The Winter of our Discontent – The Promise and Perils of Seasonal Heat Pump Rates

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ABSTRACT

Electric heat pumps are a key part of plans to decarbonize the building sector. However, under existing electric rate designs, adopting a heat pump may lead to bill increases for customers replacing gas heating, as gas is often cost-competitive with electric heating at prevailing electric and gas rates. This represents a barrier for heat pump adoption and thus for achievement of decarbonization goals.

Today, electricity is often priced above marginal cost, indicating there is room for alternative rate designs that better reflect underlying costs and could better support bill savings for heat pump customers. While there are many potential rate design options, seasonal heat pump rates are growing in popularity, with Maine and Massachusetts offering new seasonal heat pump rates and other states offering electric heating rates or electrification rates that can fall under a broad definition of seasonal heat pump rates.

Seasonal heat pump rates reduce the per-kWh price of electricity during winter months. The rates we have evaluated differ with respect to discount mechanism, technology eligibility, discount magnitude, and whether they incorporate other elements such as an increased fixed charge, an increased delivery rate in the summer, or time-of-use periods.

We review different seasonal heat pump rates and assess their benefits, primarily the reduction in operating costs for heat pumps, and disadvantages, such as concerns regarding fairness. We also consider long-term challenges for these rates as the grid shifts to winter peaking. We consider an example using customers in Massachusetts to illustrate some of these benefits and challenges.

Introduction

For decades, regulators and utilities developing residential electric rate designs have sought to balance often competing goals of supporting fairness, reflecting cost causation, promoting efficient use of electricity, and others (Bonbright 1988). For residential customers in many states, this has led to low fixed charges ($/month), high volumetric charges (c/kWh), and limited use of other rate components. As a result, residential volumetric rates often exceed the marginal cost of electricity supply and delivery, while fixed charges recover less than their cost-reflective level (E3 2025a). Larger users, such as commercial and industrial customers, often see more varied and complex rate offerings, reflecting the perception that these customers can better understand complex rate designs and manage usage accordingly.

The historical approach to residential rate design was aligned with a historical moment when fuel costs reflected a large share of electricity rates. Rates with high volumetric costs encouraged customers to conserve electricity, helping to reduce costs and emissions from fossil generation. However, today and looking forward, the cost structure of the electric system has changed dramatically, with growth in delivery costs (transmission and distribution) and an increasing share of system costs attributable to renewable generation and battery storage, alongside a decline in fuel costs. In addition, as states have adopted ambitious economy-wide decarbonization goals, high volumetric electric rates have emerged as a barrier to electrification, especially to building electrification for customers with natural gas heating.

To respond to this challenge, jurisdictions are exploring alternative rate designs that can better support the cost-competitiveness of building electrification. “Seasonal heat pump rates” have emerged as a popular design choice. These rates offer lower marginal pricing in the winter for customers using electricity as the primary heating source. These rates aim to improve the customer economics of building electrification, helping support winter bill reductions relative to default residential rates with high volumetric pricing.

Several recent studies have examined the role of alternative rate designs in improving heat pump cost-competitiveness. Sergici et al. (2023) find that, while all customers in their sample face higher operating costs under default electricity rates post-electrification, moving to more cost-reflective alternative rates results in net operating cost savings. Malinowski et al. (2025) find that winter electricity discounts are key to preventing bill increases in cold climates, in contrast to flat rates that increased bills for heat pump customers. Murray and Velez (2025) study seasonal discount rates and find that deeper discounts proposed by the Massachusetts Department of Energy Resources (DOER) could result in savings for 82% of homes. NEEP (2025) more broadly emphasize the need for modern rate design options in the Northeast, such as seasonal rates, time-varying rates, and fixed charge reforms, to align with policy goals and address affordability concerns.

However, as more customers adopt electric heating devices, especially in cold climates such as New England’s and potentially even warmer climates like California’s, electric reliability needs are expected to transition from the summer to the winter; Figure 1 shows the expected transition of the New England (ISO-NE) grid from summer- to winter-peaking by 2040.

This transition will lead to winter discounts becoming misaligned with the rate design goals of reflecting cost causation and promoting efficient use, as peak winter usage will increasingly drive the need for additional electric supply and delivery infrastructure. Regulators and utilities face a challenging path ahead: developing rates that encourage the adoption of efficient electric equipment in the near term, while ensuring that rates can evolve over time to reflect changes in the cost structure of the grid.

This paper contributes to this literature by cataloging different kinds of seasonal heat pump rates and examining their near- and long-term challenges, including equity concerns and the risk of policy lock-in as grids transition to winter peaking.

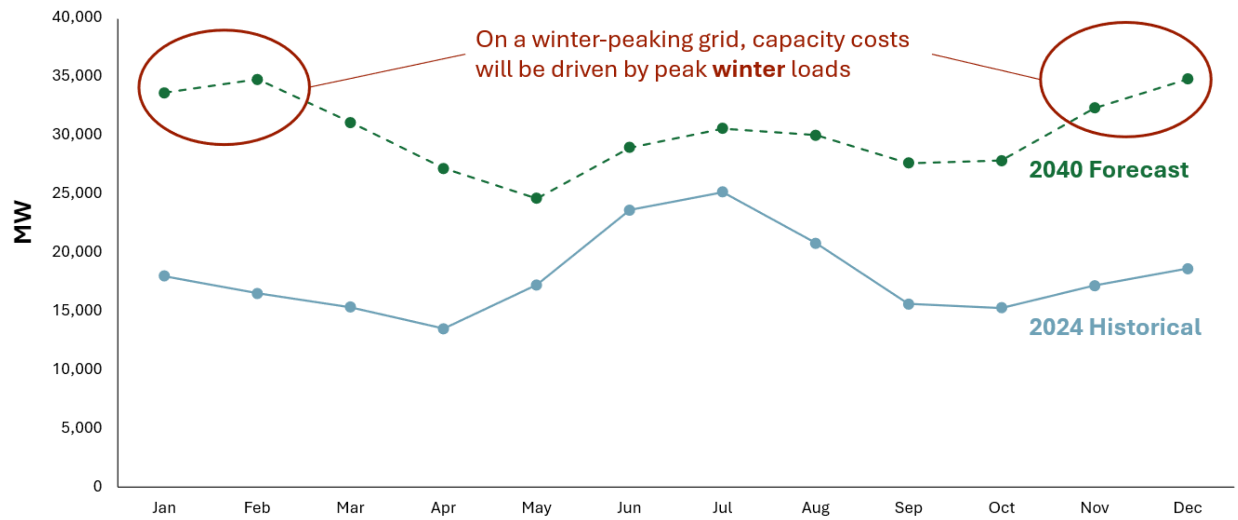

Figure 1. ISO-NE Monthly Peak Loads – 2024 Historical vs. 2040 Forecast (E3 based on loads from Synapse 2024)

Seasonal Heat Pump Rates

Table 1 provides a comparison of different approaches to seasonal heat pump rates, surveying a diverse set of rate designs under a broad definition of seasonal heat pump rates. All these rates provide lower marginal winter pricing than default rates, although they take different approaches. These rates vary across four dimensions:

1. **Technology eligibility**: While some utilities have restricted rate eligibility to customers with heat pumps, others have offered “electric heating” rates to customers that use electricity as the primary heating source, including both heat pumps and electric resistance. Others have developed “electrification rates” with eligibility open to customers with advanced electric devices such as heat pumps, battery storage systems, and electric vehicles.
2. **Mechanism of discount**: Seasonal heat pump rates can use different mechanisms to provide discounted marginal pricing in the winter. A flat discount reduces the per-kWh volumetric rate by a fixed amount for all household consumption during winter months. A tiered or declining block design instead applies lower marginal rates only to consumption beyond a specified monthly usage threshold, such that higher-usage customers (who are more likely to be heating with electricity) receive a lower effective marginal price on their incremental consumption. Time-of-use based discounts offer lower pricing during specific hours of the day, which can be targeted to common heating periods.
3. **Level of discount**: Table 1 illustrates a wide range in the magnitude of discount provided under different seasonal heat pump rates. For each rate, the marginal price in the winter is compared to the default residential rate. For TOU rates, the table considers an average

across the 24 hours of a winter day.[1] For declining block, the marginal price reflects the price from the highest tier of consumption (i.e., the lowest volumetric price).

4. **Balancing element**: Several of the rates listed offer “strict discounts,” *i.e.*, an identical rate structure except for the winter discount. Other rates offset decreased revenues from winter sales through increased customer charges, increased summer volumetric rates, and/or changes to time-of-use rates. These balancing elements can support fairness and reduce risks associated with cost shifts among customer groups; however, they may reduce the overall bill savings for heat pumps. While higher summer pricing would increase space cooling costs, these bill impacts may be partially or fully offset by the superior cooling efficiency of heat pumps relative to room air conditioning. Increasing fixed charges could also support reduced seasonal volatility in bills and could support a transition to longer-term rate designs, as described below.

Table 1. Example seasonal heat pump rates (broad definition)

Region - Utility	Discount Mechanism	Technology Eligibility	Winter Marginal Price Discount	Balancing Element
Massachusetts – National Grid, Eversource, Unitil “Heat Pump Rate” (DPU 2025a)	Flat discount on winter delivery rate	Heat pump customers only	~4 c/kWh (National Grid), ~5 c/kWh (Eversource); ~6 c/kWh (Unitil)	None
Maine – Central Maine Power (expired)[2] “Seasonal Heat Pump Rate” (CMP 2024)	Flat discount on winter delivery rate		~10 c/kWh	Higher fixed charge, higher summer pricing
Minnesota – Xcel Energy “Electric Space Heating Rate” (Xcel Energy 2025)	Flat discount on winter delivery rate	All electric space heating customers	~5 c/kWh	None
Maine - Versant “Home Heating Eco Rate” (Versant 2025)	Declining block in winter		~7 c/kWh	None
New York – Public Service Enterprise Group “Rate 580/D580” (PSEG 2025)	Declining block in winter		~5 c/kWh	None

[1] Under current summer-peaking rates, peak periods (e.g., 4-9pm under CA TOU rates) typically do not overlap with the highest space heating usage. However, if higher pricing is aligned with high heating hours, which could be the case under a cost-based TOU rate in a winter-peaking system, using an average price may underestimate bills.

[2] Replaced by “Electric Technology Rate”, which offers a lower volumetric rate year-round and a higher fixed charge to customers with electric vehicles, batteries, and heat pumps (CMP 2025).

California – Pacific Gas and Electric *("E-ELEC", PG&E 2025)*, Southern California Edison *("TOU-D-PRIME", SCE 2025)*, San Diego Gas and Electric *("TOU-ELEC", SDG&E 2025)*	Winter discount; removal of inclining block	Heat pump, battery, or EV customers	~7 c/kWh (PG&E); ~8 c/kWh (SCE); ~13 c/kWh (SDG&E)	Higher summer pricing, TOU changes (higher on-peak pricing)

Benefits and Challenges of Seasonal Heat Pump Rates – Massachusetts Example

Development of Seasonal Heat Pump Rates in Massachusetts

In 2024 and 2025, E3 supported the Massachusetts Interagency Rates Working Group (IRWG) in developing reports on near-term and long-term rate design strategies. Alongside each report, the IRWG developed a set of recommendations. One focus of E3's near-term report was a consideration of different potential rate design approaches to improve the cost-competitiveness of heat pumps. Informed by E3's report and stakeholder feedback, the IRWG recommended that the Department of Public Utilities (DPU) direct the state's electric distribution companies (EDCs) to develop optional seasonal heat pump rates with winter delivery rate discounts (IRWG 2025). By November 1, 2025, all three EDCs offered seasonal heat pump rates with discounts on winter volumetric delivery charges, restricted to customers with heat pumps.

The Massachusetts EDCs developed seasonal heat pump rates by assuming that an average customer, after adopting a heat pump, should still pay the same total winter costs for distribution. The rationale is that with a summer-peaking grid, adding winter load would not increase distribution costs. To do so, the utilities defined representative winter heat pump loads, added these loads to average residential loads, and then calculated the lower winter rate that would enable recovery of the same winter distribution costs as from a customer with gas heating. The rate approved for Eversource also includes a lower rate for transmission in the winter, following a similar approach.

All three EDCs were able to automatically enroll customers who purchased heat pumps through the state's Mass Save energy efficiency and electrification rebate program. This was possible because this implementation of seasonal heat pump rates guarantees savings to any customer who enrolls. This strategy enabled a rapid deployment of the new rates, with over 100,000 customers enrolled (Massachusetts 2025).

Methodology

Calculations in this section use the following assumptions:

- For alignment with E3's reports for the IRWG, we use a default residential rate of 33 c/kWh for National Grid, including basic supply. Rates today are a few cents higher.
- Aligned with National Grid's current pricing, the seasonal heat pump rate reflects a 4.23 c/kWh discount from November through April (National Grid 2026).

- Monthly loads for mixed-fuel and heat pump customers are from the Massachusetts Department of Energy Resources' (DOER) calculations in their petition to open an investigation into a seasonal heat pump rate (DOER 2025).
- To represent a renter with electric resistance heating, we model a smaller home with lower baseline usage and less efficient electric heating. To reflect smaller home size, we scale down the average mixed-fuel customer's demand, assuming 75% of non-heating electricity consumption and 75% of heating service demand. Because electric resistance heating is less efficient than a heat pump, we assume it uses 2.5 times as much electricity to deliver each Btu of heating service.
- Winter-peaking marginal cost-based rates are from E3's Long-Term Ratemaking Study (E3 2025b). For simplicity, we take the simple average of hourly pricing over the day from the time-varying rates designs in the study. Note that if higher pricing is aligned with high heating hours, which could be the case under a cost-based TOU rate in a winter-peaking system, bills may be higher than bills under the average price and therefore underestimated in this analysis.

Benefits of Seasonal Heat Pump Rates

Supporting heat pump cost-competitiveness. The key benefit of seasonal heat pump rates is that they reduce winter bills for heat pump customers relative to default rates. This reduction aims to better reflect the system cost impacts of adding incremental electric heating load during the current non-peak season (i.e., winter), which is lower than the default rates. This change supports the cost-competitiveness of heat pumps relative to natural gas and other heating fuels.

Figure 2**Error! Reference source not found.** shows the average winter electric bill (November through April) for illustrative customers of National Grid, reflecting National Grid's approved heat pump rate. While some stakeholders proposed reducing multiple components of the delivery rate in the winter, the DPU-approved rate only reduces the distribution charge, resulting in a 4.2 c/kWh discount in the winter.

Note that these figures only show the electric bill and do not include natural gas costs. For a more apples-to-apples comparison, the approximate cost of gas space heating ($200-250/mo, depending on the supply cost of gas) is shown for the mixed-fuel customer. Note that the cost of other gas consumption is not included here for any of the customers, and therefore the costs shown do not reflect an all-in energy bill.

On the default rate, adding a heat pump would increase this customer's winter electric bill by around $325/mo in the given example. Under the seasonal heat pump rate, the heat pump customer sees an electric bill increase of only $260/mo (or $65/mo savings relative to heat pump adoption under the default rate), improving the cost-competitiveness of heat pump adoption.

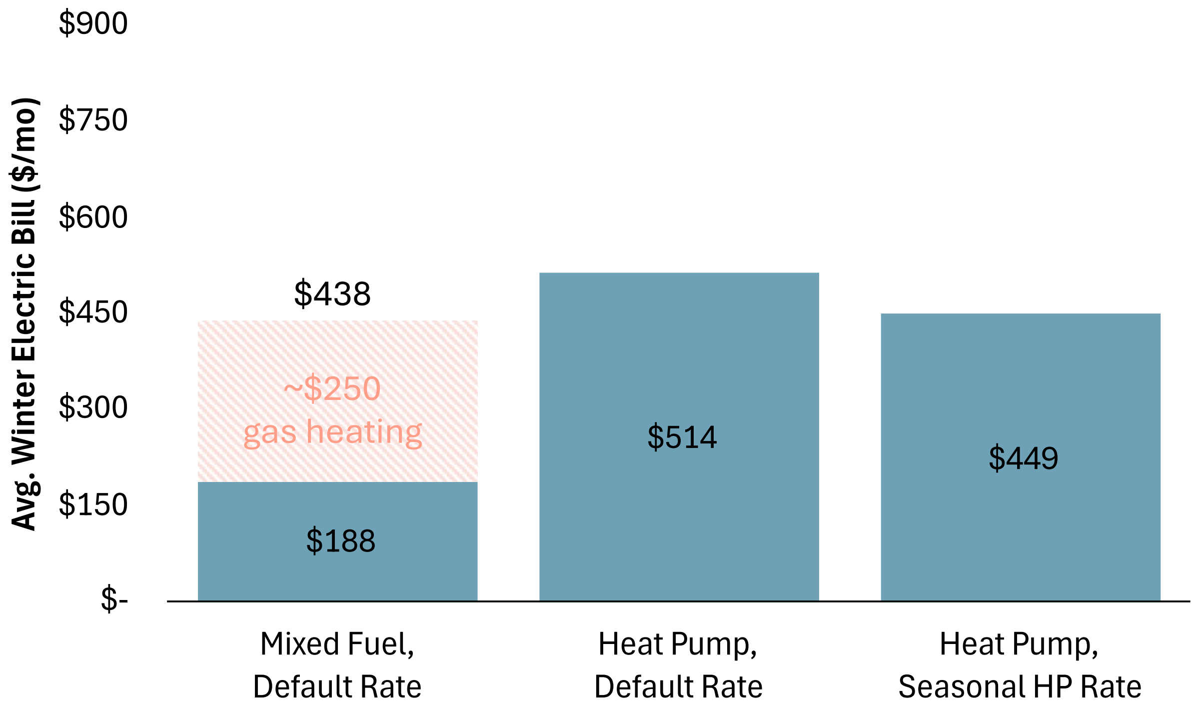

Figure 2. Heat Pump adoption can lead to adverse bill impacts under existing rates, while seasonal heat pump rates can support cost-competitiveness of heat pumps.

Ease of deployment. In Massachusetts, regulators and utilities were able to move quickly to develop seasonal heat pump rate offerings, as these rate offerings only affect a subset of customers and did not impact the default rate. Furthermore, because the Massachusetts rate offering provides a "strict discount," utilities were able to automatically enroll customers who received heat pump incentives through the Mass Save program and guarantee bill savings on the new rate.

Stakeholder acceptance. Technology-specific rates may face lower stakeholder opposition compared to changes to default rate structures, as non-participating customers do not see direct bill impacts nor changes in incentives (*e.g.*, for conservation). In Massachusetts, the IRWG's stakeholder process revealed stronger stakeholder support for technology-specific rates than for changes to default rates.

Challenges with Seasonal HP Rates

Seasonal heat pump rates face a mix of near- and long-term challenges. In the near term, there are key questions about affordability for electric resistance heating customers, as well as broader questions regarding fairness. In the long term, seasonal heat pump rates will face structural challenges as electric systems transition to winter-peaking conditions.

Electric resistance eligibility. As described above, a key question is whether customers with electric resistance heating should be eligible for seasonal discount rates. The economic rationale for seasonal heat pump rates – that default rates overprice electricity in the winter relative to system costs – applies equally to electric resistance heating as to heat pumps. The key argument for excluding electric resistance customers from seasonal discount rates is that making these customers eligible for lower pricing would reduce their incentive to invest in efficiency, such as through installing efficient heat pump equipment. However, excluding electric resistance customers can risk exacerbating affordability challenges. In Massachusetts, electric resistance heating is predominantly associated with low-income households and renters, who may not have the ability to install heat pumps and may face high energy burdens (E3 2025a). Figure 3 illustrates how an electric resistance customer could achieve bill savings under the National Grid seasonal HP rate, although they would not be eligible for that rate.

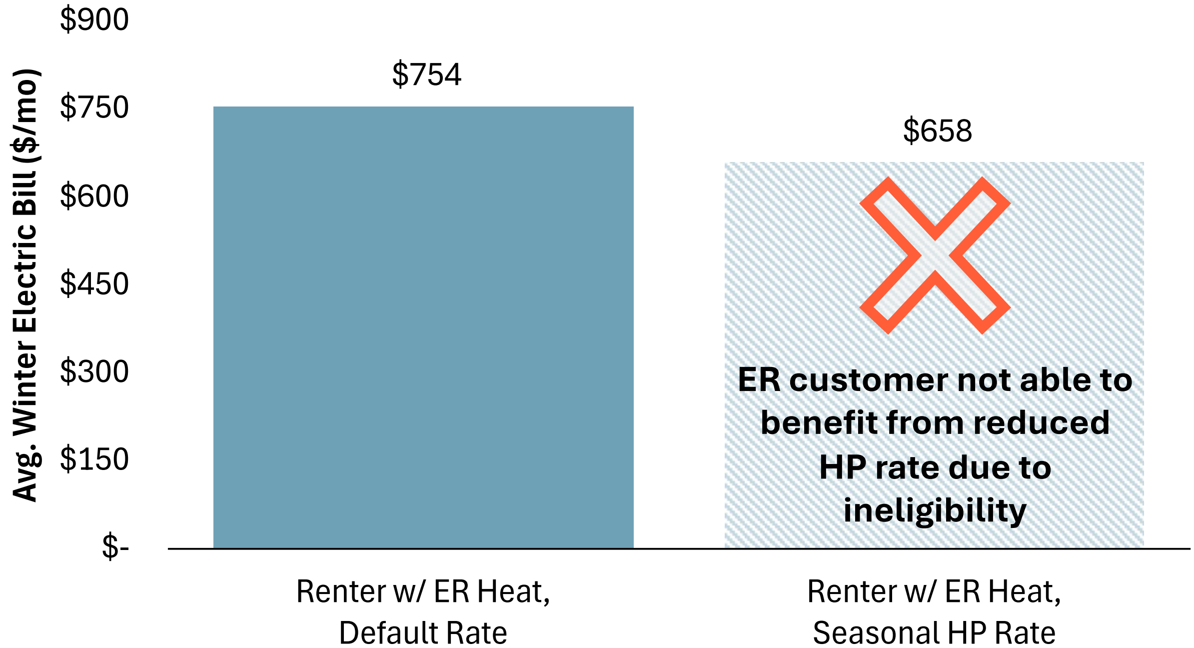

Figure 3. Excluding electric resistance customers from enrolling in seasonal heat pump rates may support conservation but imperils equity and affordability goals. The figure describes a renter, as we found that renters are relatively more likely to have electric resistance heat in Massachusetts.

Fairness. Aside from electric resistance customers, regulators and policymakers will have to grapple with the fairness of price discrimination among customer groups based on the adoption of one specific technology. This concern is distinct from the question of cost-reflectiveness: while seasonal heat pump rates may better align winter pricing with underlying system costs for heat pump customers, the fairness question here is whether it is equitable to offer those cost-reflective prices selectively; i.e., only to customers who have adopted a heat pump. Under seasonal heat pump rates, all household loads are subject to an alternative rate structure. Depending on the rate design, a seasonal heat pump rate may structurally benefit certain types of customers, such as large users, or may benefit any customer who is allowed to enroll in the rate. While climate policy goals may be a sufficient reason to pursue seasonal heat pump rates, regulators will need to consider whether it is fair to offer lower pricing to customers with specific technology types. As an example, a customer with an electric vehicle (EV) may pay $115/mo to charge their EV on the default rate. If they adopt a heat pump and can enroll in the seasonal heat pump rate, they could charge their EV for $100/mo in winter months. Is it fair that a heat pump is needed to receive lower pricing for EV charging? The same question can be asked regarding any other type of residential non-heating load, such as electric cooking or electric water heating.

Long-term durability and risk of policy lock-in. Seasonal heat pump rates are premised on the fact that, in many places, summer peak loads drive capacity needs on the electricity system. However, as heat pump adoption grows, the hours of the year that drive capacity need will increasingly occur in the winter. Even systems that do not see gross load peak in the winter may still see reliability conditions occur in the winter due to high net load (*i.e.*, load net of variable renewable generation such as wind and solar) on cold winter evenings when renewable output declines and heating demand is high. Once this change occurs, offering reduced winter pricing will risk misaligning customer price signals with underlying electric system costs. If customers with heat pumps pay less-than-average-prices but contribute more-than-average to utility marginal costs, then seasonal heat pump rates would shift costs onto other ratepayers. An additional challenge is that adapting to future conditions may be difficult once incentives become ingrained. While rates can in principle be adjusted through regular rate cases, reducing an established customer benefit can be politically challenging. For example, attempts to reform net energy metering have seen significant pushback across many jurisdictions, even where programs generate large cost shifts. Seasonal heat pump rates could face a similar challenge with near-term discounts at risk of becoming "locked in" and resistant to modification, even if future system conditions warrant changes. While customers could in theory retain legacy treatment for discounted pricing, costs would unfairly be shifted to other customers. Figure 4 illustrates the potential cost issue on a winter-peaking system.

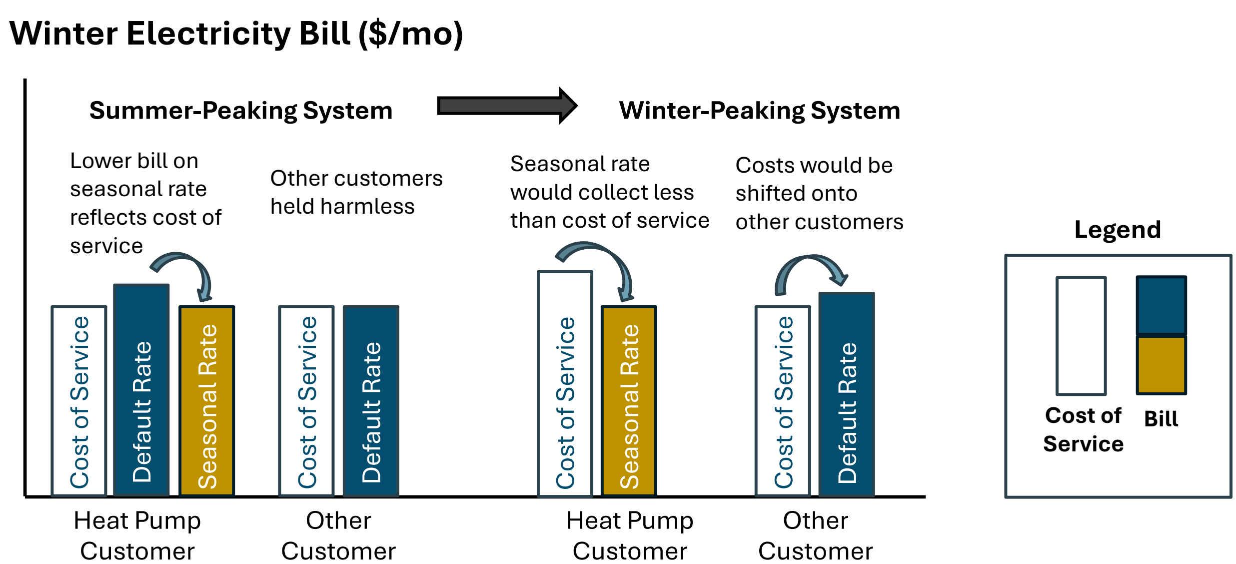

Figure 4. Illustration of the cost challenge with a seasonal heat pump rate after the transition to a winter-peaking system.

In a winter-peaking system, a cost-based electricity rate would have *higher* winter pricing, posing long-term challenges for how to retain cost-effectiveness of heat pumps. Figure 5 shows the average winter electric bill rising under a winter-peaking rate. This figure shows the average over November through April, though costs would be higher in the coldest months.

In the long-term rate design study, we found that reducing overall volumetric rates is a key strategy for maintaining affordability of heat pumps under the transition to a winter-peaking grid (E3 2025b). One way to reduce volumetric rates is to shift cost recovery to other bill components, for example by increasing customer charges, ideally income-based to manage impacts on low-income customers, and/or through demand charges. Another way to reduce volumetric rates is to shift the funding of certain public policy programs (e.g., energy efficiency and renewable energy programs currently funded through volumetric riders) to other funding mechanisms outside of rates and/or securitizing utility costs with funding from non-ratepayer sources.

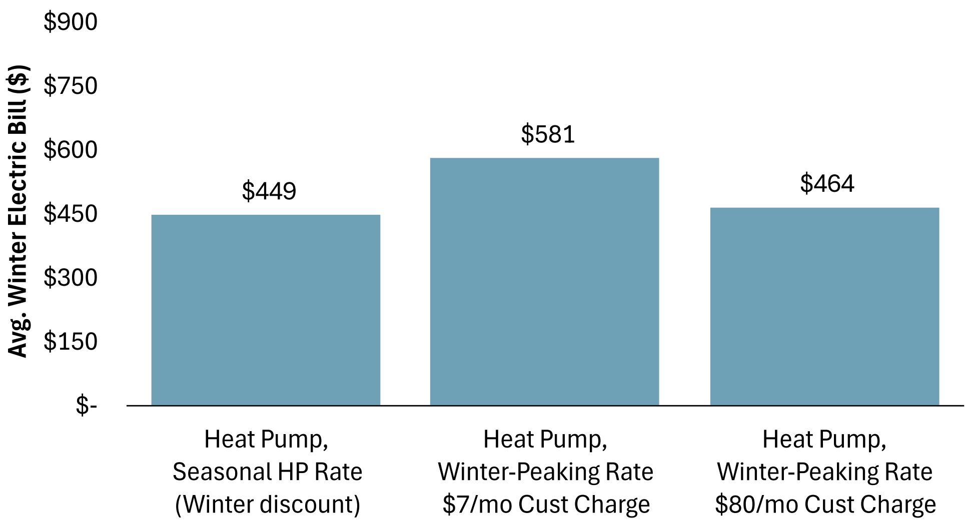

Figure 5. In the long term, cost-based electric rates may lead to higher bills for electric heating customers. This can be managed to some extent by reducing overall volumetric pricing, e.g., through an income-based fixed charge.

Seasonal Heat Pump Rate Risk Mitigation Strategies

Utilities and regulators can work to mitigate the challenges outlined above by building in rate design elements that balance winter discounts and by transparently signaling a rate transition plan to customers. In addition, other rate design approaches could support building electrification, as described below.

Building in balancing elements: Rate designs aimed at heat pump customers benefit from clearly tying rate design to the costs of serving customers with heat pumps relative to that of remaining customers. Balancing elements, such as higher summer pricing and high customer charges, can help support fairness by developing a structure that is not uniformly a discount and can enable opening these rate designs to more customer groups while limiting concerns regarding cost shifting. This approach has challenges, as balancing elements may reduce bill savings, either overall or for specific customer types. As two examples, higher fixed charges would limit savings for low usage customers and higher summer pricing would limit savings for high air conditioning users. In addition, rates with balancing elements may not be able to be rolled out automatically, as was done in MA, if they cannot ensure bill savings for all customers who enroll. As another benefit, Figure 5 illustrates that higher fixed charges can help mitigate bill impacts for heat pumps under a transition to winter-peaking rates.

Transition glide path: To mitigate policy lock-in, it may be helpful to signal from the outset that seasonal discounts may not persist forever. This could include developing a clear transition plan or glide path to decreasing the winter discount, informed by observed seasonal peak demand trends. A transition plan or glide path would help ensure that these rates continue to adhere to underlying system costs.

Other Rate Design Levers to Support Building Decarbonization

Besides innovative rate design for heat pump customers, other options can support the cost-competitiveness of building electrification. Other potential options include changes to default electric rates, changes to gas rates, and end-use specific pricing. Each of these approaches has its own potential concerns.

Changes to default electric rates: Modifying default rates to reduce overall volumetric pricing can improve the cost-competitiveness of heat pumps and better align pricing with underlying system costs. These changes can also reduce seasonal energy bill volatility, especially as customer electric usage patterns change over time through heat pump adoption. However, increasing fixed and/or demand charges will affect bills and price signals for all customers and thus will raise political challenges as well as important concerns regarding unintended outcomes. As one example, California has introduced income-based fixed charges that reduce volumetric rates by 5-7 c/kWh across the large IOUs, significantly improving the customer economics of electrification. Although this change includes protections for low-income customers, it may increase bills for low-usage customers who are not enrolled in low-income programs. Shifts like this may be politically challenging even if aligned with fair cost recovery.

Changes to gas rates: Reflecting the cost of environmental externalities and/or emission abatement costs in gas rates would provide a clear signal to customers to shift away from gas equipment. Carbon taxes, cap-and-trade programs, and clean heat standards are three example policies that have been used to fund decarbonization investments and other social goals while increasing pricing for fossil fuels. Although these approaches can help improve cost-competitiveness for electrification, they often face political headwinds and raise concerns about energy affordability not only for all gas customers in the near term, but even more in the long run for customers with limited ability to change their heating equipment.

End-use specific rates: End-use specific rates describe rates offered exclusively for the electricity usage corresponding to certain technologies such as heat pump equipment. End-use specific rates would enable utilities to offer lower pricing for heat pumps, potentially as low as marginal cost, without changing rates for other home loads. This approach could also be used to offer dynamic pricing for flexible and automatable loads such as electric vehicle charging. A key challenge is that requiring sub-metering may lead to enrollment challenges due to the costs associated with revenue-grade submetering equipment. This type of challenge has already been observed for a set of EV-specific rates of the California IOUs as well as for Unitil Massachusetts' opt-in TOU rate (Unitil 2024). Other utilities have been successful in offering end-use specific rates using telematics data from electric vehicles and chargers rather than separate metering equipment. (Baltimore Gas and Electric 2026). A separate concern with end-use specific rates is that the approach implicitly accepts status quo rates for other home loads, potentially foregoing an opportunity for broader rate reform that could better align electricity pricing with policy goals.

Conclusion

Seasonal heat pump rates are a promising policy option to promote building electrification. Different jurisdictions have approved a range of seasonal heat pump rates with differences in discount mechanism, technology eligibility, discount magnitude, and balancing mechanisms. Regulators and utilities will need to consider strategies to manage near-term concerns regarding fairness and long-term concerns regarding durability and policy lock-in.

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AI-assisted tools used: OpenAI ChatGPT, Microsoft Copilot
Used for: research, editing.
Extent: organizing outline, citation research, organizing citations.
Human review: The authors reviewed and verified all content, calculations, and citations.