Workshop: Rate Design Initiative

Why Focus on End-Use Rates?

Freddie Hall

Resource Planner, BED

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Introduction

Focus of the presentation

Focus

§ Rick Weston (RAP)

Rick proposes a firm foundational for future ratemaking in two parts. An embedded cost analysis is needed to address revenue adequacy and the fair allocation of costs between classes. The other focused on avoidable or incremental costs that can be used to shape sharper price signals for better load management. Rates and controls can also be structured for more open access and active contributions from value-added (third party) service providers.

§ Jeff Monder (GMP)

Utility load management can provide a relatively simple (from the customer perspective) path to creating customer value through the utility controls. Jeff will present on flexible load management, the experience and insights gained from GMP pilots and discuss future opportunities for well-crafted utility-choreographed load management service packages.

§ Paul Hines (Packetized Energy, U. of Vermont)

Building off the presentation by GMP on flexible loads and utility packaging of load management, Paul takes to concept to another level and discusses the potential for further expansion of load management packages and the related opportunity for product differentiation bundled service arrangements sometimes referred to as service contracts or subscription services. Building on earlier comments, DU access can foster open-access for value-added services and providers.

§ Freddie Hall (BED)

From earlier presentations we know that some of the newer loads, like EVs and potentially CCHP present potential long-term challenges to costs if left uncontrolled. Freddie will present and discuss end use pricing as a path to increase both adoption and responsiveness of end use loads, like EV loads.

§ Scott Burnham (NewGen)

At the end of the day, advanced forms of pricing require acceptance and adoption by customers. Customers have been slow to adopt time-varying rates. Scott will build off of the presentations from Workshop #3 and feature some of the myriad of pathways that are leading to greater adoption of innovative rates.

A few rate tools for changing behavior

Overview of a few rate options for incentivizing end-use device adoption/behavior

Invasiveness

Whole Home Rate/Program

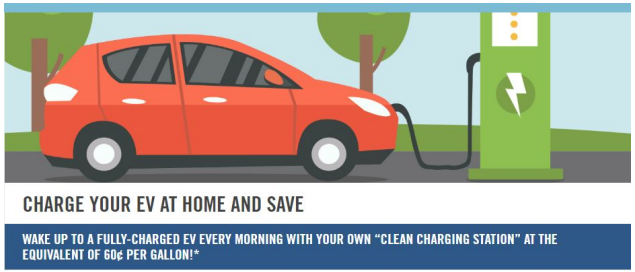
- Time of Use[1]
- Defeat the Peak[2]

Rider

- Electric Hot Water Heater Bill Credit[3]
  - A one-time $25 credit on your bill
  - A monthly bill credit of $1.37
  - 4 LED light bulbs
  - 6 feet of hot water heater pipe insulation
  - A low-flow showerhead

Full End-Use Rate (Submetered)

- Residential Electric Vehicle Rate[4]
  - Fixed EV Charging Option
  - Flexible Load Option



Sources

1. http://burlingtonelectric.com/rates-fees#residential-service-time-of-use-rt
2. http://burlingtonelectric.com/peak
3. https://burlingtonelectric.com/hotwater
4. https://www.burlingtonelectric.com/sites/default/files/inline-files/Residential%20EV%20Rate%20Tariff.pdf

Why focus on End-Use Rates?

What is important to consider

General considerations:

End-Use rates are useful to incentivize behavior with minimal downside, generally higher adoption if technology exists

Does it meet cost tests for the customer, utility, and society (which in return benefits everyone)?

Key considerations

- Amount of energy usage
- Peak coincidence / flexibility
- Is it a new marginal load?
- Does it accomplish climate goals?
- Is technology reliable/commercially available to provide submetering and/or load control

End-Use Device	Amount of Energy	Peak Coincidence	New Marginal Load	Climate	Technology
Coffee Maker	Small	Low	N	N	N
Pool Pump	Medium	High	N	N	Y
Electric Vehicle	Large	High	Y	Y	Y

EV Rate Calculation

Derivation of the EV Charging Credit

		Cost ($/kWh)	Explanation
1	Power Supply Costs	$0.04	• Energy Costs HE 1-12, 23-24 • REC prices
2	Hardware/Software Costs	$0.02	• Cost to recover hardware over 8 year window • Based on 2,558 kWh/yr • Software fees incurred from data management • $400 Capital or $51.16/year/device
3	Fixed Cost Contribution	$0.02	• Contributing to rate suppression • Each EV will contribute $51 per year

Capital	Subscription
$ -	$ 51.16
$ 100.00	$ 38.37
$ 200.00	$ 25.58
$ 300.00	$ 12.79
$ 400.00	$ -

$0.08/kWh → **$0.067735 /kWh Credit**

Efficient Electric Thermal Rate Research

Process to calculate rate…

Incentive Stack

Tier 3 / Energy Efficiency Monies:

T3 Incentive ($1,650 to $2,200)
Energy Efficiency Rebate (up to $650)

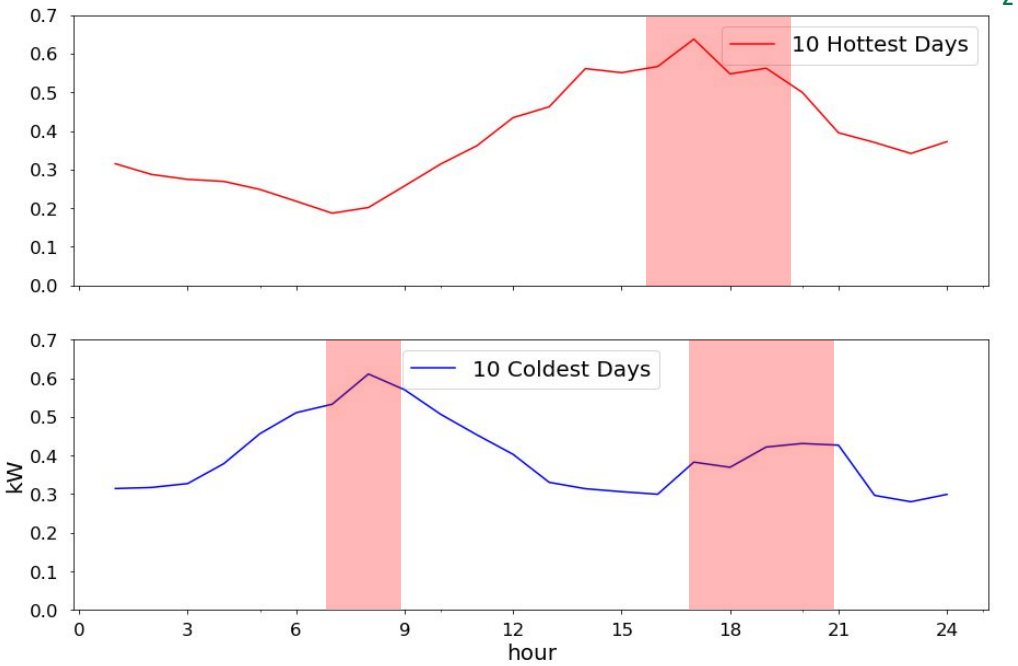
Increased marginal load:

~2,000 - 3,000 kWh

Demand Response Potential:[1]

Transmission: $ 0.0190 / kWh
Capacity: $ 0.0160 / kWh

Cold-Climate Heat Pump Load Profile Under Extreme Temperatrues [2]

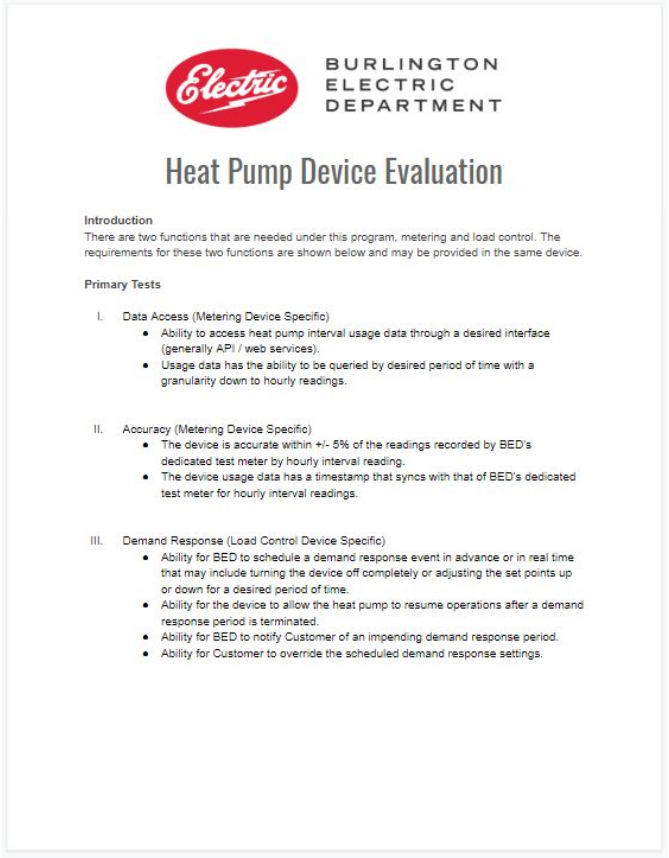


Sources

1. Based on recreated load shape coincidence with WEM peak costs derived from COP to temperature and adjusted to match weekday/weekend seasonal load shapes and annual kWh usage
2. Open EEMeter Analysis of +100 Burlington Electric Department residential customers with installed ccHP github: https://github.com/fabioyoohoo/eulp

Efficient Electric Thermal Rate Research

Technology testing



BURLINGTON ELECTRIC DEPARTMENT

Heat Pump Device Evaluation

Introduction

There are two functions that are needed under this program, metering and load control. The requirements for these two functions are shown below and may be provided in the same device.

Primary Tests

I. Data Access (Metering Device Specific)
- Ability to access heat pump interval usage data through a desired interface (generally API / web services).
- Usage data has the ability to be queried by desired period of time with a granularity down to hourly readings.

II. Accuracy (Metering Device Specific)
- The device is accurate within +/- 5% of the readings recorded by BED's dedicated test meter by hourly interval reading.
- The device usage data has a timestamp that syncs with that of BED's dedicated test meter for hourly interval readings.

III. Demand Response (Load Control Device Specific)
- Ability for BED to schedule a demand response event in advance or in real time that may include turning the device off completely or adjusting the set points up or down for a desired period of time.
- Ability for the device to allow the heat pump to resume operations after a demand response period is terminated.
- Ability for BED to notify Customer of an impending demand response period.
- Ability for Customer to override the scheduled demand response settings.

Thank you!

Why Focus on End-Use Rates?

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Program Research

Case Study: Otter Tail Power Company

Otter Tail Power Company

Dual Fuel Rate - Combining your current heating system with an efficient, cost-effective electric heating option that helps to manage the electric system and save money with a kilowatt-hour rate that is about half the price. Electricity is the primary heating fuel used during normal off-peak conditions. A non-electric backup system supplies heat during periods of peak demand when energy control is needed. This is accomplished through a radio receiver installed near the meter.

Deferred Load Rate - Savings of up to 30% on electric heating and cooling costs when a qualified thermal storage system is installed.

Rebates for HP:

- $400 per ton on an ASHP
- $600 per ton on a ccHP
- Energy control rebate of $600 per ton on ccHP when:
  - Rated with an HSPF of 10.0 or higher
  - Served through a Dual Fuel, Deferred Load or Residential Demand Control Rate
  - Sized for heating season performance
  - Installed with crossover set point no higher than 0℉

Sources

1. https://www.otpco.com/ways-to-save/heating-and-cooling/heat-pumps/cold-climate-heat-pumps