



# Using OpenADR for TOU Rate Programs

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UNIVERSAL DEVICES

ORLY HASIDIM

# Grid Stability- the “New Energy Challenge”

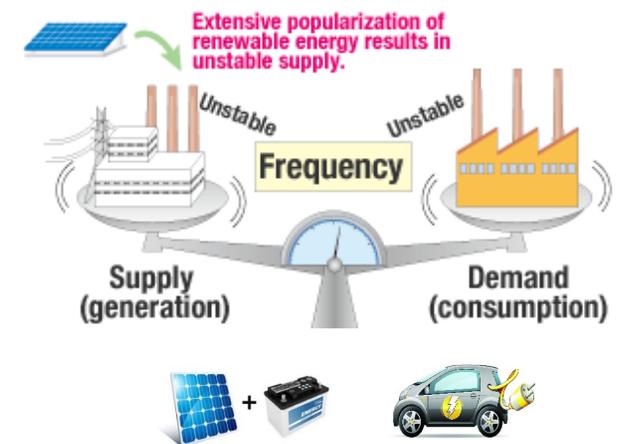
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Grid stability requires a balance between intermittent energy supply and consumer demand

- Extremely difficult to balance the grid when there are more distributed energy resources like solar and storage and even electric cars on the demand side of the grid

To improve grid reliability, there is an accelerating trend by many electric utilities to deploy rates such as Time of Use

- New rates can incentivize customers to consume energy during times when the cost of generating electricity is cheap and vice versa
- This will not balance the grid in real time but will help balance the supply and demand for a more moderate load shaping



# TOU – Pricing based on costs

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Innovative rate structures for residential energy consumers meant to incentivize customers to consume energy during times when the cost of generating electricity is cheap, and to disincentive energy consumption when the cost of generating electricity is high

## **PGE**

Peak Pricing 4–9 p.m. Every Day

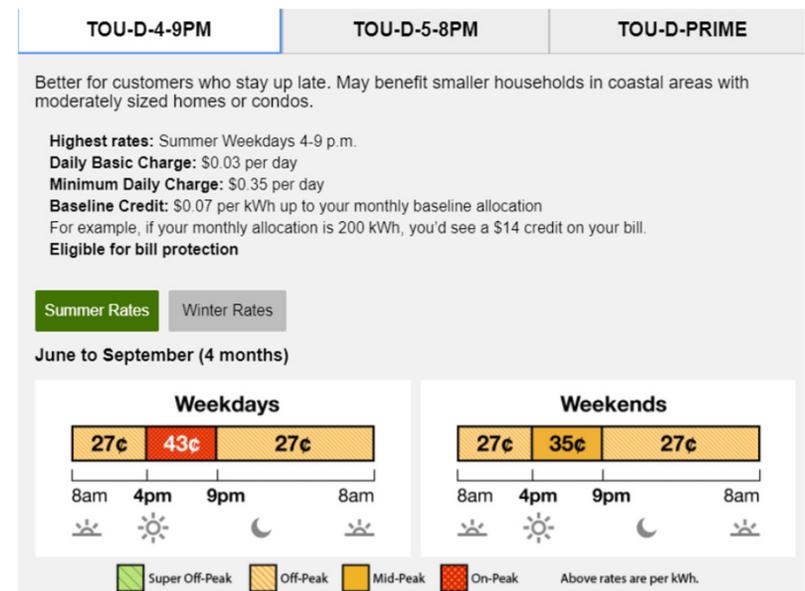
## **SCE**

On-peak: **2:00 pm to 8:00 pm** on non-holiday weekdays Super-off peak: 10:00 pm to 8:00 am every day Off-peak: all other times (including 2:00 pm to 8:00 pm on weekends & holidays)

# Demand Is As Important As Supply – TOU can help

For TOU rates to work efficiently, we need

- Automated and standardized method of communicating Time of Use prices
  - OpenADR 2.0a/b Price Signals
- Standardized methods for providing M&V to the utilities to help with further refining the TOU rates/periods
  - OpenADR 2.0a/b Price Signals
- Customer Engagement
  - Engage customers with impactful information
  - Empower them to easily automate energy usage based on TOU + their preferences
  - Enable them to use off-the-shelf and existing devices



# SCE Field Demonstration

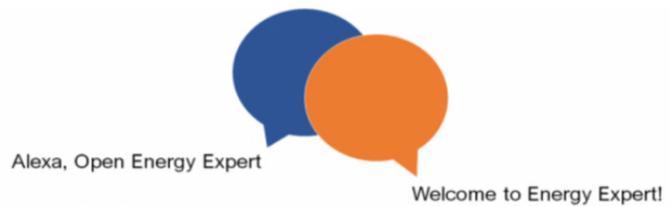
200 Homes with

- ✓ WiFi Thermostat
- ✓ WiFi Lightbulbs
- ✓ Z-Wave Energy Monitors
- ✓ Smart Speaker
- ✓ Smart Meter
- ✓ IoT Energy Management system
  - OpenADR 2.0b getting TOU Prices from a VTN including day ahead prices for more optimization
  - OpenADR 2.0b reporting Smart Meter energy usage to the VTN
  - Command, control, and optimization of all devices



# Customer Interface - Alexa

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**"What is my rate"** - Energy Expert will then provide you with the details of your current rate plan.

**"What are the other rates"** - Energy Expert will then provide you with the details of all other rate plans for your comparison.

**"Enable text notifications"** - Energy Expert will then notify you, via text messages, when your rate is high.

# Why Did We Use OpenADR?

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## ✓ Cutdown development effort by more than 70%

- Didn't have to come up with, parse, and test parsing spreadsheets
- Didn't need to worry about changes in periods and prices
- Automatically supported Day Ahead prices (even though the same)
- Reporting whole house energy usage didn't require any development

## ✓ Cutdown operational costs by more than 50%

- Didn't have to come up with a secure and automated process of downloading/uploading rate files
- Easy integration with customer rates using Green Button (phase 2)

## ✓ Extensible (and profitable!)

- Utilities can use their existing VTN infrastructure
- The same solution will work with any VTN with zero (to very minor) modifications and thus profitable



# Measurement and Verification

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## 5 Minute Interval Data

- ✓ Smart Meter
  - 20 seconds readings
  - OpenADR 2.0b Report Service to the VTN at 1 minute intervals
- ✓ Thermostat
  - State and Temperature
  - Can use OpenADR 2.0b Report Service
- ✓ Lightbulbs
  - State and Temperature
  - Can use OpenADR 2.0b Report Service
- ✓ Z-Wave Energy Monitors
  - Real time energy usage information for such things as ovens, refrigerators, washer/dryers, etc.
  - Can use OpenADR 2.0b Report Service
- ✓ Smart Speaker
  - Customer interactions with Alexa

### Energy Expert Reports ✕

File Name: Energy-Expert-Reports-2021-02.zip  
Month: 2021-02  
Status: Report is ready  
Last Changed: 2021-03-17 10:12:36  
Requested By:

[Refresh](#) [Generate New Reports](#) [Cancel](#)

# What can we do better?

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- ✓ Customer registration/commissioning through OpenADR is still manual
  - One automated, getting TOU rates to customers is as easy as commissioning only once
  - This does not have to be part of OpenADR specs. Perhaps recommendations just like Implementation Guide
- ✓ Measurement and Verification is very important for refining the TOU rates
  - Using OpenADR Report Service only for Smart Meters. Report Service can be used for almost any device (reference Implementation Guide)
  - Standardized reports cut development and operational costs for both the utilities and the manufacturers



# Thank you!

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