MASSACHUSETTS INTERAGENCY RATES WORKING GROUP

A Collaboration to Advance Near- and Long- Term Rate Designs that Align with the Commonwealth's Decarbonization Goals

LONG-TERM RATEMAKING STUDY DRAFT PRESENTATION – OCTOBER 28, 2024

AGENDA

I. IRWG Introduction & Background (15 minutes)

II. Presentation from E3 (45 minutes)

III. Public Comment (30 minutes)

CONTEXT & PURPOSE OF IRWG'S WORK

- Existing electric rates jeopardize the Commonwealth's clean energy goals as they remain a barrier to building and transportation electrification
- Massachusetts Interagency Rates Working Group (IRWG) was formed to **advance near- and long-term electric rate designs that align with the Commonwealth's decarbonization goals** by prioritizing the reduction of energy burden while incentivizing transportation and building electrification
    - Includes representatives from the Executive Office of Energy & Environmental Affairs (EEA), the Massachusetts Clean Energy Center (MassCEC), the Department of Energy Resources (DOER), and the Attorney General's Office (AGO)
    - The IRWG will determine appropriate next steps to support implementation; IRWG member organizations intend to advocate for implementation of electric rate designs aligned with their recommendations

IRWG OBJECTIVES

- **Near-Term Rates Strategy** to address barriers to near-term electrification through rate design offerings available before electric consumers receive advanced metering infrastructure (AMI) meters.
- **Long-Term Ratemaking Study** to present a vision and recommendations for advancing ratemaking mechanisms and rates for a decarbonized energy system and the associated technologies and capabilities available.
  - **Regulatory and ratemaking mechanisms** that:
    - incentivize least-cost distribution system upgrades as the Commonwealth seeks to achieve its Clean Energy and Climate Plan targets through 2050;
    - incentivize improved grid reliability, communication, and resiliency; and
    - promote DER and generation for decarbonization;
  - **Rates** that:
    - accommodate transportation and building electrification, in addition to new loads
    - provide appropriate price signals, including to effectuate load management; and
    - minimize or mitigate impacts on ratepayers, especially low- and moderate-income ratepayers.

PURPOSE OF LONG-TERM RATEMAKING STUDY

- **Rate Design**
  - Review of potential rate design options in Massachusetts with the deployment of advanced metering infrastructure (AMI)
- **Regulatory & Ratemaking Mechanisms**
  - Review of existing regulatory and ratemaking mechanisms in the Commonwealth, with attention to barriers to decarbonization and affordable electrification
- The Long-Term Ratemaking Study, and the IRWG's accompanying recommendations will provide a vision for advancing ratemaking to achieve a decarbonized energy system.

IRWG PROCESS

I. Near-Term Rates Strategy (May – Dec)

- Collect stakeholder feedback (May-June)
- E3 presents Near-Term Rates Strategy Draft Report (Aug 12)
- Collect stakeholder feedback on Near-Term Rates Strategy Draft Report (Aug)
- IRWG member organizations draft Near-Term Rates Strategy Recommendations (Aug-Dec)

II. Long-Term Ratemaking Study (Oct – Dec)

- Collect stakeholder feedback (Sept)
- E3 presents Long-Term Ratemaking Draft Study (Oct 28)
- Collect stakeholder feedback on Long-Term Ratemaking Draft Study (Oct-Nov)
- IRWG member organizations draft Long-Term Rates Study Recommendations (Oct-Dec)

III. Interagency Rates Working Group Recommendations (Dec 31)

- IRWG releases Near-Term Rates Strategy and Long-Term Ratemaking Study (E3) and accompanying Recommendations (IRWG member organizations), to include appropriate next steps to advocate for implementation of its recommendations in the Commonwealth

STAKEHOLDER ENGAGEMENT OPPORTUNITIES

IRWG will release recommendations at the end of the year; please register for engagement opportunities at IRWG's website

OCTOBER

M	T	W	TH	F
	1	2	3	4
7	8	9	10	11
14 Indigenous Peoples Day	15	16	17	18
21	22	23	24	25
28 E3 Presentation of Draft Long-Term Ratemaking Study (LTRS)	29	30	31	

NOVEMBER

M	T	W	TH	F
				1 DG/DER Workshop (LTRS)
4	5 EDC/MLP/ Supplier Workshop (LTRS)	6	7 Consumer & Advocacy Workshop (LTRS)	8
11 Veterans Day	12	13 Synthesis Workshop (LTRS)	14	15 Public Comment Due on LTRS Deck
18	19	20	21	22
25	26	27	28 Thanksgiving Day	29

INCORPORATING ENERGY JUSTICE

- Following feedback from stakeholders, the IRWG hired Peoples Energy Analytics, led by Dr. Destenie Nock, to incorporate expertise on energy justice into the studies and recommendations
- Dr. Nock will advise on the E3 analytical results, including how low-income, racial, and other vulnerable groups may be differently impacted, and create a supplemental report on research findings of how changes in electric rates impact differential energy usage patterns and energy poverty outcomes

Dr. Destenie Nock, Peoples Energy Analytics

- Dr. Destenie Nock is a Professor of Engineering and Public Policy and Civil and Environmental Engineering at Carnegie Mellon University.
- Dr. Nock is a leader in energy justice, environmental justice, sustainable energy transitions, and the energy-poverty-climate change nexus. She has pioneered new measures of energy poverty to help utility companies identify vulnerable populations and energy deficits (i.e., energy limiting behavior and forgone thermal comfort).
- Dr. Nock is the Chief Executive Officer of Peoples Energy Analytics, a data driven company which uses energy analytics to identify energy poverty in vulnerable households.

MASSACHUSETTS CLEAN ENERGY CENTER

DOER Massachusetts Department of Energy Resources

INTRODUCTION TO E3 PRESENTATION

- IRWG is requesting feedback on the **Long-Term Ratemaking Study Draft** presented by E3
- Feedback will inform the Long-Term Ratemaking Study prepared by E3
- The IRWG is hosting a workshop series to engage in dialogue with and between stakeholders on the draft Report
- **Written comments on the Long-Term Rate Strategy Draft Report are due by November 15, 2024 to give sufficient time for consideration and should be sent to Rates.WG@mass.gov**

Interagency Rates Working Group Study

Long-Term Ratemaking Report

October 2024

Dr. Andrew DeBenedictis
Dr. Ari Gold-Parker
Vivan Malkani
Paul Picciano
Brendan Mahoney

Energy+Environmental Economics

Outline

+ Study Context
+ Changing Electric System in 2030s and Beyond
+ Time-Varying Rates (TVR)
+ Ratemaking in the Future
+ Conclusions

Study Context

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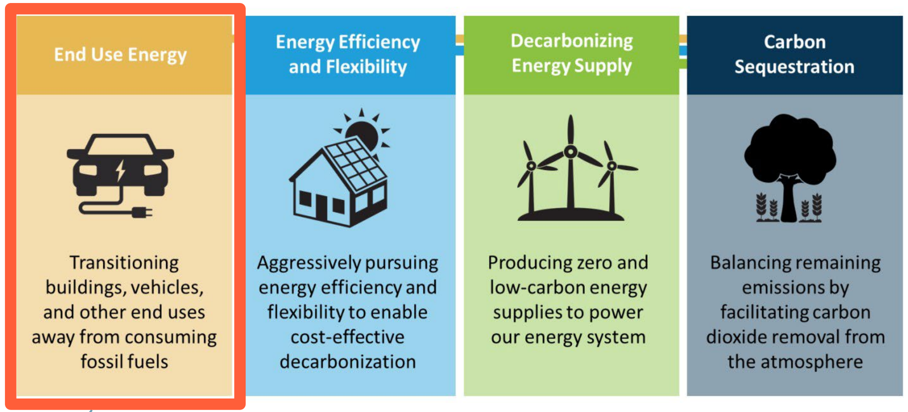
Electrification required to achieve the Commonwealth's decarbonization mandate may worsen affordability under current rates

+ High electric rates are generating concerns for electrification and energy affordability

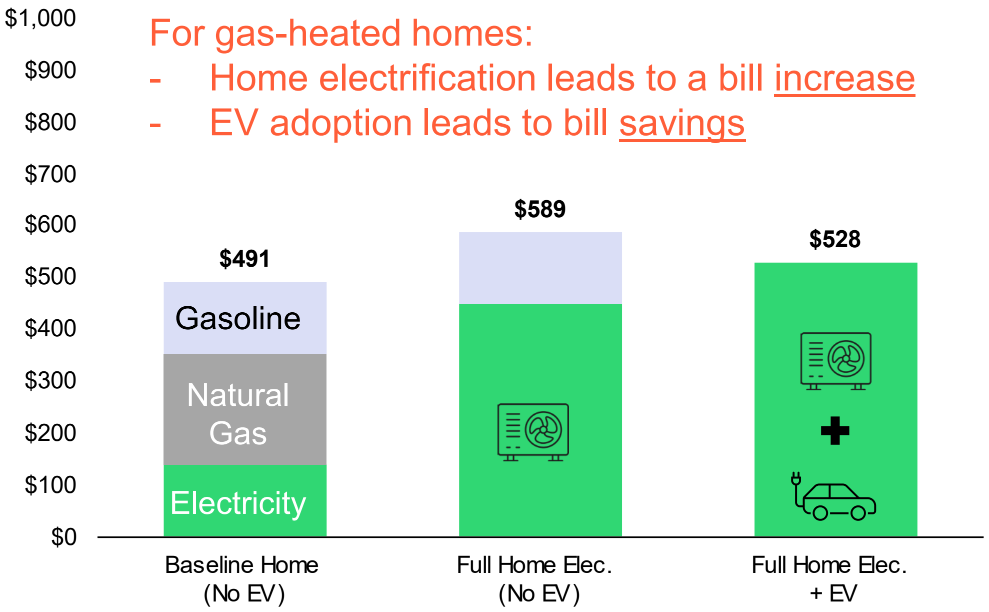
- *Decarbonization goals*: we will not achieve needed levels of electrification if it leads to bill increases
- *Equity goals*: policymakers and regulators must ensure that electrification supports affordability



2030 statutory greenhouse gas reduction limits:
Transportation: 34%
Residential heating and cooling: 49%
Compared to 1990 levels

+ Electrification under today's rates mostly leads to lower bills for electric resistance, propane, and fuel oil customers, but not customers with natural gas heating

Monthly Avg. Energy Expenditure *(incl. Vehicle Use)*
Example modeling for a 1700 sqft natural gas heated home
($/mo)



Key research questions explored in this report

1. **What are the anticipated drivers of electric system cost growth?**
2. **What is the range of rate options under “TVR” (time-varying rates), and what are best practices in designing TVR to reflect avoidable system costs?**
3. **How can TVR provide price signals to enable customer flexibility and efficient dispatch of distributed energy resources?**
4. **What are alternative regulatory approaches to traditional cost-of-service ratemaking that could supplement those already in place in the Commonwealth?**
5. **Could certain components of today’s electricity rates be shifted to non-ratepayer cost recovery to better support decarbonization and affordability?**

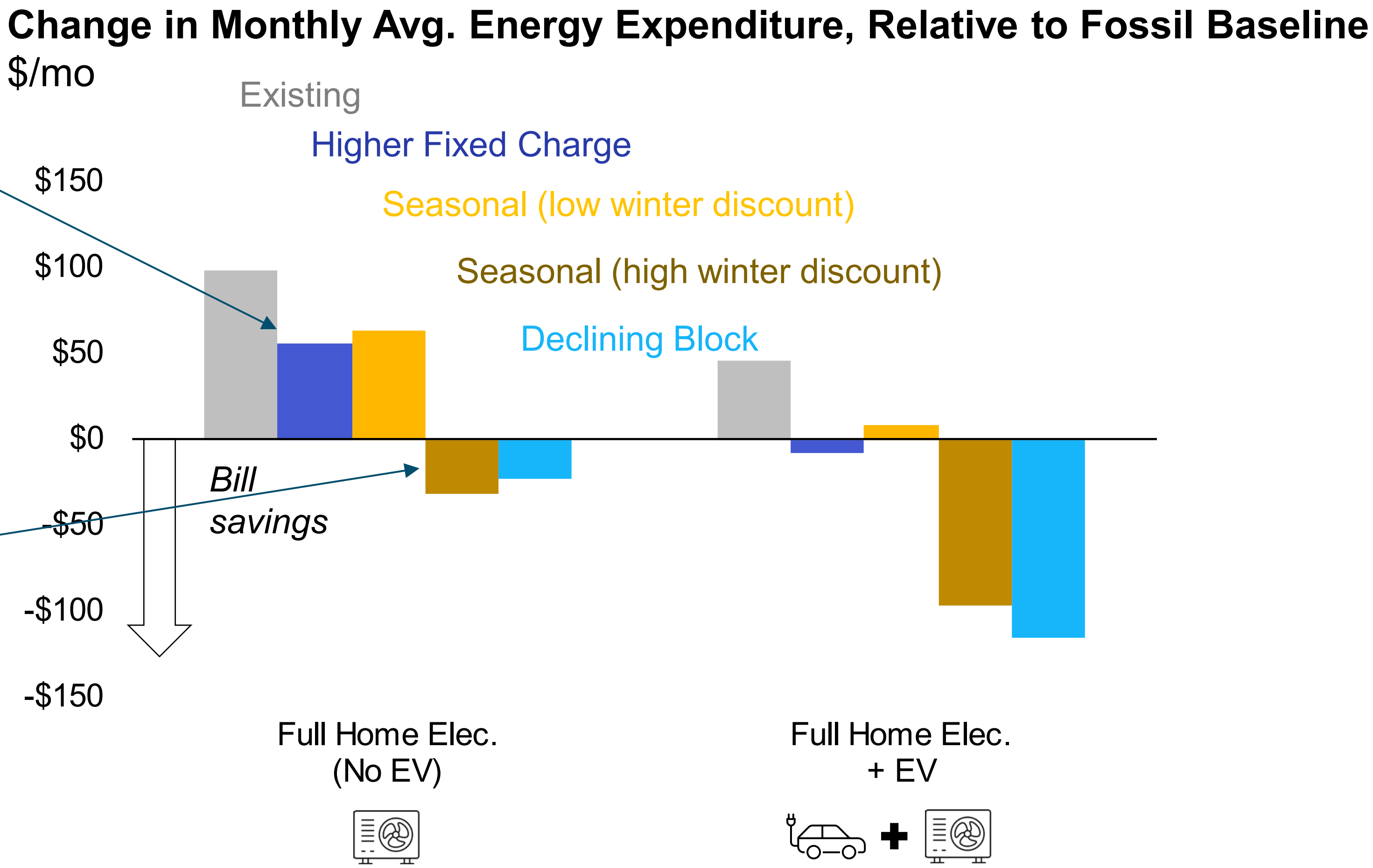
Key Takeaway from Near-Term Study: Winter heating discounts can improve the price signal for electrification in the near-term

Shifting policy and embedded delivery costs out of volumetric rates to fixed charges would reduce bills for electrifying customers

- Income-graduation would help protect low-income, low-usage customers

Winter heating discounts would unlock significant bill savings for customers adopting heat pumps

- This approach would need to be phased out as this electric system shifts to winter peaking in the early- to mid-2030s



Changing Electricity System in 2030s and Beyond

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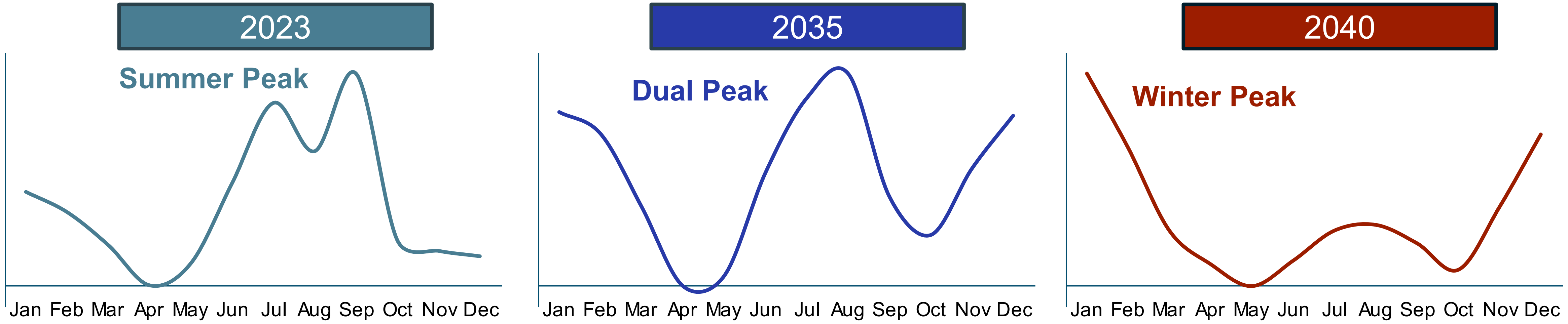
System costs will change over time, and rates will need to evolve accordingly

+ Rate design will need to adapt to a changing electric system

- Today's electric peak is driven by summer air conditioning demand. However, in the future, the system is expected to see *winter* peaks driven by electrification of space heating.
- The timeline for this transition is uncertain and will depend on the pace of building electrification adoption.
- Consumers will need to be prepared for evolving electric rates that reflect shifts in electric system costs.

Normalized Annual Net Load

from ISO-NE 2023 data and Charging Forward: Energy Storage in a Net Zero Commonwealth, Dec 2023



Electricity costs in the future will be driven by the need for asset replacement, grid upgrades, and decarbonizing electricity generation

Utility revenue requirements will increase over time as extensive ongoing and planned capital investments hit rates:

Grid modernization will require replacing and improving infrastructure to serve existing load

- Costs associated with continuing to provide safe and reliable service through replacing and upgrading substations, distribution lines, grid hardening, etc.

Electrification of transportation and heating is expected to drive incremental peak load growth

- Increasing peak loads will necessitate additional generation capacity, as well as investments in the transmission and distribution systems

New generation and transmission investments are needed to support clean electricity goals

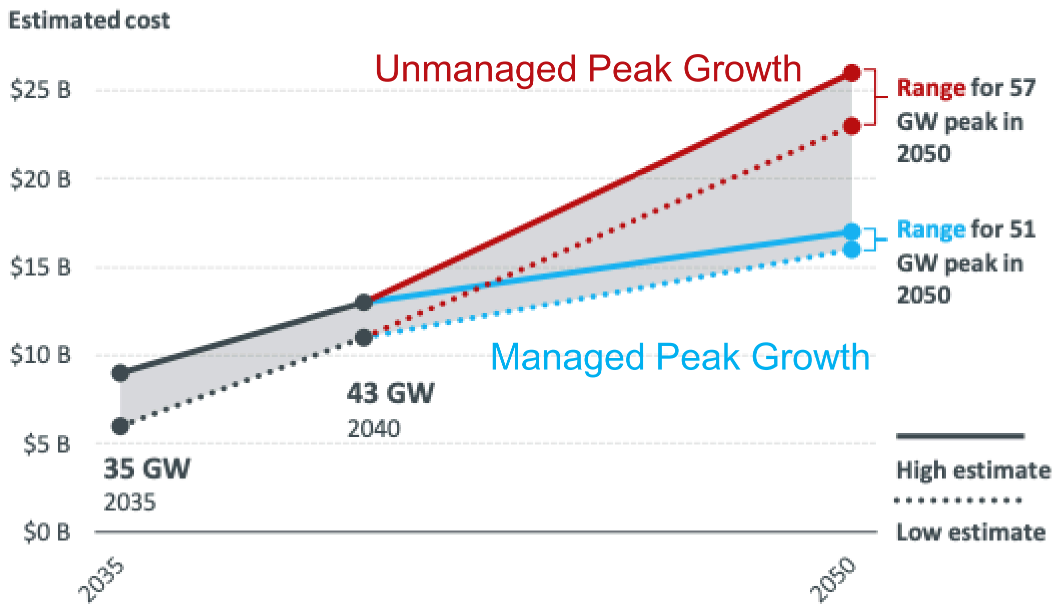
- Decarbonizing the Commonwealth's electricity supply while maintaining reliability will entail significant deployment of new, clean energy resources and expanded transmission capacity

Substation icon created by Fahmi Hidayat, the Noun Project

Electrification will increase loads, but the extent to which it increases costs will depend on our ability to manage loads

ISO-NE Transmission Cost Savings from Peak Reduction

ISO-NE 2050 Transmission Study



$7-10B potential transmission cost savings alone by limiting peak load growth, with significant additional savings from avoided generation capacity, distribution system costs, and energy costs.

- **Electric sales are expected to grow in the long term, which will to some extent mitigate pressure on rates**
- **Peak load management will be crucial to limiting the required electric system buildout and associated expense from electrification**
- **Some end uses will be more flexible than others:**
  - EV loads and behind-the-meter batteries will be highly flexible
  - Water heating and low-kWh loads may provide some flexibility with enabling technologies
  - Space conditioning loads will likely have more limited flexibility

Time-Varying Rates

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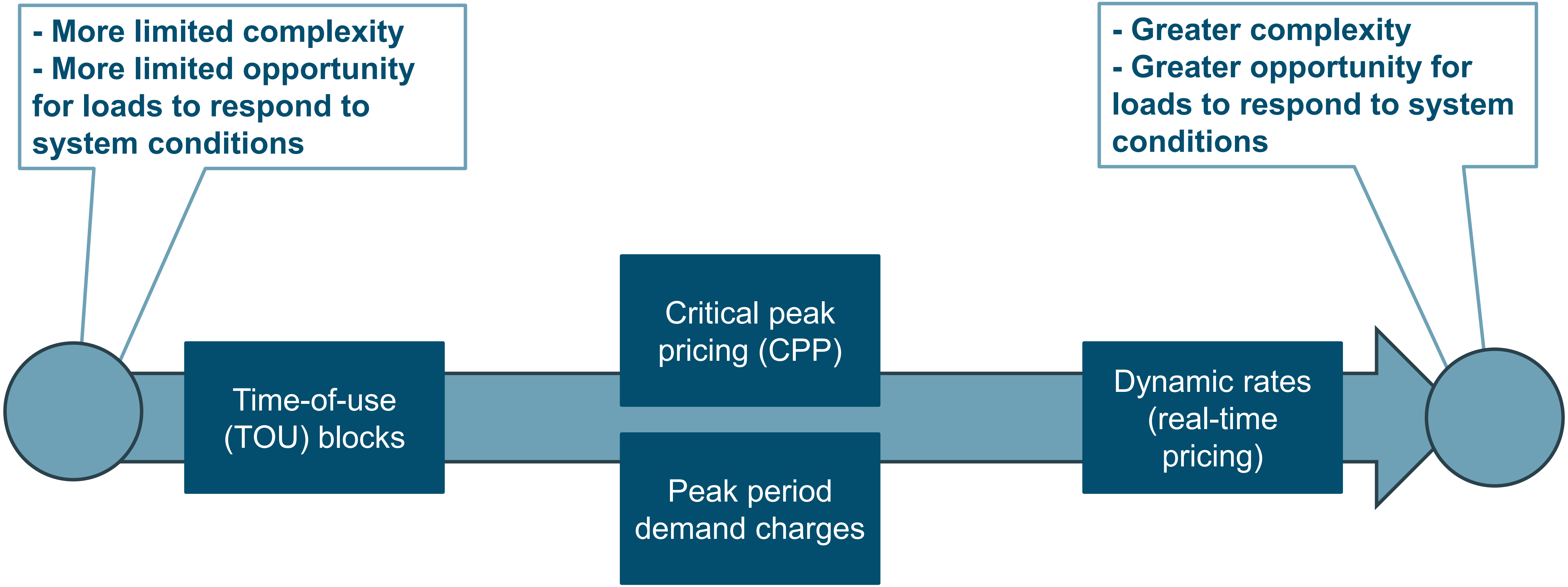
Time-varying rate designs will have tradeoffs between complexity and opportunity for economic load response



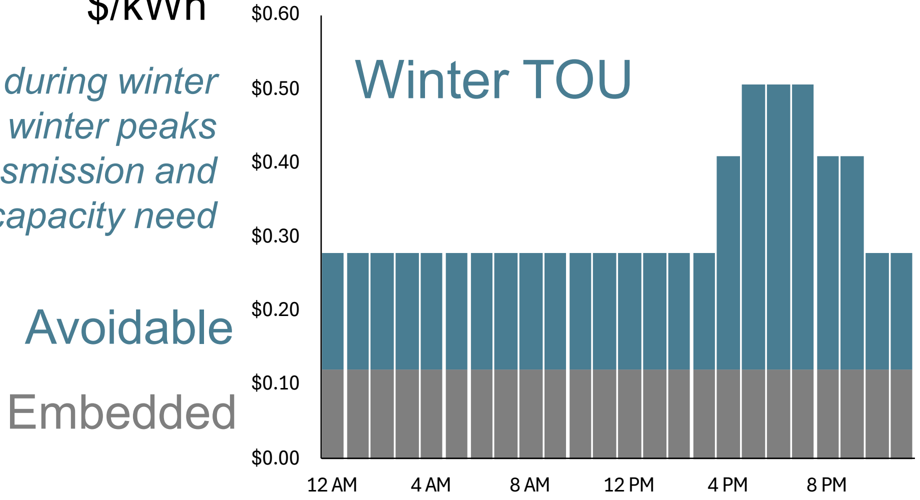
Time-of-use rates are the most common implementation of "time-varying rates"

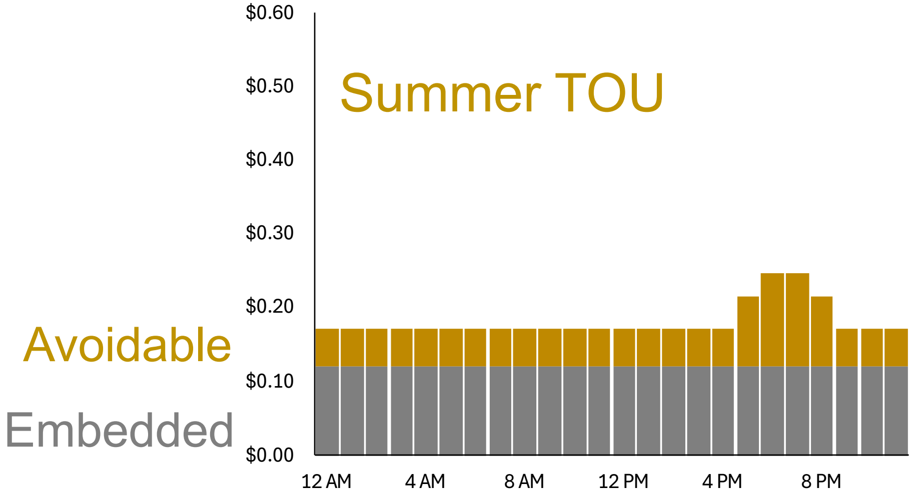
- **Time-of-use rates provide pre-determined pricing that varies by time-of-use "periods"**
- **These rates have two primary objectives:**
  1. **Encourage customer response:** Encourage customers to reduce consumption during peak hours by shifting usage into off-peak periods
  2. **Support fairness**: Bill customers in a way that is more aligned with underlying system costs
- **In a "cost-based" TOU rate, the differences between peak and off-peak pricing would reflect differences in avoidable system costs**
  - In practice, peak vs. off-peak ratios are often designed by balancing demand elasticity (larger ratios) vs. perceived customer preferences (flatter)
  - Note that cost-based rates would price winter heating at a high rate in the future

Illustrative 2035 TOU Residential Rate*

$/kWh

Higher costs during winter as rising winter peaks drive transmission and generation capacity need



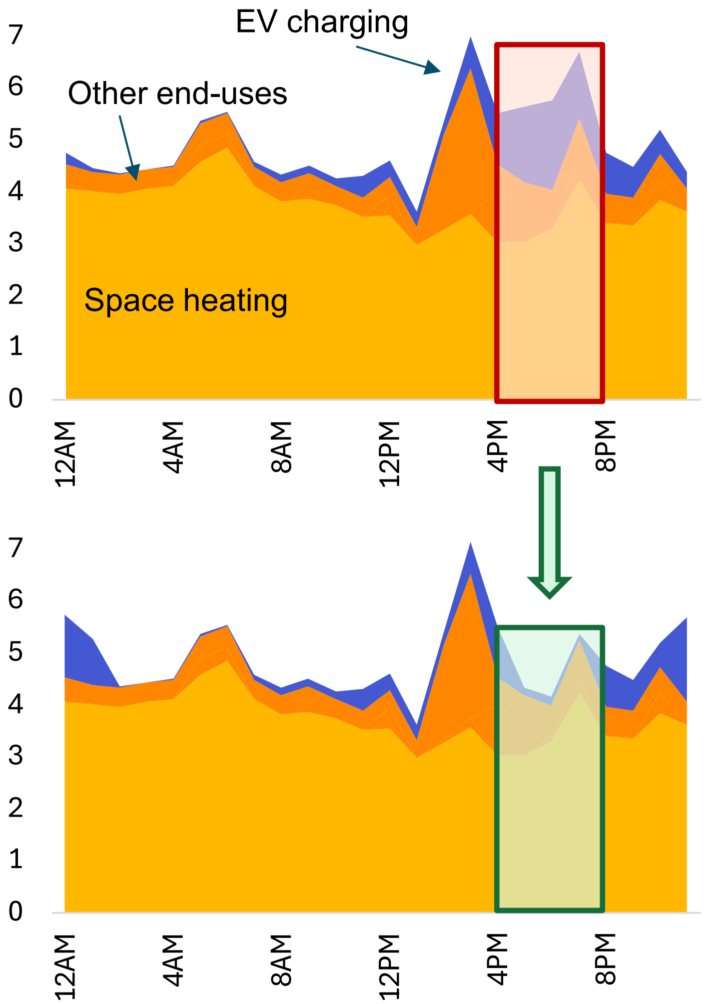


Assuming $40/month fixed charge for policy costs

Different end uses may have vastly different degrees of flexibility

- **EV load flexibility presents the clearest opportunity for peak load reduction**
- **Space heating and cooling may be less flexible, especially during extremely hot or cold events that drive system peak**
  - This underscores the importance of technologies that can reduce peak impacts from space conditioning such as building shell measures, ground-source heat pumps, storage, and others
- **TVR will lead to increased bill volatility for customers with inflexible loads**
  - An opt-in approach could be used to protect vulnerable customers
    - E.g., California automatically transitioned most residential customers to opt-out TOU except for low-income customers in hot climates
  - However, opt-in rates will have reduced system benefits if they see low enrollment

Daily Energy Consumption, coldest day of 2035
kWh/day

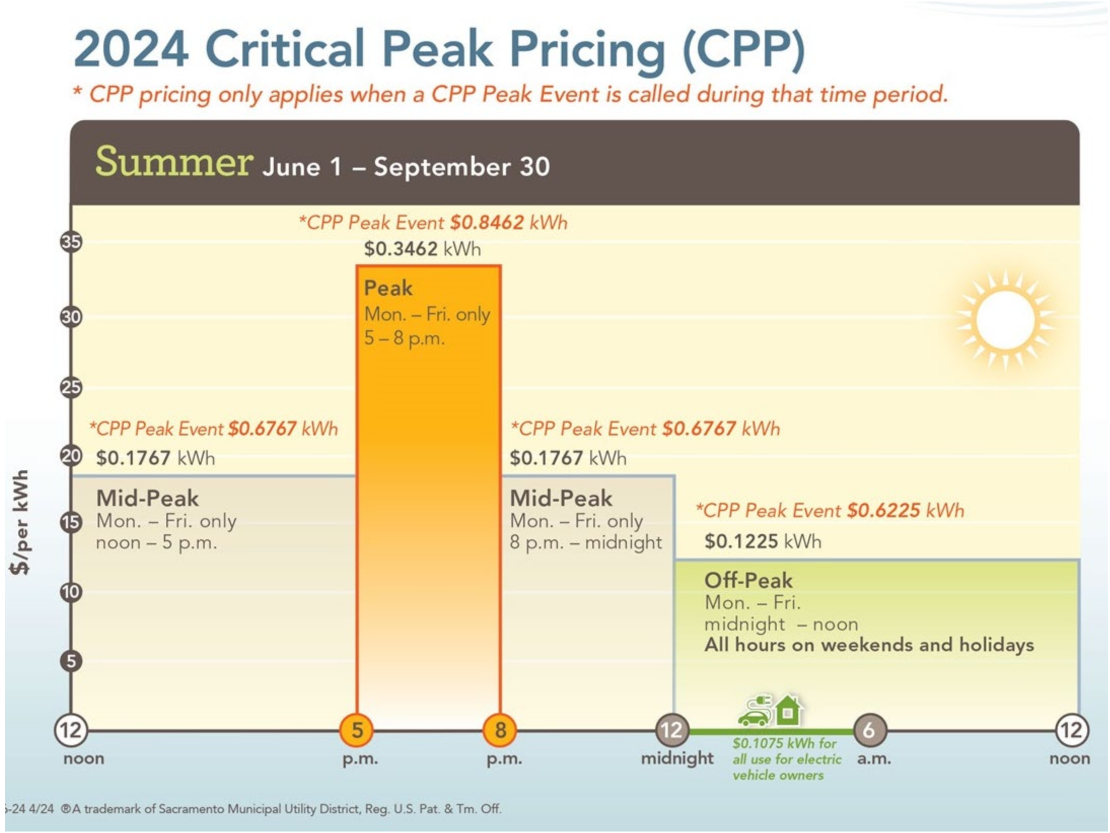


Unmanaged EV charging

24% peak period kWh reduction through shifting EV charging later

Critical peak pricing (CPP) can provide further opportunity to reduce peak demand during key hours of the year

+ **CPP is an important next step in providing more granular price signals to reduce peak demand**
  - CPP aims to incentivize behavioral response on the most challenging days of the year for the grid
+ **CPP provides customers with a trade:**
  - A small discount over many hours of the year
  - Dramatically higher pricing during a limited set of hours
+ **The Sacramento Municipal Utility District (SMUD) has an instructive pilot:**
  - 2c/kWh savings during all summer off-peak and mid-peak
  - 50c/kWh additional charge during CPP calls, which are 1-4 hours long and limited to 50 hours total per year
  - Customers are informed of a call on the prior day



https://www.smud.org/Rate-Information/Residential-rates/Critical-Peak-Pricing

+ **Flexible customers may see savings, but CPP may lead to higher bills for inflexible customers**
  - For this reason, it is often offered as an opt-in program today,
  - As flexible loads become more common, it could potentially be part of a default rate in the future

How do demand charges fit in?

NCP (Non-Coincident Peak) demand charges

+ **NCP demand charges measure a customer's maximum monthly usage, regardless of when it occurs**
  - These charges are generally used to recover embedded distribution system costs in a way that is reflective of cost causation
  - These costs are generally *not* designed with the goal of avoiding forward-looking costs
+ **Where these fit into ratemaking:**
  - NCP demand charges are designed to be difficult to bypass, to scale with customer size, and to have a clear tie to cost causation
  - Where accepted by customers and stakeholders, these charges can be a useful rate component to recover embedded costs

"Peak period" demand charges

+ **"Peak period" demand charges measure a customer's maximum usage *during pre-specified peak hours***
  - Alongside time-of-use rates, these charges are meant to provide an additional signal to reduce peak loads during hours that are anticipated to be costly or difficult for the electric system
+ **Although serving a similar role, critical peak pricing may be a better tool to achieve load reductions during hours of system need**
  - CPP may be easier for customers to understand than peak-period demand charges
  - CPP targets *specific days* when the system is stressed (e.g., up to 20 days), rather than a pre-determined set of days (e.g., all weekdays June through September)

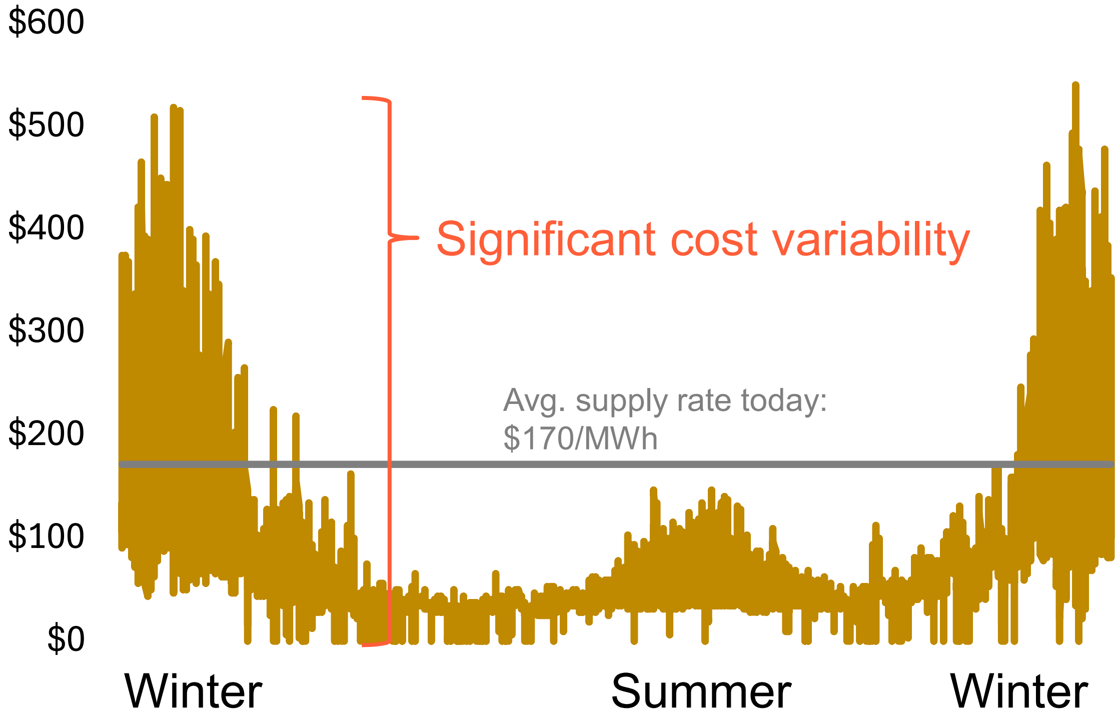
"Real-time pricing" provides the most granular price signals

- **Real-time pricing, or "dynamic rates," provides customers with hourly or subhourly pricing based on dynamic system costs**
  - Although this design could lead to highly efficient customer response, it would also lead to extremely high bill volatility for customers
  - Thus, it is premature to expose residential customers to RTP at their primary meter
- **Two promising ideas for RTP pilots:**
  1. Pilots designed specifically for highly flexible end uses, such as EV charging
  2. Pilots for flexible and sophisticated non-residential customers, who may already hedge their exposure to daily gas prices

2035 Wholesale Energy Prices

Incl. Generation Capacity and Transmission Costs

$/MWh

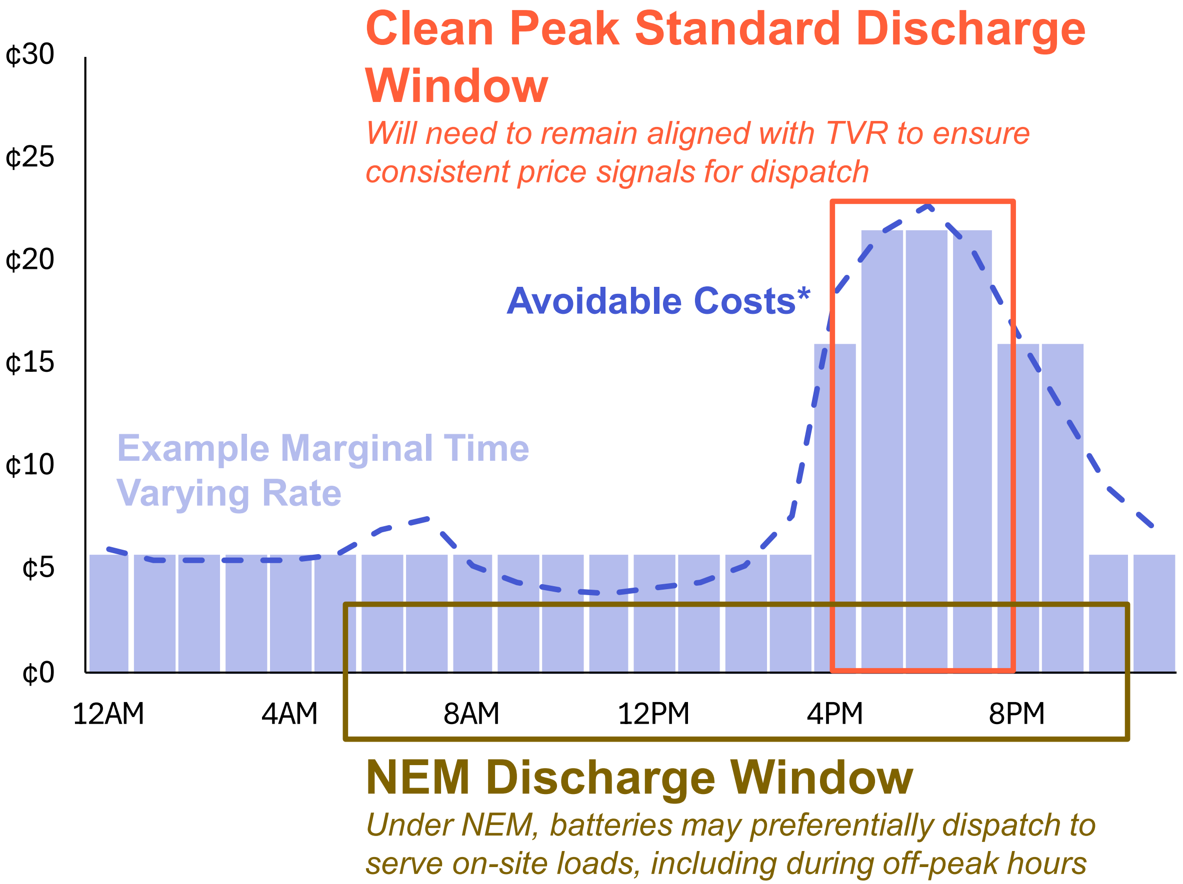


Future rate changes should trigger reevaluation of existing DER programs with overlapping goals

Programs and rates should work in unison to provide clear dispatch signals for distributed energy resources (DERs) such as batteries

- In the long run, the simplest price signals for DER dispatch would be symmetric import and export rates reflecting avoidable system costs, with a non-bypassable charge to reflect embedded system costs
- Today, rates and programs provide distinct signals to customers that can be difficult to navigate:
  - Net energy metering (NEM) encourages offsetting on-site loads due to only 60% of exported energy receiving NEM credits
  - The Clean Peak Energy Standard encourages charging and discharging during specified windows
  - ConnectedSolutions introduces calls during times of peak system stress, compensating batteries on a $/kW basis

Battery Dispatch Signals with Winter Avoidable Costs
cents/kWh



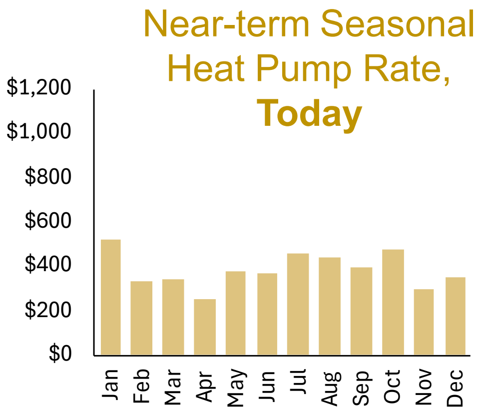
- Combining rates and programs also risks compensating customers twice for the same system benefit

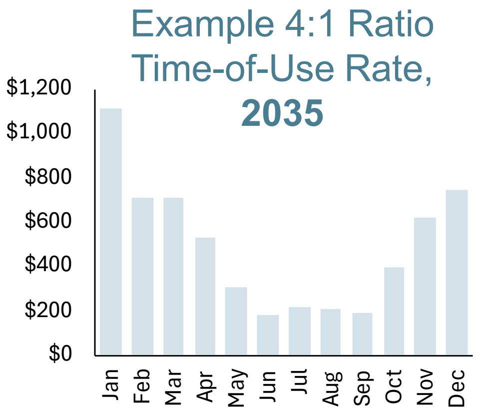
*Energy, generation capacity, and transmission capacity

Winter peaking electric system costs remain a significant challenge for electric heating

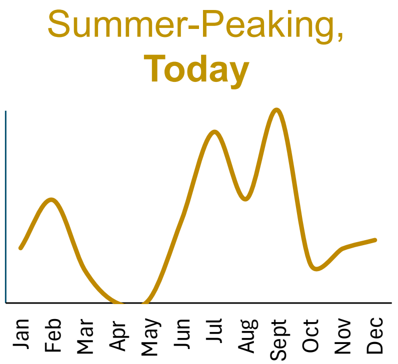
- **The costs associated with meeting the coldest peak demand hours of the year will endanger energy affordability for those adopting heat pumps**
  - This is true across TOU, CPP, and RTP designs, since the avoidable system costs are very high in these hours
  - Space heating has limited flexibility and accounts for a large share of a household's energy consumption, so there is a risk of significant expense during winter peak hours
- **Technology and policy solutions that reduce peak loads will be crucial for reducing system costs, rates, and bills:**
  - Energy efficiency and highly-efficient technologies such as ground source heat pumps, building shell improvements, etc.
  - Nascent innovative technologies such as thermal energy storage, networked geothermal, etc.
  - Load management and demand response programs for more flexible end uses

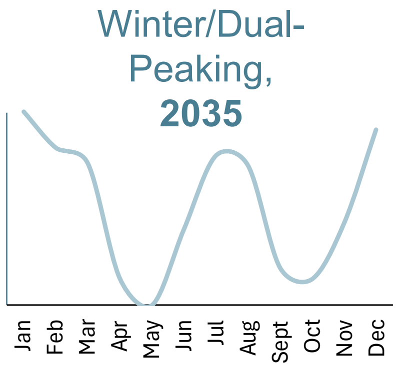
Illustrative Electricity Bills for All-Electric Household
$/month





Normalized Aggregate System Gross Load Shape





Ratemaking in the Future

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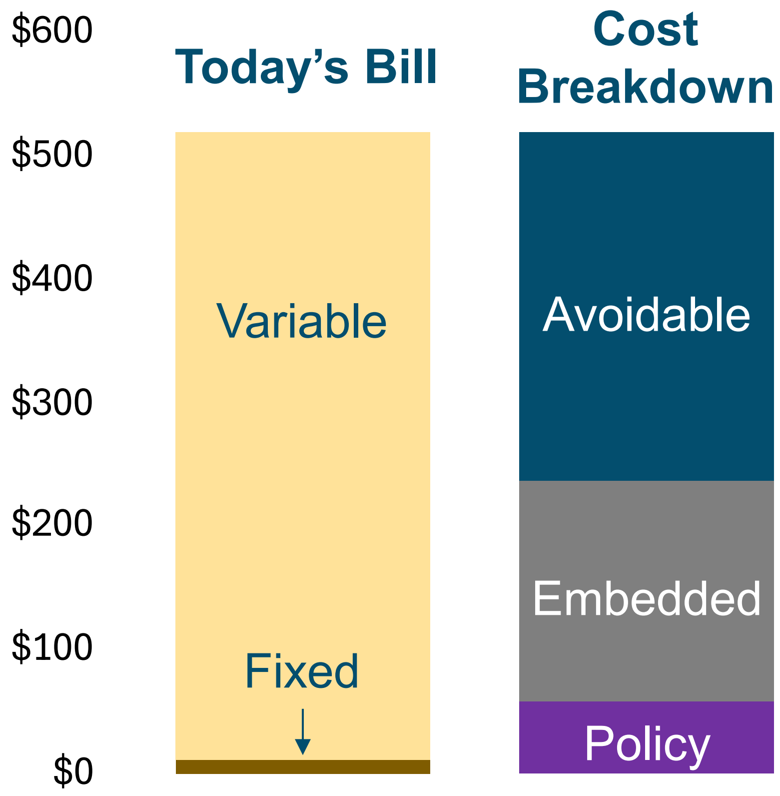
Current approach to recovery of program costs is hindering state goals

Illustrative Cost Disaggregation of Monthly Electricity Bill for an All-Electric Customer
$/month



Broadly speaking, there are three categories of costs that are recovered in rates:

1. Forward-looking costs that are "avoidable" through changes in customer usage and/or demand
Includes avoidable costs for energy, generation capacity, transmission capacity, and distribution capacity. Should be reflected in rates.

2. Embedded or "sunk" costs that have already been incurred
Primarily distribution system costs. Could be recovered through non-bypassable charges or through tax revenues like public infrastructure.

3. Costs of programs that support policy goals
These costs could be recovered outside of rates. Funding these programs through electric rates is more regressive than relying on taxpayer funding.

Several regulatory reforms have been proposed that have the potential to better align utility and public interests

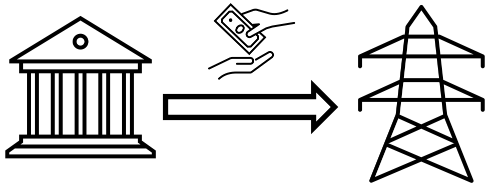
+ **Traditional cost of service model enables utilities to earn a fair rate of return on capital investments**
  - This does not provide a clear incentive for utilities to prioritize efficient capital spending to support energy affordability or pursue other policy goals including decarbonization and instead incentivizes greater capital investment
+ **Advanced ratemaking mechanisms seek to align utility performance with the public interest, including examples such as:**
  - **Performance-Based Ratemaking,** including Reporting Metrics, Scorecard Metrics, Performance Incentive Mechanisms, and Earnings Sharing Mechanisms. These entail utilities reporting to regulators on specified metrics related to goals such as decarbonization and customer service, with clear financial incentives to pursue these goals and share benefits with ratepayers
  - **Revenue Decoupling** ensures that utilities only recover approved revenue requirement; additional revenue generated through greater-than-expected sales is passed back to ratepayers
  - **Multi-year Rate Plans and Formula Rates** are alternatives to frequent utility rate cases, reducing the regulatory burden on utilities, boosting revenue certainty (and thus reducing borrowing costs), and creating an incentive to increase operational efficiency
+ **These approaches have important risks that must be considered, including:**
  - Risk that reducing scrutiny of utility expenditures may lead to higher costs for ratepayers
  - Risk that certain incentive elements may be “gamed” by the utility

State financing could further help to reduce costs

+ **Public financing could utilize lower borrowing rates to reduce the costs of clean energy contracts**
  - E.g., many of California's community choice aggregators offering alternative supply options to consumers have earned investment-grade credit ratings and have begun to issue low-cost debt backed by future rate revenues
  - These bonds are being used to pre-pay for a significant portion of a renewable PPA, generating a ~15% "prepayment discount" on the PPA contract
  - This approach effectively substitutes low-cost debt for a share of the capital behind renewable projects

CCC FA California Community Choice Financing Authority

+ **State debt could also be used to finance utility-owned projects**
  - E.g., a proposed California Decarbonization Authority would establish a public fund to promote electricity affordability. (Bill language that did not pass).
  - Benefits here are more limited as utilities already have a lower cost of capital than project developers, especially publicly-owned utilities
  - Plus, major questions and concerns about disruption to utility business model. Would the state own these capital projects? Would the utility maintain them?



Conclusions

Energy+Environmental Economics

Key Takeaways

- **TVR covers a range of different rate design strategies with an inherent tradeoff between complexity and ability to reflect system conditions**
- **To provide customers with economically efficient price signals, TVR should ideally reflect changes in avoidable system costs over time**
  - Customers should anticipate that TVR rates will be expected to evolve year-to-year as system costs change
- **Many jurisdictions have taken the approach of implementing simpler TOU rates as default, with more complex TOU designs and/or CPP as opt-in rate options**
  - Affordability impacts for low-income customers should be considered prior to any TVR rate rollout
  - For real-time pricing (RTP), near- to mid-term potential is for highly flexible customers and end uses, likely not whole-home RTP
- **A winter-peaking grid will have high costs during the coldest hours of the year. A key challenge will be maintaining affordable building electrification while providing efficient price signals**
  - Key roles for TVR, non-bypassable charges, alternative ratemaking (PBR), and changes to cost recovery
  - Also key roles for programs and technologies that reduce winter peak impacts such as building shell measures, ground-source heat pumps, networked geothermal systems, and nascent technologies like thermal storage

Further Topics for Regulators and Stakeholders to Consider

- TVR customer-responsiveness by end use and impacts on customers with limited energy control
- Alternative ratemaking mechanisms: effectiveness in providing ratepayer savings and supporting utility fulfillment of stated goals
- DER-enabling strategies beyond rates (incl. encouraging load flexibility, virtual power plants, etc.).
- Political challenges and open questions in shifting electric program costs to taxpayers
- Supply-side resource needs for clean firm capacity to meet winter heating electric needs – T&D, storage, offshore wind, etc.
- Demand-side technologies and policies to reduce peak demand in a winter-peaking system without endangering energy affordability

OPTION FOR "OFFICE HOURS"

We are providing an opportunity for small group or individual "office hours" sessions with members of the IRWG

- **Audience**: Those entering these conversations and finding it difficult to participate and provide input based on assumed level of background in electric rates and regulation
- **Purpose**: Space to field questions related to underlying concepts
  - This is not intended to be a forum for sharing feedback and public comments
- **Timing**: IRWG members will be available from 12-1pm on Tuesday, 10/29; Wednesday, 10/30; and Thursday, 10/31
- **Process**: Please use this form: https://forms.office.com/r/WEiJsb7ZU7 to submit your time slot request. We will coordinate groups, as needed, and send calendar invitations.

INSTRUCTIONS FOR PUBLIC COMMENTS

- Please use the "raise hand" function on Zoom if you have a comment you wish to make on behalf of yourself or your organization, we will operate on a first-come, first-served basis.
- Speakers will be asked to identify themselves by name and affiliation and will have up to 2 minutes to comment.
- Written comments are also welcome and encouraged! Please send written comments to Rates.WG@mass.gov. All written comments will be considered public and may be posted on the IRWG website. **Written comments on the Long-Term Ratemaking Study Draft are due by November 15, 2024 to give sufficient time for consideration and should be sent to Rates.WG@mass.gov**

FUTURE STAKEHOLDER OPPORTUNITIES

- The IRWG is hosting workshops to discuss further subject matter specific topics in greater detail
  - **November 1, 2-3PM:** Distributed generation/distributed energy resource developers/providers
  - **November 5, 2-3PM:** Electric distribution companies, utilities, suppliers
  - **November 7, 3-4PM:** Consumer and advocacy organizations
  - **November 13, 11-12PM:** Synthesis for all stakeholders
- Register for these sessions at IRWG's Outreach and Engagement Opportunities

THANK YOU!

MASSACHUSETTS INTERAGENCY RATES WORKING GROUP

A Collaboration to Advance Near- and Long- Term Rate Designs that Align with the Commonwealth's Decarbonization Goals