

Smart Speaker & TOU Project



TOU Based
Energy Optimization
Using
Alexa & Off-the-Shelf Devices



Agenda

- Executive Summary
- Background
- Results
- Lessons Learned
- Recommendations

In 2019, SCE partnered with UD to develop “Energy Expert” for two purposes

- Educate customers about their Time-of-Use (TOU) rates using smart speakers
- Enable customers to optimize their off-the-shelf devices based on their preferences and rates

The results are impressive

- TOU 5-8PM saved 10% or 0.22kW on Summer Weekdays
- TOU 4-9PM saved 9.7% or 0.23kW on Summer Weekends
- High participation rate of 69%
- Potential to save \$22M/Year at 10% participation and \$200M/Year at 90% participation

Customers in Data	Active Customers	Active Customers still on rate
91	69	63

Optimize behind the meter devices using TOU rates and preferences

- Goal 200; 100 installations due to COVID
- Use OpenADR to send TOU Rates
- Use off-the-shelf devices
- Log everything for M&V




Alexa, Open Energy Expert

Welcome to Energy Expert!

Provide an Alexa Interface for Customers

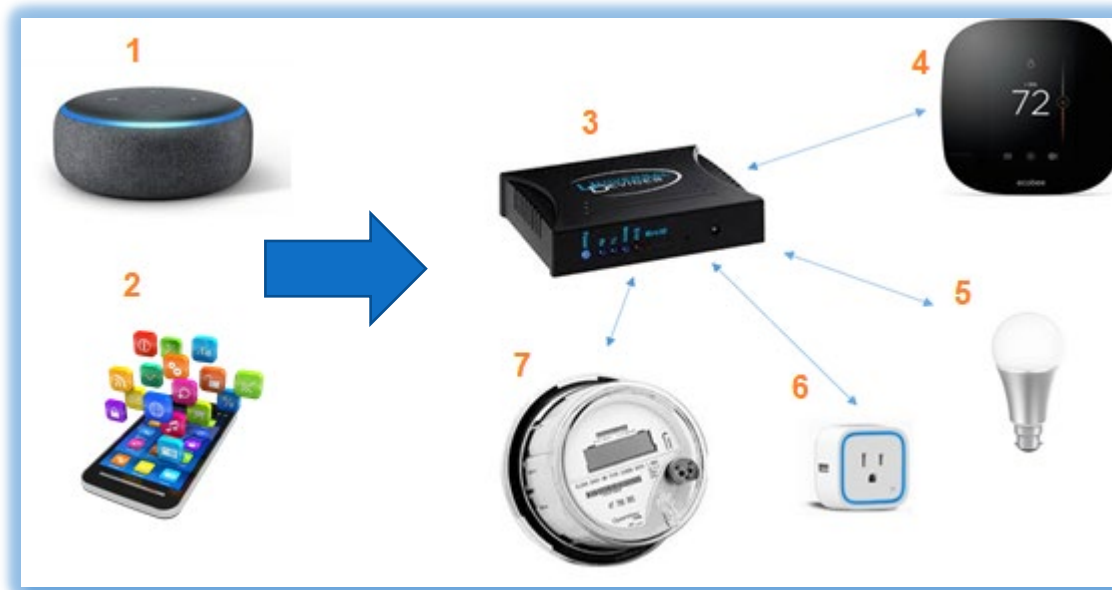
- Information about rates, bills, energy usage
- Optimization of devices based on savings levels
- Notifications for high prices and violations

<p style="text-align: right;">Rate</p> <ul style="list-style-type: none">– What's my rate?– What are other rates?– Am I on the right rate? 
<p style="text-align: right;">Bill</p> <ul style="list-style-type: none">– Get my last bill– Get my bill for < Period >
<p style="text-align: right;">Optimization</p> <ul style="list-style-type: none">– Set my savings level to < Low Moderate High > for < Everything Device >– Stop optimizing < Everything Device >– Calibrate < Everything Device >
<p style="text-align: right;">Informational</p> <ul style="list-style-type: none">– When is a good time to < Wash Dishes Charge My Car Do Laundry ... >– What is my electricity cost for < Device > for the last < Number > of < Days Weeks Months >
<p style="text-align: right;">Notifications</p> <ul style="list-style-type: none">– < Enable Disable > Notifications

Equipment & Topology



- OpenADR Hourly TOU Prices
- Green Button Billing & Usage

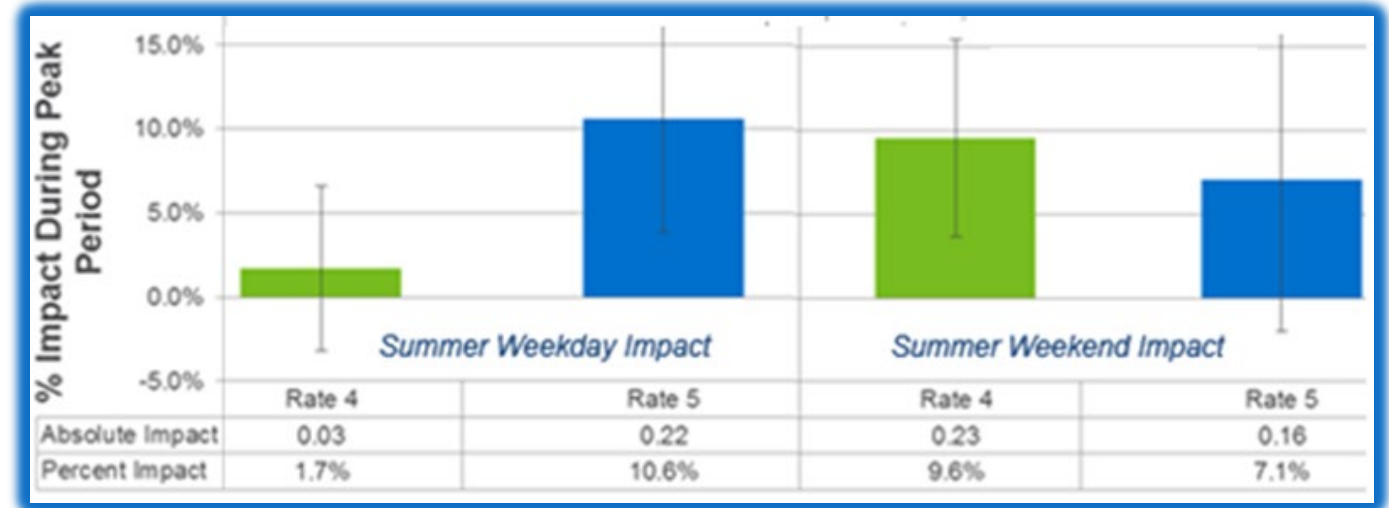


TOU 5-8 (Weekdays)

- 10% / 0.22kW / 0.66 kWh
- More customers/equipment

TOU 4-9 (Weekends)

- 9.6% / 0.23kW / 1.15 kWh
- Less customers/equipment



Customer Assumptions

- 2M Customers on TOU
- Ratio of 10 to 6 : TOU5-8 | TOU-4-9

Storage Assumptions




- Based on cost projections for 2050*
- Storage costs of \$173/kWh
- Max capacity of 20kWh

Participation Rate	Avoided # Batteries	Potential GW Saved	Potential \$Savings / Year
10.00%	6,600	0.04	\$22,836,000
20.00%	13,200	0.07	\$45,672,000
30.00%	19,800	0.11	\$68,508,000
40.00%	26,400	0.14	\$91,344,000
50.00%	33,000	0.18	\$114,180,000
60.00%	39,600	0.22	\$137,016,000
70.00%	46,200	0.25	\$159,852,000
80.00%	52,800	0.29	\$182,688,000
90.00%	59,400	0.32	\$205,524,000
99.00%	65,340	0.36	\$226,076,400

* [Cost Projections for Utility-Scale Battery Storage: 2021 Update](#) (NREL 2021)

Customer Engagement Is Key!

- Lowest open rate corresponds to increase in Alexa usage
- Optimizations/cost were 60% of all Alexa interactions in August!
- Increased savings corresponds to optimization and TOU awareness

	What Is My Rate Regular · SCE AI Pilot Sent Fri, July 3rd, 2020 10:00 AM to	Sent Classic Builder	51.0% Opens	3.0% Clicks
	Healthcheck and Support Regular · SCE AI Pilot Sent Fri, June 26th, 2020 3:41 PM to 101	Sent Classic Builder	58.4% Opens	2.0% Clicks
	Welcome to Energy Expert Newsletter Regular · SCE AI Pilot Sent Fri, June 19th, 2020 11:00 AM to	Sent Classic Builder	56.9% Opens	8.8% Clicks

Intent	July	August	September	Total	Percent
Get Electricity Cost	9	40	7	56	32%
Other (Blank in Data)*	16	25	8	49	28%
Amazon Fallback Intent	2	13	3	18	10%
Device Use Time	8	2	8	18	10%
Lowest Cost Time	0	5	2	7	4%

* Set Savings Level - Opt in : runs the automation routines

Requiring Any Installation Is Bad!

– Costly and time consuming

- Scheduling customers added delays
- Required training and handholding

– Added complexity to commissioning and setup

- Some thermostats were never commissioned
- Some light bulbs were never commissioned

– Customers may have emotional attachment to their existing equipment

- More than 15% abandoned participation when confronted with installation



Keep Customers Engaged

– Support all customer channels

- Smart Speakers, Mobile App, Push, Email, and Text
- Enable customers to use their preferred channel



– Make it super easy, educational, and informative

- TOU Rates and Comparisons, Usage, Bills
- Suggestions and recommendations
- Notifications of important events such as high prices and PSPS



– Analyze the interactions to optimize engagement

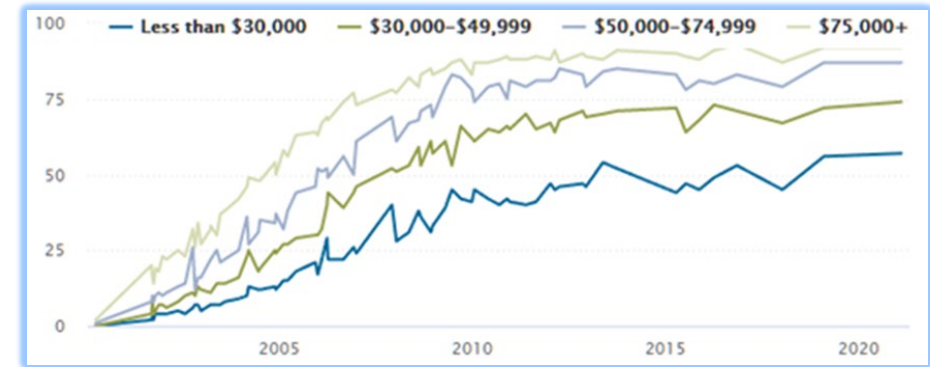
- Understand customer segments and preferred channels

Don't Require Installation

– For the Affluent

- More than 95% have home broadband (1)
- WIFI devices are ubiquitous

➤ Optimize their existing devices.



% Home Broadband by Income

– For the Disadvantaged

- 40% don't have home broadband (1)
- 30% use their Smart Phones as the only vehicle for Broadband access (2)
- But, more than 95% either have Mobile or Cell phones (3)

➤ Keep them engaged and informed using their preferred channel.

	Cellphone	Smartphone	Cellphone, but not smartphone
Total	97%	85%	11%
White	97%	85%	11%
Black	99%	83%	15%
Hispanic	100%	85%	14%
Less than \$30,000	97%	76%	19%
\$30,000-\$49,999	97%	83%	14%
\$50,000-\$74,999	97%	85%	12%
\$75,000+	100%	96%	3%
Urban	98%	89%	9%
Suburban	97%	84%	12%
Rural	94%	80%	14%

% Own Mobile or Cell

Thank You!

Contact Information:

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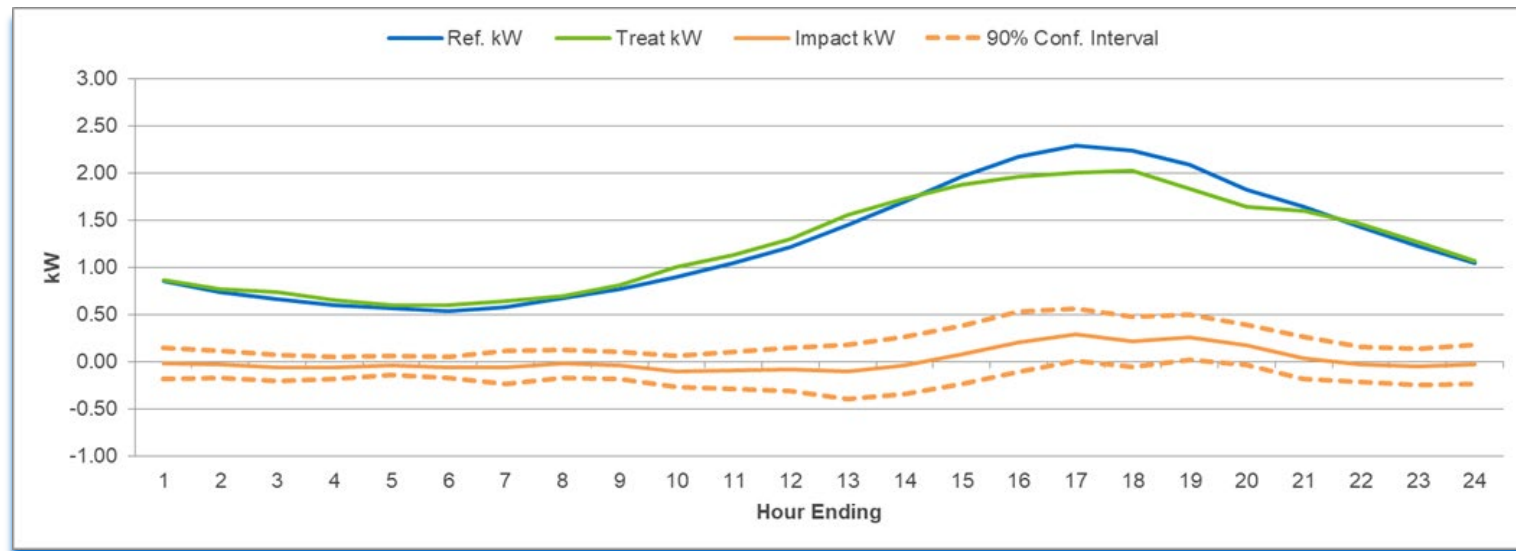
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Backup

Results

TOU 5-8 (Weekdays)

- 10% / 0.22kW / 0.66 kWh
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TOU 4-9 (Weekends)

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