BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

*** * * * ***

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR APPROVAL OF ITS 2024-2028 CLEAN HEAT PLAN.	**)** **)** **)** **)**	**PROCEEDING NO. 23A-0392EG**

DIRECT TESTIMONY OF NICK C. MARK

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

August 1, 2023

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DIRECT TESTIMONY OF NICK C. MARK

I. INTRODUCTION, QUALIFICATIONS, PURPOSE OF TESTIMONY, AND RECOMMENDATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Nick C. Mark. My business address is 401 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Xcel Energy Services, Inc. ("XES") as a Manager of Demand Side Management Strategy and Policy. XES is a wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy") and provides an array of support services to Public Service Company of Colorado ("Public Service" or the "Company") and the other utility operating company subsidiaries of Xcel Energy on a coordinated basis.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of Public Service.

Q. WHAT IS YOUR PREFERRED FORM OF ADDRESS?

A. I use he/him pronouns and am comfortable being addressed as Mr. Mark.

Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.

A. As the Manager of Demand Side Management ("DSM") Strategy and Policy, I am responsible for ensuring Xcel Energy's energy efficiency, beneficial electrification ("BE"), and other DSM programs adhere to regulatory policies and Colorado Public Utilities Commission ("Commission") rules. In this capacity, I provide strategic direction and oversee a team that: (i) develops long-range goals for the portfolio of programs for resource planning; (ii) tracks and reports energy efficiency and related achievements and financial operations; (iii) prepares DSM regulatory reports and filings; (iv) provides subject-matter expertise in discussions of state and federal policy with regard to DSM; and (v) analyzes the cost-effectiveness of DSM programs and portfolios in all of XES's state jurisdictions with active energy efficiency programs or pending legislation. A description of my qualifications, duties, and responsibilities is set forth after the conclusion of my Direct Testimony in my Statement of Qualifications.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN PROCEEDINGS BEFORE THE COLORADO PUBLIC UTILITIES COMMISSION?

A. Yes. I have provided testimony before the Commission in several proceedings, including the Company's 2022 DSM and BE Strategic Initiatives proceeding ("2022 SI Proceeding").[1] In addition to my Direct Testimony and Rebuttal Testimony in that 2022 SI Proceeding, I also filed Supplemental Direct Testimony addressing specific questions from the Commission regarding the impact of the hypothetical

[1] Proceeding No. 22A-0309EG.

full electrification of new single-family homes on the gas and electric systems. Through Decision No. C23-0413 ("2022 SI Proceeding Decision"), the Commission approved the Company's Application, with modifications, establishing energy savings and budgets for 2024 – 2026. Three parties, including the Company, filed Applications for Rehearing, Reargument or Reconsideration ("ARRR"). These ARRRs remain pending as of the date of the Company's Clean Heat Application and my Direct Testimony.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my Direct Testimony is to explain the role of DSM and BE in the Company's first Clean Heat Plan to help deliver carbon emission reductions as directed by Senate Bill 21-264 ("SB 21-264"). Company witness Mr. Jack Ihle provides an overview of SB 21-264 in his Direct Testimony, including the various modeling scenarios that the statute, as well as Commission rules, require to address carbon emission reductions by gas local distribution companies ("LDCs"). The portfolios that the Company is required to model and present in its Clean Heat Plan filing include a portfolio designed to try to achieve the carbon emission reductions targets for 2025 and 2030 specified by SB 21-264 ("Emissions Target Portfolio") as well as a portfolio that seeks to achieve emission reductions while adhering to the cost cap specified by SB 21-264 ("Cost Target Portfolio"). Mr. Ihle's testimony discusses both the Emissions Target Portfolio and the Cost Target Portfolio presented by our Clean Heat Plan filing, as well as the Company's preferred portfolio: The Clean Heat Plus Portfolio ("Clean Heat Plus") that seeks to balance achieving emission reductions with cost considerations. My testimony

addresses the significant role that we expect DSM and BE adoption will play in these portfolios. Achieving the scale of DSM/BE-driven emission reductions necessary will be challenging for a number of reasons, including the need to significantly increase customer adoption rates (particularly for electrification technologies) and the costs associated with doing so. It is important that the Commission and stakeholders understand these challenges, particularly given that emission reductions from DSM/BE are expected to drive the majority of the overall emissions reductions in the Clean Heat Plus portfolio, and an even larger share in other portfolios.

Q. WHAT RECOMMENDATIONS ARE YOU MAKING IN YOUR DIRECT TESTIMONY?

A. I join other Company witnesses in recommending that the Commission approve the Company's Clean Heat Plan Application, including approving moving forward with Clean Heat Plus. I also recommend that the Commissions' approval of Clean Heat Plus authorize the Company to proceed with the approach we identify to increase DSM and BE adoption, as set forth in the Company's Application, my Direct Testimony, and the testimonies of other Company witnesses. Finally, I recommend that the Commission's approval of Clean Heat Plus authorize the Company's suggested approach to cost recovery for this increased DSM and BE, as further described herein.

II. HISTORY AND CONTEXT OF DEMAND-SIDE MANAGEMENT AND BENEFICIAL ELECTRIFICATION IN COLORADO

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. In this section of my testimony, I provide background on the history of DSM and BE in Colorado, as context to understand the magnitude of DSM and BE measures and associated costs that will be required for Clean Heat Plus and other portfolios based on the modeling performed by Energy and Environmental Economics, Inc ("E3"). As part of this discussion, I describe the Company's gas DSM and BE initiatives in Colorado. I also describe the scope of the Company's current gas customer programs aimed at reducing natural gas consumption, describing certain aspects of how DSM works and how DSM achievement is measured.

Q. WHAT IS DEMAND-SIDE MANAGEMENT?

A. Demand-side management is an umbrella term that refers to programs that seek to modify customer usage of energy. DSM includes multiple components or subsets of activities. Although common usage often equates DSM with energy efficiency, energy efficiency is only one of the categories of activities included. Other activities that are categorized as DSM in Colorado include conservation, load management, beneficial electrification, and demand response. Because BE is a relatively new element of DSM programming, and because there are separate Colorado statutory requirements for utilities to file plans for implementing DSM and BE, it is helpful to be as clear as possible about what is meant by a given term when used in the remainder of my testimony. For convenience, when I refer only to "DSM," I am including all activities that are categorized as DSM (as mentioned

above), inclusive of BE. However, when it is necessary or helpful to distinguish categories of DSM in the context of my testimony, I will specifically refer to BE, energy efficiency ("EE"), demand response ("DR"), and other categories of DSM.

Q. PLEASE PROVIDE A BRIEF OVERVIEW OF THE DEVELOPMENT AND IMPLEMENTATION OF DSM IN COLORADO.

A. The introduction of the Company's DSM programs, in their current format, began in 2007 with the Company's 2007 Electric and Gas DSM Plan,[2] which was modified by the Company's 2008 Electric and Gas DSM Plan.[3] Under these first plans, the Company operated programs and offered incentives that encouraged customers to install more efficient end-use technologies such as higher efficiency lighting, heating, air conditioning, and building envelope improvements like insulation. These plans also included electric DR programs such as Saver's Switch. In 2010, the Company filed a "Strategic Issues" proceeding[4] where longer-term policies and frameworks for the implementation of DSM programming were decided. These Strategic Issues filings continued in 2013,[5] 2017,[6] and most recently in 2022 (the 2022 SI Proceeding I referenced previously). Cost recovery for the Company's DSM programs is primarily achieved using a rate rider – the Demand-Side Management Cost Adjustment ("DSMCA").

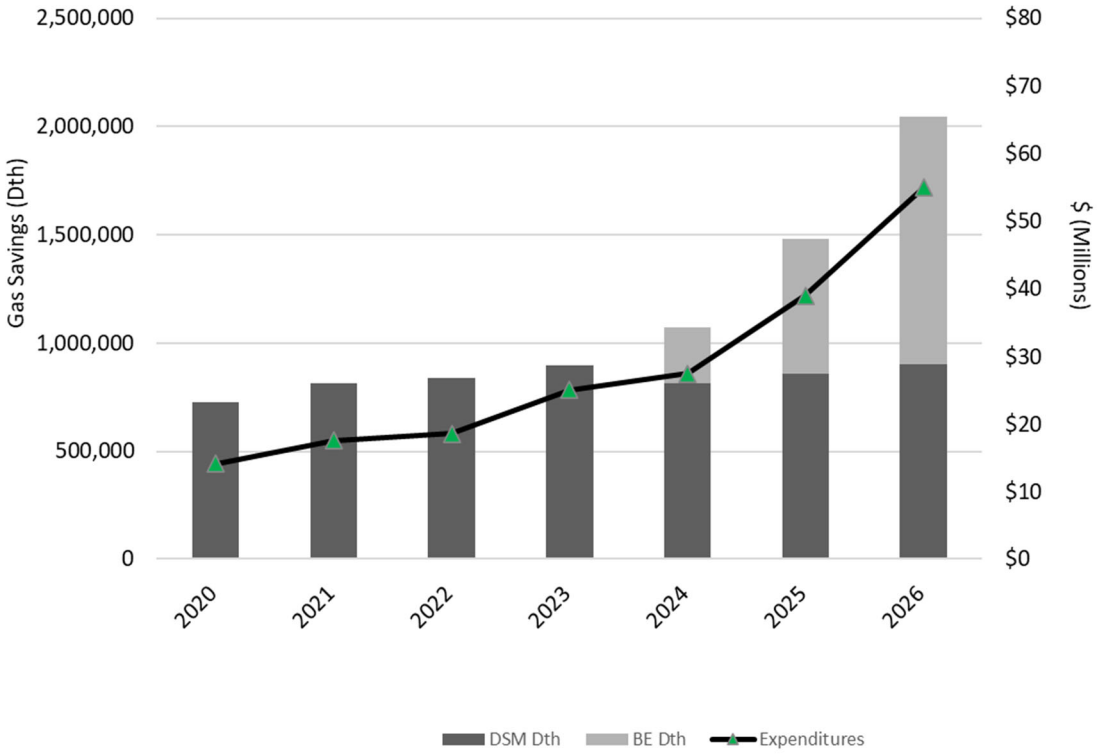
[2] Proceeding No. 07A-420E.
[3] Proceeding No. 08A-366EG.
[4] Proceeding No. 10A-554EG.
[5] Proceeding No. 13A-0686EG.
[6] Proceeding No. 17A-0462EG.

Q. WHAT HAVE BEEN THE COMPANY'S RECENT NATURAL GAS SAVINGS ACHIEVEMENTS AND HOW DO THEY COMPARE TO FUTURE SAVINGS GOALS?

A. Currently, the Company delivers a portfolio of natural gas DSM programming that supports energy-efficient options for nearly every natural gas end use. Since 2021, these programs have included fuel-switching (or BE) incentives to encourage customers to install efficient heat pump equipment for both space and water heating. Savings from these fuel-switching measures represent about 58,000 Dth, or 6.9 percent, of the total gas savings achieved in 2022. The 2022 SI Proceeding Decision established gas energy efficiency goals ranging from 814,000 Dth to 903,000 Dth savings over the three years of 2024-2026, with a spending cap of $18 million per year. The Commission also established BE gas savings goals of 257,000 Dth in 2024, 622,000 Dth in 2025, and 1,143,000 Dth in 2026, with budgets of $9.5 million, $21 million, and $37 million respectively.[7] Figure NCM-D-1, below, illustrates the trajectory of the Company's recent overall gas DSM achievements and expenditures, as well as the approved savings goals and budgets from the 2022 SI Proceeding through 2026.

[7] While ARRR for the 2022 Strategic Issues Proceeding is pending as of the date of my testimony, the outcome is not likely to substantially affect the goals and budgets described here.

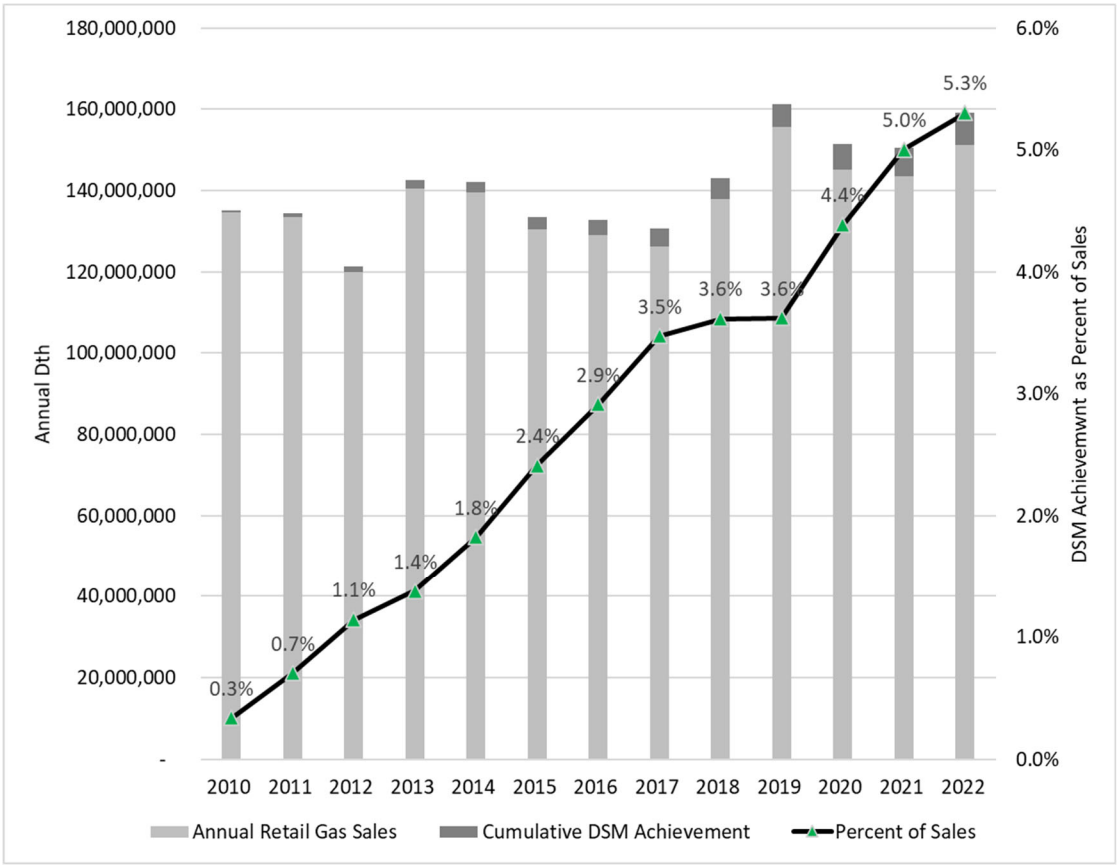
Figure NCM-D-1: DSM Achievements and Expenditures



Q. HOW DO THE GAS SAVINGS ACHIEVEMENTS COMPARE TO THE COMPANY'S OVERALL GAS SALES?

A. The gas DSM savings achieved as a result of new participation in 2022 represent about 0.6 percent of gas sales. That percentage is calculated based on 2022 actual sales to the Company's full-service gas customers. Customers who choose transportation service are not eligible to participate in gas DSM programs and their throughput is not included in this calculation. Figure NCM-D-2, below, illustrates the Company's cumulative historical DSM achievements through 2022 as a percent of retail sales.

Figure NCM-D-2: DSM Achievements as Percent of Retail Sales



The dark gray portion at the top of each column in Figure NCM-D-2 represents the cumulative impact of DSM in each year, while the line illustrates the growth in that impact as a percent of the total energy needs of customers in each year. Thus, in 2019, it can be seen that total end-use customer energy needs were just over 160 million Dth, and energy savings from DSM met 3.6% of that need. In 2022, 5.3% of customer energy needs were met with energy savings from gas DSM.[8]

[8] Another way of thinking about this is to say that, without the cumulative impact of DSM activity since 2010, gas sales in 2022 would have been 5.3% higher than they were.

Q. CAN YOU COMMENT ON THE SIGNIFICANCE OF FIGURE NCM-D-2 IN THE CONTEXT OF CLEAN HEAT?

A. Figure NCM-D-2 demonstrates two important considerations to contextualize where we need to go with additional gas DSM/BE penetration in Clean Heat. First, it shows the Company has made significant progress driving increased gas savings from DSM over time, viewed in terms of the percentage of customer energy needs delivered by such savings. Second, it demonstrates that while gas DSM energy savings have provided an increasing portion of total customer energy needs over time, they still account for a relatively small overall portion of those energy needs, underscoring the challenges associated with the dramatic but necessary increase in gas DSM and BE, which I discuss later in Sections III and IV of my Direct Testimony.

Q. CAN YOU EXPLAIN HOW DSM ACHIEVMENTS WILL BE CONSIDERED IN THE CONTEXT OF CLEAN HEAT AS COMPARED TO THE TRADITIONAL DSM FRAMEWORK?

A. In the traditional DSM context, we rely on a cost-effectiveness assessment (the modified Total Resource Cost Test ("mTRC")) to determine if the benefits to be delivered by a specific DSM measure or program exceed the costs of that measure or program, on a present-value basis. "Benefits" under this test include the dollar value of the fuel and capacity saved by the measure, as well as the social cost of emissions that are avoided through the measure. "Costs" include utility program

costs such as marketing and program administration, as well as the cost to the customer of purchasing and installing the measure.[9]

DSM achievement traditionally is quantified in terms of first-year energy savings. Additionally, savings achievements in traditional DSM are considered in terms of "net savings," which is to say we try to isolate just those savings delivered as a result of our DSM initiatives.[10] By contrast, in the Clean Heat context, the primary metric is total gross emissions, and cost-effectiveness is considered simply relative to other means of reducing emissions. Notions like first-year savings, "net-to-gross" adjustments, and the mTRC, familiar to the Commission and stakeholders from the Company's SI proceedings, do not apply. In the next section of my testimony, I will describe the role of DSM programming in achievement of Clean Heat emission reductions targets.

[9] Utility rebates are ignored by the mTRC since they simply represent a transfer of dollars from the utility to the customer. It is also important to understand that the customer cost considered by the mTRC is typically the "incremental cost" – that is, the difference in customer cost between the hypothetical baseline option and the more efficient option (which frequently has higher upfront cost).

[10] "Gross savings," on the other hand, reflect the total savings that customers will realize and is generally greater than "net savings" due to an expectation that some participants would have pursued energy-saving measures even without the utility's influence.

III. CLEAN HEAT TARGET AND CONTRIBUTIONS FROM DSM

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. In this section of my testimony, I compare the scope of the Company's existing DSM programs, including BE, with the requirements of Clean Heat.[11] Specifically, I compare the budgets and natural gas savings goals established in the 2022 SI Proceeding with the range of incremental contributions from DSM and BE that will be required under various portfolios modeled by the Company, as well as the costs to achieve those incremental contributions.

Q. ARE THE SAVINGS GOALS ESTABLISHED BY THE COMMISSION IN THE 2022 SI PROCEEDING SUFFICIENT TO ACHIEVE THE CLEAN HEAT GOALS ESTABLISHED IN LEGISLATION?

A. No. Based on the modeling conducted by E3, significantly more DSM will be required under any portfolio that seeks to achieve the Clean Heat goals. Moreover, that incremental achievement will require significantly more investment than has been approved for existing DSM programming. E3 Witness Mr. Dan Aas discusses the modeling results in further detail in his Direct Testimony.

Q. CAN YOU PROVIDE A HIGH-LEVEL COMPARISON OF THE PORTFOLIOS MODELED BY E3?

A. Table NCM-D-1, below, provides a comparison of the estimated annual cost of the DSM and BE portions of the various modeled portfolios. It is important to bear in

[11] The Company intends to focus the efforts to increase BE adoption through Clean Heat on its customers who take both electric and gas service from the Company, as the Company currently has over one million such customers. Mr. Ihle describes the rationale for this tactic in his testimony.

mind that the costs in Table NCM-D-1 are incremental to the DSM budgets established in the 2022 SI Proceeding.

Table NCM-D-1: Incremental DSM/BE Cost By Portfolio Comparison

	Estimated Average Annual Cost (2024-2030) $M[12]	2030 Emissions Target Achieved?
Cost Target	$42	No
Emissions Target	$191	Yes
Clean Heat Plus	$98	Yes
Electrification Only	$587	Yes

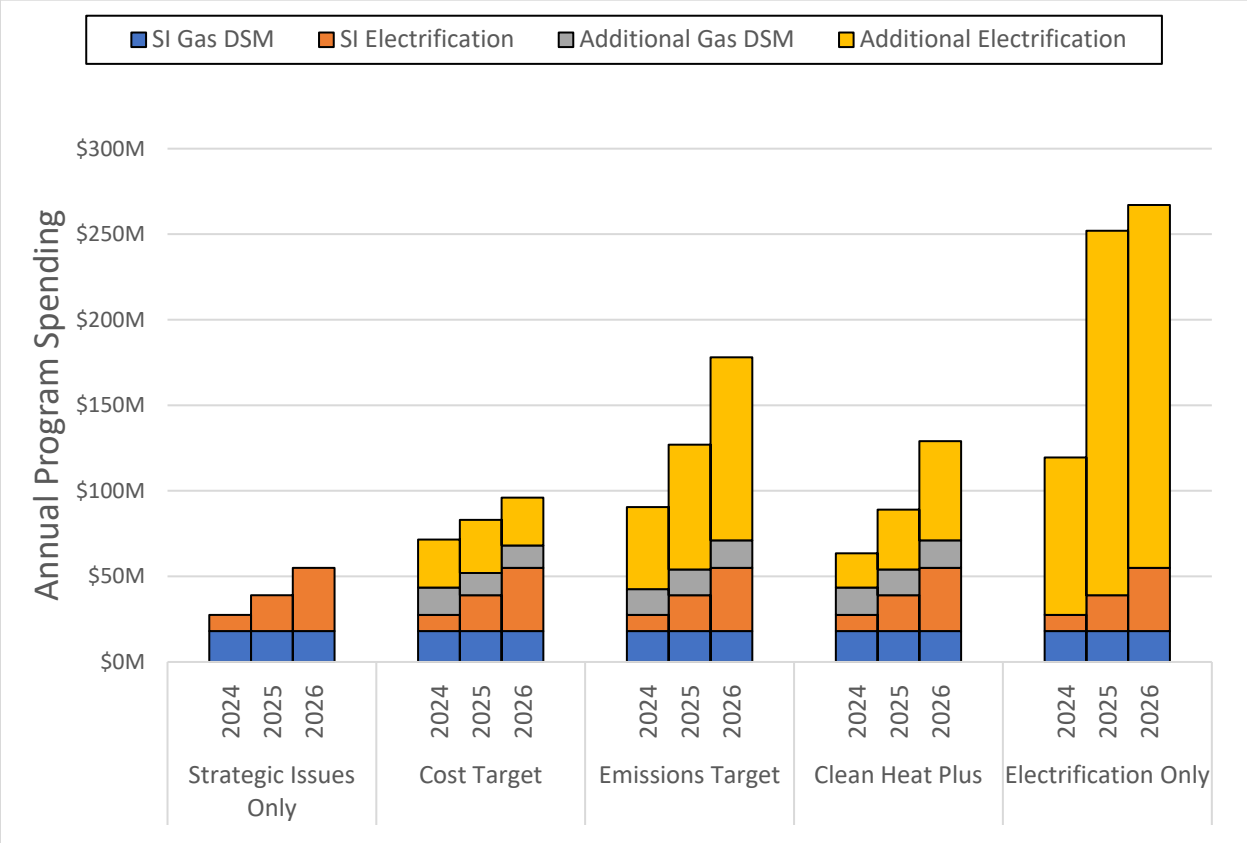
Q. HOW DOES THE SCALE OF INCREMENTAL DSM PROGRAM ACTIVITY CALLED FOR UNDER THESE VARIOUS CLEAN HEAT PORTFOLIOS COMPARE TO APPROVED DSM TARGETS FROM THE 2022 SI PROCEEDING?

A. As I noted previously, the Commission approved three-year gas savings goals in the 2022 SI Proceeding. In total, the Commission approved approximately 4.6 million Dth savings with a total three-year budget of approximately $122 million. Figure NCM-D-3 below compares the approved DSM and BE budgets with the amounts necessary under the various Clean Heat portfolios.[13]

[12] These figures are presented as 2024 to 2030 budget figures given the table is oriented around the projected achievement of the 2030 Clean Heat target. Other budget figures throughout the Company's Direct Case, however, are presented as 2024-2028 figures because that is the Clean Heat action period for this Clean Heat Plan.

[13] These budget figures are based on the E3 modeling for each portfolio. Because the modeling conducted by E3 is designed to develop cumulative cost of abatement estimates, it is difficult to directly compare the annual savings goals approved in the 2022 SI Proceeding to the DSM contributions estimated in the model. The comparison here thus focuses on spending levels.

Figure NCM-D-3: DSM & BE Budgets from SI Proceeding with Additional Spending Under Clean Heat Portfolios, 2024-2026



As the figure shows, the cost of DSM under any portfolio that achieves the emissions target is dramatically greater than what the Commission approved in the 2022 SI Proceeding. Even the Cost Target Portfolio represents additional DSM spending in 2024-2026 that is roughly equal to the budget approved in the 2022 SI Proceeding. In other words, spending twice the amount approved by the Commission for DSM/BE in the 2022 SI Proceeding would, alone, fall well short of the Clean Heat emissions targets. In addition, the figure above only reflects spending in 2024-2026 – the annual spending projected by the model in later years is even greater.

Q. HOW DO ENERGY EFFICIENCY AND ELECTRIFICATION COMPARE TO OTHER RESOURCES IN TERMS OF THEIR RELATIVE CONTRIBUTION TO OVERALL EMISSION REDUCTIONS?

In all the portfolios modeled, DSM – the combination of EE and BE – drives more than half of the total emission abatement, and in some portfolios a much larger share – up to 100%.

Q. WHY DOES DSM PLAY SUCH A PROMINENT ROLE IN ALL OF THE PORTFOLIOS MODELED?

A. DSM contributions are significant in all of the portfolios primarily because demand-side options represent one of, if not the, lowest-cost resource to achieve emission reductions, despite the high overall cost. Indeed, energy efficiency (and some other forms of DSM) frequently has a negative lifetime cost – meaning it saves both emissions and money in the long run. Even where the cost is not negative, it is generally considerably lower than the cost of low-carbon fuels. This is partly because those fuels tend to be more expensive than conventional natural gas, and also because low-carbon fuels must be purchased every year, whereas DSM measures reduce emissions throughout the lifetime of the measure.

Q. PLEASE DISCUSS THE DISTRIBUTION OF DSM ACTIVITY BETWEEN ENERGY EFFICIENCY AND BENEFICIAL ELECTRIFICATION.

A. E3's modeling shows that, in all portfolios, the majority of DSM-related spending and emission reductions comes from BE, as opposed to EE.[14] This is because, while energy efficiency is critically important, there are limits to how efficiently any fuel can be used and modern furnaces already have efficiency ratings nearing 100 percent. Weatherization can reduce the customer's annual heating load, and a high-efficiency furnace can meet the remaining load with a minimum of gas consumption – but particularly in a cold climate, that minimum remains substantial. In order to make significantly greater reductions in emissions, it is thus necessary to move away from natural gas technologies and toward non-emitting[15] ways to meet at least a portion of end-use needs, i.e., to electrify either partially or fully.[16][17]

Q. IS THERE ANYTHING ELSE YOU WISH TO HIGHLIGHT ABOUT THE CONTRIBUTIONS OF ENERGY EFFICIENCY RELATIVE TO BENEFICIAL ELECTRIFICATION?

A. Yes. E3's models were developed prior to the Commission's 2022 SI Proceeding Decision. In that Decision, the Commission directed the Company to begin phasing out incentives for a number of energy efficiency measures which have

[14] EE is the primary non-electrification form of DSM that is relevant for Clean Heat; other forms of gas DSM – such as demand response – are important but function primarily as capacity resources and have only modest emission reduction contributions. The E3 model refers to both "BE" and "gas DSM", but really only considers EE in the "gas DSM" category.
[15] It is worth remembering that electric-sector emissions are not included in the E3 modeling, however, due to the high efficiency of most heat pump technologies and the continuing decarbonization of electricity, the increase in electric-sector emissions due to BE is generally likely to be smaller than the decrease in emissions from customer gas consumption.
[16] I will further discuss the topic of "full" vs. "partial" electrification later in my testimony.

historically represented a considerable share of DSM savings. Specifically, the Decision calls for a phasing out of incentives for gas-fired appliances for both space and water heating in both new construction and retrofit applications, on various timetables. The impact of this requirement could not be incorporated into E3's model before this filing, with the result that the model over-states the available contribution from additional EE. In other words, the portfolios modeled by E3 assume the availability of emission reductions from efficient gas appliances, which will not be available in practice.

In addition, in selecting between resources, the E3 model prioritizes measures that represent the lowest cost per ton of emissions avoided. This means that it tends to select electrification measures over building shell measures, for the reason I described earlier: shell measures can reduce a portion of the heating-related emissions, but electrification can potentially eliminate the emissions entirely, at least from the perspective of the model. As previously noted, however, electric system costs are not considered by the model, nor are customer electric bills. Building shell measures will be essential to ensure the newly-electrified heating load is manageable both in terms of customer bills and in terms of the electric system overall. Another way to frame this might be to say that BE tends to turn weatherization into an electric EE measure rather than a gas EE measure, and electric EE measures are out of the model's scope.

Q. HOW DOES THE CONTRIBUTION FROM DSM IN THE CLEAN HEAT PORTFOLIOS COMPARE TO THE ROLE OF DSM IN REDUCING ELECTRIC-SECTOR EMISSIONS?

A. First, let me focus on some general differences between achieving electric emission reductions and gas emission reductions. When seeking to reduce electric emissions, the goal is to replace fossil-fuel generation with non-emitting sources of electricity. Demand-side resources have a critical role to play and make it possible to achieve that replacement at lower cost. Primarily, though, it is a matter of obtaining electricity from different sources and can thus be thought of as a supply-side problem. There are a number of viable alternative ways to produce electricity, and from an end-user's perspective, electricity produced from one source is indistinguishable from electricity from other sources. Critically, there are also a relatively small number of decision-makers who must be convinced to make changes, and a relatively small number of changes that must be made in order to make significant reductions in electric emissions.[18]

When it comes to natural gas, achieving emission reductions is a very different proposition. Many supply-side alternatives to natural gas (such as biogenic methane) are limited in terms of the overall available resource. And those limited alternatives are, at least currently, considerably more expensive than conventional natural gas. Further, in some cases, these alternatives have only limited interchangeability with natural gas. This means that reducing natural gas

[18] I acknowledge that this is an over-simplification and do not mean to diminish the cost, difficulties, or complexity of moving to a carbon-free electric system. I am simply discussing in broad strokes the ways in which the challenge differs when it comes to natural gas.

emissions will need to rely much more heavily on demand-side solutions like energy efficiency and electrification. This, in turn, means that there are a vast number of individual decision-makers – primarily customers – who must be convinced to take action. And ultimately, adoption – or not – is up to each individual customer.

Q. WHAT FACTORS DRIVE THE DSM AND BE COST ESTIMATES SO HIGH?

A. There are two primary drivers, which are related to each other. First, the need to achieve a very high level of DSM/BE participation (whichever portfolio is considered) means that any given incentive amount must be paid to a large number of customers. As an example, the Clean Heat Plus portfolio anticipates 14,200 new heat pump installations in single family homes in 2025 (both hybrid and all-electric). If the Company paid rebates of $2,200 (as just approved in the 2023 DSM/BE Plan) for each installation, that cost alone would be over $31 million (exceeding the BE budget approved by the Commission for 2025 in the 2022 SI Proceeding).

Second, it is likely that achieving that level of participation would require a much higher incentive amount per unit, driving costs higher still. As a result, the model estimates BE program costs in 2025 of $35 million for Clean Heat Plus, and considerably higher in later years (exceeding $100 million by 2028).[19] The other portfolios have varying estimates of program cost, but the underlying drivers of

[19] Costs in the model include both incentive and program administration costs; Mr. Aas discusses the model assumptions, including assumptions related to necessary customer incentive levels, in his Direct Testimony.

high participation levels needed to achieve emission targets, and high incentives needed to achieve those participation levels, are common to all.

Q. ARE THERE OTHER COSTS NOT DIRECTLY REFLECTED IN THE VARIOUS PORTFOLIOS?

A. Yes. The E3 modeling, described in greater detail by Mr. Aas, is based on choosing portfolios that select lowest-cost resources – at least, lowest cost from the perspective of the gas system and program participants. As Mr. Ihle discusses in his Direct Testimony, the E3 model doesn't "see," and doesn't seek to quantify, the cost of increased electrification on the electric system (e.g., substation upgrades, additional distribution facilities, and other electric system investments necessary to handle the increased electric load associated with significantly increased electrification). The portfolio cost estimates also do not capture either customer premise improvement costs that might be required to accommodate BE (e.g., electric panel or interior electrical wiring upgrades) or the cost of measures that might exceed any incentive from the utility.[20] All of these costs are incremental to those estimated by the E3 modeling, and they will increase with higher levels of electrification.

[20] These customer costs – both wiring upgrades and measure costs beyond the amount of an incentive – are considered by the model in selecting Clean Heat resources, but excluded from the portfolio cost estimates, which represent only the Company's costs.

Q. COULD YOU PROVIDE A MORE TANGIBLE EXAMPLE OF THE EXPANSION OF DSM ACTIVITY NECESSARY TO ACHIEVE CLEAN HEAT EMISSION REDUCTION TARGETS?

A. Yes. As I mentioned earlier, the Company achieved gas savings of about 58,000 Dth in 2022 from fuel-switching measures, primarily heat pump systems for residential space heating. These savings were achieved through the installation of about 2,000 heat pump systems.

By comparison, E3's modeling suggests that between 200,000 and 400,000 heat pumps must be installed over the course of just seven years, depending on the portfolio at issue. This means that an annual average of between 28,000 and 57,000 heat pumps must be installed in every year beginning in 2024 – roughly fourteen to twenty-eight times the number installed in 2022. I address the challenges of scaling up DSM activity to this level in the next section of my testimony.

IV. SCALING UP DEMAND SIDE MANAGEMENT

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. As I noted above, driving the emissions reductions necessary to achieve the aggressive Clean Heat goals will require dramatic increases in DSM achievements, particularly for BE. This is true across all Clean Heat portfolios. Even under the relatively lower cost Clean Heat Plus portfolio, incremental DSM and BE spending averages $98 million per year, in addition to the $40.5 million per year (average) that the Commission just approved in the 2022 SI Proceeding. More aggressive DSM and BE portfolios are significantly more expensive. However, program costs are not the only consideration. In this section of my testimony, I discuss some of the additional factors, beyond program budgets, that will make it challenging to scale DSM activity to the required levels.

Q. WHAT DO YOU SEE AS THE FIRST MAJOR SUCH CHALLENGE?

A. The question of customer adoption is critical to reaching Clean Heat emission reductions goals. As I mentioned earlier, there are a vast number of individual customers who must be convinced to adopt energy efficient and/or electrification technologies. Our current tools to drive customer adoption are primarily education, marketing, and financial incentives. While the level of a given promotion or incentive will have an effect on adoption rates, adoption is ultimately an issue beyond Company control because it comes down to choices our customers make. We do not have the authority to forcibly retrofit a customer's home or dictate a builder's construction design. And even with a broad, well-funded and aggressive effort, it will take time to build customer awareness around heat pumps and to

change preferences given both the higher up-front cost of heat pumps and the familiarity and comfort of many customers and equipment installers with natural gas appliances[21]. While we have a successful history of convincing customers to take action by providing incentives, the sheer number of customers that must be moved to action in order to achieve Clean Heat goals will require unprecedented levels of spending.

Q. ARE THERE OTHER CONSIDERATIONS THAT PRESENT CHALLENGES TO CUSTOMER ADOPTION?

A. Yes. Because cost is such a significant consideration when deciding to electrify (or change any appliance), customers generally tend to replace end-use technologies at or near the end of the appliance's lifetime. People generally do not seek to replace new or even adequately functioning appliances because of the long lifetimes and high upfront costs. Furthermore, if a customer does make the decision to replace an appliance – early or at end-of-life – they must be able to incur the capital costs associated with that decision, which may include more than the cost of the appliance itself. If the customer chooses to convert from natural gas to electricity, there is a potential that the home's electrical system may not be sufficient to provide service to the new appliance. Electrification could thus require increasing panel size, running new or upgraded wiring, or installing new fixtures and outlets. These costs are on top of the potentially significant capital investment

[21] When asked the questions "When heating your home, do you prefer to use gas or electric heat?" and "When heating the water in your home, do you prefer to use gas or electricity?" in the 2021 ENERGY STAR New Homes program evaluation, 61% of customers preferred or somewhat preferred natural gas for space heating and 51% preferred or somewhat preferred natural gas for water heating. 2021 Energy Star New Homes Evaluation.pdf (xcelenergy.com)

that comes with any new appliance, and which customers may struggle to afford even for relatively lower-cost minimum-efficiency equipment. In addition, the capital investment cost for a new heat pump varies by the type of heat pump (e.g. air source versus ground source) and the heating load.

Additionally, electrification of space and water heating end uses may have different performance characteristics when compared to natural gas fired space and water heating appliances. As an example, heat pump water heaters typically have lower first hour capacities and longer recovery times than comparable natural gas fired units. Similarly, heat pumps used for space heating typically have slower recovery times from overnight setbacks when compared to natural gas furnaces. These subtle differences in performance may affect customer adoption as well as contractor willingness to recommend the technology.

Finally, air-source heat pumps ("ASHP"), at least currently, have technological limitations which must be kept in mind.

Q. PLEASE SUMMARIZE THE TECHNOLOGICAL LIMITATIONS TO WHICH YOU REFER.

A. I am not an engineer but can give a general overview of the topic. As I previously noted in my Direct Testimony in the 2022 SI Proceeding, there are a number of reasons to be cautious about embracing "full electrification" of existing buildings, some of which relate to these technical challenges.[22] In general, the ability of heat pumps to deliver heat to the inside of a building degrades at very cold

[22] *See* 2022 SI Proceeding, Direct Testimony of Nick C. Mark Direct at pp. 48-50.

temperatures. Both the heat pump's coefficient of performance (or "COP", a measure of heat pump efficiency) and its heating capacity (the amount of heat it can deliver at a given time) decline as temperatures drop. A useful analogy is to consider a water pump trying to move water up an elevation difference: the greater the difference in elevation, the harder the pump must work. As the difference in elevations increases, it requires more energy to move the water and the rate at which the water reaches the desired height will be slower. In this analogy, the difference in elevation corresponds to the difference in temperature between outdoor air and the desired indoor temperature. When that difference is relatively modest, the heat pump is extremely efficient; as the difference grows the efficiency and amount of heat the unit can deliver both drop, and at a certain point the heat pump is unable to deliver enough heat to keep the building at the desired indoor temperature.[23] The specific temperature at which this occurs will vary by system and the building in which it is installed, and much of the recent advancement in heat pump technology has been focused on ways to allow the heat pump to continue operating both effectively and efficiently at lower temperatures.

Q. ARE THERE ANY OTHER FACTORS WHICH MAY AFFECT AN ASHP'S ABILITY TO PROVIDE HEAT EFFICIENTLY?

A. Potentially, yes. The Company has been working with the National Renewable Energy Laboratory ("NREL") to understand how ASHP performance is affected by the combination of cold temperatures and high altitude, which characterize much

[23] The same phenomenon can occur when a heat pump is being used for cooling, but even on the hottest days of summer, the difference in temperatures between indoor and outdoor air is much smaller than it is during the winter, and so the effect is much less pronounced and tends not to create performance issues.

of the Company's service area. Early findings suggest that the lower density of air at high altitude reduces the effectiveness of heat transfer, reducing the efficiency and capacity of the system similarly to the impact of low temperature. The Company plans to continue working with NREL, including through field studies at high altitude in the coming heating season, to better understand the potential importance of this effect with regard to ASHP performance.[24]

Q. WHAT HAPPENS WHEN A HEAT PUMP IS UNABLE TO PROVIDE THE NECESSARY AMOUNT OF HEAT?

A. Generally, it must rely on a backup system. Specifically, this can vary based on the system configuration. Some systems retain natural gas (or other combustion fuels) as the backup system, while others use electric resistance heating as backup. Some are designed to "cut over" from the heat pump to the backup system at a specific outdoor temperature, while others keep the heat pump running to provide as much heat as possible and supplement with the backup heat source to meet the full load. This latter configuration is generally more likely to be found when electric resistance is the backup.

Q. DOES THIS NEED FOR BACKUP HEAT HAVE IMPLICATIONS FOR THE UTILITY SYSTEM?

A. Yes, and potentially for both the gas and electric system. If natural gas is the backup fuel, installing a heat pump may not result in any change in the peak gas

[24] Ground-source heat pump systems are much less subject to performance degradation due to air temperature or altitude, because they rely on relatively constant ground temperatures. However, their applicability can be limited due to lack of space available to install the necessary ground heat exchange loops as well as the high cost of installation.

demand of the building, meaning that the same amount of gas utility infrastructure will be required, even as the building's total annual gas consumption declines steeply. If the backup is electric resistance, the relative inefficiency of that technology will exacerbate the impact of heating needs on the electric system, accelerating both the transition toward a winter-peaking electric grid and the need for additional electric system investment to support the new load. It should also be noted that the efficiency of even the best cold climate ASHP units currently available degrade to very near a COP of 1.0 (the same efficiency as electric resistance) at design day temperatures in the PSCO service territory.

Q. GIVEN THE TECHNOLOGICAL LIMITATIONS OF HEAT PUMPS, WILL THE INSTALLATION OF A HEAT PUMP ALWAYS RESULT IN THE ELIMINATION OF GAS HEAT TO A PREMISE?

A. No, installation of a heat pump will often not result in the "full electrification" of a premise's heating requirements. While in some cases full electrification will be a good solution, a "hybrid" or "dual-fuel" system that retains a gas appliance to provide backup heat for the coldest times of year may be a preferable option for many customers and would still provide considerable emission reductions even while retaining gas service. As an example, a customer choosing to replace a failed air conditioner with a heat pump, while retaining their working furnace to provide heat for any needs the heat pump is unable to meet, could result in substantial annual emissions reductions. Indeed, E3's modeling suggests more than half of buildings installing heating system electrification measures will use hybrid systems under both the Emissions Target and Clean Heat Plus portfolios.

Q. CAN YOU PROVIDE AN EXAMPLE OF ANOTHER NEW TECHNOLOGY THAT PROVIDES INSIGHT INTO THE PACE OF CUSTOMER ADOPTION?

A. I think electric vehicles ("EVs") provide a useful comparison. EVs have grown rapidly in market share in recent years and have increasingly been hailed as the future of transportation, including by automakers. However, that momentum took time to build, and even today EVs remain a small fraction of both the overall vehicle fleet and new car purchases despite considerable and long-standing efforts to incentivize their adoption. And customer acceptance and widespread adoption of BE, by comparison, may take even longer: Stock turnover for vehicles is considerably faster than for heating and cooling equipment; the average age of cars on the road in the U.S. is 12.2 years,[25] compared to the 18–20-year lifetime typical for HVAC equipment.

Q. IS CUSTOMER ACCEPTANCE THE ONLY CONCERN WITH REGARD TO QUICKLY SCALING-UP DSM TO THE LEVELS REFLECTED IN THE VARIOUS E3 PORTFOLIOS?

A. No. Achieving the emission reductions goals will also require collective efforts from our communities, trade partners, contractors, and supply chains. There is no easy solution or "silver bullet" waiting in the wings to quickly transform the marketplace or to immediately drive down the cost of retrofitting customer end-use technologies. As an example, we will need a supply chain and contractor base

[25] US Bureau of Transportation Statistics, "Average Age of Automobiles and Trucks in Operation in the United States," https://www.bts.gov/content/average-age-automobiles-and-trucks-operation-united-states, accessed 7/28/2023.

that is capable of meeting demand. Today, the market – whether it involves retrofit appliances or new home construction – is designed primarily towards dual-fuel systems, *i.e.,* electric cooling and gas heating. When a customer decides to electrify – again typically when an appliance is at or near the end of its life – for the sake of comfort and safety they will want to replace the appliance quickly. Thus, if a customer decides to replace a failed heating system, they are unlikely to be in a position to wait multiple weeks for a heat pump to be in-stock.[26] Heat pump installers and distributors will need to keep inventory on hand to meet short term demand, regardless of the season. Similarly, as more customers electrify, we will need a sufficient number of qualified and knowledgeable technicians capable of sizing and installing new equipment. If we – collectively – fail to timely meet demand or customer expectations for comfort and convenience, the appeal of electrification will be tarnished and efforts to transform the market will suffer a set-back.

Q. GIVEN ALL THESE CONSIDERATIONS, DO YOU BELIEVE THE LEVELS OF INCREASED DSM AND BE ADOPTION REQUIRED TO MEET CLEAN HEAT GOALS CAN BE ACHIEVED?

A. Yes I do, though it does present a daunting challenge, for the reasons I've described. To begin with, like everything about addressing climate change, this is not a matter of finding new technology to solve a problem – we have the technological tools we need and have had many of them for decades. What we

[26] The same is true for traditional air conditioning equipment that fails in the summer cooling months; customers will be much less likely to install a heat pump to replace an air conditioning unit that failed in July if that heat pump will not be available until October.

need is innovative and ambitious deployment strategies that get people to act, willingness to push hard (and possibly make some mistakes), and business and policy drivers to manage the cost implications of large-scale deployment. The Company believes we can change customer and market attitudes and perceptions, though it will not be easy at this scale, and we will need support from the Commission and stakeholders.

Q. HOW CAN THE COMPANY INFLUENCE CUSTOMER ATTITUDES AND PERCEPTIONS?

A. While we need to be realistic about the limits of the market today and our ability to transform those markets quickly, we have experience here, and the Company has previously been successful in promoting adoption of other technologies, such as LED lighting and smart thermostats. Specific to BE, as discussed further by Mr. Ihle in his Direct Testimony, we have partnered with several stakeholders to develop and implement two market transformation BE demonstration projects as well as to integrate BE strategies into two non-pipeline alternative projects. These projects will give us the opportunity to better understand what the necessary steps are to bring customers, contractors, trade allies, and communities along with this market transformation. We can then leverage the insights from those efforts to quickly modify our existing DSM and BE programs to better target, educate, and incentivize the adoption of BE and DSM more broadly.

Q. HOW WILL THE COMPANY APPROACH OTHER POTENTIAL CHALLENGES TO SCALING UP THAT YOU HAVE ADDRESSED IN YOUR TESTIMONY?

A. To illustrate, I provide two examples relating to supply chains and to contractor education and training. With respect to supply chains, the Company has a history of providing incentives to distributors and manufacturers to ensure that appliances are in stock and available to customers on demand. This has long been a strategy with respect to high efficiency air conditioning and space heating equipment. If a customer needs to replace an appliance on-demand, they will select the most readily available appliance, and if high-efficiency units are not in stock they will not wait long and will simply select less efficient units. While upstream or midstream incentives are not a new strategy, they are not cheap and easy. Manufacturers and distributors will want to see not only incentives to stock appliances but customer demand (which will require incentives) to purchase the inventory. If incentives (and therefore demand) are lacking, manufacturers and distributors will shift to other markets or cut back their efforts both of which risk slowing progress.

The Company also has some role to play in educating and training contractors and trade partners. Again, we have a long history of offering training to contractors that participate in our programs. Such training ensures we get good results from our investments in DSM but also that customers receive a quality service - which will make them more likely to encourage others to follow suit or to choose a more efficient option next time. In our 2022 DSM Strategic Issues filing, we foreshadowed our commitment to continued contractor training and engagement for BE.

Q. DO YOU HAVE ANY CONCLUDING THOUGHTS REGARDING THE ACHIEVEMENT OF DSM AND BE EFFORT AT THIS SCALE?

A. First, as I've discussed throughout my testimony, growing DSM and BE to the scale necessary to achieve the Clean Heat goals is uncharted territory. While I believe it is achievable, it will be difficult, and success is by no means certain. Accordingly, prudence calls for a diversified approach to emission reductions, to afford the Company, the Commission, and stakeholders the opportunity to evaluate what is working well and what is not and change strategies if necessary. The Clean Heat Plus portfolio provides that diversified pathway. If we solely focus on one solution or another, we risk the loss of critical time necessary for early action on LDC emission reductions. As the cost-effectiveness and efficacy of the various components of the Clean Heat Plus portfolio become clearer, we can pivot in future Clean Heat Plans to maximize the cost-effectiveness and emission reductions benefits. Successful strategies such as that proposed by the Company hedge bets and diversify risks.

Second, while the Company is prepared to lead, all stakeholders must recognize that this needs to be a collective effort in order to succeed. We fully expect to continue to develop new and creative approaches to program implementation and promotion over time, both through our own efforts and in collaboration with our customers, communities, trade allies, and policy-makers. The innovative mobilization strategies I mentioned earlier will need to be developed with support from all of these partners. And success will also require

fresh thinking in order to manage the cost of the aggressive DSM efforts described here, which is the topic of the next section of my testimony.

V. NEW APPROACHES TO DSM/BE FUNDING

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. In the previous sections of my testimony, I discuss the considerable challenges to achieving the necessary levels of customer participation in electrification, efficiency, and related demand-side programming. I also highlight the dramatic increase in utility spending that will be required. I believe that the traditional DSM business model – by which I mean the provision of customer rebates and the concurrent recovery of program spending through the DSMCA rider – may not be a viable approach to achieve the DSM/BE scale required for Clean Heat. In this section of my testimony, I support an approach that can help mitigate the short-term impact of DSM spending and potentially help facilitate achievement at the necessary scale. Mr. Ihle discusses this approach and its mechanics in more detail in his Direct Testimony.

Q. WHY DO YOU BELIEVE A NEW APPROACH TO COST RECOVERY IS NEEDED?

A. Traditional DSM cost recovery models are not designed for the transformational effort necessary under Clean Heat. This is the first-ever Clean Heat proceeding in Colorado, and I urge the Commission to recognize that novel and creative approaches will need to be considered here, in order to develop a business model that aligns Company, stakeholder and customers to drive increased DSM/BE adoption.

There are three factors that lead the Company to this view. First, the level of spending necessary to attempt to achieve the emission reductions that must be

achieved through incremental DSM and BE is significant and unprecedented, as I detailed previously in my testimony. That said, that significantly increased spending is both necessary and appropriate because scaling up DSM/BE to drive further adoption is one of the lowest cost emissions reduction measures available to the Company.

Second, energy affordability is a significant concern in Colorado. New spending at the rate necessary to achieve the Clean Heat targets could, if recovered under the traditional DSM business model, considerably exacerbate that concern. Any of the portfolios that achieve the emission reductions targets represent hundreds of millions of dollars of new DSM spending, which would be reflected directly on customer bills if those costs were to be recovered concurrently.

Third, these efforts will carry significant cost not just in terms of utility spending, but directly for participating customers. I discussed earlier that to achieve the necessary participation rate, high incentive levels are likely to be necessary. Historically, DSM incentives have focused on reducing the incremental cost of more efficient options, but of course the customer perceives the full equipment cost – and so even incentives representing 100 percent of incremental cost (or more) could potentially still leave a customer facing a significant capital investment need in order to replace a failed heating system, often (as I mentioned earlier) on short notice. Given the significant investments to be made and costs to be recovered, the Company believes it is appropriate to consider a funding

approach that reflects these factors and moves beyond the traditional DSM cost recovery models.

Q. WHAT DOES THE COMPANY PROPOSE?

A. Mr. Ihle discusses the broader cost recovery proposal, which we believe can support the required levels of increased DSM/BE investment, in his Direct Testimony. In summary, the Company requests to recover annual revenue requirements associated with beneficial electrification rebates through the Clean Heat Support Electric Adjustment ("CHSEA"), and additional gas DSM rebates through the Clean Heat Support Gas Adjustment ("CHSGA"). Public Service also proposes to recover both BE and gas DSM costs through a regulatory asset that is amortized over a 15-year period, which I support. As I noted above, it is critical that cost recovery for DSM/BE be designed to align Company, customer, and public policy interests in order to drive the significantly increased DSM/BE adoption that will be required under Clean Heat in a manner that mitigates near-term bill impacts. Approval of the Company's Clean Heat cost recovery proposal is key to success.

Q. WHY IS THIS CAPITALIZATION APPROACH GOOD POLICY?

A. I noted earlier that the barrier to achieving emission reduction goals is not technological, but one of scale. Thought of another way, it is a challenge of deploying capital in ways that result in a lower-carbon energy system. As I also mentioned, unlike many of the investments made to decarbonize the electric system, these capital deployments will not be centralized but rather spread across millions of homes and businesses. Investments in building envelopes, water

heating, and HVAC systems will drive emission reductions in the gas system. The capitalization proposal recognizes this fact and treats program spending the same as capital investment – which, ultimately, is what customer rebates represent.

Q. WHAT ARE SOME OF THE ADVANTAGES OF THE APPROACH PROPOSED BY THE COMPANY?

A. There are several. As discussed throughout my testimony, the modeling indicates that the cost-effective way to achieve targets is through the significant expansion of DSM. While expanded DSM is the most effective tool to achieve direct emission reductions, it is certainly not low cost. By capitalizing and recovering these costs over time, rather than in a single year as under the current DSMCA approach, we can reduce the short-term impact on customer bills. Another advantage is that the proposed approach creates a new model by which the Company can effectively invest directly in the homes and businesses we serve in ways that support both individual customer needs (such as comfort and cost savings) and societal goals like emission reductions. Like traditionally-financed DSM, the effort can create jobs and spur economic development while potentially increasing customer property values. Unlike traditionally-financed DSM, it would better align the timing of costs with the benefits realized from DSM, by spreading those costs out over time. It also creates a way to offer support to customers who may have difficulty obtaining capital through traditional financing options due to factors such as poor credit ratings and does so without creating debt for the customer.

Q. WOULDN'T THIS ESSENTIALLY PUT THE UTILITY INTO THE BUSINESS OF FINANCING CUSTOMER PROPERTY UPGRADES?

A. Only in a sense. I think of this as an early step in the long-term evolution of the utility business model. The proposal would simply direct investment into a new sort of infrastructure, which is one way to think of building shells and heating systems. It is true that many (though by no means all) customers will have access to other financing tools when they seek to make home improvements. However, few of those tools are focused on improvements that drive emission reductions; a home equity lender is unlikely to care if the customer is planning to install a heat pump or a traditional HVAC system as long as they make their loan payments. In contrast, the utility can support projects that not only reduce emissions but also support the utility grid for all customers. As an example, a requirement might be that a customer's heat pump be demand-response enabled in order to better manage peak impacts.

Q. ARE THERE OTHER WAYS THESE INVESTMENTS COULD SUPPORT THE UTILITY SYSTEM FOR ALL CUSTOMERS?

A. Yes. For example, the Company could target particular areas of interest, such as areas where the gas system is capacity constrained: By investing in heat pumps and insulation through new business models such as that proposed by the Company, it may be possible to avoid some capacity expansion investments. The strategy could also be used to direct investments to disproportionately impacted communities and ensure that customers in those communities have equitable access to energy upgrades for their homes and businesses.

Q. HAS THIS CAPITALIZATION OF PROGRAM COSTS BEEN ALLOWED IN OTHER CONTEXTS IN COLORADO?

A. Yes. In Proceeding No. 20A-0204E, the Company's inaugural Transportation Electrification Plan ("TEP"), the Commission approved the Company's request to capitalize customer rebates. In the TEP context, this capitalization was expressly authorized by statute; however, similar principles warranting this approach in the TEP context are applicable here, as Company witness Mr. Ihle addresses in more detail.

Q. DOES THE CLEAN HEAT STATUTE (SB 21-264) EXPRESSLY ADDRESS THE QUESTION OF CAPITALIZING DSM COSTS INCURRED BY A UTILITY AS PART OF A CLEAN HEAT PLAN?

A. No; however, nothing in the Clean Heat Statute precludes this approach, and as in the TEP context, allowing the Company to capitalize these costs can serve to align the Company's incentives with customer interests and state policy.

Q. UNDER THIS PROPOSAL TO CAPITALIZE CLEAN HEAT INVESTMENTS, WOULD THE COMPANY "OWN" ANY ASSETS?

A. No, just as the Company does not own the assets for which it provides clean transportation rebates. The physical assets – the heat pumps, insulation, and other measures that were installed on customer premises – would remain the property of the customer, as in the current DSM framework (and the TEP).

Q. WHAT COSTS DOES THE COMPANY PROPOSE TO CAPITALIZE UNDER THIS APPROACH?

A. The cost of rebates and other incentives used to encourage customer adoption of Clean Heat measures (or those necessary for the installation of Clean Heat measures, such as circuit panel upgrades) would be included. I specify "and other incentives" along with rebates because it is possible that some incentives may not take the form of rebates (for example, if the program directly pays the full cost of a measure and there is no out-of-pocket cost for the participant, this is not a rebate, strictly speaking). In addition, incentives to distributors, manufacturers, and other trade allies to encourage them to stock and promote heat pumps would be included in the capitalization treatment. Program administration, marketing, and other costs that would normally be considered operations and maintenance expense ("O&M"), on the other hand, would follow the traditional concurrent-recovery framework.

Q. WHY IS 15 YEARS AN APPROPRIATE AMORTIZATION PERIOD?

A. As noted by Mr. Ihle, because Clean Heat Plan rebates incentivize and enable customers to make BE investments that will result in customer benefits, emissions reductions, and system efficiencies for years to come, the Company supports spreading out related cost recovery over a commensurate period of time and proposes 15 years. This is roughly aligned with the expected lifetime of most DSM and BE measures that are expected to be installed (e.g., the Company's recently-approved 2023 DSM Plan's technical assumptions include an 18-year lifetime for residential ducted heat pump systems, and a 15-year lifetime for storage water heaters).

Q. IS THE COMPANY PROPOSING THIS APPROACH FOR OTHER ASPECTS OF ITS CLEAN HEAT PLAN BEYOND DSM AND BE?

A. No, this proposal would be limited to the DSM and BE components of the approved Clean Heat portfolio, as discussed in more detail by Mr. Ihle.

VI. CONCLUSION

Q. DO YOU HAVE ANY CONCLUDING REMARKS?

A. As I have made clear through my testimony, Clean Heat is a novel and unprecedented undertaking, and increased DSM and BE will figure prominently here, whichever portfolio is ultimately approved by the Commission. This increased DSM/BE push will be expensive, necessitating a well-considered approach to funding these efforts. It will also evolve over time as we implement our Clean Heat Plan and come to better understand which approaches to increasing DSM/BE adoption are working well, and which are not. While the challenges are significant here, so is the opportunity, though I must emphasize again that success here does not rest solely on the shoulders of the Company. By working in collaboration with the Commission, stakeholders, our customers, Colorado communities, and our suppliers and contractors, we can successfully chart this new path.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

Statement of Qualifications

Nick C. Mark

I graduated from Carleton College with a Bachelor of Arts in History and from the University of Minnesota's Humphrey School of Public Affairs with a Master's degree in Public Policy.

I am the Manager of DSM Strategy and Policy at Xcel Energy. I manage a group whose primary responsibilities are to: (i) ensure that Xcel Energy's energy efficiency, electrification, and other DSM programs are adhering to regulatory policies; (ii) develop long-range goals for the portfolio of programs for resource planning; (iii) track and report on energy efficiency achievements and financial operations; (iv) prepare DSM regulatory reports and filings; (v) provide subject-matter expertise in discussions of state and federal policy with regard to DSM; and (vi) analyze the cost-effectiveness of DSM programs and portfolios in each of Xcel Energy's jurisdictions with active energy efficiency programs or pending legislation. I am also responsible for setting measurement and verification (M&V) policies and ensuring that proper M&V is being conducted for all programs.

I have held this position at Xcel Energy since 2021. Prior to joining Xcel Energy, I spent fourteen years working on regulatory and policy matters related to customer energy efficiency programs at CenterPoint Energy, initially with the title of Administrator, Energy Programs and later as Manager of Conservation & Renewable Energy Policy.