



VGI Communication Standards Implementation Considerations

VGI Working Group – 8/7/2017

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Overview

- Standards as Tools
- Use Cases Where EV –EVSE Standards Help
- Proper Implementation
- Use Cases Where EV – EVSE Standards Do Not Help
- Conclusions

Disclaimer

- I will **not** be talking about costs of implementation on Honda vehicles.
- I am only representing Honda. No other entity is represented by this presentation.

Standards as Tools

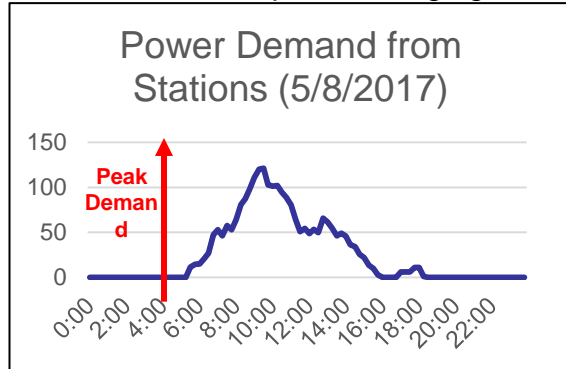
- Standards such as ISO 15118 and SEP 2.0 are not silver bullets which make VGI simple to implement
- Honda considers these communication standards as tools
 - Can help to provide a conduit for information flow
 - If properly implemented, can improve customer experience
 - If misapplied, result could be excessive cost or poor usability
- Just like any tool, proper use and understanding is key
 - This is challenging: understanding requires both a detailed knowledge of standards as well as the 10,000 ft. view of VGI
- Honda's view: there are use cases where Vehicle – EVSE communication standards make sense, but there are also use cases where it does not help or even hurts VGI

Use Cases Where Standards Help

- In the case of public or workplace charging, getting customer requirements from vehicle via the charging cable help implement demand mitigation or other power control strategies
- Demand mitigation has a clear value
 - Pay less to the utility
 - Able to install more stations with same size power feed
- On paper: Intelligently allocating power to vehicles improves customer experience
 - Examples: Pay less for charging, better availability of charging stations

Use Case: Cost Effective Workplace/Public Charging by reduction of peak demand

Current Utility Demand
AHM Workplace Charging

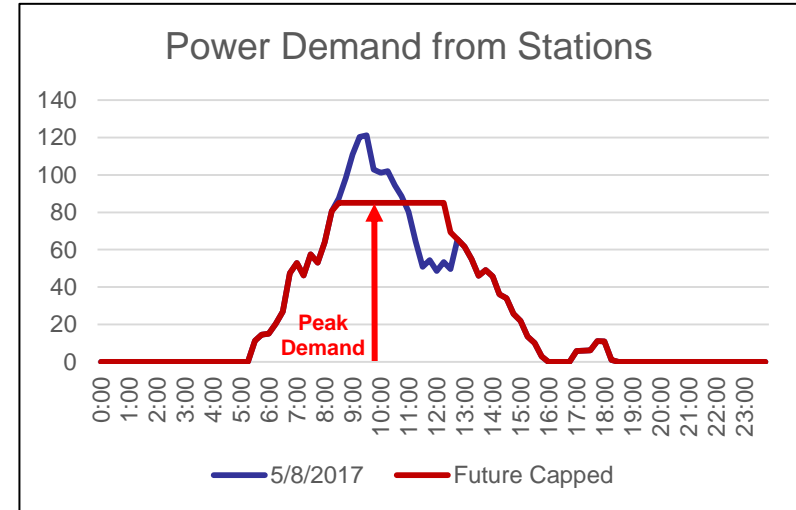


120 kW Demand = \$1858 per month
SCE TOU-EV-4 Rate (EV Specific Rate)

Today (example AHM campus):
 60 L2 Ports for employees
 50-60 drivers per day
 600 kWh per day (peak)
 Long dwell time (hours spent fully charged)

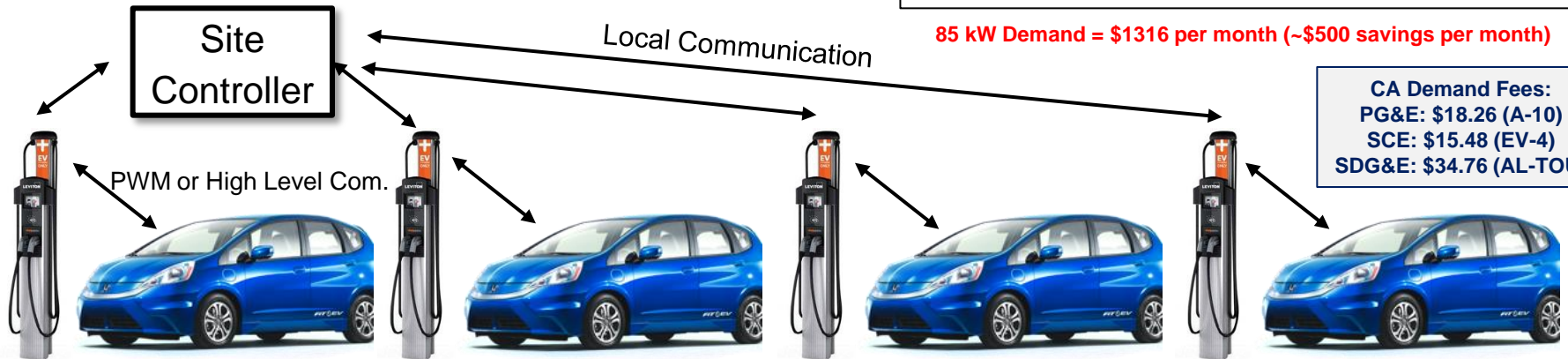
Future:
 Use control scheme software or physical box ("site controller") to manage site demand
 Optional: EV to EVSE comm.

Capped Utility Demand



85 kW Demand = \$1316 per month (~\$500 savings per month)

CA Demand Fees:
 PG&E: \$18.26 (A-10)
 SCE: \$15.48 (EV-4)
 SDG&E: \$34.76 (AL-TOU)



PWM= Pulse Width Modulation – standard used today to adjust charging load

Proper Implementation

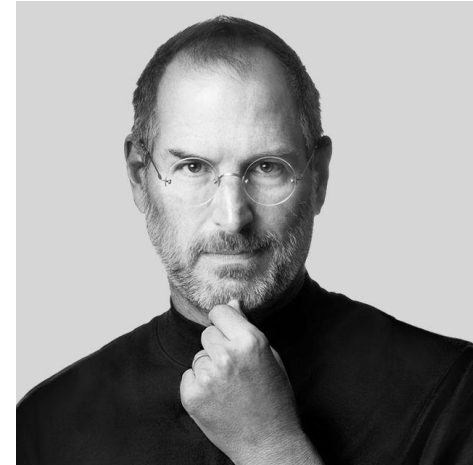
In reality, both automakers and charging station providers must provide good implementations to improve customer experience

- Automakers must provide:
 - Clear customer facing interface in the vehicle, app, and/or key fob
 - This is intentionally not defined in these standards
 - Automatic/machine learning of some needs
 - Miles traveled to kWh conversion, acceptable price vs. power curve, etc.
 - Exception handling for overrides, communication errors, or other issues
 - Including compatibility testing with multiple EVSE makers (like DCFC)
- Charging Station Manufactures must provide:
 - Easy and seamless ways for site hosts to manage price and site power level
 - Intelligent algorithms that can safely handle many vehicles at a time
 - Consider over-subscription ratios of over 3:1 EVSE to site power feed!
 - Exception handling for communication errors or vehicles that do not support the standards

Good Implementation or Bad Implementation?

“With a stylus, you can only use one finger. Without it, you can use all five.”

-Steve Jobs to John Sculley
In the movie Steve Jobs (2015)



Use Case Where Standards Do Not Help

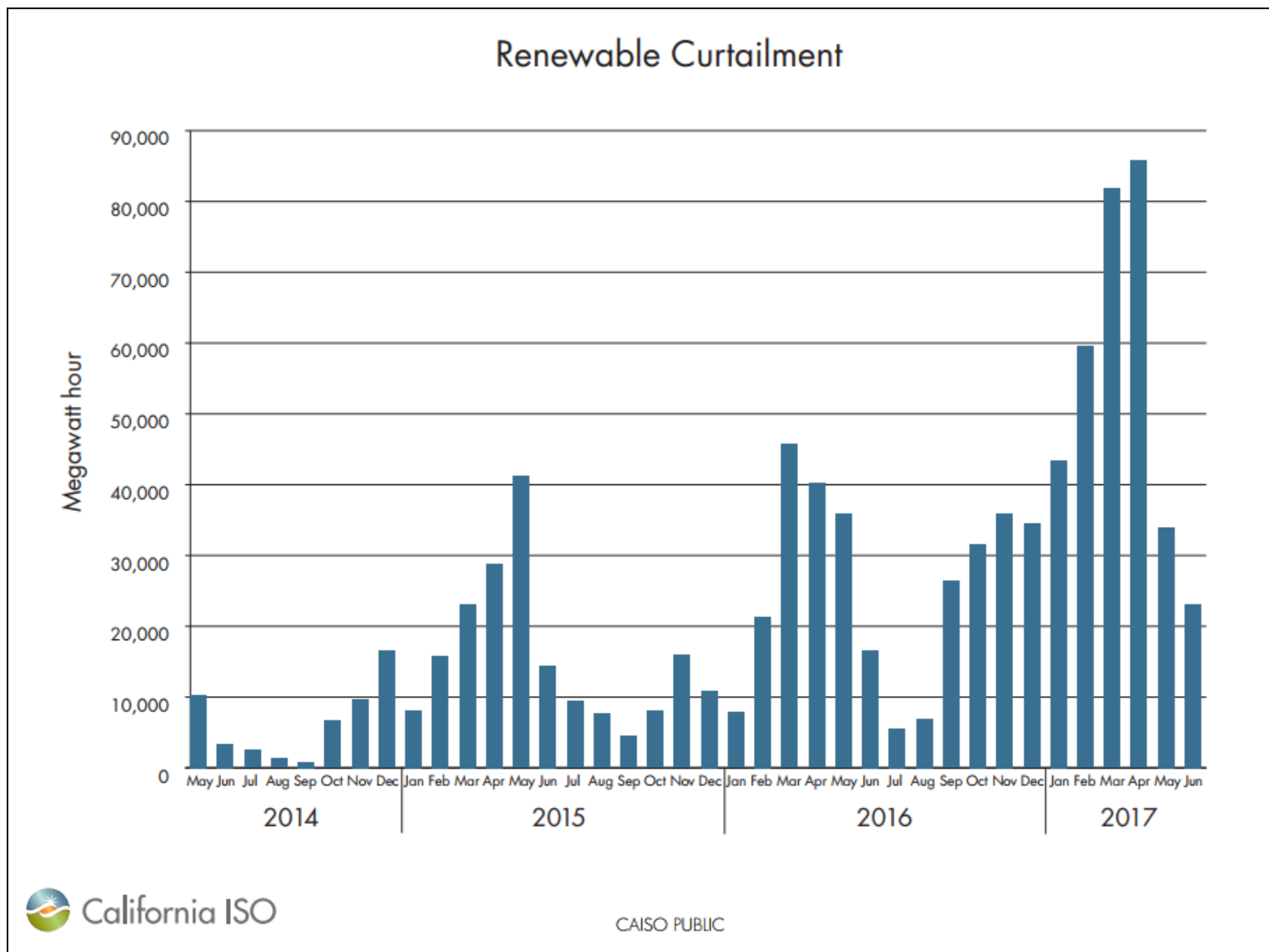
- In order for individual vehicles to be participants in the wholesale market, they must be bundled together to make a large enough resource to meet minimum size requirements
- Aggregation requirements:
 - Need to prove customer is responding with utility grade meter data (often house meter is used)
 - Need utility customer to sign CISR form (detailed enrollment process)
 - Need to meet minimums within a specific geographic area (sub-LAP)
 - All participants must be under the same LSE
 - Need to know number of vehicles to kW conversion
 - Not all vehicles always available, especially in summer DRAM hours (1-5 pm)
 - Some customers will opt out or not respond
 - This is a function based upon time of day and day of week
- Currently, a lot of work required in order to have vehicles participate in wholesale market
- An EVSE to EV standard solves none of these problems!

CISR – Customer Information Service Request (authorization for meter data sharing)

LSE – Load Serving Entity – Utility or other power provider (such as Sonoma Clean Power)

DRAM – Demand Response Auction Mechanism – mechanism for wholesale market participation

Biggest Problem within CA Wholesale Market

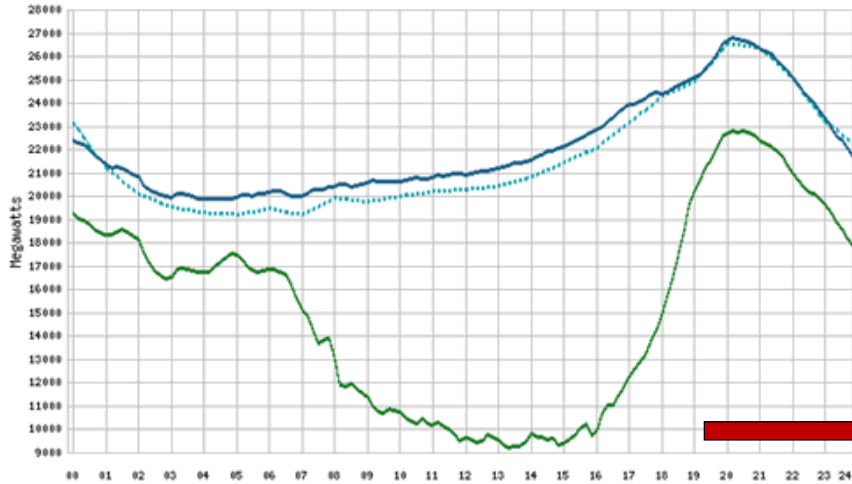


Biggest Problem within CA Wholesale Market

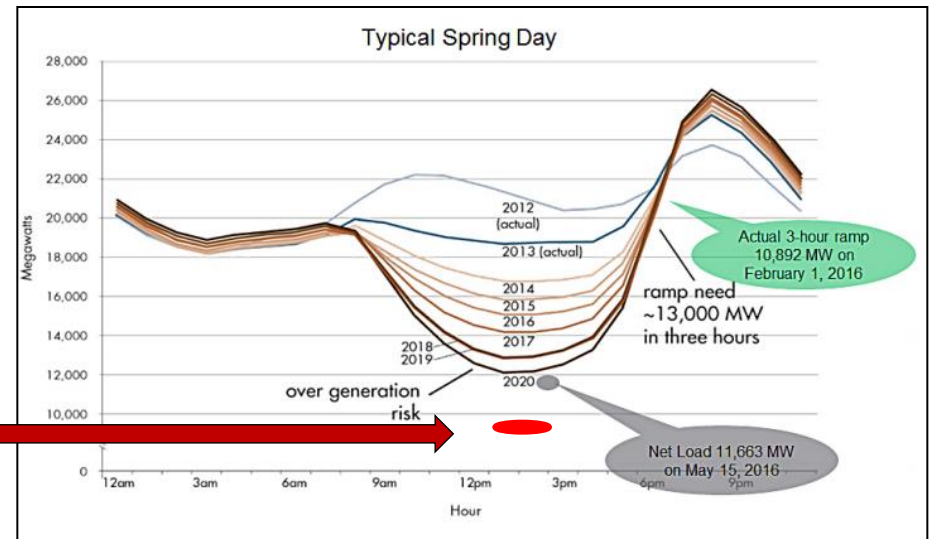
80,000 MWh is equal to:

- Eight Million 10 kWh sessions (average charging session on AHM campus)
 - ~260,000 sessions per day
- 280 Million Miles of zero emissions driving at zero cost* (at least for now)
- We are four years ahead the duck curve!

4/23/2017 Actual and Net Load



CAISO Duck Curve (Net Load)



Solving Renewable Overgeneration

Consider from first principles:

- We need more daytime charging!
- Majority of vehicles are sitting at work with few plugged in
- Providing workplace charging is expensive
- Why is workplace charging currently expensive to provide?
 - Networked EVSEs can be expensive
 - Running power out to the parking lot is expensive
 - Electricity is expensive, mostly due to demand charges
 - Most drivers don't want to pay any more than home charging
- Through policy actions, can reduce electricity costs
 - Daytime super off peak, reduced demand charges, etc.
- Local communication can reduce power requirements, reducing costs

Charging station manufactures: it is up to you to bring down EVSE costs and provide solutions that do not have expensive networking fees

Conclusions

- Standards are not silver bullets which make VGI simple to implement
- There is a case to be made for a communication standard between the EV and EVSE for some use cases
- Aggregating vehicles as wholesale resources has other challenges that EV to EVSE standards do not solve on their own
- There are many ways to have vehicles “solve” grid problems, but our main focus should be getting as many vehicles on the road as soon as possible by providing efficient, convenient, and affordable infrastructure