



OpenADR for Everyone

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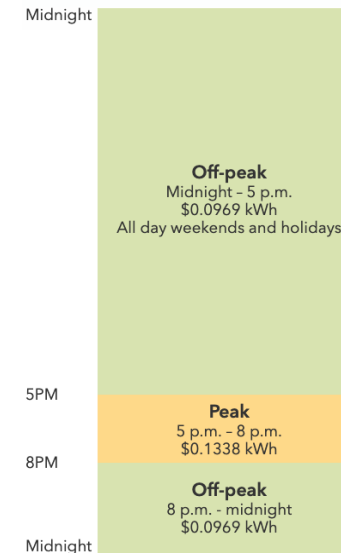
Context

- ⌘ Time-varying rates are here - CPP, TOU, & more dynamic
- ⌘ Many devices in buildings could/should be price-responsive
- ⌘ Things change
 - ✂ Rates and periods
 - ✂ Weekends and holidays
 - ✂ Daylight saving time
- ⌘ More dynamic prices better for grid, economy, environment
- ⌘ Devices need to get rate information **automatically**
- ⌘ “OpenADR” should be core to this



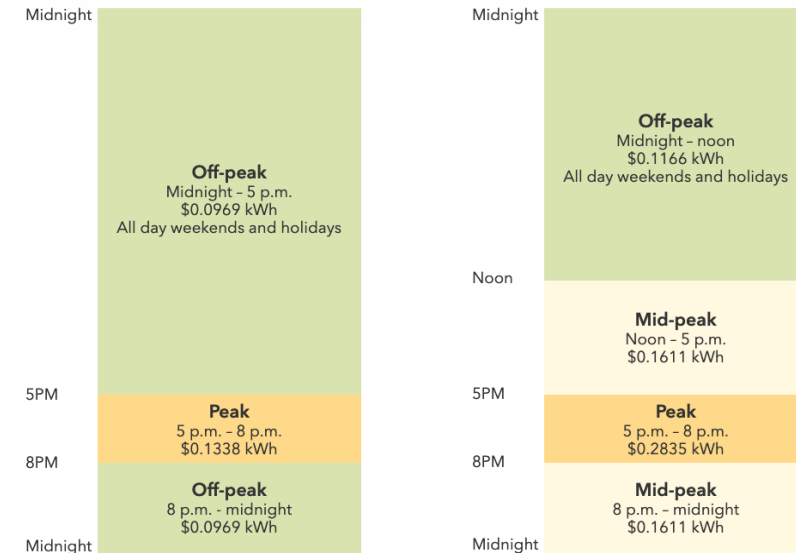
❄ Non-summer

October 1 - May 31



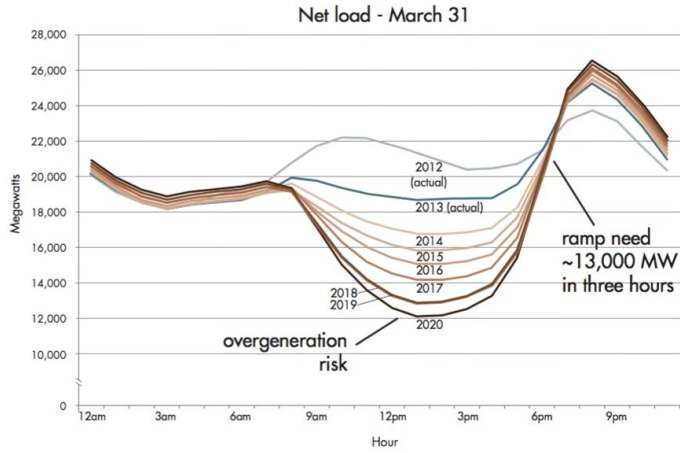
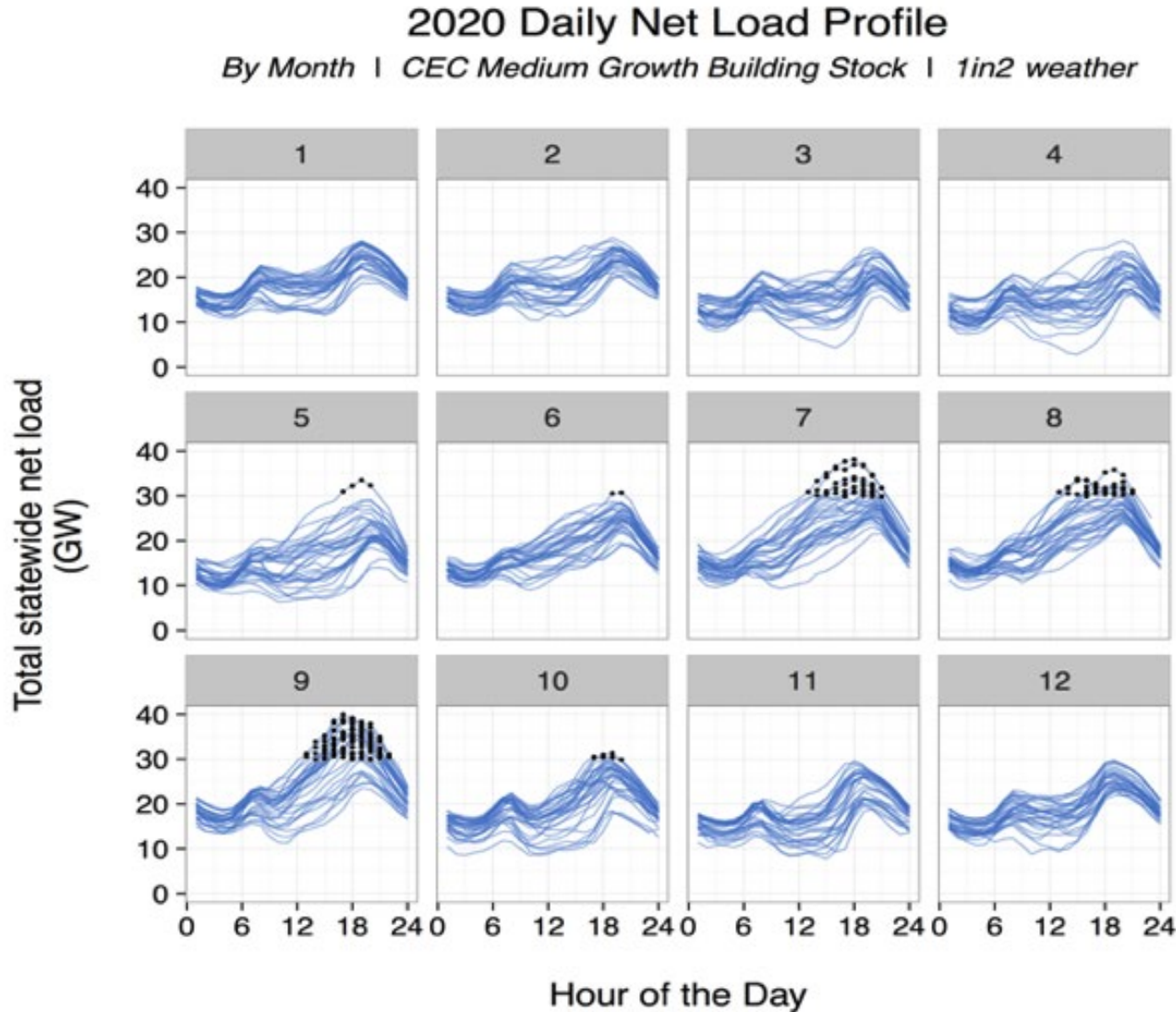
☀ Summer

June 1 - September 30



Electric vehicle owners: Register your EV on My Account to receive a 1.5¢ charging credit on all electric usage between midnight and 6 AM

Every day is different



- Peaks and valleys shift
 - Shapes change
 - Magnitudes change
- (black dots are 250 highest hours)

Source: 2015 California Demand Response Potential Study, LBNL, 2015

OpenADR and Pricing

- ⌘ OpenADR is sometimes perceived to be complex; and it can be!
- ⌘ Most uses of OpenADR today use a small fraction of capability
 - ✦ Pricing extends this trend
- ⌘ Devices that only need to send or receive prices are burdened
- ⌘ Price broadcast requires only 1-way communication
 - ✦ Utility meter readings provide measurement/verification
- ⌘ Should also include basic DR commands already in wide use, e.g. Shed

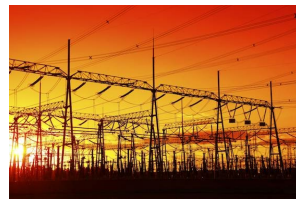
- ⌘ A defined subset of OpenADR 2.0 could
 - ✦ Reduce vendor costs
 - ✦ Simplify explaining OpenADR to new or skeptical groups
 - ✦ Have simple branding to identify the limited capability

How to get prices to end-use devices?

& Direct:
Grid → Device



& Indirect:
Grid → Building Central Entity*
BCE → Device



*EMS, Gateway, Bridge, ...
(adjacent to meter)

Wide-area

Local

Why Indirect Price Distribution?

- ⌘ (Many) Fewer devices listen to grid directly
 - ✦ Easier to change physical or application layer
 - ✦ Technology can vary by region
 - ✦ Can enable multiple channels (e.g. Internet, cellular, FM radio, ...)
- Can broadcast in multiple protocols in building
 - ✦ OpenADR, Zigbee, Z-wave, Ethernet,
- ⌘ Can create 'local prices'
 - ✦ Value of electricity in building can differ from grid value (price) ...
 - ✦ ... particularly when have local storage and/or generation
- ⌘ In-building price distribution protocol can be a "Local" version of OpenADR
 - ✦ Could use different security, transport, ...

Technical approaches

- ⌘ Strictly subset 2.0a or 2.0b
- ⌘ Define a new limited profile
- ⌘ Define a strictly one-way method
- ⌘ Consider data encodings and other mechanisms
- ⌘ ...

Considerations

- ⌘ **Ensure no disruption to existing OpenADR Ecosystem**
- ⌘ Vast majority of future VENs do not yet exist
- ⌘ VEN burden from OpenADR should be minimized
- ⌘ Key: Maintain/leverage OpenADR brand
 - ✦ Protocols details can/should evolve
- ⌘ Devise clear nomenclature to avoid confusion

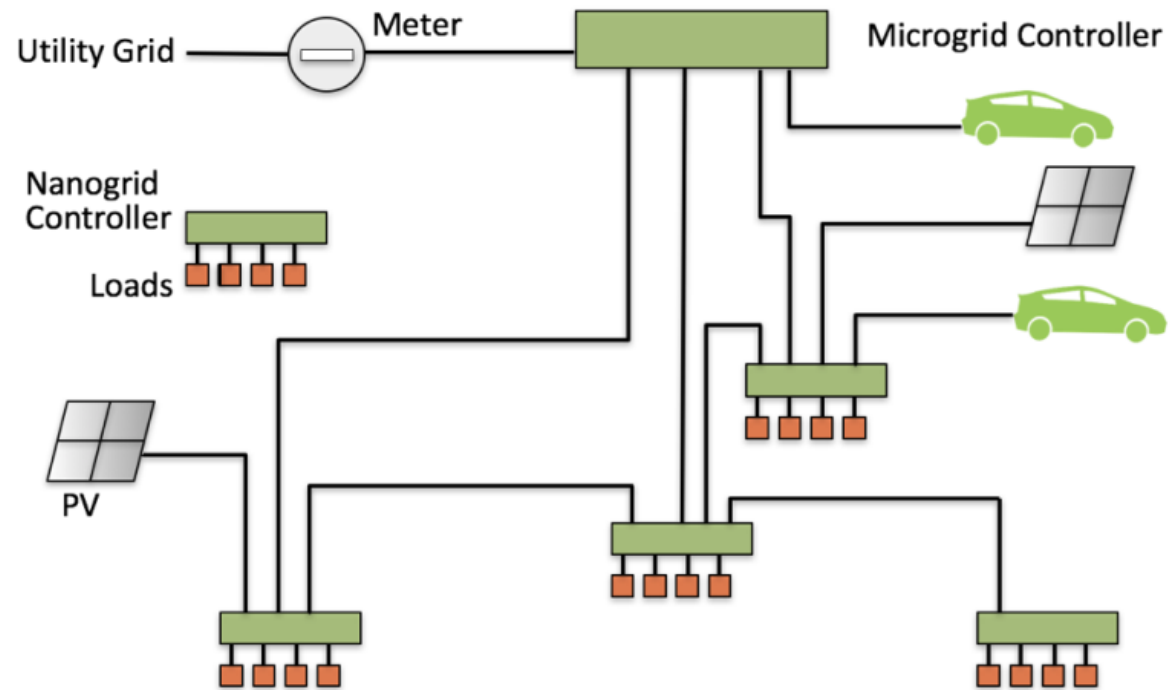
Expected outcomes

- ⌘ Huge future success of OpenADR
- ⌘ Wide recognition of protocol
- ⌘ Easier to incorporate into building central entities

- ⌘ Easier to require in voluntary programs
- ⌘ Easier to require in mandatory standards

- ⌘ More effective price-response in buildings; sooner

Thank you



Possible technical approaches

- ⌘ Strictly subset 2.0a or 2.0b
- ⌘ Define a new profile
- ⌘ Define strictly one-way method
- ⌘ Define limited two-way method
- ⌘ Add new option for data encoding (e.g. JSON instead of XML)
- ⌘ Consider other Energy Interop mechanisms for moving prices

- ⌘ Consider role of registration
- ⌘ Consider how multiple rates communicated

Some reasons for local prices

- ⌘ Differential buy/sell prices
- ⌘ Carbon valuation
- ⌘ DC circuits
- ⌘ Peer-to-peer exchange
- ⌘ Microgrids
- ⌘ Capacity constraints
- ⌘ Battery management

