BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of

Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric and Gas Service.

Case 25-E-0072; 25-G-0073

May 30, 2025

Prepared Testimony of:

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I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Alexander Lopez. My business address is 6218 Georgia Avenue NW, Suite #1, Washington, DC 20011.

Q. By whom are you employed and in what position?

A. I am employed by Rewiring America, Inc., ("Rewiring America") as a Senior Manager of Regulatory Policy. Rewiring America is a leading national home electrification nonprofit dedicated to accelerating the transition to clean energy in households and communities across the country. We develop accessible tools, data, and policy solutions that empower Americans to reduce emissions, improve health outcomes, lower energy bills, and build the clean energy workforce of the future.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of the Alliance for a Green Economy ("AGREE").

Q. Briefly describe your educational background.

A. I graduated from Claremont McKenna College in 2003 and received a B.A. degree in Asian Studies. I received an M.A. degree in International Affairs from the Johns Hopkins University School of Advanced International Studies in 2012 with concentrations in Energy, Resources, and the Environment and International Economics.

Q. Please summarize your professional background.

A. I joined Rewiring America in November 2024, where I manage national regulatory strategy across New York, Massachusetts, Michigan, Minnesota, Colorado, Oregon, and Washington. Prior to joining Rewiring America, from 2021 to

2024, I was employed by Uplight – a company that implements utility software solutions for energy efficiency, rates engagement, and demand management – where I was a Senior Product Marketing Manager responsible for customer rates engagement and behavioral energy efficiency solutions. I was employed from 2019 to 2021 by the District of Columbia Department of Energy & Environment as an Energy Program Analyst, where I was responsible for managing the Solar for All community solar program for low- and moderate-income ("LMI") customers and assisted in regulatory matters before the Public Service Commission of the District of Columbia. I was employed from 2013 to 2019 by Oracle Utilities (previously Opower) in various Regulatory Affairs and Market Development roles, where I was responsible for developing and implementing state regulatory strategy supporting demand-side management programs across the Midwest and Mid-Atlantic regions. I was employed from 2012

to 2013 by Northeast Utilities (now Eversource Energy) as a Consultant supporting energy efficiency product development in Massachusetts. My full resume is included as Exhibit__(AL-1).

Q. Have you previously sponsored testimony before the New York State Public Service Commission ("Commission")?

A. No.

Q. What is the purpose of your direct testimony in these proceedings?

A. My direct testimony discusses the marketing, education, and outreach ("MEO") strategies and tools utilized by Consolidated Edison Company of New York, Inc. ("ConEd" or "the Company") to engage its residential customers around rate options that support electrification, help manage customer bills, and incentivize demand flexibility. My direct testimony further makes several recommendations for how the Company

should improve its MEO strategies and enabling tools that deepen customer rates awareness and understanding, increase beneficial rate adoption, and empower customers to achieve greater bill savings — all in service of advancing state energy policy goals for decarbonization, affordability, and grid flexibility.

Q. Briefly summarize the conclusions and recommendations included in your testimony.

A. Electrification of heating and transportation is critical to meeting New York's climate goals, and innovative rate designs—like seasonal flat rates and seasonal time-of-use ("TOU") rates—are essential to ensuring that this transition is affordable, equitable, and grid-beneficial.

However, these benefits can only be realized if customers adopt these rates. The Company's existing heat pump rate (SC1 Rate IV), while

cost-saving for some, suffers from low enrollment due to limited awareness, complexity, and barriers for low-income customers. Since 2020, ConEd's highly successful residential heat pump incentive program (Clean Heat) has installed over 43,000 heat pumps. But only 425 heat pump customers are enrolled in heat pump rates, which means that as many as 99% of Clean Heat participants are missing out on a main opportunity to make their heat pumps more affordable to operate. The magnitude of lost electric bills savings is meaningful at the household level and immense in the aggregate. EDF Witness Nelson estimates that new, more easily understandable heat pump rates could save the average household between $439 and $507 per year in electricity costs, with additional saving opportunities for customers able to shift load to off-peak periods. If the remaining 99% of Clean Heat participants that have not yet enrolled in a heat pump rate enrolled in this

rate, it would unlock between $19.2 million and $22.3 million in annual bill savings, which could increase to between $113 million and $131 million in cumulative bill savings over the 2026 to 2028 rate period.

The proposed MEO plans lack the specificity and ambition needed to drive meaningful customer participation. The proposed enhancements to the Rate Tools are ill-defined and will not support rate comparisons personalized for a customer's specific load profile and DER investment plans.

To unlock the full potential heat pump rates to improve the affordability of electric heat pumps, I recommend the Commission require the Company to integrate rate education into the NYS Clean Heat Program, train staff, contractors and customer service representatives ("CSR") to provide personalized rate advice, expand SC1 Rate IV reporting requirements, modernize rate

engagement tools, and expand the menu of electrification-friendly rates by adopting simpler rate options — such as the proposed Seasonal Heat Pump Flat and Seasonal Heat Pump TOU Rates proposed by EDF Witness Nelson. These steps are necessary to close the gap between heat pump adoption and rate enrollment, and to deliver meaningful affordability and climate benefits to ConEd customers.

Q. How is your direct testimony organized?

A. The remainder of my direct testimony is organized into four sections:

(1) Importance of rate design and customer rate adoption to advance state energy goals;

(2) Opportunity to integrate customer rate education with the Company's implementation of the New York State Clean Heat Program ("NYS Clean Heat Program" or "Clean Heat");

(3) Recommended enhancements to modernize the Company's rate education tools and MEO

efforts; and

(4) Conclusion and summary of recommendations.

II. IMPORTANCE OF RATE DESIGN AND CUSTOMER RATE ADOPTION TO ADVANCE STATE ENERGY GOALS

Q. Please describe how rate design can advance state energy goals.

A. The 2019 Climate Leadership and Community Protection Act ("CLCPA") establishes statewide goals and requirements to achieve a reduction in greenhouse gas emissions of 40 percent by 2030 and 85 percent by 2050 from 1990 levels, and the 2022 New York State Climate Action Council Scoping Plan ("Scoping Plan") (Available: https://climate.ny.gov/-/media/Project/Climate/Files/NYS-Climate-Action-Council-Final-Scoping-Plan-2022.pdf) provides key strategies that will be needed to achieve these goals and requirements. One of the key findings of the

Scoping Plan is that New York State must electrify 1 to 2 million homes with heat pumps by 2030 and 3 million zero-emission light-duty vehicles by 2030, many of which will be battery electric vehicles requiring at-home charging. The urgent need to electrify home heating and transportation creates several challenges for customers and the grid related to load growth, affordability, and equitable access. Innovative rate design, including the residential electrification rate options proposed in Witness Nelson's testimony on behalf of Environmental Defense Fund, helps to mitigate these challenges while creating new opportunities for customers to manage their bills while delivering demand flexibility benefits to the grid.

Q. Does the Scoping Plan establish any strategies related to rate design to support electrification?

A. Yes. Scoping Plan Strategy B7: Align Energy

Price Signals with Policy Goal advises the Commission and the Department of Public Service ("the Department") "to lead consideration of dynamic underlying electric rate structures … that provide appropriate price signals to customers to incentivize deployment and usage of DERs, including heat pump systems, EV charging, battery and thermal storage, and other load flexibility measures that promote more efficient utilization of the electric delivery system and help to mitigate summer and winter system peaks." (Scoping Plan at 206)

Q. Has the Commission recognized the importance of rate design in achieving state energy goals?

A. Yes. In the Reforming the Energy Vision Proceeding (Case 14-M-0101), the Commission adopted Rate Design principles for utility customer and DER compensation. Two of these principles directly emphasize the important role of rate design in advancing policy outcomes:

- "**Encourage outcomes:** Rates should encourage desired market and policy outcomes including energy efficiency and peak load reduction, improved grid resilience and flexibility, and reduced environmental impacts in a technology neutral manner"; and
- "**Policy transparency:** Incentives should be explicit and transparent, and should support state policy goals." (Case 14-M-0101, Staff White Paper on Ratemaking and Utility Business Models, July 28, 2015 at 95)

More recently, the Commission's Grid of the Future Proceeding (Case 24-E-1065) identified rate design as an essential element in developing a Grid of the Future Plan to build a customer-centered, flexible, and resilient electric grid in the attainment of New York State's climate goals. The framework for this proceeding establishes that the Grid of the Future Plan:

- "Must identify the potential for customer savings and benefits through improved, more economically efficient, and more customer-friendly price signals sent to utility customers through the rates and charges on utility bills"; and

- "Should identify whether additional rate options providing stronger time-varying price-signals beyond those already available to customers should be implemented, such as a rate option which may be attractive for customers that install beneficial electrification technologies including ground-source and air-source heat pumps." (Order Instituting the Proceeding at 16-17)

The Commission has also approved specific rate options within rate case proceedings for specific utilities. For example, as I will detail below, the Commission has approved specific time varying and demand-based rates in previous ConEd rate cases with the purpose of accomplishing electrification and load shifting goals.

Q. How can rate design mitigate the load growth challenges related to residential electrification?

A. Residential electrification, especially electrification of heating and transportation,

will lead to an increase in overall demand on the electricity grid. Electrification of home heating will result in a relatively larger increase in peak demand during the winter season. Time-varying rates, such as TOU rates, send price signals that encourage customers to shift energy usage from on-peak to off-peak periods, attenuating growth in residential peak demand.

Q. Why is it important to attenuate growth in residential peak demand?

A. Growth in residential peak demand will require incremental investment in generation, transmission, and distribution assets to meet that peak demand. Rates and other programs that promote load shifting from peak to off-peak periods reduce peak demand growth, thereby enabling more efficient utilization of grid assets and potentially deferring or avoiding investments in new grid infrastructure. This

results in cost savings for customers and improved asset utilization and system resiliency.

Q. How can rate design help reduce peak demand?

A. Decades of empirical evidence reveals that customers reliably shift load in response to TOU price signals. The magnitude of customer load shift is related to TOU rate design elements such as the timing and duration of the on-peak period, the ratio between on-peak and off-peak price levels, seasonal differentiation in rate design, and whether the rate is offered as a default rate (opt-out) or optional rate (opt-in) (see: Sanem Sergici, Ahmad Faruqui, and Sylvia Tang, Do Customers Respond to Time-Varying Rates: A Preview of Arcturus 3.0, January 2023, available: https://www.brattle.com/wp-content/uploads/2023/02/Do-Customers-Respond-to-Time-Varying-Rates-A-Preview-of-Arcturus-3.0.pdf). Rate education,

customer feedback, and use of enabling devices such as smart thermostats can additionally enhance customer response to TOU price signals by increasing awareness and understanding of TOU rates, enrollment in TOU rates, and response to TOU price signals. The potential of residential TOU rates to contribute to grid flexibility is summarized in the Grid Flexibility Potential Study, filed on January 31, 2025, in the Commission's Grid of the Future proceeding (Case 24-E-0165). The Grid Flexibility Potential Study modeling reveals that time-varying rates, including TOU, could result in 700 MW to 1,800 MW of peak demand reduction, depending on the season (Grid Flexibility Potential Study at 9).

Q. How can rate design improve customer affordability related to residential electrification?

A. Rate design can improve customer affordability related to residential electrification in

several ways:

- Seasonal rates that shift the recovery of peak demand-induced costs to summer season rates can result in lower annual electricity bills for heat pump customers.
- Time-varying rates, including TOU rates, create opportunities for customers to shift discretionary loads, such as EV charging, to lower-cost off-peak periods, thereby saving money on their electricity bills. Time-varying rates ("TVR") that reduces peak demand helps avoid peak-related grid costs, keeping rates lower and improving affordability for all customers.
- Increases to the monthly customer charge that are offset by associated reductions in volumetric charges can result in bill reductions for higher-usage customers, including heat pump customers.

Q. How can rate design improve equitable access to

residential electrification?

A. Rate design can assist with an equitable transition to electrified heating. A recent white paper from the American Council for an Energy-Efficiency Economy identifies several rate design options that promote equitable electrification, including percentage of income payment plans, income-graduated fixed charges, and seasonal rates (such as those proposed by EDF Witness Nelson). For more information, see Edward Yim and Sagarika Subramanian, *Equity and Electrification-Driven Rate Policy Options*, September 2023, available: https://www.aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options.

Q. Is good rate design sufficient to deliver the peak reduction, affordability, and equitable access benefits you described in your testimony?

A. No. Good rate design is necessary but not sufficient to deliver these benefits. The

benefits of good rate design are only realized when (1) customers are aware of the available rate options and how they work; (2) customers understand the value of participating in the rate and complete the rate enrollment process; and (3) customers adopt strategies to manage their bills under the new rate – such as behavioral load shifting and device scheduling and automation – and can track their progress on the new rate. Utilities, including ConEd, must play a critical role in educating customers about rate options and provide rate enablement tools that help customers navigate the rate selection process and successfully manage their bills. I discuss these strategies in greater detail in Section IV of my Direct Testimony.

Q. Please summarize the Company's existing residential rate options that contribute to achieving state energy goals.

A. The Company offers two TOU rates for Service

Classification No. 1 ("SC1"): SC1 Rate II and SC1 Rate III. SC1 Rate II was closed to new participants on March 1, 2014. For this reason, my testimony focuses on SC1 Rate III, which remains open to new customer enrollments.

Q. Please describe SC1 Rate III.

SC1 Rate III is a voluntary (opt-in) TOU rate currently open to new participants. SC1 Rate III is a two-period TOU Rate 18-hour on-peak period. The current approved SC1 Rate III has a peak-to-off-peak ratio of 14.1:1 (June 1 to September 30) and 5.2:1 (all other months). The Company proposes to change to peak-to-off-peak ratios of 5.3:1 (June 1 to September 30) and 3.3:1 (all other months), respectively. The Company's proposed modifications to SC1 Rate III would reduce the peak-to-off-peak ratio by 62% in summer (June 1 to September 30) and 38% in all other months (Company direct testimony, EXHIBIT___ERP-2, Schedule 3, Table No. 3).

Q. Can you describe what these ratios mean and why they matter?

A. The TOU peak-to-off-peak ratio is defined as the ratio between the volumetric cost during the on-peak period and the volumetric cost during the off-peak period. Since SC1 Rate III has seasonally-differentiated rates, the on-peak and off-peak ratios are different in the summer and non-summer periods. Empirical studies of TOU rate programs reveal that customer load shift increases in proportion to the peak-to-off-peak ratio. Therefore, a decrease in the TOU peak-to-off-peak ratio is likely to result in less load shift, and vice versa.

Q. Are the Company's current residential TOU rates (current or proposed) sufficient to achieve state energy goals?

A. No. The on-peak periods for the SC1 Rate III (16 hours) is too long to encourage load shifting.

Best practice for TOU rates is to limit on-peak periods to 3-6 hours to allow customers to shift usage away from on-peak periods. The existing TOU rate structures are likely to attract customers whose existing load profile favors overnight usage (i.e., structural winners) but are unlikely to attract customers interested in managing bills through load shifting, with the possible exception of overnight EV charging.

Q. How are the proposed changes to the Company's TOU rates likely to impact customer load shifting?

A. The Company proposes to significantly reduce the peak-to-off-peak price ratio in both the summer and non-summer seasons for SC1 Rate III. It is generally understood that a higher peak-to-off-peak price differential yields greater customer load shifting, and so the Company's proposed change would lead to lower levels of customer load shifting. However, as I

explained previously, the long durations of on-peak periods in the Company's existing TOU rates already discourage customer load shifting. Nonetheless, the proposed reduction in the peak-to-off-peak ratio would likely result in even less customer load shifting.

EDF Witness Nelson proposes a Heat Pump Seasonal TOU Rate with a six-hour on-peak period, which is more appropriate to incentivize customer load shifting.

Q. Apart from TOU rates, what other residential rate options does the Company offer that promote state energy goals?

A. The Company offers SC1 Rate IV, which is a voluntary (opt-in) demand-based rate. This rate is marketed to residential heat pump customers as offering potential bill savings relative to the default SC1 Rate I.

The design of SC1 Rate IV recovers variable

distribution costs through a monthly billable demand rate ($/kW) rather than through a volumetric rate ($/kWh). The billable demand rate is calculated as the average of the three highest maximum daily demands occurring in each time period for the applicable billing period, with on-peak periods defined as noon to 8:00 pm (excluding holidays) and off-peak periods defined as all other hours.

Q. What kind of customer behavior does the SC1 Rate IV encourage and why is that beneficial to heat pump customers and the grid as a whole?

A. The SC1 Rate IV sends price signals that theoretically encourage a reduction in non-coincident peak demand during the on-peak period of noon to 8:00 pm (i.e., the customer's highest hourly demand within the on-peak period). In theory, this shift in non-coincident peak demand may yield capacity benefits for the grid. However, demand charges don't necessarily

reduce coincident peak load in a coordinated way, and often don't result in meaningful behavior change due to confusion or inability to act.

The Company's demand-based rates have not resulted in measurable reduction in peak demand. The Company tested customer response to a different demand based rate in the Innovative Pricing Pilot. The evaluation of the pilot results found that "there is not currently sufficient evidence to conclude that customers are able or willing to respond in a significant manner to the [demand-based] rates tested in Wave 1 through Wave 3 of the Pilot" (*Innovative Pricing Pilot Evaluation Wave 1, Wave 2, & Wave 3 Final Report* submitted in Case 18-E-0397 at 28). The evaluation attributed the lack of change in customer energy usage behavior to several possible factors, including low participant understanding how demand-based rates

work, low participant awareness of the timing of the on-peak period, an 8-hour on-peak period that is too long to to shift demand around, and structural bill savings enjoyed by customers in the absence of demand shifting (*Ibid.*). I am not aware of similar evaluation studies conducted on SC1 Rate IV customers, but it is reasonable to assume that the evaluation results from the Innovation Pricing Pilot results are relevant due to the similar demand-based rate design featured between the rates.

Q. When and why was the SC1 Rate IV approved and who is eligible to use it?

A. SC1 Rate IV was initially approved in the Company's 2019 Rate Plan (Case 19-E-0065) for geothermal heat pump customers and up to 5,000 other customers, "to address concerns raised in some parties' testimony that Con Edison's volumetric delivery rates include[d] recovery of fixed system costs that geothermal customers do

not cause to be incurred, and so create a subsidy for other rate payers." (January 16, 2020 Commission Order in Case 19-E-0065, p. 52) In 2023, the Commission approved continuation of the rate, describing its purpose as "to promote electrification" (July 20, 2023 Commission Order in Case 22-E-0064, p. 70) and approved expanding eligibility to all residential SC1 customers, allowing the rate to be used by any "ratepayers who may be able to modify their consumption to respond to demand-based price signals." (July 20, 2023 Commission Order in Case 22-E-0064, p. 98) . The Company markets the SC1 Rate IV as the "Select Pricing Plan" or "SPP" and promotes the rate to both air-source and geothermal heat pump customers (see: https://www.coned.com/en/accounts-billing/select-pricing-plan-enrolled).

Q. Can you please describe the Price Guarantee that accompanies the SC1 Rate IV?

A. The Company offers a Price Guarantee that is available to residential heat pump customers that take service under SC1 Rate IV. If, at the end of a 12-month enrollment period, the customer's total bill under SC1 Rate IV is higher than it would have been under the default SC1 Rate I, the Price Guarantee will provide customers with a bill credit equal to the difference. Participation in the Price Guarantee program is capped at 500 ground-source heat pump customers and 500 air-source heat pump customers. As of the Rate Plan filing, the Company has not met the customer cap for either air-source or or ground-source heat pump customers.

Q. What is the purpose of the Price Guarantee?

A. The purpose of the Price Guarantee is to give customers a 12-month, risk-free opportunity to try out a rate that they may be hesitant to try. The Company identifies customer unfamiliarity

with the demand-based rates as a significant barrier to customer enrollment in SC1 Rate IV, citing consumer research conducted by the Smart Energy Consumer Collaborative (Exhibit__(AL-6): Company's Response to EDF-1-10). The Price Guarantee is one strategy used by the Company to try to overcome this barrier to customer enrollment.

Q. Is the Company proposing any changes to SC1 Rate IV in the Rate Plan filing?

A. Yes, the Company has proposed several changes to this rate. The Company is proposing to increase the monthly customer charge from $29.00 to $34.00. The Company's proposed modifications to SC1 Rate IV would increase the demand charge rates in each period, but maintain a seasonal discount rate of about 23% for the non-summer on-peak periods relative to the summer on-peak period (See: Company direct testimony, EXHIBIT___ERP-2, Schedule 3, Table No. 4).

Finally, the Company proposes to remove the customer cap for the SC1 Rate IV Price Guarantee and extend the Price Guarantee through December 31, 2028. (see: Company Direct Testimony of the Customer Energy Solutions Panel pp. 32-35).

Q. Are the Company's proposed changes to SC1 Rate IV likely to improve savings potential for electric heat pump customers?

A. The proposed changes to the SC1 Rate IV design are unlikely to significantly increase or decrease the savings potential (relative to SC Rate IV) for electric heat pump customers because the magnitudes of the proposed changes to SC1 Rate IV are relatively small. However, lifting the customer cap on the Price Guarantee program may encourage additional customers to participate in the rate.

Q. Are the Company's existing and proposed residential rate options sufficient to achieve

state energy goals?

A. No. In order to meet New York State's ambitious electrification goals, the Company will need to expand the rate options for its residential customers beyond the voluntary TOU rate (SC1 Rate III) and the existing demand-based rate (SC1 Rate IV). As stated previously in my testimony, SC1 Rate III contains an 16-hour on-peak period, which is too long to support customer load shifting, with the possible exception of overnight EV charging. While SC1 Rate IV is likely to result in lower electricity bills for heat pump customers, the demand-based charge is unfamiliar to most residential customers and customer adoption has been very slow.

Q. What about a demand-based charge is particularly unfamiliar to residential customers?

A. Demand charges are difficult for residential customers to understand because their design is

unlike practically any other fee structure that a customer encounters in their daily lives. Even if a customer understands the mechanism through which the demand-based rate is charged, the concept of managing bills by maintaining a low hourly energy demand during a specific time of the day is challenging to plan around. Demand charges introduce volatility in customer bills because the entirety of the customer's volumetric distribution charge is determined by that customer's average hourly energy usage across the highest energy usage hours in each time period over each billing period. The resulting bill volatility makes it difficult for customers to anticipate and budget for monthly electricity bills. James Bonbright's first principle of good rate design holds that rates should be simple, understandable, acceptable, and feasible to apply. (James C Bonbright, Principles of Public Utility Rates, 1961, p.291. Reprint available:

https://www.raponline.org/wp-content/uploads/2023/09/powellgoldstein-bonbright-principlesofpublicutilityrates-1960-10-10.pdf). The demand-based rate does not meet Bonbright's first principle for most customers. This is not, by itself, a reason to discontinue SC1 Rate IV. Indeed, some customers have enrolled, indicating a certain amount of customer interest. However, simpler and more understandable rate options are needed to support the broader population of ConEd customers adopting electric heat pumps. Two such options are the Heat Pump Seasonal Flat Rate and the Heat Pump Seasonal TOU Rate, as proposed by EDF Witness Nelson.

Q. What impact does this unfamiliarity have on customer adoption?

A. This unfamiliarity may be a reason why so few customers have enrolled in SC1 Rate IV. As of April 25, 2025, there were only 642 customers enrolled in this rate (Exhibit__(AL-2):

Company's Response to EDF Question No. 1-5), of which 425 have reported having a heat pump installed (Exhibit__(AL-3): Company's Response to EDF Question No. 1-6). As a point of reference, according to the NYS Clean Heat Program 2024 Annual Report (Case 18-M-0084), ConEd installed and provided incentives for 14,018 residential heat pump projects through the Clean Heat Program in 2024 alone. The Company identifies a lack of customer awareness and difficulty understanding the rate as probable barriers to adoption of SC1 Rate IV (Exhibit__(AL-6): Company's Response to EDF Question No. 1-10). The Company identifies a third barrier where customers were required to call the call center to request rate enrollment. The Company reports that this third barrier was resolved in December 2024 with the launch of an online rate enrollment form (*Ibid.*).

These barriers to customer rate enrollment may

be especially pronounced for low-income customers, who are underrepresented in the SC1 Rate IV population. According to the Company, only 28 of the 642 customers enrolled in SC1 Rate IV — just 4.4% — are also enrolled in the low-income Energy Assistance Program (EAP) (Exhibit__(AL-4): Company response to EDF Question No. 1-7). For comparison, ConEd's April 2025 EAP Program Report (Cases 22-E-0064, 22-G-0065, 14-M-0565) shows that 444,515 residential electric customers — approximately 14.6% of ConEd's 3 million residential electric customers — are enrolled in EAP. This means that the share of SC1 Rate IV customers who are also in EAP is less than one-third the EAP enrollment rate among all residential customers.

Q. Why might EAP customers be participating in SC1 Rate IV at a disproportionately lower rate than non-EAP customers?

A. There are several potential explanations for

this trend. A larger portion of low-income customers live in multifamily and/or rental units and may therefore be ineligible for the Clean Heat program. Until 2022, SC1 Rate IV was primarily marketed to customers with ground-source heat pumps, which tend to be customers in large houses and with higher incomes (i.e., less likely to be low-income). Low-income customers may face higher barriers related to awareness, trust, and engagement. They may possess a lower tolerance for the hassle and complexity of researching and signing up for a new rate. Lack of digital access, rates literacy, and language barriers may also create barriers that disproportionately affect low-income customers. Regardless of the reason, the Company should take proactive steps to market heat pump rates – such as SC1 Rate IV and the two rates proposed by EDF Witness Nelson – to low-income or EAP customers that receive a heat pump installation through Clean Heat.

Helping a low-income customer find the best rate that will keep bills low for their household is especially important to help reduce energy burden for low-income customers.

SC1 Rate IV will likely remain a valuable (and viable) option for some heat pump customers to manage their electricity bills, and should remain available to customers on a voluntary basis. However, the Company's portfolio of electrification rates should expand beyond SC1 Rate IV to offer additional rate options that feature more familiar rate design elements, including flat volumetric rates with seasonal differentiation and TOU rates with seasonal differentiation. Two of these rate designs are proposed in the Direct Testimony of EDF Witness Nelson.

Q. Why would flat volumetric rates with seasonal differentiation and TOU rates with seasonal

differentiation be an improvement over the Company's existing and proposed rates from a customer adoption standpoint?

A. Flat volumetric rates with seasonal differentiation and TOU rates with seasonal differentiation provide a number of benefits to customers relative to the existing demand-based rate (SC1 Rate IV), while also creating savings opportunities for heat pump customers. These benefits include:

- **Understandability** – Customers are already familiar with volumetric rate designs because the default SC1 Rate I is a volumetric rate design. The Company will need to conduct some customer education to explain the seasonal differentiation in rate levels (i.e., summer rates being higher than non-summer rates), as well as the two-period TOU design (i.e., on-peak period and off-peak period), because these designs are likely less familiar to

customers.

- **Predictability** – Seasonal TOU rates and seasonal volumetric rates provide clearer and more predictable price signals to customers. It is simple to learn and plan for seasonal rate change and daily on-peak periods, whereas demand-based rates require constant monitoring of loads and strategies to stagger the timing of electric appliance usage. Demand-based rates can also increase bill volatility for customers.

III. OPPORTUNITY TO INTEGRATE CUSTOMER RATE EDUCATION WITH THE COMPANY'S IMPLEMENTATION OF THE NYS CLEAN HEAT PROGRAM

Q. Please briefly describe the NYS Clean Heat Program.

A. The NYS Clean Heat Program is a statewide program administered by each investor-owned electric utility in New York that provides a

range of incentives to advance the adoption of heat pump technology, including air source heat pumps, air-to-water heat pumps, heat pump water heaters, and ground source heat pumps. The Clean Heat Program incentives help reduce the upfront cost of heat pump adoption and build a market for heat pump technologies in order to advance statewide electrification goals.

Q. Do the NYS Clean Heat Program incentives address the ongoing electricity costs required to run heat pump technologies?

A. No. However, the Company does offer an optional residential demand rate (SC1 Rate IV) that may be beneficial to heat pump customers. EDF Witness Nelson proposes two additional rate designs that, if approved, would be beneficial to heat pump customers.

Q. How many heat pump projects has ConEd completed through the NYS Clean Heat Program?

A. As mentioned above, ConEd completed 14,018 heat pump projects in 2024, according to the NYS Clean Heat Program 2024 Annual Report. According to the same report, the Company has completed 43,852 cumulative heat pump projects between the Program's launch in April 2020 and the end of 2024.

Q. How many heat pump customers are enrolled in the Residential Demand-Based Rate (SC1 Rate IV)?

A. According to the Company, as of April 25, 2025, there were 425 heat pump customers enrolled in SC1 Rate IV (Exhibit__(AL-2): Company's Response to EDF Question No. 1-5).

Q. Are you concerned with the large variance between heat pump projects completed (43,852 projects) and the number of heat pump customers enrolled in SC1 Rate IV (425 customers)?

A. Yes. While the Company is exceeding its Clean Heat project targets for heat pump

installations, the vast majority of customers receiving an install are not enrolling in SC1 Rate IV — the only currently approved rate designed to deliver bill savings for heat pump users. With just 425 heat pump customers enrolled in SC1 Rate IV, participation in this rate is more than 100 times lower than the number of completed projects. This points to a major disconnect between heat pump installation and adoption of the corresponding electrification rate, leaving potential customer bill savings untapped.

Q. How much money do heat pump users stand to save if they utilize the SC1 Rate IV?

A. According to the Company, from January 2023 through October 2024, of the 66 customers enrolled in SC1 Rate IV for twelve months, 86% realized savings on their annual electricity bill relative to what they would have been charged had they stayed on the default

residential rate (SC1 Rate I). The average annual bill savings across enrolled heat pump customers was $1,000 (see: Company Direct Testimony, CES Panel p. 33, lines 20-22 and p. 34, lines 1-4).

Q. Do you believe these annual in bill savings measured for early SC1 Rate IV adopters could be realized by future customers that sign up for the rate?

A. Yes, but likely to a lower level. It's possible that early adopters of SC1 Rate IV are not wholly representative of the ConEd's residential customer population. The early adopters may have larger households, higher income, larger load profiles, etc. that are different from average residential customers in ConEd's territory. However, I do believe that there is savings potential for average households that adopt heat pumps and enroll in SC1 Rate IV, however I am not aware of any analysis to this end included

in the Company's Rate Application.

Q. Are you aware of any analysis of the average annual saving potential for other proposed heat pump rates?

A. Yes. The testimony EDF Witness Nelson analyzes savings potential for the average ConEd residential customer under the Heat Pump Seasonal Flat Rate and the Heat Pump Seasonal TOU, which are proposed in the same testimony. Witness Nelson finds that the average residential customer with a heat pump would realize an average annual savings of $508.61 on the seasonal flat rate and $438.54 on the seasonal TOU rate. Applying this annual savings rate to the Company's cumulative completed Clean Heat Program projects where the customer is not already enrolled in SCC, there are as many as 43,413 additional heat pump customers with the potential to save between $19.2 million and $22.3 million annually by enrolling in a heat

pump rate. The number of potential savers and the potential bill savings from rate switching will continue to increase over the next rate period. If the Company continues to complete Clean Heat heat pump projects at the same rate it achieved in 2024 (14,018 projects), the cumulative savings potential for Clean Heat participants switching to the proposed heat pump rates would be between $113 million and $131 million over the 2026 to 2028 rate period.

Q. Aside from the unrealized savings for specific heat pump customers, why is this a problem from a state policy perspective?

A. Energy affordability (real and perceived) remains a significant barrier to customers adopting heat pumps. Heat pump rates can decrease customer bills (relative to the default rate), but only if customers enroll in these rates. Successfully reaching the state's heat pump (and electric vehicle) targets will be

easier if the operating costs of these machines are lowered through an electrification rate, such as SCI Rate IV.

Q. How does the underutilization of electrification rates, such as SC1 Rate IV, impact energy equity, heat pump adoption, and affordability for LMI customers.

A. LMI customers and other highly price-sensitive customers are the most likely to forgo electrification, and the health and comfort benefits that come along with it, due to concerns over operating costs of heat pumps. Yet these customers may have the most to gain from utilizing the SC1 Rate IV to reduce their energy bills. Better utilization of the SC1 Rate IV and other rates that reduce operating costs of heat pumps may be an important tool for addressing one of the key policy tensions identified by the Commission's recent order in case 18-M-0084 "In the Matter of a Comprehensive Energy Efficiency

Initiative". In the May 15, 2025 "Order Authorizing Low- to Moderate-Income Energy Efficiency and Building Electrification Portfolio for 2026-2030", the Commission stated that "the State's ability to decarbonize the buildings sector will require strategies and solutions to electrify space and water heating with heat pump solutions within the LMI market segment." (p. 76) But the Commission went on to recognize the "concern that converting to heat pumps can result in higher operating costs in some circumstances, particularly when the customer is converting from a lower-cost fuel." The Commission ordered LMI program administrators to focus on energy affordability when assessing whether heat pump incentives should be approved for LMI customers, and to "align programs and policies to enable affordable electrification," including by "exploring additional opportunities to facilitate electrification while mitigating

energy burden increases" (p. 82). ConEd has a role to play here. The Company should assess how its various rates can support LMI electrification and subsequently how the marketing of its rates can be designed to ensure equitable uptake of electrification technologies.

Q. Describe the Company's approach to integrating rate education into the Clean Heat Program implementation.

A. The Company provides installation contractors with educational materials meant to raise customer awareness of the Select Pricing Plan, but does not require installation contractors or other customer-facing personnel to advise Clean Heat participants on electrification rate options that may reduce electricity bills (see: Exhibit__(AL-7): Company Response to EDF Question No. 2-13, including Attachments 1 & 2). Neither the NYS Clean Heat Implementation Plan

nor the Company's Clean Heat Program Manual discuss integrated rate education efforts provided to customers considering heat pump projects through the Program. Most of the marketing for the rate occurs after a customer has made the decision to buy a heat pump. The Company promotes SC1 Rate IV to Clean Heat Program participants through email marketing campaigns, including information on the rate in the post-installation email, in semiannual emails, and through education materials left behind after program inspection (See: Exhibit__(AL-5): Company Response to EDF Question No. 1-8).

Q. Are you aware of any other jurisdiction that is integrating rate education into heat pump incentive programs?

A. Yes. The California Equitable Building Decarbonization Direct Install Program is a good example of how utilities can integrate

personalized rate education into building electrification and energy efficiency programs. The Equitable Building Decarbonization program is a residential building electrification program that provides no-cost heat pump installations for low-income households and underresourced communities. The program guidelines require that program administrators work with participant households to enroll them in the best electrification rate plan for their household. Specifically:

> [Program a]dministrators shall ensure that participating households are enrolled in the most appropriate rate plan available from their utility (which may be a rate specifically designed for electric homes), as well as any rate discounts for which they are eligible. Administrators shall offer to assist households to enroll in appropriate rates and discounts for which they are not already enrolled, including budget billing/level pay programs to smooth out monthly variability in energy bills.

(Exhibit _(AL-12): California Energy Commission, *Equitable Building Decarbonization Direct Install Program Guidelines*)

Q. Outside of California, are you aware of any other states where electric utilities are integrating rate education with heat pump incentive programs?

A. Yes. Massachusetts recently published its Interagency Rates Working Group ("IRWG") Near-Term Rate Strategy Recommendations (Exhibit__(AL-13): Massachusetts Interagency Rates Working Group ("IRWG") Near-Term Rate Strategy Recommendations), which includes several recommendations to integrate rate education into the Mass Save heat pump incentive programs. The IRWG report recommends that electric utilities, in their roles as program administrators of Mass Save, target marketing efforts for heat pump rates to reach customers considering or having completed a heat pump installation through Mass Save. The IRWG recognizes the complementarity of heat pump incentive programs and heat pump rates to

address both the upfront and operating costs of heat pumps. It also identifies installation contractors as credible messengers to educate customers about rate options that may help them reduce their electricity bills.

Q. Based on your expertise and your understanding of the California Equitable Building Decarbonization Direct Install Program and the Massachusetts IRWG Near-Term Strategy Recommendations report, what recommendations do you have for ConEd?

A. ConEd should identify opportunities to more closely integrate rate education into the NYS Clean Heat Program to better assist customers with operating costs of owning a heat pump. This effort is particularly important to address the gap between the large numbers of customers receiving heat pump incentives through Clean Heat and the relatively small number of customers enrolling in the Select Pricing Plan

rate. The Company has proposed investments in Rate Tool enhancements that will enable better rate comparison estimates for customers with heat pumps and customers considering future installation of a heat pump. Heat pump installers, project auditors, CSRs, and any other staff or contractor who interacts with a Clean Heat or other state heat pump program participant should do more than just provide generic talking points and rate education flyers. They should be able to leverage the Rate Tool to deliver personalized rate comparison reports that identify the lowest cost rate option based on a customer's actual load profile, the type of electric equipment installed at the customer's home, and the customer's load shifting preferences. Through the Clean Heat Program, the Company delivers heat pump equipment packages that are designed and sized specifically to meet each customer's household attributes and energy service needs.

The implementation contractors and the Company should also be delivering the same type of personalized recommendations to customers when it comes to rate selection. The expansion of electrification rate options proposed in EDF Witness Nelson's testimony will make personalized rate recommendations even more valuable to customers pursuing household electrification–further increasing the need to integrate meaningful rate education into the ConEd Clean Heat Program.

Q. Can you describe in more detail what the Company and its Clean Heat Program installation contractors should be required to do with regard to rate education as they interact with customers considering heat pump purchases?

A. I recommend that the Company follow the example of the California Equitable Building Electrification and integrate personalized rate education and rate enrollment support into the

Clean Heat Program as part of the installation, field assessment, and/or other relevant processes. The Company's proposed investment in customer-facing Rate Tools – enhanced with the additional rate analysis capabilities I recommend in Section IV of this testimony – should enable the Company and/or its contracted partners to provide personalized rate recommendations to customers considering or undertaking heat pump conversions. A standardized printout report that shows the customer's projected electricity bills under the current rate versus under the lowest-cost rate plan would be sufficient to guide this conversation. The Company should also guide customers to eligible rate discounts, such as the Energy Assistance Program ("EAP"), for which they are not already enrolled. Finally, the Company should assist customers with switching to their preferred rate and/or discount program as part of this conversation. Whenever possible,

rate comparisons should be based on the customers actual usage data, with applicable load modifiers to simulate the new heat pump installation, rather than generic residential load data.

Q. Should the Company be required to expand annual reporting metrics to reflect the integration of the NYS Clean Heat Program, SPP, and other approved electrification rates?

A. Yes. The Company's annual SPP reporting metrics (Case 22-E-0064) should be expanded to include additional metrics that illustrate the important interplay between NYS Clean Heat and SPP and other rates that may reduce electricity costs for heat pump customers:

- Number of Clean Heat Program participants enrolled in SPP and other approved electrification rates; and
- Average annual bill decrease (or increase) for Clean Heat Program participants taking

service under SPP or other approved electrification rates.

IV. RECOMMENDED ENHANCEMENTS TO MODERNIZE THE COMPANY'S RATE EDUCATION TOOLS AND MEO EFFORTS

Q. What new initiatives and systems does the Company propose to enhance customer rates education?

A. The Company proposes one new initiative, as well as upgrades to one existing system to enhance customer rate education. First, the company proposes to establish a new Rate Implementation Team within Customer Energy Solutions ("CES"). The Rate Implementation Team will support other customer-facing teams, such as the Call Center and Billing teams, with technical rates expertise to better assist customers with rate-related queries. The Rate Implementation Team will also lead cross-functional initiatives to improve the customer rates experience

(Company Direct Testimony, Exhibit__CES-6, pp. 48-51). Second, the Company proposes to upgrade the customer-facing Rate Tool housed inside the Customer Analytics, Reporting, and Engagement ("CARE") Program. These proposed enhancements will enable the customer to (1) explore rate options based on clean energy technologies installed and program participation and (2) compare bill impacts by potential clean energy technologies (Company IT Panel Direct Testimony, Exhibit__IT-5 at 59-65).

Q. Regarding the Company's proposed enhancement to the customer-facing Rate Tool, please identify which capabilities are committed and which capabilities are exploratory.

A. Based on my reading of the CARE Program White Paper (cited below) and the Company's response to various interrogatories (listed below), I surmise that the final scope and capabilities of the Rate Tool are still under development and

includes both committed and exploratory capabilities.

For example:

- Proposed enhancements to the **rate education products**:
  - **Will** include the ability for customers to explore rate options based on:
    - Clean energy technologies installed (e.g., heat pumps, installing electric vehicle charging stations); and
    - Program participation (e.g., demand response) (Company direct testimony, Exhibit___(IT-5) at 61);
  - **Will** include the ability for customers to compare bill impacts by potential clean energy technologies (e.g., heat pumps alone versus heat pumps plus building envelope);
  - **Could** include more targeted customer insights on energy usage patterns with the adoption of one or more clean energy technologies (Exhibit__(AL-8): Company's Response to EDF Question No. 2-19);
  - **Could** include customer insights on utility bill impacts based on clean energy technology adoption, using representative load profiles or historic energy consumption (Exhibit__(AL-8): Company's Response to EDF Question No. 2-19); and
  - **May** enable customers to simulate changes to bills related to load shifting or installation of clean energy technologies such as distributed energy resources and air source heat pumps (Exhibit__(AL-9):

Company's Response to EDF Question No. 2-22).

- The proposed **Rate Eligibility Screener**:
  - **Will** provide customers with [eligible] utility rate options based on customer-specific information, such as customer account type, historical energy usage or demand, and meter type (Company IT Panel Direct Testimony, Exhibit___(IT-5) at 61); and
  - **May** provide customers with the rate options available based on installed or potential clean energy technology solutions, and other eligibility criteria, such as customer account type and historical energy usage and demand (Exhibit__(AL-9): Company's Response to EDF Question No. 2-22).
- Proposed enhancements to the **Rate Comparison Calculator**:
  - **Will** provide customers with estimated bill impacts based on the clean energy technology adopted (e.g., heat pumps, rooftop solar) (Exhibit__(AL-9): Company's Response to EDF Question No. 2-22); and
  - The Company **has not determined** whether rate products will include enhancements that enable customers to compare bills using historic AMI usage and demand data for eligible rate options ("**shadow billing**" or "**bill comparison**") (Exhibit__(AL-9): Company's Response to EDF Question No. 2-22).
- The proposed **Customer Rate Education Module**:
  - **Will** describe the various utility rate options available to residential customers and how key utility bill components such as peak and off-peak demand charges could

change based on adoption of clean energy technologies (Exhibit__(AL-8): Company's Response to EDF Question No. 2-19).

- The proposed **Customer Communication Channels** for surfacing Rate Tool insights:
  - **May** vary depending on the enhancement, for example depending on if the insight contains personal or sensitive information (Exhibit__(AL-10): Company's Response to EDF Question No. 2-23);
  - **May** include outbound communication channels like email and bill inserts (Exhibit__(AL-10): Company's Response to EDF Question No. 2-23); and
  - **May** leverage customer feedback for insights.
- The proposed **Clean Energy Customer Service Tools**:
  - **Will** support Company staff responding to customer inquiries and ensuring a seamless customer experience (Exhibit__(AL-10): Company's Response to EDF Question No. 2-23); and
  - **Will** include training for CSR on and use customer-facing Rate Tools to answer customer questions and help customers compare rate options to understand which rate is expected to best help them manage their bills (Exhibit__(AL-11): Company's Response to EDF Question No. 2-24).

Q. Does the Company's proposed Rate Tools reflect best practice for customer rates engagement tools?

A. No. Many of the Company's rate tools capabilities contain vague descriptions that make it difficult to ascertain precisely what the capability is and how it will be delivered to customers. Additionally, there appears to be some contradiction about which capabilities are committed (**will**) and which are exploratory (**may** or **could**). For example, it is unclear whether the Company plans to allow customers to compare the bill impacts of clean energy technology adoption, or if it is still exploring this capability. Furthermore, it is unclear if the rate comparisons generated by the bill impact model would rely on generic customer load profiles or an individual customer's actual customer usage data.

Q. In addition to the proposed Rate Tools discussed in the Application, are there other rate education tools and rate MEO strategies that the Company should offer its residential customers?

A. Yes. I have a number of recommendations regarding rate education tools and rate MEO strategies.

- The Company should invest in rate tools and customer outreach approaches to support each stage of the customer rates journey — from identifying the best rate for their household (pre-enrollment stage), to switching rates (enrollment stage), initial onboarding onto the new rate (early post-enrollment stage) and long-term maintenance of bill management strategies (long-term post-enrollment stage). The Company should also continue to conduct market research on Rate Tools that have been deployed successfully in support of other rate programs, starting with the Long Island Power Authority's recent transition to default residential TOU rates.
- All residential customers should have access to self-service rate comparison

tools through the Company's customer portal and/or the mobile application. The rate comparison tool should automatically screen the customer for eligible rates and provide personalized and accurate rate comparisons. The rate comparison insights should be calculated using each customers' individual interval and demand consumption data rather than generic customer load profiles.

- The Company should send proactive, personalized rate comparison reports to all residential customers on a regular cadence (ex: annually) to help customers identify the best rate option for their unique household situation.
- The Rate Comparison Tool should be able to model the impact of heat pump adoption on customer bills under each eligible rate option. This could be accomplished by applying a load modifier to an existing customer's usage profile. Personalized heat

pump modeling in the Rate Comparison Tool should be provided to every customer that has received a heat pump through the Company's Clean Heat Program.

- The Company's proposed market research initiatives in the area of rate education (Company direct testimony, Exhibit___(IT-5) at 61) should include customer surveys, user testing, structured interviews, and other strategies to reveal valuable rate MEO designs, including customer program participation goals, preferences for specific rate insights, message framing, and desired communication channel and frequency.
- Rate insights should be delivered to customers through the customers' preferred outbound and self-service channels, including email, postal mail, SMS, push notification, mobile application, customer portal, CSR tools. Print mail

communications are impactful but expensive, and so print mail campaigns should be used judiciously.

V. CONCLUSION AND SUMMARY OF RECOMMENDATIONS

Q. Please summarize your conclusions regarding the Company's proposed Electric Rate Plan.

A. My conclusions are summarized below:

- Electrification of residential heating and transportation is essential to achieving New York State's decarbonization goals. Innovative rate designs — such as seasonal and TOU rates — can help to ensure that the electrification transition in New York centers customer affordability, equity, and smart grid investments. These myriad benefits, however, will only be realized if customers participate in the rates.
- In order for a customer to participate in a rate, the customer must (1) be aware that

the rate exists, (2) understand how the utility charges for service under the rate, and (3) perceive the potential benefit of participating to outweigh the risk of rate shifting and the friction of requesting a rate change.

- While the Company offers a residential demand-based rate (SC1 Rate IV) that has resulted in lower bills for many heat pump customers, the limited number of customers enrolled in this rate (even with a Price Guarantee) reveals that customers either do not know about the rate, do not understand how the rate works, or are hesitant to sign up for the rate due to the novel demand-charge pricing element.
- The underrepresentation of EAP customers in the SC1 Rate IV customer population indicates that there may be additional barriers preventing low-income customers from signing up for this rate.

- There is a significant gap between customers receiving heat pump incentives through the Clean Heat Program and customers enrolling in SC1 Rate IV, which results in tens of millions of dollars of unrealized bill savings across tens of thousands of ConEd customers each year.
- The Company's proposed MEO efforts and rate tool enhancements appear to be a step in the right direction, but they lack specificity and ambition and do not follow best practices for customer rates engagement.
- To realize the benefits of innovative rate design, such as SC1 Rate IV and the rate designs proposed in testimony of EDF Witness Nelson, the Company must deliver personalized, proactive, and timely rate insights that motivate customers to enroll in these rates and adopt bill management strategies.

Q. Please summarize your recommendations regarding the Company's proposed Electric Rate Plan.

A. My recommendations are summarized below:

- Integrate rate education into the NYS Clean Heat Program to address both the upfront and on-going costs of heat pump adoption. Require that rate education materials and personalized rate comparisons be provided to each residential customer considering and completing a Clean Heat project.
- Train Clean Heat Program installers, auditors, and CSRs to use rate tools to provide personalized rate recommendations to customers.
- Expand the reporting requirements for SC1 Rate IV established in Case 22-E-0064 to include metrics related to the integration of the NYS Clean Heat Program with SC1 Rate IV, as well as other electrification rates that may be approved in this or future

proceedings. Specifically, add annual reporting metrics for:

- Number of Clean Heat Program participants enrolled in SPP and other approved electrification rates; and
- Average annual bill decrease (or increase) for Clean Heat Program participants taking service under SPP or other approved electrification rates.

- Enhance customer rates engagement tools:
  - Provide a rate comparison calculator that uses actual customer usage data rather than generic load archetypes to calculate bill comparisons under eligible rate options.
  - Provide options in the rate comparison calculator to simulate the bill estimates after the adoption of heat pumps, electric vehicles, and other

priority DERs.

- Make insights available to customers in a variety of outbound channels (ex: email, postal mail, SMS, push notification) and inbound channels (ex: customer portal, mobile app, CSR tools).

- Modernize rate MEO strategies:
  - Support each stage in the customer rate adoption process, from initial rate awareness to long-term bill management.
  - Provide proactive rate comparison reports to all residential customers at a minimum of once per year.
- Expand electrification-friendly rate options to include simpler, more familiar rate designs alongside the existing demand-based SC1 Rate IV. Specifically, approve the Seasonal Heat Pump Flat Rate

and the Seasonal Heat Pump TOU Rate proposed in the Direct Testimony of EDF Witness Nelson.

Q. Does that conclude your direct testimony?

A. Yes, it does.

Exhibits

Exhibit__(AL-1): Resume of Witness Alexander Lopez

Experience

Rewiring America
Bellingham, WA

Senior Manager, Regulatory Policy **November 2024 – Present**

- Led Rewiring America's national regulatory policy team to make electrification the easy, affordable, and obvious choice for every American household
- Designed and implemented state PUC advocacy strategy in New York, Massachusetts, Minnesota, Michigan, Colorado, Oregon, and Washington

Uplight
Bellingham, WA

Senior Product Marketing Manager **September 2021 – October 2024**

- Planned and executed the go-to-market strategy for residential customer solutions in the areas of Behavioral Energy Efficiency and Time Varying Rates Engagement
- Exceeded product line ARR targets while improving gross margin through lean program design strategies
- Provided subject matter expertise and product demos for utility SaaS sales engagements and RFP responses supporting a $60m ARR pipeline

District of Columbia Department of Energy and Environment
Washington, DC

Energy Program Analyst **January 2019 – August 2021**

- Developed a subscriber management strategy for an income-eligible community solar program, managing internal and external teams, and achieving on-time recruitment and enrollment of over 4,000 households
- Represented the District in PSC proceedings establishing the regulatory foundation for utility-administered energy efficiency and demand response programs, securing comprehensive cost-effectiveness standards, robust low-income program requirements, and the District's first energy efficiency resource standard
- Led the District's participation in regulatory proceedings and rulemakings related to utility transportation electrification, dynamic pricing, and the renewable portfolio standard

Oracle Utilities (formerly Opower)
Arlington, VA

Senior Manager, Regulatory Affairs and Market Development **August 2018 – January 2019**

- Developed and executed regulatory strategy supporting residential energy efficiency and demand response programs in seven states and the District of Columbia
- Represented Oracle at grid modernization proceedings and workgroups focused on issues of rate design, distribution system planning and operations, and performance-based ratemaking
- Created the market qualification and go-to-market strategy for a new behavioral load shaping product

Regulatory Affairs Manager **October 2015 – August 2018**

- Managed commission and stakeholder relationships to secure regulatory approval for behavioral energy efficiency programs representing over $10 million in annual recurring revenue
- Led regulatory engagement strategy and business case development for demand response programs for over one million residential customers at eleven utilities across five wholesale electricity markets
- Represented Opower through written comments in regulatory proceedings and stakeholder engagements before state and federal energy regulatory commissions

Senior Analyst, Regulatory Affairs **April 2014 – October 2015**

- Defined Opower's strategy for the long-term treatment of energy savings from home energy report programs, effectively mitigating regulatory risk for energy efficiency contract renewals and expansions
- Represented the regulatory affairs team on the cross-functional core team responsible for defining the engineering, delivery, marketing, sales, and regulatory strategy for the behavioral demand response product
- Analyzed over 50 independent evaluations of Opower energy efficiency programs, assessed the implications of the evaluations for program risk, and led response to evaluators and utility clients

Analyst, Regulatory Affairs **April 2013 – March 2014**

- Completed domestic and international market qualification for behavioral demand response programs
- Supported regulatory engagements in the Mid-Atlantic and New England states, including Grid Modernization in Massachusetts and implementation of the energy efficiency obligation in Pennsylvania.

Eversource Energy **Westwood, MA**
Energy Efficiency Product Development Consultant **September 2012 – March 2013**

- Identified, scoped, developed, and secured the market adoption of energy efficiency technologies for the commercial and industrial customers of Massachusetts' largest investor-owned electric and gas utility
- Conducted quantitative and market analysis to determine appropriate levels for financial incentives that reward customers for realized energy savings while controlling program costs and minimizing free ridership

U.S. International Trade Administration **Washington, DC**
Environmental Industries Graduate Intern **June 2011 – December 2011**

- Supported the development and implementation of a global market prioritization study for the U.S. environmental industry based on quantitative trade data and qualitative indicators of market potential

Camsing Global **Beijing, China**
Marketing Manager **August 2008 – July 2009**

- Negotiated terms for brand licensing agreements between foreign brand owners and Chinese companies

Prudent Energy **Beijing, China**
Business Development Analyst **August 2007 – May 2008**

- Conducted primary and secondary research to identify global markets for advanced energy storage technology, including renewable energy, distributed generation, and remote area power supply

Education

Johns Hopkins University **Washington, DC**
School of Advanced International Studies (SAIS) **May 2012**
Master of Arts, International Affairs

Claremont McKenna College **Claremont, CA**
Bachelor of Arts, Asian Studies **August 2003 – May 2007**

Additional information

Languages: English (native); Chinese (proficient); Spanish (basic)

Functional Skills: Policy advocacy; stakeholder relationship management; public speaking; grant management; regulatory filings; utility rate design; demand response; energy efficiency; energy storage

Training: Completed course "Fundamentals of Utility Law" taught by Scott Hempling (January - April 2019)

Civic: Advisory Neighborhood Commissioner (January 2021 – April 2023)

- Twice elected to represent the Shaw East neighborhood to advise the District of Columbia government on all matters affecting the community, including transportation, zoning, and public safety

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-1
Date of Response: May 05, 2025
Responding Witness: CES / Electric Rates Panels

Question No. :5
For questions 5-14, please refer to the Direct Testimony of the Customer Energy Solutions Panel, page 32, line 11, through page 35, line 19, discussing the Select Pricing Plan (SPP), SC1 Rate IV, program. Where applicable, please provide your response in a live, unlocked Excel spreadsheet with all links and formulas intact.

What is the current enrollment in the program?

Response

As of 4/25/25, there are 642 customers enrolled in the SPP.

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-1
Date of Response: May 05, 2025
Responding Witness: CES / Electric Rates Panels

Question No. :6
How many program participants are heat pump customers?

Response

425 of the 642 SPP participants have reported a heat pump installed. Heat pump customers are identified by confirming participation in the Clean Heat program or by the customer providing the serial number of their heat pump unit when enrolling in SPP.

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-1
Date of Response: May 05, 2025
Responding Witness: CES / Electric Rates Panels

Question No. :7
How many program participants are low income?

Response

28 of the 642 SPP participants are low income (listed as energy affordability program (EAP) participants).

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-1
Date of Response: May 05, 2025
Responding Witness: CES / Electric Rates Panels

Question No. :8
Please describe the Company's public education efforts related to the SPP's availability.

Response

The Company informs all residential customers about rate options, including the SPP, through seasonal emailed newsletters, an annual bill insert concerning customers "Rights and Responsibilities as a Customer Billed Under Residential or Religious Rates," and information on the Company's "Your Guide to Rates" web page.[1] Furthermore, the Company promotes the SPP directly to Clean Heat program participants by including information on the plan in a "welcome" email after they receive their heat pump incentive through the Clean Heat program, by emailing all Clean Heat participants roughly twice per year, through bill messages, and through educational material left behind after program inspections. The Company has also equipped third party heat pump contractors with information on the SPP through webinars, and with materials as part of the "Contractor Toolkit" which contractors are encouraged to provide to customers following heat pump installation.

[1] https://www.coned.com/en/accounts-billing/your-bill/your-guide-to-rates

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-1
Date of Response: May 05, 2025
Responding Witness: CES / Electric Rates Panels

Question No. :10
Has the Company identified any barriers to participation in the SPP rate? If so, describe the barriers and any steps the Company has taken to address them.

Response

The Company has identified a few barriers for heat pump customers to enroll in the SPP. It is continuing to work to overcome them:

- Enrollment process: Until December 2024, customers had to call the Con Edison call center or email the Company directly to enroll in the SPP. In December 2024, the Company launched a new online enrollment form that allows customers to input necessary information to check eligibility for the rate and whether they are a heat pump customer to receive the price guarantee.
- Awareness: The Company recognizes many customers for whom the rate is beneficial may not be aware of the rate. As a result, in 2024 and 2025, the Company initiated many of the education efforts aimed at previous Clean Heat participants outlined in response to question 8. The Company continues to identify new strategies and messages to increase awareness and explain the rate to customers.
- Customer understanding of the rate: Studies[1] have indicated that customers often don't understand optional or demand-based rates and therefore may be reluctant to enroll in a rate like the SPP. The SPP price guarantee gives customers a risk-free opportunity to enroll in a rate that they may otherwise be hesitant to try.

[1] For example: *Electric Bills and Rate Plans: Consumer Awareness and Understanding | Smart Energy Consumer Collaborative (SECC).*

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-2
Date of Response: May 21, 2025
Responding Witness: Customer Energy Solutions Panel

Question No. :13
Please provide copies of any training materials prepared by the Company for Clean Heat implementation partners and/or installation contractors related to customer rate options, if any. Does the Company require installation contractors to advise Clean Heat program participants on customer rate options that may reduce electricity bills?

Response

The Company provides Clean Heat implementation partners with materials to make customers aware of the Select Pricing Plan. See Attachment 1 and Attachment 2.
Because they are implementation contractors and not rate experts, the Company does not require installation contractors to advise Clean Heat program participants on customer rate options that may reduce electricity bills.

conEdison

Have a Heat Pump? The Select Pricing Plan Can Help You Save.

How It Works

The Select Pricing Plan lets you pay for electricity based on when you use it and how much you use at different points in the day, which makes it ideal for heat pump customers. Heat pumps work best when you set and leave them at a comfortable temperature setting, helping you avoid spikes in electricity use, which can help lower your bill. You'll be able to stay comfortable all day while saving money.

Can I Save Money if I Enroll?

Yes! After one year, 80% of heat pump customers who moved to the Select Pricing Plan saved money on their annual electric bill compared to what they would have paid had they not made the switch. Heat pump customers saved an average of 10% over the course of a year.

Enroll Now to Try It Risk Free for a Year

The first 500 air-source heat pump and first 500 geothermal heat pump customers to enroll in the Select Pricing Plan will get a one-year price guarantee. After a year on the plan, we'll compare your bills versus what you would have paid with your prior rate. If your bills were higher on the plan, we'll credit your account the difference—you'll never pay more than you would have on your old rate. Plus, if you aren't satisfied with the new plan, you can always return to your old rate whenever you like.

Don't miss out—enroll today!

Scan the code or visit **conEd.com/SelectPricingPlan**

What is the Select Pricing Plan?

A voluntary rate option designated SC 1 Rate IV in the Con Edison electric tariff

A time-variant rate, with peak and off-peak hours that apply to supply & delivery charges

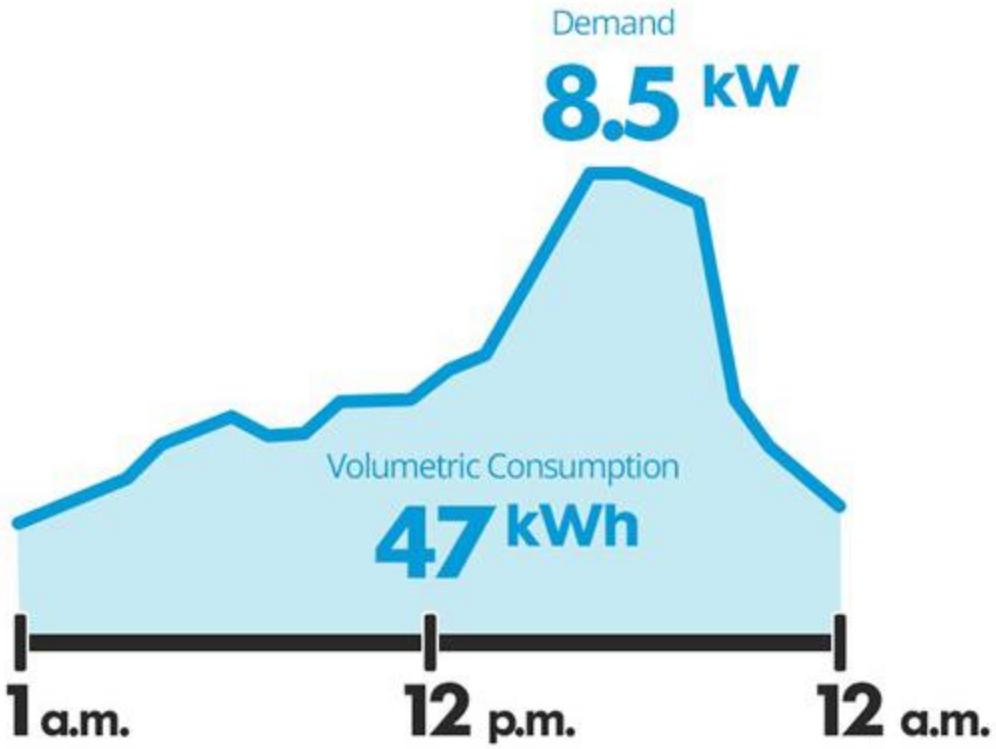
A demand rate with no volumetric (i.e., per kWh) component for delivery charges

A rate that may be **beneficial to customers with heat pumps** installed in their homes

Defining Demand

Standard Residential Rate SC 1 Rate I
Delivery charges based on total volume of electricity used during the billing cycle.

The Select Pricing Plan SC 1 Rate IV
Delivery charges based on demand – i.e., the average of the three 60-minute periods during peak hours and the three 60-minute periods during off-peak hours when the customer uses the most electricity.



Demand Rates and Heat Pumps

Why are demand rates often beneficial to heat-pump customers?

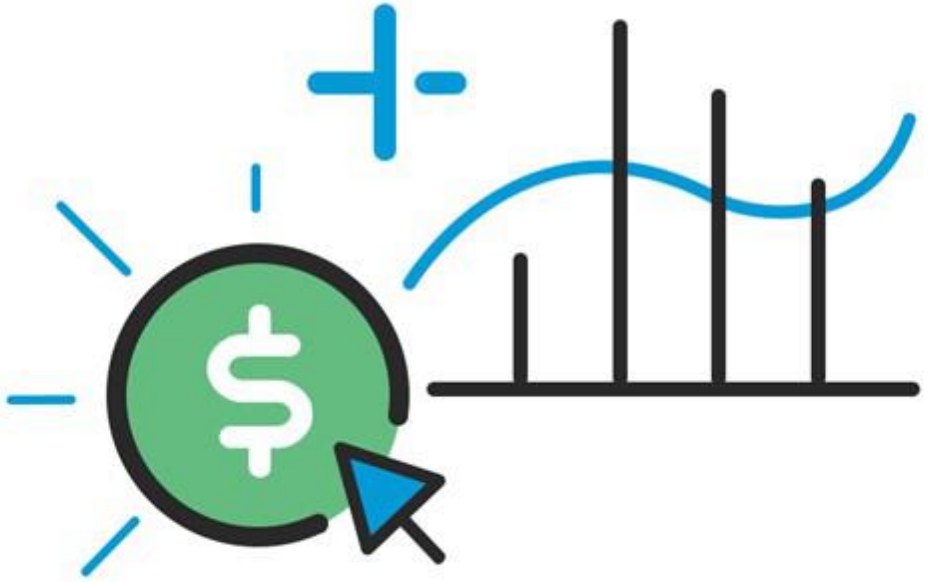
When left at a single temperature setting, heat pumps use a consistent amount of electricity throughout the day.

The Select Pricing Plan and Heat Pumps

Why is the Select Pricing Plan beneficial to heat-pump customers?

The first 500 geothermal heat-pump and the first 500 air-source heat-pump customers who enroll will receive a **one-year price guarantee**.

We'll apply a credit to the accounts of any customers whose bills on the Select Pricing Plan were more than they would have been on the customers' prior rates.

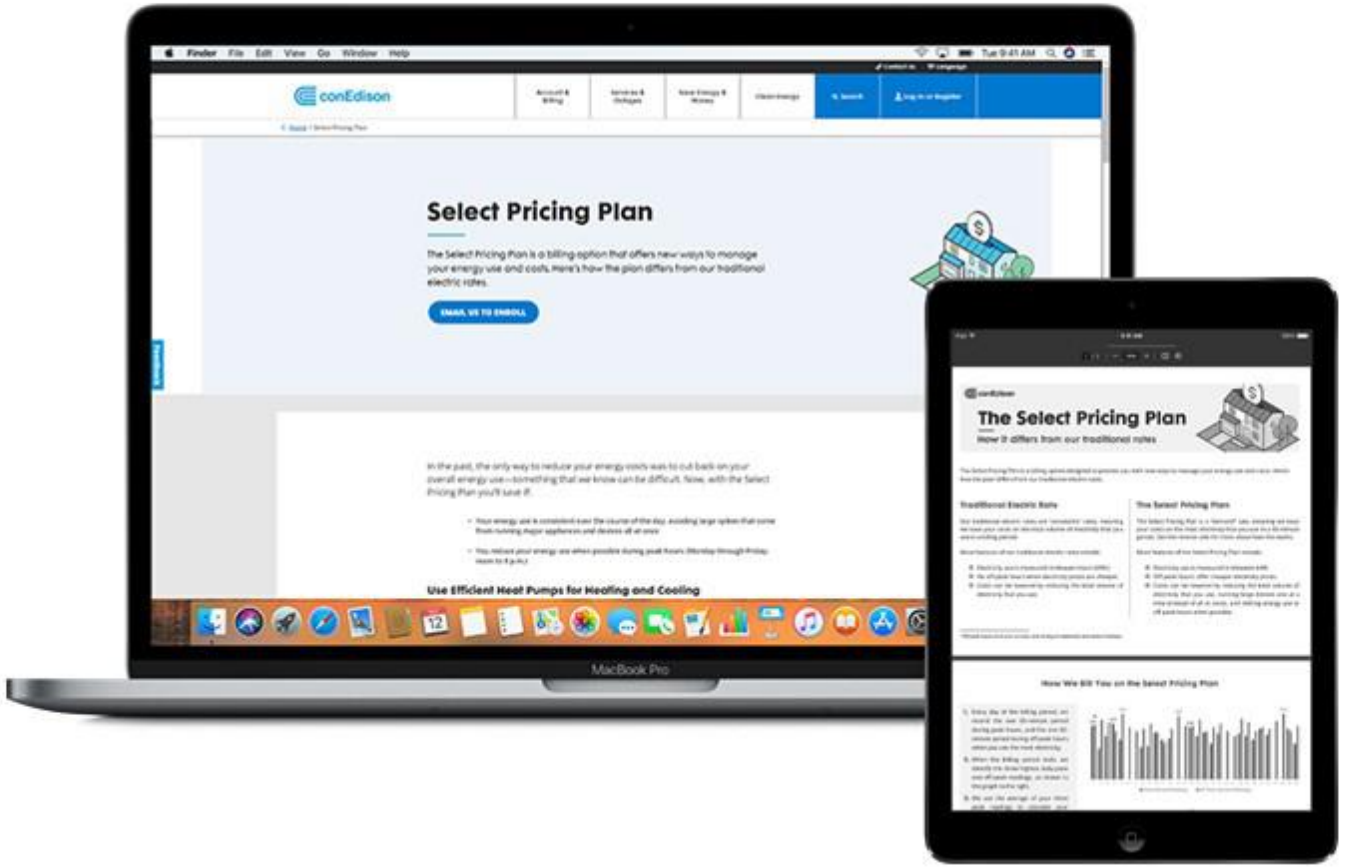


Want to Know More?

conEd.com/SelectPricingPlan

How the SPP is Different PDF

Promotional Campaigns



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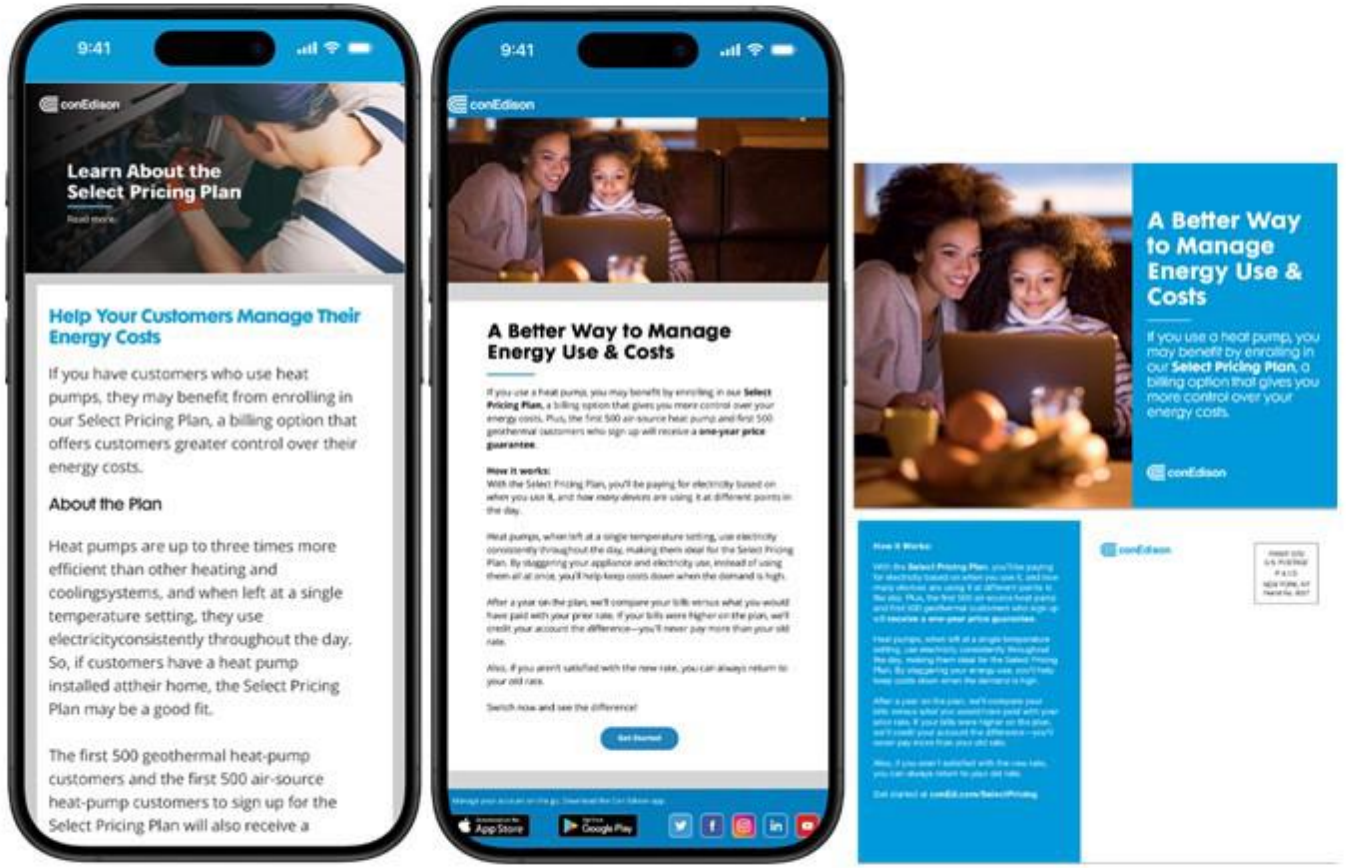

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-2
Date of Response: May 21, 2025
Responding Witness: Customer Energy Solutions Panel

Question No. :19
Please refer to the Direct Testimony of the Information Technology Panel, page 38, lines 5 through 8. Please describe the proposed tools to be developed to guide customers through alternative rate options.

Response

As described in the white paper (Exhibit_IT_5), the CARE program proposed rate product enhancements that provide utility rate education to customers. The Company is currently developing a customer rate education module that describes the various utility rate options available to residential customers and how key utility bill components such as peak and off-peak demand charges could change based on adoption of clean energy technologies. Enhancements to rate products during the next rate period could include more targeted customer insights on energy usage patterns with the adoption of one or more clean energy technologies. Additional enhancements could include customer insights on utility bill impacts based on clean energy technology adoption, using representative load profiles or historic energy consumption.

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-2
Date of Response: May 21, 2025
Responding Witness: Customer Energy Solutions Panel

Question No. :22
For question 22-28, please refer to the Direct Testimony of the Information Technology Panel, Exhibit__(IT-5), page 59 through page 65.

In reference to the Rate Products project within the Customer Analytics, Reporting, and Engagement (CARE) program:

a. Please describe the capabilities of the proposed bill comparison tool.
b. How will the proposed tool differ from or improve upon the existing Rate Comparison Calculator (https://c03.apogee.net/mvc/home/hes/land/el?utilityname=coned&spc=trc)?
c. Please describe the capabilities of the proposed "utility rate eligibility screeners" tool.
d. Will the Rate Products allow customers to compare bills using historic AMI usage and demand data for eligible rate options (a capability sometimes referred to as "shadow billing" or "bill comparison")?
e. Will the Rate Products allow customers to simulate changes to bills related to:
    i. Behavioral load shifting (i.e., behavioral changes to the time period in which energy is consumed)?
    ii. Behavioral peak demand management (i.e., behavioral changes to a customer's peak demand)?
    iii. Installation of distributed energy resources (DERs), such as solar photovoltaics (PV), energy storage, or smart thermostats?
    iv. Installation of air source heat pumps (ASHP) for space heating or water heating?
    v. Purchase or lease of an electric vehicle (EV) with home EV charging?
    vi. Changes to EV charging schedules?

Note that capabilities e(i)-e(vi) are sometimes referred to as "What-if Analysis" or "load modifier simulations".

Response

a. See EDF-2-19

b. The existing Rate Comparison Calculator is a tool that provides customers with estimated overall bill savings based on Standard and Time-of-Use Rates, while the proposed tool will provide customers with estimated bill impacts based on the clean energy technology adopted (e.g., heat pumps, rooftop solar).

c. The proposed utility rate eligibility screeners may provide customers with the rate options available based on installed or potential clean energy technology solutions, and other eligibility criteria, such as customer account type and historical energy usage and demand.

d. The Company has not determined whether rate products will include enhancements that enable customers to compare bills using historic AMI usage and demand data for eligible rate options ("shadow billing" or "bill comparison").

e. Rate products may enable customers to simulate changes to bills related to load shifting or installation of clean energy technologies such as distributed energy resources and air source heat pumps. The Company will evaluate additional potential enhancements to rate products, including the various load modifier simulations above, and determine which enhancements to launch after additional discovery and research in the next rate period.

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-2
Date of Response: May 21, 2025
Responding Witness: Customer Energy Solutions Panel

Question No. :23
Through which channels does the Company propose surfacing Rates Tools insights? Web portal, mobile application, outbound email, outbound print and mail, CSR tools, or a different channel?

Response

The channel for surfacing Rate Tools insights in the next rate period may vary depending on the enhancement. The Company would like to publicly surface rate education material as broadly as possible if it does not contain personal or sensitive information. If rate tools are developed leveraging personal customer information for targeted recommendations, the Company will explore the various channels for communication (e.g., outbound email, bill inserts, etc.) and leverage customer feedback for insights. As described in the white paper (Exhibit_IT_5 pp. 61), Clean Energy Customer Service Tools will also be developed to support Con Edison staff responding to customer inquiries and ensuring a seamless customer experience.

Company Name: Con Edison
Case Description: 2025 CECONY Electric and Gas Rate Cases
Case: 25-E-0072, 25-G-0073

Response to EDF Interrogatories – Set EDF-2
Date of Response: May 21, 2025
Responding Witness:

Question No. :24
How will Company's CSRs be able to utilize the Rates Tools to answer customer questions about rate options or advise on bill management strategies?

Response

The Company is still developing these Rate Tools, but its CSRs will be trained on and use customer-facing Rate Tools to answer customer questions and help customers compare rate options to understand which rate is expected to best help them manage their bills.

DOCKETED	
Docket Number:	22-DECARB-03
Project Title:	Equitable Building Decarbonization Program
TN #:	252682
Document Title:	Equitable Building Decarbonization Direct Install Program Guidelines (Adopted)
Description:	Guidelines for the Equitable Building Decarbonization Direct Install Program, adopted by the California Energy Commission on October 18, 2023.
Filer:	Diana Maneta
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	10/23/2023 1:19:30 PM
Docketed Date:	10/23/2023

CALIFORNIA ENERGY COMMISSION

California Energy Commission

PROGRAM GUIDELINES

Equitable Building Decarbonization Direct Install Program Guidelines

Gavin Newsom, Governor

October 2023 | CEC-400-2023-003-CMF

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ACKNOWLEDGMENTS

Dozens of individuals and organizations provided input on the design of the Equitable Building Decarbonization Direct Install Program through public workshops and written comments. The CEC deeply appreciates their contributions to the development of these guidelines. In addition, the author would like to thank the following CEC staff members who were key participants in this effort.

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ABSTRACT

These guidelines for the Equitable Building Decarbonization Direct Install Program outline the initial rules and requirements for the program, including funding allocations, household and property eligibility requirements, and eligible measures. Assembly Bill 209 (Committee on Budget, Chapter 251, Statutes of 2022) directed the California Energy Commission to develop the Equitable Building Decarbonization Program. The program will include a direct install program for low-income households, which is a type of program that provides and installs energy-efficient electric appliances, energy efficiency measures, and related upgrades directly to consumers at minimal or no cost. The direct install program will include a statewide direct install program and a tribal direct install program. The Equitable Building Decarbonization Program will also include a statewide incentive program to accelerate deployment of low-carbon building technologies.

The primary goals of the program are to reduce greenhouse gas emissions and advance energy equity. The statewide direct install program, which is the focus of these guidelines, will be administered separately in Northern, Central, and Southern California by competitively selected program administrators who will partner with community-based organizations for culturally appropriate outreach, education, and support for participating households and communities.

Keywords: Equitable Building Decarbonization Program, decarbonization, buildings, equity, underresourced community, direct install, low-income, energy efficiency, electrification

Please use the following citation for this report:

Maneta, Diana. 2023. *Equitable Building Decarbonization Direct Install Program Guidelines*. California Energy Commission. Publication Number: CEC-400-2023-003-CMF.

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CHAPTER 1:
Program Overview

A. Background

The State of California is committed to a just and equitable transition to carbon neutrality by 2045.[1] Residential and commercial buildings account for about 25 percent of California's greenhouse gas emissions,[2] so the decarbonization of buildings is essential to achieving the state's carbon neutrality goal. Building decarbonization must prioritize low-income, disadvantaged, and tribal communities, who bear the highest energy burden and have suffered the most from historical environmental injustices, economic disparities, and the current climate crisis.[3] The participation of all California communities will be needed for the state to achieve its climate and energy goals.

The California Energy Commission (CEC) advances building decarbonization through numerous programs, including:

- Developing building energy efficiency standards, energy and water efficiency appliance standards, flexible demand appliance standards, and load management standards.
- Advancing innovation and research that supports building decarbonization.
- Implementing incentive programs.
- Developing data-informed policy recommendations.

Based on the results of the *California Building Decarbonization Assessment*, the *2021 Integrated Energy Policy Report* recommended the state adopt a goal of 6 million heat pump installations by 2030 and direct funding toward building decarbonization retrofits in low-income and disadvantaged communities.[4] The goal of 6 million heat pumps by 2030 was endorsed by Governor Gavin Newsom in July 2022.[5]

---

1 *Executive Order B-55-18 To Achieve Carbon Neutrality*, signed by Governor Edmund G. Brown Jr. on September 10, 2018, https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf.

2 Kenney, Michael, Nicholas Janusch, Ingrid Neumann, and Mike Jaske. 2021. *California Building Decarbonization Assessment.* California Energy Commission. Publication Number: CEC-400-2021-006-CMF, https://www.energy.ca.gov/data-reports/reports/building-decarbonization-assessment.

3 Bailey, Stephanie, Jane Berner, David Erne, Noemí Gallardo, Quentin Gee, Akruti Gupta, Heidi Javanbakht, Hilary Poore, John Reid, and Kristen Widdifield. 2023. *Final 2022 Integrated Energy Policy Report Update.* California Energy Commission. Publication Number: CEC-100-2022-01-CMF, https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2022-integrated-energy-policy-report-update.

4 Kenney, Michael, Jacob Wahlgren, Kristina Duloglo, Tiffany Mateo, Danuta Drozdowicz, and Stephanie Bailey. 2022. *Final 2021 Integrated Energy Policy Report, Volume I: Building Decarbonization.* California Energy Commission. Publication Number: CEC-100-2021-001-V1, https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2021-integrated-energy-policy-report.

5 Letter from Governor Newsom to Chair Liane Randolph, California Air Resources Board. July 22, 2022, https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.

In September 2022, Governor Newsom signed Assembly Bill 209 (Committee on Budget, Chapter 251, Statutes of 2022), which directs the CEC to develop and implement an Equitable Building Decarbonization Program that will install retrofit measures in single-family and multifamily homes. The program will include two components: a direct install program and a statewide incentive program to accelerate deployment of low-carbon building technologies.

The Equitable Building Decarbonization Program will also further the purposes of Assembly Bill 32 (Núñez, Chapter 488, Statutes of 2006) and Senate Bill 32 (Pavley, Chapter 249, Statutes of 2016) by investing in projects that reduce greenhouse gas emissions.

In December 2022, the CEC released a request for information and held a public workshop to solicit input on key topics related to the design of the Equitable Building Decarbonization Program. Public comments received at that workshop and in writing informed the development of draft guidelines, which were released in May 2023. In May and June 2023, the CEC held a public comment period and hosted public workshops on the draft guidelines in Fresno, Indio, Los Angeles, San Francisco, and Santa Rosa, as well as several online workshops and tribal listening sessions. These final guidelines were informed by input received at those workshops and written comments submitted to the docket.

These guidelines address the direct install program. Separate guidelines will be developed through a public process for the statewide incentive program.

B. Program Goals

The primary goals of the Equitable Building Decarbonization Program are to reduce greenhouse gas emissions from existing buildings and advance energy equity.

The Equitable Building Decarbonization Program will also encourage resiliency to extreme heat, air quality improvements, energy affordability, grid reliability, and local workforce opportunities. In addition, the program will advance the state's goals of 6 million heat pump installations by 2030, 3 million climate-ready and climate-friendly homes by 2030, and 7 million climate-ready and climate-friendly homes by 2035.[6]

The CEC is required to report progress toward these goals annually to the Legislature.[7] See Chapter 4 for information about metrics that will be used to track progress.

C. Program Components

The Equitable Building Decarbonization Program may include the following components.

- **Statewide Direct Install Program:** The Statewide Direct Install Program will provide building decarbonization upgrades for low-income households in single-family,

6 These goals were established in a letter from Governor Newsom to Chair Liane Randolph, California Air Resources Board. July 22, 2022, https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.

7 Public Resources Code Section 25660.2.

multifamily, and manufactured homes in underresourced communities. The program will be administered separately in Northern, Central, and Southern California (Chapter 2).

- **Tribal Direct Install Program:** Recognizing the unique needs of tribes and tribal communities and consistent with Assembly Bill 209 (Committee on Budget, Chapter 251, Statutes of 2022), the CEC has set aside funding for a separately administered component of the direct install program to serve residential buildings owned or managed by California Native American tribes or California tribal organizations and buildings owned by members of California Native American tribes. Program details will be developed through consultation and engagement with tribes and included in a future update to these guidelines (Chapter 3).
- **Support for Existing Programs:** To begin achieving program goals in the more immediate future while other components are under development, the CEC is evaluating directing a portion of initial funding to bolster existing state programs that provide building decarbonization upgrades for low- to moderate-income California households.
- **Statewide Incentive Program:** The Statewide Incentive Program will provide incentives for low-carbon building technologies and may be implemented in concert with new federal incentive funds authorized by the Inflation Reduction Act (IRA). Separate guidelines will be developed for this program through a public process.

D. Budget

California has allocated up to $922 million to the Equitable Building Decarbonization Program from Fiscal Years 2022–23 through 2026–27 (Table 1).[8] The program will be funded by the General Fund and the Greenhouse Gas Reduction Fund, which is administered by California Climate Investments. See Chapter 4 for more information about California Climate Investments.

Table 1: Equitable Building Decarbonization Program Budget (Millions)

	2022–23	2023–24	2024–25	2025–26	2026-27	Total
General Fund	$2	$87	$213	$165	$50	$517
Greenhouse Gas Reduction Fund	$60	$345	$0	$0	$0	$405
Total	**$62**	**$432**	**$213**	**$165**	**$50**	**$922**

Source: 2023-24 California State Budget

The expected budget breakdown among Equitable Building Decarbonization Program activities is shown in Table 2.

8 The program budget shown here is consistent with the 2023–24 California State Budget passed by the Legislature and signed by the Governor in 2023. The program budget may change if modified by the Governor and Legislature in future years.

The budget breakdown is subject to change based on the amount of funding authorized by the California Legislature over the lifetime of the program. The funding amounts listed in Table 2 may also be increased in the future through the addition of federal, state, and/or utility funds.[9]

Table 2: Equitable Building Decarbonization Program Budget Breakdown

Program Investments	Estimated Funding Over Program Lifetime
Statewide Direct Install Program, including 5% set-aside for manufactured housing	$689,800,000
Tribal Direct Install Program	$30,000,000
Support for Existing Programs	$30,000,000
Statewide Incentive Program	$80,000,000
Program Administration	$92,200,000
Total	**$922,000,000**

Source: CEC staff

9 Additional funding sources to augment the above budget may include, but are not limited to, additional amounts of up to $300 million from the Homeowner Managing Energy Savings (HOMES) Program (IRA Section 50121(b)), up to $300 million from the High-Efficiency Electric Home Rebate (HEEHRA) Program (IRA Section 50122(b)), and up to $10 million from the State-Based Energy Efficiency Contractor Training Grant Program.

CHAPTER 2:
Statewide Direct Install Program

Three administrators will be competitively selected to implement the Statewide Direct Install Program in Northern, Central, and Southern California. Because program funds are insufficient to decarbonize all underresourced communities in the state, the program will initially focus on a subset of underresourced communities, as described in this chapter.

A. Regional Funding Allocation

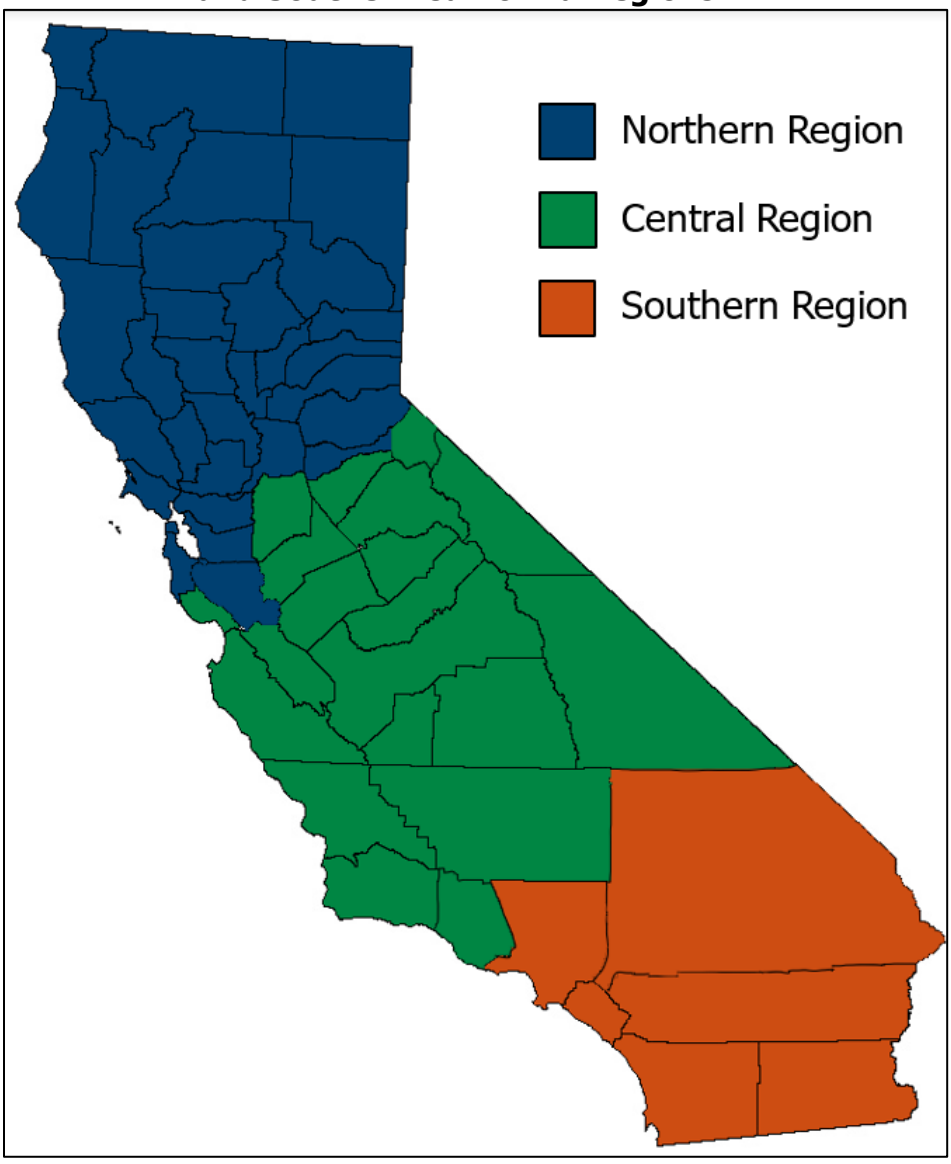
The program will be administered separately in Northern, Central, and Southern California to better ensure a broad distribution of funds. Counties included in each region are listed below and shown in Figure 1.

Northern Region: Alameda, Amador, Butte, Colusa, Contra Costa, Del Norte, El Dorado, Glenn, Humboldt, Lake, Lassen, Marin, Mendocino, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Francisco, San Mateo, Santa Clara, Shasta, Sierra, Siskiyou, Solano, Sonoma, Sutter, Tehama, Trinity, Yolo, Yuba

Central Region: Alpine, Calaveras, Fresno, Inyo, Kern, Kings, Madera, Mariposa, Merced, Mono, Monterey, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Santa Cruz, Stanislaus, Tulare, Tuolumne, Ventura

Southern Region: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego

Figure 1: Map of Northern, Central, and Southern California Regions



Source: CEC staff

Funding allocations for the three regions are shown in Table 3. Allocations are based on the relative population of underresourced communities in each region. See Section C for the definition of an underresourced community for this program.

Table 3: Regional Funding Allocation

Region	Population of Underresourced Communities	Percentage of Statewide Direct Install Program Funds[10]
Northern Region	5.3 million	23%
Central Region	4.3 million	19%
Southern Region	13.6 million	58%

Source: CEC staff

B. Selection of Administrators

The CEC will release a competitive solicitation to select administrators for the three regions. Administrator selection criteria will be outlined in the competitive solicitation request for proposals, which will be developed through a public process.

Applicant teams will be required to have expertise in residential building decarbonization, including decarbonization of single-family homes, multifamily buildings, and manufactured housing.

Applicant teams will also be required to include several community-based organizations (CBOs) for culturally appropriate outreach, education, and support for participating households and communities.[11] Proposals may be led by CBOs or include CBOs as subcontractors or both. For this program, CBOs include nonprofit organizations, tribal entities, or governmental entities that have demonstrated effectiveness representing underresourced or tribal communities and providing support and services to individuals in those communities.

Applicant teams will be required to include CBOs in their proposed budgets and clearly delineate the proposed roles of participating CBOs. For example, CBO roles may include, but are not limited to, the following:

- Inform the selection of initial community focus areas.
- Inform program implementation and evaluation activities.
- Customize outreach materials for each participating community.
- Provide translation services.
- Conduct targeted outreach to potential participants.

10 In addition to the three regional administrators, a portion of Statewide Direct Install Program funds will be used for CEC-administered statewide contracts to support the regional administrators.

11 Public Resources Code Section 25665.3 states: "In selecting third-party implementers, the commission shall prioritize applications from entities that include at least one community-based organization in order to ensure for the provision of culturally-appropriate outreach, education, and support to households participating in the direct install program, and from entities that employ workers from local communities." Priority for local workers is addressed in the Workforce section in Chapter 4.

- Provide potential participants with information about the program and the benefits of building decarbonization and respond to their questions and concerns.
- Support households with the enrollment and income verification process.
- Serve as a point of contact for participating households.
- Administer follow-up surveys to participating households.
- Ensure that tenants in participating buildings are informed of their rights (Chapter 4, Section C).
- Conduct outreach to local and diverse contractors to encourage their participation in the program (Chapter 4, Section D).

C. Community Eligibility

All households served by the program must be in an underresourced community, as defined in statute,[12] in addition to meeting the Household/Property Eligibility Requirements described in Section E. For this program, an underresourced community is defined as a community located in one or more of the following geographic areas:

- Disadvantaged communities designated by the California Environmental Protection Agency for purposes of Senate Bill 535 (De León, Chapter 830, Statutes of 2012)[13] (required for at least 65 percent of expenditures in each of the northern, central, and southern regions)
- Census tracts with median household incomes at or below 80 percent of the statewide median income
- Census tracts with median household incomes at or below the threshold designated as low-income by the Department of Housing and Community Development[14]

In addition, households that are within one half-mile of a disadvantaged community will be eligible for the program. These households must also meet the Household/Property Eligibility Requirements described in Section E. In alignment with California Climate Investment requirements, the program will target 5 percent of funding in areas that are outside but within one half-mile of disadvantaged communities.

12 Public Resources Code Section 25665 states that an underresourced community is "defined by Public Resources Code Section 71130," which "means a community identified pursuant to Section 39711 of the Health and Safety Code, subdivision (d) of Section 39713 of the Health and Safety Code, or subdivision (g) of Section 75005." California Climate Investments uses the term "priority population," which is synonymous with "underresourced community" for this program.

13 The Senate Bill 535 Disadvantaged Communities Map developed under Health and Safety Code Section 39711 is available at https://oehha.ca.gov/calenviroscreen/sb535.

14 Low-income thresholds by county and household size are established annually by the Department of Housing and Community Development and posted at https://www.hcd.ca.gov/grants-and-funding/income-limits.

These geographic areas are shown on the California Air Resources Board's Climate Investments Priority Populations Map at https://webmaps.arb.ca.gov/PriorityPopulations/.[15]

D. Initial Community Focus Areas

The competitive solicitation request for proposals will require administrators and their CBO partners to recommend specific underresourced communities to be served in the initial phase of the program following requirements and scoring criteria established by the CEC.

Administrators should strive for diversity among initial focus areas. In this context, "diversity" includes geographic diversity, inclusion of urban and rural communities, inclusion of communities with different types of housing stock (prevalence of single-family, multifamily, and manufactured homes), communities in several climate zones,[16] and diversity in other equity-related characteristics.

The competitive solicitation request for proposals will include detailed criteria according to which administrators shall recommend initial community focus areas. Criteria are expected to include, but may not be limited to:

- The presence of a local organization with which the program can partner for culturally appropriate outreach and engagement with community residents. As described in Section B, administrators are required to partner with CBOs.
- Communities in which households are most likely to experience utility bill savings as a result of decarbonization, based on climate zone, utility rates, and other factors.
- Communities vulnerable to extreme heat, high fire risk, or other climate risks, and communities vulnerable to high levels of ambient air pollution.
- Communities underserved by existing programs that fund building decarbonization, weatherization, and related measures.
- Communities in which households experience higher than average energy burdens.

In recommending initial focus areas, administrators may also consider areas that have been identified as strong candidates for gas decommissioning, such as through the CEC-funded Tactical Gas Decommissioning Project.[17]

Within initial focus areas, the program will target households/properties most likely to benefit from decarbonization retrofits, as described in Section F.

---

15 Areas identified on the map as "disadvantaged communities" and "low income communities" are underresourced communities as defined in this section.

16 California is divided into 16 climate zones for the purpose of the California Energy Code. Details are available at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/climate-zone-tool-maps-and.

17 For details about the Tactical Gas Decommissioning Project, see Gridworks' Tactical Gas Decommissioning Project Overview at https://gridworks.org/2022/06/tactical-gas-decommissioning-project-overview/.

The CEC will work with administrators to expand the program to additional focus areas in subsequent phases. This expansion will include an opportunity for communities not identified as initial focus areas to be considered for inclusion.

E. Household/Property Eligibility

Households and properties must meet the following criteria to be eligible for funding through the program.

1. Eligible Building Types

The program is limited to residential buildings constructed before January 1, 2020. New construction is not eligible. A building may not participate in the Equitable Building Decarbonization Direct Install Program more than once. Eligible building types include:

- Single-family homes and two- to four-unit residential properties.
- Multifamily residential properties of five or more units.
- Townhouses and condominiums.
- Farmworker housing consistent with the definition in Health and Safety Code Section 50199.7(h)(2).
- Residential buildings such as assisted living facilities, transitional housing, and group homes. This does not include nonresidential buildings used as emergency makeshift shelters.
- Mixed-use buildings that include residential units. Only the residential portion, including common areas, is eligible for the program.
- Manufactured homes, mobile homes, and multifamily manufactured homes, as defined in Health and Safety Code Section 18007 et seq.

Eligible buildings may be either owner-occupied or rented. Manufactured homes are eligible regardless of whether the home or the land it sits upon is owned or rented by the occupant.

2. Eligible Fuel Types

To be eligible, a building must use natural gas, propane, or another fossil fuel as the primary fuel for space heating or water heating.

3. Income Eligibility for Single-Family Homes

To be eligible, single-family homes must be occupied by low-income households,[18] which are defined as households earning up to 80 percent of the area median income (AMI). In the case

18 Under Public Resources Code Section 25665, "'[L]ow-to-moderate income' has the same meaning as 'persons and families of low or moderate income' as defined in Section 50093 of the Health and Safety Code." While the first phase of the program will be limited to low-income households, future phases may include moderate-income households as well.

of rented properties, the income requirement applies to the building occupant, not the building owner.

Low-income thresholds by county and household size are available from the California Department of Housing and Community Development at https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits.

Income eligibility may be demonstrated through a variety of methods, including, but not limited to, one of the following:

- Federal tax returns for all household members over the age of 18
- Recent pay stubs for all working household members
- Proof of enrollment in an income-qualified program that requires an income less than or equal to the income threshold for this program. Such programs may include but are not limited to:
    - California Alternative Rates for Energy (CARE)
    - Family Electric Rate Assistance Program (FERA)
    - Low Income Home Energy Assistance Program (LIHEAP)
    - Low-Income Weatherization Program (LIWP)
    - Energy Savings Assistance Program (ESA)
    - Weatherization Assistance Program (WAP)
    - Disadvantaged Communities — Single-Family Solar Homes Program (DAC-SASH)
    - Women, Infants, and Children (WIC)
    - CalFresh/Supplemental Nutritional Assistance Program (SNAP)
    - CalWORKs/Temporary Assistance for Needy Families (TANF)/Tribal TANF
    - Supplemental Security Income (SSI)
    - Medicaid/Medi-Cal
    - Head Start
    - Lifeline Support for Affordable Communications
    - Food Distribution Program on Indian Reservations
    - National School Lunch Program
    - Housing Improvement Program
    - Housing Opportunities for Persons with AIDS

4. Income Eligibility for Multifamily Buildings

A multifamily building is eligible for the program if at least 66 percent of households earn less than or equal to 80 percent of AMI, or if rent for at least 66 percent of units is affordable to such households. If a multifamily building is eligible, then all units in the building, as well as common areas, will be eligible to receive upgrades.

Multifamily income eligibility may be demonstrated through a variety of methods, which may include:

- Documentation of a rent regulatory agreement with federal, state, or local agencies identifying that at least 66 percent of households earn less than or equal to 80 percent of AMI.
- Pay stubs or annual tax returns showing that at least 66 percent of households earn less than or equal to 80 percent of AMI.
- Documentation showing that at least 66 percent of households are enrolled in income-qualified programs that are available primarily to those with income levels less than or equal to 80 percent of AMI, such as those listed in Section 3 above.
- Documentation showing that rent for at least 66 percent of units is affordable to households with income equal to 80 percent of AMI, where affordability is defined as rent plus utilities that does not exceed 30 percent of household income.

F. Household/Property Targeting

The CEC is engaging a technical support contractor to develop a program wide analytical tool based on household-level energy utility interval meter data and other factors. Using this tool, the CEC will support regional administrators and their CBO partners to target specific households and properties that are most likely to benefit from the program according to the criteria listed below. Targeted households will be a subset of eligible households within the communities served by the program and will receive targeted outreach (Section G).

Targeting criteria may include, but are not limited to, the following. Criteria will depend in part on data availability.

- Likelihood of utility bill savings from decarbonization, based on such factors as primary space- and water-heating fuel type, energy utility meter data, electricity and gas rates, local propane rates (if available), climate zone, building age, age of existing appliances, and benchmarking program data
- Higher vulnerability to extreme heat (for example, homes in hot regions that lack cooling)
- Higher potential for avoided greenhouse gas emissions
- Proximity to other targeted low-income households, for economies of scale in outreach, implementation, and direct install retrofitting

The targeting tool will also be used to help identify the eligible measure(s) most appropriate for each targeted household and associated projected utility bill impacts. See Section I for more information about eligible measures.

Households need not be targeted to participate in the program. Income-eligible households that are within a community served by the program and not targeted may express interest and be evaluated for inclusion by the program administrator.

G. Outreach and Engagement

Program administrators will be required to partner with CBOs to develop or customize outreach materials and conduct culturally appropriate outreach and engagement in participating communities. Outreach will focus on owners and occupants of targeted households (Section F).

H. Set-Aside for Manufactured Homes

Manufactured homes and mobile homes face unique challenges to decarbonization, including low electrical capacity, limited space availability for decarbonization measures, and higher remediation needs. In addition, retrofits of manufactured homes must comply with the National Manufactured Home Construction and Safety Standards rather than state and local building codes.

To address these challenges, administrators of the Statewide Direct Install Program will be required to propose an intentional approach to serve manufactured homes and mobile homes, and direct at least 5 percent of their budgets to these housing types. In developing this approach, administrators are encouraged to coordinate with other programs that serve manufactured housing, such as the California Public Utilities Commission's Mobilehome Park Utility Conversion Program.

I. Eligible Measures

1. Required Measures

All building retrofits conducted by the program will, at a minimum, include the following elements.

a) Replace existing gas-fired[19] heating equipment with a heat pump for space heating and cooling, or replace an existing gas-fired water heater with a heat pump water heater.

b) At the conclusion of the retrofit, at least two of the following four end uses in the building must be electric: space heating, water heating, cooking, and clothes drying. Full building electrification is encouraged but not required.

2. Eligible Measures

Table 4 lists all measures that are eligible for funding through the program. All work funded by the program requires a California contractors' license. Work must comply with applicable standards and manufacturers' installation instructions and obtain required permits.

19 In this document, "gas-fired" refers to equipment fueled by natural gas, propane, or another fossil fuel.

Table 4: Eligible Measures

Category	Measure	Details
Heating and Cooling	Heat pump for space heating and cooling	Eligible as a replacement for gas-fired or electric resistance heating equipment. Must meet the highest efficiency tier (not including any advanced tier) established by the Consortium for Energy Efficiency (CEE).[20] Equipment installed on or after 7/1/24 must use refrigerant with global warming potential (GWP) less than 750.[21] Installer must possess U.S. Environmental Protection Agency Section 608 Technician Certification.[22] Home Energy Rating System (HERS) field verification and diagnostic testing is required consistent with the California Energy Code.
Heating and Cooling	Duct testing/sealing, and/or new ducts, returns, and registers	Duct testing/sealing is required in conjunction with installation of a ducted heat pump for space heating and cooling consistent with the California Energy Code.
Heating and Cooling	Occupant controlled smart thermostat	Required in buildings with central heating/cooling system, if not already present. Must be certified compliant with Joint Appendix 5 (JA5) of the California Energy Code.
Heating and Cooling	Ceiling fan or whole-house fan	Ceiling fans must be ENERGY STAR®-certified.

20 Residential products meeting CEE's Highest Tier (not Advanced Tier) are listed at https://www.ahrinet.org/certification/cee-directory. Where CEE standards vary by climate region, the applicable standards are those for the CEE South region, which includes California.

21 In addition, the CEC encourages the installation of heat pumps that use low or ultra-low GWP refrigerants. Low GWP is defined as GWP of less than 150, and ultra-low GWP is defined as GWP of less than 10.

22 Section 608 certification is required for technicians who "maintain, service, repair, or dispose of equipment that could release refrigerants into the environment." More information is available from the U.S. Environmental Protection Agency at https://www.epa.gov/section608/section-608-technician-certification.

Category	Measure	Details
Building Envelope	Air sealing	
Building Envelope	Insulation	
Building Envelope	Solar window film	Must be certified by the National Fenestration Rating Council.
Water Heating	Heat pump water heater (unitary)	Eligible as a replacement for a gas-fired or electric resistance water heater. 240V heat pump water heaters must meet Northwest Energy Efficiency Alliance (NEEA) Advanced Water Heater Specification for Integrated or Split-System Heat Pump Water Heaters at Tier 3 or higher; 120V heat pump water heaters must meet NEEA Advanced Water Heater Specification for Plug-In Heat Pump Water Heaters at Tier 2 or higher. Must be certified compliant with Joint Appendix 13 (JA13) of the California Energy Code and installed in accordance with JA13 specifications. Must meet the highest efficiency tier (not including any advanced tier) established CEE.[23]
Water Heating	Heat pump water heater (central)	Eligible as a replacement for a gas-fired or electric resistance water heating system. Must appear on CEC's Central Heat Pump Water Heater Performance Map Certification List.[24]

23 Residential products meeting CEE's Highest Tier (not Advanced Tier) are listed at https://www.ahrinet.org/certification/cee-directory.

24 CEC Central Heat Pump Water Heater Performance Map Certification List is available at https://www.energy.ca.gov/rules-and-regulations/building-energy-efficiency/manufacturer-certification-building-equipment-8.

Category	Measure	Details
Water Heating	Low-flow showerheads and faucets	Low-flow showerheads are required in conjunction with heat pump water heater installation, if not already present. Must be WaterSense certified and comply with California Title 20 standard for water efficiency.
Cooking	Induction range or cooktop	Only eligible as a replacement for a gas range or cooktop. Provide gift card for purchase of compatible cookware.
Laundry	Electric clothes dryer (heat pump or electric resistance)	Only eligible as a replacement for a gas clothes dryer. Must be ENERGY STAR-certified.
Lighting	Light-emitting diode (LED) bulbs and fixtures	Replace interior and exterior incandescent, compact fluorescent, halogen, and T12 linear fluorescent bulbs with LED. New fixtures may be installed where existing bulbs cannot be upgraded. Must be certified compliant with Joint Appendix 8 (JA8) of the California Energy Code.
Indoor air quality	Air filtration	Replace existing air filter with a Minimum Efficiency Reporting Value (MERV) 13-rated filter, and associated modifications needed to comply with pressure drop requirements in the California Energy Code.
Electrical	Electrical wiring and panel upsizing	Upgrades and new wiring needed to enable full electrification of the building.[25] Excludes upgrades on the utility side of the meter and distribution system upgrades, which are ineligible for program funding. Subject to cost caps (see Table 5). See Section 5, Electrical Upgrades.

25 This may include wiring to support electric vehicle charging, but not the cost of an electric vehicle charging station.

Category	Measure	Details
Electrical	Automatic circuit sharing devices	See Section 5, Electrical Upgrades.
Remediation and safety	May include construction needed to create physical space for decarbonization measures, repair of roof or envelope leaks/damage, remediation of galvanized pipe, lead paint, asbestos, and/or mold, installation of smoke and carbon monoxide alarms, ventilation, and other work needed to bring property up to code.	Subject to cost caps (see Table 5).

Source: CEC staff

3. Ineligible Measures

The following measures are not eligible for funding through this program. However, administrators are encouraged to coordinate with complementary programs that offer these measures.

- Solar photovoltaic systems.
- Battery storage not directly integrated into one of the four key appliances identified in Section 1 above.
- Window replacement (other than for remediation/safety).

The following measures are not eligible for funding through this program.

- Any new system or equipment that uses natural gas, propane, or any other fossil fuel.
- Installation of electric resistance heating to serve as the primary heat source for a home.

4. Product Availability Constraints

Administrators may submit to the CEC Executive Director a request to approve equipment that does not meet the eligibility criteria listed in Table 4 if eligible equipment is not available on the market or is subject to lengthy delays in availability. Such requests must include documentation of the product availability constraint and specifications of the proposed substitute equipment in relation to the eligibility criteria listed in Table 4.

The Executive Director shall review and approve a request to substitute equipment if the Administrator provides: (1) proof of product unavailability exceeding 12 weeks, and (2) proof that no alternative product meeting the eligibility criteria is available. The proposed substitute equipment shall be selected to minimize the impact on the goals of the program and shall not use natural gas, propane, or any other fossil fuel. An approval to substitute equipment will be

effective for a limited period specified by the Executive Director, not to exceed one year. If an Administrator must use ineligible equipment beyond the time period approved by the Executive Director, the Administrator shall submit a new request to the Executive Director.

5. Electrical Upgrades

As shown in Table 4, upgrades to a building's electrical system and upsizing of the electrical panel are eligible measures. However, the CEC encourages building retrofits that avoid the need for electrical panel upgrades when appropriate. While electrical panel upgrades will be needed in some homes, avoiding unnecessary panel upgrades will allow projects to be completed more quickly and at lower cost. Administrators shall encourage contractors to utilize strategies for avoiding unnecessary panel upgrades, such as:

- Use of the load calculation methodology described in California Electrical Code Section 220.87 to determine whether a panel upgrade is needed.
- Selection of low-power appliances, such a 120V heat pump water heaters and heat pump clothes dryers, where appropriate.
- Installation of automatic circuit sharing devices as an alternative to upgrading the electrical panel, where appropriate.
- Avoiding the installation of space heating and water heating systems that have resistance heating elements, where appropriate.
- Use of sub-panels to facilitate the addition of new circuits or when there are not enough open slots to accommodate new circuits in the existing panel.

6. Packages of Measures

Program administrators will be responsible for developing a set of packages of eligible measures to be applied to participating buildings. Packages should be designed to achieve bill savings and greenhouse gas emission reductions in participating households while improving air quality, resiliency, and grid reliability, where possible. The intent of packages is to simplify and streamline the program for participants and contractors with highly replicable activity, and avoid the need for a custom solution to be developed for each building. The expectation is that some packages will include a broad range of eligible measures, while other packages will include a more limited number of measures. Packages should consider variations in appropriate measures based on property attributes such as building type and characteristics (including packages appropriate for manufactured homes), age and condition of existing appliances, climate zone, utility service territory, and site conditions.

Program participants should be provided with choices among packages for which they are eligible whenever possible. Administrators and contractors shall maintain flexibility to modify packages on a case-by-case basis as required to meet the needs and preferences of participating households.

7. Equipment Removal

Replaced equipment must be removed from the site and properly recycled or disposed of in accordance with federal, state, and local regulations. Removal and disposal of appliances containing refrigerant with GWP greater than 150 must follow refrigerant recovery procedures

required by California Code of Regulations Section 95390 and Code of Federal Regulations Title 40, Part 82, Subpart F.

8. Eligible Costs

In addition to the costs of eligible measures listed above, Equitable Building Decarbonization Direct Install Program funds may be used to cover associated costs including installation labor, permitting, engineering design services for multifamily buildings, equipment removal and recycling/disposal, and HERS field verification and diagnostic testing.

9. Quality Control and Customer Support

Administrators will be responsible for the quality of contractors' work for a minimum of 12 months, and for promptly addressing any deficiencies.

Administrators shall ensure that participating households are enrolled in the most appropriate rate plan available from their utility (which may be a rate specifically designed for electric homes), as well as any rate discounts for which they are eligible. Administrators shall offer to assist households to enroll in appropriate rates and discounts for which they are not already enrolled, including budget billing/level pay programs to smooth out monthly variability in energy bills.

Administrators shall ensure that building owners and occupants are informed about the proper operation of their new equipment and any recommended maintenance (for example, the changing or cleaning of filters, setback temperatures, warm-up periods, and programming of equipment). Administrators shall maintain a hotline for customers to report problems and questions regarding equipment operation. The hotline telephone number shall be provided to customers in a clear and useful format, for example on stickers affixed to equipment. Administrators shall summarize and report the content of hotline calls and responses to the CEC.

J. Pricing and Cost Caps

Administrators will be required to implement mechanisms to control costs, such as cost analysis, competitive bidding, and standard pricing for eligible measures. The program will cover 100 percent of the net cost of eligible measures for participating households after applying other applicable incentives, subject to the cost caps in Table 5.

The average per-home cost of remediation and safety measures, including wiring and electrical panel upgrades, shall not exceed the maximums listed in Table 5. These maximum average costs apply to single-family homes, manufactured homes, and per-unit in multifamily buildings. Capping the average, rather than per-home, remediation cost will allow the program to serve homes with a range of remediation needs. Administrators will be expected to collect detailed information on actual remediation measures and costs, and maximum average costs may be adjusted based on this information.

Table 5: Maximum Average Electrical and Remediation Costs

Type of Home	Maximum Average Cost for Electrical and Remediation Measures
Single-family and multifamily buildings (per unit)	$6,000
Manufactured and mobile homes	$7,200

Source: CEC staff

CHAPTER 3:
Tribal Direct Install Program

Recognizing the unique needs of tribes and tribal communities, CEC has set aside funds for a separately administered component of the direct install program to serve buildings owned or managed by California Native American tribes or California tribal organizations, and buildings owned by members of California Native American tribes. Program details will be developed through consultation and engagement with tribes and will be included in a future update to these guidelines.

CHAPTER 4: Administration

A. Program Coordination and Incentive Layering

Numerous federal, state, utility, regional, and local programs offer direct installation or incentives to advance energy efficiency, weatherization, electrification, and decarbonization in California homes. Administrators will be responsible for coordinating with other programs, where possible, to maximize the benefits of the Equitable Building Decarbonization Program.

Program coordination may include:

- Coordination with programs that provide funding for one or more measures that are also eligible through the Equitable Building Decarbonization Program, such as remediation, smart thermostats, electrical panel upgrades, or heat pumps. Leveraging other funding sources will allow more homes to be reached by the Equitable Building Decarbonization Program.
- Coordination with programs that provide funding for complementary measures that are not eligible for Equitable Building Decarbonization Program funding, such as solar photovoltaic panels, electric vehicle charging, shade trees, and battery storage.

To maximize the number of California households that benefit from the Equitable Building Decarbonization Program, complementary funding sources should be applied to a project prior to Equitable Building Decarbonization Program funds whenever possible.

Program coordination should be designed to reduce greenhouse gas emissions and advance energy equity, in alignment with Equitable Building Decarbonization Program goals. In addition, program coordination should consider the following principles:

- Minimize complexity for program participants and contractors.
- Comply with legal and regulatory requirements of each funding source.
- Ensure that the total amount of funding applied to a project does not exceed the actual project cost.

B. Metrics and Data Collection

Administrators will be required to collect and report specified data from program activities, analyze data on a regular basis, and present results to CEC to help determine the need for adjustments to the program. This data will also be used to inform the CEC's annual reporting to the Legislature as required by Public Resources Code Section 25660.2.

Table 6 and Table 7 list the goals of the program, direction from the program's authorizing legislation (Assembly Bill 209, Chapter 251, Statutes of 2022) that underlies the goals, and metrics that CEC anticipates will be used to track progress toward the goals. Additional overall program metrics and data may include but are not limited to:

- Number of homes retrofitted

- List of installed measures
- Expenditure breakdowns
- Number of occupants in retrofitted homes
- Locations of retrofitted homes (zip code, climate zone, utility service territory)
- Participant opt-out rate
- Participant satisfaction

Metrics will be refined during program development and implementation and used to inform data collection requirements. Data collection requirements and fields will be standardized statewide. The CEC will collaborate with the California Air Resources Board to develop refined metrics and consistent methodologies for quantifying greenhouse gas reductions and other economic, environmental, and public health benefits, including workforce benefits. Data will be collected at the time of the project and for up to 12-24 months post-project.

Table 6: Primary Goals and Metrics

Goal	Direction From Authorizing Statute[26]	Possible Metrics
Reduce greenhouse gas emissions	The direct install program shall reduce the emissions of greenhouse gases	• Greenhouse gas emissions avoided • Cost of avoided greenhouse gas emissions • Type and amount of refrigerant in installed equipment
Advance energy equity	• Participation shall be at minimal or no cost for low-to-moderate-income residents • Encourage energy affordability where feasible • Preference for buildings located in underresourced communities • Preference for buildings owned or managed by a California Native American tribe or a California tribal organization • Preference for buildings owned by a member of a California Native American tribe • May include tenant protections for participating rental properties	• Average reduction in utility bills due to program • Number of homes with increased/reduced bills • Funds directed to low-income households • Funds directed to very low-income households • Funds directed to underresourced communities • Funds directed to disadvantaged communities designed by the California Environmental Protection Agency • Funds directed to tribes, tribal organizations, and tribal members • Average duration of tenant displacement due to project • Average change in rent before/after participation • Number of violations of tenant protection provisions

Source: CEC staff

26 Public Resources Code Section 25665.3.

Table 7: Secondary Goals and Metrics

Goal	Direction From Authorizing Statute[27]	Possible Metrics
Improve resiliency to extreme heat	Encourage resiliency to extreme heat where feasible	• Number of homes with cooling, insulation, and air-sealing upgrades • Participants' thermal comfort before and after retrofit
Improve air quality	• Encourage indoor air quality improvements where feasible • Estimate reduced onsite criteria air pollutants	• Number and type of gas appliances and equipment removed from homes • Change in indoor pollutants in sample homes • Estimated onsite reductions in criteria air pollutants
Support grid reliability	Encourage grid reliability support where feasible	• Change in household average coincident peak load • Number of smart thermostats installed • Number of JA13-compliant heat-pump water heaters installed • Households signed up for load-flexibility programs
Support local workforce and high-quality jobs	• Projects shall be performed by workers paid prevailing wage where possible and when applicable • Prioritize applications from implementers that employ workers from local communities	• Proportion of workers that are paid prevailing wages • Average and range of wages by occupation • Jobs that provide employer-paid health insurance, paid leave, and/or a retirement plan • Local workers employed by participating contractors • Licenses and certifications held and newly completed by participating contractors and workers • Above workforce metrics for individuals from priority populations • Number of contracts and dollar value awarded to small businesses or women, minority, disabled veteran, or lesbian, gay, bisexual, and transgender (LGBT) business enterprises. • Participant assessment of contractor professionalism • Participant assessment of job quality

27 Public Resources Code Sections 25660.2 and 25665.3.

Goal	Direction From Authorizing Statute[27]	Possible Metrics
Support the Governor's goal of 6 million heat pumps installed by 2030	None[28]	• Number and type of heat pumps installed • Propane and gas heating/cooling and water heating technologies replaced with heat pumps
Support the Governor's goal of 3 million climate-ready and climate-friendly homes by 2030 and 7 million by 2035	None[29]	• Number of homes made climate-ready and climate-friendly through the program • Number of homes made all-electric through the program

Source: CEC staff

C. Tenant Protection

This program includes tenant protections, which include the following elements: rent increase limitations, eviction protections, information for tenants and property owners on rights and responsibilities under the program, and requirements related to project work and temporary displacement.

The CEC plans to prepare documents (program participation agreements) for Program Administrators to use when contracting with program participants. Program participants will include tenants, property owners, and potentially other relevant participants. Program participation agreements will identify the rights and responsibilities of program participants and will include terms addressing rent increase limitations and eviction protections. Additional details are listed below.

Program participation agreements will take one or more of the following forms: lease addendum, deed recording, or other documents. The form of the program participation agreements may depend on whether the property is already deed restricted, the number of units, or other factors.

Property owners shall also be subject to all applicable state and local laws regarding rent increases, eviction, tenant displacement, and other tenant protections. Where state or local

28 Goal established in letter from Governor Gavin Newsom to Chair Liane Randolph, California Air Resources Board. July 22, 2022, https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.

29 Goal established in letter from Governor Gavin Newsom to Chair Liane Randolph, California Air Resources Board. July 22, 2022, https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.

laws require more tenant protections than described in this section, the more stringent requirements shall apply.

These tenant protections may be revisited by the CEC based on feedback from program administrators and participants and revised in a future edition of these Guidelines.

1. Rent Increases

For eligible deed-restricted affordable housing, the deed recording must be in place for at least 10 years post-project under this program (or be extended if it would otherwise expire before this time).

For market-rate rental housing, the program participation agreements will include provisions that require a property owner choosing to participate in this program not to increase rent for units improved by the program by more than 3 percent per year. Rent increases up to 3 percent per year must be due to a documented increase in property taxes, operations and maintenance costs, or amortization of improvements unrelated to a project funded by this program. This rent increase limitation will apply:

- 10 years after project completion for buildings with 5 or more units.
- 5 years after project completion for buildings with 1-4 units.

2. Eviction

Program participation agreements will prohibit property owners from terminating a tenancy and/or evicting a tenant from an improved unit before, during, or after the project without just cause as defined in Civil Code Section 1946.2. The property owner must also commit in writing that the building retrofits conducted pursuant to the Equitable Building Decarbonization Program, or any other activity related to the program, shall not be the basis for just cause for eviction.

3. Information for Tenants and Property Owners

Administrators will be responsible for ensuring that project information is available in the predominant languages spoken in the community and is communicated clearly to both property owners and tenants. Such information should include:

- Measures to be installed
- Benefits expected from installed measures
- Expected duration of construction and construction hours
- Whether temporary displacement is required
- Tenant and property owner rights and responsibilities related to participation in this program, including those related to rent increases, evictions, and displacement
- Expected timing of post-project follow-up surveys
- Number to call regarding any concerns related to a project funded by this program

In addition, the CEC will provide information on program benefits and potential impacts that will be required to be provided to tenants prior to execution of any program participation agreements by tenants and commencement of the project.

4. Construction Rules and Temporary Displacement

Project construction shall be limited to 30 days whenever possible.

Projects should be designed to minimize disruption to tenants, avoid the need for temporary displacement if possible, and reduce the duration of displacement if it is necessary. If displacement is needed, tenants shall have the right to return to the same unit once construction is complete and state and local laws governing tenant displacement shall apply.

D. Workforce Standards and Requirements

1. Prevailing Wage

Pursuant to Public Resources Code Section 25665.3(f), "Projects funded pursuant to the direct install program shall be performed by workers paid prevailing wage where possible and when applicable." Building retrofits conducted using Equitable Building Decarbonization Direct Install Program funds will likely trigger public works laws (Labor Code Section 1720, et seq.), a requirement of which is to pay prevailing wages. Administrators are fully responsible for complying with all applicable laws, which can include California public works requirements. Only the Department of Industrial Relations (DIR) and courts of competent jurisdiction may issue legally binding determinations that a project is or is not a public works project.

Administrators should assume their projects are public works, and that prevailing wage requirements apply, unless they obtain a determination to the contrary from DIR or an appropriate court. Administrators are also responsible for ensuring their subcontractors comply with applicable prevailing wage requirements. California law provides for substantial damages and financial penalties for failure to pay prevailing wages when such payment is required. Invoices submitted to the CEC for payment will require a certification of compliance with prevailing wage laws.

2. Workforce Requirements

Administrators shall propose, implement, and measure results of a workforce plan with the goal of ensuring high-quality installations and creating local, high-quality jobs in the communities served. Workforce plans shall include the following elements.

Contractor Preference

Administrators shall perform outreach to a diverse set of licensed contractors to participate in the program, with a focus on local contractors in participating underresourced communities. Administrators shall provide preference for contractors that meet at least three of the following criteria:

- Comply with "skilled and trained workforce" standards as defined in Public Contracts Code Section 2600, et seq.
- Are based in the community or county where the work will occur.
- Are small businesses or women, minority, disabled veteran, or LGBT business enterprises.
- Participate in relevant state-approved apprenticeship programs.

- Are party to a multi-craft community workforce and training agreement covering work on the project.
- Employ targeted hiring strategies to create jobs for residents of underresourced, tribal, or low-income communities, and individuals with barriers to employment.[30]

Administrators shall establish an initial priority period for each funding round which limits applications and awards to contractors who meet at least three of the six criteria listed above.

Training and Experience Requirements

Administrators shall establish minimum training and experience requirements for construction workers, including hands-on training to install equipment and appliances eligible for the program. Workers who have either (1) graduated from a state-approved apprenticeship program, or (2) possess at least three years of relevant installation experience and have received training and certification in the type of equipment being installed shall be deemed to have adequate training. At least one-third of all construction workers on a project shall meet the established minimum training and experience requirements.

All electrical panel upgrades shall be installed by state certified electricians.

Bundling

Administrators shall group projects per contractor for economies of scale and to encourage contractor participation.

E. California Climate Investments

The Equitable Building Decarbonization Program is part of California Climate Investments, a statewide program that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment, particularly in disadvantaged communities. The Cap-and-Trade program also creates a financial incentive for industries to invest in clean technologies and develop innovative ways to reduce pollution. California Climate Investments projects include affordable housing, renewable energy, public transportation, zero-emission vehicles, environmental restoration, more sustainable agriculture, recycling, and much more. At least 35 percent of these investments are located within and benefiting residents of disadvantaged communities, low-income communities, and low-income households across California. For more information, visit the California Climate Investments website at caclimateinvestments.ca.gov.

Programs part of the California Climate Investments are required to meet minimum levels of investments to projects that benefit residents of disadvantaged communities, low-income communities, and low-income households, collectively referred to as "priority populations." The following investment targets have been established for the Equitable Building Decarbonization Direct Install Program. These targets apply specifically to the portion of the

30 "Individual with a barrier to employment" is defined in the federal Workforce Innovation and Opportunity Act of 2014, Section 3, Part 24. https://www.congress.gov/113/bills/hr803/BILLS-113hr803enr.pdf

program funded by California Climate Investments, but are consistent with the design of the program as a whole, as described in Chapter 2 of these guidelines.

- 65% of funds targeted to households in disadvantaged communities.
- 5% of funds targeted to households outside but within one half-mile of a disadvantaged community.
- 20% of funds targeted to low-income communities or households.
- 90% of funds targeted to Priority Populations.

As required by California Climate Investments, the CEC will use Benefit Criteria Tables to determine if projects have a direct benefit to priority populations. Benefit Criteria Tables for this program will be available at arb.ca.gov/cci-resources.

As described in Section B (Metrics and Data Collection), the CEC will collaborate with the California Air Resources Board to develop refined metrics and consistent methodologies for quantifying greenhouse gas reductions and other economic, environmental, and public health benefits, as required by California Climate Investments.

F. Guidelines Authority

These program guidelines are adopted under Public Resources Code Division 15, Chapter 7.6 added by Assembly Bill 209 (Committee on Budget, Chapter 251, Statutes of 2022), which directs the CEC to establish the Equitable Building Decarbonization Program. Under Public Resources Code Section 25665.6, the Administrative Procedure Act (Chapter 3.5 [commencing with Section 11340] of Part 1 of Division 3 of Title 2 of the Government Code) does not apply to the adoption of these guidelines.

G. Effective Date of Guidelines

The Equitable Building Decarbonization Direct Install Program guidelines will take effect only after they have been adopted by the California Energy Commission at a CEC business meeting. Once finalized, the CEC will post the adopted guidelines on the Equitable Building Decarbonization Program webpage (https://www.energy.ca.gov/programs-and-topics/programs/equitable-building-decarbonization-program).

H. Interpretation

Nothing in these guidelines shall be construed to abridge the powers or authority of the CEC or any CEC-designated committee as specified in Division 15 of the Public Resources Code, commencing with Section 25000, or Division 2 of Title 20 of the California Code of Regulations, commencing with Section 1001.

I. Changes to Guidelines

1. Substantive Changes

After adoption, substantive changes to the adopted program guidelines may be made with the approval of the CEC at a publicly noticed meeting. Before adopting any revisions to the guidelines, CEC staff will provide an opportunity for public comment and host one or more

staff workshops to discuss the proposed changes. Unless stated otherwise in the resolution approving substantive changes, such changes shall take effect upon adoption by the CEC.

2. Nonsubstantive Changes

If the program guidelines require nonsubstantive changes, such as reorganization of text, grammatical corrections, or other changes that do not materially affect the program, CEC staff will provide a notice of the changes to the associated CEC subscription lists, the CEC website, and the program docket.

J. California Environmental Quality Act

In general, the CEC must comply with California Environmental Quality Act (CEQA),[31] which requires public agencies to identify and consider potential environmental impacts of proposed projects when the CEC supports proposed projects with grants or other subsidies.[32] The CEC has made an initial determination that the development of these guidelines is not a project for purposes of CEQA. However, if the guidelines are a project, the CEC has made an initial finding that they are exempt from CEQA under California Code of Regulations, Title 14, Sections 15307 and 15308. These provisions exempt actions taken by a regulatory agency pursuant to state law to "assure the maintenance, restoration, or enhancement of a natural resource" and actions taken to "assure the maintenance, restoration, enhancement, or protection of the environment" where the action involves procedures for protection of the environment. The CEC has also made an initial determination that the guidelines are exempt from CEQA under the common-sense exemption, California Code of Regulations, Title 14, Section 15061(b)(3), because there is no possibility that the guidelines may have a significant effect on the environment, as defined by CEQA.

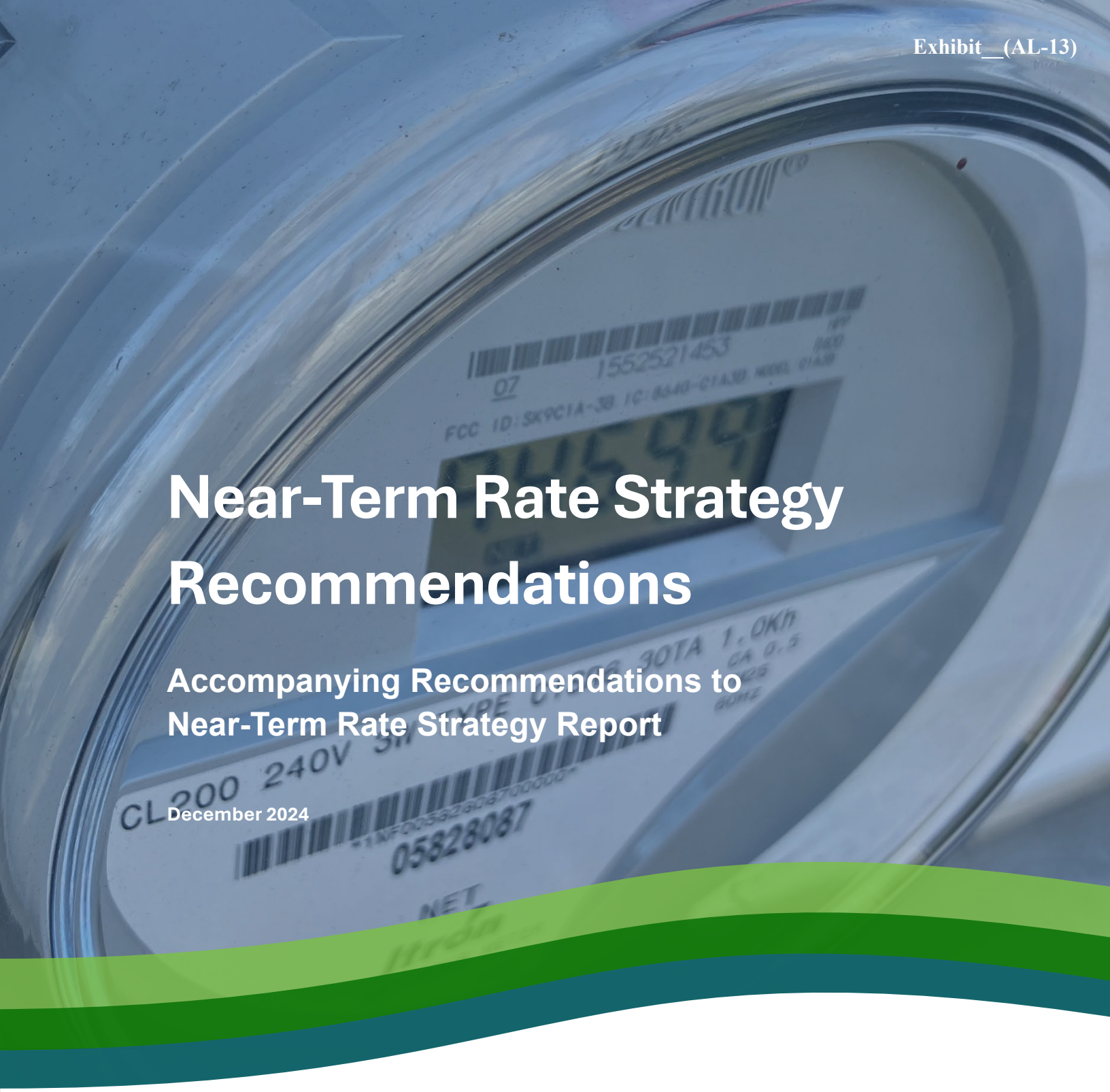
31 Public Resources Code Section 21000 et seq.; see also California Code of Regulations, Title 14, Section 15000 et seq.

32 Public Resources Code Section 21065(b).

GLOSSARY

Term	Definition
Area median income (AMI)	Median household income based on household size of a geographic area of the state, as annually updated by the Department of Housing and Community Development.
California Energy Commission (CEC)	California's primary energy policy and planning agency.
Carbon neutrality	A state of net-zero greenhouse gas emissions, in which greenhouse gases emitted to the atmosphere are balanced in equal measure by greenhouse gases removed from the atmosphere.
Community-based organization (CBO)	A nonprofit organization, tribal entity, or governmental entity with demonstrated effectiveness representing an underresourced or tribal community and providing support and services to individuals in the community.
Decarbonization	Activities that reduce or eliminate greenhouse gas emissions, such as by replacing the use of fossil fuels (in buildings, vehicles, industry, and electric power generation) with clean and renewable technologies.
Disadvantaged community	An area identified as disadvantaged by the California Environmental Protection Agency per Senate Bill 535 (Chapter 830, Statutes of 2012) based on geographic, socioeconomic, public health, and environmental hazard criteria. A map of disadvantaged communities is available at https://calepa.ca.gov/EnvJustice/GHGInvest/.
Energy burden	The percentage of household income spent on energy costs.
ENERGY STAR®	A program run by the U.S. Environmental Protection Agency and the U.S. Department of Energy that promotes energy efficiency by certifying and labeling energy-efficient products.
Global warming potential (GWP)	A measure of how much energy the emissions of 1 ton of a greenhouse gas will absorb over a given period of time (usually 100 years), relative to the emissions of 1 ton of carbon dioxide.
Greenhouse gas (GHG)	Gases that trap heat in the atmosphere, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).
Heat pump	An appliance that uses electricity to transfer heat from a cool space to a warm space, providing an energy-efficient way to heat and cool buildings or to heat water.
High-quality job	A job that facilitates economic mobility by providing retirement benefits, vacation and sick leave, training opportunities, and wages at or above the average median wage of a region.

Low-income community	A census tract with a median household income at or below 80 percent of the statewide median income, or a census tract with a median household income at or below the threshold designated as low-income by the Department of Housing and Community Development.
Low-income household	A household earning 80 percent or less of the area median income. Low-income thresholds by county and household size are available from the Department of Housing and Community Development at hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits.
Priority population	For the purpose of California Climate Investments, priority populations include disadvantaged communities, low-income communities, and low-income households. A map of Priority Populations is available at webmaps.arb.ca.gov/PriorityPopulations.
Underresourced community	A disadvantaged community or a low-income community.
Very low-income household	A household earning 50 percent or less of the area median income. Very low-income thresholds by county and household size are available from the Department of Housing and Community Development at hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits.



Near-Term Rate Strategy Recommendations

Accompanying Recommendations to Near-Term Rate Strategy Report

December 2024

Executive Office of Energy and Environmental Affairs

MASSACHUSETTS CLEAN ENERGY CENTER®

MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES

OFFICE OF THE ATTORNEY GENERAL COMMONWEALTH OF MASSACHUSETTS

Massachusetts Interagency Rates Working Group

A Collaboration to Advance Near- and Long-Term Rate Design and Ratemaking that Aligns with the Commonwealth's Decarbonization Goals

Table of Contents

Executive Summary

The **Interagency Rates Working Group (Working Group)**, which includes representatives from the Executive Office of Energy & Environmental Affairs, the Department of Energy Resources, the Massachusetts Clean Energy Center, and the Attorney General's Office, was formed to advance near- and long-term electric rate design and ratemaking that aligns with the Commonwealth's decarbonization mandates.

The Working Group, supported by Energy & Environmental Economics, Inc., explored barriers and opportunities for electric rates to support the energy transition. Electric rate design and ratemaking must prioritize affordability, such that no resident experiences undue energy burden (energy burden is defined here as the percent of income spent on energy bills), alongside the reduction of the barriers to transportation and building electrification to facilitate the clean energy transition. The objective of the **Near-Term Rate Strategy Report** is to identify rate designs that better support the adoption of electrification in Massachusetts in the near-term, or prior to the widespread deployment of advanced metering infrastructure (AMI) meters that will enable additional, more advanced electric rates. The Working Group has thus far focused on residential electric rates.

Summary of Recommendations

The Working Group prepared these recommendations following the development of the Near-Term Rate Strategy Report and robust stakeholder engagement. The recommendations are focused on potential rate designs that would enable Massachusetts' households to make cost-effective electrification choices that support and advance the Commonwealth's climate and clean energy goals. The **Near-Term Rate Strategy Recommendations** focus on the following areas: rate structure; marketing, education, and outreach; monitoring and evaluation; complementary programs and policies; and implementation. Specifically, the Working Group recommends that:

- All electric distribution companies (EDCs) offer an optional, seasonal heat pump rate, with differentiated volumetric rates to reduce energy burden for customers transitioning from gas heating to electric heat pumps;
- The Commonwealth further considers an additional non-bypassable fixed charge, exercised in a targeted manner to include specific policy or public benefits programs;
- Marketing, education, and outreach efforts associated with the seasonal heat pump rate should be customer-centric, and should identify potential barriers to participation and then mitigate or remove those barriers to create an experience for customers that is easy, convenient, and as frictionless as possible;
- The Massachusetts Department of Public Utilities (DPU) and EDCs monitor and evaluate seasonal heat pump rates, including information and analysis related to enrollment and customer outcomes, in addition to changes in energy usage and bill impacts; and
- The Household Energy Expenditure Model (HEEM), as described in the Near-Term Rate Strategy Report section below, or similar form of granular rate impact analysis, that considers energy cost impacts on a variety of Massachusetts' households, be developed and used as an instructive tool for the DPU and EDCs to analyze rate impacts in the future.

Introduction

The **Interagency Rates Working Group (Working Group, or IRWG)** was formed to advance near- and long-term electric rate design and ratemaking that aligns with the Commonwealth's decarbonization mandates. The Working Group includes representatives from the Executive Office of Energy & Environmental Affairs (EEA), the Department of Energy Resources (DOER), the Massachusetts Clean Energy Center (MassCEC), and the Attorney General's Office (AGO).

Goals and Objectives of the Working Group

The **Massachusetts Clean Energy and Climate Plan (CECP)**[1] identifies electrification as a core strategy to reduce greenhouse gas (GHG) emissions in the building and transportation sectors. The Commonwealth has identified existing electricity rates as a barrier to widespread electrification and achieving the Commonwealth's decarbonization mandates.[2] The **Massachusetts Commission on Clean Heat Final Report** provided several recommendations related to aligning rate design with the Commonwealth's decarbonization mandates, including both near- and longer-term actions to address "the operating costs barrier to adoption of clean heating technologies."[3] Namely, the Commission on Clean Heat recommended that EEA "pursue opportunities to defray electric operating cost increases in the near-term and incentivize the expanded adoption of heat pump technology, particularly for LMI [(low- and moderate-income)] households."[4] In addition, the Commission on Clean Heat identified additional research needed regarding rate design.[5] While this Working Group was not developed to address all of the Clean Heat recommendations directly, they inform the Working Group's objectives.

In addition, the Working Group explored options and engaged with stakeholders throughout the development of the rates studies and recommendations, with the objective of gathering and understanding stakeholder perspectives, and providing early information and engagement, ahead of and to help inform later process during DPU's evaluation of rate design topics and proposals.

The Working Group developed a project scope to comprehensively look at the barriers and opportunities for electric rates to support the clean energy transition. Electric rate design and ratemaking must prioritize affordability, such that no resident experiences undue energy burden (defined here as the percent of income spent on energy bills), and the reduction of the barriers to

[1] Reference includes the Massachusetts Clean Energy and Climate Plan for 2025 and 2030 and the Massachusetts Clean Energy and Climate Plan for 2050.
[2] *Final Report of the Massachusetts Commission on Clean Heat* at 23-24.
[3] *Final Report of the Massachusetts Commission on Clean Heat* at 24.
[4] *Final Report of the Massachusetts Commission on Clean Heat* at 25.
[5] The Commission on Clean Heat recommended that "[the DPU] should initiate an evaluation of the current electricity structure and alternative rate design options to identify opportunities that can better align energy prices with the cost of service and equity goals." The Commission recommends that the DPU's investigation include opportunities to redesign/restructure current rates and offerings to more accurately reflect the cost of service for clean heat technologies and approaches to minimize additional cost burdens on low-income customers. (*Final Report of the Massachusetts Commission on Clean Heat*, November 30, 2022, at 24-26, https://www.mass.gov/info-details/commission-on-clean-heat-issues-final-report).

transportation and building electrification to facilitate the clean energy transition. The Working Group acknowledges that the upfront costs to electrify are also significant barriers to the adoption of electric vehicles (EVs) and heat pumps, and the Commonwealth must continue to pursue strategies to lower upfront costs, especially for low- and moderate-income customers. However, the recommendations discussed herein are limited to addressing the operating costs of electrification – i.e., rate design and ratemaking for residential customers. While the recommendations included herein focus on the application of rate designs for residential customers, the Working Group notes that several recommendations may also be appropriate for commercial customers facing barriers to electrification. With the support of Energy & Environmental Economics, Inc. (E3) and the review, input, and insight from stakeholders, the Working Group developed three primary products to support a set of final recommendations of the Working Group. The three primary products include:

Figure 1: Interagency Rates Working Group Deliverables

Electric Rates Asssement	Near-Term Rate Strategy Report	Long-Term Ratemaking Study
• Define the current state of electric rates in Massachusetts, describe the policy and regulatory landscape that shapes rates, and compare Massachusetts against other states' electric utilities	• Address operational cost barriers to near-term electrification through rate design offerings available before electric consumers receive AMI meters	• Present a vision and recommendations for advancing ratemaking mechanisms and rates for a decarbonized energy system and the associated technologies and capabilities available

Rate Design and Ratemaking Priorities

The Working Group developed the following rate design and ratemaking priorities, informed by several rounds of stakeholder feedback, discussed more fully below. These priorities draw from traditional rate design and ratemaking considerations, with additional specificity to support the development of rates that align with the Commonwealth's climate goals and emission reduction mandates.

Figure 2: Near- and Long-Term Rate Design and Ratemaking Priorities

Promote electrification by removing operating barriers inherent in electric rates	• Design cost-based electric rates that encourage ratepayers to electrify end-uses • Create rate design features targeted to reducing energy burden for ratepayers - while maintaining safe and healthy living conditions
Increase adoption of cost-effective distributed energy resources (DER) to advance decarbonization and electrification	• Promote DER and equitably allocate costs (e.g., the costs of interconnection, incentive programs, etc.) through rate design
Integrate distribution system planning into the utility's business-as-usual operations and investments	• Promote least-cost electric system investments that accommodate transportation and building electrification and other new loads
Promote operational efficiency to facilitate the transition of the distribution grid	• Utilize price signals to achieve effective load management, including peak demand reduction, which may defer or avoid electric system investments • Improve grid reliability, efficiency, and resiliency

Near-Term Rate Strategy Report

MassCEC retained the services of E3 to support the Working Group. E3 conducted an analysis of near-term rate strategies that would support electrification and energy affordability goals for residential customers with current electric metering technology.

The objective of the **Near-Term Rate Strategy Report** is to identify rate designs that better support the adoption of electrification in Massachusetts in the near-term, defined as the period before widespread deployment of AMI meters that would enable additional, more advanced electric rates. This includes carefully considering the energy burden of electrification for LMI consumers and prioritizing the development of solutions to address unaffordable and unsustainable levels of energy burden. We note that for some households with low energy burden, low energy bills are the result of lack of air conditioning (A/C) systems in their homes. These households should also be targeted for electrification and expansion of their cooling systems, in tandem with weatherization and other energy efficiency measures that can help mitigate increases in electricity usage and bills, which are needed to adapt to climate change.

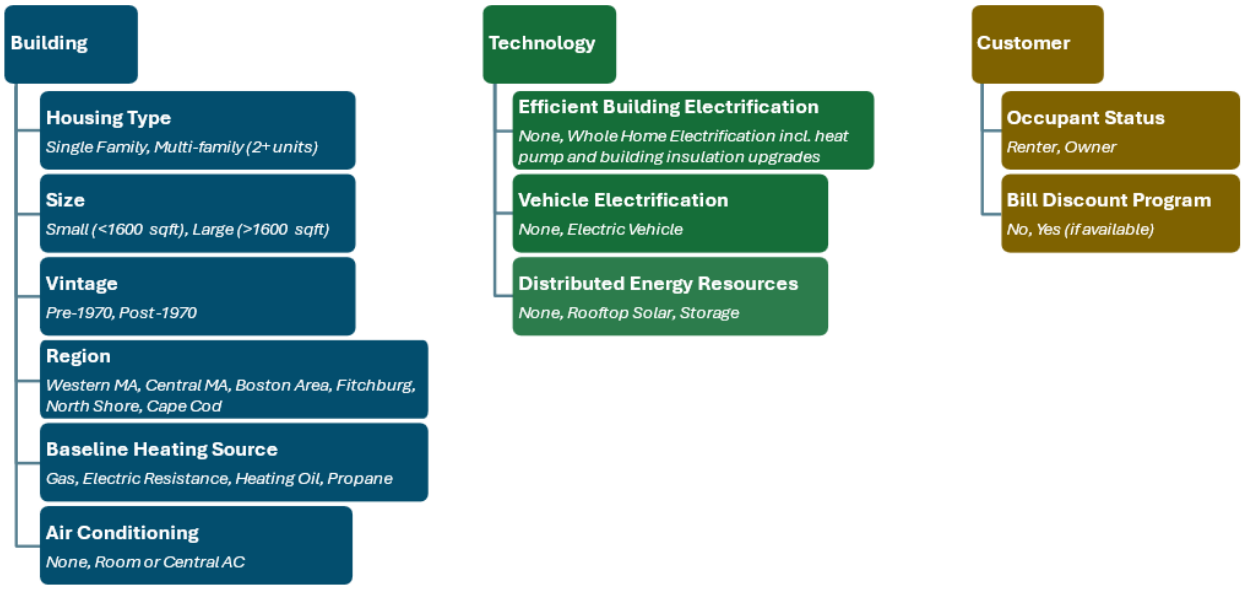
The Massachusetts Workbook of Energy Modeling Results demonstrates the required scale of decarbonization in the buildings, transportation, and electric power sectors.[6] The 2030 modeled targets consistent with sector limit GHG emission mandates include: 230,000 households with upgraded envelopes (i.e., type of weatherization); 572,000 households with heat pumps; 1,000,000 light-duty EVs; and 3.2 gigawatts (GW) of offshore wind, 8.36 GW of solar, and 2.68 GW of energy storage.

Achieving these targets will require widespread adoption of new clean energy technologies, including by individual residents. Electric rates must be designed to support residents in their adoption of electrification technologies and associated usage patterns to ensure that the transition to clean energy does not result in unaffordable and unsustainable energy burdens.

An important contribution of the Near-Term Rate Strategy Report is a novel method of providing more granular analysis of the impact of rate changes on different types of Massachusetts' households that vary in terms of their energy usage (see Figure 3). The E3 analysis included the development of a new modeling tool, called the Household Energy Expenditure Model (HEEM). HEEM uses data on Massachusetts-specific household-level characteristics and estimated load profiles to calculate energy costs for a range of household types.

[6] https://www.mass.gov/doc/massachusetts-workbook-of-energy-modeling-results/download.

Figure 3: HEEM Customer Prototypes[7]



The household characteristics considered in the analysis include type of home (single- or multi-family), size and age of a home, location (region), baseline heating fuel, presence of A/C, level of electrification technology adoption (including heat pump and building insulation upgrades, and EV), occupant status (renter or owner), and enrollment in a bill discount program. HEEM was used to calculate household energy cost and energy burden for over 9,000 different household prototypes (see Figure 3).

HEEM allows for an improved understanding of the range of energy cost experiences of Massachusetts' households during the energy transition. HEEM illustrates bill impacts beyond a basic analysis of singular circumstances based on average usage. This more granular analysis is increasingly important given that the energy transition introduces several new variables that impact energy usage, all of which are important for the DPU to consider when assessing the bill impacts of rate changes. For example, HEEM can illuminate how a rate change will differently impact a customer in a large, new, well-insulated home with heat pumps compared to a small, older vintage apartment in a multifamily building with electric resistance heating. Additional analytical methods, described in Appendix: Near-Term Rate Strategy Report Affordability Feedback for the Interagency Rates Working Group, can provide further insight into differential electric rate impacts by race, age, and other demographics.

Because new rate designs will impact different types of households in diverse ways, the Working Group recommends that the DPU and the utilities consider adopting a more advanced rate analysis method compared to the standard method that looks at bill impacts of new rates for customers with average usage. A modeling tool, such as HEEM, alongside analysis such as that described in Appendix: Near-Term Rate Strategy Report Affordability Feedback for the Interagency Rates Working

[7] See Appendix to E3 Near-Term Rate Strategy Report, Figure 40.

Group, could be used to analyze more granular rate impacts to diverse household types going forward.

Barriers to Electrification and Affordability with Current Rate Design

As presented in the Near-Term Rate Strategy Report, the Working Group identifies the following key barriers to electrification and affordability with current rate design. The Working Group's recommendations are focused on providing rate designs that enable Massachusetts' households to make cost-effective electrification choices that support and advance the Commonwealth's climate and clean energy goals.

Converting from Gas to Electric Heating Can Increase Energy Burden

Current electric rates can present a barrier to the adoption of electrification technologies. The impact on total household energy costs and therefore the energy burden of adopting electrification technologies depends on a household's baseline technology and the electrified alternative adopted. In Massachusetts, 54% of homes are heated by natural gas, 26% are heated by fuel oil, 13% are heated by electric resistance, and 7% are heated by other sources.[8] **A typical customer switching from natural gas, the most common heating source in Massachusetts, to air-source heat pumps, the most common electrified home heating option, will face an increase in the cost of energy.**[9] Households switching from heating oil to air-source heat pumps, as reflected in Table 1, may also experience increases in the cost of energy, driven by the price of heating oil relative to electricity rates. This presents a barrier to Massachusetts' policy goal to achieve widespread deployment of electrification technologies to reduce emissions. Without an alternative rate offering that addresses this barrier, households may be unwilling to adopt heat pump technology at a pace and scale necessary to achieve the Commonwealth's electrification targets. In fact, negative customer experience related to increased energy burden of operating a heat pump under current electric rates may further jeopardize the trajectory of the Commonwealth's clean energy policies and climate goals by deterring further investments from being made.

On the other hand, households heating via electric resistance are likely to see immediate bill savings from switching to heat pumps.[10] It is also the case that electric resistance heating is more common in low-income, multifamily housing.[11] Households converting from electric resistance to heat pumps will also see a benefit from new or increased access to efficient space cooling. Therefore, prioritizing the conversion of households that use electric resistance heating, as the Massachusetts 2025-2027

[8] Other sources include but are not limited to propane, wood, and thermal solar. *See* accompanying E3 Near-Term Rate Design to Align with the Commonwealth's Decarbonization Goals, at 28-29. ("Near-Term Rate Strategy Report").

[9] For instance, E3 estimated that a large, multi-family home with room A/C may experience a monthly bill increase of approximately $98, or nearly 20%, when replacing gas heating with electric heat pumps (Near-Term Rate Strategy Report at Figure 16). This increase reflects a net monthly bill increase from heating electrification only, reflected in a lower gas bill alongside a higher electric bill.

[10] Near-Term Rate Strategy Report, at Figure 14.

[11] Near-Term Rate Strategy Report, at Figure 26.

Energy Efficiency and Decarbonization Plan emphasizes,[12] will advance both affordability and energy equity.

Table 1: Estimated Cost of Heat Delivered by Fuel in Winter 2024-25[13]

Fuel	Retail Cost	Cost of Heat Delivered *(Range reflects device efficiencies)*
Natural Gas		
National Grid	$2.49 per therm	$26-$31 per MMBtu
Eversource	$2.37 per therm	$25-$30 per MMBtu
Unitil	$3.32 per therm	$35-$42 per MMBtu
Electricity (Electric Resistance)		
National Grid	$0.34 per kWh	$100 per MMBtu
Eversource	$0.32 per kWh	$93 per MMBtu
Unitil	$0.45 per kWh	$132 per MMBtu
Electricity (Cold-Climate Heat Pump)		
National Grid	$0.34 per kWh	$31-$39 per MMBtu
Eversource	$0.32 per kWh	$29-$36 per MMBtu
Unitil	$0.45 per kWh	$41-$51 per MMBtu
Fuel Oil	$3.43 per gallon	$28-$31 per MMBtu
Propane	$3.33 per gallon	$43-$48 per MMBtu

Further compounding this challenge, under current conditions, **electric rates are expected to increase over the next five years, which may result in heat pumps being even more expensive compared to fossil fuel alternatives**. The base distribution charge will increase annually, consistent with the DPU-approved performance-based ratemaking adjustments for each EDC.[14] Similarly, the transmission charge is expected to increase given forecasts by the Independent System Operator of New England (ISO-NE) of the Regional Network Service (RNS) rate, which is used to calculate charges for wholesale regional transmission service in New England. The RNS rate is expected to increase 20% in 2025 and nearly 41% by 2029.[15] Additionally, electric supply rates generally reflect wholesale electricity markets predominantly driven by the price of natural gas in New England. Unpredictable gas markets and additional energy services impacting energy supply prices make it challenging to predict rate impacts from energy supply. However, because electric supply rates are still largely driven by natural gas prices, as the price of natural gas falls the electric rate necessary to reflect cost parity with gas heating will also be reduced. The Long-Term Ratemaking Study explores electricity supply costs further.

[12] Massachusetts 2025-2027 Energy Efficiency and Decarbonization Plan at 12. https://ma-eeac.org/wp-content/uploads/Exhibit-1-2025-2027-Three-Year-Plan.pdf.
[13] Near-Term Rate Strategy Report, at Table 4.
[14] *See* Orders D.P.U. 22-22 (2022), D.P.U. 23-80 (2024), and D.P.U. 23-150 (2024).
[15] https://www.iso-ne.com/static-assets/documents/100014/a05_pac_rns_rate_forecast_presentation.pdf.

Further, many costs associated with various other electric bill charges can reasonably be expected to increase between now and 2030, including charges that account for the cost of AMI, EV programs, grid modernization, provisional system planning for the interconnection of distributed generation (DG), Electric Sector Modernization Plans, long-term renewable energy contracts, net metering, distributed solar (Solar Massachusetts Renewable Target, or SMART),[16] energy efficiency programs (Mass Save), and residential bill assistance programs. Several other charges may increase electricity rates as well, such as revenue decoupling and vegetation management. These charges fluctuate depending on various factors but are generally expected to increase as the scale of the programs they support grow; recent trends in these charges can be analyzed further in the electric rates database that was developed as part of the Working Group's scope.[17]

Energy Affordability and Equity, and the Role of Rate Design

A holistic approach to addressing unaffordable and unsustainable energy burdens is necessary to advance electrification in the Commonwealth. Currently, energy efficiency, DG, and discount rates offer opportunities for participating customers to reduce their bills. Energy efficiency and DG also aim to lower the need for further investments in the electric system, reducing total system costs for all ratepayers.

However, because the programs supporting each of these efforts are funded primarily through volumetric rates,[18] energy rates are not fully reflective of the cost to provide service to customers. As a result, all customers pay higher electric rates to support these programs. At the same time, not all customers are benefitting from the programs to the same extent. For example, renters utilize Mass Save programs at low rates compared to the number of renters in the Commonwealth.[19] Similarly, customers in certain cities and towns have more successfully utilized Mass Save incentives, and these cities overall tend to have higher-income residents.[20] Stakeholders also noted challenges for renters and affordable housing associated with heating costs shifting from landlords to renters.

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[16] The SMART program offers incentives for solar developers, with bonus incentives for battery storage, community solar, and low-income participation. DOER is working with stakeholders to modernize the program and plans to release a new iteration of it in 2025.

[17] *Massachusetts Electric Rates Database*, prepared by E3: https://www.mass.gov/doc/massachusetts-residential-electricity-rates-database/download.

[18] Other programs, such as utility ownership of solar generation and EV rebates, are also funded through volumetric rates.

[19] *See* Massachusetts Program Administrators, *2013-2022 Residential Non-Participant Study*, Appx. B (2024) (demonstrating a negative correlation coefficient between renter status and program participation, indicating that areas with high rates of renter occupancy participate in energy efficiency programming at lower rates than the statewide average), available at https://ma-eeac.org/wp-content/uploads/MA24X24-B-RNPS-Final-2013-2022-Residential-Nonparticipant-Study-20241016.pdf.

[20] *Id.* at 28 (showing a 35.2 percent participation gap between income-eligible and market-rate programs, 2019–2022); *id.* at Appx. C (showing participation rates by municipality across the Commonwealth); Massachusetts Program Administrators, *2013–2022 Massachusetts Residential Customer Profile Study*, at 14–15 (2023) (showing lower participation rates in environmental justice communities compared to non-environmental justice communities), available at https://ma-eeac.org/wp-content/uploads/MA23X19-B-RCPSDURB-2022-RCPS-Results-Brief.pdf. *See also* Elizbeth A. Stanton, Emrat Nur Marzan, and Sagal Alisaiad, *Accessing Energy Efficiency in Massachusetts: An Initial Review of Data*, at 3 (2018) ("Families in towns and Boston neighborhoods with median household incomes of $45,000 or less averaged 1.9 percent in savings, while the remaining towns and neighborhoods averaged 2.7 percent").

Energy affordability efforts need to recognize the impact of different bill components: while energy efficiency programs provide important ways for participating customers to reduce their consumption and, accordingly, their bill (and have enabled significant GHG emission reductions), the energy efficiency surcharge adds costs to all customers' bills. Similarly, net energy metering and SMART incentivize and support DG by providing bill credits to participants. Distributed solar generation is an important element of decarbonizing electricity in the Commonwealth, but these programs also increase customer bills because participants receive bill credits and contribute less to programs funded via volumetric rates. Energy affordability programs reduce bills for low-income customers, and costs are distributed among all customer classes through a volumetric reconciling mechanism, further increasing bills.

The DPU opened an investigation into energy burden with a focus on affordability for residential ratepayers[21] and subsequently narrowed the scope of the proceeding to further investigate tiered discount rates, recovery of revenue shortfall, arrearage management programs, disconnection protections, outreach, and enrollment and verification.[22] The member agencies of the Working Group have been and will remain partners in the work to advance energy affordability through that proceeding; the Working Group conducted the Near-Term Rate Strategy Report and prepared its accompanying recommendations to be complementary to the energy burden proceeding.

Discount rates, which provide a percent discount on the total electric bill, are an essential component supporting energy affordability, and the Working Group supports ongoing efforts to modify discount rate programs to more meaningfully address high energy burdens faced by many households in Massachusetts. For example, the DPU approved a tiered discount approach for National Grid's low-income discount rate. The Working Group commends the DPU for this decision and for prioritizing affordability. The Working Group also recognizes that further improvements to existing energy affordability programs are necessary to reduce high energy burdens for residential ratepayers, as is being further explored by the DPU.[23]

However, while increasing discounts or participation is often seen as a solution to making energy more affordable for low- and moderate-income households, relying too heavily on this approach can have unintended consequences—particularly for the state's goals of electrification and decarbonization, as it will increase the cost of electricity for all ratepayers, resulting in less customers willing to electrify. To ensure energy affordability without undermining broader policy objectives, we must extend efforts beyond rates, including by reducing upfront and operation costs, through energy efficiency initiatives (e.g., weatherization and heat pumps),[24] point of purchase rebates for EVs for income-qualified customers (including for used EVs),[25] and tax credits for electrification measures. While there are several programs and initiatives that are necessary to

[21] Notice of Inquiry by the Department of Public Utilities on its own Motion into Energy Burden with a Focus on Energy Affordability for Residential Ratepayers, D.P.U. 24-15 (2024).
[22] D.P.U. 24-15-A Interlocutory Order (2024).
[23] Id.
[24] Mass Save, https://www.masssave.com/en.
[25] Massachusetts Offers Rebates for Electric Vehicles (MOR-EV), https://mor-ev.org/.

support affordability, the Near-Term Rate Strategy Report and the accompanying recommendations is limited to addressing near-term actions specific to rate design for residential customers.

Stakeholder Engagement

Public outreach and engagement were critical inputs to the development of the underlying analysis and these recommendations. The Working Group conducted a robust stakeholder engagement strategy including technical sessions, focus groups, and public listening sessions. Throughout the process, stakeholders have also had the opportunity to send written comments to a dedicated Working Group email inbox. All written comments are available for public review on the Working Group website, and a summary of comments is available in the Appendix: Summary of Stakeholder Feedback.

The Working Group conducted the following series of stakeholder engagement events to support the development of this report:

Phase I: Framing and Scoping

The Working Group hosted a series of workshops before work began on the Near-Term Rate Strategy Report, or Study, to provide stakeholders an opportunity to provide input on framing the purpose and scope of the Study. After an initial general listening session, the Working Group held sector-specific workshops with consumer and advocacy groups, the EDCs, electricity suppliers, municipal light plants, and DG and DER organizations, to enable deeper conversation on each stakeholder group's priorities.

Stakeholder Engagements:

- Initial presentation on Purpose and Scope of Study: May 6, 2024
- Comment & Dialogue: Consumer and Advocacy Organizations: June 12, 2024
- Comment & Dialogue: Electric Distribution Companies, Municipal Light Plants, and Suppliers: June 13, 2024
- Comment & Dialogue: Distributed Energy Resources/Distributed Generation: June 18, 2024

Phase II: Near-Term Rate Strategy Review

Following the development of the Near-Term Rate Strategy Draft Results, the Working Group hosted a series of workshops to present the results of the Study to stakeholders and solicit feedback. After holding sector-specific workshops, the Working Group held a synthesis workshop to summarize comments for stakeholders and encourage cross-sector conversation.

Stakeholder Engagements:

- Initial presentation on Draft Results of the Near-Term Rates Strategy: August 12, 2024
- Comment & Dialogue: Electric Distribution Companies, Municipal Light Plants, and Suppliers: August 19, 2024
- Comment & Dialogue: Consumer and Advocacy Organizations: August 22, 2024

- Comment & Dialogue: Distributed Energy Resources/Distributed Generation: August 23, 2024
- Synthesis Workshop: September 4, 2024

The Working Group carefully considered all feedback received from stakeholders and worked to meaningfully incorporate this feedback into the scope of the Near-Term Rate Strategy Report and the Near-Term Rate Strategy Recommendations. A summary of comments is provided in the Appendix, and stakeholder feedback is highlighted throughout the recommendations below.

Phase III: Equity Analysis

In response to feedback from stakeholders, the Working Group expanded the consulting expertise on the project to add an expert on energy affordability and energy justice. Dr. Destenie Nock of Carnegie Mellon University and Peoples Energy Analytics offered expertise in how energy usage patterns and energy affordability differ by demographics such as race and age, and for other vulnerable groups. Dr. Nock provided feedback directly to E3 on the Near-Term Rate Strategy Report and on the Working Group's recommendations. In addition, Dr. Nock developed a supplemental report on how additional data and analysis could provide a more complete assessment of the impact of electric rate design and ratemaking on equity and affordability outcomes. Finally, Dr. Nock also developed a memorandum defining energy affordability, which discusses the information needed to comprehensively understand how each part of the energy system impacts electricity bill affordability. Dr. Nock's supplemental report and memorandum defining energy affordability are provided in Appendix: Near-Term Rate Strategy Report Affordability Feedback for the Interagency Rates Working Group and Appendix: Defining Energy Affordability. Dr. Nock presented her findings to stakeholders and responded to stakeholder questions and feedback.

Dr. Nock developed a set of six recommendations summarized below.

1. **Adopt a clear definition of energy affordability**. The typical application of energy burden, the percent of income spent on energy, does not consider access to reliable and sufficient energy services and energy limiting behaviors to decrease energy expenses. Dr. Nock provides a recommended definition of energy affordability in Appendix: Defining Energy Affordability.
2. **Utilize increased demographic designations in analyzing rate impacts**. Not accounting for race and age, in particular, risks an incomplete understanding of differential impacts across the population.
3. **Enhance data-driven methods to assess rate impacts and target at-risk customers**. Pairing enhanced demographic data, energy bill and/or meter data, and weather data provides a robust toolset to identify hotspots for energy affordability issues.
4. **Develop a holistic view of housing related energy burden**.
5. **Take an integrated approach to supporting at-risk customers**. Targeted and informed customer outreach can facilitate uptake of assistance programs such as rebates for energy efficiency upgrades and bill assistance for households most in need, where these programs can improve energy affordability and equity.

6. **Support the upfront costs of fuel switching**. Upfront costs of electrification for low-to-moderate income households and rental units underscore the importance of robust upfront incentives with targeted marketing, such as those offered through Mass Save.

This set of recommendations is broader than the scope of the Near-Term Strategy Report and Recommendations; however, they provide guidance on energy affordability broadly, and point out levers for improving affordability in the near- and long-term, including how future AMI data can be used to advance energy equity in the Commonwealth.

Recommendations

The Working Group prepared these recommendations following the development of the Near-Term Rate Strategy Report and robust stakeholder engagement. The following recommendations are categorized as follows: rate structure; marketing, education, and outreach (MEO); monitoring and evaluation; and complementary programs and policies.

The Working Group also aims to support the DPU as it implements its mandates to prioritize affordability, equity, and reductions in GHG emissions, in addition to safety and reliability of service.[26] This mandate extends explicitly to all decisions or actions regarding rate designs,[27] and the Working Group is attendant to this requirement in the recommendations that follow.

I. Rate Structure

The Working Group explored four rate options to reduce operating cost barriers to electrification, using the options available prior to AMI being widely available to residential customers. Following detailed analysis and feedback from stakeholders, the Working Group identified the optional, seasonal heat pump rate as providing the greatest potential benefits while balancing other rate principles and objectives. The seasonal heat pump rate supports building electrification by addressing the operating cost barrier inherent in current electric rates. Transportation electrification is equally as important, though prior to deployment of AMI, the Working Group recommends other mechanisms to further incentivize transportation electrification in the near-term in the Complementary Programs and Policies section. Most stakeholders favored an optional seasonal rate for heat pump owners as their preferred near-term rate option, expressing that this rate provides an incentive to electrify without creating unintended impacts for non-electrifying customers or distributed energy resource owners.

Deploy an Optional Seasonal Heat Pump Rate

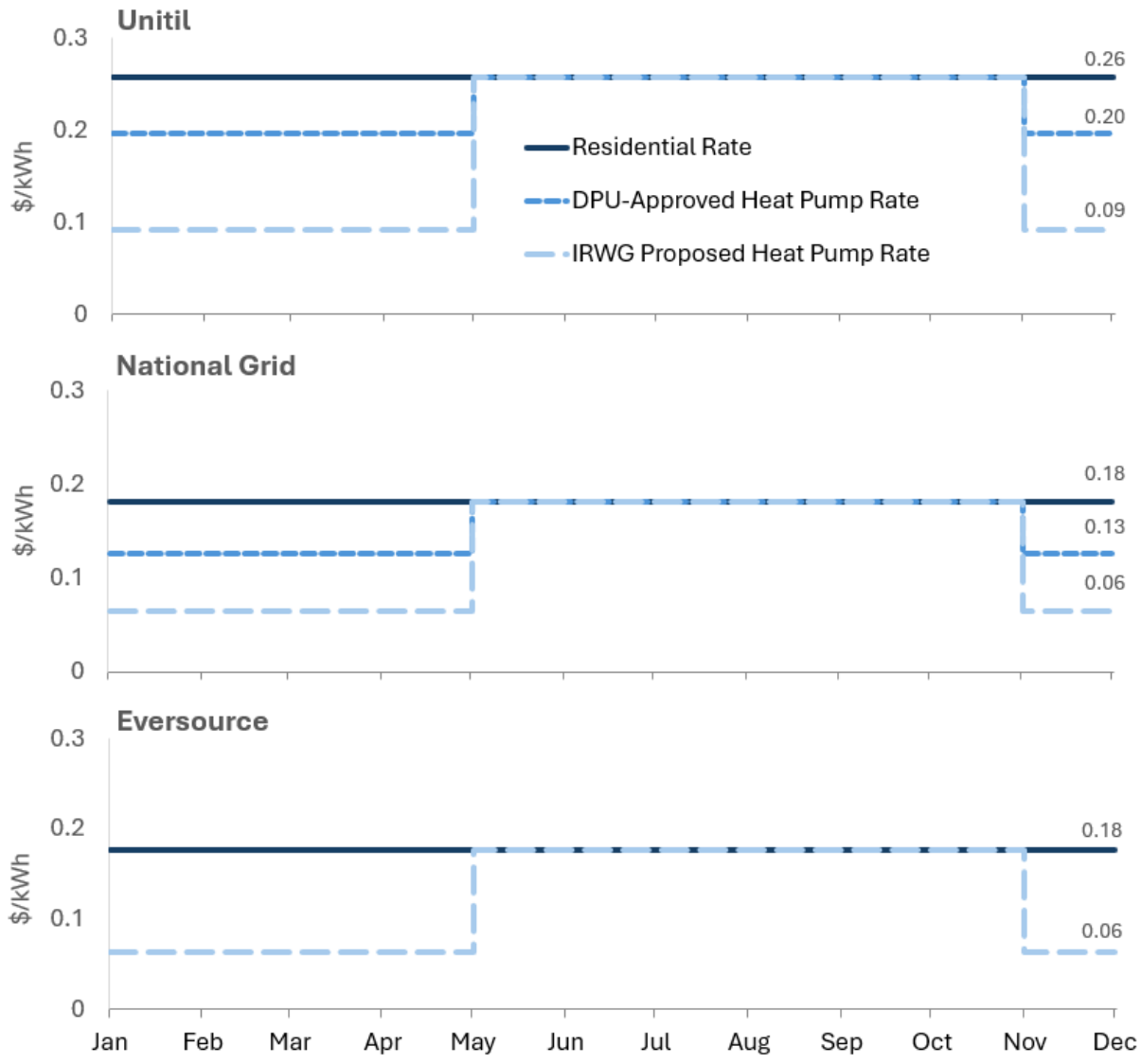
The Working Group recommends each EDC expeditiously deploy an optional seasonal heat pump rate, with seasonal differentiation that is cost reflective and that will bring winter season heating costs more in line with natural gas heating.[28] A seasonally differentiated heat pump rate can be designed to support the Commonwealth's electrification and emission reduction targets by incentivizing customer adoption of heat pump technology. Further, customers adopting heat pumps through Mass Save should be seamlessly enrolled in the seasonal heat pump rate.

The DPU recently approved a seasonal heat pump rate for Unitil in D.P.U. 23-80 and directed National Grid to adopt a similar rate in D.P.U. 23-150.[29] The DPU found that heat pump rates are "a reasonable, cost-efficient solution to mitigate the potential high bills associated with heat-pump implementation

[26] G.L. c. 25, § 1A; c. 164, § 141.
[27] G.L. c. 164, § 141.
[28] The Near-Term Rate Strategy Report presents the cost of heat delivered via different heating technologies (*see* Table 4), which informs the level of electric rates relative to natural gas rates necessary to reach parity in heating costs.
[29] D.P.U. 23-80 (2024); D.P.U. 23-150 (2024).

faced by residential and low-income customers within the context of current rate structures, while maintaining a rate structure that accurately reflects the cost to serve customers during this stage of electrification."[30] **However, the Working Group finds that there are important modifications to these rates that are necessary to ensure the rates can reduce energy burden for customers switching from gas to heat pumps as will be required to meet our emission reduction mandates.**

Figure 4. Illustrative Comparison of Total Delivery Rate for Standard Residential Customers, the DPU-Approved Seasonal Heat Pump Rate, and the IRWG Proposed Seasonal Heat Pump[31]



[30] D.P.U. 23-150 at 510 (2024).

[31] Figure 4 compares illustrative rates of the DPU-approved heat pump rate and the Working Group's proposed seasonal heat pump rates based on the current total delivery rate for residential customers.

The heat pump rates approved by the DPU are available to all residential customers who install and use heat pumps in all or part of their homes. During the winter, when heat pumps result in increased electricity use, heat pump rate customers are charged a lower kilowatt-hour (kWh) rate. This rate structure provides a lower winter volumetric charge that decreases the cost of operating a heat pump. As designed, the heat pump rate structure includes a fixed customer charge and a volumetric summer rate (i.e., May to October) per kWh, consistent with the residential rate offering. The winter volumetric kWh rate is set to recover the same level of total costs collected from an average residential customer, so that the rate is revenue-neutral and minimizes cost-shifts to other ratepayers.

The Near-Term Rate Strategy Report modeled a seasonal heat pump rate that increases the electricity rate during the summer season to offset the revenue deficiency associated with eliminating the entire delivery component from the winter rate. Several stakeholders raised concern that increasing electricity costs for households during the cooling season could lead to higher energy burdens in the summer and, due to the increasing concern with extreme heat, this would not lead to an equitable outcome. Instead, the DPU - in approving the seasonal heat pump rates for Unitil and National Grid - has proceeded with a minimal winter charge to collect revenue without increasing the summer rate. The Working Group recommends expanding on this approach to maintain bill savings for heat pump adoption, while mitigating energy expenditures for households during the summer months.

The following considerations were provided by stakeholders and/or explored by the Working Group in arriving at this recommendation:

Seasonal Differentiation Needs to be Applied Beyond the Base Distribution Charge

The Near-Term Rate Strategy Report demonstrates that the recently approved Unitil heat pump rate does not lead to overall bill savings for customers switching from gas to heat pumps.[32]

Part of the reason for this result is that the heat pump rate only applies to the distribution charge, which in 2023 accounted for approximately one-quarter to one-third of the customer's bill.[33] The Unitil heat pump rate design lowers the base distribution charge from $0.09576 per kWh to approximately $0.03419 per kWh providing a savings of $0.06157 per kWh off of a total residential retail rate of over $0.45 per kWh.[34] Table 2 provides a comparison between the DPU-approved seasonal heat pump rate and the Working Group's recommendation; seasonally differentiating the transmission and other reconciling mechanism charges included in retail rates makes winter electric rates comparable to gas heating costs.

[32] Near-Term Rate Strategy Report, Figure 31.
[33] Based on 2023 rates across the MA EDCs. Massachusetts Electric Rates Database, accessed here: https://www.mass.gov/info-details/interagency-rates-working-group.
[34] D.P.U. 23-80, Exhibit Unitil-JDT-6 (Compliance 7-5-24). (https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/19329263). Massachusetts Electric Rates Database, accessed here: https://www.mass.gov/info-details/interagency-rates-working-group.

Table 2. Illustrative Comparison of Unitil's Seasonal Heat Pump Rate

	DPU-Approved Seasonal Heat Pump Rate ($/kWh)		Working Group Recommendation ($/kWh)	
	Summer	**Winter**	**Summer**	**Winter**
Supply	0.19304	0.19304	0.19304	0.19304
Distribution	0.09576	0.03419	0.09576	0.03419
Transmission	0.03501	0.03501	0.03501	0.01250
Other	0.12686	0.12686	0.12686	0.04530
Total	0.45067	0.38910	0.45067	0.28503
Differentiation	-	0.06157	-	0.16564

The cost-effectiveness of heating electrification depends on electricity and gas rates, in addition to the underlying technology efficiencies. Table 1 shows that under current gas rates that the majority of Massachusetts' households pay, the breakeven electricity rate to deliver the same unit of heat with an air-source heat pump is as low as $0.25 per kWh. For the seasonal heat pump rate to reach cost parity with gas heating and ensure customer bill savings from electrification, the differentiation must be applied to parts of the electric rate beyond the distribution charge, such as to the transmission charges and other reconciling charges during the winter season.[35] This would reflect the lower marginal cost of delivering electricity during those periods. **Therefore, the Working Group recommends all EDCs offer a seasonal heat pump rate similar to those recently approved and directed by the DPU, but expanded to apply beyond the distribution charge for a larger winter differentiation to be cost-based and ensure energy bill savings for customers transitioning from gas heating to electric heat pumps**.

Given that electric rates are expected to increase over the next five years, it is even more important to establish a seasonal differentiation that will be robust enough to reduce the operating cost barrier of switching from gas to electric heating, while minimizing seasonal spikes in energy bills. A rate with seasonal differentiation based on the base distribution charge alone may be eroded by rate increases in other components of the electric bill.

Reflect Cost of Service

A seasonal heat pump rate (i.e., a technology-specific rate) can be designed to be a cost-reflective near-term solution. The adoption of heat pumps can alter customer load shapes in predictable ways, which supports the design of efficient and equitable rates.[36]

[35] Two reconciling mechanisms are established in statute and may not be differentiated: G.L. c. 25, § 19 sets the energy efficiency charge at $0.00250 per kWh and G.L. c. 25, § 20 sets the renewable resources charge at $0.00050 per kWh.

[36] The principles of efficiency and equity are well-established ratemaking principles and are further described in the Massachusetts-context in the Near-Term Rate Strategy Report at 84-85.

Distribution companies incur incremental costs when they need to invest in infrastructure to meet customer, local, or system peak demand.[37] Each EDC's system is currently summer-peaking, so the distribution system is built to serve the capacity of a peak summer day. In the winter, there is available capacity, or headroom, on the system, meaning that EDCs are unlikely to incur incremental system costs when usage increases during the winter season in the near-term. The EDCs expect to eventually switch from having summer-peaking to winter-peaking systems estimated to occur in mid-2030s as more buildings electrify: National Grid in 2036,[38] Eversource in 2035,[39] and Unitil in 2033.[40]

Similarly, the regional transmission system is also summer-peaking. ISO-NE forecasts the switch from a summer-peaking system to a winter-peaking system in the mid-2030s.[41] Therefore, integrating transmission costs into a heat pump rate, as recommended above, also maintains cost reflectivity in the near-term.

By implementing a seasonal rate, winter charges can be lower when the system is less strained and additional marginal usage does not increase system cost, while summer rates can reflect the impact of additional marginal demand and the cost of providing the grid infrastructure needed to serve that peak cooling demand. As a result, this rate structure can send more appropriate price signals for customers than the current rate which does not vary by season.

Address Summer Bill Increases from Access to Air-Conditioning

While switching from conventional A/C to heat pumps yields more efficient cooling, households without existing cooling systems will have new access to A/C upon adopting a heat pump. Access to A/C is an important benefit, especially given the impact of climate change on summer temperatures and increased risk of heat stress and illness. In particular, access to A/C is essential for certain populations that may be more susceptible to heat-related illness, such as those with medical conditions or who are older. These same priority populations may also be on fixed or lower incomes and be less able to afford the increased energy burden of A/C.[42] Low-income households are also slightly more likely to lack A/C at all, or use room A/C.[43]

The Near-Term Rate Strategy Report demonstrates that the modeled seasonal heat pump rate would provide annual savings to electrifying customers relative to existing rates, despite the increase in

[37] Customer peak demand drives site-level systems and infrastructure investments, such as service drops. Local peak demand, or circuit- or feeder-level peaks, drive additional infrastructure upgrades, such as reconductoring. System peak demand drives large-scale infrastructure needs, such as upgraded substations.
[38] https://www.nationalgridus.com/media/pdfs/our-company/massachusetts-grid-modernization/future-grid-full-plan.pdf at 406.
[39] https://www.eversource.com/content/docs/default-source/default-document-library/eversource-esmp%20.pdf at 14.
[40] https://unitil.com/sites/default/files/2024-01/Unitil-ESMP-2025-2050-DPU-FINAL.pdf at 212.
[41] ISO New England, 2023 Regional System Plan. https://www.iso-ne.com/system-planning/system-plans-studies/rsp.
[42] ResilientMass Plan and Massachusetts Climate Change Assessment further explore the disproportionate impact of heat on EJ communities and priority populations.
[43] Near-Term Rate Strategy Report, Figure 26.

incremental summer A/C energy demand.[44] In other words, customers who now have access to A/C after they adopt heat pumps will see summer bills increase due to greater energy use, though the increased summer bills will be offset by even greater winter bill savings. While on average, a customer may expect to see annual bill savings under the seasonal heat pump rate, the Working Group remains mindful that households receive bills monthly and can be sensitive to month-to-month fluctuations. There may be households that experience increased energy burden during summer months associated with increased cooling services; complementary programs and policies, such as energy efficiency, solar, and balanced billing, are better suited to address these needs than what rate design can offer alone. Further, the EDCs use of an integrated approach for targeting at-risk customers will be essential in providing comprehensive assistance to households, particularly the most vulnerable.

Minimize Cost-Shifting to Non-Participants

One key concern with new rate structures is cost-shifting, where non-participants (those not on the rate) subsidize the costs for those on the rate. The Near-Term Rate Strategy Report identified that universal rate design changes (i.e., increasing the fixed charge or transitioning to a seasonal rate for all ratepayers) may lead to modest bill increases for non-electrifying customers in the near-term.[45] However, a technology-specific seasonal rate can be designed such that minimal cost-shifting occurs from electrifying customers to non-electrifying customers.

A seasonal heat pump rate can ensure that participants pay their fair share of system costs, which, as discussed above, remain relatively fixed in the near-term. The winter volumetric charge of a seasonal heat pump rate can be set on a revenue neutral basis, such that, based on the expectation for increased kWh usage, the rate will still recover the same level of total fixed costs. It recognizes that a customer adopting a heat pump will utilize more energy on a per kWh basis, but will have minimal upward pressure on the fixed or system costs, provided that the system remains summer peaking. This approach maintains an EDC's revenue allocation target by reducing the volumetric rate to the customers adopting the beneficial electrification technology.

For example, a residential customer using 600 kWh per month at $0.33/kWh will contribute approximately $200 to system costs. If the same customer instead uses 1,500 kWh during a winter month, the fact that the usage is not during the system's peak season makes it unlikely that the increased usage will increase system costs in the near-term. Therefore, the customer can be charged $0.13/kWh and still contribute the same amount toward their cost to serve, approximately $200 in system costs. As a result, the seasonal heat pump rate can minimize cost-shifting to non-participants as the participating customer is paying for their costs to the system and not driving incremental system costs.

[44] Near-Term Rate Strategy Report, Figures 33 and 34.
[45] Near-Term Rate Strategy Report, Table 8.

Streamline Eligibility and Verification

Technology-specific rates risk being complex and costly to implement *if* verification of eligible technologies and submetering appliances is required.

To ease the administrative burden and encourage participation, eligibility for the seasonal heat pump rate can be streamlined by allowing customers to self-attest to their use of a heat pump, as has been allowed for Unitil and National Grid's heat pump rates. The Working Group does not recommend changes to this approach. Verification of technologies is unnecessary; self-attestation is common for determining eligibility for other utility tariffs designed for customers adopting specific technologies.[46] Self-attestation reduces the complexity and time typically required for verification, thereby lowering implementation costs while still ensuring that the rate is targeted at the appropriate customer group. As further described below, the Working Group recommends the EDCs, in their roles as program administrators of Mass Save, streamline heat pump rate enrollment for customers receiving heat pump rebates. In the near-term, residential heat pump installations occurring through Mass Save is a meaningful form of verification to counterbalance the risk of self-attestation.

As discussed above, the Working Group recommends a heat pump rate that is both cost reflective and designed to close the operational cost differential for a customer converting from natural gas to air source heat pumps. This means that households that convert from other delivered fuels or electric resistance and enroll in the heat pump rate may see bill savings greater than is needed to bring those customers to bill parity.[47] In fact, most households converting from other delivered fuels or electric resistance heating would not need a technology-specific rate to see bill savings from air-source heat pump installation. Households converting from electric resistance heating in particular will see lower energy costs while reducing heating-related electricity usage.[48] While it would not be administratively feasible to limit eligibility to customers converting from natural gas, there can be more targeted outreach to those customers. The Working Group recommends that the DPU, utilities, and stakeholders explore cost-effective ways to conduct targeted marketing and educational efforts to individual households.[49]

The recommended seasonal technology-specific rate would be whole-home, meaning that it would not require separate, or sub-, metering for the heat pumps. This simplifies customer education and cost. Further, even though all household loads would be subject to the heat pump rate, the Near-Term Rate Strategy Report indicates that a heat pump rate could still result in bill savings for households with EVs and heat pump(s).[50]

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[46] *E.g.*, Central Maine Power's seasonal heat pump rate requires self-attestation, https://www.cmpco.com/documents/40117/46385123/a-seasonal_06.29.23.pdf/13c3d872-e9d9-48f3-030d-f261ba6b8456?t=1688039790490.

[47] *See* Near Term Rate Strategy Report at Table 8.

[48] *See, e.g.*, Near-Term Rate Strategy Report at 29 (54% of MA households heat with natural gas, 26% with fuel oil, 13% with electric resistance, and 7% with other sources).

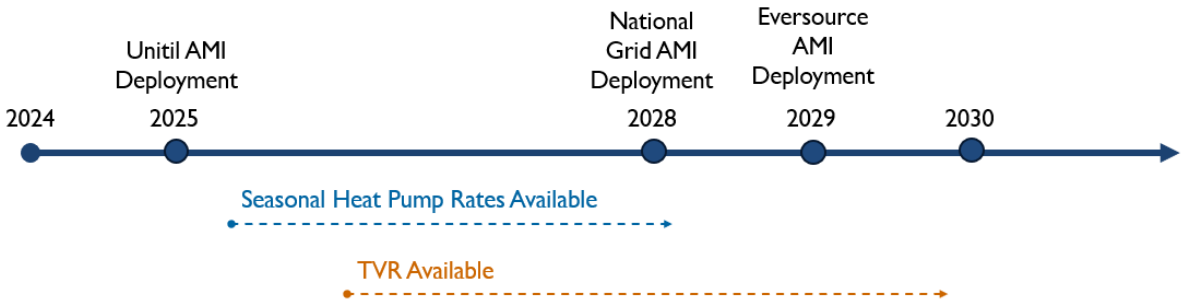
[49] *See* Appendix: Near-Term Rate Strategy Report Affordability Feedback for the Interagency Rates Working Group.

[50] Near-Term Rate Strategy Report at 67.

Rate Option Can Serve as Bridge to Time-Varying Rates

More sophisticated rate design, such as time-varying rates (TVR), requires deployment of AMI. The EDCs expect to have full deployment of AMI by 2025 for Unitil, 2028 for National Grid, and 2029 for Eversource.

Figure 5. AMI Deployment Timeline



The timing of each EDC's next rate case following AMI deployment is also important because that is one venue in which the EDC or other parties can propose TVRs. Across the three EDCs, assuming no delays in AMI deployment and that TVRs are proposed and approved in subsequent rate cases, wide-spread TVR will likely be in effect between 2029 and 2033.[51]

A seasonal rate can act as a steppingstone to future, more granular TVRs, which can support robust demand management. A seasonal rate will educate consumers that electric costs vary temporally. In the near term, customers on the seasonal heat pump rate will observe that electricity costs are currently lower in the winter and higher in the summer. This introduces customers to the concept of differential pricing based on system conditions.

The DPU expects the EDCs with approved heat pump rates to monitor the impact of the heat pump rates, as well as progress towards increased electrification in the Commonwealth, and include an analysis and discussion in each EDC's next base distribution rate case regarding the successes, failures, and lessons learned from its offerings, including the proposal of any necessary changes to the heat pump rate.[52] The Working Group emphasizes the importance of reviewing the rates to ensure they continue to align with the goals of energy efficiency, affordability, and decarbonization. Insights from monitoring and evaluation can inform adjustments to rate structure, outreach efforts, or complementary programs. Further, the DPU has recently emphasized this flexibility for the National

[51] Unitil will file its next rate case in mid-2028 for rates effective approximately mid-2029 (*see* D.P.U. 23-80 at 36-37 (2024). Eversource may file a request to extend its current performance-based ratemaking plan term for another five-year term in mid-to-late 2027, in which case Eversource would file its next rate case in early 2032 for rates effective in early 2033. If an extension is not granted, Eversource's stay-out provision will be extended by one year for a rate case filing in early 2029 for rates effective in early 2030 (*see* D.P.U. 22-22 at 55-56 (2022)). National Grid will file its next rate case in late-2028 for rates effective late-2029 (*see* D.P.U. 23-150 at 80-82 (2024)).

[52] D.P.U. 23-80 at 408-409 (2024).

Grid seasonal heat pump rate, indicating it will be an interim offering until the next distribution rate case, or until an alternative is approved.[53] When AMI enables additional TVR structures, the seasonal rate could evolve to include time-of-use components that better reflect real-time grid conditions. This gradual transition helps customers acclimate to more complex pricing structures while still realizing financial benefits from managing their energy use.

It is important to note that the electric summer system peak will change to a winter peak in the future (as discussed above), such that the pattern of lower winter prices and higher summer prices being observed by seasonal rate customers today will change. As with many other aspects of the energy transition, this will require sufficient marketing and outreach to prepare customers as well as flexible rate designs to account for these changing conditions. While this transition is expected to occur in the mid-2030s, the glidepath to a winter-peaking system will be gradual and informative as we assess actualized grid impacts of increasing heat pump and other electrified technologies. The Working Group's recommendations include considerations for monitoring and evaluation to account for any changes that may be necessary to continue to support a decarbonized grid.

Consider a Non-Bypassable Fixed Charge for Public Benefits Programs

The Near-Term Rate Strategy Report explored an additional fixed charge as a rate design lever to reduce the high volumetric rate that is a barrier to electrifying building and transportation end-uses. The Working Group identifies this lever, exercised in a targeted manner, as an area for further consideration. Electrification of buildings and transportation is key to achieving decarbonization goals, yet a volumetric charge penalizes customers for increased electricity usage, even when that increased usage is due to switching away from fossil fuels like oil or gas to electric heat pumps.

Several stakeholders provided feedback to the Working Group expressing concern about the impact of higher and non-bypassable fixed charges, citing concern that this lever would discourage energy efficiency and the adoption of DG like rooftop solar as well as impact low-income ratepayers. Electric rates include fixed charges, which do not vary based on a customer's consumption, as well as volumetric charges, which are directly related to the amount consumed. The electric system requires significant infrastructure to ensure safe and reliable service, and the costs of this infrastructure represent a portion of the electric rates paid by customers.

Electric rates also include many charges that are not directly related to a customer's usage, like the costs for important programs with widespread public benefits such as Mass Save decarbonization incentives or low-income discounts. Historically, program costs were collected through volumetric rates to encourage energy conservation and efficiency. Today's higher electricity rates, however, discourage customers from pursuing the adoption of clean energy technologies—like heat pumps—central to the Commonwealth's decarbonization strategy, and from using enough electricity to meet essential needs, a problem that is exacerbated because public benefits programs also are funded through volumetric charges. Further, customers who have the means to reduce their energy consumption, whether through energy efficiency upgrades or the installation of DG (like rooftop solar), can reduce the amount they pay into public benefits programs (because these programs are funded through volumetric charges; when a customer adopts rooftop solar or deploys energy

[53] D.P.U. 23-150 at 512-513 (2024).

efficiency, their billed volumetric consumption is reduced because they use less energy). These are often the same customers who can afford significant energy efficiency and solar investments, allowing them to further benefit from reduced consumption while contributing less to the public benefits funds that they initially drew from for energy efficiency upgrades and to offset costs associated with the installation and operation of rooftop solar.

A non-bypassable fixed charge – a monthly charge that cannot be avoided by any customers, including DG owners – may be appropriate for certain public benefits programs. A non-bypassable fixed charge could fund crucial programs that support the state's energy, affordability, and decarbonization goals in a way that does not increase volumetric charges, a key barrier to electrification. This would ensure that all customers, independent of increases or decreases in usage, contribute fairly to the cost of these programs. A non-bypassable fixed charge for specific programs or policies, if designed appropriately, can help reduce barriers to electrification, ensure equitable cost recovery, be more cost-reflective, and provide more stability to customers' bills through the year. The Working Group recommends further consideration of a non-bypassable public benefits fixed charge through the facilitated stakeholder process discussed in the Implementation section below.[54]

II. Marketing, Education, and Outreach

The effectiveness and success of the Working Group's rate design recommendations, particularly the optional seasonal heat pump rate, will depend on customer awareness and adoption of such offerings. The Working Group recommends the EDCs, in their roles as program administrators of Mass Save, streamline enrollment for the heat pump rate for customers receiving heat pump rebates.

The overall focus of the EDCs' MEO efforts to make customers aware of the seasonal heat pump rate should identify potential barriers to participation and then tailor MEO efforts to mitigate or remove those barriers to create an experience for customers that is easy, convenient, and as frictionless as possible. While the specific approaches and goals of the EDCs' MEO efforts will vary for each specific rate, program, and initiative, and by location, in general, MEO efforts should be customer-centric and should:

- Minimize technical terms that can cause frustration and/or confusion to customers;
- Use plain-language terms that are simple and easy for customers to relate to and understand (e.g., at a 5th grade reading level);
- Provide a single point of contact for all (or several) relevant rates/programs/initiatives;
- Reduce and simplify documentation and/or verification requirements;
- Ensure that customers can easily reach knowledgeable utility staff with any questions (e.g., customer service representatives that answer calls or website inquiries should know the answer to questions or know how to get the answer quickly);
- Recognize and respond to language needs for limited English proficiency customers;

[54] The Working Group notes that the programs or policies considered public benefits will be a subject for further deliberation, and provides the Mass Save decarbonization incentives and low-income discounts as illustrative.

- Tailor efforts to meet customers where they are (e.g., by providing the right information so that customers make informed choices);
- Use language that resonates with audiences of different cultural backgrounds (i.e., a multi-cultural communication strategy);
- Recognize that different communities will have different barriers to participation, different needs, and different motivations and may respond to messaging differently;
- Use a variety of outreach channels (e.g., email, phone, radio, internet, social media and in-person events);
- Encourage collaboration and partnerships with community members and community groups, particularly from communities that are underrepresented in the clean energy transition and/or in the specific rate/program/initiative; and
- Target individual households based on their needs and risks;
    - Use meter (and eventually AMI) energy usage data along with available income data to identify the risks that households face, and then communicate opportunities for electrification and reduction of financial burdens to these households;[55] and
    - Use direct to household channels (e-mail, texting, in-app messages) to communicate about programs that benefit low-income households.

In designing MEO efforts, EDCs and/or program administrators should draw from best practices; MEO professionals; and the experience of other utilities, including utilities in the Commonwealth as well as other jurisdictions.[56] To ensure that MEO efforts are effective, they should be evaluated regularly and revised as needed. This approach should include (1) message testing (qualitative and quantitative) before material is deployed; and (2) identifying and tracking key performance indicators.[57] Appropriate key performance indicators include:

- participation rates (including enrollment rates);
- penetration rates (i.e., the number of eligible customers who participate in a rate or program) at the census tract or block group level;
- bill savings;
- energy limiting behavior (i.e., households that under-consume energy during summer and winter months);

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[55] *See* Appendix: Near-Term Rate Strategy Report Affordability Feedback for the Interagency Rates Working Group for further discussion of energy use data informing targeted marketing.

[56] *See, e.g.,* American Council for an Energy-Efficient Economy, *Adapting Energy Efficiency Programs to Reach Underserved Residents*, at 4 (last modified Nov. 2023), https://www.aceee.org/sites/default/files/pdfs/adapting_energy_efficiency_programs_to_reach_underserved_residents_-_encrypt.pdf; Questline, *How to Reach Low-Income Customers of Energy Utilities* https://www.questline.com/blog/how-to-reach-low-income-customers-of-energy-utilities/#:~:text=For%20energy%20utilities%2C%20building%20awareness,bill%20assistance%20and%20budget%20billing; Erifili Draklellis et al, *Five Steps for Utilities to Foster Authentic Community Engagement* (last modified June 2, 2022) https://rmi.org/five-steps-for-utilities-to-foster-authentic-community-engagement/.

[57] This approach to evaluating MEO efforts may highlight barriers to participation that can be mitigated through changes to rate/program design. Thus, staff tracking and evaluating MEO efforts should be in regular contact with rate/program administrators to ensure that relevant information from MEO evaluation is used to inform program design.

- customer satisfaction; and
- customer engagement level.

The cost-effectiveness of implementing the EDCs' MEO efforts should also be tracked and evaluated (e.g., cost per leads, advertising response rates). This information should be shared publicly online in a format that is easy to find and understand, and not solely in utility filings.[58]

Examples of Ongoing and Planned MEO Efforts

Ongoing or planned MEO efforts serve as examples and should be used to inform future cost-effective MEO approaches to increase enrollment in seasonal heat pump rates.

In National Grid's most recent electric rate case, D.P.U. 23-150, the Department approved National Grid's proposed $3 million annual budget for MEO, as well as $1.235 million annually for 10 additional full time staff members to support its new tiered discount rate.[59] National Grid's planned education and outreach includes multiple media channels, such as radio, television, and digital channels, translation of outreach and educational materials, and working with community-based organizations. The Working Group recommends that these efforts by National Grid should expand to directly target and message to consumers who are estimated to be at-risk, which can be done cost-effectively using e-mail, text messaging, and in-app messages.[60]

With regards to the heat pump rate that the DPU approved for Unitil (electric) in D.P.U. 23-80, Unitil plans to promote awareness and adoption through additional informational resources on its website, a series of targeted messages utilizing direct-to-customer channels such as on-bill messaging and email campaigns, and geo-targeted social media outreach where available.[61] Further, the DPU directed Unitil to begin outreach and education to promote awareness of the new rate offering.[62]

Consider Leveraging Mass Save® as a Clearinghouse for MEO

As program administrators of Mass Save, the EDCs are well-positioned to reach customers who are exploring heat pump installation. Mass Save program administrators should be directed to assist recipients of heat pump rebates to enroll in the rate. Historical Mass Save data also can be used to target materials and outreach to households that have already installed heat pumps. The MEO efforts to promote the seasonal heat pump rate offering should be complementary to the efforts already

[58] The DPU has examined procedural enhancements to its public notice requirements to increase public awareness of and participation in Department proceedings and issued an Order Establishing Tiering and Outreach Policy (D.P.U. 21-50-A) in February 2024, that should be informative to utility filings and DPU approaches to outreach.
[59] D.P.U. 23-150 at 604 (2024).
[60] Peoples Energy Analytics directly messages at-risk customers using monthly and daily energy usage data, for an estimated cost of less than a penny per household. Peoples Energy Analytics uses energy meter data (monthly and daily) to identify different risk levels of households (pipe freeze, heat stroke, and high bills). Then using this information, they design targeted marketing strategies (e-mails, text messages), which go to individual households to let them know about the programs they qualify for. These programs are chosen based on their risk category. This information can also be used to pre-qualify homes for assistance programs.
[61] D.P.U. 23-80 at 400 (2024).
[62] Id. at 409 (2024).

underway in promoting Mass Save incentives and rebates. To maximize the benefits of the seasonal heat pump rate, the Working Group recommends:

- Mass Save heat pump incentive marketing should include discussion of the seasonal heat pump rate and low-income discount rates;
- All heat pump installations should be paired with enrollment on seasonal heat pump rate and low-income discount rates for eligible customers (e.g., customers should be provided notice of or affirm awareness of the switch to a heat pump rate as part of Mass Save installation and verification process);
- The EDCs should target MEO to prior Mass Save customers that have deployed a heat pump to inform them of the availability of the seasonal heat pump rate; and
- Mass Save infrastructure should be leveraged to educate manufacturers, installers, and other contractors (e.g., water heater contractors, plumbers, electricians) about seasonal heat pump rates.

Leverage Seasonal Rate Offerings for Targeted Electrification Pilots

Seasonal heat pump rates also can be leveraged to support planned pilot projects for strategic electrification. In its landmark Order DPU 20-80-B on the future of gas, the DPU directed the Massachusetts Local Distribution Companies (LDCs, i.e., natural gas utilities) to work with the EDCs on demonstration projects for decommissioning portions of the gas system through strategic electrification. The LDCs must file these pilot projects with the DPU for approval by March 1, 2026. The DPU directives for these pilot programs include requirements for the use of innovative electrification and decarbonization technologies to ensure cost-effectiveness. If seasonal heat pump rates are available, they could help reduce costs for customers in these targeted electrification pilot programs.

III. Monitoring and Evaluation

It is important to monitor and evaluate the performance of the optional seasonal heat pump rate to ensure it meets its goals of achieving cost savings for participating ratepayers.

The DPU directed Unitil and National Grid to provide annual reporting on the "number of customers opting into (and off) the new tariffs, twelve months of pre- and post- installation monthly kWh use, and monthly peak kW use, if possible."[63] They also required the utilities to include the number of customers, by rate class, opting into the heat-pump rate who received a heat pump rebate through the Mass Save program, as well as the number of customers who received a rebate through the Mass Save program but have not opted into the heat pump rate.[64]

The DPU expects the utilities with approved heat pump rates to monitor the impact of the heat pump rates, as well as progress towards increased electrification in the Commonwealth, and include an analysis and discussion in its next base distribution rate case regarding the successes, failures, and

[63] D.P.U. 23-80 at 408 (2024); D.P.U. 23-150 at 513 (2024).
[64] D.P.U. 23-80 at 408 (2024).

lessons learned from its offerings, including the proposal of any necessary changes to the heat pump rate.[65] Similarly, National Grid's heat pump rate will be an interim offering available until National Grid's next base distribution rate case, or until an alternative is approved by the DPU.[66]

The DPU has already determined a robust set of monitoring and reporting requirements for heat pump rates. The Working Group recommends the following additional monitoring and evaluation requirements.

Enrollment and Customer Outcomes

The EDCs should report the following information on a quarterly basis, if feasible:

- Heat pump installations relative to baseline (pre-program) and year-over-year;
- Estimate of total households with heat pumps that are enrolled in the seasonal heat pump rate; and
- An analysis of available time-interval data for households enrolled in the rate program, to the extent AMI meters are installed and operating, compared to available time-interval data for households on R-1 and R-2 rates.

All reported data should be disaggregated by rate class (e.g., R-1 versus R-2) and geography, including whether the household is in an environmental justice (EJ) community or not. Tracking the program's ability to enroll otherwise traditionally underserved ratepayers is essential to identifying potential barriers and achieving equitable access. EDCs should compare enrollment rates of R-2 households with heat pumps relative to enrollment rates of R-1 households with heat pumps.

Changes in Energy Usage and Bill Impacts

The DPU requires "twelve months of pre- and post- installation monthly kWh use, and monthly peak kW use, if possible." In addition, to the extent information is available, monthly usage should be compared before and after enrollment separately for the subset of customers that had heat pump(s) installed for at least one heating season prior to enrollment. This will allow for an analysis of any changes in usage that may be attributable to the rate program, separate from changes in bills attributable to the installation of heat pump(s). An analysis of available energy usage data for households across seasons should be completed for those enrolled and not enrolled in the rate program across the first several years of implementation. This will allow for understanding how household energy usage shifts with rate changes, seasons, and technology changes. Monthly data is sufficient, but to the extent AMI meters are installed and operating, daily or hourly energy usage information should be used. Finally, for each enrolled customer, shadow billing should be reported for what that customer would have otherwise paid each month had they not been enrolled in the rate program.

[65] D.P.U. 23-80 at 408-409 (2024).
[66] D.P.U. 23-150 at 512-513 (2024).

IV. Complementary Programs and Policies

While this report focuses on recommending rate designs that can better support electrification, we recognize that rate design will need to be complemented with other programs and policies to advance decarbonization in the Commonwealth. In addition to rate design, complementary program offerings provide necessary incentives for the adoption of, and load management associated with, clean energy technologies. The following sections summarize existing or developing programs and policies that are essential complements to rate design.

Demand Response and Load Flexibility Programs

Reducing peak demand is essential to maintain customer affordability by deferring or avoiding grid infrastructure upgrades, the costs of which are passed on to ratepayers. Demand response and load flexibility programming allows the EDCs to work with customers to manage peak demand and create bill savings for all ratepayers.

The existing demand response and load flexibility programs in the Commonwealth include National Grid's EV Off Peak Charging Rebate Program, ConnectedSolutions, and the Clean Peak Standard (CPS). These pre-AMI demand response and load flexibility programs rely on rebate-style payments that reduce customer bills. While the rebate-style payment can continue to shift peak energy usage and reduce total system costs while also continuing to incentivize electrification, in the long-term, following deployment of AMI, advanced rate design can provide more accurate and granular price signals to reduce peak-demand. Even with advanced rate design, demand response and load flexibility programs can complement well-designed dynamic rates by further incentivizing customers to shift energy use away from high-cost periods and allowing for the avoidance or deferral of grid infrastructure investment.

EV Managed Charging Programs

EVs are a critical electrification technology, whose advancement is a Commonwealth priority supported by a variety of EV and charger installation incentives. While EVs are a key climate technology, the Commonwealth's ambitious EV targets are projected to contribute to approximately 20% of new electric load by 2050.[67] This makes EV managed charging programs especially crucial in balancing the Commonwealth's electrification agenda, particularly in the near-term when AMI-enabled advanced rate design is not available.

National Grid already has implemented a residential off-peak charging rebate program which has successfully shifted approximately 80% of weekday EV charging load off-peak with over five thousand enrollees. It plans to begin enrollment in a similar off-peak charging rebate program for fleet customers this year.[68] Eversource and Unitil do not currently have EV-managed charging programs, but Eversource has proposed an EV managed charging programs in D.P.U. 24-195, filed on December 18, 2024. Unitil is expected to file a proposal with the DPU in the near future. In addition,

[67] Phase Scenario, https://www.mass.gov/doc/massachusetts-workbook-of-energy-modeling-results/download.
[68] https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/19070892.

many municipal light plants also administer successful managed charging programs that remain illustrative.

Peak Demand Reductions

Massachusetts has multiple programs designed to reduce peak demand from various load types and customer classes (e.g., residential, commercial, etc.). While the Near-Term Strategy Report focuses on recommendations for residential customers, peak demand reductions from commercial and industrial customers will also be essential to managing load. In preparation for growing electrification load, these existing programs need to continue and evolve. For instance, ConnectedSolutions, a peak demand response incentive program for products that have coincident load with summer peak, can start to incentivize reductions of coincident load during the winter peak as heat pump adoption increases.

The Commonwealth also administers the CPS, which provides incentives for implementation of energy storage, demand response, and renewable generation during periods of high grid stress. The CPS can not only reduce grid burden, but also reduce GHG emissions by shifting the energy supply to cleaner sources while enhancing grid reliability.

Upfront Incentives for Decarbonization Technologies

Mass Save provides rebates and financing to reduce the upfront cost of heat pumps. The Program Administrators, in coordination with the Energy Efficiency Advisory Council (EEAC), have filed the 2025-2027 Energy Efficiency and Decarbonization Plan which calls for an additional $1 billion focused on equity programming. Through Mass Save, Massachusetts' customers can leverage zero-interest financing through the HEAT loan, which allows customers to spread the cost over time and align payments with energy savings – so long as the operating costs of heat pumps are lower than a customer's legacy heating system. Additionally, the Massachusetts Community Climate Bank's Energy Saver Home Loan Program helps eligible Massachusetts homeowners cut their energy use and reduce or eliminate their reliance on fossil fuels.[69]

Ensuring an affordable and equitable transition for households using natural gas for heating to instead use efficient heat pump technologies will necessitate complementary rates and energy affordability programs. The Commonwealth's implementation of a seasonal heat pump rate, open to customers on the low-income discount rate, as has been the case in the DPU-approved heat pump rates for Unitil and National Grid, can complement existing programs, such as Mass Save's income-eligible programs, which can reduce or even eliminate the upfront cost of heat pump installation.

Similarly, the Massachusetts Offers Rebates for Electric Vehicle (MOR-EV) program provides rebates and financing to reduce the upfront cost of EVs.[70] Through this program, Massachusetts' customers can leverage rebates for the purchase or lease of eligible battery electric vehicles (BEVs) and fuel-cell EVs, including passenger cars, medium-, and heavy-duty trucks. MOR-EV also offers rebates for

[69] https://www.masshousing.com/en/mass-community-climate-bank/energy-saver-home-loan.
[70] https://mor-ev.org/.

used EVs, a rebate adder for income-eligible residents, and a rebate adder for medium- and heavy-duty vehicles in EJ areas.

In addition, the Commonwealth supports DER and DG through several key ratepayer-funded initiatives, including the SMART program, net metering, and the Renewable Energy Portfolio Standard (RPS). The SMART program offers incentives for solar developers, with bonus incentives for battery storage, community solar, and low-income participation. DOER is working with stakeholders to modernize the program and plans to release a new iteration in 2025. Net metering allows DG owners to receive credits on their electricity bills for exporting excess generated renewable energy to the distribution grid. Massachusetts also administers the RPS, which incentivizes renewable energy development by generating renewable energy credits (RECs) that load-serving entities must acquire to meet compliance obligations.

In addition, the Massachusetts Department of Environmental Protection is developing a Clean Heat Standard (CHS), which is a proposed regulatory program that would require heating suppliers to reduce their GHG emissions by implementing clean heat technologies. When coupled with cost-reflective rate design, the CHS can increase penetration of clean heat technologies.

Weatherization and Energy Efficiency Upgrades

Massachusetts offers numerous incentives for weatherization and energy efficiency upgrades.

Through the Mass Save program, Massachusetts' residents can leverage zero-interest financing to improve their homes' building envelopes with insulation, air sealing, and weatherstripping. Mass Save customers can also use Mass Save rebates to purchase energy-efficient appliances such as Energy Star-certified refrigerators and dryers. Further, in 2022, Massachusetts supplemented appliance efficiency standards and established minimum energy and water efficiency standards for specific products not already subject to federal appliance efficiency regulations. Products covered by these updated standards include residential faucets and showerheads, water coolers, and ventilation fans.

Massachusetts is leading the nation in the development and adoption of the opt-in Stretch and Specialized Building Energy Codes, which require new buildings to meet high thermal performance standards, dramatically decreasing the heating and cooling loads for buildings built to the code, thus enabling cost-effective electrification in new construction without significantly increased electric service load requirements.

The Commonwealth also supports the deployment of federal incentives for the Home Energy Assistance Program (HEAP, formerly known as the Low-Income Home Energy Assistance Program), which provides financial assistance to low-income households attempting to weatherize, and the Weatherization Assistance Program (WAP), which provides free energy efficiency upgrades for low-income households.[71]

[71] https://www.mass.gov/info-details/learn-about-home-energy-assistance-heap.

Implementation

Among the near-and long-term recommendations, there is an appropriate degree of phasing that should be considered during implementation. Many of the near-term recommendations are most effectively addressed expeditiously to maximize the public interest while other long-term recommendations will be more appropriately investigated and addressed at longer timescales.

Near-Term Recommendations

The Working Group's primary recommendation for the near-term is for the DPU to require all the EDCs to establish a seasonal heat pump rate, similar to those recently approved and directed by the DPU for Unitil and National Grid, but with larger winter differentiation to ensure energy bill savings for customers transitioning from gas heating to electric heat pumps. In addition to the rate structure recommendation, the Working Group provides additional recommendations on MEO; monitoring and evaluation; and complementary programs and policies.

These recommendations, principally the seasonal heat pump rate, can be implemented in the near-term and are essential for affordability and decarbonization. The Working Group seeks to advance implementation of seasonal heat pump rates across utilities in Massachusetts to enable customer enrollment by next winter (2025/2026). To further this goal, DOER is considering petitioning the DPU to investigate the near-term recommendations and direct the utilities to establish, or modify, the seasonal heat pump rates as recommended by the Working Group. The Working Group appreciates the EDCs' progress on heat pump rates thus far, as well as the EDCs' participation in the Working Group's stakeholder sessions. The Working Group looks forward to coordinating with the EDCs to explore how to implement several of the Working Group's near-term recommendations.

Long-Term Recommendations

The Working Group has identified areas for further consideration and will be addressing issues related to AMI-enabled rate design, ratemaking, and regulatory mechanisms in its Long-Term Ratemaking Recommendations. The Working Group determined that these areas could benefit from additional stakeholder deliberations and thus supports a facilitated stakeholder process to further discuss and consider the areas covered in the Long-Term Ratemaking Study and Long-Term Ratemaking Recommendations. The Working Group intends to engage key stakeholders, referred to as the Massachusetts Electric Rates Task Force (Task Force), to consider issues that may be included in a separate, future petition to the DPU. The Working Group's analysis and recommendations will serve to inform stakeholders engaged in the Task Force. The Working Group expects that an investigation at the DPU will be a necessary step to implement comprehensive changes related to AMI-enabled rate design, ratemaking, and regulatory mechanisms.

Appendix

Stakeholder Feedback Summary

Grid Impacts of Heat Pumps and Electric Vehicles

There is a strong emphasis on ensuring that EV charging and heat pump adoption are coordinated with the grid to avoid peak loads. Comments highlight the need for electricity rates for these technologies that reflect system costs and, where possible, advance peak demand reductions.

Affordability for Low- to Moderate-Income Households

Many comments prioritize making electrification affordable for low- and moderate-income households. This includes recommending bill assistance, energy efficiency programs, and rate structures that protect vulnerable populations from excessive costs. Affordability and equity concerns are central, suggesting a need for additional support to avoid disproportionate impacts on low-income households.

Technology-Specific and Seasonal Rates

Stakeholder comments generally favor seasonal rates, especially for heat pump users, as a means to lower winter heating costs. There is support for differentiated rates to encourage electrification, particularly for customers who use energy-efficient technologies like heat pumps. There was some concern about the longer-term impacts of technology-specific rates creating inequities between customers who have electrified and those who have not. Additionally, some stakeholders recommended revaluating a seasonal rate when the electric system becomes winter-peaking.

Dynamic Pricing

Some comments advocate for the implementation of dynamic pricing, where customers would be charged based on peak demand, though capped at certain levels to protect affordability. Dynamic pricing could incentivize flexible load management through the use of smart technologies.

High Fixed Charges

Several comments express concern over the impact of high fixed charges, which could discourage energy efficiency and the adoption of DERs like rooftop solar. The preference is for rate designs that maintain a volumetric component, ensuring that customers are incentivized to reduce usage. Others argued that an income-graduated fixed charge is the best way to address both equity and electrification.

Alignment with Decarbonization Goals

Many emphasize that rate design must support the state's decarbonization goals by promoting renewable energy and discouraging fossil fuel reliance. This includes ensuring that electrification efforts are paired with energy efficiency measures to minimize overall energy consumption.

Near-Term Rate Designs Concept

Some stakeholders suggested that the state should wait to implement any new rate design options until AMI has been fully deployed, saying that interim rate design options could confuse customers and make it more difficult to enroll customers in AMI-enabled rate designs like TVR. Some argued that the state's focus should be on implementing TVR rates as quickly as possible.

Consumer Education

Stakeholders encouraged the Working Group to think carefully about educating consumers about any new rate offerings. Some expressed concern about these rates changing consumer behavior or being adopted without considerable education efforts. Automatic enrollment for heat pump customers could be one option to address this.

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Near-Term Rate Strategy Report Affordability Feedback

Destenie Nock, PhD

Executive Summary I reviewed the Near-Term Rate Strategy Report (Near-Term Report, or Report), focusing on its structure around energy rates and the identified potential impact on diverse households. Based on my assessment, I have several recommendations intended to ensure that the Near-Term Report addresses energy affordability, considers vulnerable groups, and incorporates a more data-driven and holistic approach. When discussing how to craft a holistic approach, I reference previous case studies in other regions to provide examples of how data has been used in practice to identify affordability gaps. I also discuss my recommendations for how a similar analysis can be conducted in the future to ensure robust consideration of energy affordability and energy burden, as well as recommendations for how electrification initiatives can be designed to reach vulnerable households and protect people from significant bill impacts due to electrification and rate changes. Overall, my goal is to illustrate how an analyst or a Commissioner at the Department of Public Utilities (DPU) could use these expanded analyses to support decision-making in proceedings with impacts to energy affordability and rate design.

Recommendations:

1. **The Near-Term Report should include a clear definition of energy affordability**
    - A foundational component of the Near-Term Report should be a clear and comprehensive definition of energy affordability. Energy affordability is the ability for households to access the energy they need to maintain comfortable living

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conditions, participate in modern society, and manage energy costs without facing energy poverty or undue financial strain. This encompasses an ecosystem of factors, including the cost of energy, energy usage, the efficiency of end uses, access to modern energy technologies, and the impact of policies and rate structures. I have developed a separate Appendix wherein I suggest a definition of energy affordability and a framework for thinking about the landscape of contributing factors. See "Defining Energy Affordability" by Dr. Destenie Nock in the Appendix.

2. **The Report and subsequent analyses should utilize additional demographic designations**
    - The Report should incorporate more detailed demographic data, particularly for racial and age groups, when analyzing the impact of energy rates on household electrification efforts. Currently, the analysis focuses on analyzing rate impacts across income and housing types, including units that are rented versus owned. Yet, various racial and age groups – for instance, households with children under 5 and households necessitating medical devices – experience unique challenges, particularly when they intersect with the low-income category. Thus, race and age should be considered explicitly (in addition to income) when evaluating affordability and equity outcomes.[72] For instance, in the U.S., Black, Indigenous, and People of Color (BIPOC) populations are younger than the White population (based on the U.S.

[72] There is evidence that living in minority communities often means there is limited access to energy technologies and resources. *See*: Reames, T. G. (2016). A community-based approach to low-income residential energy efficiency participation barriers. Local Environment, 21(12), 1449-1466; Sunter, D. A., Castellanos, S., & Kammen, D. M. (2019). Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity. Nature Sustainability, 2(1), 71-76.

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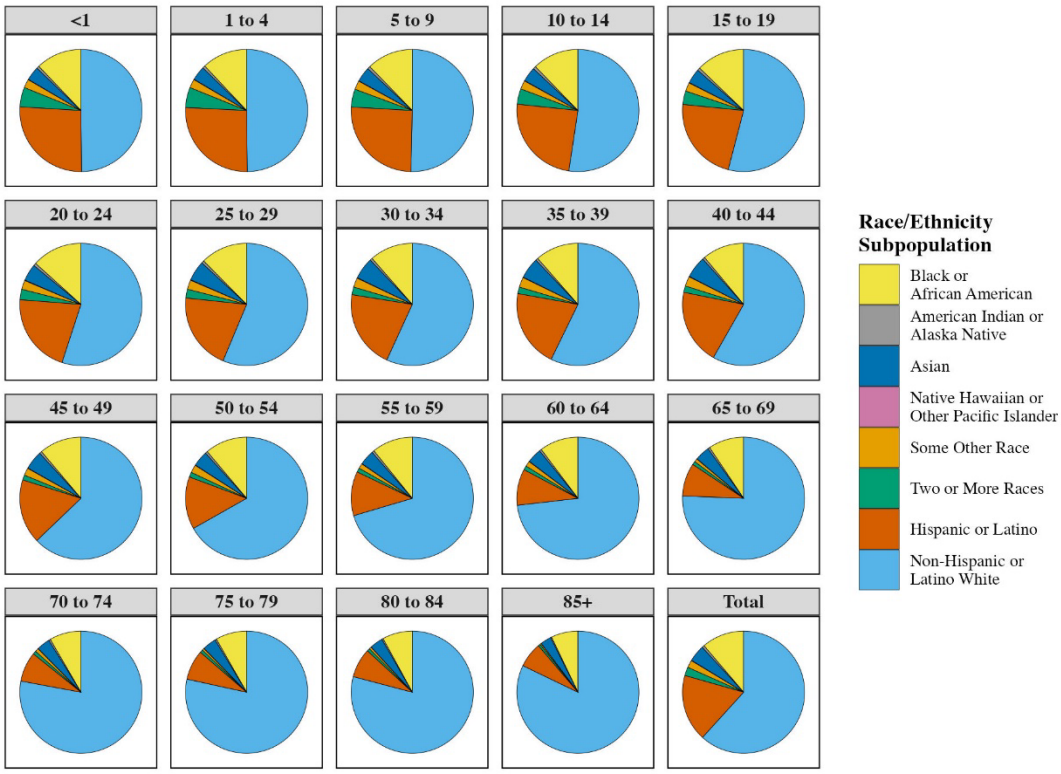
Census Bureau).[73] In 2017, the White population is the only subgroup with people under 40 accounting for less than half of the total population and people over 60 accounting for more than a quarter of the total population (see Figure 1). Americans who are 80 and older make up 4.8% of the White population but no more than 2.5% of any other subgroup (e.g., Black, Hispanic). The lower life expectancy for BIPOC communities is one factor in the lower incomes of these populations.[74] Thus, folding in this demographic data is important in establishing a knowledge base that will allow for better policies and protections to be designed and implemented to make sure the most vulnerable homes are not left behind. Note that identifying families with children under the age of 5 is distinct from households under 40 and worth parsing out in any analysis. Both the elderly and young children are vulnerable to economic, social, and environmental shocks.

[73] This information was sourced from Dennin et al. (under review) which analyzed census data. Data source: U.S. Census Bureau. American Community Survey (ACS). *Census.gov: Our Surveys & Programs* https://www.census.gov/programs-surveys/acs.

[74] When looking at the intersection of race, ethnicity and class, scholars have found that persons at these intersections can have challenges overcoming procedural, distributive and intergenerational equity barriers. Sources: Brown, M. A., Soni, A., Lapsa, M. V., Southworth, K., & Cox, M. (2020). High energy burden and low-income energy affordability: conclusions from a literature review. Progress in Energy, 2(4), 042003; Carley, S., & Konisky, D. M. (2020). The justice and equity implications of the clean energy transition. Nature Energy, 5(8), 569-577.

Figure 1: Racial categories by age group for the US.[75]



- To fill this gap, I recommend that income, age, and race information from households across utility service territories be collected using survey or census data. This can be done through utilities themselves, or in partnership with third parties (companies, analysts, or university researchers). Surveys, similar to the surveys conducted by utilities in other jurisdictions,[76] would be the gold standard because this would allow for the analysis of the intersection of race, age, and income. Detailed household information can also be captured by utilities when new forms or enrollment are made for various reasons. In the absence of survey data, the utilities or state agencies can

[75] The data was sourced from the US Census, and the chart was sourced from Dennin, Luke, Destenie Nock, Nicholas Z. Muller, Medinat Akindele, Peter J. Adams. "Supplementary Information: Modeling wildland fire smoke damages in the U.S. and unpacking impact disparities by social vulnerability" (2025). In Press.
[76] Cong, S., Nock, D., Qiu, Y. L., & Xing, B. (2022). Unveiling hidden energy poverty using the energy equity gap. *Nature Communications*, *13*(1), 2456.

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connect household information to census demographics. If census data is not available, then zip code data can be used. For an example of using locational data, see Huang et al. 2023.[77]

- Once this additional demographic information is available, it should be used to investigate multiple risks across households (e.g., inability to heat and cool homes, energy limiting behavior, and the level of energy burden (i.e., spending on energy bills)).[78] This data investigation can be conducted by the utilities (at the direction of the DPU) or the DPU itself, in collaboration with another third party. Bill data should be tied with individual risk metrics by linking address, income, and demographic information, and identifying disparities in energy usage and spending habits across income and demographic groups. When identifying energy limiting behavior, high-income groups should be used as a baseline for energy usage across outdoor temperatures since these high-income households are less likely to have a budget constraint on energy spending habits, and thus would prioritize comfort and safety

[77] Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. *Energy Policy*, *182*, 113748. https://www.sciencedirect.com/science/article/pii/S0301421523003336.

[78] Cong, S., Nock, D., Qiu, Y. L., & Xing, B. (2022). Unveiling hidden energy poverty using the energy equity gap. *Nature Communications*, *13*(1), 2456; Kwon, M., Cong, S., Nock, D., Huang, L., Qiu, Y. L., & Xing, B. (2023). Forgone summertime comfort as a function of avoided electricity use. *Energy Policy*, *183*, 113813; Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. *Energy Policy*, *182*, 113748; Brown, M. A., Soni, A., Lapsa, M. V., Southworth, K., & Cox, M. (2020). High energy burden and low-income energy affordability: conclusions from a literature review. Progress in Energy, 2(4), 042003; Scheier, E., & Kittner, N. (2022). A measurement strategy to address disparities across household energy burdens. Nature Communications, 13(1), 288.

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over minimizing bill spending.[79] The gap in cooling and heating use (i.e., energy limiting behavior and the energy equity gap)[80] as well as energy burden thresholds should be used to identify the risks. These risk metrics should be calculated at the individual level, which can then be used to target interventions and distribute information to customers about incentives and programs.

3. **The Commonwealth should ensure there are robust protections for low- and moderate-income households**
    - Households with low- to moderate-incomes (LMIs) need protections against high rates, particularly given that electrification (e.g., switching from natural gas to electric heating, adopting electric vehicles) can raise overall energy expenses. Specific rate structures or discounts should be available to protect these households from increased financial strain. I note that the DPU supports the use of tiered discount rates and has approved a tiered discount rate for National Grid.[81] I think that the Report has good recommendations for differentiating seasonal rates, but there should be more emphasis for moving extreme temperature expenses (winter and summer) to less extreme seasons (spring and fall) to help households maintain

[79] *See* the work of Dr. Nock in her papers detailing energy limiting behavior. YouTube: https://www.youtube.com/watch?v=F2ps44sAil8
Academic paper: Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. Energy Policy, 182, 113748.
[80] https://www.nature.com/articles/s41467-022-30146-5
[81] The National Grid tiered discount contains 5 tiers, with the highest being up to a 71% discount. *See* Executive Summary for D.P.U. 23-150 (National Grid Rate Case): https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/19692111; The DPU selected tiered discount rates (TDRs) for further investigation in D.P.U. 24-15: https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/19692111.

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consistent bills. This is similar to balanced billing, where the utility charges a household the same amount every month of the year, with annual adjustments based on consumption and rates. To enhance the uptake of low-income households using balanced billing, there should be direct and targeted marketing to vulnerable households. E3's analysis finds that over a full year, there are net savings with the seasonal heat pump rate, as opposed to just moving costs from one season to another. Pairing seasonally differentiated rates with low-income discount rates, including tiered structures that have been approved and considered recently in the Commonwealth,[82] can provide some protection. However, some households may need additional protections during the energy transition, such as bill caps.

- I also recommend that the DPU rethink the existing fixed and volumetric charges[83]. I support introducing a non-bypassable fixed charge for public benefits that would ensure stable and equitable funding for crucial programs that support the Commonwealth's energy, affordability, and decarbonization goals (such as Mass Save and low-income discount rates), while also eliminating a key barrier to electrification. This would ensure that all customers, independent of increases or decreases in usage, contribute fairly to the cost of these programs. I note that a non-bypassable fixed charge, even for public benefits, may increase energy burden for

[82] I understand that the MA DPU recently approved a tiered discount rate in D.P.U. 23-150, and has indicated interest in further considering tiered structures in D.P.U. 24-15.
[83] Fixed charges should include fixed infrastructure (i.e., distribution and transmission system charges) and the costs for important programs like Mass Save energy efficiency or low-income discounts. Volumetric charges should be based on variable costs.

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LMI, so this option should be compared against the total cost to households for the volumetric charges. I note that in Massachusetts, by law, the costs associated with on-site generation are supposed to be explicitly tied to affordability for low-income customers.

4. **The DPU should support data-driven methods to assess rate impacts, and to target programs and program designs to alleviate burdens for at-risk customers**
    - The Report did a nice job of looking into different housing types and investigating how electric heat pumps and electric vehicles will add to a household's energy burden (i.e., the percent of income spent on energy bills).[84] To enhance future analyses, I recommend utilizing data-based methods, such as monthly billing data or advanced metering infrastructure (AMI) data, to determine the rate impact on low-income and at-risk customers specifically (rather than only focusing on housing and fuel types).[85] In the Report, there is a good analysis on housing types using modeling, and this can be enhanced by benchmarking this against actual energy usage and bill data from energy utilities. Such data could identify households struggling to maintain safe

[84] Simcock, N., Jenkins, K. E., Lacey-Barnacle, M., Martiskainen, M., Mattioli, G., & Hopkins, D. (2021). Identifying double energy vulnerability: A systematic and narrative review of groups at-risk of energy and transport poverty in the global north. Energy Research & Social Science, 82, 102351.
[85] Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. *Energy Policy*, *182*, 113748.; Peoples Energy Analytics is also a company that can be used as an example of using AMI and monthly data to identify affordability gaps, and they deploy targeted marketing.

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indoor temperatures during extreme weather periods (winter[86] or summer[87]). A data-driven approach will ensure that affordability interventions target those most affected by unaffordable bills.

- AMI will also allow for greater visibility into price responsiveness across income groups once time-varying rates (TVR) are rolled out. This will allow analysts, utilities, and the DPU to see if low-income households are getting hit hardest by on-peak pricing (especially during extreme weather events when poor insulation in combination with high heating/cooling loads and high on-peak rates have a compounding effect on household spending needs).
- I recommend that the types of data-driven efforts be expanded to directly target and message consumers who are estimated to be at-risk. This can be done using e-mail, text messaging, and in-app messages.[88] In addition, people who are at-risk often have other touchpoints outside of the utility that can be helpful. For example, targeting households with young children can mean direct messaging collaborations with the Department of Health and Education, as well as hospitals. For at-risk adults with

[86] Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. *Energy Policy*, *182*, 113748. https://www.sciencedirect.com/science/article/pii/S0301421523003336

[87] Cong, S., Nock, D., Qiu, Y. L., & Xing, B. (2022). Unveiling hidden energy poverty using the energy equity gap. *Nature Communications*, *13*(1), 2456. https://www.nature.com/articles/s41467-022-30146-5; Kwon, M., Cong, S., Nock, D., Huang, L., Qiu, Y. L., & Xing, B. (2023). Forgone summertime comfort as a function of avoided electricity use. *Energy Policy*, *183*, 113813. https://www.sciencedirect.com/science/article/pii/S0301421523003981.

[88] For an example of this suggestion, *see* Peoples Energy Analytics, which directly messages at-risk customers using monthly and daily energy usage data, for an estimated cost of less than a penny per household. http://www.PeoplesEnergyAnalytics.com.

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equipment, connections to social workers, hospitals, and/or clinics, pharmacies and medical supply stores can be great ways to capture their attention.

- To ensure that data on new rates is used to inform future electrification efforts and affordability programs, analyses should be conducted to identify energy limiting behavior and energy insecurity within individual households across heating and cooling seasons for those enrolled and not enrolled in the seasonal heat pump rate. I recommend that the utilities (at the direction of the DPU) or the DPU itself, in collaboration with another third party, conduct an analysis using available energy usage data (monthly or daily level) at the individual household level for all households in the region. The analysis should include three years of energy usage prior to when the customer was enrolled in the seasonal heat pump rate and then be conducted periodically over the course of the first five years of implementation to investigate affordability impacts. This will demonstrate how household energy usage shifts with rate changes, seasons, and technology changes. Monthly data is sufficient, but to the extent AMI meters are installed and operating, daily or hourly energy usage information should be used. The utilities should use meter (and eventually AMI) energy usage data along with available income and demographic data to identify the risk types that households face, and then communicate opportunities for electrification and reduction of financial burdens to these households. Then, utilities should use direct-to-household channels (e-mail, texting, in-app messages) to communicate about programs that benefit low-income and at-risk households,

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targeting affordability programs for individual households based on their needs and risk types.

5. **The utilities, the DPU, and the Commonwealth should take a Holistic View of Housing-Related Energy Burdens**
    - A comprehensive view of energy burdens, energy limiting behavior, and how higher rates may cause households to use less electricity is essential. Housing quality issues, such as poor insulation or leaky windows, contribute to higher energy costs and exacerbate the financial burden on households. I appreciate that the analysis in the Report modeled housing structures of different ages. It would be great if this type of information could be used to identify how electricity rates should change by housing type, housing infrastructure, and/or income group. Rates could have consumption thresholds for different discount levels for income-eligible ratepayers. Addressing these housing-related barriers to affordability as part of a comprehensive electrification strategy can improve access to energy efficiency measures, reducing energy usage for households in the long term, thereby enhancing energy affordability overall.
6. **The utilities, the DPU, and the Commonwealth in general should take an integrated approach for supporting at-risk customers**
    - The utilities, the DPU, energy efficiency program administrators, and the Commonwealth more generally should take a holistic approach to support at-risk customers, particularly those who are the main targets of electrification initiatives. The Report investigates housing types and low-income homes, which is a good start.

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Moving forward, this type of analysis could inform multi-faceted assistance, combining rate protections, home efficiency improvements, and targeted outreach to ensure ratepayers can participate in electrification without financial strain. Particularly, targeted marketing will provide a streamlined, cost-effective way to make sure households have adequate information about their electrification and affordability options.

7. **Support for upfront costs of fuel-switching**
    - While the Near-Term Report addressed the operational costs of electrification in great detail, I think there is an opportunity to more robustly address the fact that upfront costs will continue to be a large factor in whether low- to moderate-income households can electrify. In Massachusetts, there are generous incentives for subsidizing heat pumps – 100% of costs are covered for low-income households. The utilities and energy efficiency program administrators should use targeted marketing (see above recommendations for more detail) to make sure people are aware of these incentives, as well as new rate designs and affordability programs. In addition, moderate-income homes should be included in this heat pump benefit. This support can help make electrification more accessible and affordable for a broader range of income levels.

Conclusion The recommendations provided here aim to strengthen the Near-Term Rates Strategy Report by making it more equitable, data-informed, and focused on long-term energy affordability. I have also discussed broader recommendations on how vulnerable ratepayers can be provided more robust support as the Commonwealth works to meet its electrification goals. By adopting these

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recommendations, the transition to electrification can become more accessible and sustainable for all households, particularly those most vulnerable to rising energy costs and energy-related hardships.

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Defining Energy Affordability

Destenie Nock, PhD

In my feedback to the IRWG on the Near-Term Rate Strategy Report, I recommended that the work should include a clear definition of energy affordability. I developed the definition presented here to support the work of the Massachusetts Interagency Rates Working Group (IRWG) in their consideration of near- and long-term electricity rates that support decarbonization. In this report I detail a proposed framework for a comprehensive definition of energy affordability. I then enumerate the components that contribute to it, and the data sources, data challenges, and data needs for each component.

Definition

Energy affordability ensures that households can access the energy they need to maintain comfortable living conditions, participate in modern society, and manage energy costs without facing energy poverty or undue financial strain.[89] This means having access to enough reliable, clean energy to meet essential needs such as heating, cooling, lighting, cooking, and powering appliances, while still having sufficient financial resources to cover other living expenses.[90] Energy affordability

[89] Brown, M. A., Soni, A., Lapsa, M. V., Southworth, K., & Cox, M. (2020). High energy burden and low-income energy affordability: conclusions from a literature review. Progress in Energy, 2(4), 042003; Scheier, E., & Kittner, N. (2022). A measurement strategy to address disparities across household energy burdens. Nature Communications, 13(1), 288; Heindl, P., & Schüssler, R. (2015). Dynamic properties of energy affordability measures. Energy Policy, 86, 123-132; Cong, S., Ku, A. L., Nock, D., Ng, C., & Qiu, Y. L. (2024). Comfort or cash? Lessons from the COVID-19 pandemic's impact on energy insecurity and energy limiting behavior in households. Energy Research & Social Science, 113, 103528.

[90] Welsch, H., & Biermann, P. (2017). Energy affordability and subjective well-being: Evidence for European countries. The Energy Journal, 38(3), 159-176; Also, *see* the United Nations Sustainable Development Goal 7. https://sdgs.un.org/goals/goal7

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also necessitates a balanced approach, where the cost of energy is reasonable relative to household income and individual circumstances, preventing individuals from having to choose between paying for energy and other basic needs like food, healthcare, or housing.[91] Conversely, energy is not affordable if the cost of energy influences an individual's ability to heat and cool their home to avoid adverse health risks.

Energy affordability encompasses an ecosystem of factors, including: the cost of energy bills, the efficiency of energy end uses, access to modern energy technologies, and the impact of policies and rate structures.[92] Further, energy affordability is influenced by factors such as rate structures, household income, location, energy-efficient infrastructure, and equitable access to renewable energy solutions.[93] One method to measure energy affordability is to calculate the percent of income (energy burden) a household spends to maintain an adequate level of warmth or cooling.[94] The World Health Organization recommends indoor temperatures of 70°F (21°C) in living rooms and 64°F (18°C) in other occupied rooms during daytime hours.[95] I note that currently in the U.S. the energy burden

[91] Miniaci, R., Scarpa, C., & Valbonesi, P. (2014). Energy affordability and the benefits system in Italy. Energy Policy, 75, 289-300; Carley, S., Graff, M., Konisky, D. M., & Memmott, T. (2022). Behavioral and financial coping strategies among energy-insecure households. Proceedings of the National Academy of Sciences, 119(36); Hernández, D. (2016). Understanding 'energy insecurity' and why it matters to health. Social science & medicine, 167, 1-10.
[92] Hernández, D., & Bird, S. (2010). Energy burden and the need for integrated low-income housing and energy policy. Poverty & public policy, 2(4), 5-25.
[93] Simcock, N., Jenkins, K. E., Lacey-Barnacle, M., Martiskainen, M., Mattioli, G., & Hopkins, D. (2021). Identifying double energy vulnerability: A systematic and narrative review of groups at-risk of energy and transport poverty in the global north. Energy Research & Social Science, 82, 102351.
[94] In her 1991 book, Fuel Poverty: From Cold Homes to Affordable Warmth, Brenda Boardman introduced the concept of fuel poverty, defining it as a household needing to spend more than 10% of its income to maintain adequate warmth. Currently in the U.S. the affordability threshold is often set to 4-6% of income. Citation: Boardman, B. (1991). Fuel poverty: from cold homes to affordable warmth.
[95] The World Health Organization has many recommendations for indoor temperatures. They highlight that cold indoor temperatures are often a consequence of outdoor temperature, structural deficiencies, including

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affordability threshold is often set to 4-10% of income[96] and that energy burden often does not include a temperature indicator.[97] Thus, I suggest including energy limiting behavior metrics,[98] in addition to energy burden, to paint a more holistic measure of energy affordability.

Components of Affordability

Energy affordability encompasses several key components, all of which interrelate to energy bills, energy usage, and the technologies employed to produce and manage energy. Here are the primary components:

1. Energy Costs (Energy Bills)

- **Rate Structures**: The way utilities structure pricing, such as inclining block rates (where higher usage results in higher per-unit costs), time-of-use (TOU) rates (where prices vary based on timing of peak demand), seasonal rates (where bills can be very high in winter or

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a lack of insulation and airtightness, and lack of heating. As outlined in this chapter, cold indoor temperatures have been associated with increased blood pressure, asthma symptoms and poor mental health. *See* https://www.who.int/publications/i/item/9789241550376

[96] Brown, M. A., Soni, A., Lapsa, M. V., Southworth, K., & Cox, M. (2020). High energy burden and low-income energy affordability: conclusions from a literature review. Progress in Energy, 2(4), 042003; Cook, J. J., & Shah, M. (2018). Reducing energy burden with solar: Colorado's strategy and roadmap for states (No. NREL/TP-6A20-70965). National Renewable Energy Lab. (NREL), Golden, CO (United States).

[97] In addition to lacking temperature analysis, most energy burden studies do not analyze household spending on transportation energy or water services. In addition, these energy burden studies do not tend to include different sources of financial support. From 2013–2014, household energy burdens were estimated to be 16.3% for low-income households and 3.5% for non-low-income households. Sourced from: Eisenberg, J. F. (2014). Weatherization assistance program technical memorandum background data and statistics on low-income energy use and burdens (No. ORNL/TM-2014/133). Oak Ridge National Lab. (ORNL), Oak Ridge, TN (United States).

[98] Cong, S., Nock, D., Qiu, Y. L., & Xing, B. (2022). Unveiling hidden energy poverty using the energy equity gap. Nature communications, 13(1), 2456; Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. Energy Policy, 182, 113748; Cong, S., Nock, D., Laasme, H., Qiu, Y. L., & Xing, B. (2023). Understanding energy limiting behavior in different climate zones: case studies of three utility service regions. https://www.researchsquare.com/article/rs-3361275/v1

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summer months and lower in spring and fall months), or fixed rates, can significantly affect affordability.[99] Rate design, for instance, can disproportionately negatively affect households that use less energy but pay a higher percentage of their income on fixed charges, such as if they are low- or moderate-income, or on a fixed income. Additionally, rate design can also hurt certain vulnerable households if they are higher energy consumers (for instance, due to using resistance heating, having many occupants in the home, and/or having a low-quality housing unit), or if the consumer struggles to adequately manage bill volatility across seasons (e.g., energy bills are higher in winter and summer, than in spring or fall) due to inflexible loads.

- **Energy Poverty Stemming from Financial Strain**: Households are often considered energy poor when they spend a large proportion of their income on energy bills, typically defined as over 6-10% of household income, and when they are under consuming energy to the point where they place themselves at a health risk (i.e., energy limiting behavior or energy insecurity).[100] Therefore, households can be at risk of energy poverty if they have low- or moderate-income, fixed-income, or single-income, or based on usage (such as medical devices, disabilities, or working hours/living situation). Energy poverty is characterized by, for

[99] Miniaci, R., Scarpa, C., & Valbonesi, P. (2014). Energy affordability and the benefits system in Italy. Energy Policy, 75, 289-300.
[100] Brown, M. A., Soni, A., Lapsa, M. V., Southworth, K., & Cox, M. (2020). High energy burden and low-income energy affordability: conclusions from a literature review. Progress in Energy, 2(4), 042003.

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instance, an increase in utility disconnections, and a decrease in adequate indoor temperature regulation (i.e., energy limiting behavior),[101] causing adverse health risks.[102]

- **Subsidies and Assistance Programs**: Programs like the Low-Income Home Energy Assistance Program (LIHEAP, renamed HEAP in Massachusetts), utility discount rates, or utility bill arrearage management programs can help reduce the burden of energy bills for low-income households.

2. Energy Usage

- **Efficiency of Homes and Appliances**: Older, inefficient appliances or poorly insulated homes can lead to higher energy consumption, inflating energy bills. Increasing energy efficiency through home upgrades (like insulation, efficient lighting, and smart thermostats) can reduce overall usage and increase affordability.

  The quality of homes and appliances is heavily influenced by policies. For example, in Massachusetts energy efficiency upgrades (e.g., insultation, smart thermostats, etc.) have been incentivized through Mass Save rebates. In addition to this, strong federal appliance standards have helped ensure the efficiency of energy technologies in the home. Strict state policies regarding building codes have largely reduced the heating load. These efforts have reduced energy usage and lowered energy bills for those that are able to access and adopt

[101] For more about energy limiting behavior, *see* research by Dr. Nock and her company. Research paper 1: Cong, S., Ku, A. L., Nock, D., Ng, C., & Qiu, Y. L. (2024). Comfort or cash? Lessons from the COVID-19 pandemic's impact on energy insecurity and energy limiting behavior in households. Energy Research & Social Science, 113, 103528; Research paper 2: Cong, S., Nock, D., Qiu, Y. L., & Xing, B. (2022). Unveiling hidden energy poverty using the energy equity gap. Nature communications, 13(1), 2456; Company work is at Peoples Energy Analytics.

[102] Sometimes these energy hardships are referred to as energy insecurity. Hernández, D. (2016). Understanding 'energy insecurity' and why it matters to health. Social science & medicine, 167, 1-10.

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these technologies (e.g., homeowners) but there is still more work to be done in identifying gaps in adoption capabilities (e.g., renter populations and those in older homes).

- **Behavioral Factors**: How individuals use energy (e.g., heating/cooling practices, appliance usage habits) influences consumption. Awareness and education about structural and social barriers to energy-saving behaviors are essential for improving affordability.
- **Individual circumstances**: Energy usage varies by many lifestyle factors, some of which are dictated by circumstances not within an individual's control, making them vulnerable to energy insecurity or poverty, such as having to power medical devices, accommodate disabilities, and having to maintain an indoor temperature regulation necessary to support health and comfort.
- **Energy limiting behavior:** Households are considered to be exhibiting energy limiting behavior when they reduce their energy use to save money on bills, thereby putting themselves at risk of adverse health impacts. For example, this can include turning off working air conditioning and heating systems, being unable to fix a broken heating or cooling equipment, or being unable to purchase cooling equipment.[103] This can be considered a subset of behavior factors.[104]

[103] Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities across cooling and heating in households: Energy equity gaps. Energy Policy, 182, 113748; Kwon, M., Cong, S., Nock, D., Huang, L., Qiu, Y. L., & Xing, B. (2023). Forgone summertime comfort as a function of avoided electricity use. Energy Policy, 183, 113813. https://www.sciencedirect.com/science/article/pii/S0301421523003981.
[104] Cong, S., Ku, A. L., Nock, D., Ng, C., & Qiu, Y. L. (2024). Comfort or cash? Lessons from the COVID-19 pandemic's impact on energy insecurity and energy limiting behavior in households. Energy Research & Social Science, 113, 103528. https://www.sciencedirect.com/science/article/pii/S2214629624001191.

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- **Demand Side Management (DSM)**: Programs that encourage users to shift their usage to off-peak times or reduce consumption during peak times can lower overall energy costs, making energy more affordable for those that are able to participate.

3. Energy Technologies

- **Clean Energy Adoption**: In Massachusetts, there is the ability to take advantage of distributed generation (DG) and net energy metering incentive programs. Technologies like solar panels or wind energy can lower long-term energy costs, especially if paired with battery storage to manage intermittent supply. However, the upfront cost of these technologies can be a barrier for lower- and fixed-income households, and can be inaccessible to renters based on landlord uptake. I note that the Commonwealth has made significant efforts and progress in expanding access via the establishment of a variety of community solar offerings to reach these customers (e.g., renters, low-income and fixed-income) and are continually improving community solar offerings.
- **Electrification and Regenerative Energy Systems**: Shifting to electrified systems (like heat pumps, electric vehicles, and induction stoves) can reduce energy bills. There can be further savings if households also adopt on-site clean energy. Thus, Massachusetts should continue to support policies which reduce or eliminate the upfront cost of electrification appliances for low- and moderate-income households.

4. Policy and Regulation

- **Regulatory Frameworks**: Government policies, such as renewable energy incentives, energy efficiency standards, and carbon pricing, impact the affordability of energy technologies and

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the cost of energy for consumers. Utility regulatory frameworks and business models, such as the regulated rate of return and other incentive structures, also impact the cost of energy and impact the ability and willingness of utilities to address affordability challenges.

- **Data Sharing and Communication**: As discussed in the following section, data regarding the amount of energy households are using by location, heating and cooling systems in a home, income and demographic group, house size, occupant age, and house age could be used to understand affordability challenges across the state. However, responsive policy and regulation enables the creation and sharing of data.
- **Decarbonization Policies**: Efforts to reduce carbon emissions, such as transitioning to clean and renewable energy sources and the other enabling investments, such as the electric grid, can have mixed effects on affordability. While clean energy may be cheaper in the long term, the short-term costs of transitioning from fossil fuels can raise prices unless mitigated by subsidies or policy support.
- **Equity in Energy Transition**: Ensuring that vulnerable populations, such as lower- and fixed-income households or marginalized communities, benefit from energy transitions is essential for affordability. Without equitable access to efficiency upgrades, and improvements in the housing quality, these groups may face higher costs while others benefit from lower bills. In addition, there is concern that low-income households will be some of the last to completely electrify and phase out of the gas network. As less customers are on the natural gas network the costs of maintaining that system will be high, and thus, the electricity sector may need to supplement the final phase out of fossil fuels.

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5. Local Factors

- **Geography and Infrastructure**: Energy costs vary by region due to differences in energy sources, weather patterns (which affect heating/cooling needs), and infrastructure. Remote or underserved areas may face higher energy costs due to limited access to clean, affordable energy technologies or reliance on more expensive fuel types.
- **Climate**: In colder or hotter climates, energy usage for heating and cooling is a significant component of energy bills. Efficient systems can lower costs, but the investment in those systems can be a barrier to affordability.

These components highlight the complex relationship between energy usage, technologies, and affordability, particularly for lower-income households and other vulnerable populations. Programs that combine energy efficiency, clean energy adoption, and policy support can help mitigate energy costs while promoting equitable energy use. The following figure summarizes the ecosystem of components contributing to energy affordability.

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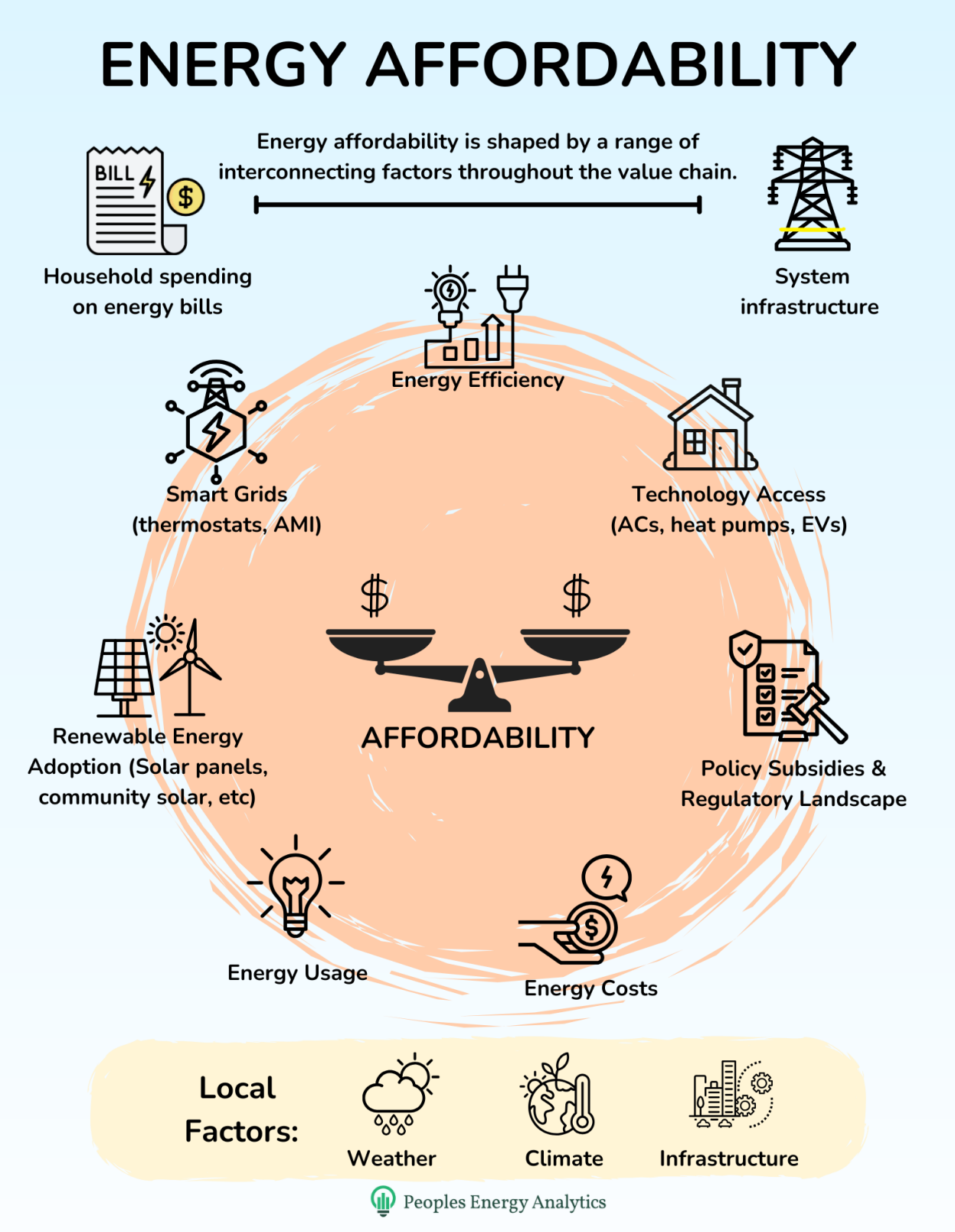

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Data Sources, Needs, and Challenges

Addressing energy affordability requires collecting, analyzing, and managing various types of data from multiple sources. Each component of energy affordability presents unique data needs and challenges. Below is a breakdown of the key data sources, data needs, and data challenges for each of the components. This data should be used to create a model of energy risks for each individual household, and to identify energy affordability challenges across a utility's territory in real time. This model would be used for an in-depth system analysis which would then allow regions, regulators, utilities, and community advocates to understand how the energy system, or changes to the system impacts individuals. The measured impacts should include energy bill spending relative to other household expenses (i.e., energy burden adjusted for cost of living),[105] thermal comfort and safety (i.e., energy limiting behavior), as well as infrastructure deficits and needs.

1. Energy Costs (Energy Bills)

Data Sources:

- **Utility Bills**: Monthly or annual billing data from energy providers and utilities.
- **Rate Structures**: Public records from utilities or government agencies on pricing mechanisms (e.g., tiered rates, time-of-use rates).
- **Census and Economic Data**: Information on household income and demographics (e.g., U.S. Census Bureau, Eurostat).

[105] Zhang, J., Nock, D., & Li, X. (2024). Ignoring cost of living misses the true level of energy burden.

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- **Subsidy and Assistance Program Data**: LIHEAP data, utility discount programs, or energy subsidies information.

Data Needs:

- Accurate data on household energy consumption and costs over time.
- Information on energy pricing structures and how they vary by region and customer class.
- Household income levels to measure energy burden (i.e., the percentage of income spent on energy).

Data Challenges:

- **Multiple sources of energy use**: Electricity bills do not encompass all energy costs, which is increasingly true as end uses such as transportation electrify. Access to bill data for all energy uses would increase accuracy and understanding, such as the cost of delivered fuels and transportation fuels.
- **Privacy Concerns**: Access to individual household energy bills and income data may be restricted due to privacy protections.
- **Inconsistent Reporting**: Energy bills may be reported differently across utilities, making it hard to compare data.
- **Hidden Costs**: Fees, taxes, or other charges on energy bills may vary, obscuring actual costs.

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2. Energy Usage

Data Sources:

- **Meters**: Ideally real-time data from utilities on energy consumption at the daily, hourly, or sub-hourly timescale. If AMI has not been deployed, then monthly meter data can be used.
- **Surveys and Household Energy Audits**: Surveys on appliances, insulation, heating/cooling systems, and behavior (e.g., Residential Energy Consumption Survey).
- **Building Codes, Characteristics, and Standards**: Data on building materials, insulation, age, size, location, energy efficiency codes, and other building characteristics.

Data Needs:

- Real-time or near-real-time energy consumption data at the household and appliance level. The ideal time step is energy usage at the daily or sub-hourly timescale. If AMI has not been deployed, then monthly meter data can be used.
- Data on energy efficiency of buildings, appliances, and HVAC systems.
- Behavioral data on how households use energy and make decisions about the use of energy.

Data Challenges:

- **Access to Meter Data**: Utility companies may not share detailed consumption data due to privacy concerns.
- **Self-Reported Data**: Surveys may rely on self-reported information, which can be inaccurate or incomplete.

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- **Granularity**: Getting detailed, appliance-level usage data can be difficult and costly. To overcome this hurdle load disaggregation devices and software can be used.

3. Energy Technologies

Data Sources:

- **Clean and Renewable Energy Installations**: Data on solar panels, wind turbines, and battery storage systems (e.g., National Renewable Energy Laboratory databases) at the household and community level. (i.e., utility scale).
- **Smart Grid Infrastructure**: Data from utility companies on grid modernization systems and device deployments, and grid capabilities.
- **Energy Performance Data**: Manufacturer and third-party performance reports on energy-efficient appliances and systems.

Data Needs:

- Data on the cost, performance, environmental impacts, and lifespan of clean energy systems and energy-efficient appliances.
- Adoption rates and distribution of renewable energy technologies across different income groups and geographies. This would include which homes have installed this technology behind the meter, and which community scale projects have been established.
- Data on incentives or subsidies for energy technologies.

Data Challenges:

- **Upfront Costs**: Data on actual installation and maintenance costs can be difficult to obtain.

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- **Equitable Access**: Gathering data on how technology adoption varies across socio-economic groups and regions.
- **Technology Integration**: Data on how new technologies integrate with existing energy systems and the challenges of scaling these technologies.

4. Policy and Regulation

Data Sources:

- **Government Energy Reports**: Regulatory filings, government databases, and energy commission reports (e.g., Department of Energy, Federal Energy Regulatory Commission).
- **Utility and Policy Databases**: e.g., DSIRE (Database of State Incentives for Renewables & Efficiency), state public utility commission records.
- **Energy Poverty and Assistance Program Data**: Data from agencies managing energy assistance programs (e.g., LIHEAP and WAP).

Data Needs:

- Comprehensive data on energy policies, subsidies, and assistance programs at local, state, tribal, and federal levels.
- Data on the impact of regulatory changes on energy prices and affordability.
- Information on policy-driven technology adoption (e.g., subsidies for solar panels or energy efficiency upgrades).

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Data Challenges:

- **Timeliness**: Policies change frequently, and there can be a delay in the availability of up-to-date data.
- **Quantifying Impact**: Measuring the direct impact of policies on household affordability is complex and often indirect.

5. Local Factors (Geography, Climate, Infrastructure)

Data Sources:

- **Weather and Climate Data**: Data on temperature patterns, heating degree days, cooling degree days (e.g., NOAA, local weather stations).
- **Geospatial Data**: Geographic Information Systems (GIS) data on energy infrastructure, remote or underserved areas, and access to different energy technologies like solar panels, EV charging infrastructure. Data sources can include satellite data, and local surveys.
- **Census and Demographic Data**: Information on population density, household composition, and regional economic data (e.g., U.S. Census Bureau).

Data Needs:

- Regional data on energy demand influenced by weather (heating/cooling needs) and infrastructure (housing quality/age, insulation, grid reliability, renewable sources). This is partially addressed by E3's HEEM analysis (which uses ResStock),[106] and can be enhanced by benchmarking against utility data, once it becomes available.

[106] HEEM stands for Household Energy Expenditure Model. *See* E3's Near-Term Rate Strategy Report.

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- Data on regional fuel types and energy costs.
- Local data on building efficiency and the adoption of energy-efficient technologies by census track. Ideally the adoption of energy efficiency appliances would be captured at the building/household level so it can be paired with energy usage data from energy utilities. In the absence of available building data, this can be modeled with trends and averages using models like NREL's ResStock.

Data Challenges:

- **Regional Disparities**: Energy usage and needs vary significantly across geographic locations, making data comparison challenging.
- **Weather Volatility**: Unpredictable weather events can make energy needs fluctuate dramatically.
- **Infrastructure Limitations**: Data on energy infrastructure in rural or underserved areas may be incomplete or outdated. Energy infrastructure can include availability of high-quality internet in the area (necessary for interacting with smart thermostats, participating in demand response, and some distributed generation technologies).

Overall Data Challenges Across All Components:

- **Data Silos**: Many data sources (utility, demographic, technology, policy) are siloed and not easily integrated, which limits the ability to assess affordability holistically.
- **Privacy and Accessibility**: Individual household data on energy usage and income is often private and accessing detailed consumption data can be restricted by utilities or regulators.

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- **Data Granularity**: Many datasets lack the granularity needed to provide actionable insights at a household level, such as specific energy use behaviors, appliance performance, or the precise impact of subsidies.
- **Data Collection Costs**: Collecting detailed, real-time data on energy usage and technology adoption is expensive and resource intensive.

Conclusion

By addressing these data needs and overcoming the associated challenges, researchers and policymakers can better understand and improve energy affordability, especially for vulnerable populations. My objective with highlighting all of the data needs and challenges is not to say that this effort is insurmountable, but rather, that affordability is multidimensional and complex. There are multiple opportunities for improving affordability efforts in the region, and here the goal is to highlight the opportunities to use data to spur progress towards energy affordability goals. By knowing the challenges, goals, and data opportunities the region can better design the solutions needed to ensure energy is affordable for every household.

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