November 16, 2021

Some Thoughts on Rate Design for EVs

Washington Utilities and Transportation Commission

David Farnsworth
Principal
The Regulatory Assistance Project (RAP)®

50 State Street, Suite 3
Montpelier, VT 05602
USA

802-498-0708
dfarnsworth@raponline.org
raponline.org
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org
Outline

• Pricing
• The Opportunity
• Some Examples
Rates are Prices…

What does this rate design say to you?

$1.50 $2.25 $2.75
The Opportunity
Electric Vehicles w/Low-Capacity Utilization Rates Makes them Potential Grid Resources

Shifting Electricity Demand

Source: © E Source, adapted from Integral Analytics Inc.
Uncontrolled Water Heater Loads Are Easy to Spot
Controlled Water Heaters

The CTA 2045 socket enables any control network to connect to any new water heater.
Uncontrolled Household Loads Could Add Up To A Lot

- Lights / Minor Appliances: 3 kW
- Major Appliances: 4.5 kW
- Water Heat: 4.4 kW
- EV: 6.6 kW
- Space Conditioning: 4 kW

Total Peak Demand: 22.5 kW
Demand Flexibility Dramatically Cuts Peak Demand

Shift EV, Water Heat, Major Appliances, and Pre-condition spaces

- Lights / Minor Appliances
- Major Appliances
- Water Heat
- EV
- Space Conditioning

Peak Demand (kW)

3.6 kW
If you Avoid High-Cost Hours You Avoid High Costs

Source: Rhode Island Power Sector Transformation, Phase One Report to Governor Gina M. Raimondo (November 2017)
There is Value in Flexibility

Avoid Heating Water or EV Charging during these hours

Source: California ISO
Wind Penetration and Curtailment: Use Flexible Load and Avoid Waste

Note: Each year, the total reflects only those ISOs for which we have curtailment data.

Note: All curtailment percentages shown represent both forced and economic curtailment. PJM’s 2012 curtailment estimate is for June through December only.

Some Rate Designs
The Basic Goal

Rate design should make the choices the customer makes to minimize their own bill consistent with the choices utilities would make to minimize system costs.
Managing Load

Pairing EV adoption and EV charging with intelligent rate design can improve electric distribution system utilization and create downward pressure on rates through load management and system peak reduction.

Rate Designs

**Flat energy rates**
- Rates do not vary by time or wholesale market cost and include an insurance premium to protect customers from volatility

**Tiered rates (inclining or declining blocks)**
- The cost per unit of electricity increases/decreases at defined consumption thresholds
- Inclining Rates – rate increases with each block of usage
- Declining Rates – highest rate is in the first block and the cost per kwh decreases in each subsequent block
Rates are Prices…

What does this rate design say to you?

$1.50  $2.25  $2.75
What does this one say?
Rate Designs

Time of use (TOU) rates (time of day, seasonal).
• Divides the period (day) into time periods and provides a schedule of rates for each period (e.g., peak, off-peak, shoulder)

Critical peak pricing (CPP)/Peak Time Rebate (PTR)
• Typically, an overlay on TOU pricing. During times of system stress or high cost (i.e., critical peak [CP] events), price rises to a very high level to reflect very high, but short-term, cost of generating or purchasing electricity at times of shortage or peak demand. Customers are notified in advance of a CP event. The number of events per year is typically capped.
• Alt., customer avoids a CP event and gets a PTR.
Rates

TOU Rates

CPP = critical peak price  
PTR = Peak Time Rebate
Technology Can Help
Technology Can Help

Average Peak Reduction from Time-Varying Rate Pilots

- TOU
- TOU w/ Tech
- PTR
- PTR w/ Tech
- CPP
- CPP w/ Tech
- RTP
- RTP w/ Tech

Peak Reduction

1 - Pricing Pilot - 109
RAP Resources on Electrification

- Roadmap for Electric Transportation
- Taking First Steps: Insights for States Preparing for Electric Transportation
- Beneficial Electrification: Ensuring Electrification in the Public Interest
- Beneficial Electrification of Transportation
- Getting From Here to There: Regulatory Considerations for Transportation Electrification
- Blog post: We All Wish We Were More Flexible: Electrification Load as a Grid Flexibility Resource
RAP Resources on Ratemaking

- Smart Rate Design for a Smart Future
- Demand Charges: What are They Good For?
- Principles of Modern Rate Design
- Smart Non-Residential Rate Design
Thanks for Listening
## Alt. to Demand Charges – Moratorium (SCE)

| Southern California Edison | TOU-EV-7 (< 20 kW) | TOU-EV-8 (20 – 500 kW) | TOU-EV-9 (>500 kW) | Customer Charge: ✓ | Energy Charge: ✓ | Demand Charge: × (until 2024) | Time Of Use Rates: ✓ | Demand Charge Holiday; Customers receiving service under this schedule will not face a Demand Charge until March 2024. Starting in 2024, the Demand Charge will be phased-in over a 5-year period. |
## Alt. to Demand Charges – Volumetric (PGE)

| Portland General Electric | Schedule 38 (<200 kW) | Customer Charge: ✓ | Energy Charge: ✓ | Demand Charge: × | Time of Use Rate: ✓ | TOU Rate for customers with demand< 200 kW; Customers face an energy TOU rate ($0.0607/kWh during the on-peak period; $0.0457/kWh during the off-peak period). Distribution and transmission charges are volumetric but are not time based. |

---

Regulatory Assistance Project (RAP)®