## SacEV Sacramento

Mar 12, 2014

- Introduction , Trivia Quiz w/Awards , Events
- Cadillac ELR overview
- SMUD Charging 2014 Update (Ralph Troute, SMUD)
- Future of EV Battery Technology (Robert Spotnitz, 15 minutes)
- Vehicle Grid Integration (Peter Klauer, Cal ISO, 15 minutes)
- West Coast Charging Networks (Richard Sachen, CEO/Founder, Sunspeed Enterprises, 10 minutes)
- Breakouts / Mixer

## **Trivia Contest**

- Which State Has The Highest Percentage Of EVs?
- In which states has Tesla not sold a car?
- What percent of Model S cars were sold in California?
- What part of a BEV requires more frequent maintenance than an ICE vehicle?
- Letting your faucet run for 5 minutes which will be uses as much energy as leaving a 60w light bulb on for how long? (CEC)



Tuolumne

Mariposa

Mendocino

Glenn



Home Energy Efficiency Expo
Workshops | EV Rides | EV Exhibit | Booth
April 12

SMUD\*



Solar Car Race American River College EV Exhibit and Booth May 2





Northern California Solar Regatta Rancho Seco Recreational Area EV Exhibit and Booth May 16 and 17



## California Automobile Museum

# IT'S ELECTRIFYING! ALTERNATIVE FUEL VEHICLES IN CALIFORNIA

Just south of Old Town, along the Sacramento River.



#### Web Site: SacEV.org

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National Plug In Day Ride & Drive



Clean Start Showcase



International Auto Show



Advanced Clean Tech Forum



Electric Car Guest Drive West Coast Tour

Past Events

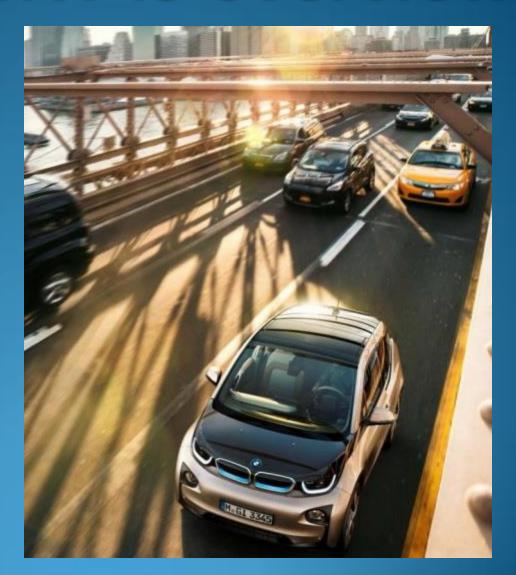
#### Locate other events in our EV calendar

#### Regional EV Calendar Today October 2013 \* Month Agenda 💌 Sun Mon Wed Thu Fri Tue Oct 1 10am National Plug In I 11:30am Sac EV Associa 10 12 2:30pm Take Charge St Electric Car Test Driv Cool Davis 2013 Ever 8:30am EVs at COOL Da 15 19 Clean Start Showcas Sacramento International Auto Show

## BMW i3 overview

May 14<sup>th</sup>
 Meeting

BMW i3 overview (Frank Breust, BMW)



## Cadillac ELR overview



Briam Hatch

## SMUD - Charging Update

Ralph Troute

## West Coast Charging Networks

Richard Sachen, CEO/Founder, Sunspeed Enterprises,

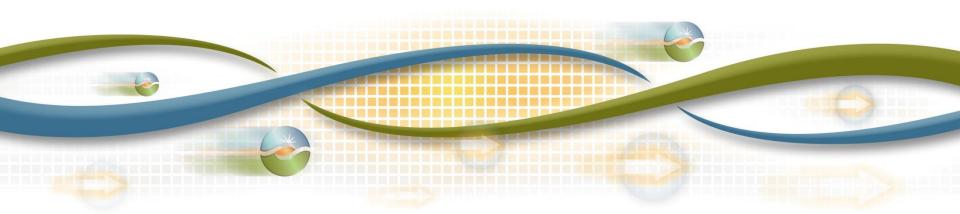
## Future of EV Battery Technology

Robert Spotnitz
President of Battery. Design LLC



## Integrating Electric Vehicle Technologies

Peter Klauer Smart Grid Solutions Manager, California ISO

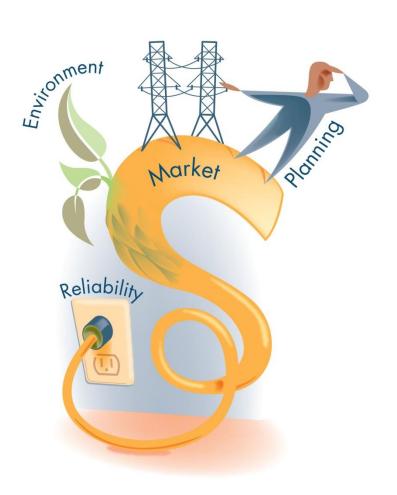


## Shaping the industry

The ISO, a nonprofit public benefit corporation, maintains the constant and reliable flow of electricity for the health, safety and welfare of consumers

#### How?

- Delivering 309 million megawatthours of electricity annually
- Facilitating fair and transparent wholesale electricity market
- Performing comprehensive transmission planning
- Clearing the way for clean, green resources to access the grid





## California ISO by the numbers



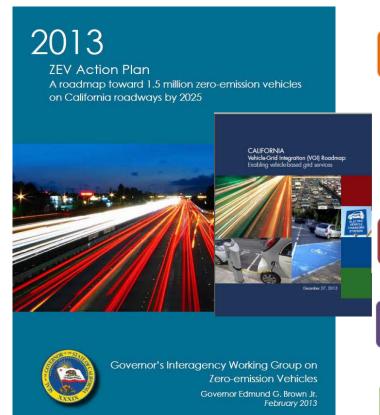
- 58,698 MW of power plant capacity
- 50,270 MW record peak demand (July 24, 2006)
- 26,500 market transactions per day
- 25,627 circuit-miles of transmission lines
- 30 million people served



## Agenda

- Governor's ZEV Action Plan and VGI Roadmap
- The case for flexible resources for grid management
- ISO activities related to EV's

## The Vehicle-grid integration roadmap is a component of the larger Governor's Zero Emission Vehicle Action Plan



**Goal 1: Complete Needed Infrastructure and Planning** 

 "Develop roadmap to commercialize vehicle to grid (V2G) services provided by PEV batteries."

Goal 2: Expand Consumer Awareness and Demand

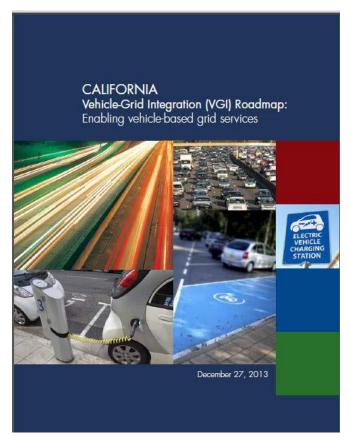
**Goal 3: Transform Fleets** 

**Goal 4: Grow Jobs and Investments in the Sector** 

http://opr.ca.gov/docs/Governor's Office ZEV Action Plan (02-13).pdf



# The roadmap focuses on developing solutions that enable electric vehicles to provide grid services while still meeting consumer driving needs



http://www.caiso.com/Documents/Vehicle -GridIntegrationRoadmap.pdf

#### Smart Charging Strategies

- Vehicle charging is coordinated with grid conditions to ensure that EVs do not increase peak load or require added generation or capacity expansion
- Vehicle to Grid
  - Communication and power flow is two way between EVs and the power grid with aggregations of EVs responding to grid operator signals



## The roadmap identifies 3 key activity tracks to enable electric vehicles to provide grid services

#### Determine VGI Value

- Model grid impact of EV's and contribution of EV managed charging and vehicleto grid capabilities
- Develop models and perform analysis to determine value of different EV use cases

#### **Develop Enabling Policy**

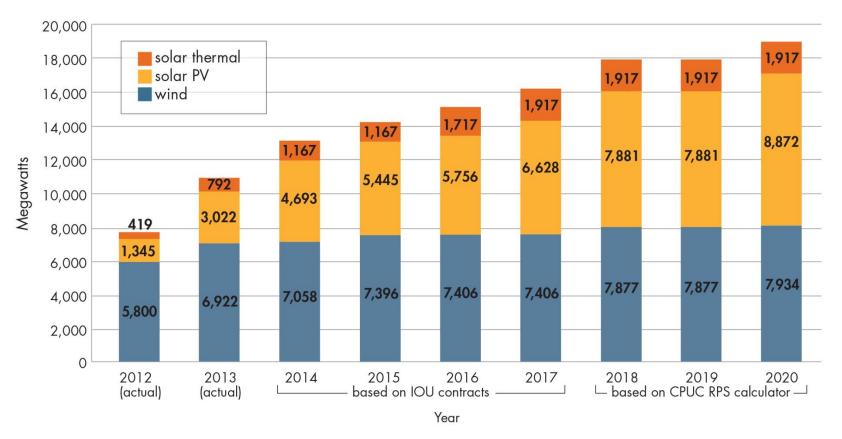
- Develop and refine products & programs to enable EVs to provide services
- Define requirements to provide services including measurement and verification

#### Support Enabling Technology Development

- Identify needed technology capability for EVs to provide grid services
- Pilot and measure performance to promote technology development



## Expected variable resources development in ISO footprint to achieve 33% energy from renewable sources.

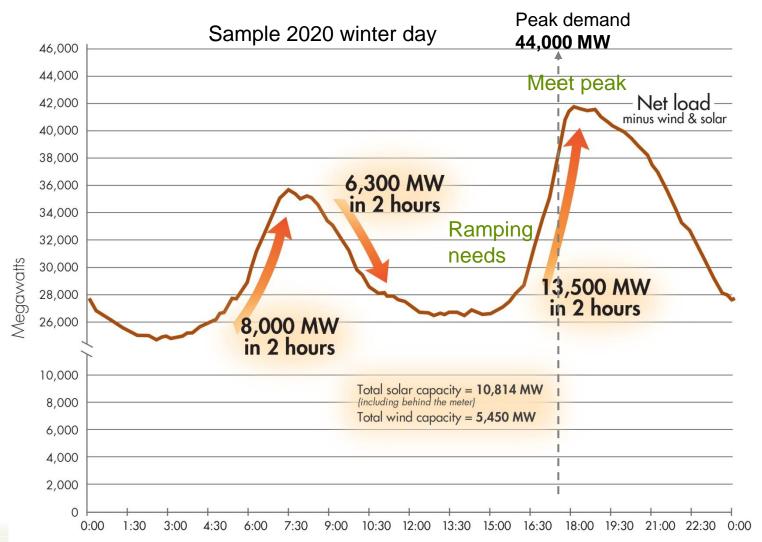




ISO Solar Production Record: 4093 MW – 3/8/14 California Solar Initiative: 1990 MW – 3/11/14

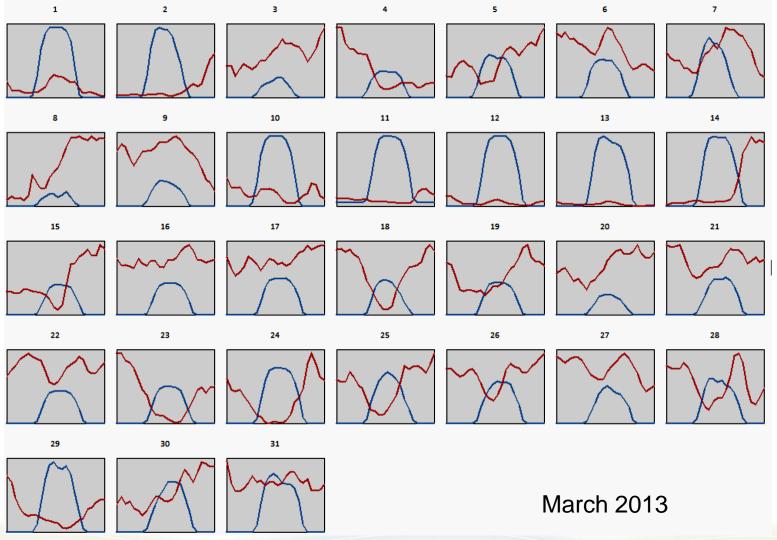


### Net load curves (load minus wind and solar) highlight the evolving system needs.





## Actual wind and solar production can vary significantly from one day to the next.

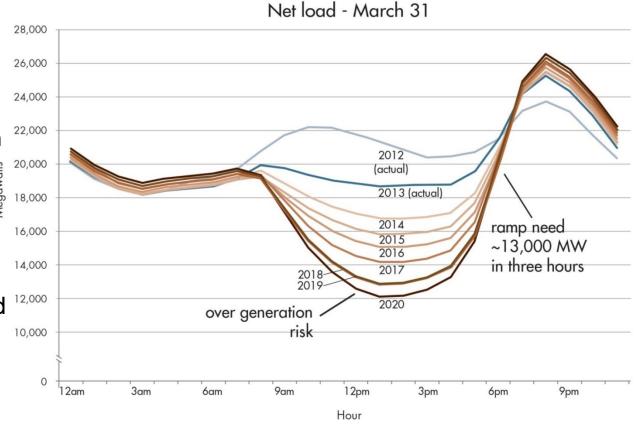




## Reliability depends on having resources with capabilities to follow the net load curve.

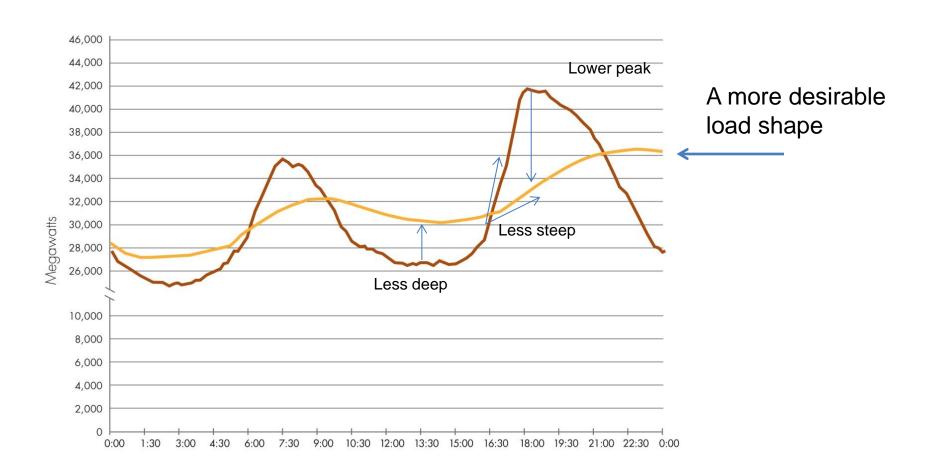
#### **Resource flexibility**

- Ramp up or down speed
- Ability to sustain ramp
- Change ramp direction
- Ability to store energy for modify use
- Time required to start
- How frequently the resource can be cycled on and off



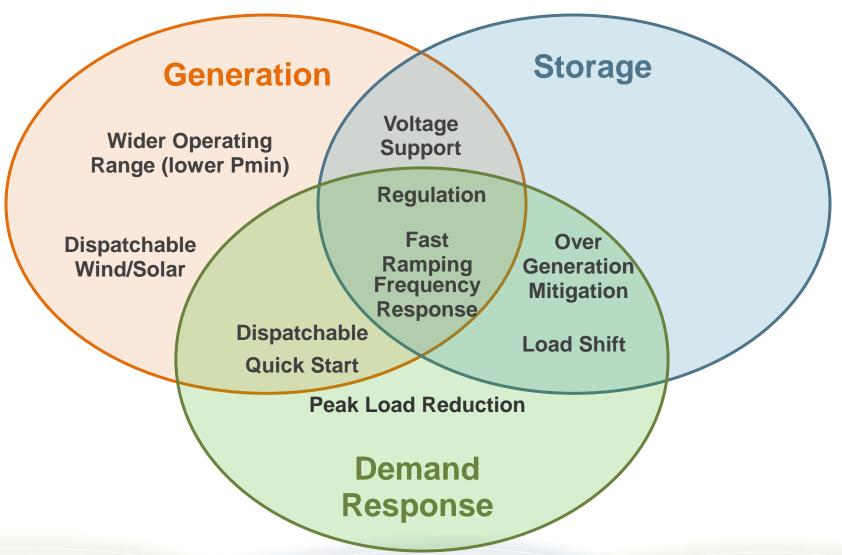


## Measures to reshape the load curve reduces resource procurement needs.





#### Meeting the operational challenges beyond 20% RPS





#### The ISO is supporting several EV activities



#### Los Angeles Air Force Base

- 500-600 kW capacity
- 35+ V2G capable vehicles/trucks
- 2014 Planned Market Participation

#### **Naval Air Weapons Station – China Lake**

- 3,000 kW capacity
- 75+ V2G capable vehicles/trucks
- 2014-5 Planned Market Participation





#### SDG&E

- Grid to vehicle Demand Response
- Driver interface to dynamic rates
- Save, reliable, efficient customer experience
- 2014 Planned Market Participation





# Transmission = ISO Federal Jurisdiction Wholesale Tariff







60-220+ kV

Retail Tariff
State Jurisdiction
Distribution = Utility



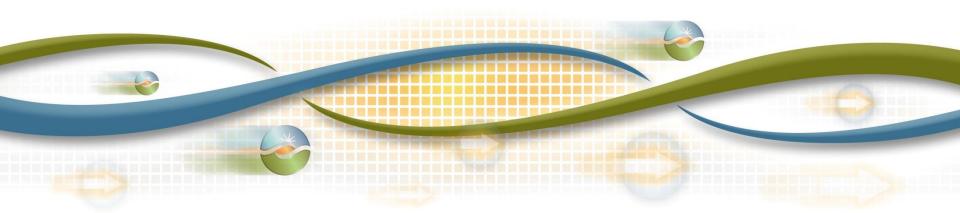






## Thank You

Peter Klauer Smart Grid Solutions Manager, California ISO pklauer@caiso.com



# TakeCharge EV Activity Calendar http://tinyurl.com/takecharge-cal

- Regional calendar
- Maintained by SacEV
- Embedded in SacEV's and TakeCharge's web site
- To add events ask for admin privileges or send info@SacEV.org

