MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

Bill & Distributed Energy Resources (DER) Impacts

Expert Presentation Series | June 30, 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.

Contact Information

Austin Dawson
Deputy Director of Energy Supply and Rates
austin.dawson@mass.gov
617.875.6856

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

Expert Presentations

I. IRWG Bill Impact Recommendations

Massachusetts Clean Energy Center, Sarah Cullinan

Present recommendation for more granular bill impact analysis

II. Opportunities and Challenges in Rate Design

Energy and Environmental Economics, Inc., Ari Gold-Parker, Mike Sontag, & Vivan Malkani

Present on the Household Energy Expenditure Model (HEEM) for considering bill impacts, implications of cost-reflective rates for bills, DERs, and complementary programs

III. Evolution of DER Programs in Hawai'i

Hawaii Public Utilities Commission. Abby Austin & Clarice Schafer

Present the implementation of long-term DER programs in Hawaii that includes smart DER tariffs and bring-your-own-device tariffs

IV. Impacts on Existing DER Policies and Incentive Programs

Massachusetts Department of Energy Resources, Samantha Meserve

Present the impacts of time of use rates on existing policies and incentive programs that incentivize solar and storage resources in the Commonwealth

Reminder

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

Interagency Rates Working Group (IRWG) Bill Impact Recommendations

For Rates Task force: Bill & DER Impacts Session

Sarah Cullinan, MassCEC

MASSACHUSETTS CLEAN ENERGY CENTER®

Household Energy Expenditure Model (HEEM)

- Primary IRWG Bill Impact recommendation: More granular rate impact analysis, that considers energy cost impacts on a variety of MA households
- Household Energy Expenditure Model (HEEM)
  - Developed to calculate energy bills for a multitude of diverse customer profiles
  - Considers variables such as heat fuel, home vintage, single versus multi-family, discount rate status, etc.
  - Designed to answer questions such as: How do energy bills differ by key household characteristics? Which types of households face the most significant energy burdens today? How does electrification affect a household's energy burden?

Representative building types modeled in HEEM

Over 6,000 customers modeled to explore diversity of bills with and without electrification under current and alternative rate designs

Building

- **Housing Type**
  Single Family, Multi-family
- **Size**
  Small (<1600 sqft), Large (>1600 sqft)
- **Vintage**
  Pre-1970, Post-1970
- **Region**
  Western MA, Central MA, Boston Area, Fitchburg, North Shore, Cape Cod
- **Heating Source**
  Gas, Electric, Heating Oil, Propane
- **Air Conditioning**
  None, Room or Central AC

Technology

- **Building Electrification**
  None, Whole Home Electrification
- **Vehicle Electrification**
  None, Electric Vehicle
- **Distributed Energy Resources**
  None, Rooftop Solar, Storage

Customer

- **Occupant Status**
  Renter, Owner
- **Bill Discount Program**
  No, Yes (if available)

Motivation for Commissioning HEEM

Status Quo	Changing Factors	What is Needed
• Analyze rate impacts based on simple bill with average usage • Analyze bill impact in year 1 of implementation, versus today's rates (all else equal)	• Adding programs and policies with annual rate changes • Energy transition introduces new sources variation in customer experience, including EE upgrades, electrified end uses, adoption of solar + storage	• More representative understanding of bill impact across the spectrum of MA energy customers • More holistic/realistic understanding of bill impacts (over time, and in context of all other proposed changes, potentially with sensitivities/scenarios)

Dr. Nock: Recommendations to Assess Affordability and Impacts to Vulnerable Ratepayers

1. **Include clear definition of energy affordability**
2. **Additional demographic designations (e.g., race and age)**
3. **Enhance data-driven methods to assess rate impacts and target at-risk customers**
4. **Holistic view of housing-related energy burdens**
5. Integrated approach for supporting at-risk customers
6. Support for upfront costs of fuel switching

Challenges and Opportunities for Electric Rate Reform in Massachusetts

E3 Presentation to Rates Task Force

June 2025

Energy+Environmental Economics

Ari Gold-Parker
Mike Sontag
Vivan Malkani

About E3 and Interagency Rates Working Group (IRWG) Studies

130+ full-time consultants

30+ years of deep expertise

Engineering, Economics, Mathematics, Public Policy…

San Francisco

New York

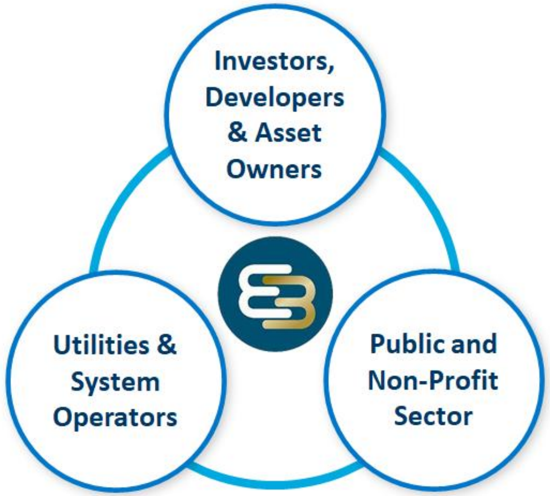
Boston

Calgary

Denver

E3 Clients

300+ projects per year across our diverse client base



IRWG Work products

- MA Electricity Rates Database
- E3 Near-Term Rate Strategy Report and IRWG Recommendations
- E3 Long-Term Ratemaking Study and IRWG Recommendations

Executive Office of Energy and Environmental Affairs

MASSACHUSETTS CLEAN ENERGY CENTER®

MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES

OFFICE OF THE ATTORNEY GENERAL COMMONWEALTH OF MASSACHUSETTS

This presentation does not represent the IRWG's opinions

IRWG Near- and Long-Term Rate Design Reports

+ E3 supported the Massachusetts Interagency Rates Working Group (IRWG) by developing two reports:

- Focused on the next 5 years
- Reflects that Advanced Metering Infrastructure (AMI) is not yet available

- Focused on longer term
- Widespread AMI implementation
- Transition to a winter-peaking grid

Key Takeaways – MA Rate Design Studies

- **Existing electric rate design is creating barriers to the Commonwealth decarbonization and energy affordability goals.**
  - Rate reform will be a crucial policy tool to support these objectives.
- **A winter-peaking grid will have high costs during the coldest hours of the year. A key challenge will be keeping building electrification affordable while providing price signals that encourage investment in building efficiency and efficient heating equipment.**
  - Increasing fixed charges, or alternatively moving costs out of rates, can effectively reduce volumetric rates and would be a durable approach to supporting heating electrification in the long term.
- **As customers increasingly adopt new technologies like electric vehicles, time-varying rates (TVRs) can provide price signals to encourage load management aligned with system needs.**
  - Programs and rates will need to work together to help mitigate electric system cost growth through load management.

Near-Term Rates and Modeling Approach

Energy+Environmental Economics

E3 Household Energy Expenditure Model (HEEM) explored diversity of bills with and without electrification under current and alternative rate designs

Building

- **Housing Type**
  Single Family, Multi-family (2+ units)
- **Size**
  Small (<1600 sqft), Large (>1600 sqft)
- **Vintage**
  Pre-1970, Post-1970
- **Region**
  Western MA, Central MA, Boston Area, Fitchburg, North Shore, Cape Cod
- **Baseline Heating Source**
  Gas, Electric Resistance, Heating Oil, Propane
- **Air Conditioning**
  None, Room or Central AC

Technology

- **Efficient Building Electrification**
  None, Whole Home Electrification incl. heat pump and building insulation upgrades
- **Vehicle Electrification**
  None, Electric Vehicle
- **Distributed Energy Resources**
  None, Rooftop Solar, Storage

Customer

- **Occupant Status**
  Renter, Owner
- **Bill Discount Program**
  No, Yes (if available)

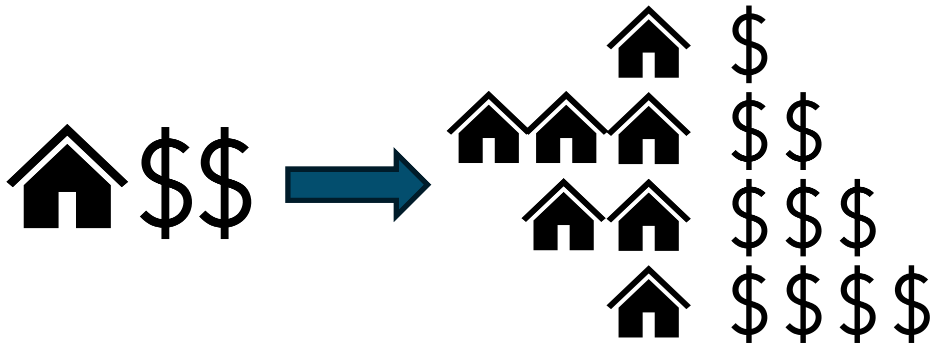
Guiding Questions:

- *Which households face high energy burdens today?*
- *Which customers see largest bill increases from electrification?*
- *How would customer bills change under alternate rate designs?*

Understanding distribution of bill impacts across customers helps identify opportunities and challenges of rate reform

+ HEEM enables exploration of bill impacts across diverse customer usage profiles
+ Shifting away from "average customer" rate impact analyses to identify challenges faced by different customer segments

Average Customer | **Distribution of Customers**



Monthly Average Energy Expenditure Changes for Households without Bill Discounts relative to Baseline Home and Existing Rates

		High Fixed Charge	Seasonal	Seasonal, Heat Pump	Declining Block, Heat Pump
Baseline Home (No EV)	Natural Gas	-$5 to $5 (-1% to 1%)	-$3 to $1 (0% to 0%)	N/A for households not adopting heat pumps	
	Fuel Oil	-$12 to $6 (-1% to 1%)	-$3 to $0 (-1% to 0%)		
	Electric Resistance	-$83 to -$35 (-9% to -5%)	-$75 to -$27 (-7% to -5%)		
Full Home Elec. (No EV)	Natural Gas	$3 to $61 (0% to 26%)	$8 to $69 (2% to 19%)	-$78 to -$13 (-14% to -4%)	-$103 to $4 (-17% to 1%)
	Fuel Oil	-$139 to -$26 (-17% to -8%)	-$117 to -$30 (-14% to -6%)	-$255 to -$101 (-35% to -19%)	-$257 to -$90 (-35% to -17%)
	Electric Resistance	-$472 to -$217 (-49% to -39%)	-$468 to -$221 (-48% to -40%)	-$545 to -$261 (-54% to -47%)	-$538 to -$244 (-54% to -39%)
Full Home Elec. + EV	Natural Gas	-$56 to $0 (-18% to 0%)	-$45 to $16 (-14% to 7%)	-$137 to -$79 (-29% to -14%)	-$193 to -$88 (-31% to -22%)
	Fuel Oil	-$204 to -$88 (-25% to -20%)	-$173 to -$76 (-21% to -12%)	-$325 to -$166 (-44% to -32%)	-$352 to -$183 (-48% to -34%)
	Electric Resistance	-$535 to -$274 (-55% to -41%)	-$522 to -$263 (-54% to -39%)	-$610 to -$331 (-61% to -60%)	-$631 to -$337 (-64% to -54%)

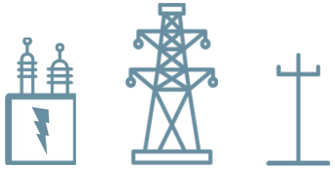
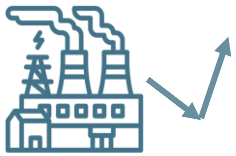
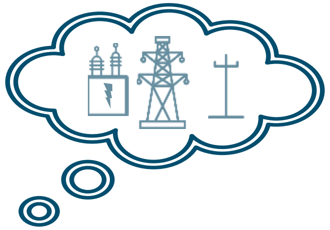
Bill savings
Range crosses 0
Bill increase

Note: Monthly bill impact (and percentage change) is shown for the 10% to 90% range across modeled representative prototypes selected from NREL's ResStock database.

Designing Cost-Reflective Rates

Energy+Environmental Economics

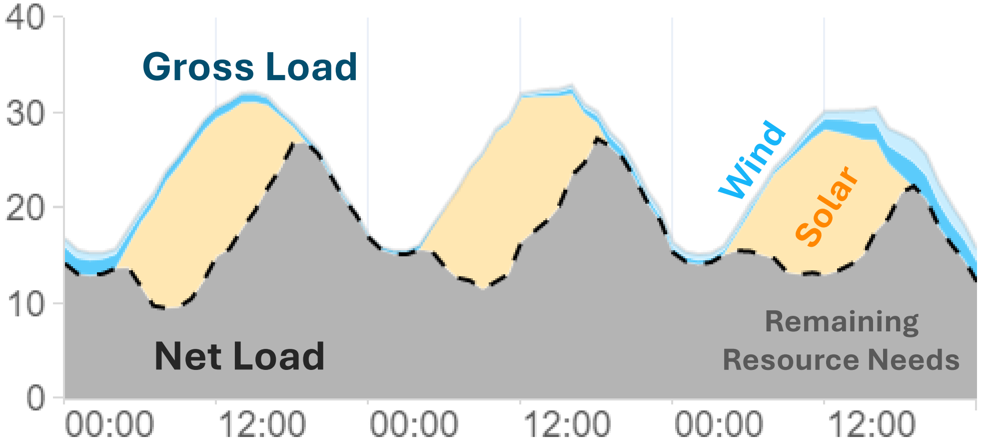
Time-varying rates should communicate temporal differences in *avoidable* energy system costs

				
Program Costs	**Embedded Delivery Infrastructure**	**Marginal Supply Costs**	**Forward-looking Delivery Infrastructure**	**Forward-looking Generation Capacity**
Independent of Electric System	**Embedded**	**Avoidable**	**Avoidable**	**Avoidable**
Programs funded through rates do not reflect electric system costs	*Embedded infrastructure costs cannot be avoided through load reductions*	*Supply costs will vary by hour, but can be avoided through any load reduction*	*Avoiding long-run capacity investments will require dependable load reductions during specific peak hours that drive system capacity need*	

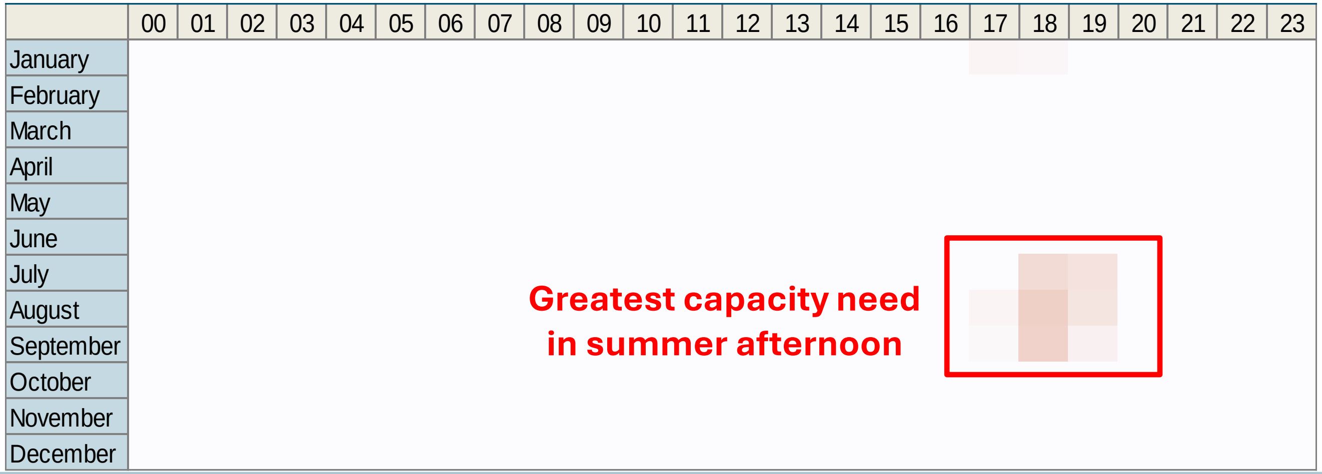
In the near term, summer evenings drive capacity need

Example Summer Week in July 2030

Renewable Output and Net Load (GW) – *Before Storage*



Month-hour System Firm Resource Needs



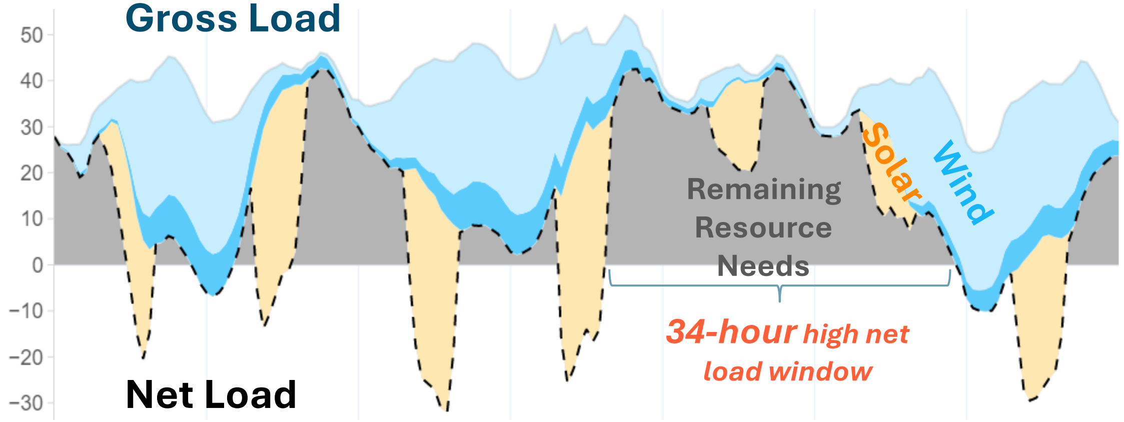
- **Today, summer air conditioning loads drive peak demand in New England**
- **2030 perspective: resource needs are driven by summer evenings, when solar availability decreases but electricity demand remains high**

From DOER/E3 Charging Forward Study, December 2023

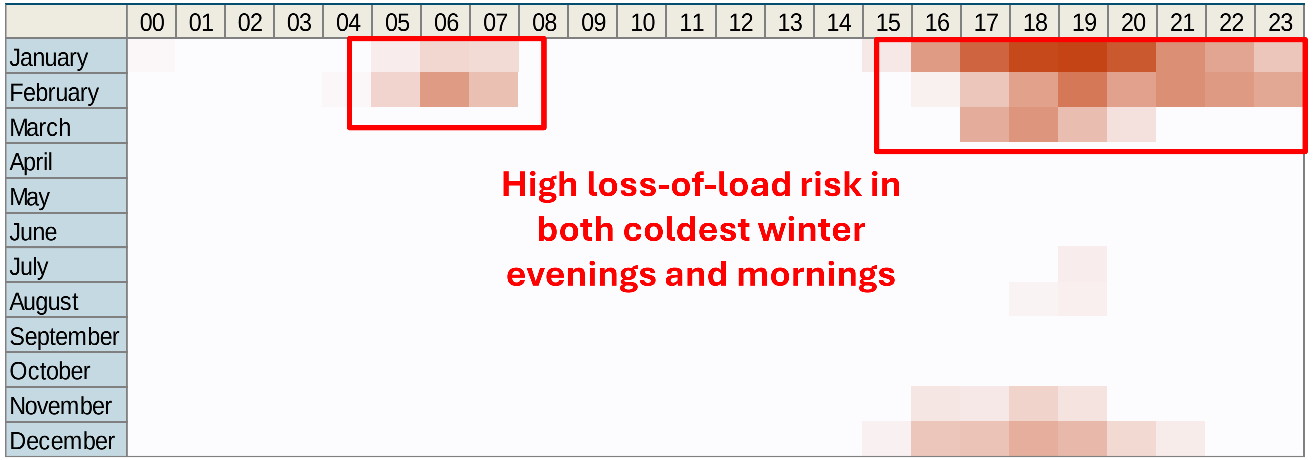
In the longer term, winter mornings and evenings are expected drive capacity need

Example Winter Week in 2050

Renewable Output and Net Load (GW) - *Before Storage*



Month-hour System Firm Resource Needs



- **Electrification of transportation and heating is expected to drive peak load growth and associated costs**
- **Critical hours driving electric system costs will shift to winter mornings and evenings**
- **Load management during critical, high-cost hours will be crucial to limiting electric system buildout and cost**

A cost -based time-of-use (TOU) rate design would reflect the temporal differences in avoidable system costs

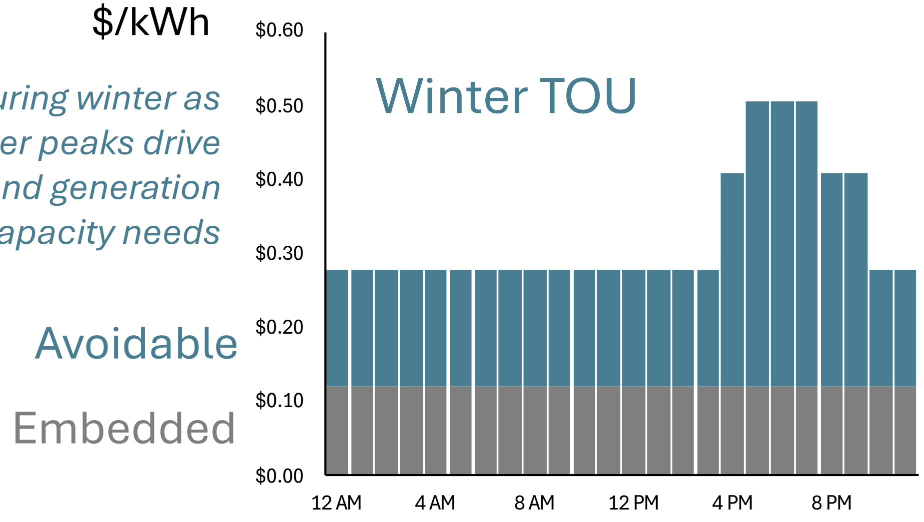
+ **In a "cost-based" TOU rate, the differences between peak and off-peak pricing reflect differences in avoidable system costs.**
  - Cost-based price signals could enable the greatest peak load reductions that could be achieved from customers without overpaying relative to the system value provided.

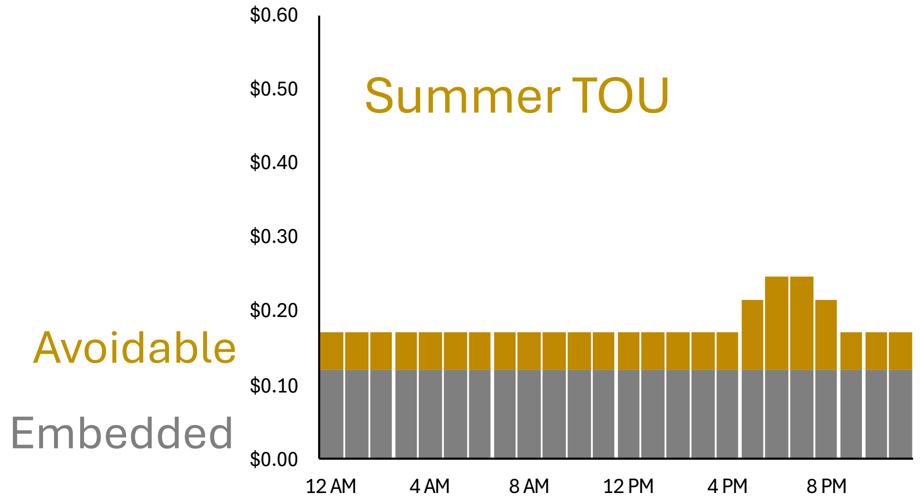
+ **TOU rates shown here are aligned with system costs on a winter-peaking grid, but would pose challenges for electric heating bills.**
  - This points to the need for proactive ratemaking, policy, and technology solutions to encourage load management and long-term affordability.

Illustrative 2035 TOU Residential Rate*

$/kWh

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





*Assuming $40/month fixed charge for policy costs

Challenges and Opportunities of Cost-Reflective Rates

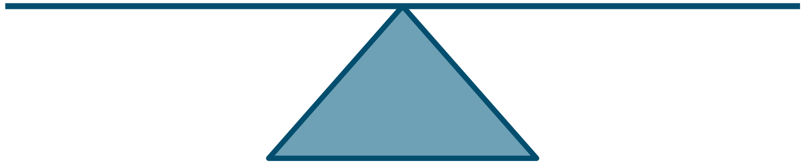
Energy+Environmental Economics

Winter peaking electric system costs will pose a challenge for electric heating

Once the grid shifts to winter-peaking, rates will need to balance two important objectives:

Support affordability and cost-competitiveness for heat pump space heating

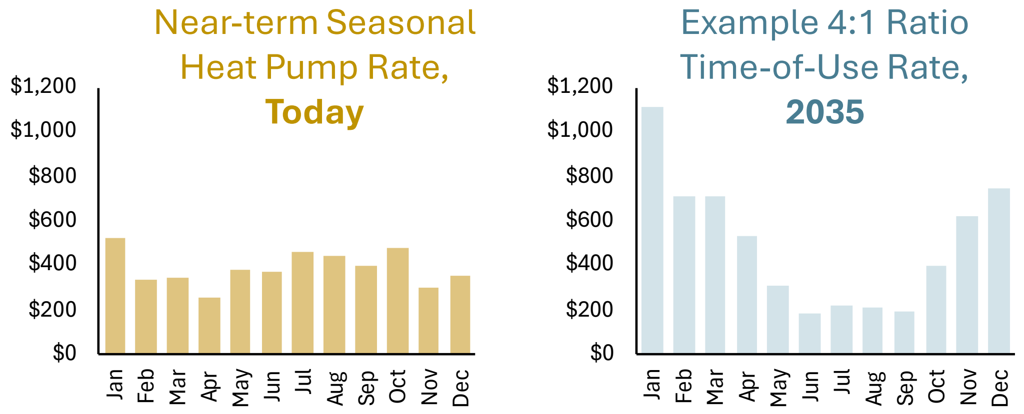
Providing price signals that encourage building efficiency and efficient equipment



+ Technology and policy solutions will be needed to support winter peak reductions, including:

- Building efficiency measures and high-efficiency heating technologies such as ground source heat pumps
- Nascent innovative technologies such as thermal energy storage, networked geothermal, etc.
- Load management and demand response programs for other end uses that are more flexible

Illustrative Electricity Bills for All-Electric Household
$/month



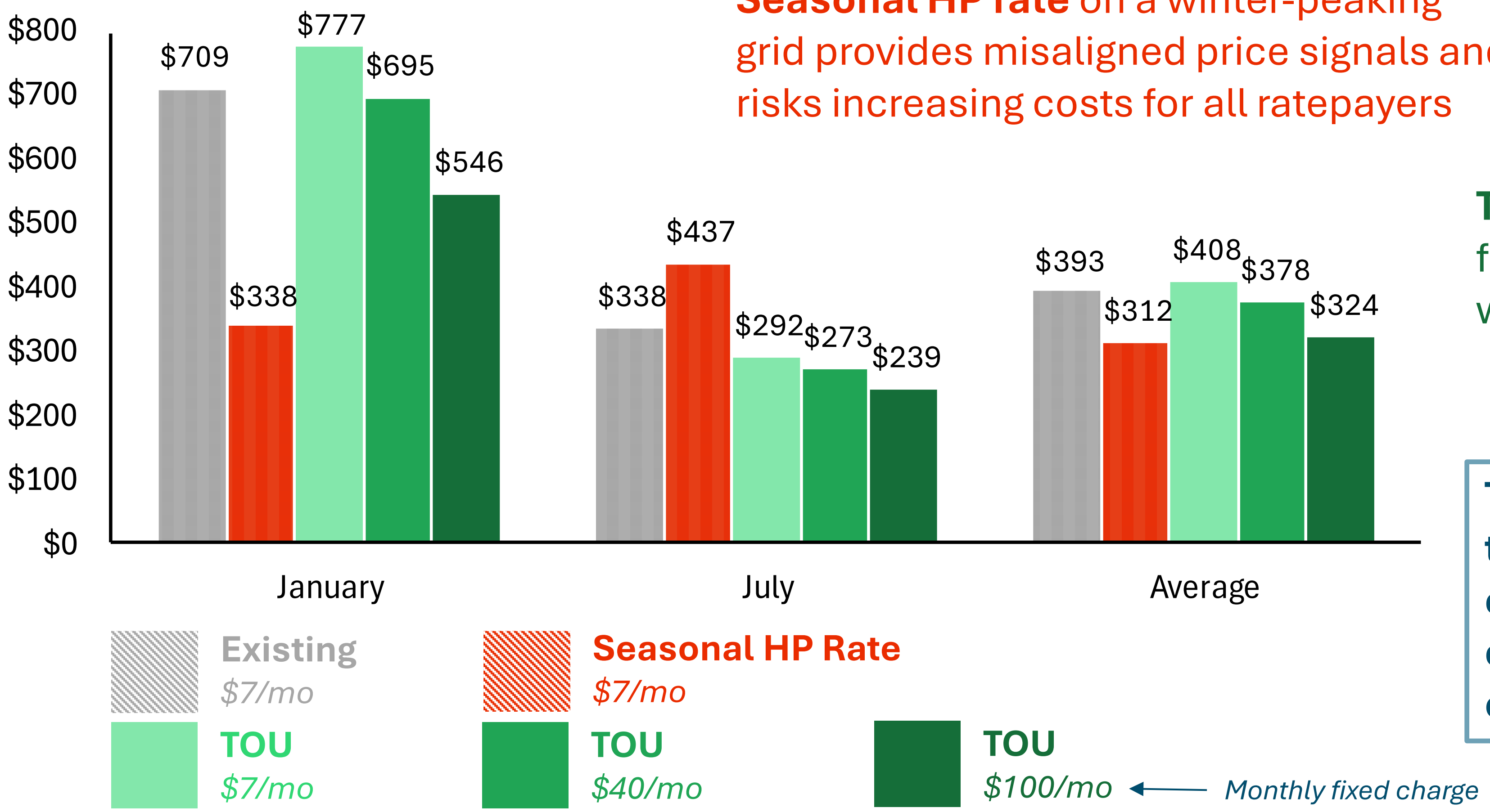
*time-of-use rates, critical peak pricing, real-time pricing

Seasonal HP rate would need to be sunset once a winter peak develops in early-mid 2030s; reducing volumetric rates will be key to ensure affordability

Monthly Energy Bills (Incl. Vehicle Use)*

Monthly fixed charges included below

$/month



Seasonal HP rate on a winter-peaking grid provides misaligned price signals and risks increasing costs for all ratepayers

TOU rates, without increasing fixed charges, would yield high winter electric heating bills.

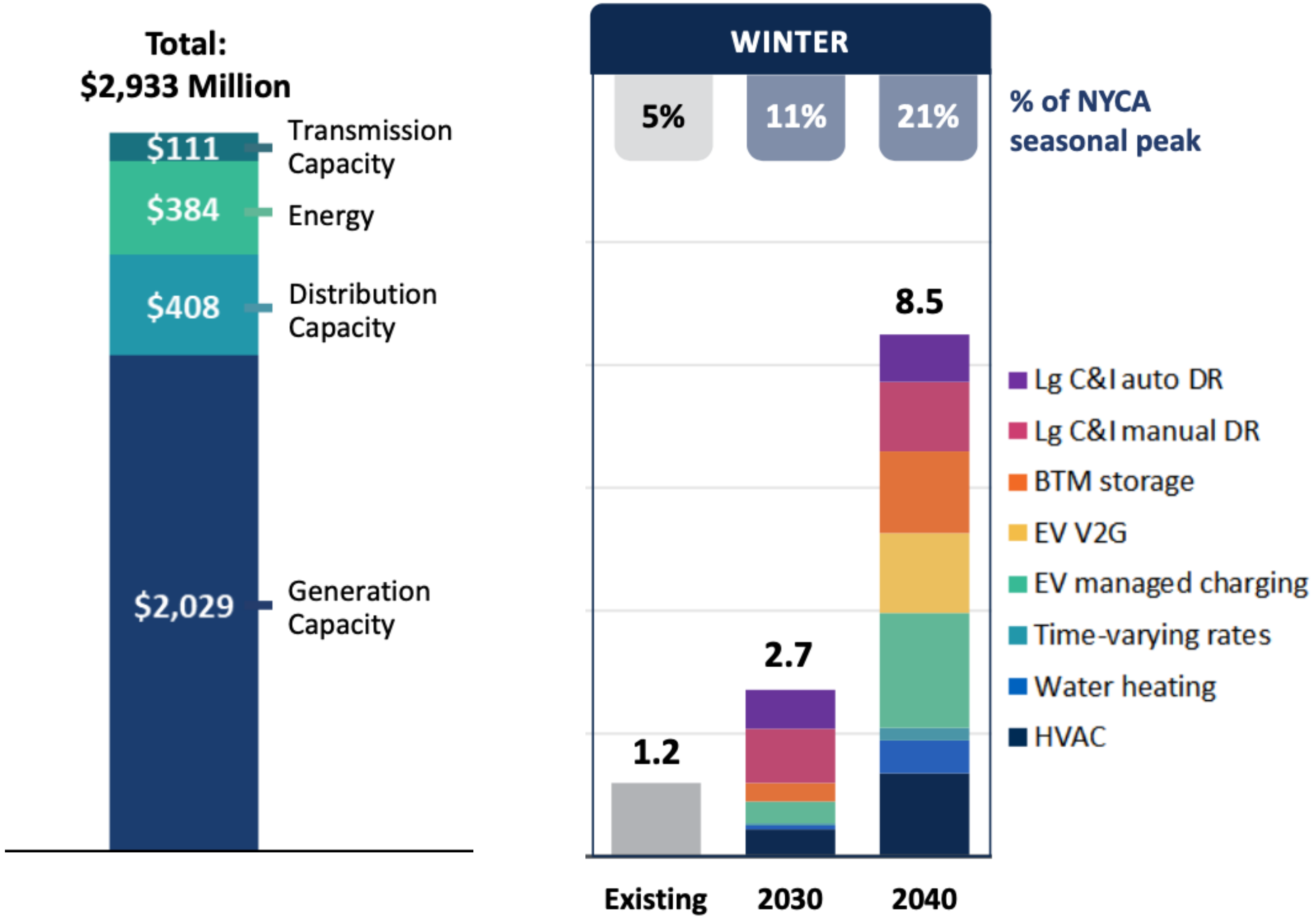
The most durable approach to support electrification cost-effectiveness is to move costs into a fixed charge or out of rates entirely.

*assuming same rate level

Multifamily home in Central Massachusetts, 1200 square feet, adopting a heat pump, electric vehicle, and weatherizing building, including light touch envelope improvements such as attic floor insulation and air sealing

Load management can help reduce system costs through dependable load reductions in critical hours

System Benefits and Achievable Grid Flexibility in New York (2040)

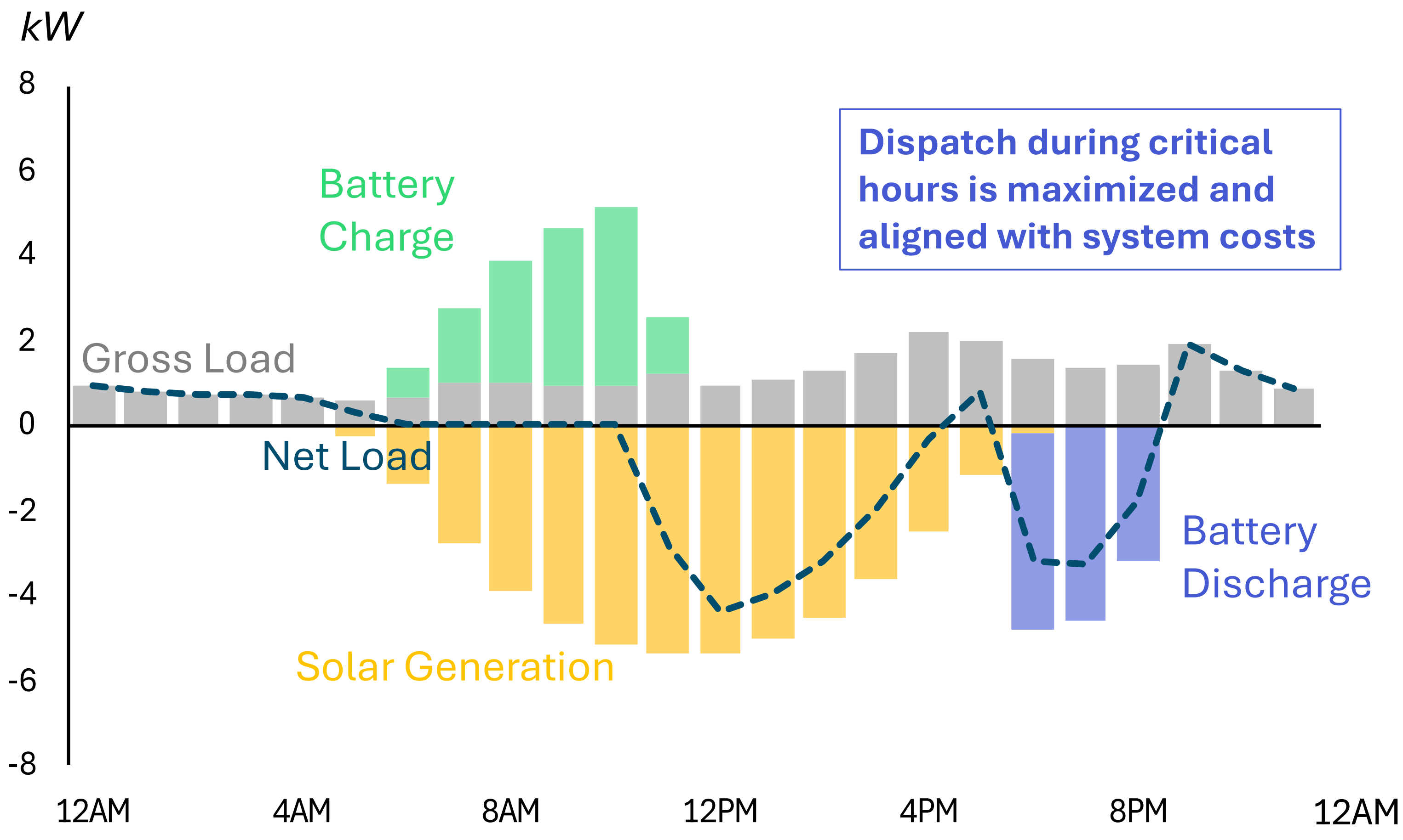


"New York's Grid Flexibility Potential" (Brattle Group, 2025)

+ **Some end uses will be more flexible:**
  - EV loads and customer batteries will be highly flexible.
  - Some C&I loads, plus water heating and low-kWh loads with enabling technologies, may provide some flexibility.
  - Space conditioning loads will likely have more limited flexibility, especially during extreme weather.
+ **Ongoing DOER and E3 study exploring technical, cost-effective, and feasible potential of load management strategies in the Commonwealth.**

Cost-reflective rates can help ensure DER dispatch is appropriately incentivized and compensated

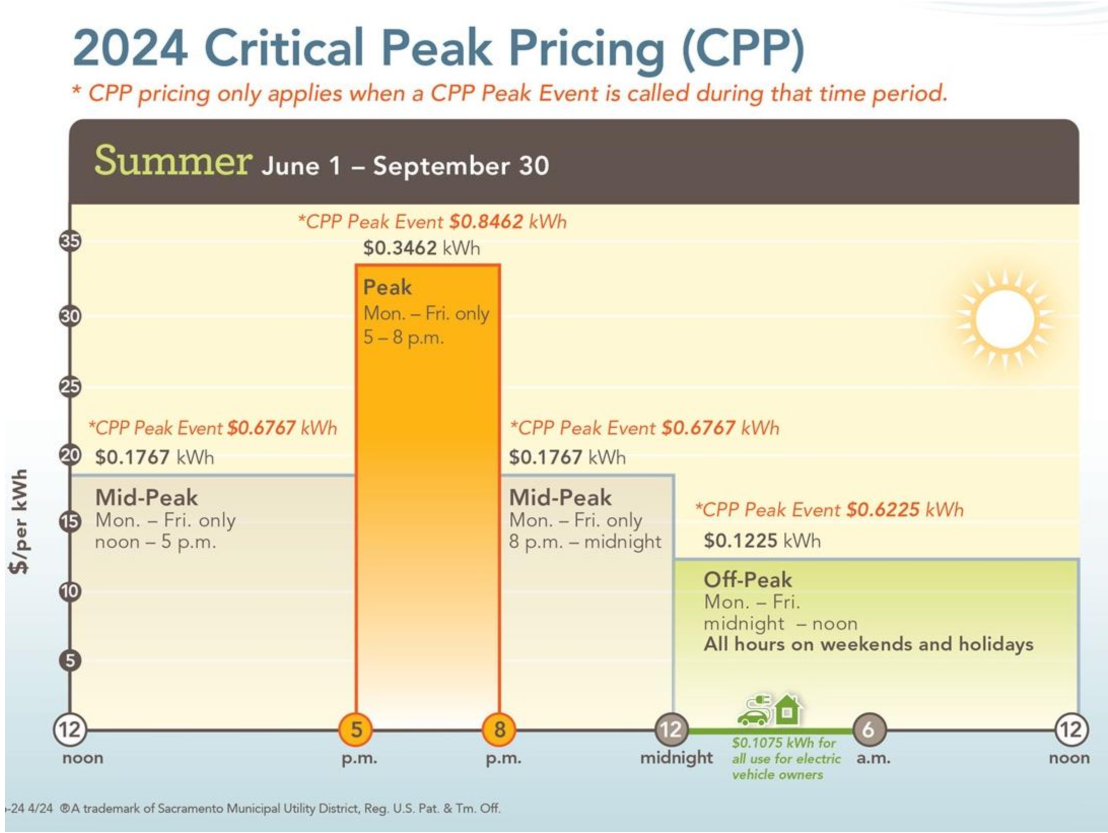
Hourly Load for Example Residential Customer



- **Time-varying rates can customer batteries to dispatch during high-value hours for the system**
- **Rates and programs will need to be closely coordinated to ensure that customers see price signals aligned with both bulk grid and local distribution system costs**
  - Ongoing MassCEC-E3 study exploring compensation for grid services, focusing on location-specific distribution system benefits
  - Caution needed to avoid double compensation through programs and rates

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

- **CPP reflects a step beyond time-of-use in providing more granular price signals to reduce peak demand**
  - CPP aims to incentivize behavioral response on the most challenging days of the year
- **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 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

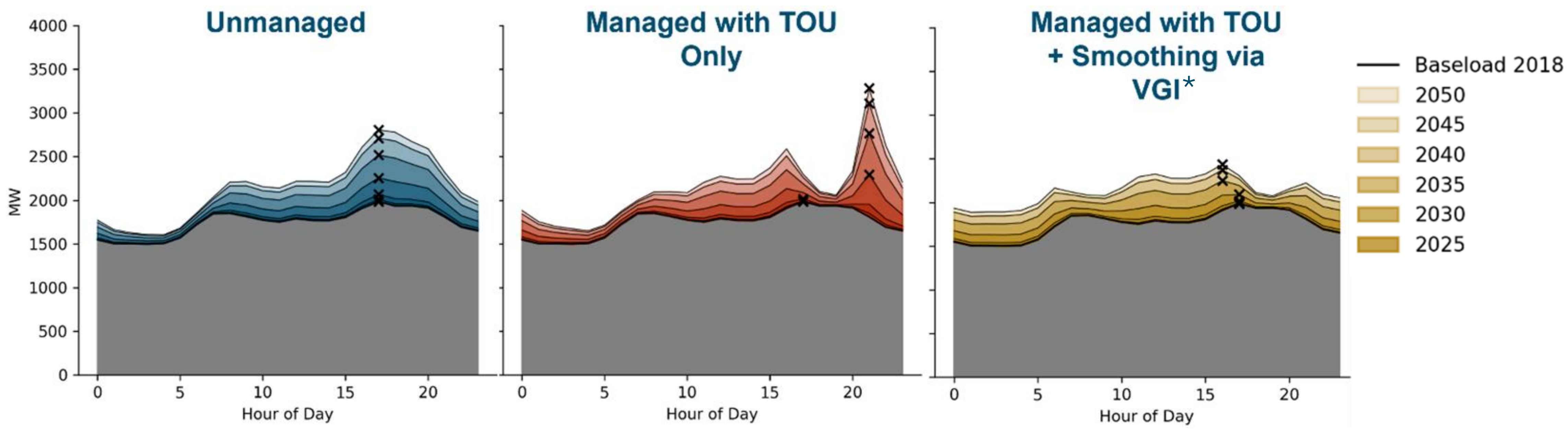
- **Flexible customers may see savings, but CPP may lead to higher bills for inflexible customers**
  - For this reason, it is often offered as an opt-in program today, potentially shifting to part of a default rate in the future
  - Dual-fuel heating systems are well suited for CPP, with high potential for peak reduction during critical winter hours

Aggregation can help optimally manage DER dispatch

EV charging example

Under TOU rates, "rebound peaks" can form right when a high-priced TOU period ends. This has been cited as an important concern in TVR design. Active management and VGI can help address this issue.

Example Peak Winter Weekday Loads with Increasing Light-Duty Vehicle Loads in Nova Scotia (E3 2023)



*Smoothing via Vehicle-Grid Integration (VGI) reflects utility-controlled load management

Rates and programs must be coordinated to ensure clear customer price signals aligned with system costs

	Rates	Programs
Purpose	Rates may be reformed to support policy goals such as encouraging electrification and providing price signals that support load flexibility.	Programs can help fill "missing money" gaps to incentivize technologies and behavior that are aligned with the Commonwealth's policy goals.
Applicability	TVR can capture differences in avoidable costs to the bulk system. However, TVR may be ill-suited to capture local distribution costs given high geographic variability.	Programs may be better suited to capture local distribution system benefits given flexibility of offering location-specific incentives, as well as support response from specific technologies, and manage potential rebound peaks from TVR.
Timing	Bulk system costs driven by net peak, *i.e.*, periods of high system demand and low renewable availability.	Local distribution system needs driven by local gross peak, which may occur at different times in different places.

Key Takeaways – MA Rate Design Studies

- **Rate reform will be a crucial policy instrument to support the Commonwealth's climate and energy affordability goals.**
  - Exploring the bill impacts of rate reform across different customer types can help inform benefits and challenges of different rate options.
- **A winter-peaking grid will have high costs during the coldest hours of the year. A key challenge will be maintaining affordability and cost-competitiveness for heat pump space heating while providing price signals that support investment in building efficiency measures and efficient heating equipment.**
  - Increasing fixed charges, or moving costs out of rates, can effectively reduce volumetric rates and would be a durable approach in the long term. Income graduation can protect low-income customers from adverse bill impacts.
- **Cost-reflective TVRs can provide price signals to encourage load management and DER dispatch to help mitigate electric system cost growth.**
  - Programs can complement rates, but their interactions should be carefully considered
  - Aggregated load management may offer opportunities to mitigate unintended consequences of TVR

Questions?

Thank you

Energy+Environmental Economics

Evolution of DER Programs in Hawai‘i

Abby Austin, Hawaii PUC Utility Analyst
Clarice Schafer, Hawaii PUC Supervising Utility Analyst

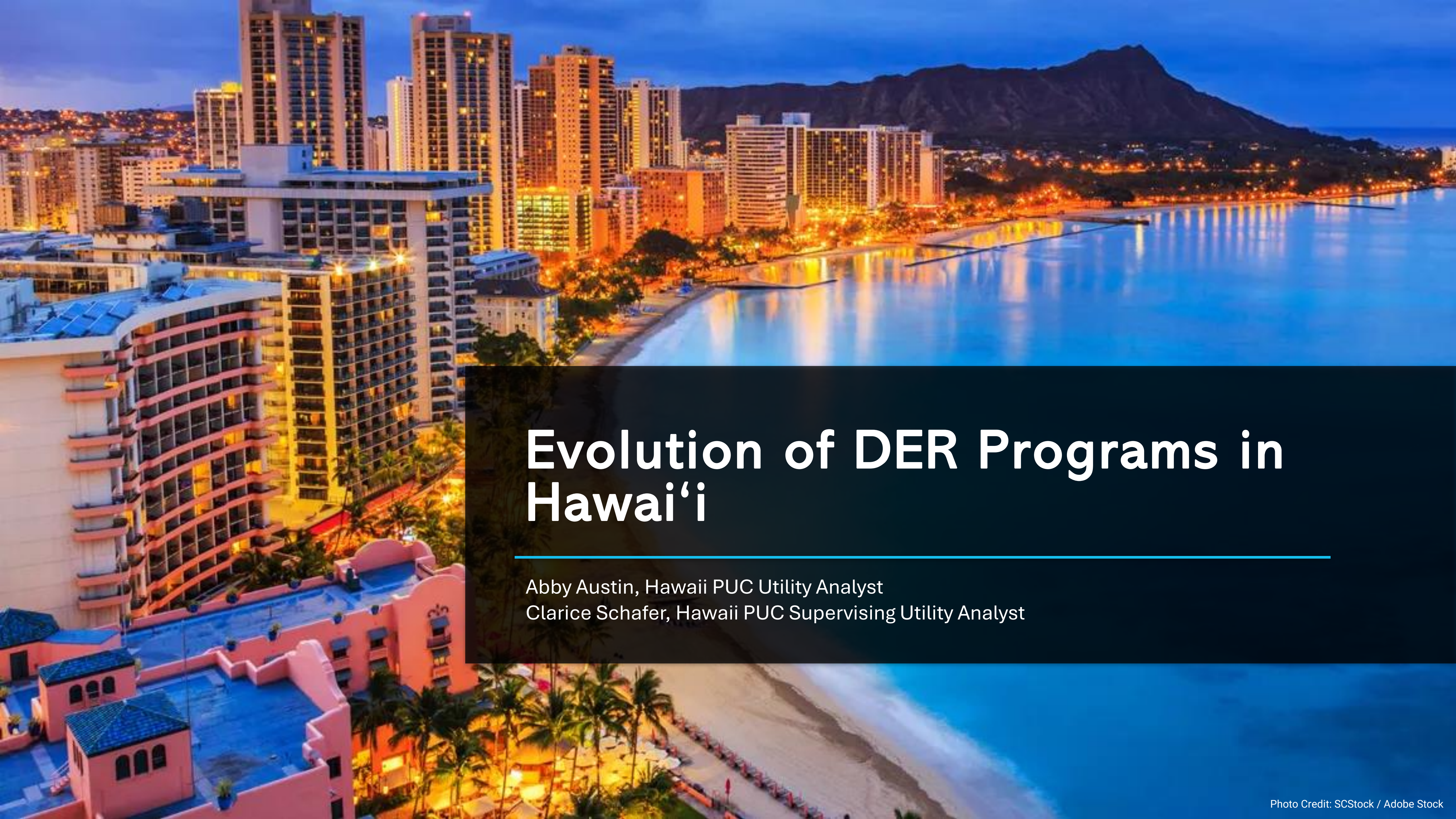


Photo Credit: SCStock / Adobe Stock

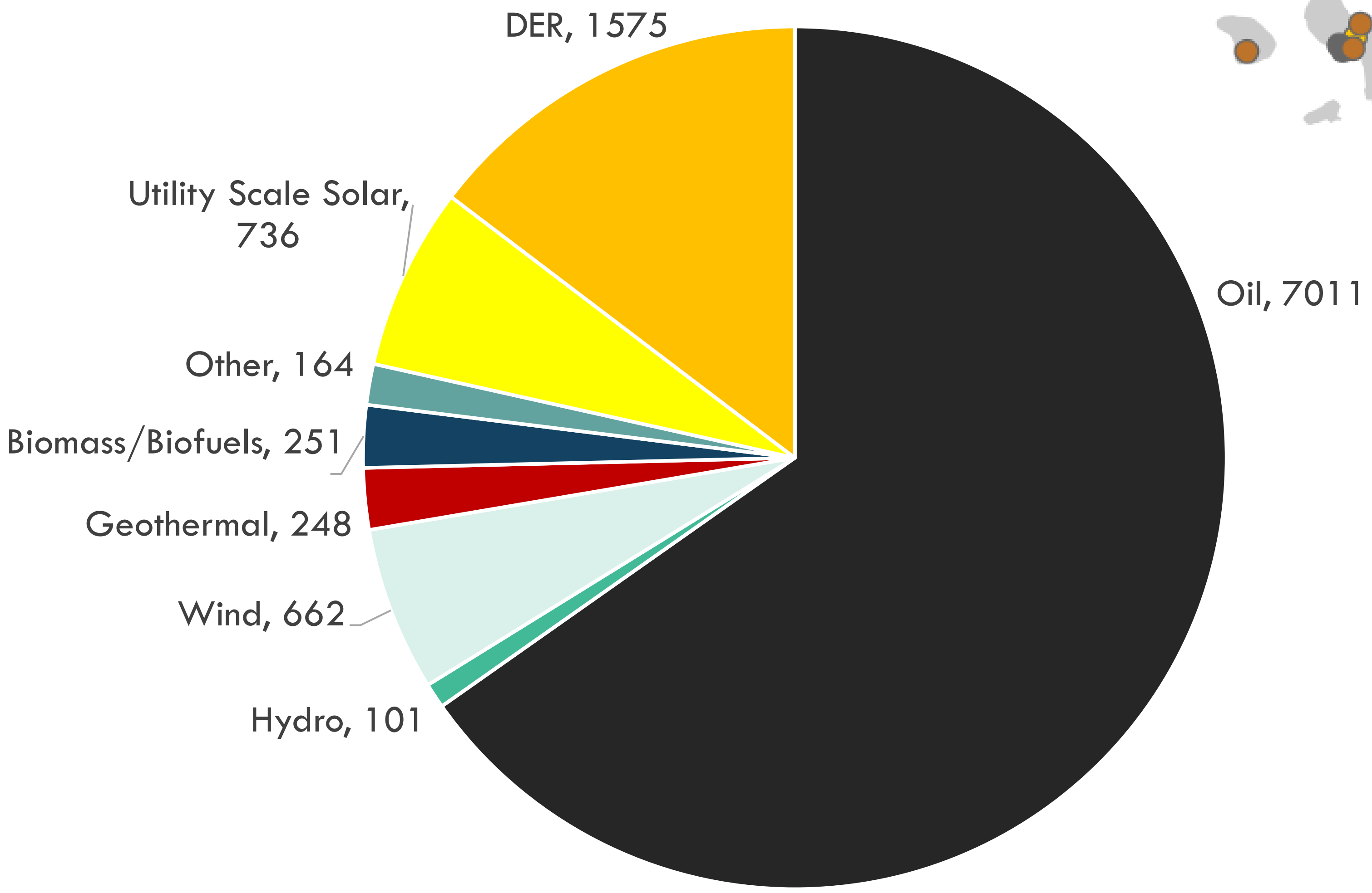
Different systems:

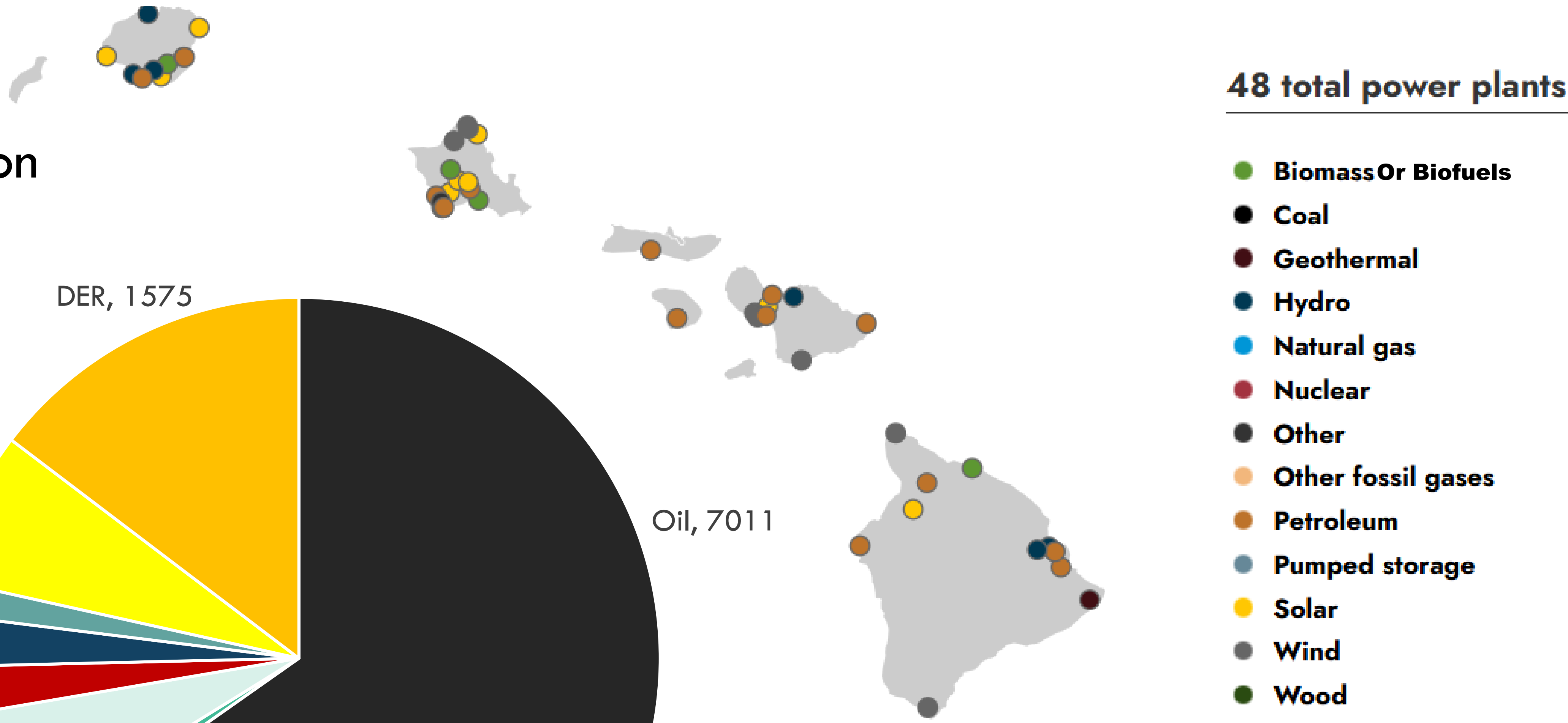
Small Independent Island Grids vs. Regional ISO

2024	Hawaiʻi	Massachusetts
Grid	7 independent island grids	ISO New England
Grid Peak Loads	5 MW Lānaʻi & Molokaʻi 1200 MW on Oʻahu	4.7 GW National Grid 6.1 GW Eversource
Sales	8,899 GWh	49,286 GWh
Customers	506,986	3,351,307
Electricity Cost	38 c/kWh	24 c/kWh
Percent Renewable	33%	34%

Sources: US EIA, American Council of Engineering Companies of Massachusetts (ACEC)

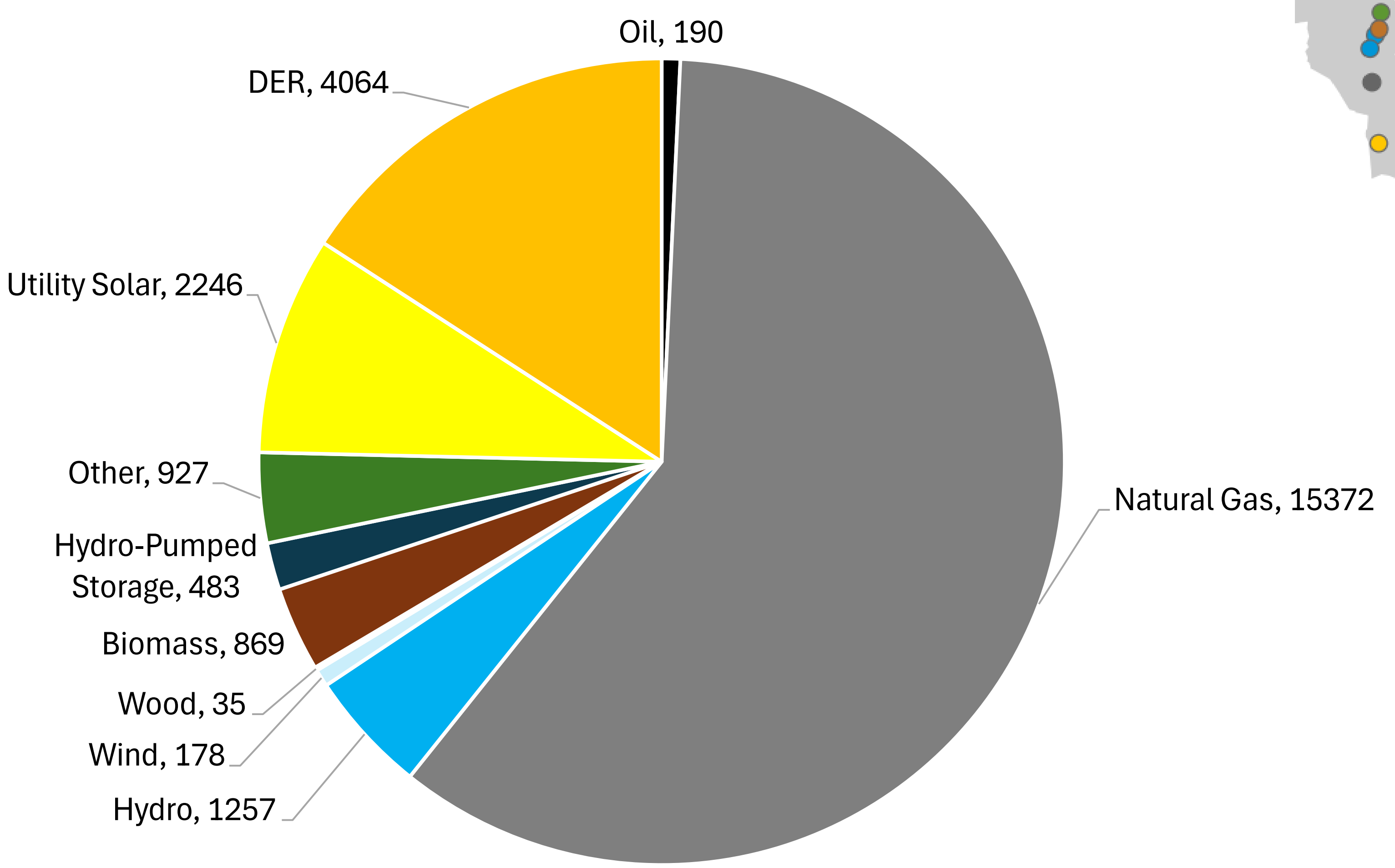
Hawaii 2024
Net Generation
10,748 GWh

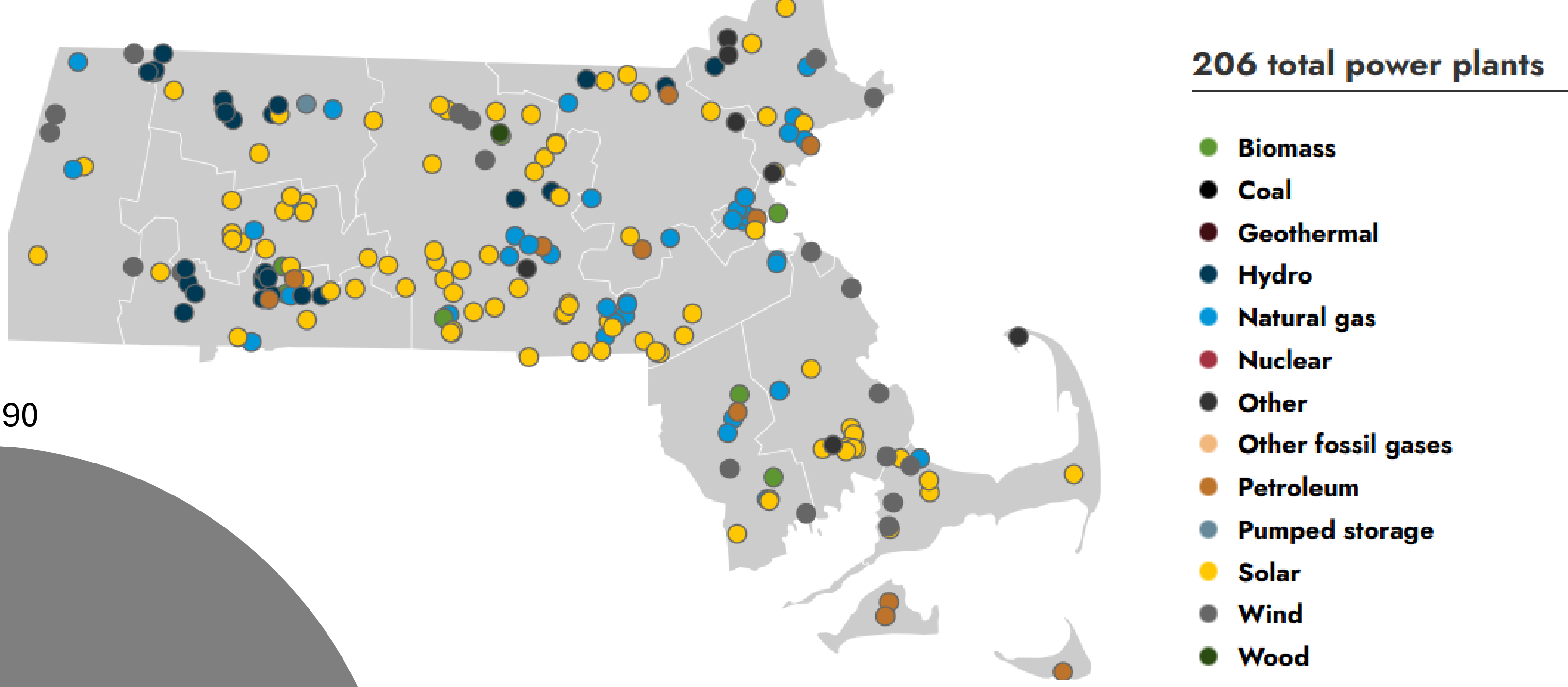




Source: US EIA

Massachusetts 2024
Net Generation
25,662 GWh

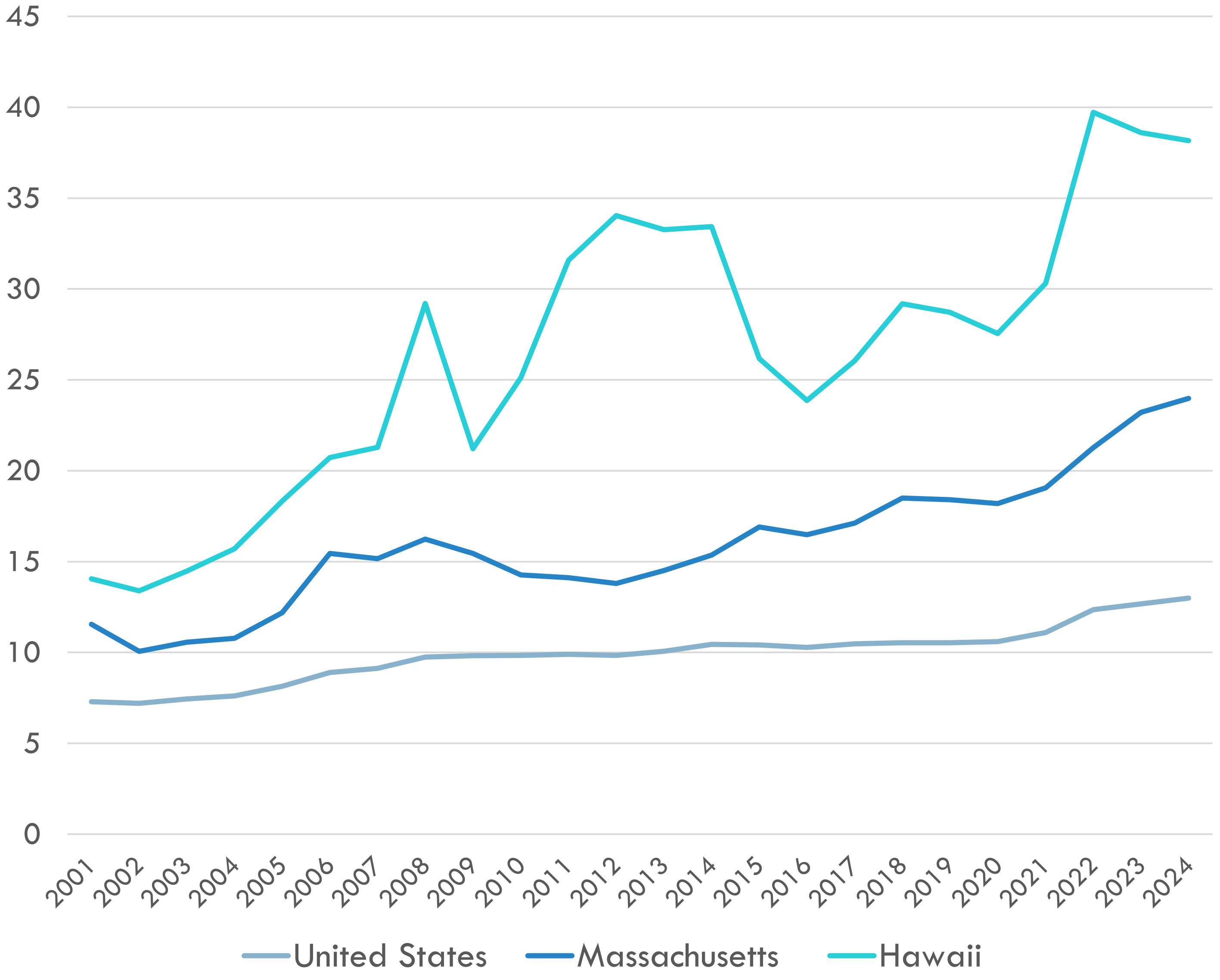




Source: US EIA

Average Annual Electricity Price

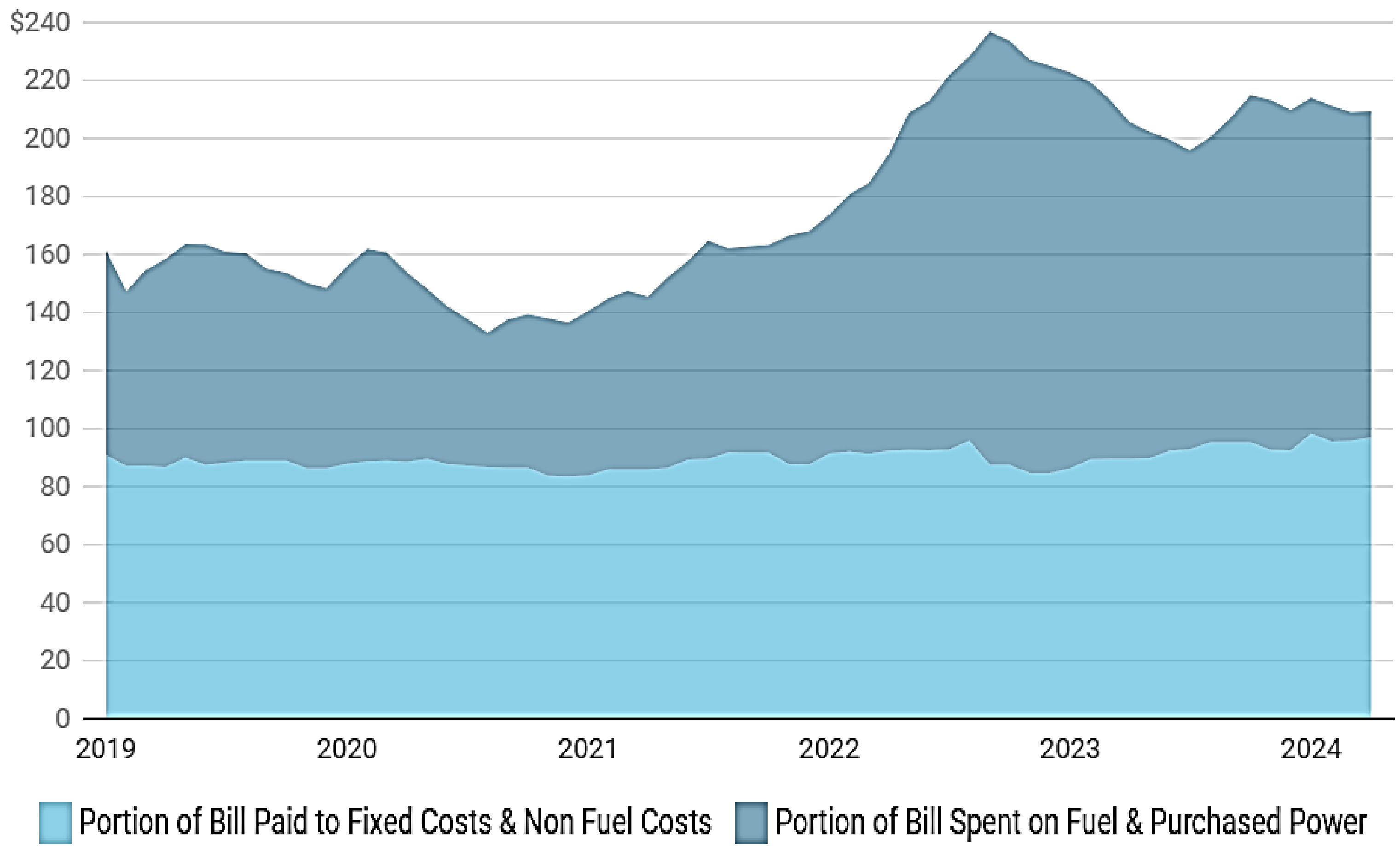
(all sectors, cents per kWh)



Source: US EIA

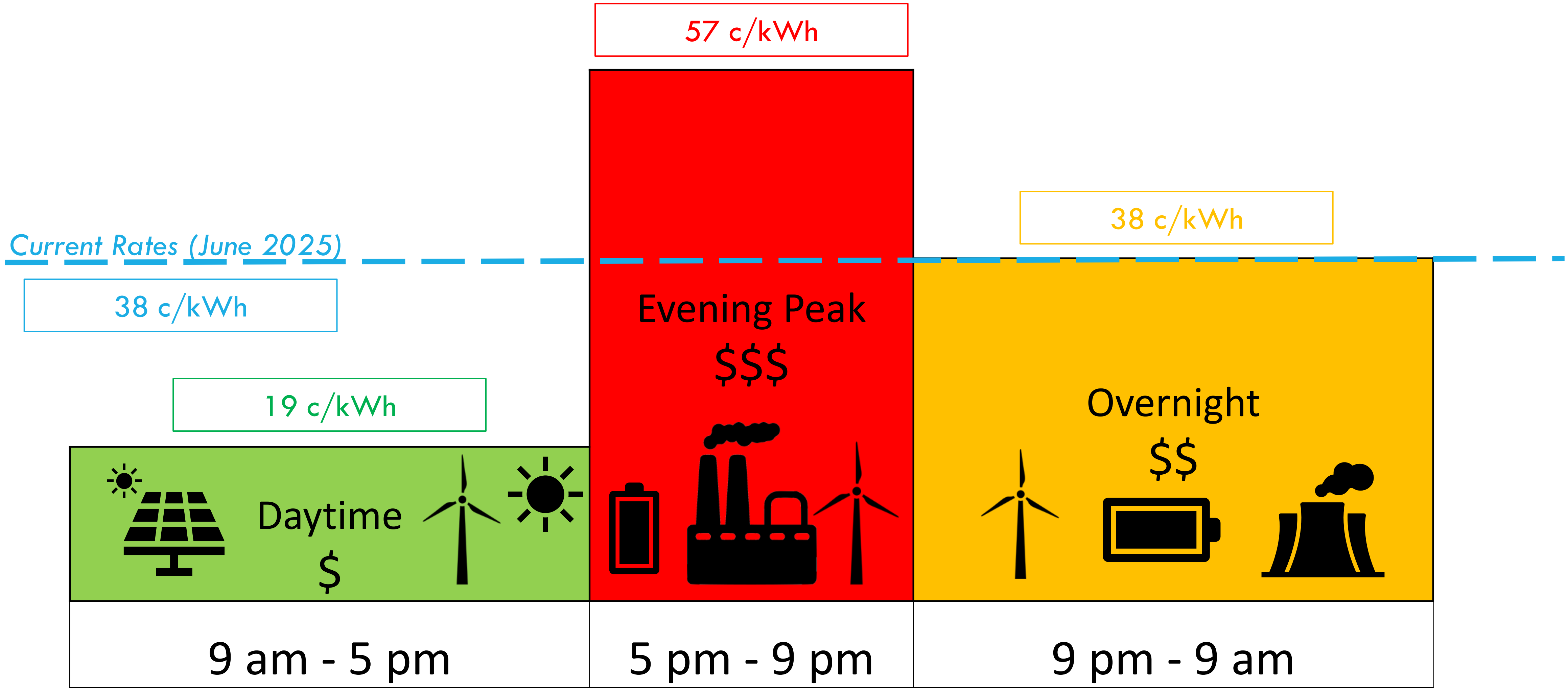
Residential Bills – Mostly to Pay for Oil

Rates & bills are volatile & track closely with crude oil prices.



Source: Hawaii State Energy Office

Time of Use Pilot (O‘ahu)



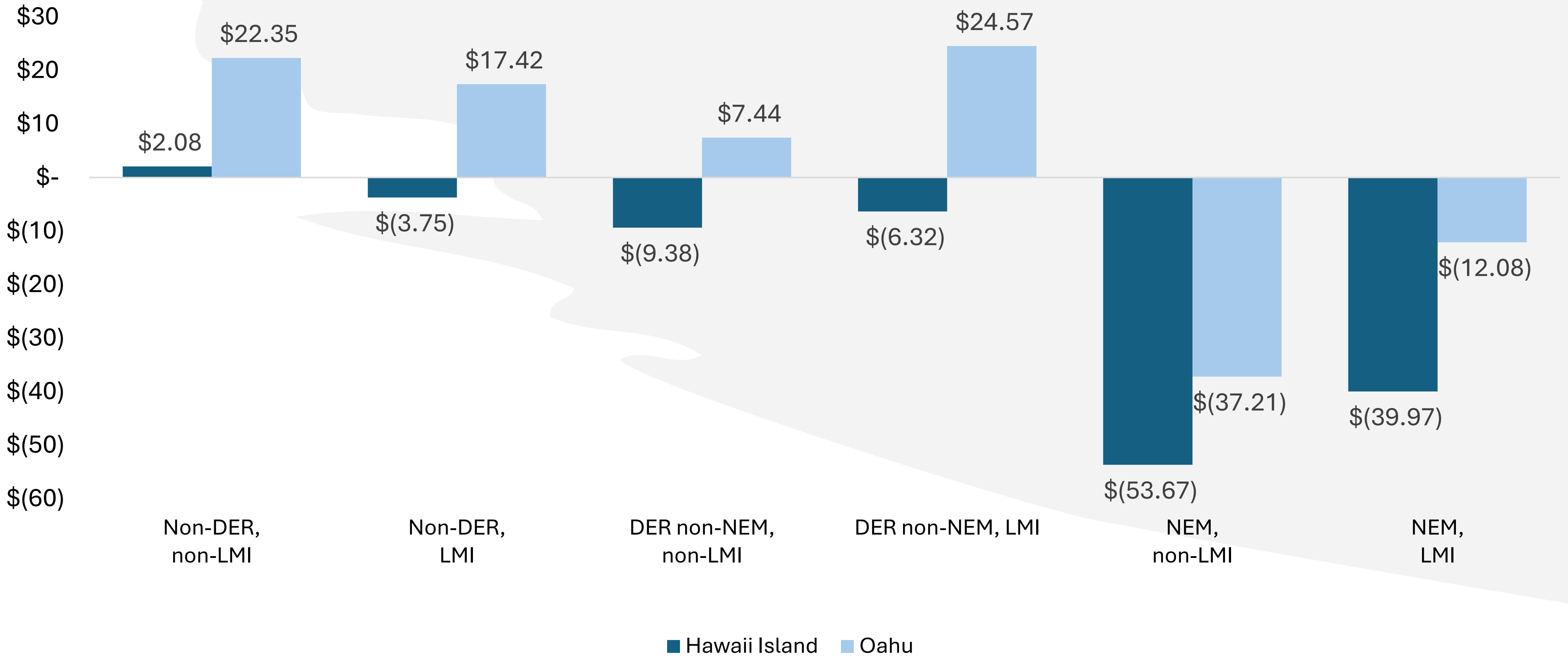
Load Changes – Residential Results

Customer Segment	Daytime (9 a.m.–5 p.m.)	Evening peak (5 p.m.–9 p.m.)	Overnight (9 p.m.–9 a.m.)	Daily (24 hour)
Residential No DER No LMI				
Hawai‘i Island	▲	▼	▼	▼
O‘ahu	▲	▼	▼	▼
Residential No DER No LMI	▲	▼	▼	▼
Residential LMI No DER				
Hawai‘i Island	▼	▼	▼	▼
O‘ahu	▼	▼	▼	▼
Residential LMI	▼	▼	▼	▼
Residential DER				
Hawai‘i Island	▼	▼	▼	▼
O‘ahu	▼	▼	▼	▼
Residential DER	▼	▼	▼	▼

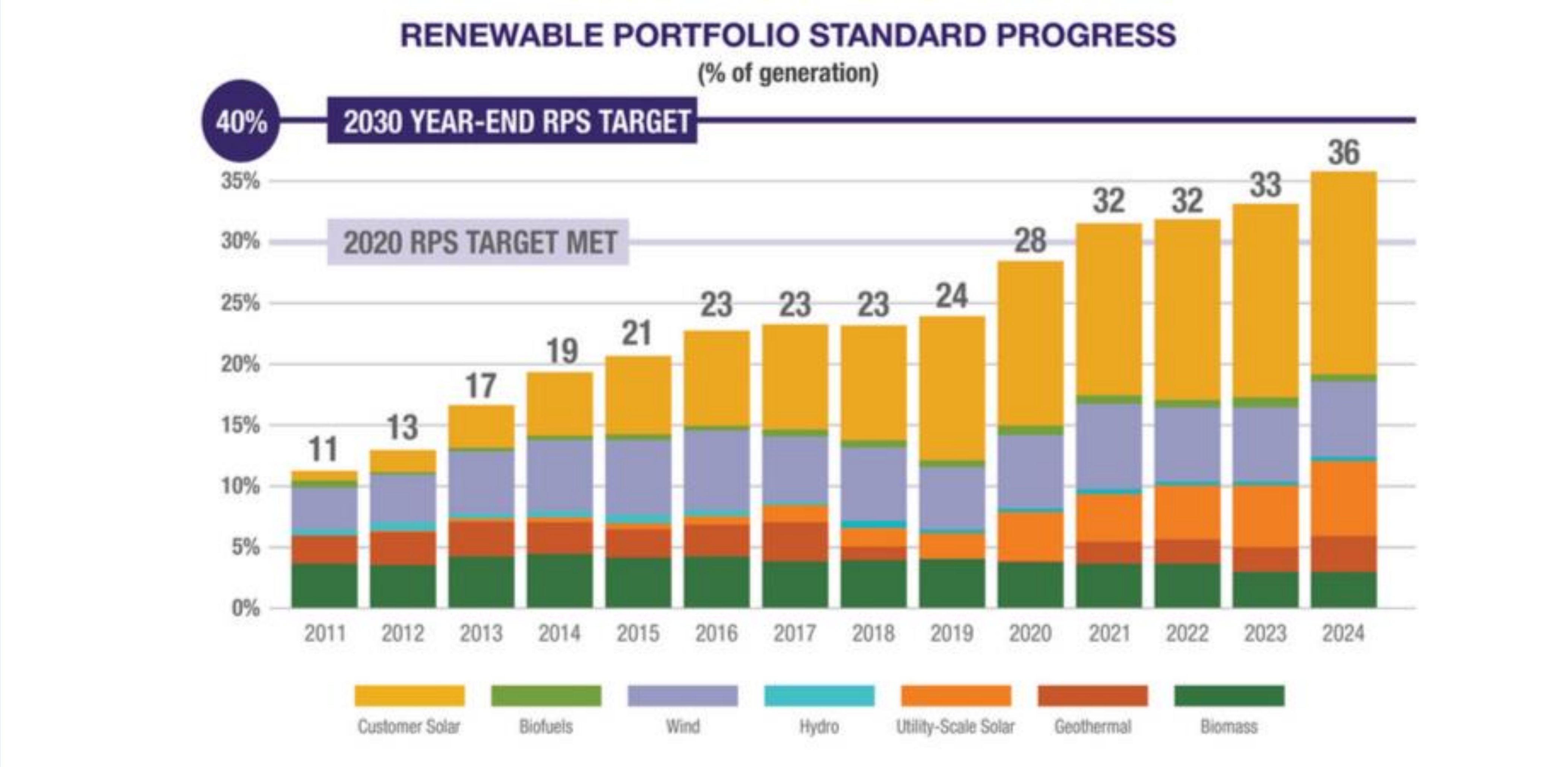
Load Changes – Commercial Results

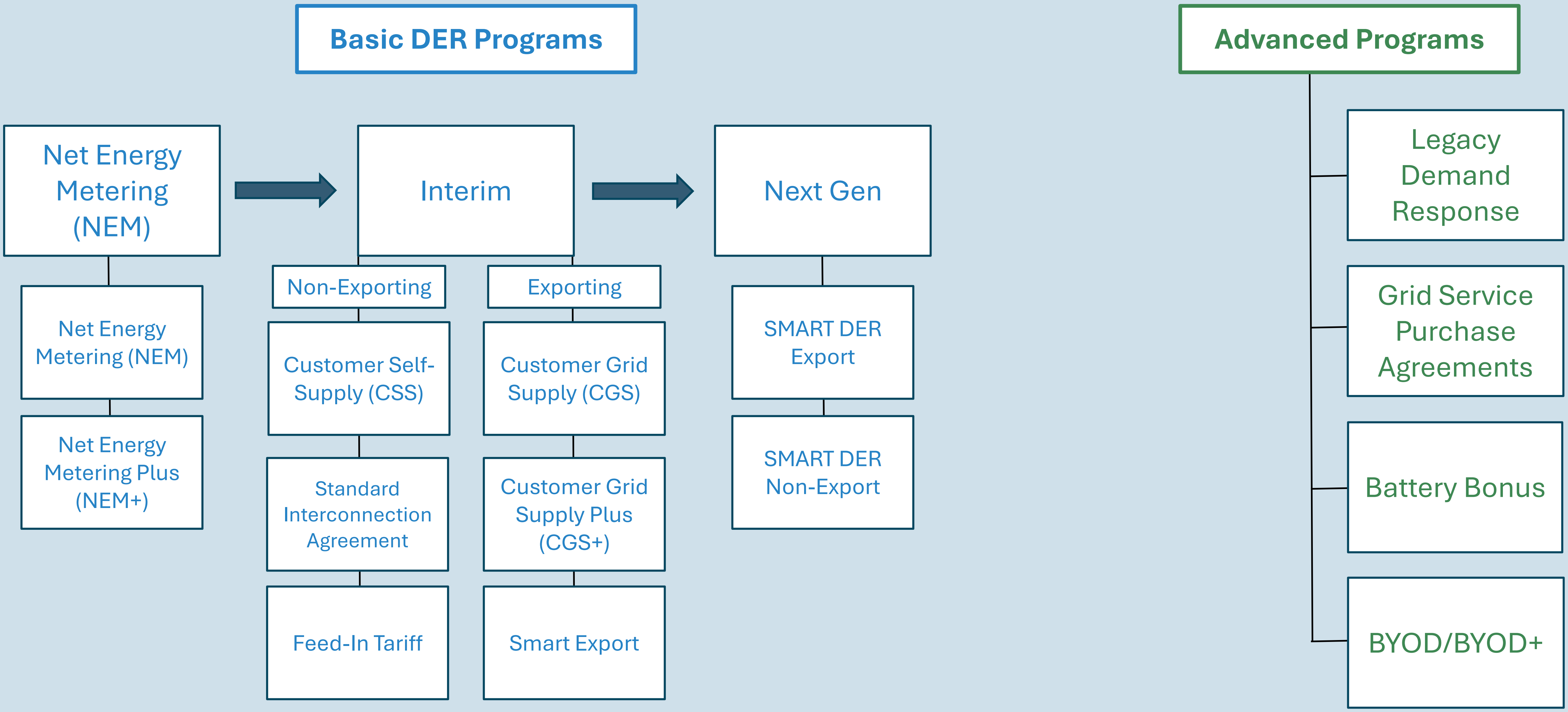
Direction of Change in Period Usage				
Customer Segment	Daytime (9 a.m.–5 p.m.)	Evening peak (5 p.m.–9 p.m.)	Overnight (9 p.m.–9 a.m.)	Daily (24-hour)
Commercial No DER				
Schedule G	▲	▼	▼	▼
Schedule J	▼	▲	▼	▼
Commercial No DER	▼	▲	▼	▼
Commercial DER				
Schedule G	▲	▼	▼	▲
Schedule J	▲	▲	▲	▲
Commercial DER	▲	▲	▲	▲

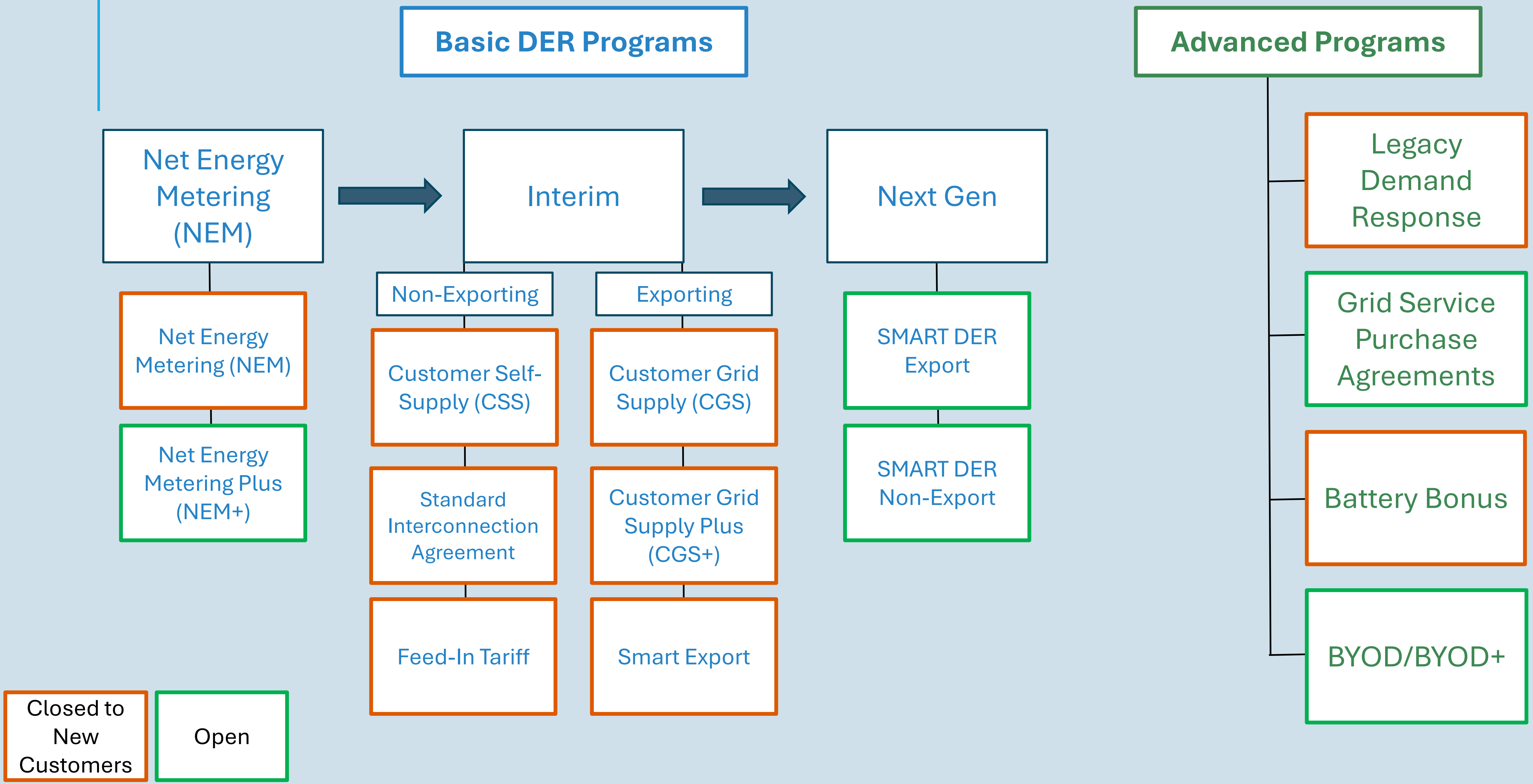
TOU Pilot Results: Residential Bill Impacts



Distributed energy resource (DER) program design




Basic DER Programs
Advanced Programs
Net Energy Metering (NEM)
Interim
Next Gen
Net Energy Metering (NEM)
Net Energy Metering Plus (NEM+)
Non-Exporting
Exporting
Customer Self-Supply (CSS)
Standard Interconnection Agreement
Feed-In Tariff
Customer Grid Supply (CGS)
Customer Grid Supply Plus (CGS+)
Smart Export
SMART DER Export
SMART DER Non-Export
Legacy Demand Response
Grid Service Purchase Agreements
Battery Bonus
BYOD/BYOD+


Basic DER Programs
Advanced Programs
Net Energy Metering (NEM)
Interim
Next Gen
Non-Exporting
Exporting
Net Energy Metering (NEM)
Net Energy Metering Plus (NEM+)
Customer Self-Supply (CSS)
Standard Interconnection Agreement
Feed-In Tariff
Customer Grid Supply (CGS)
Customer Grid Supply Plus (CGS+)
Smart Export
SMART DER Export
SMART DER Non-Export
Legacy Demand Response
Grid Service Purchase Agreements
Battery Bonus
BYOD/BYOD+
Closed to New Customers
Open

Evolution of Basic DER Programs

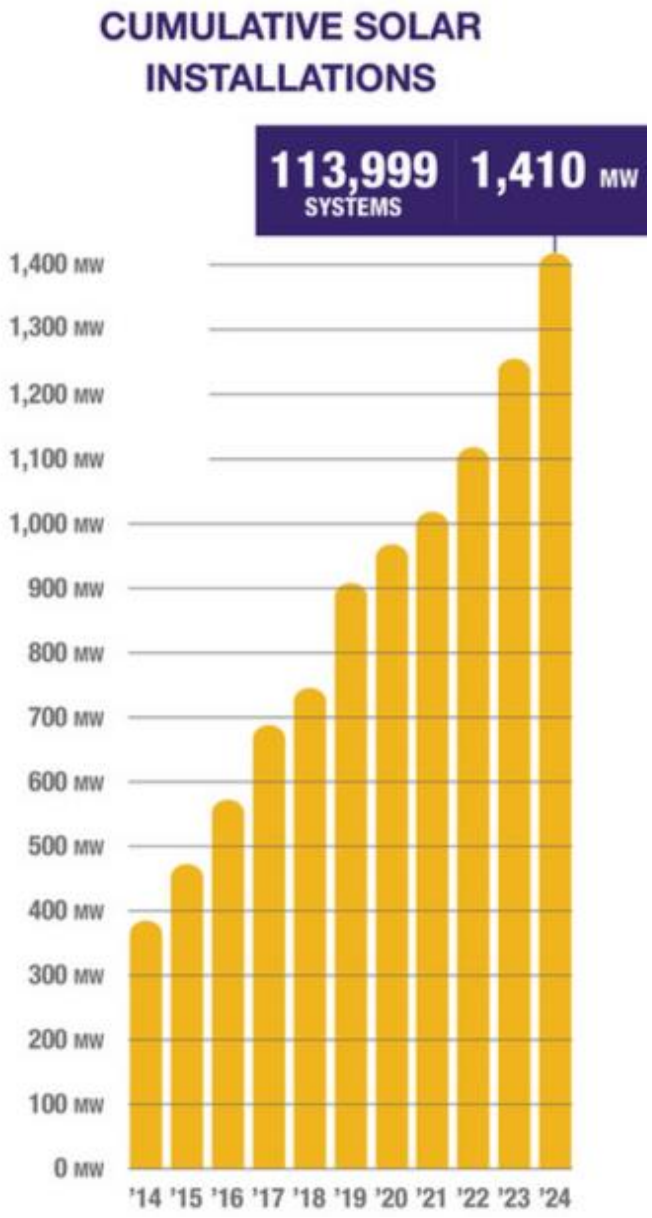
2001: Net Energy Metering (NEM) Launches

October 2015: NEM closed to new enrollment

2015-2024: Interim Export and Non-Export Programs

April 2024: SMART DER program launch

- Intended to be long-term tariff covering the next ten years of adopters
- Non-Export: faster interconnection, no compensation for exports
- Export Rider: time-varying compensation for grid exports



Smart DER Program

Non-Export Riders

- No compensation for energy exports
- Designed for self-consumption
- Faster interconnection review
- Open to all generation technologies

Advanced metering infrastructure (AMI) required, automatic enrollment in TOU rates (can opt-out), no system size limits or program caps

Export Riders

- Time-varying compensation for energy exports
- Rates are locked in for seven years (with option to opt out)
- Open to renewable generation technologies only

Time-Based Export Rider Rates

Island	Overnight (9pm–9am)	Daytime (9am–5pm)	Evening Peak (5pm–9pm)
Oahu	$0.189	$0.135	$0.329
Hawaii Island	$0.148	$0.106	$0.231
Maui	$0.131	$0.066	$0.182
Lanai	$0.259	$0.267	$0.408
Molokai	$0.174	$0.179	$0.272
	medium rate*	lowest rate*	highest rate

*except for Lanai and Molokai, where overnight and daytime are similar

Evolution of Advanced DER Programs

The New York Times

Hawaii Closes Its Last Coal-Fired Power Plant

A state law bans the use of coal for energy production beginning next year.

Share full article

Hawaii just got rid of coal power for good

Next up: finding new roles for coal plant workers — and keeping the lights on during a global energy crisis.

By **Julian Spector**
1 September 2022

Energy

Oahu's Cheapest Source Of Power Is About To Go Away

How HECO plans to replace that electricity for Oahu customers is still unknown but Hawaii's last coal-fired power plant intends to shut down in just five years.

By Stewart Yerton / August 24, 2017

Share Article 0

2021: Capacity Shortfall Leads to Battery Bonus Program

- Program Structure
  - 40 MW cap on O'ahu, 15 MW cap on Maui
  - 2-hour scheduled daily dispatch, including weekends and holidays
  - New, PV-tied batteries only
- Incentives
  - $850/kW upfront incentive
  - $5/kW bill credit monthly for ten years
- Program caps reached, closed to new enrollment

2024: Bring Your Own Device (BYOD)

- Intended to serve as long-term behind-the-meter storage tariff (revenue neutral)
- Program Structure
  - 107 MW capacity across all service territories
  - 2-hour scheduled daily dispatch, including holidays and weekends
- Incentives
  - $100/kW upfront incentive (doubled for LMI adopters)
  - $5/kW bill credit monthly for ten years
- After 1-year, BYOD-1 had almost no customer enrollment

2025: Program Amendments Lead to Bring Your Own Device Plus (BYOD+)

	BYOD-1	BYOD+
Upfront Incentive	$100/kW upfront incentive	$400/kW upfront incentive
LMI Adder	$100/kW for LIHEAP recipients	$400/kW for households at or below 140% AMI
Monthly Capacity Payments	$5/kW monthly bill credits for participation	No monthly bill credits for participation
Export Credits	SMART export credit	1:1 retail rate

Looking Ahead: Pursuing an Inclusive and Equitable Energy Transition

- With high solar penetration, encourage load-shifting through DER program tariffs and rate structures
  - Time-varying compensation to incentivize evening export
  - Encourage solar adopters to also purchase batteries
  - Encourage legacy systems to add batteries
- Support more LMI adoption via green bank loans, EE program rebates, and DER tariff adders
- Minimize cost shifting to non-adopters (e.g. renters, high rise dwellers, etc.)
  - Pursue other ways for these customers to participate in renewable transition, such as Community Solar programs

MAHALO

Hawaii Public Utilities Commission

Clarice.A.Schafer@hawaii.gov
Abigail.c.Austin@hawaii.gov

MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

Impacts on Existing Policies and Incentive Programs

Expert Presentation Series | June 30, 2025

This presentation will provide an overview of the impacts of time of use rates on existing policies and incentive programs that incentivize solar and storage resources in the Commonwealth

Contact Information

Samantha Meserve
Director of Renewable and Alternative Energy Division

Clean Energy Incentive Programs

The following incentive programs serve residential customers and have the potential to be impacted by time of use rates:

- Renewable Energy Portfolio Standard (RPS)
- Clean Peak Energy Standard (CPS)
- Net Metering
- Solar Massachusetts Renewable Target (SMART)

Renewable Energy Portfolio Standard

What is it?

- A **market-based program** aimed at increasing the amount of renewable electricity generated in Massachusetts (and across ISO-NE)
- Eligible technologies include:
  - Solar
  - Wind
  - Hydroelectric
  - Geothermal
  - Various others
- Every megawatt-hour (MWh) generated by a qualified system creates one (1) Renewable Energy Certificate (REC)
- RECs may only be used for compliance in the year they are generated
- Retail Electric Suppliers (RES) must purchase a certain number of RECs based on their Total Retail Load and the annual Minimum Standard
  - For 2025, the Minimum Standard was 27% (e.g., if a RES supplier serves 100MWh of load, they must purchase 27 RECs to meet the minimum standard)

Impacts from Time-of-Use (TOU) Rates – None

- **REC generation is independent from electric rates**
- Qualified systems with the ability to dispatch may choose to modify when they dispatch based on TOU rates, but this will not impact their REC production
- RECs are not differentiated based on the time or rate they were generated under
- All RECs are created equal!

Potential Mitigation

- None necessary

Clean Peak Energy Standard

What is it?

- A **market-based program** aimed at decreasing electric system peak demand in Massachusetts
- Eligible technologies include:
  - Qualified RPS Resources
  - Qualified Energy Storage Systems
  - Demand Response Resources
- Every MWh generated, dispatched, or reduced by a qualified system during a **Seasonal Peak Period** creates one (1) Clean Peak Energy Certificate (CPEC)
- The Seasonal Peak Periods coincide with Massachusetts' current peak electricity demand:
  - **Spring**: 5:00 P.M. until 9:00 P.M.
  - **Summer**: 4:00 P.M. until 8:00 P.M.
  - **Fall/Winter**: 4:00 P.M. until 8:00 P.M.
- CPECs may only be used for compliance in the year they are generated
- Retail Electric Suppliers (RES) must purchase a certain number of CPECs based on their Total Retail Load and the annual Minimum Standard
  - For 2025, the Minimum Standard was 5.5%
- Currently, the majority of CPS participants are **non-residential**

Impacts from TOU Rates – Mild

- **CPEC generation is independent from electric rates**
- However, qualified systems may choose to modify when they dispatch or reduce load based on TOU rate signals, which could impact their CPEC production
- CPECs are currently a core element of energy storage systems financing. TOU rates could potentially create tension with the CPS, forcing system operators to chose whether to participate in the CPS reducing their revenue stack.

Potential Mitigation

- CPS and TOU rates share similar objectives:
  - **encourage energy storage charging during times of low demand**
  - **dispatch clean energy and reduce consumption during times of high demand**
- CPS and TOU Rates take a different approach to addressing similar objectives:
  - **CPS provides an optional incentive for qualified systems to dispatch during peak periods**
  - **TOU rates send a market signal to ALL customers on when to reduce demand or dispatch resources**
- To avoid sending mixed messages to system owners or negating the impact of one policy over another, the CPS Seasonal Peak Periods and TOU Rate windows should be **aligned**

Net Metering

What is it?

- Net metering is a **billing mechanism** that allows customers with renewable energy systems to receive credit on their electricity bills for the excess electricity they send back to the grid
  - Customers can sell electricity "to the grid," which generates a Net Metering Credit, set at a **value based on supply, distribution, transmission, and transition charges**
- Net metering promotes technologies, like solar, which generate electricity for local consumption and export electricity
  - Massachusetts residential customers do not have time-of-use rates, so net metering credits are not based on the value or time of when excess electricity is exported
- In Massachusetts, there are limitations to participating in net metering (e.g., caps on systems of a certain size); though residential customers are exempted from these limitations (i.e., all residential customers are eligible for net metering)

Impacts from TOU Rates – Moderate

- Net metering and TOU rates **impact** one another
  - Net metering currently compensates systems for their electricity regardless of when it is generated or used
  - TOU rates change the price of electricity throughout the day, based on the demand on the system which can impact Net Metering Credit value

Potential Mitigation

- TOU rates will incentivize solar systems to be paired with **on-site storage** to maximize net metering value
  - On-site energy storage can charge during times when electricity being sent back to the grid would be compensated at a lower rate and dispatch during times of higher rates
- SMART program will continue to incentivize solar systems

Solar Massachusetts Renewable Target

What is it?

- Massachusetts solar incentive program that provides customers with:
  - **Electric bill credits**
  - **A direct cash incentive (**Solar Incentive Payment or SIP)
- Implemented in coordination with DOER, EDCs, CLEAResult (Program Administrator) and approved by DPU
- Incentives are calculated based on a financial analysis identifying what a project **needs to be economic**
  - Additional incentives are available for preferred project types based on location and offtakers
- Residential projects lock in their SIP at the time of qualification and receive the incentive for 10 or 20 years
- DOER annually updates the Base Compensation Rates and the Value of Energy, impacting the incentive paid to customers

Impact from TOU Rates – Mild

- The Value of Energy is a core component of the SMART calculation, which currently uses a **3-year average of basic service for R-1 customers**
- If TOU rates are implemented, how DOER calculates Value of Energy will impact residential incentives

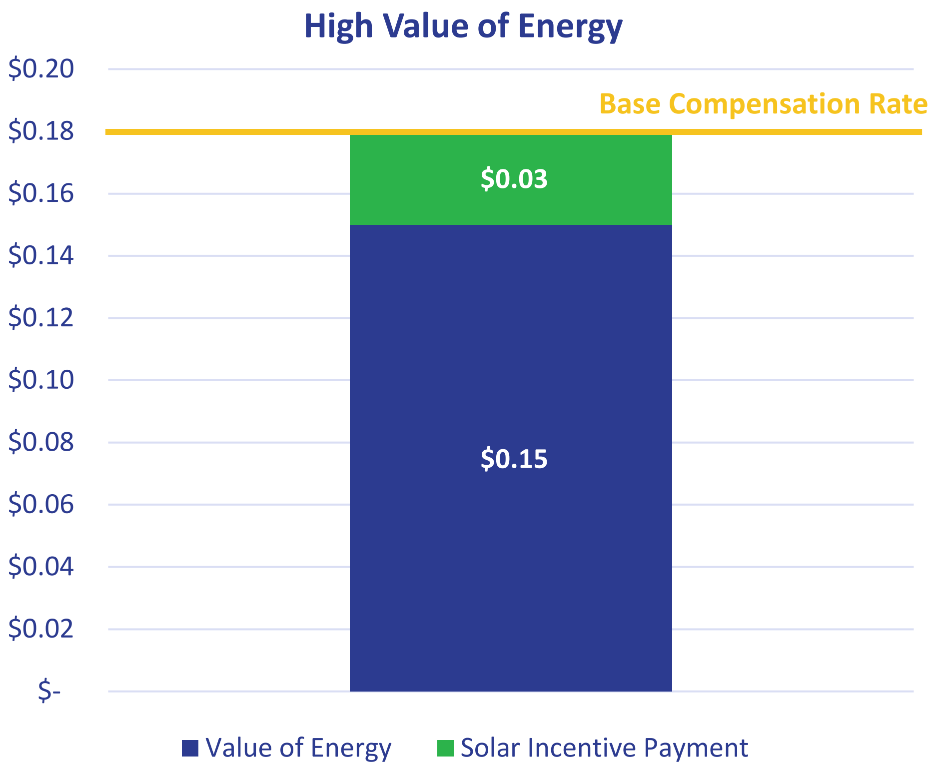
Potential Mitigation

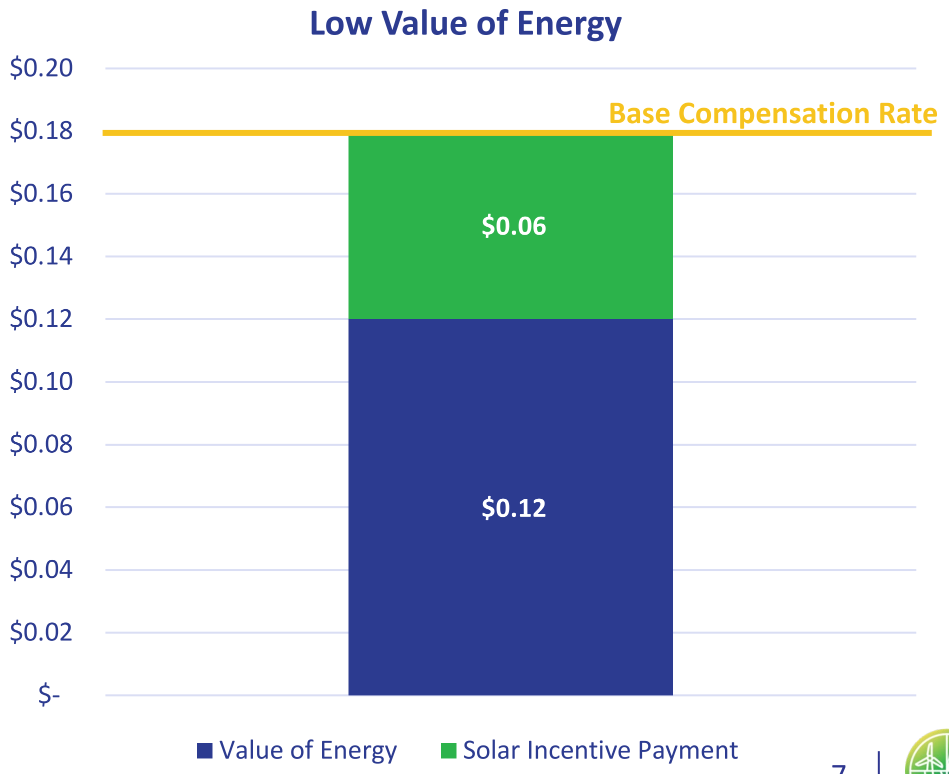
- The SMART program is **well-suited** to integrate TOU rates
- DOER will need to determine a new methodology for how to calculate Value of Energy such as setting an average Value of Energy rate based on solar production and customer usage throughout the duration of their SMART qualification

SMART Mechanics

Solar Incentive Payment = Base Compensation Rate – Value of Energy

- → **Solar Incentive Payment:** cash payment paid to system owner
- → **Base Compensation Rate:** the all in revenue a project needs to be economic
- → **Value of Energy:** three-year average of basic service





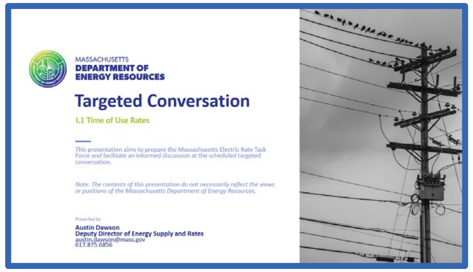
Next Steps

Targeted Conversation

July 9, 2025, 2-4pm

- Will serve as a deliberative space following related expert presentations to prompt informed discussion on policy questions and priorities

Illustrative Presentation



Optional Office Hours

June 16, 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.