MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

Time of Use Rates

Expert Presentation Series | May 19, 2025

This expert level presentation series session will provide the Massachusetts Electric Rate Task Force an opportunity to learn from experts and/or other jurisdictions on the above topic.

Note: The contents of this presentation do not necessarily reflect the views or positions of the Massachusetts Department of Energy Resources.

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Massachusetts Electric Rate Task Force Goals

The Rate Task Force brings together diverse stakeholders to reimagine how electric rates and the regulatory framework can drive an affordable, equitable, and decarbonized energy future.

Through targeted conversations, expert presentations, and thoughtful exploration of complex issues, the Task Force aims to deepen understanding, surface critical questions, clarify challenges, and build the foundation for durable regulatory reform and action.

The Rate Task Force will use the Massachusetts Interagency Rates Working Group's Long-Term Ratemaking Study and Recommendations as a starting point for discussion and knowledge building on rate designs, ratemaking, and regulatory mechanisms.

Build technical knowledge

Provide an opportunity for **knowledge-building** by and amongst stakeholders, including those who have not traditionally been involved

Develop shared understanding

Converge towards **shared understandings** of the challenges and priorities

Today's Focus

Facilitate open, inclusive dialogue

Engage in **open, inclusive dialogue** about complex ratemaking and regulatory issues outside of a regulatory proceeding

Frame critical questions and opportunities

Empower stakeholders to identify **critical questions and opportunities** for the advancement of rate design and ratemaking reform

Ground Rules & Engagement

This work is complex – and your insight matters; let's focus on learning, listening, and shaping together!

Participation, Engagement, & Respect

- Everyone's perspective is valuable – this space works best when all voices are heard
- Respect differences in background, experience, and priorities
- Bring curiosity – ask questions and offer potential answers
- Focus on understanding others' goals and values, not just their positions
- It's okay not to have a solution – help us shape the right questions

Collaboration, Not Consensus

- This body is deliberative, it is not a decision-making space
- We don't need to agree on everything, but we should work toward shared understanding
- Where we disagree, help clarify what the tension is and why it matters

Transparency & Trust

- We'll be clear about how input is used
- Share what you can; identify when you're speaking on behalf of your organization or personally
- Materials, summaries, and key findings will be shared openly to support accountability

Focus & Productivity

- Stay on topic and honor the scope of the Task Force
- Raise related concerns, but help us stay anchored in the rate design and regulatory issues at hand
- Use the structures provided (i.e., expert sessions, targeted conversations, office hours) to deepen discussion
- Avoid discussion about open and ongoing proceedings at the DPU

Why We Are Here?

Interagency Rates Working Group (IRWG)

- IRWG was formed to advance near- and long-term electric rate design and ratemaking that align with the Commonwealth's decarbonization goals; included 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)
- IRWG's **Long-Term Ratemaking Recommendations** (March 2025) identify rate designs and examine regulatory mechanisms to support decarbonization and promote affordability in Massachusetts

Long-Term Ratemaking Study and Recommendations

- Purpose: Identify **advanced rate designs** and alternative regulatory mechanisms that better support affordable electrification in MA.
- Outcome: The IRWG concluded that **TOU rates are needed to advance the Commonwealth's clean energy and energy affordability goals through our decarbonization efforts**

Today's Discussion

- Expert presentations will focus on the structure of time-of-use rate and processes on how to develop those rates
- Other sessions will focus on alternative rate designs, bill impacts, impacts on DERs, implementation, customer protection, marketing, education, and outreach

IRWG Rate Design and Ratemaking Priorities

The IRWG, informed by stakeholder feedback, developed the following near- and long-term priorities for rate design and ratemaking.

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 reduce 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

Statutory and Regulatory Parameters for Rate Design

DPU has broad authority over electric rates, though statute provides the following directives

- The DPU must "prioritize **safety, security, reliability of service, affordability, equity and reductions in greenhouse gas emissions** to meet statewide greenhouse gas emission limits and sublimits"

  G.L. c. 25, § 1A; emphasis added

- In decisions or actions regarding rate designs, the DPU must consider the impa**cts on "(i) on-site generation;. . . (iii) the reduction of greenhouse gases as mandated by chapter 21N to reduce energy use; (iv) efforts to increase efficiency and encourage non-emitting renewable sources of energy; . . . and (vii) the use of new financial incentives to support energy efficiency efforts."**

  G.L. c. 164, § 141; excerpted and emphasis added

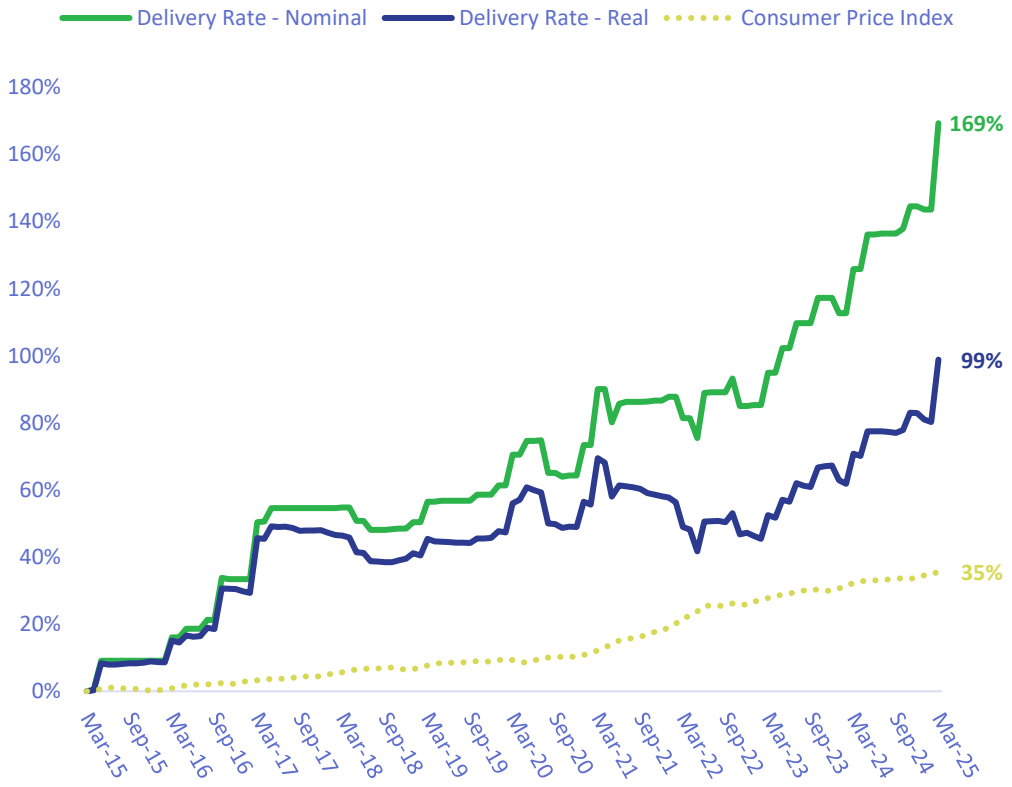
DPU has utilized the following principles to evaluate rate structures and designs

- ***Efficiency:*** *provide accurate basis for consumers' decisions about how to meet their needs and recovers the cost to society of the consumption of resources to produce the utility service (i.e., cost-based)*
- **Simplicity:** easily understood by consumers
- **Continuity:** changes to rate structure should be gradual to allow consumers time to adjust their consumption patterns in response to a change in rate structure
- **Fairness:** each customer class should pay no more than the costs of serving that class
- **Earnings Stability:** amount a company earns from its rates should not vary significantly over a period of one or two year
- **Equity:** rate structure considers affordability among customers in establishing rate classes and when establishing discount rates for low-income customers

D.P.U. 23-150 Order at 476-477

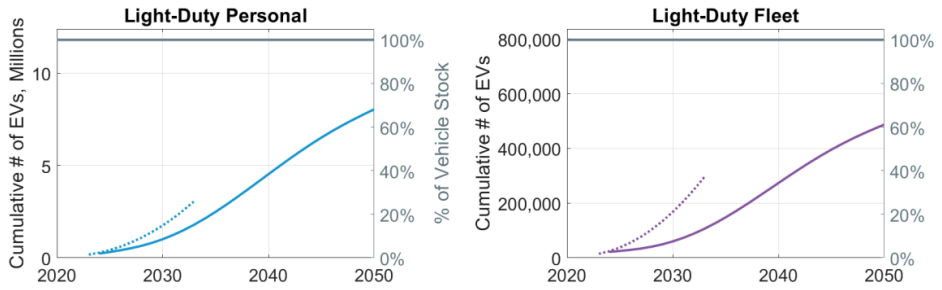
Why Rate Reform is Important to Affordability and Electrification

Electric rates are rising

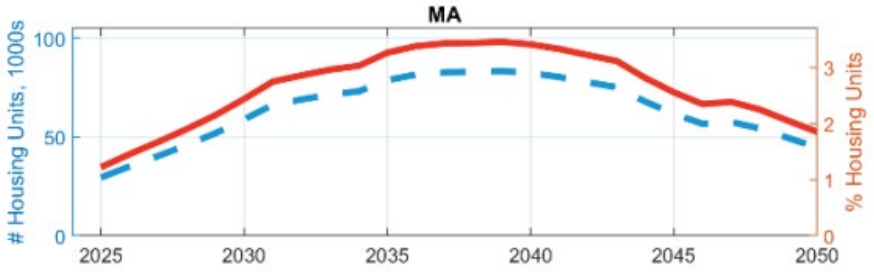


EV and heat pump adoption is slower than expected

Incremental EV Adoption, Massachusetts



Incremental Heat Pump Adoption, Massachusetts



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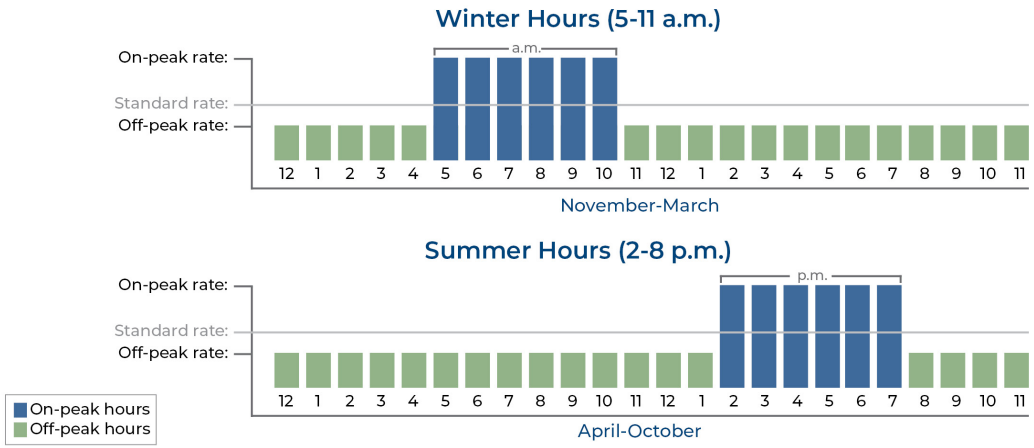
Rate Design Recommendations

Time-of-Use (TOU) Rate Structure

1) **Default**
   - All customers are enrolled, with measures in place to protect vulnerable customers
2) **Seasonal**
   - The cost of providing electricity varies on a seasonal basis. For example, we are currently a summer peaking system, so the peak price in a TOU design should be highest in summer
3) **Time-vary supply, transmission, and distribution**
   - The cost of each of these components is time-varying in nature and typically correlated. To be cost reflective, a TOU rate should consider all three, used to design one cohesive rate structure



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Default TOU

IRWG recommended that all residential customers are automatically enrolled on TOU rate once AMI meters are deployed

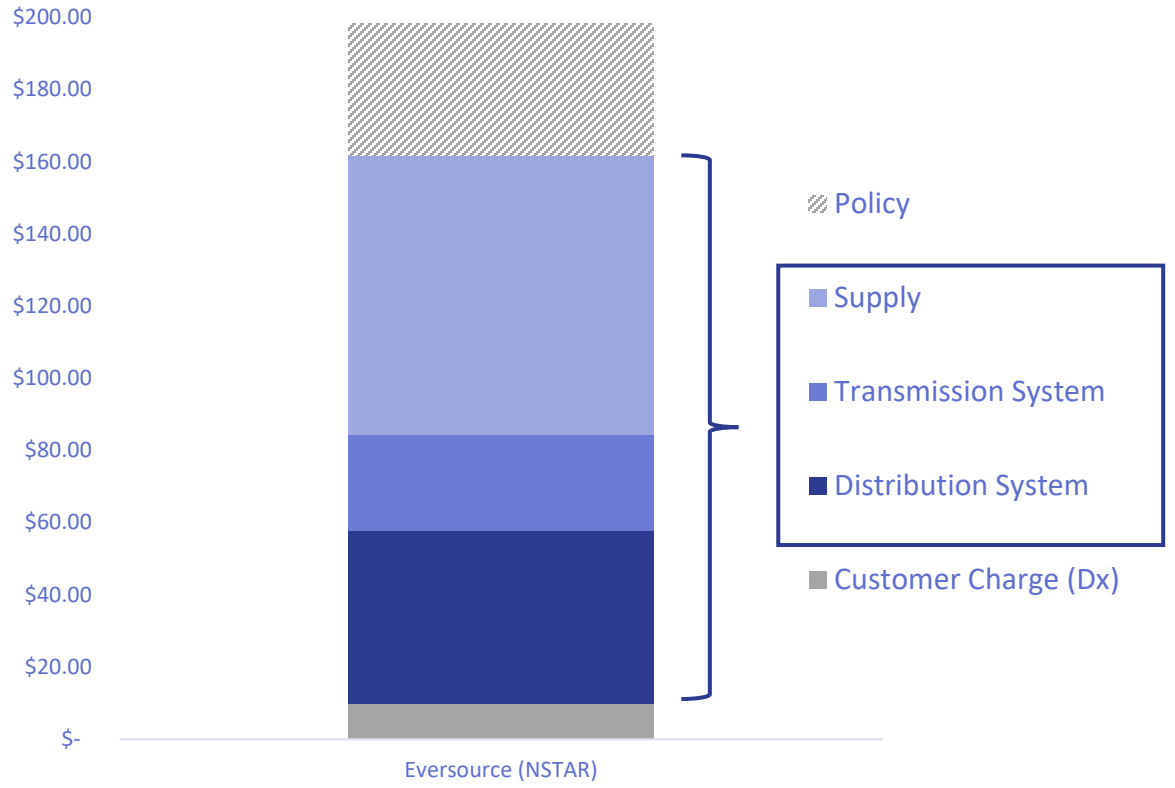
- Default TOU can significantly increase enrollment compared to opt-in, maximizing the total electricity load that is exposed to price signals for load management (Long-Term Ratemaking Study at 41-42)
- DPU has supported a default TOU rate for basic service to maximize benefits to customers, including to low-income customers (D.P.U. 14-04-C Order)
- Evidence from other jurisdictions suggest that most low-income customers experienced bill savings under TOU rates (Opinion Dynamics, 2020) indicating **that a categorical delay or even opt-in approach for low-income customers may be counter to the objectives of affordability and equity**
  - The IRWG found it necessary to implement robust safeguard for vulnerable customers, particularly in the transition and roll-out of default TOU design
  - The Task Force will explore these issues more fully under Topic 4. Implementation and Protections in late July

Include Transmission, Distribution, and Supply

Transmission, distribution, and supply costs all vary with time, so all should be part of the TOU rate

- **Distribution and transmission** costs are driven by peak demand. Consumption during system peaks necessitates costly investments in infrastructure, as opposed to off-peak times.
- **Supply** costs reflect the price of generating electricity, which will increasingly vary based on time of day as more renewable generation is deployed.
  - TOU supply rates encourage consumption when electricity costs less, often when renewable generation is abundant
- **The IRWG recommends one consolidated rate that accounts for transmission, distribution, and supply to provide customers with simple and coherent price signal**

Volumetric transmission, distribution, and supply account for most of a customer's bill



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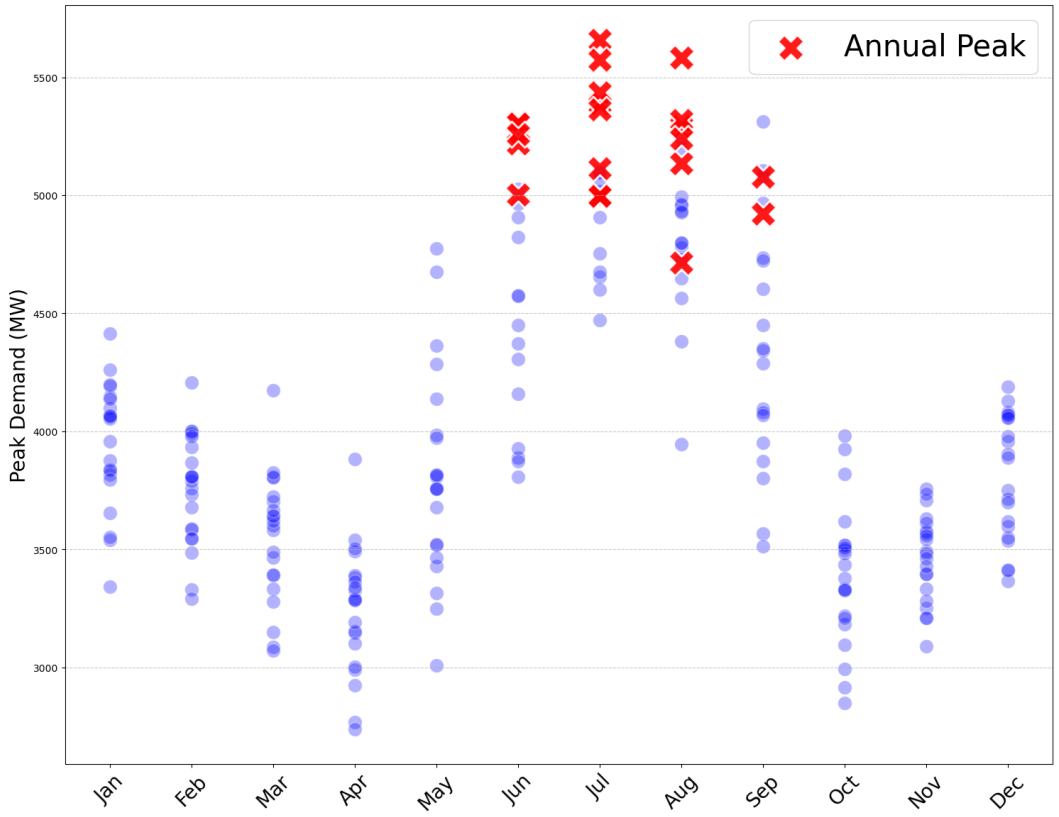
Seasonal

Costs vary by season, so should the rate

- Provide price signal that more accurately reflects the underlying costs of producing and delivering electricity
  - The timing of system peaks is highly seasonal
  - The times within a day when the monthly peak is likely to occur changes by season
  - Day-ahead electricity prices vary by season
- Currently a **summer peaking system**. Using electricity during peak hours in the summer has a much greater impact on system costs than and other season and periods, which should be reflected in the rate
- Massachusetts is projected to become a winter peaking system in the mid 2030s due to heat pump deployment. **The seasonality of rates should be dynamic to reflect evolving system realities**

Monthly and annual peak demand in the NEMA Load Zone, 2004 – 2023



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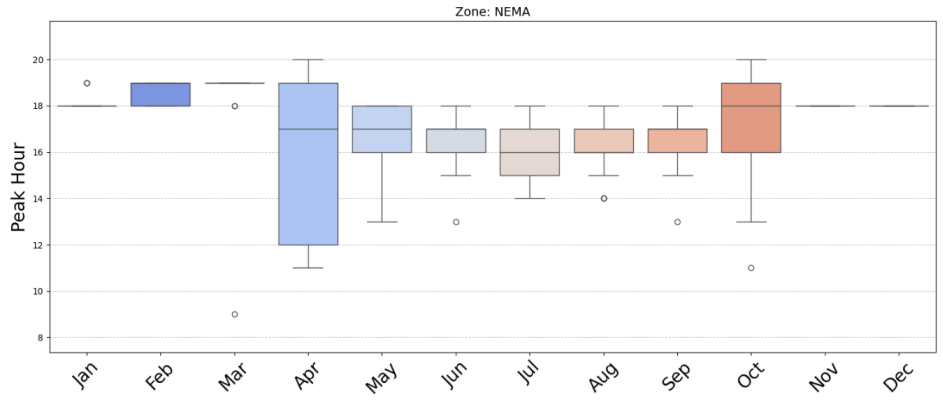
TOU Structure Principles

Peak period definition

- Peak periods should be long enough to reliably capture system peaks, but short enough that customers can reasonably shift consumption to off-peak periods.
- Peak periods should be seasonally varied. The timing of monthly peaks varies by time of year and may change over time

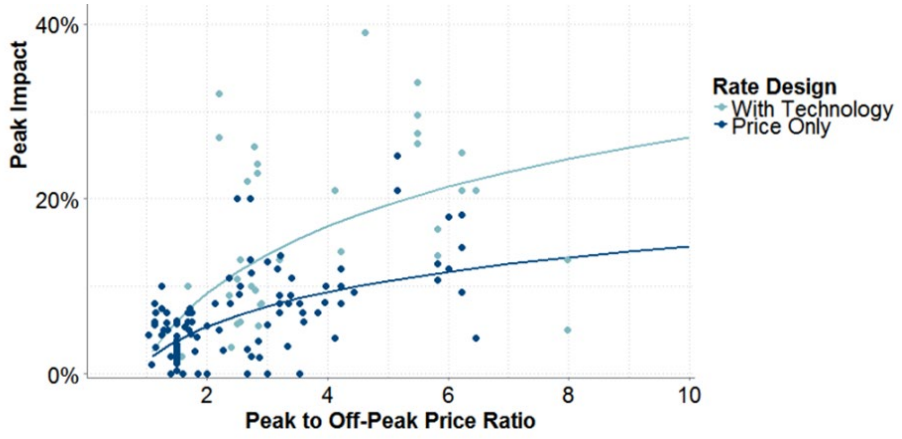
Distribution of hours when monthly peaks occur, NEMA 2018-2024



Peak to off-peak ratio

- The incremental response to TOU rates diminishes between a peak-off-peak price ratio of 4:1 to 6:1
- Reflective of cost fundamentals, as identified by embedded and marginal COS studies
- Adjusted based on an expectation of customer behavior to maximize system benefits and ensure customer acceptance

Impact of peak to off-peak ratio on peak reduction



The Brattle Group, A Survey of Residential Time-Of-Use (TOU) Rates (2019)

Expert Presentations

I. ISO-NE Perspective on Rate Designs: 1:30-2:00pm

ISO-New England, Dennis Cakert

Present on the wholesale markets and costs for energy, capacity, and transmission in New England and their relevance to the design and implementation of variable retail rates

II. Time of Use Rate Design in Maine: 2:00-2:30pm

Maine Public Utilities Commission, Chair Phillip L. Bartlett II

Present Maine's process for developing time of use rates and its most recent findings and recommendations

III. Marginal Cost Studies & Application for Rate Design: 2:30-3:00pm

Charles River Associates, Amparo Nieto

Present approach of marginal cost of service studies and the use of the marginal cost of service study in supporting time-of-use period analysis in establishing delivery rate design

IV. Maryland TOU Process: 3:00-3:30pm

Molly Knoll, Former Co-Chair of Maryland Rate Design Work Group

Present on Maryland's process to design TOU rates through the Rate Design Work Group

Reminder

Expert presentation sessions are not for substantive deliberation amongst participants. Questions for each speaker will be taken as time allows.

MAY 19, 2025 | BOSTON, MA

ISO New England Overview & Considerations for Rate Design

Massachusetts Electric Rate Task Force

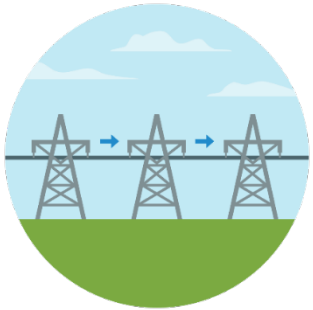
Dennis Cakert

LEAD ANALYST

ISO New England Performs Three Critical Roles to Ensure Reliable Electricity at Competitive Prices

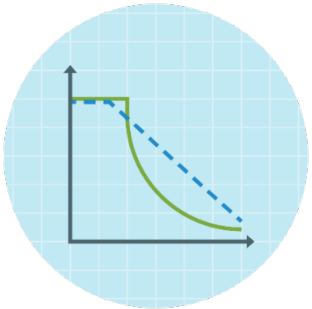
Grid Operation

Coordinate and direct the flow of electricity over the region's high-voltage transmission system



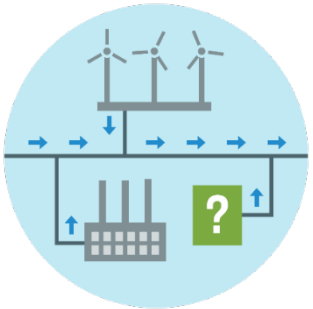
Market Administration

Design, run, and oversee the markets where wholesale electricity is bought and sold



Power System Planning

Study, analyze, and plan to make sure New England's electricity needs will be met over the next 10 years

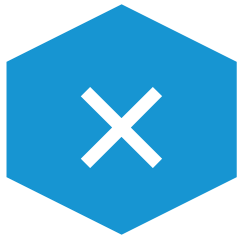


Things We Don’t Do

Handle retail electricity

Own power grid infrastructure

Have a stake in companies that own grid infrastructure



Have jurisdiction over fuel infrastructure

Have control over siting decisions

Plan the resource mix

Markets Select the Most Cost-Efficient Resources to Meet Current and Future Electricity Needs

Energy Market

The Day-Ahead and Real-Time Energy Markets are forward and spot markets for trading **electric energy**

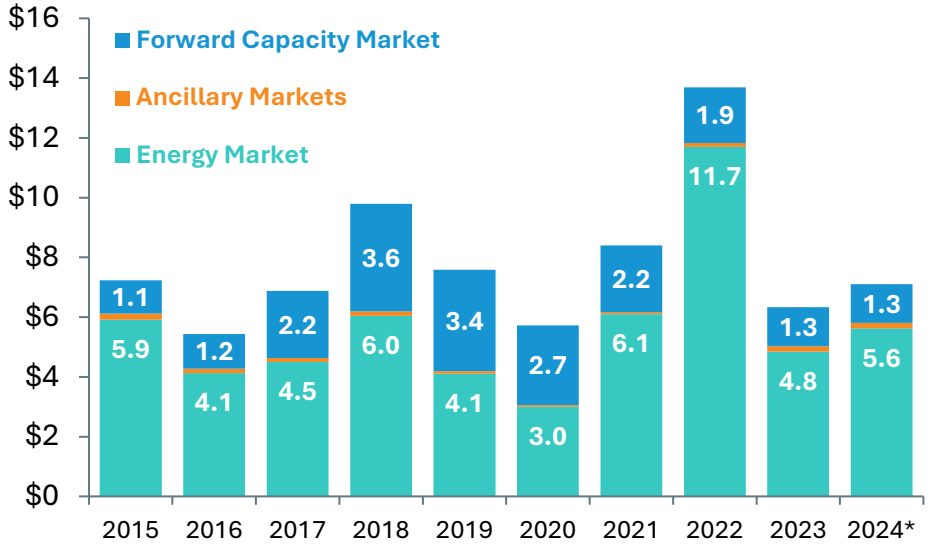
Ancillary Services

Resources provide **short-term reliability services,** as well as services needed to support the physical operation of the system (e.g., regulation, voltage support)

Forward Capacity Market

Resources compete to sell **long-term reliability services** to the system in three years' time through annual Forward Capacity Auctions

Annual Value of Wholesale Electricity Markets (in billions)



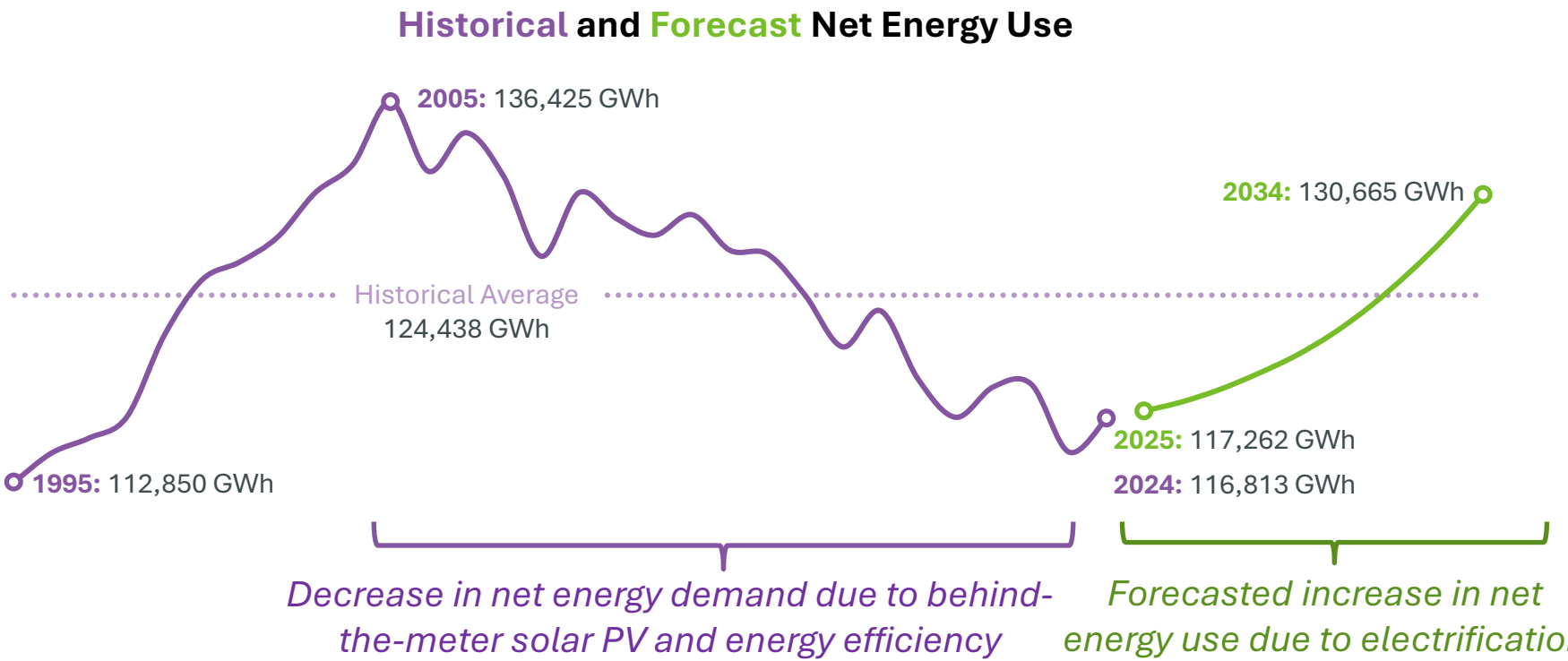
Source: ISO-NE Markets and Settlements Data; (March 2025);
*2024 data are subject to adjustment

Regional Allocation of Wholesale Costs

- The New England electric grid is a tightly interconnected system; the consumers in each state share in the benefits of reliability and market efficiencies
- The costs of energy, ancillary services, capacity and transmission are allocated to Market Participants based on energy consumption in certain hours:
  - **Energy**: hourly day-ahead load and real-time deviation
  - **Reserves and Regulation**: hourly real-time load
  - **Capacity**: real-time load during annual system peak hour
  - **Transmission**: real-time load during monthly local peak hour

See ISO New England's "Understanding the Bill" for more information

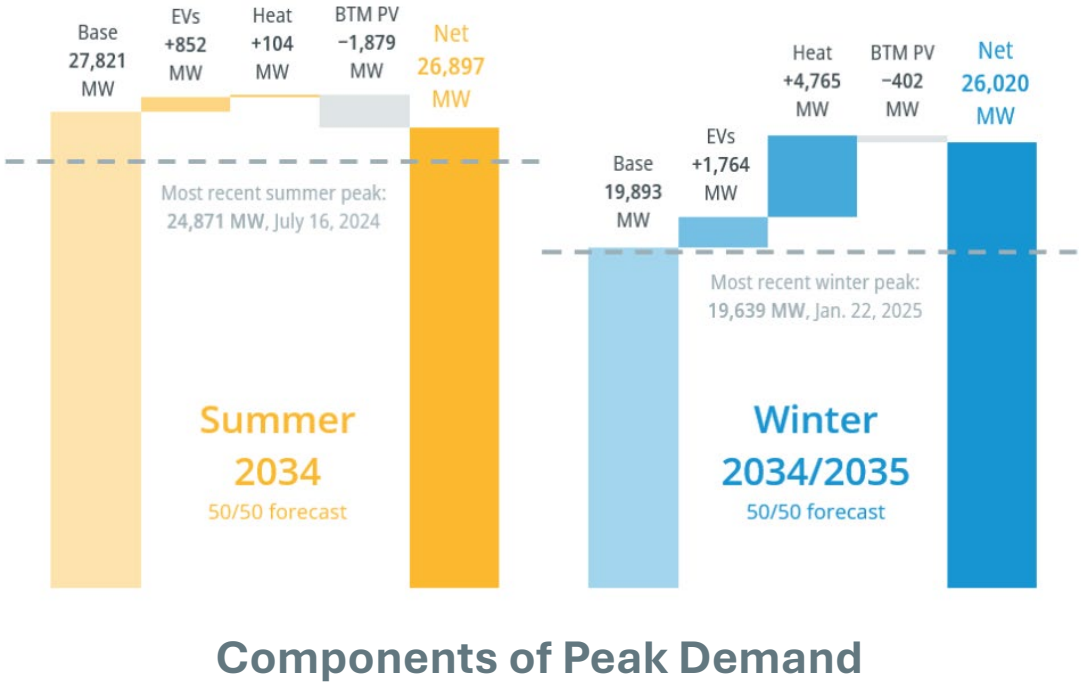
Steady Growth Expected in Annual Net Energy Use



Source: ISO New England 2025-2034 Forecast Report of Capacity, Energy, Loads, and Transmission (2025 CELT Report) (May 2025)

Heating Electrification Will Drive Higher Energy Use and Shift System Peak

- By winter 2034/2035, heating will represent **18%** of winter peak electricity demand

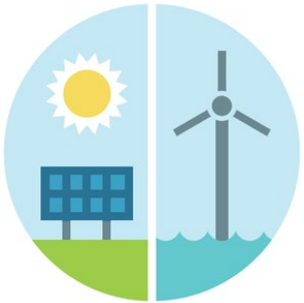


Components of Peak Demand

Source: ISO New England 2025-2034 Forecast Report of Capacity, Energy, Loads, and Transmission (2025 CELT Report) (May 2025)

Future Retail Rate Design can Encourage Valuable Demand Flexibility

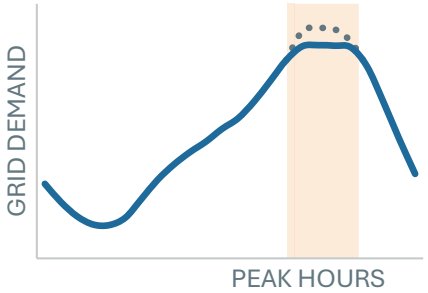
- As electricity supply decarbonizes and becomes more intermittent, load shifting becomes more valuable
- Peak load management via flexible demand (e.g., time varying rates) can help improve grid reliability and help consumers manage wholesale costs



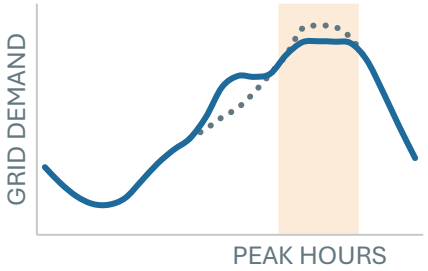
Demand Resources Can Benefit Consumers and the Grid

- Consumers can reduce demand to reduce costs
- In some cases, demand reductions are compensated as energy supply

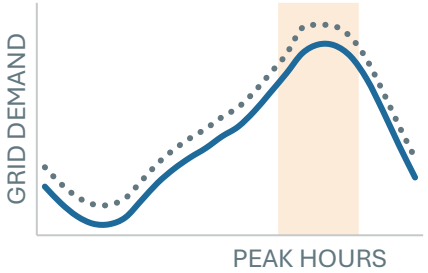
Learn More!
ISO Newswire Article from January 8, 2025,
FAQ: Demand response and the New England power grid



PEAK SHAVING
Reduces demand during peak hours by reducing consumption or increasing behind the meter generation



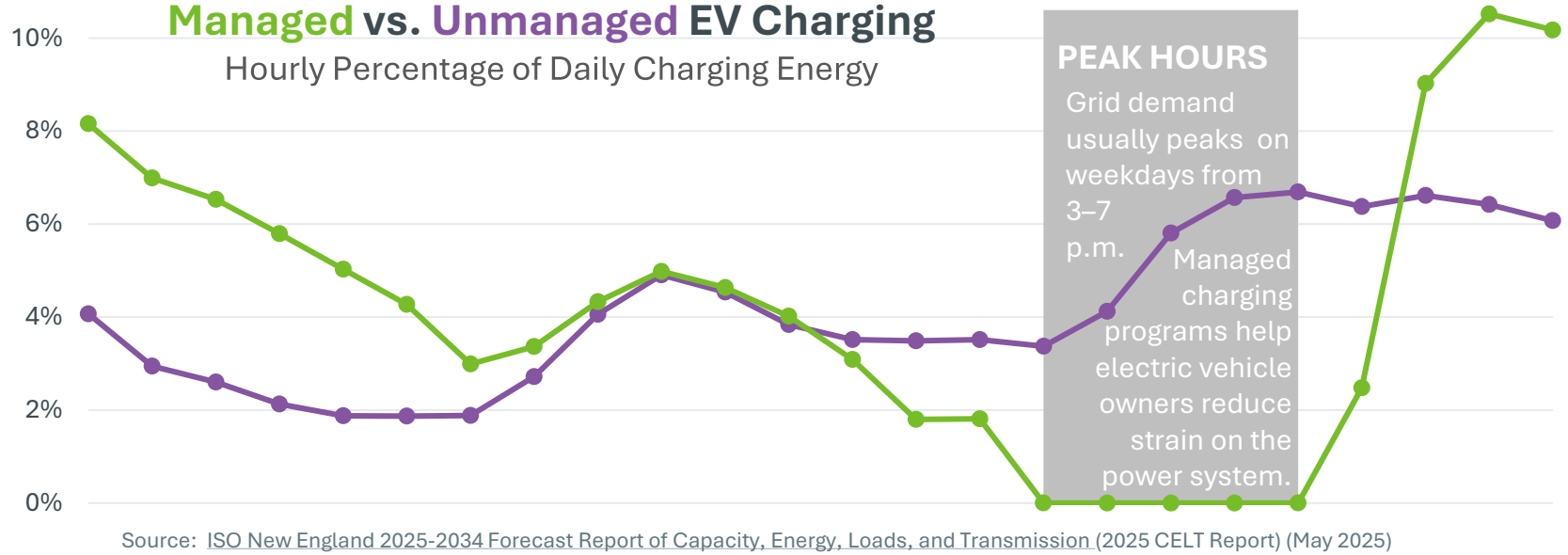
LOAD SHIFTING
Shifts demand from peak hours (and high prices) to off-peak hours (and lower prices)



ENERGY EFFICIENCY
Reduces electricity demand permanently, such as energy efficient light bulbs

For Example, Managed Charging Can Shift Load to Off Peak Hours

Managed charging programs offer incentives for EV owners to avoid charging during peak hours, shifting charging to times when demand and wholesale prices tend to be lower

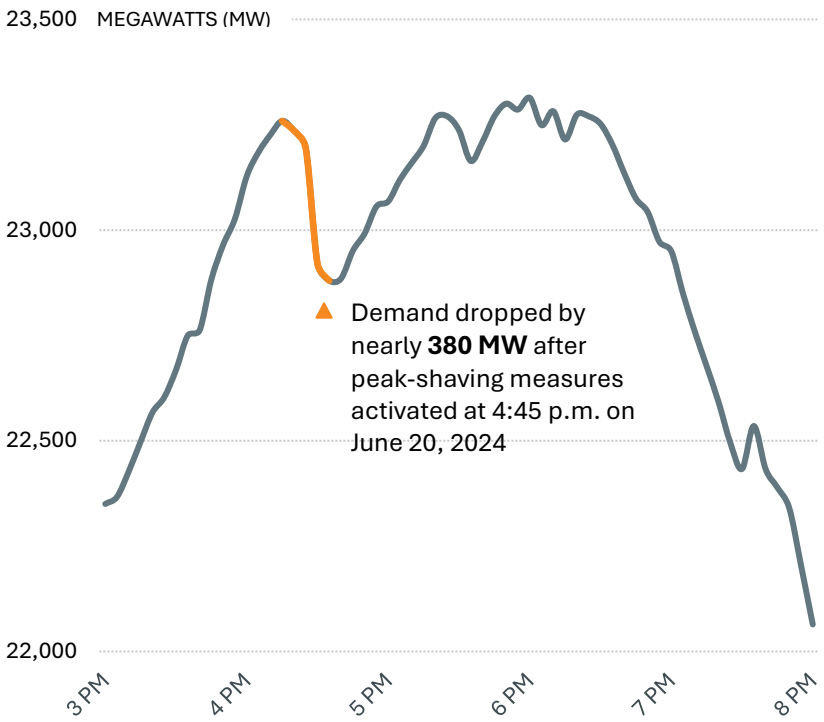


Source: ISO New England 2025-2034 Forecast Report of Capacity, Energy, Loads, and Transmission (2025 CELT Report) (May 2025)

ISO New England Grid Operations are Affected by Retail Conservation Programs

- ISO New England monitors utility conservation programs, such as ConnectedSolutions, but they are not centrally dispatched or optimized by ISO New England
- Communication from program administrators to ISO New England is important as these programs grow
  - Is consumer participation voluntary or mandatory?
  - What triggers dispatch (prices, system conditions, pre-determined hours)?
  - What is the estimated magnitude and duration of demand reduction?

Operational Impacts of Retail Demand Response Programs



- Retail demand response programs can have a significant impact on ISO's system and market operations
- The effects of retail programs operating outside of ISO's markets can be challenging to forecast

Consumer Liaison Group Provides a Forum for Consumers to Learn about Regional Electricity Issues

- A forum for sharing information between the ISO and electricity consumers in New England
- The CLG Coordinating Committee consists of 14 members who are elected every two years
- Quarterly meetings are free and open to the public, with in-person and virtual options to participate

2025 CLG Meeting Dates and Locations:

- Thursday, March 27 – Providence, Rhode Island
- Wednesday, June 4 – Massachusetts
- Thursday, September 11 – New Hampshire
- Wednesday, December 3 – Boston, MA

2024 CLG Annual Report

More information on the CLG is available at: https://www.iso-ne.com/committees/industry-collaborations/consumer-liaison/

Questions

For More Information

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Log on to ISO Express

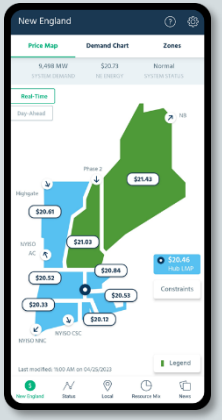
ISO Express provides real-time data on New England's wholesale electricity markets and power system operations

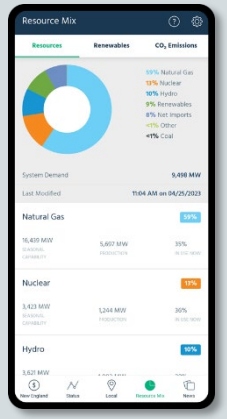
Follow the ISO on Social Media

www.iso-ne.com/social

Download the ISO to Go App

ISO to Go is a free mobile application that puts real-time wholesale electricity pricing and power grid information in the palm of your hand





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Maine Public Utilities Commission

Philip L. Bartlett II, Chair

Massachusetts Electric Rate Task Force

May 19, 2025

LEGISLATIVE RESOLVE (2023)

Directed the Commission to investigate the feasibility of requiring:

1. Standard offer service to include a TOU option, including whether the Commission recommends the use of a pilot program to assess this option;
2. All investor-owned transmission and distribution utilities (IOUs) to offer a TOU rate for delivery of electricity that would complement a TOU supply rate; and
3. Report Back by January 15, 2024

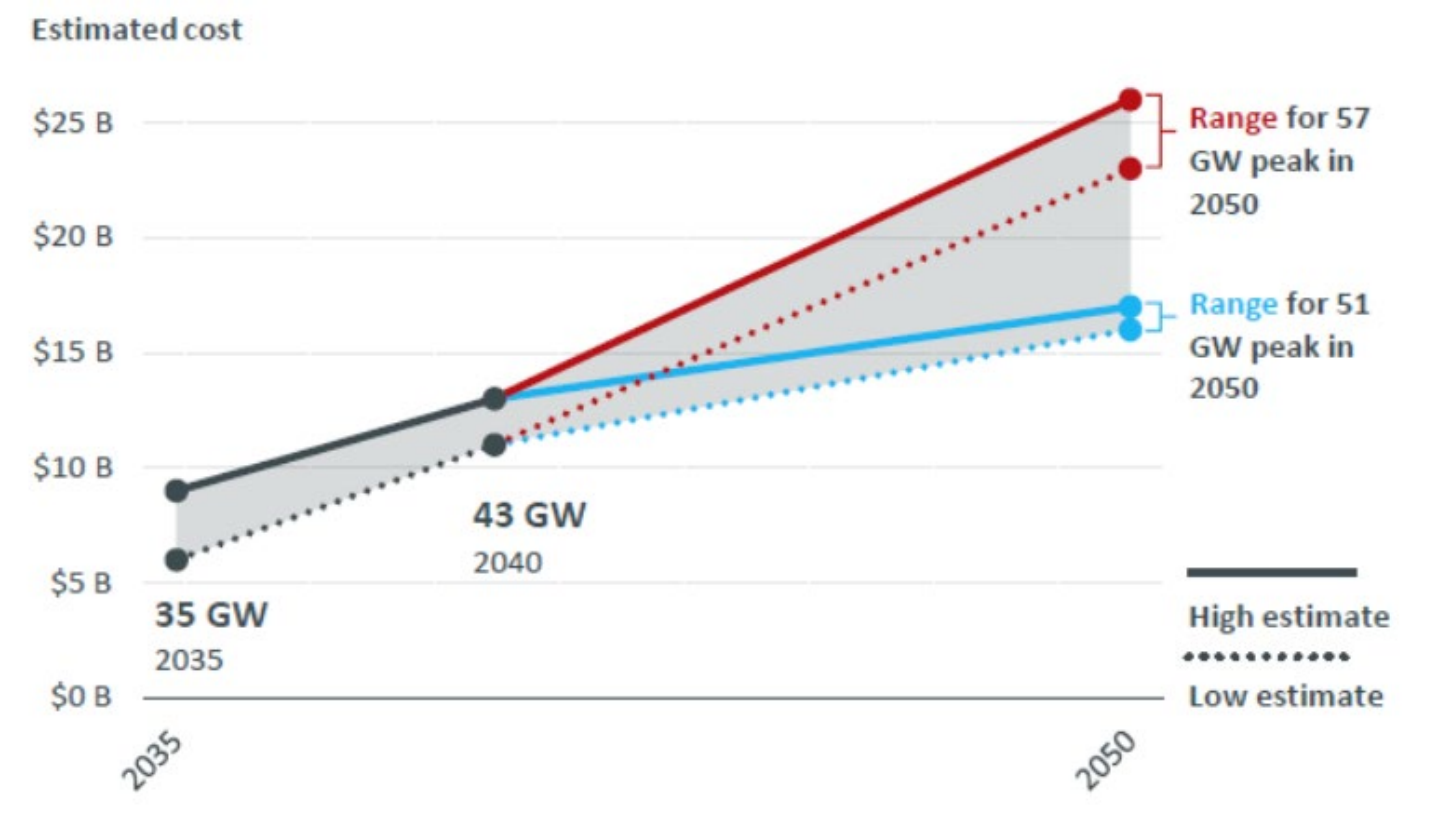
FINDINGS AND RECOMMENDATIONS

Carefully designed TOU supply and distribution rates are likely to:

- Shift load
- Reduce peaks
- Reduce overall costs to ratepayers

Combining delivery rate TOU with standard offer TOU will increase effectiveness

VALUE IN REDUCING PEAK



Source: ISO-NE 2050 Study: https://www.iso-ne.com/static-assets/documents/100008/2024_02_14_pac_2050_transmission_study_final.pdf

FINDINGS AND RECOMMENDATIONS

Pilot program is unnecessary as it would:

- Not allow for enrollment levels sufficient to realize meaningful reductions in peak load or deferred capital investments;
- Require significant costs and time to implement (similar to full rollout);
- Add costs and delay for ratepayers;
- Result in ratepayers missing out on years of valuable customer savings and peak GHG emissions reductions

OPT-IN V. OPT-OUT

Opt-in:

- Lower participation rates
- Less likely to achieve large-scale benefits
- Less opposition

Opt-out:

- Higher participation rates
- Some customers would face higher bills
- Need to address vulnerable customers

Recommendation: Opt-out

DOCKET 2024-00231

Informal Proceeding

Designed a series of workshops to

- Increase awareness of experiences in other states
- Identify challenges we would need to address
- Solicit stakeholder feedback and engagement

Develop comprehensive and analysis and recommendations specific to Maine

- Retained Exeter Associates, Inc.
- Report filed in Docket on April 24, 2025

EXETER ASSOCS. SCOPE OF WORK

1. Lessons learned from other jurisdictions, including strategies to educate and assist customers
2. Identify and quantify benefits and risks for customers, suppliers and the electric grid associated with opt-in, opt-out or mandatory TOU rates
3. Conduct quantitative and qualitative analyses of peak/off-peak differential in TOU rate and how it will impact customer acceptance
4. Develop models or other approaches to help predict bidding behavior of suppliers who bid into stand offer procurement

RECOMMENDATIONS

TOU rates should incorporate all relevant time-varying energy costs, including wholesale energy prices, capacity costs, network service costs, and distribution system marginal costs

Near term TOU rates:

- Single, year-round rate design appropriate for Maine
- Treat hours of 3:00 – 8:00 p.m. on non-holiday weekdays as on-peak
- Differential should be in excess of 2:1
- NEB customers should be eligible to participate in TOU

RECOMMENDATIONS

An opt-out TOU structure should be adopted

Customer Education/Protection

- Customers should be notified at least 90 days prior to any rate changes
- Repeated communications before any roll-out
- Communications should be coordinated between utilities and the Commission
- Do additional study to identify those who will experience adverse bill impacts
- Shadow billing should be used prior to wide rollout of TOU
- Bill protection for the first year following TOU enrollment

Widespread TOU enrollment should be conducted in waves

NEXT STEPS

Commission will launch formal adjudicatory proceeding

Exeter report and recommendations will serve as starting point

Legislative pending to clarify our authority to develop TOU for standard offer service

www.Maine.gov/MPUC

www.Facebook.com/MainePUC

www.Twitter.com/Maine_PUC

Marginal Cost of Distribution Service and Use for Time of Use Delivery Rate Design

Amparo Nieto
Principal

Massachusetts Electric Rate Task Force
May 19, 2025

CRA Charles River Associates

Agenda

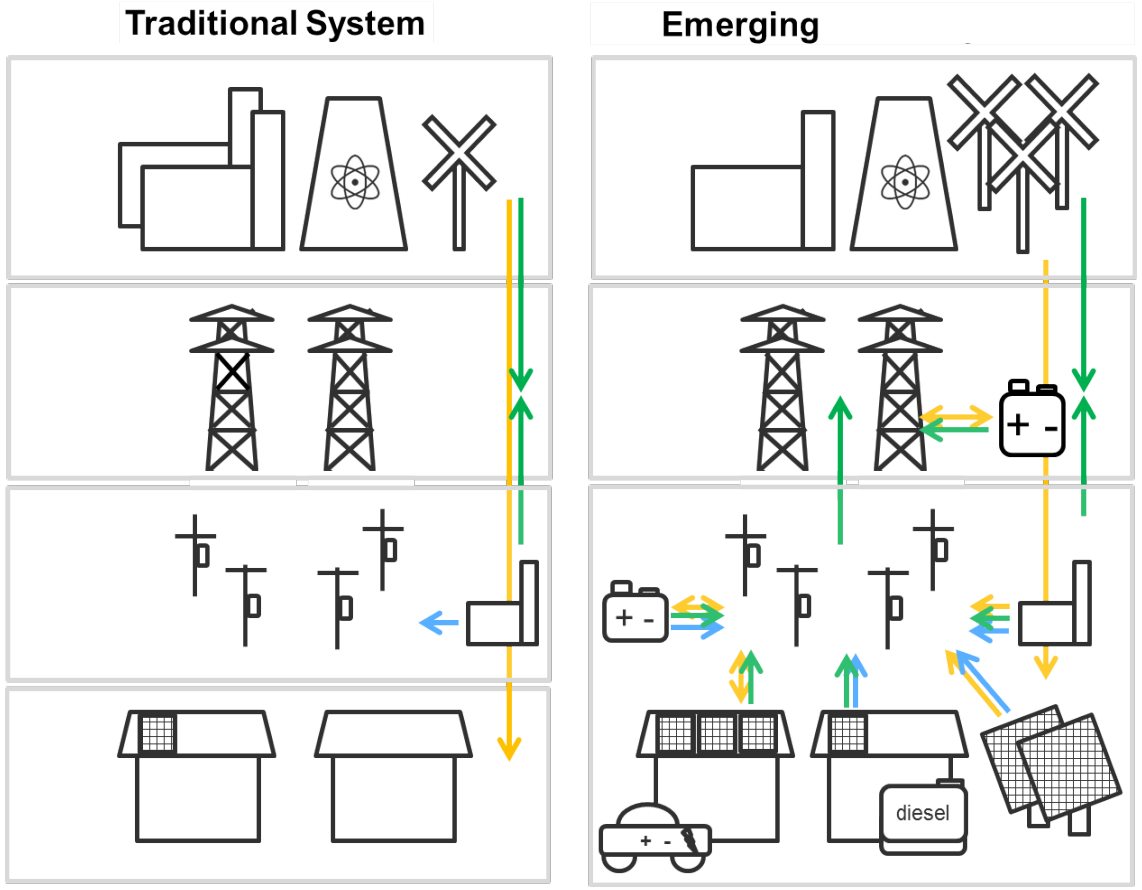
1 - Why We Need Marginal Costs For Delivery Rate Design

2 - MCOS Distribution Service Study: Key Elements

3- TOU Period Development – Factors and Method

4- Applications to TOU Rate Designs

Increased Behind The Meter Generation, EVs and Battery Storage Calls for Rate Innovation



Legacy two-part rate structures and embedded cost allocation fall short in meeting the key rate design objectives in this highly decentralized paradigm

Overarching Rate Design Goals Require Marginal Costs

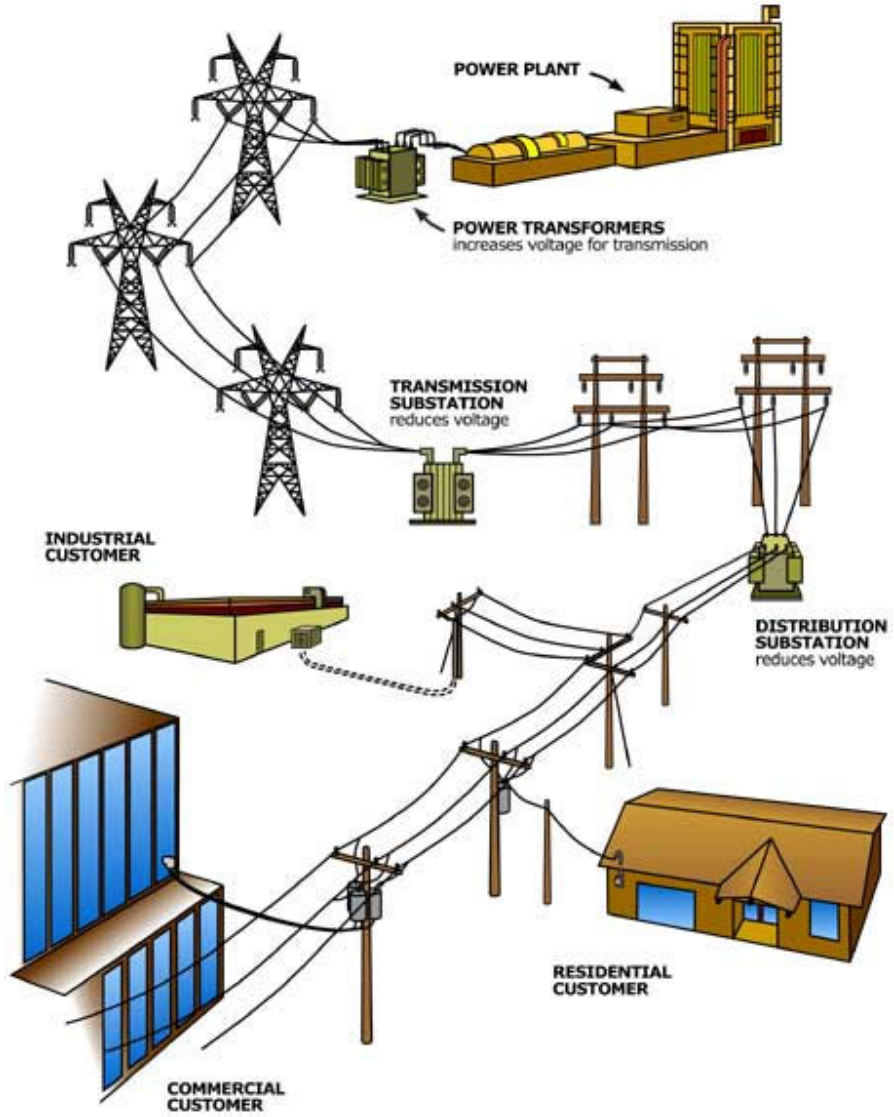
- Efficiency, equity and reliability are key goals in the transition to decarbonization
  - Efficiency in electricity taken from the grid (imports) and energy (exports) requires marginal cost (MC) to avoid unnecessary expansion of grid
  - Equity in cost allocation means that all grid users with similar import/export profiles connected at the same point of the grid pay similar costs
  - Appropriate valuation of flexibility allows for granularity and valuation of flexibility resiliency and other unbundled grid services

Key Features of MCOS Studies that Make Them More Relevant than ECOS for Rate Design

- Marginal unit cost of meeting load (“bottom-up”)
- Any cost estimates are consistent with system planning going forward
- Detailed cost granularity by:
  - Voltage level
  - Customer groups within customer class
  - Locational differentiation is possible
  - Class’ relative connection costs
- Allows for detailed TOU differentiation

A Marginal Cost Study Can Provide More Granularity in Cost Basis for Rate Components

- Distribution grid by segment:
  - Bulk substation
  - Sub-transmission feeder
  - Distribution area substation
  - Primary feeders
  - Lower voltage feeders
  - Primary taps
  - Line transformers,
  - Secondary cable



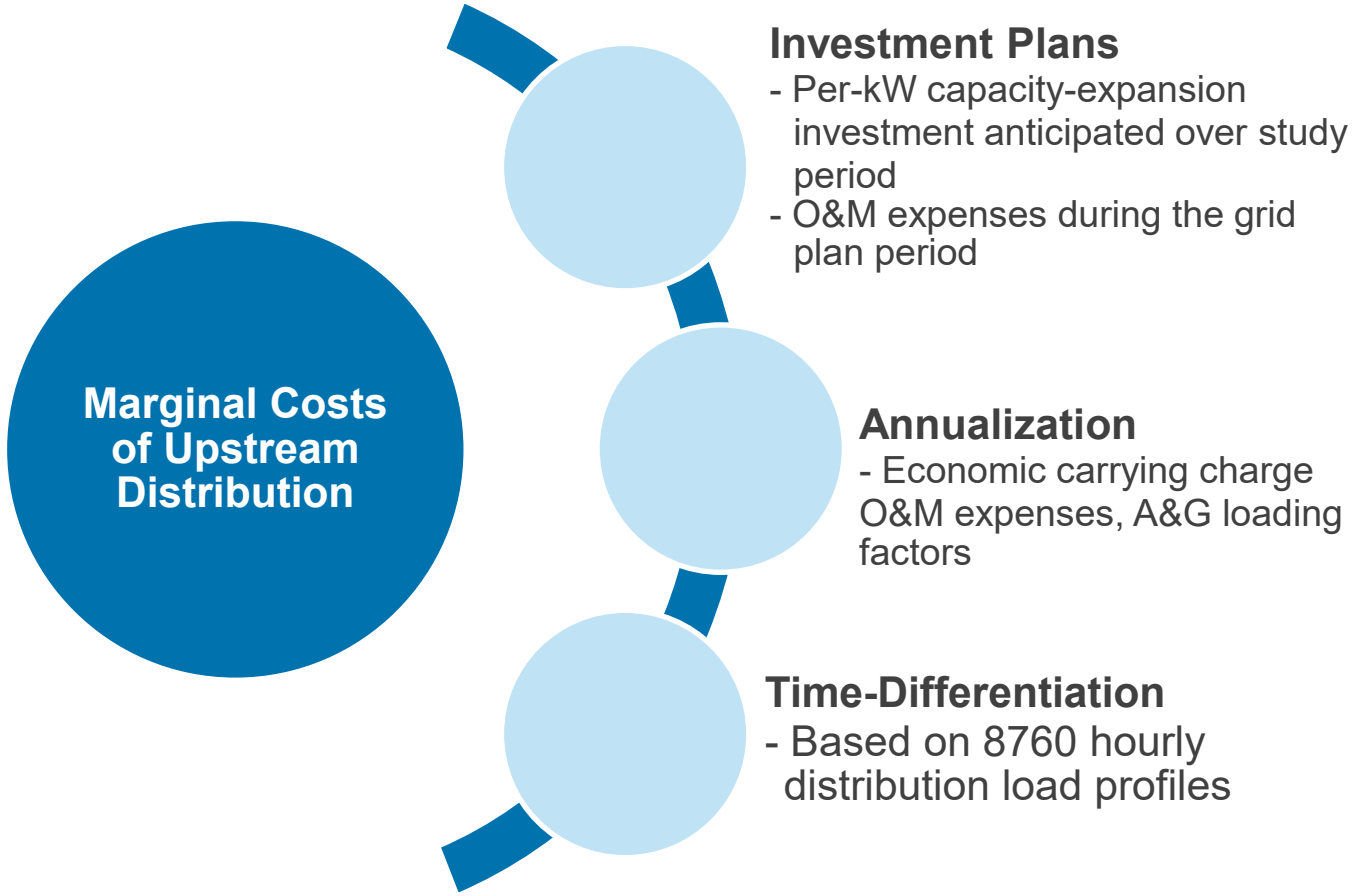
Upstream grid is shared by more customers and calls for TOU kW o kW import and export charges

Alignment to Rate Charges

- Delivery rate design should properly align with marginal cost structure
- Marginal cost peak/off peak price differential should keep a reasonable relationship of Peak to Off Peak MC to avoid under/over-incentivizing load shifting
- Aim for *technology-agnostic* rates that include both volumetric- and demand-based charges to support multiple end-use technology to support efficient EV (V2G), battery storage, and heat pump loads

Rate Component	Marginal Cost Basis
Contract kW Charge	Local Distribution Facilities
TOU Demand Charges	Costs of upstream Distribution (substation, primary trunkline feeder) allocated to hours
TOU Energy Charges	
Customer Charge	Costs of meter, service drop

Marginal Costs of Time-Varying Distribution Costs

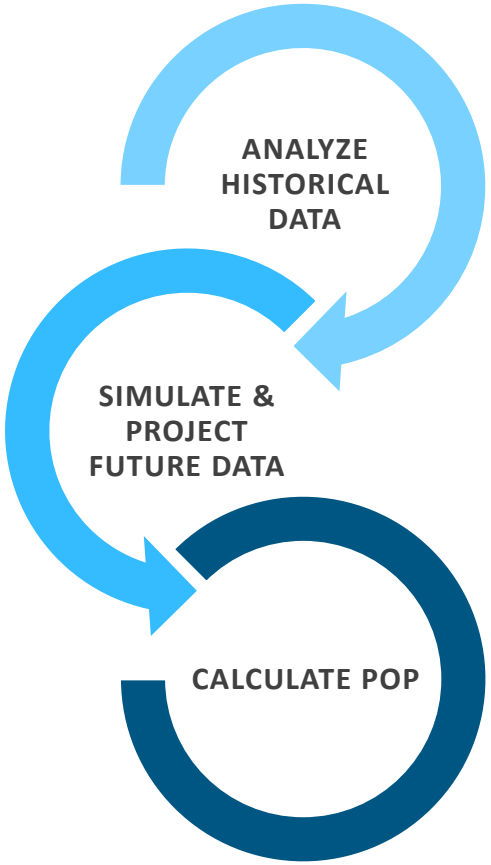


- Analysis is consistent with planning engineering approach
- Decisions on time-frame of analysis and frequency of updates, locational differentiation
- Distribution investments are increasingly determined by state policy goals (electrification)

The TOU period choice is informed by the results of MCOS study

- More granular daily periods
  - Peak, Mid, Off-peak, Super Off-Peak (low net load hours) and seasons
- Choice of TOD periods must align with marginal cost profile
  - Too broad of a peak period leads to a ‘diluted’ peak price signal
- On a probabilistic basis, cost needs to be allocated to a range of hours
  - Can use a regression analysis to determine seasons and TOD periods
  - Adjust as needed for administrative feasibility and customer understanding

Cost Time-Differentiation – Analysis of Hourly Probabilities of Peak



ANALYZE HISTORICAL LOADS

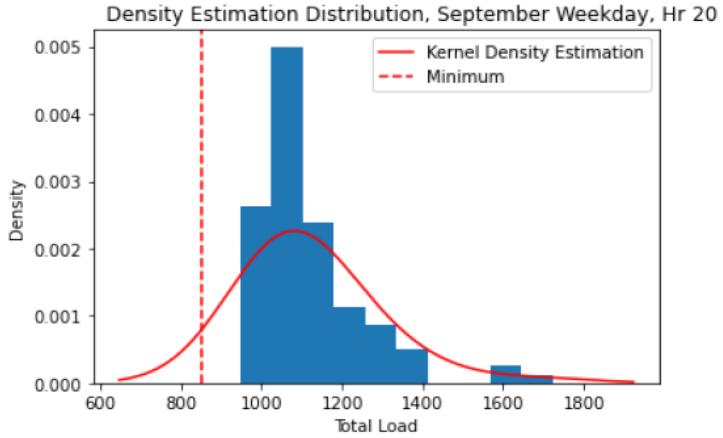
- Hourly Substation Loads for recent years
- From those hour types, create representative distributions of future load

SIMULATE & PROJECT FUTURE LOADS

- Hourly loads for two future years are simulated 500 times from the distributions described above
- Defined by weekday or weekend/holiday status
- BTM PV and ASHP load growth assumptions yield forecasted net loads

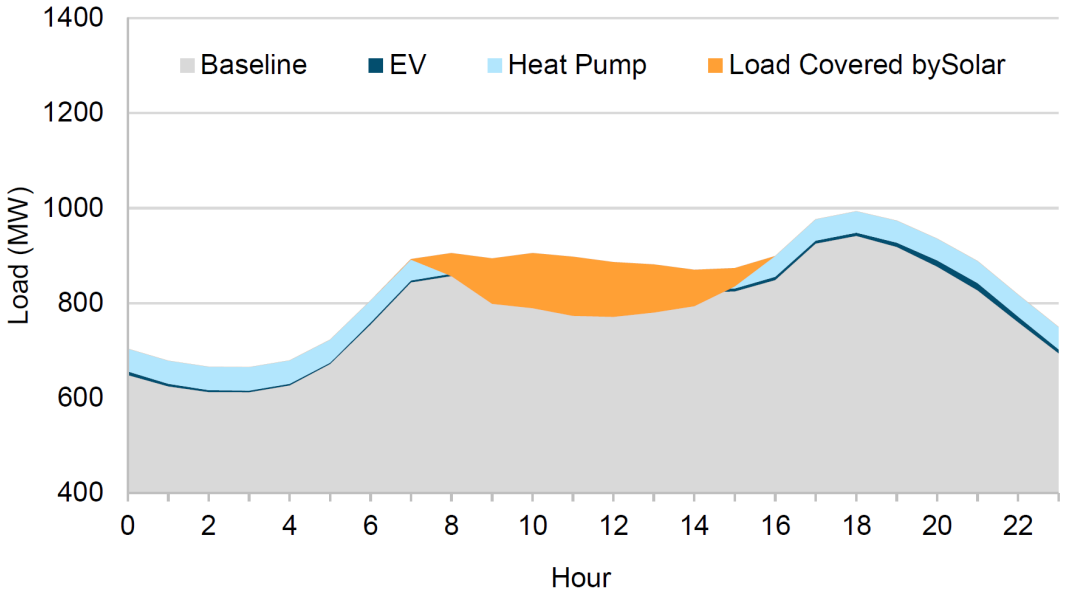
CALCULATE POP

- Threshold to determine a simulated hour's weight in the PoP calculation
- Each hour in the forecast is assigned a probability of peak to allocate the annual marginal substation costs to hours
- Costs ultimately are summarized by TOU period.



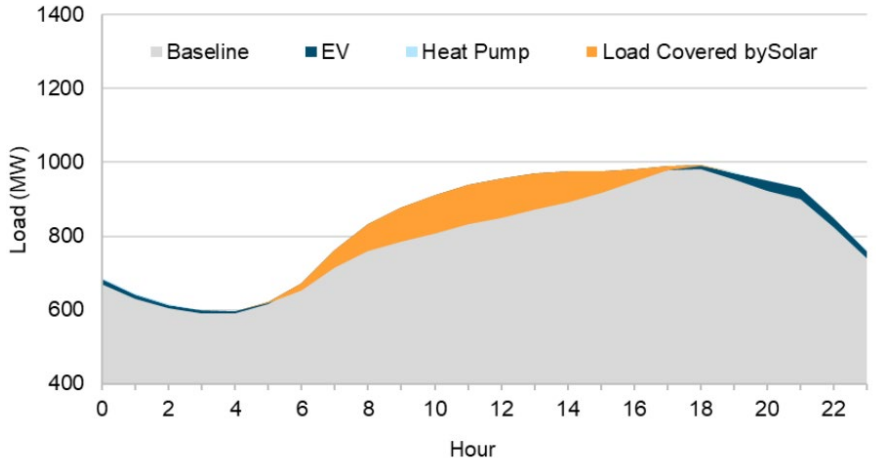
Analysis of Maine Changing Distribution Hourly Loads

Winter Distribution Hourly Load Profile, Weekday, Jan 2026 Forecast



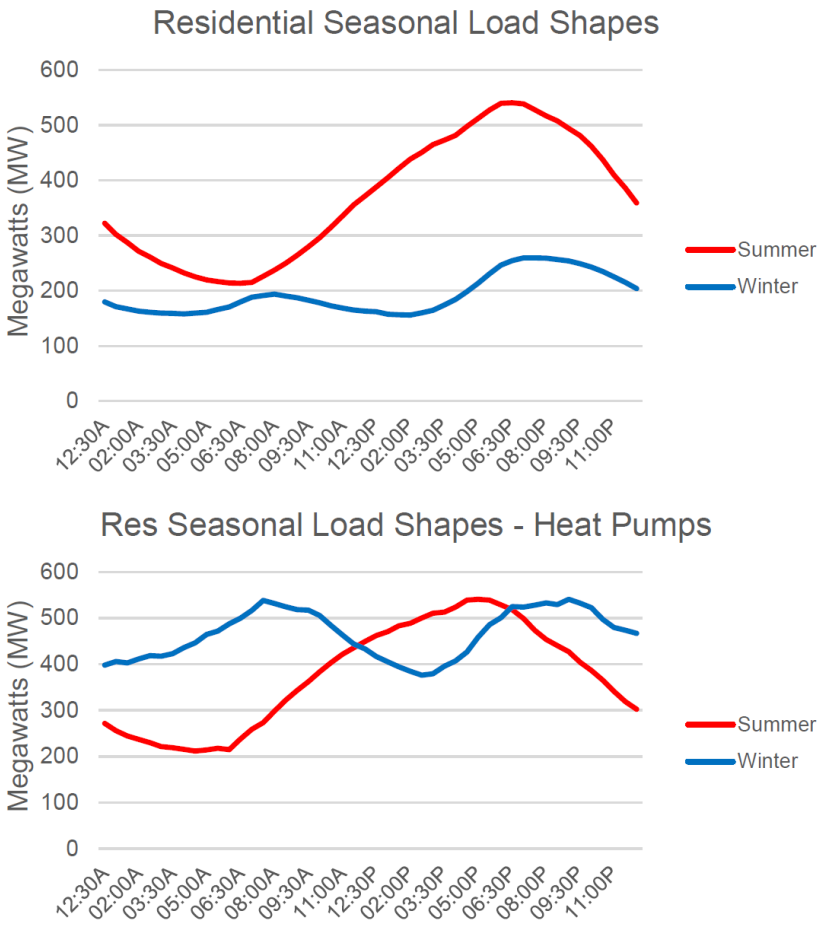
Distribution PoP increases in the core peak winter months as customers adopt space heating (other things equal)

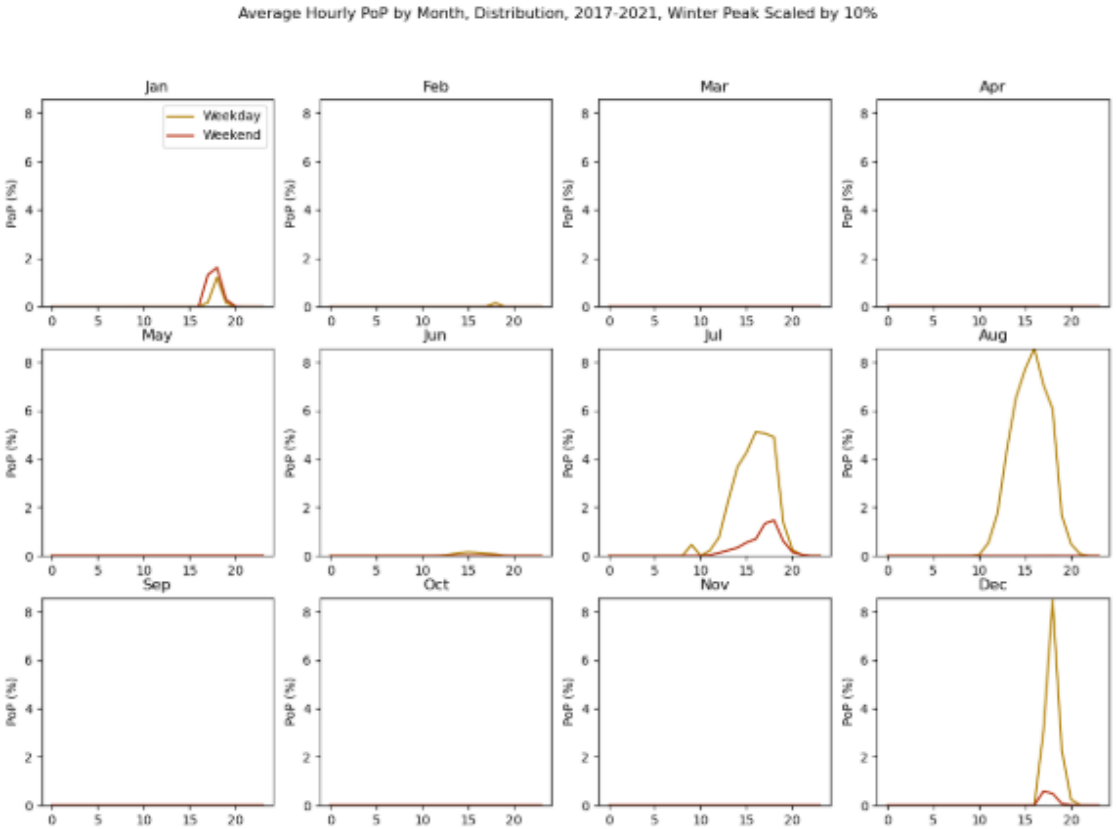
Summer Distribution Hourly Load Profile, Weekday, July 2025



Expected shift to 5 pm - 9 pm (4 hours) at high PV penetration

Monthly distribution of peak modeling heat pump load:

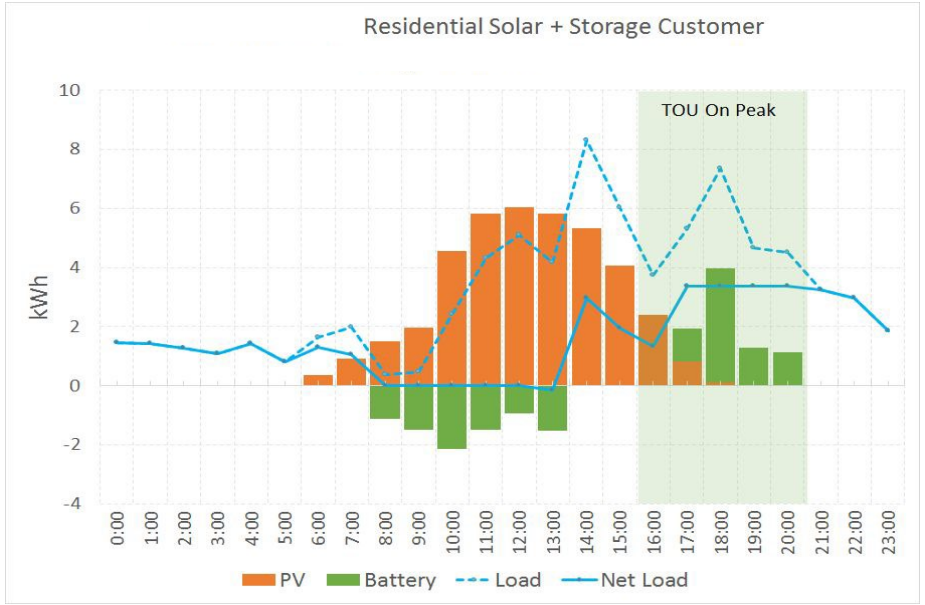


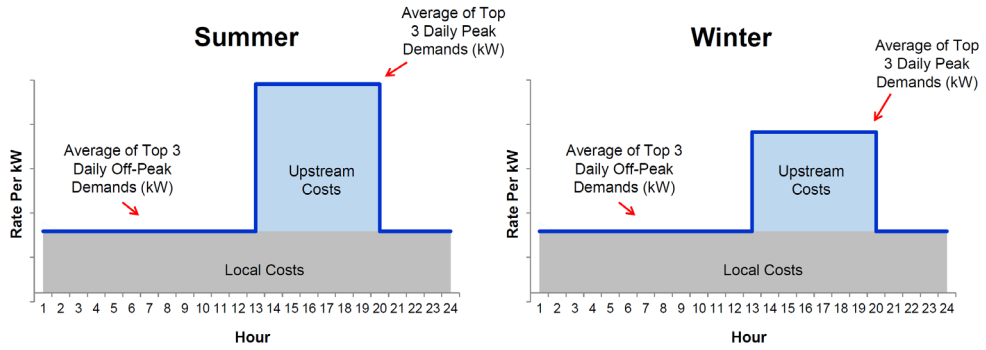


Rate Structures: Application of MC

Rate Decisions that Employ Marginal Costs:

- Size and price differentials in TOU and seasonal energy charges
- TOU and seasonal demand charges
- Capacity charges /payments (fixed per kW)
- Floor for customer charge
- Value stack (G, T, D) export rates
- Economic Development Rates
- Expansion of CPP and RTP rates
- Subscription charge
- Initial technology-specific rates





Thank You
Q&A

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Maryland TOU Rate Design Workgroup Process

May 19, 2025

Molly Knoll, Sr. Advisor

molly@alnpolicy.com

PC44 Overview - Transforming the Electric Grid

2016	Launched with invitation for Public Comment
2017	Commission established Principles and Topics TOU, EVs, Competitive Markets, IX, Storage, DSP
2018	TOU Pilot is approved and recruitment begins
2019	TOU rates go into effect
2021	TOU Pilots ended with rate remaining active Final Report
Ongoing	Evaluation, Reporting, DRIVE Act Implementation

Maryland TOU Rate Highlights

Distribution and Supply Included in Ratios

Low to Moderate Income Specific treatment group (first of its kind)

Competitive Supplier Engagement (Constellation Energy)

Summer (June - September) and Non-Summer (October - May) Periods

Robust On- to Off-Peak Ratios (4:1 - 6:1)

Achieved expected peak reductions including for structural winners and LMI treatment group

High Customer Satisfaction

Convening Stakeholders

Usual Players:

- Commission - advisors, outside experts, technical staff
- Advocates - ratepayer, low income, environmental groups
- Utility Ecosystem - utility SMEs, contractors, evaluator
- Competitive Market - retail suppliers

Anyone Missing?

- Legislators, utility SOS procurement, solar/DER

Honing the Mission

TOU Rate Design requires **comprehensive, time-based, granular data**

- Utility system - 3 year peaks for substations, feeders, etc.
- PJM system - 3 year peaks and pricing for wholesale supply, capacity, etc.

Improving rates requires **knowledge of current landscape**

- Maryland had legacy TOU rates with over 100K existing customers
- Rates had minimal on- to off-peak ratios and many customers were unaware they were on the rate

Designing a Rate

What is our goal?

No immediate NEED for TOU rates

Cost Causation v. Customer Adoption

Designing for existing system, are there any marginal savings?

When is the perfect the enemy of the good, what types of customer supports would a full roll out include?

System Impacts

Measuring success beyond load shift

What are we piloting?

Price signal, customer engagement, interaction with other programs, etc.

Designing A Rate

Distribution Rates

Goal: reduce system spending by identifying peaks across the system

Solution: Primary distribution system costs in peak period

Supply Rates

Goal: reduce overall supply and capacity costs by reducing peak demand within PJM

Solution: Capacity costs in peak period

Peak Periods

Goal: create meaningful ratios within manageable peak periods

Solution: 2 seasonal rates, 4:1-6:1 ratios

Pilot TOU Rates

FIGURE 3: AVERAGE RATES DURING THE PILOT STUDY PERIOD

	Summer (Jun 2019 - Sept 2019, Jun 2020 - Sept 2020)				Winter (Oct 2019 - May 2020, Oct 2020 - May 2021)			
	Peak	Off-Peak	Peak to Off-Peak Ratio	Default "R" Rate	Peak	Off-Peak	Peak to Off-Peak Ratio	Default "R" Rate
BGE	$0.347	$0.075	4.65	$0.110	$0.362	$0.076	4.76	$0.113
Pepco	$0.399	$0.091	4.38	$0.158	$0.419	$0.099	4.22	$0.132
DPL	$0.507	$0.087	5.82	$0.142	$0.514	$0.089	5.77	$0.142

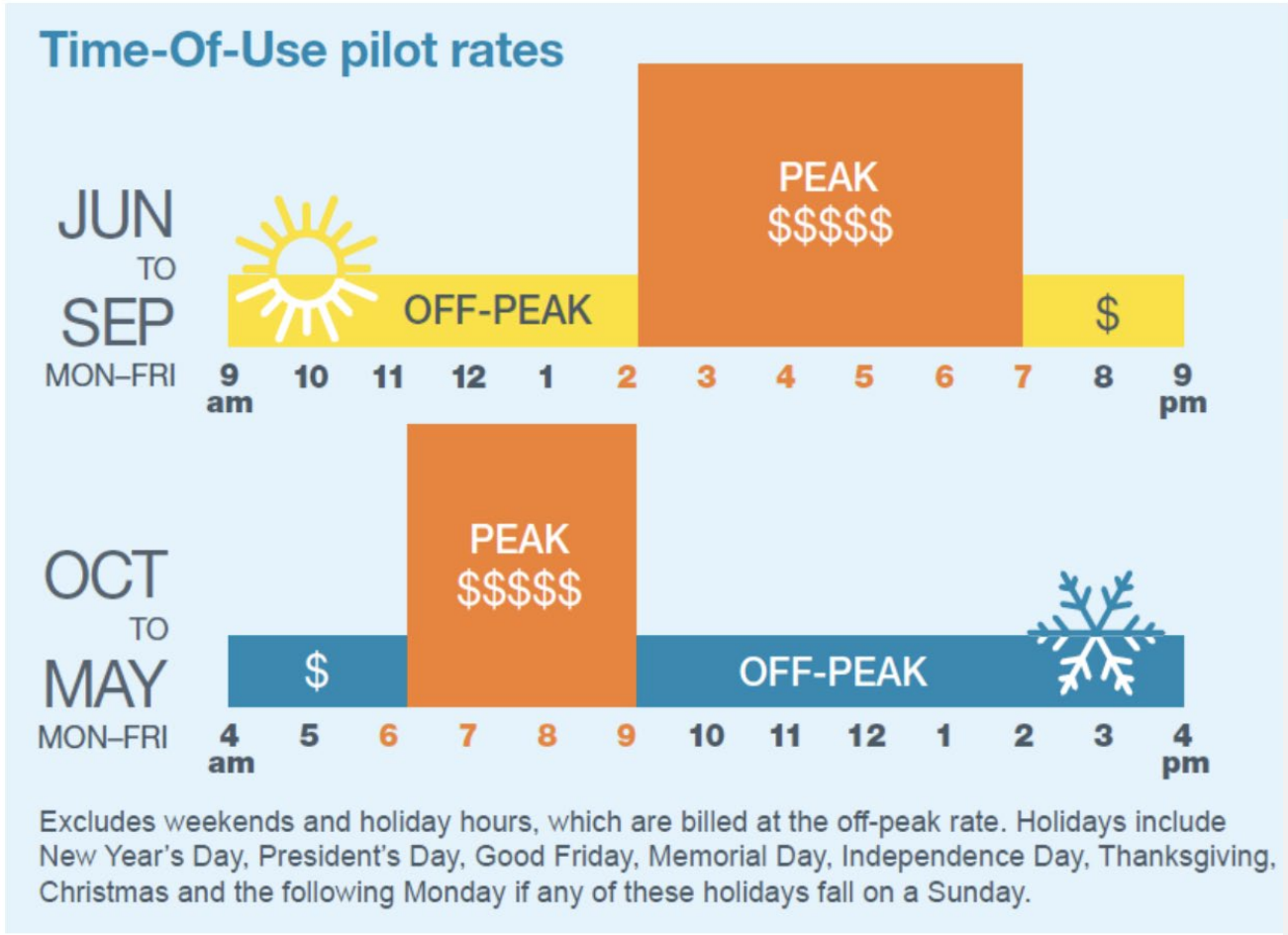
Notes: Rates for each period are simple averages of all variable components of rates in each month, as provided by the JUs. Variable rates include all applicable volumetric charges for transmission, distribution, generation, administrative credits, receipt taxes, stabilization adjustments, procurement adjustments, and county surcharges. The default “R” rate column refers to the flat volumetric rate tariff that applies to the majority of residential customers who have not opted to purchase energy from a third-party supplier.

Center the Customer

Begin as you mean to go on . . . pilot launch simulated a full scale roll out

- Prioritization on marketing and outreach - focus groups, full campaign design
- Customer supports designed to mimic on going offerings - rate comparison, customer engagement tools
- For smaller utilities (DPL) recruitment ultimately reached all customers

FIGURE 2: SEASONS AND PEAK HOURS



Source: BGE recruitment letter

Rate Comparison Tool

Your Current Rate	Lowest Cost | **Save $40**
Standard Residential (Schedule R)	**Distribution and Supply TOU (Schedule RD)**
Ideal for: Customers who prefer not to shift their energy usage based on time of day pricing. **Standard Price Plan:** Price remains consistent throughout the day.	**Ideal for:** Customers who can shift energy usage during the day to periods when prices are lowest. **Price highest:** Price varies throughout the day. It's highest on weekdays between 3pm to 8pm June-September and 6am to 9am and 5pm to 9pm October to May.
$1,105 Estimated cost per year	**$1,065** Estimated cost per year
LEARN MORE	LEARN MORE

Marketing and Outreach

Opower Rate Coach

Welcome

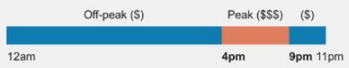
UtilityCo

Ana Rodriguez
Acct ****1234

Welcome to your Rate Coach, a weekly email designed to help you save money by avoiding high-cost times

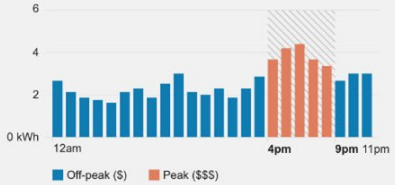
You're currently on a summer rate plan that charges different prices throughout the day, and lasts from April 25-September 30. By using less electricity when it's most expensive, others have saved on average $5 to $30 a month.

On weekdays, electricity is 1.5x more expensive from **4pm-9pm**



Here's how you used electricity this week

What parts of your routine could you do at off-peak times?



This data is based on your average weekday electricity use from July 9-13.

How can you save big during peak hours?

Appliances like these use a lot of energy. By using them at lower-priced, off-peak times, you'll see more savings.

Weekly Progress

UtilityCo

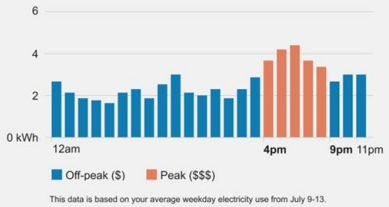
Ana Rodriguez
Acct ****1234

You spent $3 more on electricity during peak hours this week

On weekdays, electricity is 1.5x more expensive from **4pm-9pm**

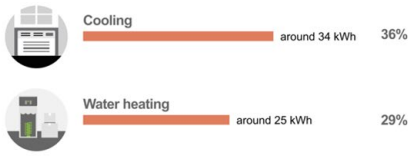
Here's how you used electricity this week

What parts of your routine could you do at off-peak times?



This data is based on your average weekday electricity use from July 9-13.

Around 65% of your on-peak electricity use came from these categories:



Post-Bill Report

UtilityCo

Ana Rodriguez
Acct ****1234

Take a look at your on-peak electricity use for your most recent bill

Jun. 1 - Jul. 1, 2023

You spent $16 less on electricity during on-peak hours compared to your last bill

On-peak hours are from **4pm-9pm**. Electricity is **2.2x more expensive** during this time.

Around $43 of your on-peak electricity costs came from these categories:

Other contributors to your on-peak electricity costs include:

- Dishwasher use
- Oven use

How do we know how you use energy?

Thanks to data from your smart meter, we can identify patterns in your electricity use that give us an idea of what appliances are using electricity in your home. We can match those end uses to different times of day to determine what appliances you use during peak hours. To get the most accurate view of your appliance use,

Seasonal Changes

UtilityCo

Ana Rodriguez
Acct ****1234

Coming soon: changes to peak hours and pricing

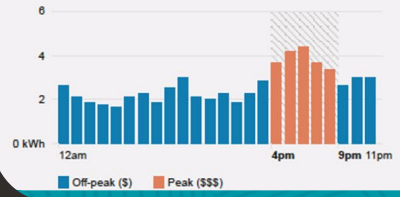
Starting June 1, peak hours and pricing will change for the new season. To save more, try to avoid using high-energy use appliances during peak hours.

	Current	New
Dates	Oct 1 - May 30	June 1 - Sept 30
Peak hours	6am - 9am	4pm - 9pm
Price difference	1.8x	1.5x

On weekdays, electricity is 1.5x more expensive from **4pm-9pm**

Here's how you used electricity this week

What parts of your routine could you do at off-peak times?



Evaluate Results

FIGURE ES-3: SUMMER PEAK IMPACTS FROM OTHER TIME VARYING PRICING PILOTS AND PC44 TOU IMPACTS

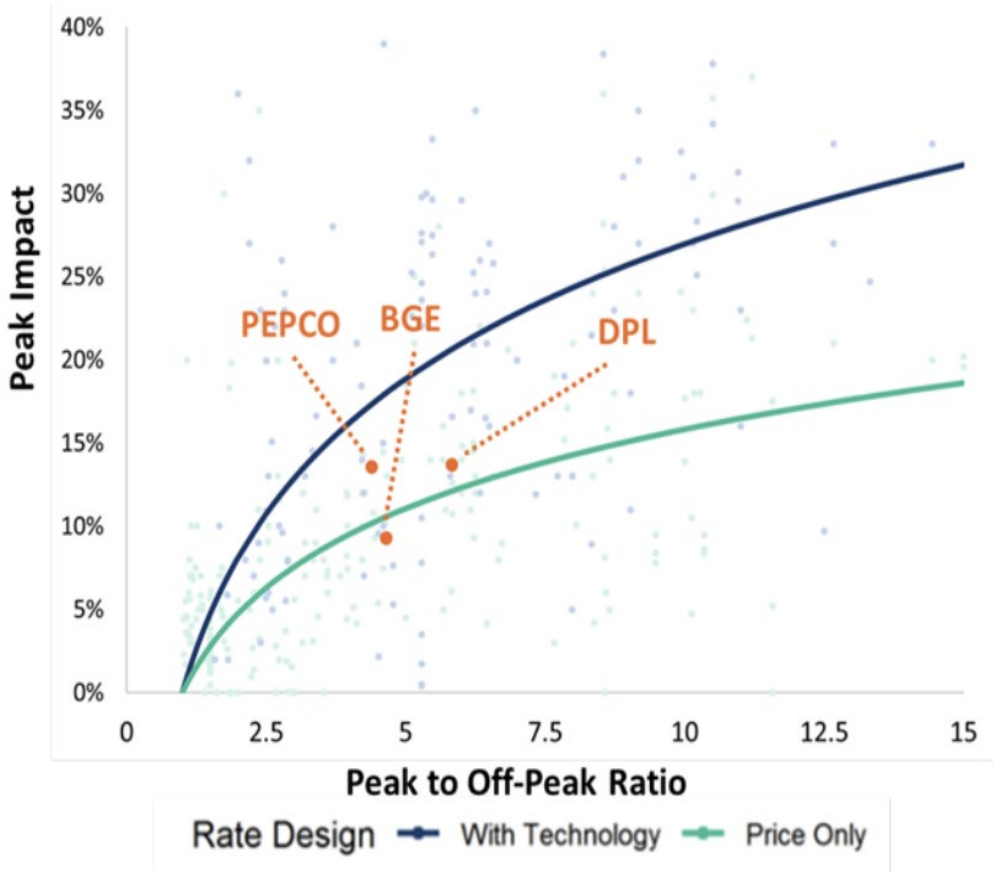
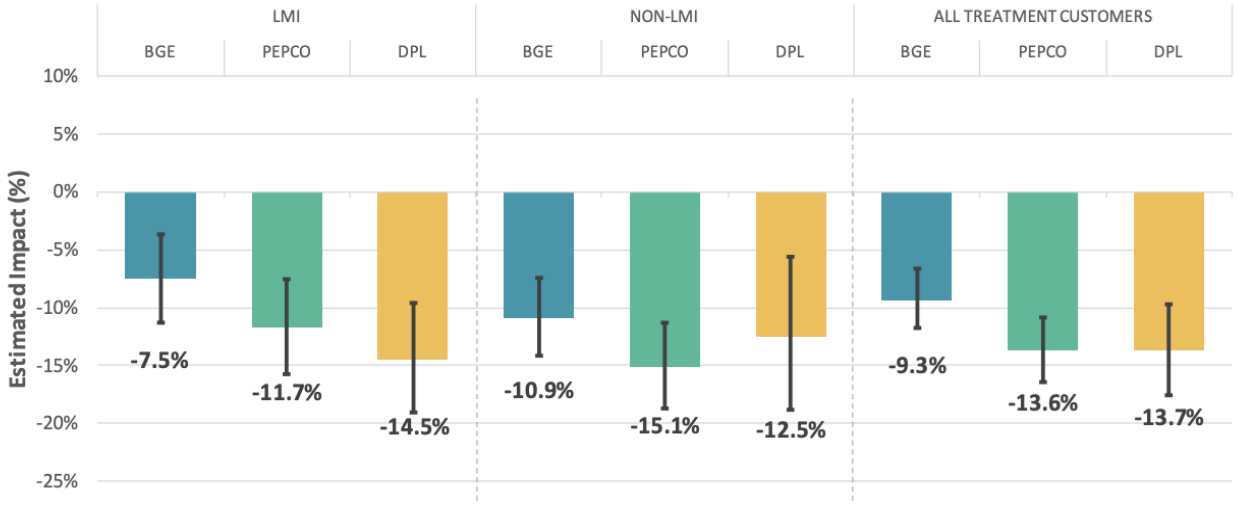
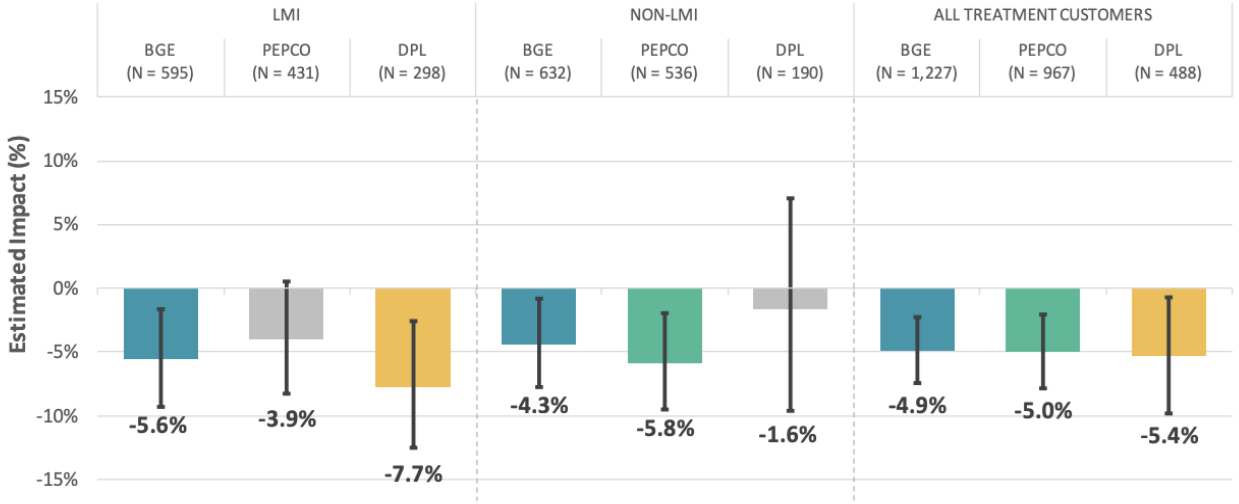


FIGURE ES-1: SUMMER WEEKDAY PEAK IMPACTS



Notes: Error bars indicate the 95% confidence interval of the regression coefficients. Grey bars denote statistical insignificance at the 5% level.

FIGURE ES-2: NON-SUMMER WEEKDAY PEAK IMPACTS



Notes: Error bars indicate the 95% confidence interval of the regression coefficients. Grey bars denote statistical insignificance at the 5% level.

Supplier Pilot

Commission specifically requested participation of the retail supply market

- Established a Utility RFP to seek supplier participation to pair with Utility distribution TOU offering
- Minimal interest, selected suppliers dropped out
- Constellation Energy completed a Load Shaping Pilot from July 2021-May 2023

Challenges:

- Wholesale market designs (inability to reduce customer capacity obligations with shifts)
- Minimal customer interest (similar to utilities)
- Lack of ratepayer support for pilot costs (marketing, EM&V)

What Did We Miss?

- Pilot period included COVID-19 Pandemic
- Interactions with existing programs
  - Unable to offer TOU for NEM customers, EV Charging rate development
- Evaluating and Measuring System Impacts
  - No ongoing evaluation of peak reductions, no way to truly measure bulk power system impacts
- Future Proofing process and interactions with upcoming programs
  - DRIVE Act Implementation, Distribution System Planning, Multi Year Rate Plans

Questions?

Brattle Year One Evaluation - https://www.brattle.com/wp-content/uploads/2021/05/19973_pc44_time_of_use_pilots_-_year_one_evaluation.pdf

Brattle End of Pilot Evaluation - https://www.brattle.com/wp-content/uploads/2021/12/PC44-Time-of-Use-Pilots-End-of-Pilot-Evaluation.pdf

Recent TOU Workgroup Report - https://www.psc.state.md.us/wp-content/uploads/PC-44-Notice-Transforming-Marylands-Electric-Distribution-System.pdf

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ALN
POLICY & LAW

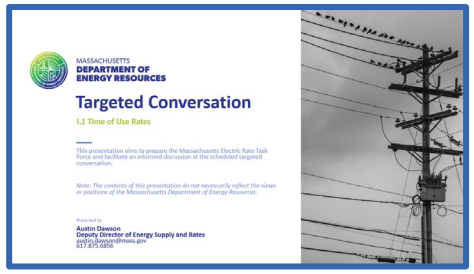
Next Steps

Targeted Conversation

May 28, 2025, 2-4pm

- Review of IRWG TOU proposal and design considerations, will serve as a deliberative space following related expert presentations to prompt informed discussion on policy questions and priorities
- DOER will share a working paper ahead of the session that will further detail primary issues and considerations to drive the conversation

Illustrative Presentation



Illustrative Working Paper

Optional Office Hours

June 4, 2025, 2-4pm

- Optional office hours for further conversation, serving as a structured opportunity to work towards common understandings and positions. We also encourage participants to have discussions amongst each other beside formal Task Force sessions
- Please reach out to chris.connolly2@mass.gov to request an invitation.