

OpenADR for Real Time Price Communications



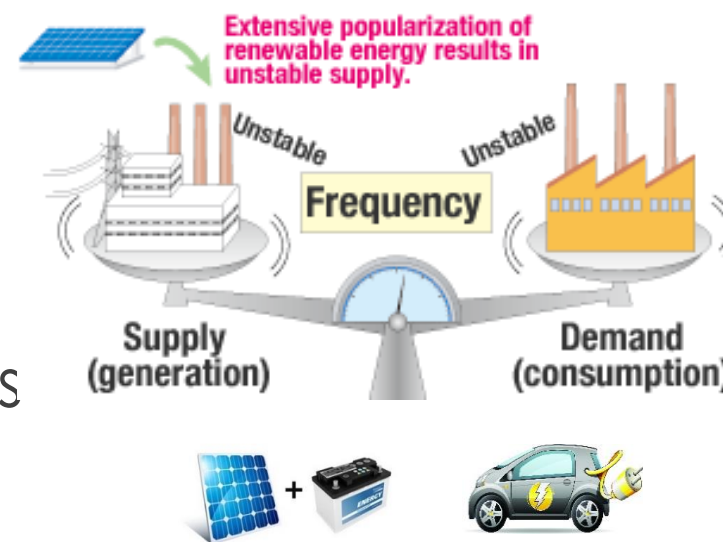
Grid Stability is Rapidly Getting Harder

Grid stability requires balance between energy supply and demand

- Extremely difficult to balance between billions of new energy generators and consumers

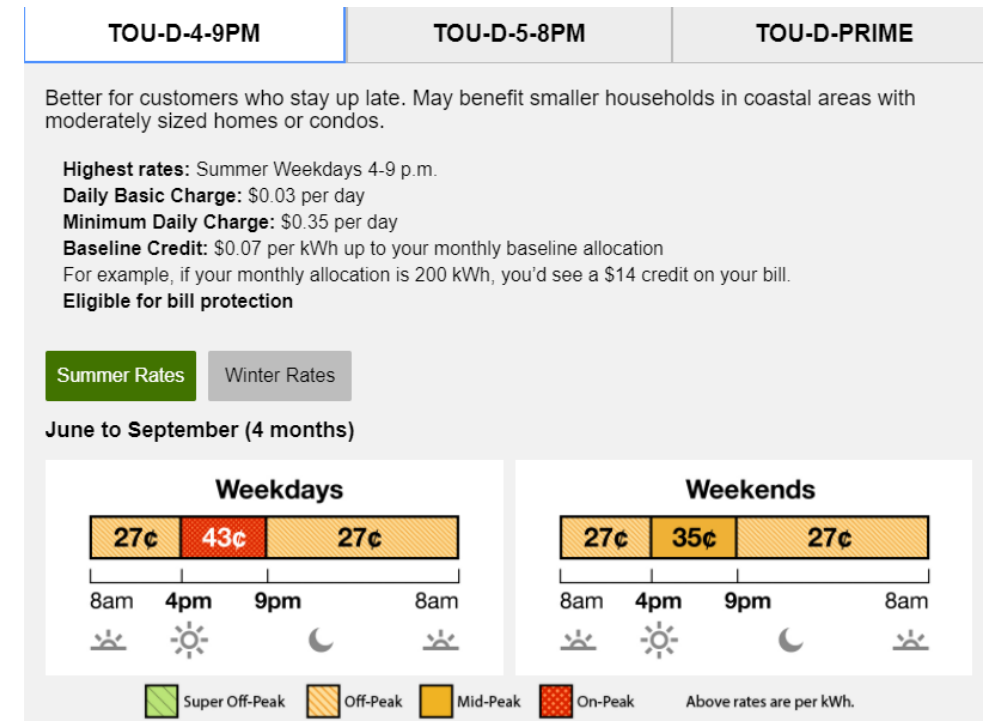
To improve grid reliability, there is an accelerating trend by many Power Utilities to use Dynamic or Time of Use pricing

- Incentivize customers to consume energy during times when the cost of generating electricity is cheap and vice versa



Effective Real Time Pricing Ingredients

1. IoT and automated and standardized method of communicating prices : OpenADR Price Signals
2. Standardized methods for providing M&V to the utilities to help with further refining the rates/prices : OpenADR Reports
3. Customer Engagement

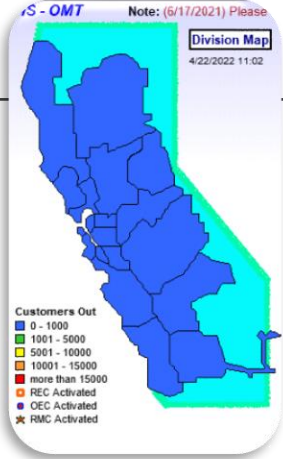


Pacific Gas and Electric



PG&E GRIDX
Rate Engine

Outage
Management
Tool (OMT)



Public Safety
Power Shutoff

SHARE USAGE DATA
Share your data with 3rd party.
SHARE MY DATA >

Customer
Authorized
Share My
Data (SMD)



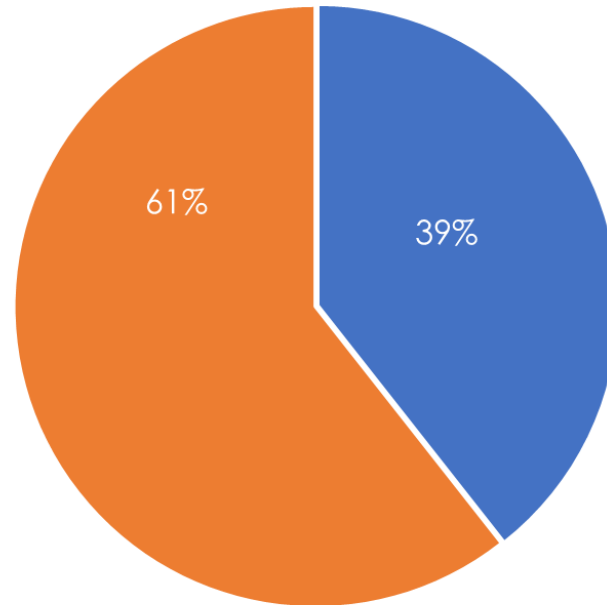
PG&E Public
Notifications

2022 SmartRate[™] Plan



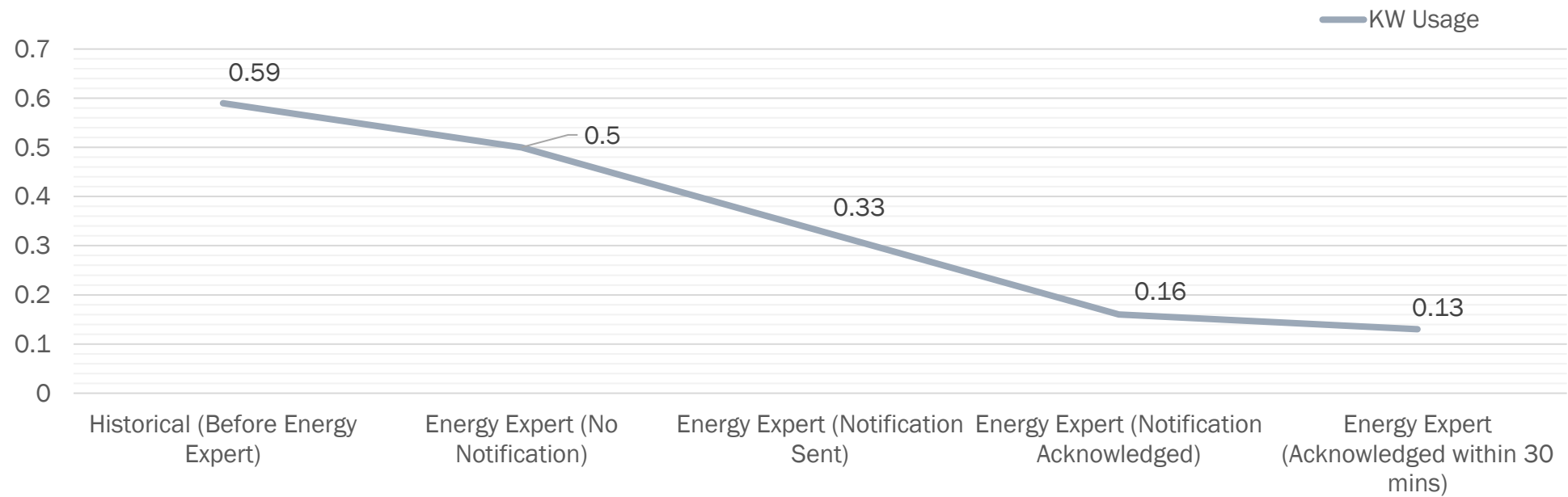
Importance of Rates

Are you on the right rate?

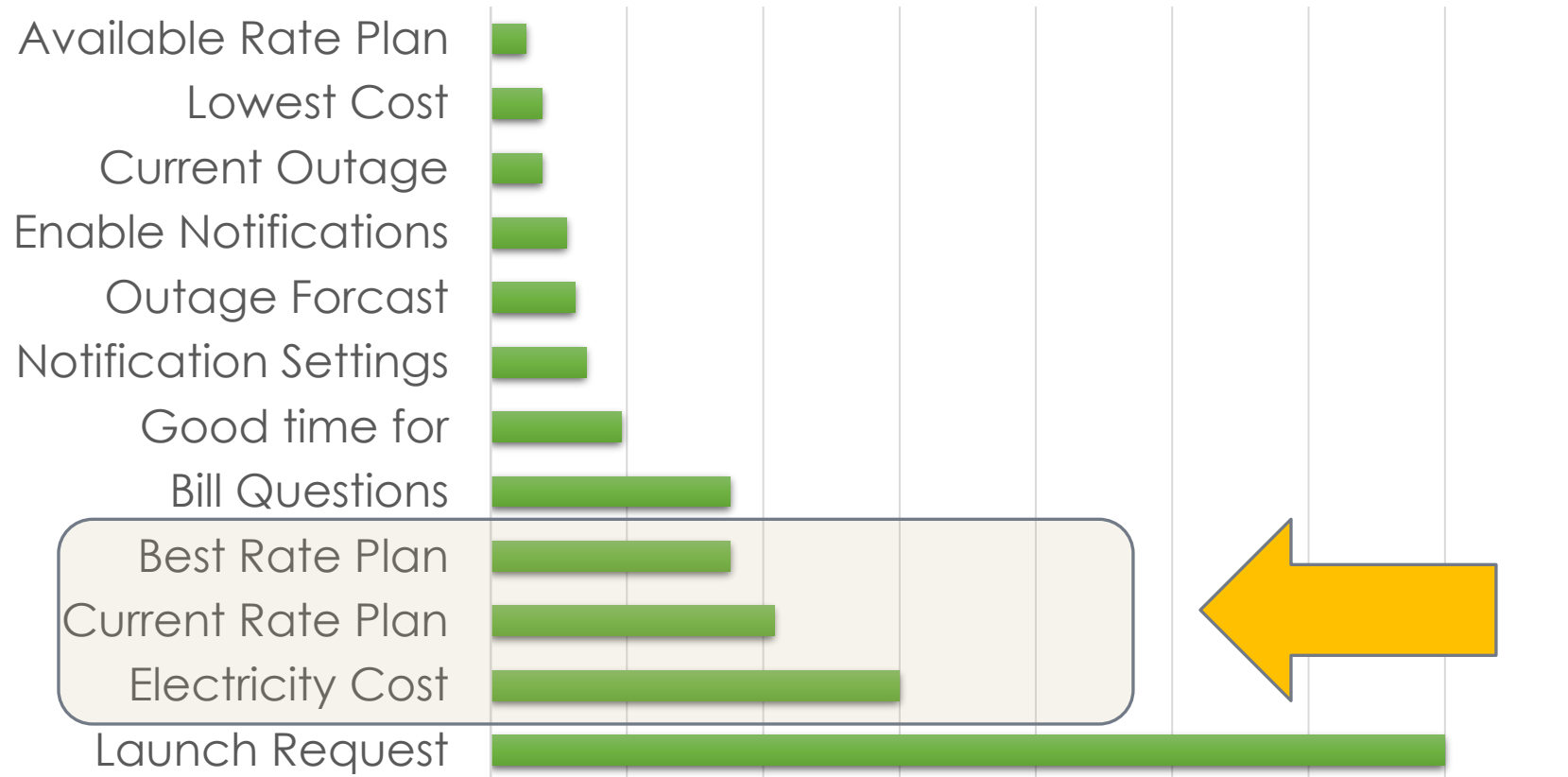


- Acknowledged within 5 minutes
- Did not acknowledge with first 5 minutes

High Price Notification Response



Alexa Frequently Asked Questions



Demonstration Using OpenADR

200 Homes with

- ✓ WiFi Thermostat
- ✓ WiFi Lightbulbs
- ✓ Z-Wave Energy Monitors
- ✓ Smart Speaker
- ✓ Smart Meter
- ✓ IoT Energy Management system



Customer Engagement

Is my house impacted by the public power shut off?

Am I on the best rate?

When is it a good time to charge my car?



"Your home, at <address> will be impacted by a PSPS at <x>, it is estimated to last <y>

Your current rate is <x>; if you switched to <y>, you could save about <z>% annually

The best time to charge your car is <x>"



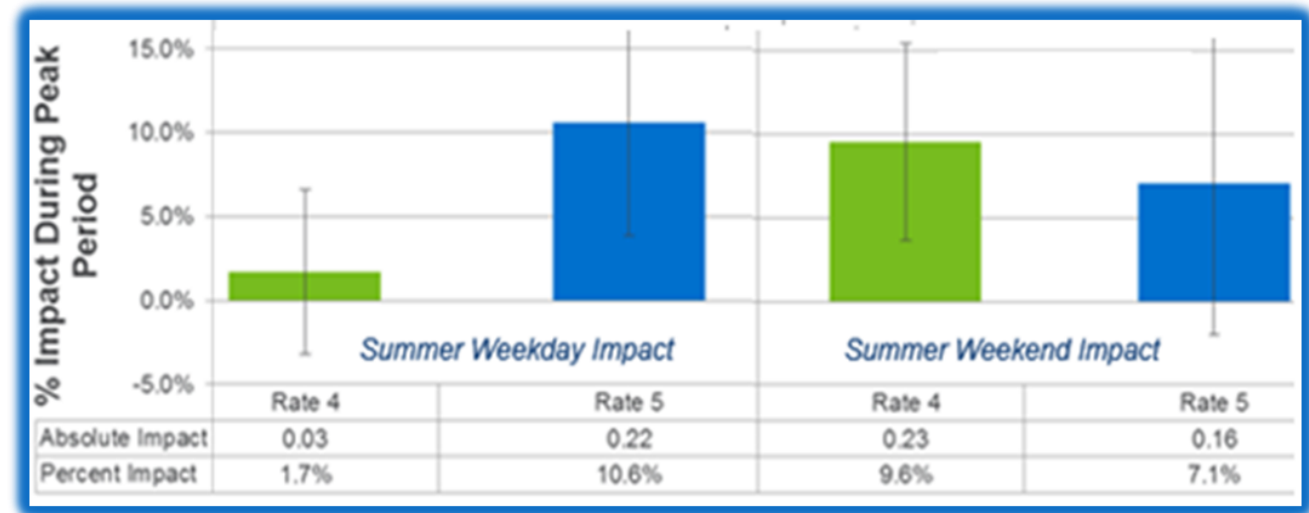
Results

TOU 5-8 (Weekdays)

– 10% / 0.22kW / 0.66 kWh

TOU 4-9 (Weekends)

– 9.6% / 0.23kW / 1.15 kWh



Why We Use OpenADR?

✓ Cutdown development effort by more than 70%

- No development for extracting prices
- No development for handling changes in periods/prices (summer/winter, weekday/weekend)
- Automatically supported Day Ahead prices
- Reporting whole house energy usage didn't require any development

✓ Cutdown operational costs by more than 50%

- No reason to use secure storage for rate files (from SCE to us)
- Easy integration with customer rates using Green Button



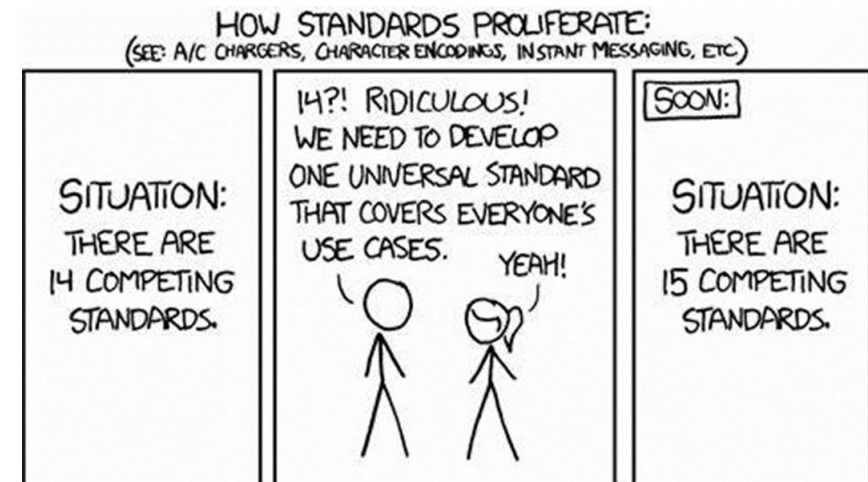
✓ Extensible

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



IoT and OpenADR

- Without IoT integration, Demand Flexibility and price responsiveness is impossible
 - Many disparate device communication protocols
 - Some support Time of Use but not much else
- The beauty of OpenADR is that it does not try to solve device communication standards
 - It acts as a proxy/conduit for utility/GHG signals
 - It has the most comprehensive set of signals that cover the majority of use cases for demand flexibility, price responsiveness, and even catastrophic events
 - Reporting and opt-in/out schedules out of the box



IoT OpenADR Configurations

1. A full energy management system

- Handles communications with all devices especially those off the shelf
- Incorporates customer preferences
- Enables integration of other services and devices such as Smart Meters, Alexa, Google Home, climate providers, etc.
- Devices can be supported through plugins
- Cons: more expensive and not suitable for use with just one or two devices

2. OpenADR signals directly to devices

- Devices directly respond to OpenADR signals
- Less expensive than full energy management system
- Cons: harder to develop, not suitable for 2+ devices



OpenADR 3.0

- Due to its comprehensiveness, OpenADR 2.0 is massive!
 - Many features are not necessary for device level integration
 - For simple price notification/reporting, it's an overkill
 - It's based on a technical spec that some developers find daunting
 - Integration with utility backend systems requires a standalone VTN (server)
- OpenADR 3.0 to the rescue!
 - Easier to develop and integrate into all products including a full energy management system
 - Specifically designed for communicating price signals and getting reports
 - Can easily be integrated with utility backend systems

Thank you London!

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Short Video



Thank you!

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