NRG Energy, Inc.
804 Carnegie Center
Princeton, NJ 08540

NRG Energy Comments to Interagency Rates Working Group
May 31, 2024

Introduction

NRG Energy Inc. ("NRG") thanks the Interagency Rates Working Group ("IRWG") for soliciting comments from stakeholders. We applaud the Executive Office of Energy & Environmental Affairs ("EEA"), the Department of Energy Resources ("DOER"), the Massachusetts Clean Energy Center ("MassCEC"), and the Attorney General's Office ("AGO") for taking the initiative to establish the IRWG.

The IRWG has a generational opportunity to capitalize on the upcoming deployment of Advanced Metering Infrastructure ("AMI"), technology innovations, and rate lessons from other regions to reduce the Commonwealth's energy costs and to meet its climate objectives. Existing rate design, and the lack of transparent price signals for customers, threatens the Commonwealth's economy and ambitious climate goals.

The NRG Retail Companies provide competitive electric generation supply as well as other energy-related products and services to residential and non-residential customers in the Massachusetts competitive retail market.[1] The NRG Retail Companies also currently provide competitive electric generation supply to more than 30 cities and towns in Massachusetts. Across North America, NRG serves 8 million energy and energy services customers, including through its smart-home company, Vivint, which has a technology-development office in Boston.

Below, NRG offers several comments about the scope of the E3 study and its ultimate work product, as well as the goals of the IRWG in general. In the Appendix, NRG provides key quotes and graphics from four recent studies focused on innovative rate design. Leveraging our deep experience across the continent, NRG plans to actively participate in the IRWG as a solutions-oriented stakeholder. Stack Energy Consulting represents NRG at the IRWG.

As a preliminary matter, NRG believes it is essential that all customers, and the suppliers who provide them energy supply service, have the opportunity to be faced with and have demand respond to all demand- and peak-related cost of elements of electricity service.

The Scope of E3's Work

I. The Study Should Acknowledge and Take Account of Massachusetts' Restructured Marketplace

[1]The NRG Retail Companies in MA include Direct Energy Business, LLC, Direct Energy Services, LLC, Energy Plus Holdings LLC, Green Mountain Energy Company, Inc., NRG Home f/k/a Reliant Energy Northeast LLC, and XOOM Energy Massachusetts, LLC. They are all licensed competitive electricity suppliers.

E3 only passingly identifies in its slide deck the important fact that one entity, the electric distribution company (the "utility"), is responsible for one set of costs associated with electricity supply service, including distribution, transmission, and certain public policy costs. Meanwhile, another set of entities—suppliers to basic service, municipal aggregations, and direct access to customers—are responsible for energy, capacity, and ancillary services costs.[2] It is not clear when E3 discusses its study of rate design whether it will focus only on utility rates, or holistically at the rates that customers face. As E3 notes, energy-supply costs constitute a majority of an average residential consumer's energy bill.[3] However, these costs are not subject to typical rate-design decision-making on the part of the state's regulatory commission, except as it relates to utility basic service.

E3's scope of work should clearly contemplate the institution of time-varying rates not just for utility costs, but also for energy supply costs in utility basic service. The study should also include a consideration of what can be done to facilitate time-varying rates for customers who take alternative supply through competition by municipal aggregations and third-party direct access retailers. NRG notes that for the customers it serves in Massachusetts, it has little to no visibility into customers' usage over time within a month, due to the limitations of non-AMI utility metering systems that are outside NRG's control. Even when AMI is installed, it is an open question whether NRG's customers will be settled using granular meter data, and the degree to which NRG will have access to that data, in bulk, for all its customers, readily and close to real-time. In parallel to the IRWG's work, utilities, suppliers, and other stakeholders have been discussing how this data can be made available to suppliers once AMI technology is installed. Put simply, for the time being, NRG has no ability to offer time-varying rates either to its municipal-aggregation or direct-access consumers in the residential customer class.

NRG also believes that to remedy the split-incentives problem that occurs in restructured markets like Massachusetts, that there should be the opportunity for suppliers or for an aggregator of distributed energy resources to access the full value stack of particular rate elements.

II. The Study Should Summarize the Cost Drivers Behind The Major Components of a Customer's Bill

To determine rates that align with cost causation, we must understand the hours when customer usage has the greatest impact on system costs, and the magnitude of that impact relative to usage during off-peak hours. The E3 study should produce a table that resembles the following:

[2] Public policy costs are a shared responsibility between utilities and suppliers.

[3] E3, "Massachusetts Electric Rate Design Study: Study Context and Scope" (May 6, 2024), Slide 7.

Cost Category	Hours That Impact Planning and/or System Cost Determinations	System Cost Impact ($/MW-yr) of Reducing Energy in These Hours	% of Total Costs Attributable to Usage During Off-Peak Hours
Transmission			
Capacity			
Distribution			

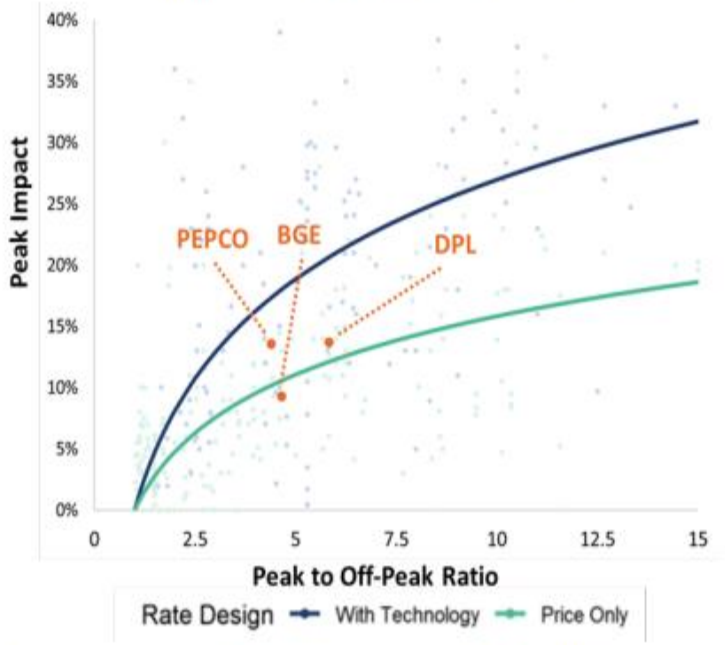
Regarding capacity and transmission, we note that certain C&I customers in MA can reduce their capacity and transmission cost allocation. While mass market customers should have the same opportunity once they receive AMI, the IRWG should focus on "reducing the size of the pie" and not just how the capacity and transmission pie are split up. To understand which hours drive capacity and transmission costs and planning decisions, we recommend the IRWG host an education session with ISO-NE. While this planning happens at the ISO level, retail rate design can impact this planning and reduce these costs.

Leveraging the existing "Avoided Energy Supply Cost" studies used for Mass Save, the E3 study should also summarize the differences in wholesale energy prices between the highest peak hours of the year and other hours.

With this information in the study, the IRWG can determine the potential impacts of Time-Varying-Rates ("TVR"), the peak to off-peak ratios that should apply for such rates, whether there should be a super-peak tier in addition to peak and off-peak, and the number of hours that should comprise each tier. As shown below, the ratio of peak to off-peak rates significantly impacts customer behavior and peak demand reductions, as Brattle Group analysis summarized for the Maryland Public Service Commission in their recent utility TOU pilots.[4] Eventually this data can inform the value stack for Distributed Energy Resources.

[4] PC44 Time of Use Pilots: End-of-Pilot Evaluation. Prepared for Maryland Public Service Commission. Prepared by The Brattle Group: Sanem Sergici, Ahmad Faruqui, Nicholas Powers, Sai Shetty, Ziyi Tang. October 4, 2021. Page v.

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



Notes: The PC44 data points are based on the results for all customers (combined LMI and non-LMI effects).

III. The Study Should Specifically Contemplate How to Maximize Customer Control Over Their Bill and "Opt-Out vs Opt-In" as a Central Consideration of Rate Design

Outside of Public Policy costs and legacy non-bypassable charges, by the time AMI is fully deployed in the Commonwealth for one year, customers should receive transparent price signals for different hours tied to cost causation and be able to control their entire energy bill (wholesale costs, transmission, distribution). In other words, if customers reduce usage during the hours that drive the greatest system costs, they should see lower costs. To chart a successful path, the IRWG should direct E3 to provide recommendations in the report for enabling customers with this control and seek stakeholder recommendations. In the Appendix, NRG provides studies from across the country examining the impact of TOU rate programs.

If we design rates such that customers can reduce overall system costs by reducing energy usage during the hours that drive those costs, then we should strive to have as high a percentage as possible of customers actively managing their usage during these highest impact hours. The residential "Connected Solutions" "Active Demand Reduction" programs generate $2.14 in net benefits for all consumers every $1 spent.[5] Therefore, rate design that reduces peak demand should improve affordability.

[5] The Clean Energy Group: "ConnectedSolutions: A Program Assessment for Massachusetts." Prepared by Applied Economics Clinic for Clean Energy Group. September 2021. Page 20.

In NRG's experience with other states' redesign of rates, it notes that extremely low rates of enrollment are associated with rates that require consumers to opt-in to alternative rate designs. If a "flat" rate is the default option, it will invariably seem like the normal, ordinary, and safer choice for consumers, compared to a more complex—but cost-reflective and beneficial—rate design. E3 should specifically survey the level of enrollment in opt-in utility rates in the restructured retail markets of the Eastern United States to obtain a full understanding of the paucity of this trend of under-enrollment. Meanwhile, it should also study the handful of jurisdictions that have either adopted time-varying rates on an opt-out basis, or which have conducted high-quality field studies that do not require customer opt-in, to make determinations that are relevant to Massachusetts.

The IRWG should direct E3 to analyze potential percentages of active customer participation, the corresponding impact to system costs of those percentages, and how a default opt-out TVR rate for basic service customers would impact those percentages. NRG recognizes that certain consumers, such as people with disabilities who may be using life-saving equipment and elderly people, may have limited flexibility and should be afforded any protections necessary to prevent them from negative bill impacts.

While NRG has provided a sampling of reports on default opt-out TVR in the Appendix, we'd recommend the IRWG to invite regulators and utilities that are currently implementing default opt-out TVR to directly share their experiences and lessons learned. To our knowledge, this includes but is not limited to regulators and utilities in Michigan, California, and a municipal utility in Fort Collins, Colorado.

IV. The Study Should Consider the Disadvantages of Technology-Specific Rates

A subtext of certain conversations around advanced rate design in New England has been the idea that certain technology-specific rates should be promulgated to encourage the adoption of heat pumps and other devices. While NRG believes that smart rate design will encourage electrification, it believes that breaking customers into subclasses or otherwise creating certain special utility rates around particular technologies is unwise and will over the long term likely create inequities between adopters and non-adopters.

California was a leader in the field of technology-specific rates, but as the head of the California PUC's retail rates group, Paul Phillips, recently explained to NARUC, "Technology-specific rate strategies are insufficient to meet future grid challenges." The state is moving to supplant "too many one-off special purpose rates" with a comprehensive system of "widespread hourly rates to improve capacity utilization and lower long run hourly rates."[6]

V. The Study Should Prioritize Time-Varying Rate Analysis Over a Reallocation of Costs to a Fixed Customer Charge

[6] Paul Phillips, NARUC Annual Meeting (2023). https://www.linkedin.com/posts/californiapuc_narucannual23-activity-7130307168871886848-VMtP/. *See also:* Demand Flexibility Rulemaking (R.22-07-005).

NRG agrees that many utility cost of service studies suggest that increasing the fixed customer charge, and thus reducing the volumetric rate, is warranted on an economic efficiency basis. However, this issue has tended to overshadow all other considerations within rate design where it has been presented as part of a study—most notably, in California. Unlike California, Massachusetts has no meaningful adoption of time-varying rates, and before it considers a structural change to the balance between its fixed charge and a flat volumetric charge, it should focus first on making the latter time-varying. As the E3 presentation notes, the cost structure of New England electricity service is weighted heavily toward energy, capacity, and transmission costs—all of which should generally be recovered through some kind of per-unit charge, albeit separated on a time basis, and not on a fixed-charge basis. It will be more efficient and productive to focus on time-varying rates as the most important part of this study (whereas currently it is "Example 2" to the reallocation of costs to fixed customer charges' "Example 1").

VI. The Study Should Contemplate Practical Steps Before Full AMI Implementation that Can Replicate Certain Features of Advanced Rate Design

For residential customers today, the only existing retail rate incentive for flexible demand resides in the ConnectedSolutions program, which is administered almost exclusively by electric distribution companies.[7] Yet, as noted above, in the Massachusetts' restructured market, the utilities are not responsible for the majority of costs of electricity supply, and meanwhile the entities that are responsible for managing these costs have no ability to gain equitable and co-optimized control of the assets that are managed under the utility ConnectedSolutions program. NRG believes that it could be feasible to increase compensation to smart thermostat and battery devices were the ConnectedSolutions program co-optimized through the suppliers responsible for the energy and capacity costs associated with municipal-aggregation and direct-access service.[8]

Additionally, at least one utility in the New England region has begun using non-utility measurements at the device level in order to transmit more dynamic prices to devices, whose loads are then netted out of the utility meter read. Given that full AMI implementation may take years, the ability to propagate to these device-level rates in the Massachusetts restructured market should be evaluated.

Conclusion

Foundational to achieving cost reductions and affordability goals are providing customers transparency and control over their energy bill and tying customer usage to cost causation. Right now, mass market customers in the Commonwealth receive essentially no price signal for their usage, with every kWh treated equally. This contributes to the energy bills in the Commonwealth being amongst the highest in the country. The IRWG has a generational opportunity to empower

[7] In the territory of the Cape Light Compact municipal aggregation, that entity manages ConnectedSolutions.

[8] NRG realizes that this may be contemplated in the "Near Term Strategy" of the IRWG and, to the extent E3's work speaks only to a longer term s
trategy, may be outside the scope of this analysis. Nevertheless, it is important context for E3's work in this matter.

Massachusetts customers to reduce their energy bills. NRG Energy looks forward to collaborating with the IRWG toward this objective.

Travis Kavulla
Vice President, Regulatory Affairs
1825 K. St., NW, Suite 1203
Washington, D.C. 20006
c: 406-788-3419

Greg Geller
Founder and CEO, Stack Energy Consulting
P: (781) 808-6616
E: greg@stackenergyconsulting.com
W: Stack Energy Consulting

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Appendix: NRG Sampling of Recent Rate Design Studies

NRG believes that the following four studies on Time-Varying Rate design will be informative to the IRWG and to E3's study.

1. Brattle Group Analysis for the Maryland Public Service Commission of MD Utility TOU Studies[9]

Key Quotes:

"In the beginning, enrollment rates in the pilots ranged from 0.5% to 1.9% across the JUs. About two-thirds of the customers who enrolled would have experienced bill reductions by switching to TOU rates without changing their load behavior. This was true of both the LMI and non-LMI customers." P. ii

"The results from the two-year impact analysis of the PC44 TOU pilots reveal that customers respond to the TOU price schedule by reducing their peak period consumption in both summer and non-summer seasons. In analyzing three utilities, two seasons, and two groups, we find that this result holds for ten of twelve customer groups comprised of three utilities, two seasons, and LMI and non-LMI customers.

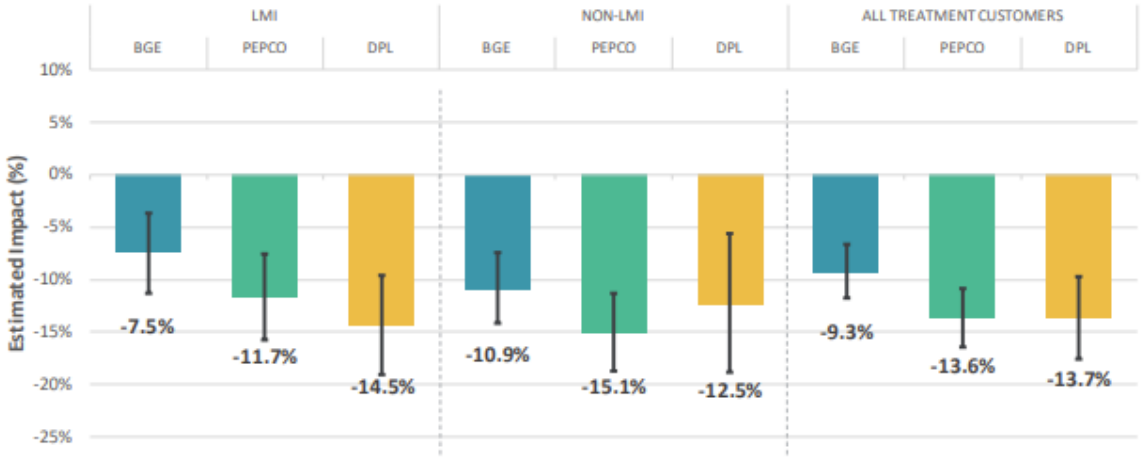
The impact evaluation yields the following seven conclusions" (not all included here for brevity):

1. "Across the JUs, TOU rates reduce peak demand in the summer season from 9.3% to 13.7% and by 4.9% to 5.4% for the non-summer season, as shown in Figures ES-1 and ES-2. These results are comparable to the impacts estimated in other pilots for similar peak to off-peak price ratios, as shown in Figure ES-3.
2. Daily energy consumption during the summer season goes down for two of three utilities. The weekday reductions range from 3.0% to 4.6%. Daily non-summer weekday does not change by a statistically significant amount for any of the JUs….
3. LMI customers respond to the TOU price signals. Across all three utilities and both seasons, the LMI response is similar in magnitude to that of non-LMI customers." P. ii-iii

Bill Impacts: *"As shown in the table below, the average customer in each of the JUs saved money by switching to TOU rates. In the first year, the savings across the JUs ranged from 5.3% to 9.7%. In year 2, the savings ranged from 2.3% to 7.5%."*- P. v

[9] PC44 Time of Use Pilots: End-of-Pilot Evaluation. Prepared for Maryland Public Service Commission. Prepared by The Brattle Group: Sanem Sergici, Ahmad Faruqui, Nicholas Powers, Sai Shetty, Ziyi Tang. October 4, 2021. Page v.

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.

2. American Public Power Association: Moving-Ahead-Time-of-Use-Rates.pdf (publicpower.org)[10]

APPA summarized Time-Varying Rate ("TVR") implementation, including default opt-out TVR in Fort Collins, CO and Sacramento Municipal Utility District ("SMUD"), across several utilities in the United States. NRG has provided several summary graphics from that study below.

[10] American Public Power Association. Moving Ahead with Time of Use Rates. American Public Power Association: Moving-Ahead-Time-of-Use-Rates.pdf (publicpower.org)

Key Graphics: Summary of Fort Collins, Colorado Municipal Utility Default TVR:

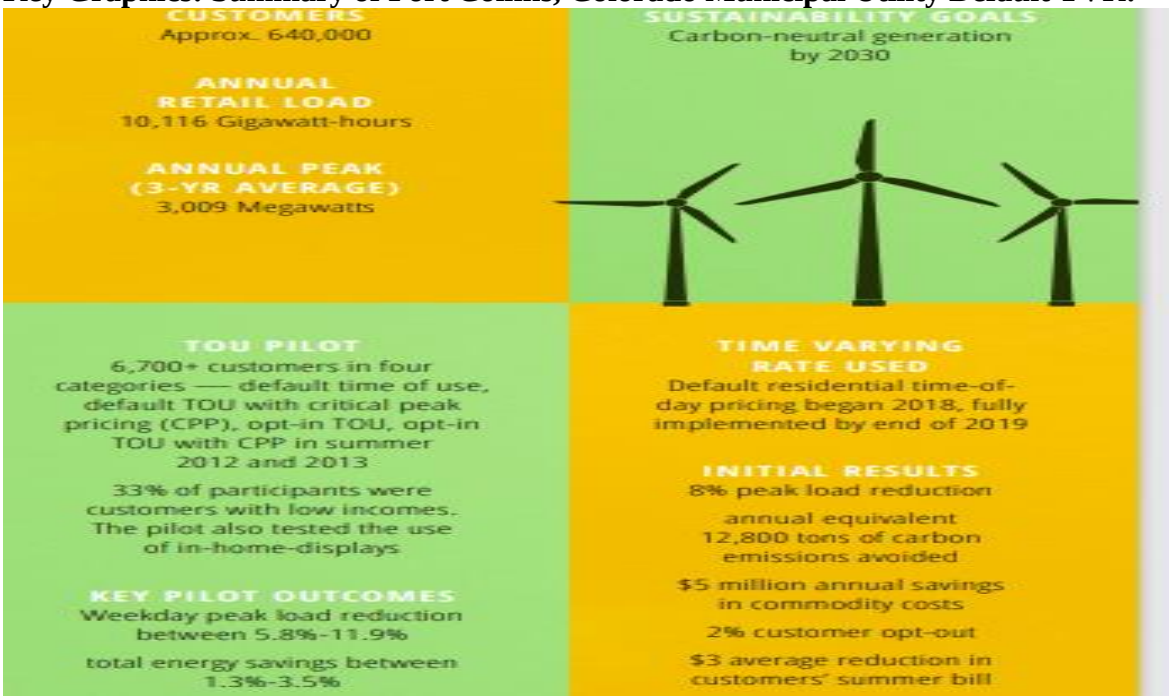


FIGURE 2. AVERAGE MONTHLY BILL IMPACT, BY CUSTOMER ATTRIBUTES

3.

Graphics from Sacramento Municipal Utility District ("SMUD") Default TVR

4.

FIGURE 5. SUMMER (JUNE 1-SEPTEMBER 30)

Residential Time-of-Day Rates, 2019

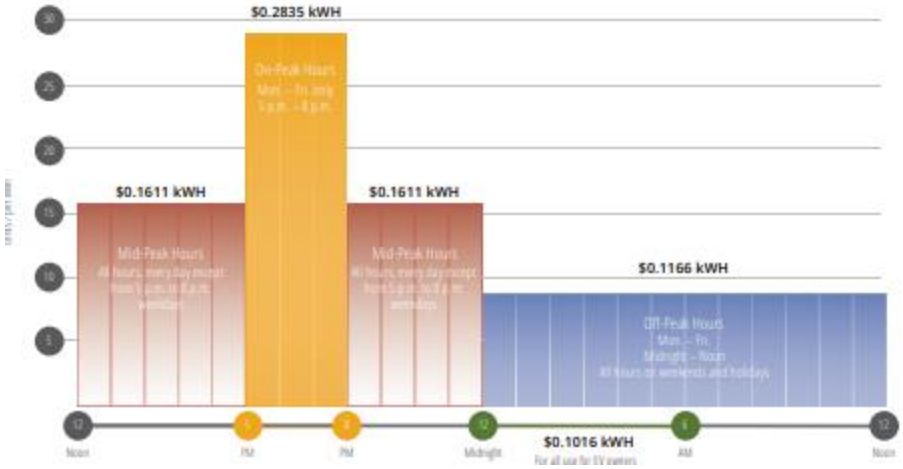


TABLE 3. RESULTS FROM TOD SHIFT IN 2019

Benefits	Estimated	Actual
Carbon Reduction	3,000-5,000 metric tons	12,800 metric tons (estimated)
Residential peak load reduction	75MW, or 5.8%	~130MW, or ~8%
Financial benefit	$3.7M annually	$5M estimated in commodity costs
Selection of TOD	96%	98% (to date)

FIGURE 6. AVERAGE CUSTOMER ENERGY USE REDUCTION

With TOD, the greatest carbon reduction was achieved on the 12 hottest days in the summer (green line)

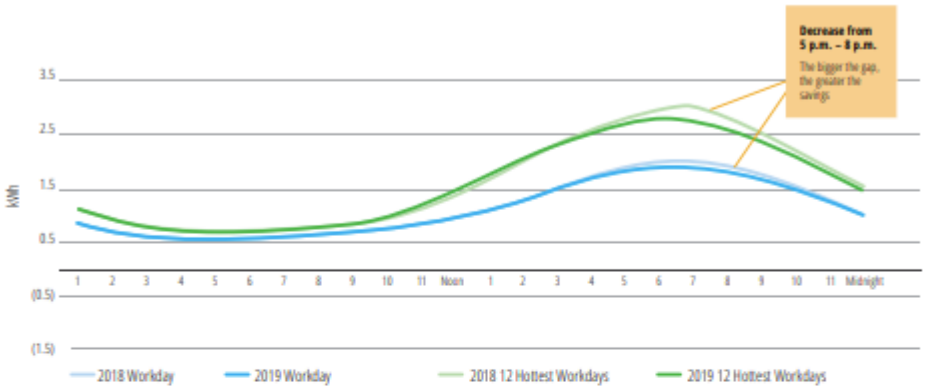
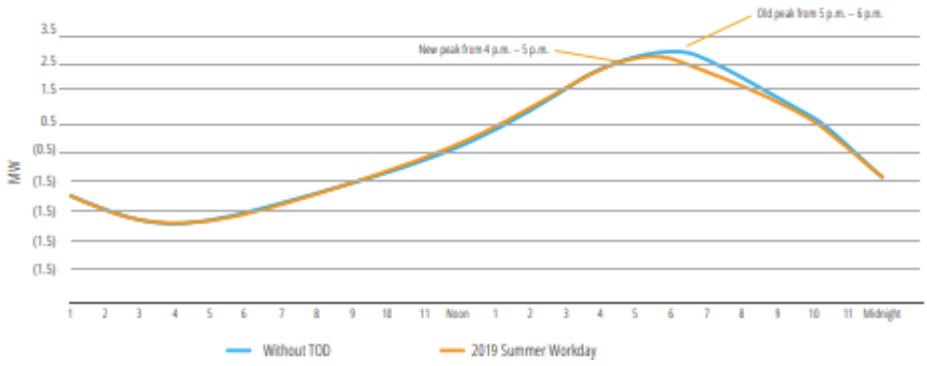


FIGURE 7. SYSTEM IMAPCT TO AVERAGE SUMMER WORKDAY

With TOD, customers moved the system peak from 5 – 6 p.m. to 4 – 5 p.m., plus also reduced the peak



5.

Key Quotes from SMUD Case Study:

"During the first summer with TOD rates, in 2019, the system peak occurred between 4 pm and 5 pm, when renewables are plentiful. Prior to implementation of TOD, the peak was moving later into the evening." – P. 23

3. **Time-Varying Rates are Moving from the Periphery to the Mainstream of Electricity Pricing for Residential Customers in the United States (brattle.com)[11]**

Key Quotes:

"A 2012 study summarized the insights gained from these pilots. One of the findings was that in 2010, Pacific Gas and Electric called 13 events under its CPP program. Although there were no observable conservation effects, average peak reduction was 14% (with load shifting to subsequent hours) and customers saved an average of 8.2% on their bills. Low-income customers provided about the same percentage of peak demand reduction as other customers." – P. 6

"But only 12.3 million households are enrolled on a time-varying rate, which is about 9% of total number of residential customers. The barriers to large-scale implementation of time-varying rates include:

• Insufficient evidence of benefits: Stakeholders are still not convinced benefits would be realized through full-scale deployment. Unless evidence of benefits is compelling, regulators, utilities, and customers will fear that a broader group of customers will be harmed by the new rates and that they will fail to promote economic efficiency or equity.

• Customer dissatisfaction and backlash: The move from flat rates to time-varying rates will more efficiently and fairly allocate costs among individual customers but it will definitely raise bills for customers whose load factors are lower than the average load factor for the residential class. It may take time for those customers experiencing bill increases to understand how to manage their electricity consumption relative to the new rate structure. Additional investment in customer education and outreach will be needed to help customers fully understand the new rates, how to choose among their rate options, and how to adjust their usage patterns to lower their bills. It would be useful to give customers a choice of several rates, including flat rates, TOU rates with different price differentials across periods, and dynamic pricing rates.

• Effects on sensitive or disadvantaged customers: Special attention has to be paid to the needs of customers with medical disabilities, customers who are unemployed and low income customers in general.

Some questions remain about how customers will react with full-scale deployment, even though study after study has shown that such rates will yield real and quantifiable efficiency benefits to customers. Despite this evidence, there are persistent fears about a customer backlash or a failure to realize expected benefits. There are ways to overcome these fears, including:

• Customer bill effect studies: Utilities and regulators can conduct studies to understand how customer bills will be affected.

[11] DRAFT: Forthcoming chapter, Handbook on Electricity Regulation. Time-varying rates are moving from the periphery to the mainstream of electricity pricing for residential customers in the United States. Ahmad Faruqui and Ziyi Tang. August 12, 2023

• Customer behavior studies: There are models available today for carrying out simulations to determine the likely customer response. These models draw from findings in prior pilot studies.

• Customer outreach and education: Utilities can engage in customer outreach programs to explain why tariffs are being changed and how the new tariffs will work. It will be important to ensure the new rates use clear and understandable language. Utilities can enlist neutral parties to endorse the change and they can use modern social media to spread the word.

Tapping into the newer generations of technology-savvy customers will be crucial. Utilities can develop new and more efficient ways to communicate with their customers, help to develop apps and smart energy tools, and otherwise explore methods to enhance the customer experience with technology. Here are some options for easing the transition:

• Transition rates: Utilities and regulators can design transition schemes that change the rates gradually over three to five years.
• Bill protection: Alternatively, bill protections can be provided to customers, ensuring that customer bills will not go up but they will be able to keep the savings, with those protections being phased out gradually over time.
• Add protections for sensitive customers: For the first five years, rates could be optional for sensitive or disadvantaged customers, such as low-income customers, small users, and disabled customers. Or these customers could be provided financial assistance for a limited period of time.
• Provide additional information and options to customers: There may be ways to provide additional options for customer participation. For example, consider a subscription concept in which customers "buy" their historical usage at the historical price, and buy or sell deviations from that usage at the new tariffs. This option would also help to transition into the fifth wave of tariff reform involving transactive energy. -P. 8-9

TABLE 2 REMEDIES FOR ADVERSE BILL IMPACT

Remedy	Implementation
Gradualism	Roll out the new rates gradually for each rate design element. For example, to introduce a TOU rate, if the peak price will be 25 ¢/kWh and the current tariff is 15 ¢/kWh, implement a peak price of 17 ¢/kWh in the first year and increase it annually by 2 ¢/kWh until it reaches 25 ¢/kWh.
Bill Protection	Provide customers with bill protection for a limited period so that they pay the lower of their old and new bill.
Optional Rates	Make the new rate design optional for vulnerable customers, mandatory for the largest customers, and the default for all other customers.
Financial Assistance	Provide customers with adverse bill impacts financial assistance for a limited period.
Enabling Technologies	Install enabling technologies such as smart thermostats on customer premises.
Two-staged Rollout	Structure the rate into two stages, where the first stage charges customers the current rate if their usage resembles a historical reference period, and the second stage exposes them to the new rate.

"In Colorado, a municipal utility moved all its residential customers from traditional volumetric rates to TOU energy rates in October 2018. The deployment was mandatory and it was preceded by a oneyear pilot. The residential opt-out pilot showed a 2.5% reduction in energy consumption.

An investor-owned utility began rolling out a default TOU rate in 2022 to all customers with smart meters. The deployment will be completed by 2025. It was preceded by a pilot that ran for two years. A cooperative has just announced plans to roll out a TOU rates as the default tariff. It will feature two pricing periods and the ratio of peak to off-peak rates will be 2:1. They will also have a three-period TOU rate for customers with EVs. It will have a 4:1 ratio between the peak and night-time rates…

In California, the three-investor owned utilities have almost completed transitioning all their residential customers to TOU rates. The deployment began in 2018. The deployment was preceded by extensive market research and a series of pilots going back almost two decades. A municipality offers a default TOU energy rate along with a $23.5 a month service charge. Only 3 percent of customers have opted out of the TOU rate. The deployment was preceded by a very well-designed pilot.

In Michigan, an investor-owned utility serving the Lower Peninsula rolled out TOU rates as the default tariff to all its residential customers in 2021. The deployment was preceded by a pilot program that saw a general reduction in peak energy of between 3% and 4%. The other investor-owned utility has also rolled out TOU rates as the default tariff. Customers can opt-out to other rates but all of them are TOU rates. In that sense, the state has implemented mandatory TOU rates.

In Missouri, regulators in Missouri have approved two new default rates of the two major investorowned utilities with peak to off-peak price ratio of 5:1 and 4:1 in 2023, the highest such ratios in default TOU rates in the US." P. 18-19

Summary of Peak to Off-Peak Ratios from Study

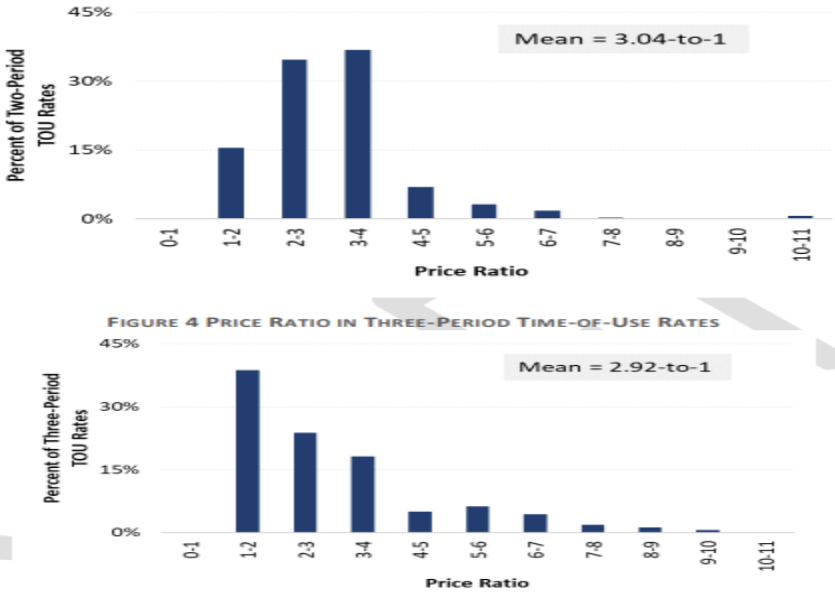


FIGURE 4 PRICE RATIO IN THREE-PERIOD TIME-OF-USE RATES

4. **Do Time-of-Use Prices Deliver Energy Savings at the Right Time? (ucdavis.edu)[12]**

Key Quotes:

"After controlling for temperature differences across years, we find that household AC use from 5pm to 8pm on summer weekdays fell by an average of 4 minutes per hour, a 16% decrease, following the switch to default TOU rates." – P. 2

[12] "Do Time-of-Use Prices Deliver Energy Savings at the Right Time?" Zheng Fu, Kevin Novan† and Aaron Smith. Department of Agricultural and Resource Economics.