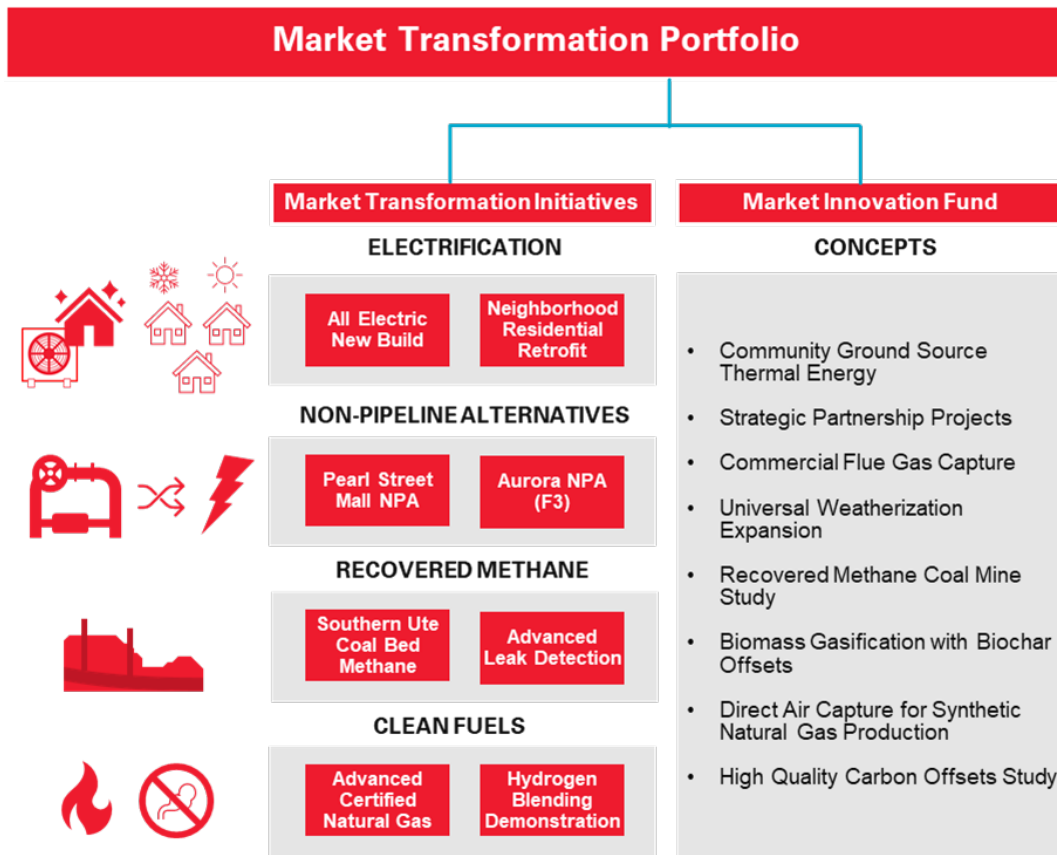
here (2024-2028) and for the long-term to 2050. But one thing is clear: these efforts will result in substantial changes to the gas LDC business and delivery infrastructure as technology advances and gas throughput changes. Accordingly, regulatory support and a reimagining of the regulatory approaches to support this transition are in order. The proposal here meets that objective for the near-term, recognizing that this discussion will evolve over time along with our plans as the Clean Heat journey continues.

6. MARKET TRANSFORMATION PORTFOLIO

We recognize that we cannot achieve the ambitious emission reduction targets established under Senate Bill 21-264 alone and will need the support of our stakeholders and customers as part of this market transformation. Much like the early days of renewable electricity, innovation will be a key to both achieving these emission reduction targets and reducing costs to our customers.

While many of the key Clean Heat Resource technologies required to reach the ambitious near-term emission reduction goals are already commercially available, new business models, engagement strategies, and collaboration will be required to scale these technologies and resources to the levels needed in connection with this proceeding and future Clean Heat proceedings. We have developed a set of initiatives to advance our understanding of our proposed emissions reduction options. These initiatives are designed to be scalable demonstration projects that align with Colorado's and Xcel Energy's emissions reduction goals. A summary of the Company's proposed Market Transformation Portfolio, which comprises Market Transformation Initiatives as well as a series of Market Innovation Fund concepts, is provided in Figure 12.

Figure 12: Summary of Market Transformation Portfolio



Moreover, the Market Transformation Portfolio is not our only effort to engage customers. While not part of the Market Transformation Portfolio, the Renewable*Connect-Natural Gas program proposed as part of our Clean Heat Plan also has the benefit of getting customers directly engaged in the process of reducing emissions from the LDC. This voluntary program facilitates the partnership and collaboration with our customers that we will ultimately need at scale, similar to our partnerships in the Market Transformation Portfolio.

FOUNDATIONAL PRINCIPLES OF MARKET TRANSFORMATION

Scalability is foundational to the concept of market transformation. Therefore, every project and concept discussed herein is intended to test, validate, and improve upon a new or novel model to achieve the goals and spirit of Clean Heat and supporting policy objectives. In addition, the Company has identified additional key principles that are reflected to varying degrees across all of the proposed Market Transformation Initiatives, as identified in Table 5.

Table 5: Market Transformation Initiative Foundational Principles

- Reduce annual and cumulative greenhouse gas emissions
- Reduce natural gas demand, and potentially natural gas infrastructure investment
- Overcome barriers to market adoptions of technologies or business models
- Minimize costs and keep customer bills low
- Enhance the customer experience and customer choice
- Ensure equitable distribution of Clean Heat programs to communities across Colorado

MARKET TRANSFORMATION INITIATIVES

Market Transformation Initiatives are projects that the Company is seeking specific Commission approval of as part of this Clean Heat Plan. These demonstration projects span multiple categories as indicated by Table 6, which provides a snapshot of projects key partners (not including other efforts where partners may not be included or have yet to be identified). Importantly, the Company has been working with several stakeholders prior to this filing to help further develop and refine these projects. This collaborative ideation is reflected through memorandums of understanding and letters of support attached to the Direct Testimony of Company witness Mr. Ihle.

Table 6: Summary of Key Market Transformation Initiative Partners

Resource Class	Project Name	Key Partners
Electrification	All Electric Residential New Build	Rocky Mountain Institute
	Neighborhood Residential Retrofit	Colorado Energy Office, City and County of Denver, Energy Outreach Colorado
Non-Pipeline Alternatives	Pearl Street Mall	City of Boulder and Boulder County
Recovered Methane	Southern Ute Coal Bed Methane	Southern Ute Indian Tribe, Colorado School of Mines
Certified Natural Gas	Advanced Measurement and Verification for CNG	Williams

MARKET INNOVATION FUND CONCEPTS

Market Innovation Fund concepts are project ideas that the Company would seek to further develop and advance through a market transformation budget. The budget would be approved by the Commission decision on this Clean Heat Plan. Individual project concepts could then be developed through more expedient regulatory processes such as the 60/90 day notice process which is commonly used in DSM programs.

Table 7: Summary of Market Innovation Fund Concepts

Resource Class	Concept Name
Electrification	Community Ground Source Thermal Energy ⁸
	Strategic Partnership Projects
Efficiency	Commercial Flue Gas Capture
	Universal Weatherization Expansion
Recovered Methane	Recovered Methane Coal Mine Study
	Biomass Gasification with Biochar Offsets
Hydrogen	Direct Air Capture for Synthetic Natural Gas Production
Offsets	High Quality Carbon Offsets Study

⁸ As part of the market transformation budget, the Company is seeking approximately \$400,000 to for initial Coordination, Siting, and Customer Recruitment activities.

7. KEY CLEAN HEAT PLAN IMPLEMENTATION CONSIDERATIONS

Key Takeaways

- Implementing a Clean Heat Plan presents substantial challenges.
- The Company is proposing budget flexibility, stakeholder feedback, and reporting mechanisms to help us further refine our plan during the implementation period.
- The Company will devote 20% of all BE and DSM spending under the Clean Heat Plan to disproportionately impacted communities and income qualified customers.
- The Plan will meet the Clean Heat Statute’s labor requirements, create jobs in Colorado across the portfolio of emissions reduction strategies, and begin a just transition for our gas LDC workforce.

MANAGING UNCERTAINTIES

This Clean Heat Plan is ambitious. Implementing it will present challenges on a scale similar to those we have faced over the last two decades of reducing GHG emissions on our electric system. There are many uncertainties across the elements of the Clean Heat Plus portfolio relating to the technologies we will need, the workforce required for installations and retrofits, and the effectiveness of incentives and other policy mechanisms. Successfully implementing this plan will rely on the actions of and partnership with our customers like never before. We expect to learn many lessons during the implementation period about what aspects of the plan work well, what aspects present challenges that we are not able to anticipate today, and how we should craft the Company’s next Clean Heat Plan in 2027.

To account for these uncertainties, the Company is proposing budget flexibility mechanisms, including a process to receive stakeholder feedback and make adjustments to the Clean Heat Plus program. The Company also proposes a Plan, Do, Check, Act process for refining the program during implementation, including Commissioners’ Information Meetings to review our annual Clean Heat reports.

INCOME QUALIFIED CUSTOMERS AND DISPROPORTIONATELY IMPACTED COMMUNITIES

The Company will not be able to successfully decarbonize its gas system unless *all* of our customers can participate in an affordable transition.

The Company will devote 20% of all BE and DSM spending under its Clean Heat Plan to Income-Qualified (“IQ”) customers and Disproportionately Impacted (“DI”) communities, consistent with the requirements of Senate Bill 21-246, incorporated into the Clean Heat Statute. This spending will be a sizeable expansion of our existing IQ/DI programs, and will benefit customers across our service territory who may not otherwise be able to easily access electrification and efficiency measures.

To implement the IQ/DI portion of our Clean Heat Plan, we will increase our engagement with community partners. We will leverage existing programs to increase efficiency and avoid customer confusion, and duplicate successful programs in new communities.

Our Market Transformation Initiatives will boost those efforts by determining what methods work best to reach IQ customers and DI communities. The Neighborhood Residential Retrofit project will be at the vanguard of that effort, creating a model for identifying and executing on Clean Heat opportunities in DI communities.

LABOR AND JUST TRANSITION

The Clean Heat Statute, Senate Bill 21-264, incorporates labor standards for Clean Heat Plan activities, and Senate Bill 23-292 creates additional requirements for certain utility projects. The Company’s Clean Heat Plan will meet those standards and go further, beginning the process for a just transition for our gas system employees as we move toward a net-zero future in 2050.

The Company has been a leader in just transition in Colorado, and we will bring our experience from empowering our electric system workforce to the gas side during this Clean Heat Plan action period and beyond. The Company does not anticipate that its gas workforce will decrease during the next five years, but it will as we move closer to 2050. We will use the same five-step process outlined in our 2021 Clean Energy Plan to create a successful, low-impact transition plan for affected employees.

That transition will be successful in no small part because the Clean Heat Plus portfolio will create jobs in Colorado across the suite of emissions reductions measures—jobs installing heat pumps and upgrading building electric infrastructure; jobs retrofitting homes and building new electric-only homes; and jobs planning how we will purchase and transport cleaner molecules on the remaining gas system. In short, this Clean Heat Plan represents an opportunity for our workforce and for current and aspiring energy sector workers across the state.

8. CONCLUSION

The Clean Heat Plus portfolio is presented as the preferred option required by Senate Bill 21-264. Consistent with Senate Bill 21-264 requirements and in the spirit of generating new ideas about the future of the LDC, however, we also present several alternative approaches for consideration and comparison. These approaches, detailed in this CHP and through our testimony, test the near-term future using only Clean Heat Resources, managing to the statutory cost target, and relying only on electrification. This Clean Heat Plan commences a dialogue about the path to take in the near-term, with an eye towards 2050.

We approach this effort with humility and in the spirit of driving dialogue, and electrification plays a major role in all portfolios. The role of electrification, considering all costs and technological viability, will remain a key element of this and future Clean Heat Plans. And we recognize that electrification may play an ever-increasing role into the future. Here, Clean Heat Plus is the Company's preferred option because we believe it strikes the optimal balance of reducing emissions while ensuring customers have clean energy choices that meet their needs. Millions of our customers today rely on natural gas for heating their homes and businesses because it is a highly flexible and efficient fuel for millions of furnaces, boilers, water heaters, stoves, and other appliances and can provide heat even on the coldest days of the year. The Clean Heat Plus plan recognizes that our success in achieving our emissions goals depends on providing effective alternatives to customers and it includes a broad range of options that will expand over time.

The Clean Heat Plus plan also follows the successful path we took on the electric side of our business, using proven tools to accelerate emission reductions today, while making strategic investments in new energy innovation so we can take advantage of the most scalable and cost-effective options as they mature. The outcome of that strategy is the same one we aim to achieve here: an affordable clean energy future.

Looking out several decades, Clean Heat Plus is a steppingstone to any 2050 future—it reduces emissions, accelerates development of high potential clean energy technologies that can be scaled over time in future plans, and positions PSCo and the State of Colorado as a national leader in the transition to a greener future. That could be a future where gas and electric infrastructure delivers a variety of clean fuels in concert with electrification; or it could be a future where Colorado invests heavily in achieving an electric future. Regardless of the end state, Clean Heat Plus provides the necessary flexibility and a practical approach to enable multiple paths to a net-zero 2050 future.

With that, we present our inaugural Clean Heat Plan to the Commission, our customers, our communities, and Colorado. Nobody said creating a net-zero carbon gas LDC would be easy, and we do not think it will be. But we have seen the fruits of sustained leadership and collaborative effort in the power sector: PSCo’s electric system emissions are half of what they were in 2005. We take up this new challenge with a spirit of determination and collaboration, recognizing that we do not know what we do not know. And we look forward to commencing this effort and journey—together.