

California Energy Market

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Alameda County Community Choice Energy

Steering Committee Presentation

September 17, 2015



Presentation Overview

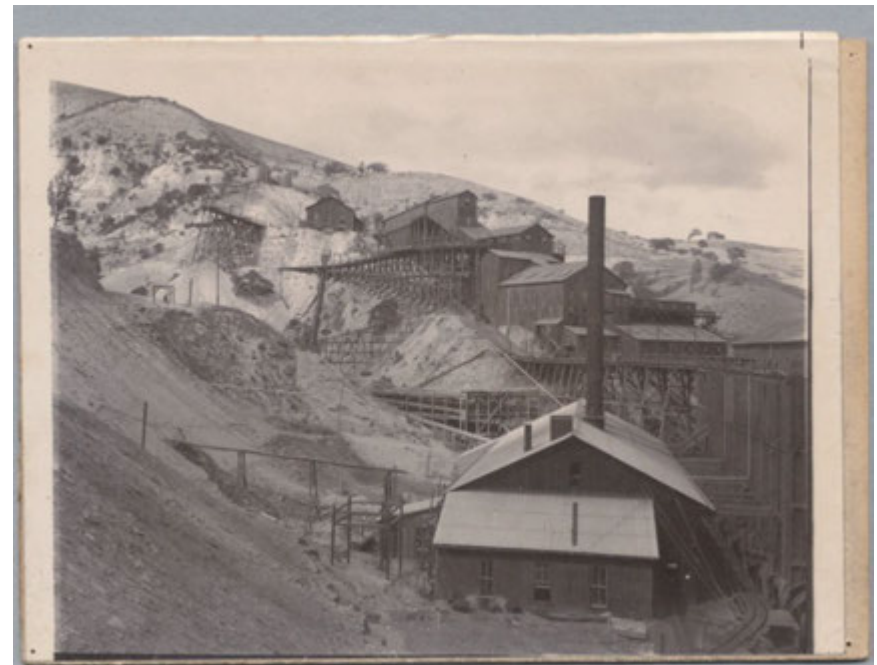
- A Little History
- Structure of the California Energy Markets
- Role of CCA as a Load Serving Entity
- Policy Update
- Q&A



California Always an Energy Trendsetter

- Due to abundant sun, wind, water and geothermal resources, California always used less energy than most other states
- Lack of coal required different approaches
- Innovation has come in waves, starting with hydro, then oil, then **nuclear...**
- Today, a global leader on renewable resource development

Coal Mine at Tesla in Altamont Pass



Due to Unique Challenges, California Broke New Ground – Starting with Hydropower

- Sierra Nevada Streams Tapped for Power by ex-49ers looking beyond gold
- **The “Pelton Water Wheel” (specifically designed for CA’s narrow rivers)**
- Nevada City: Origins of PG&E
- Transmission to Sacramento & Oakland set the stage for expansion
- Agriculture benefits from power transfers across Central Valley



Rome/Rome Power House on South Yuba River

Rome Powerhouse near
Nevada City

From Chic Nuclear to “Nega-watts”

- First “All-Nuclear” City in Ventura County
- Dozens of Nukes on Drawing Boards
- Art Rosenfeld & Others **Discover “Nega-watts”**
- **Nation’s most aggressive** energy efficiency efforts are launched
- Nukes canceled and closed down



Sacramento’s Rancho Seco: Only reactor closed by a citizen vote in 1989.



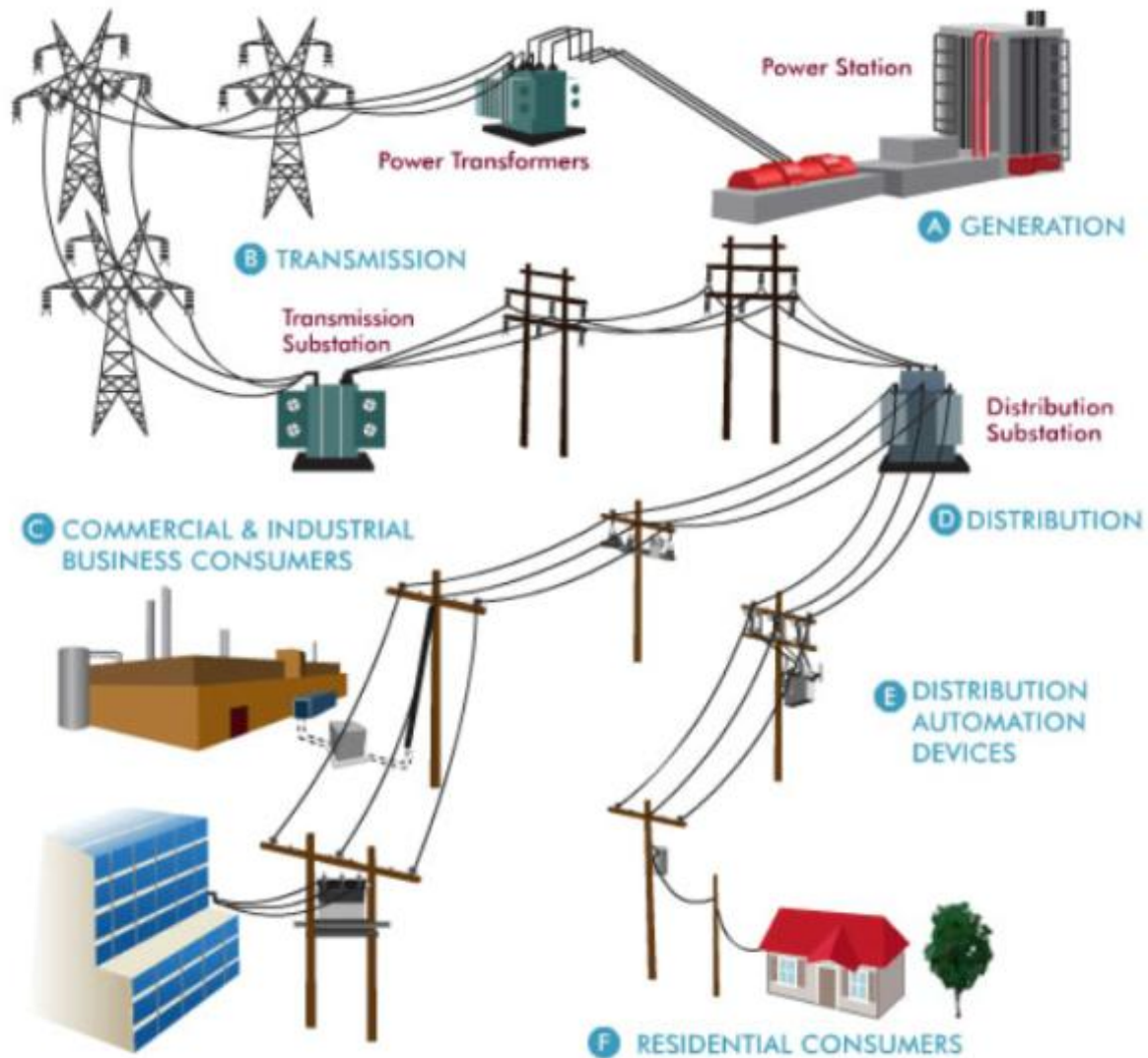
Bumps on the Road to the Present

- Deregulation in the late 1990s: Wholesale (federal) vs. Retail (State)
- Enron, rolling blackouts and PG&E bankruptcy
- Then re-regulation
- Why is this relevant? Regulators are extremely concerned about how market policy and rules potentially impact grid stability

BUT also keep in mind...

- **Between 1980 and 1990, California brings on line 90% of the world's wind power, 90% of the world's solar power, 90% of the world's geothermal power and 90% of the world's biomass power ...to become a global leader on renewable energy**

Energy 101: How the Grid Works

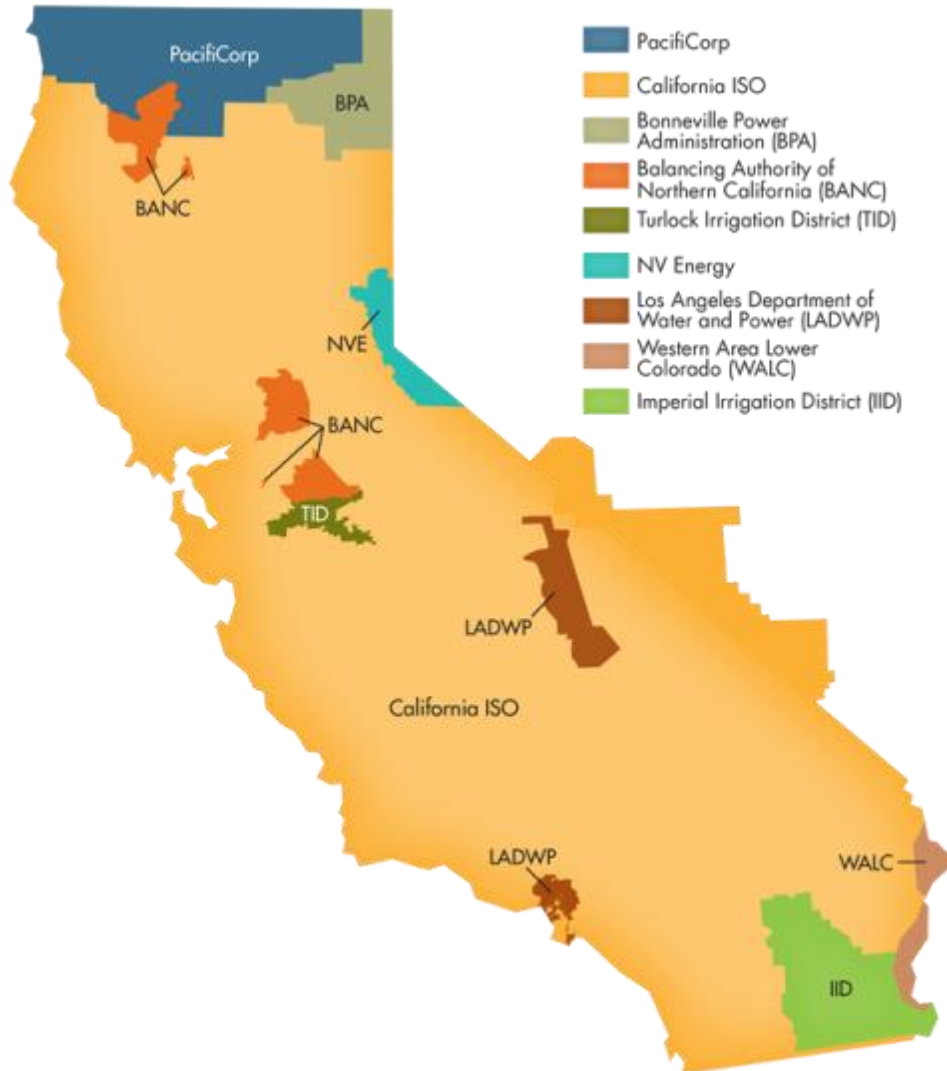




The Role of Independent System Operators (ISOs)

- Nine ISOs in North America deliver 2.2 million GWH of electricity every year and oversee more than 270,000 miles of high-voltage power lines. Two-thirds of the US is served by ISOs.
- The California ISO started in 1998. Utilities still own transmission assets, but the ISO acts as a traffic controller by routing electrons, maximizing the use of the transmission system and its generation resources.
- CAISO matches buyers and sellers of electricity, facilitating over 28,000 market transactions every day to ensure enough power is on hand to meet demand

CAISO



- CAISO is also referred to as a Balancing Authority, one of several responsible for real-time balancing of supply (generating resources) and demand (load) to ensure grid reliability.
- CAISO is by far the largest balancing authority in the State.
- A CCA serving Alameda County would function within the CAISO.



The Buyers: Load Serving Entities in California

California is served by about 81 load-serving entities (LSEs) that supply electricity to customers. These are broken down as:

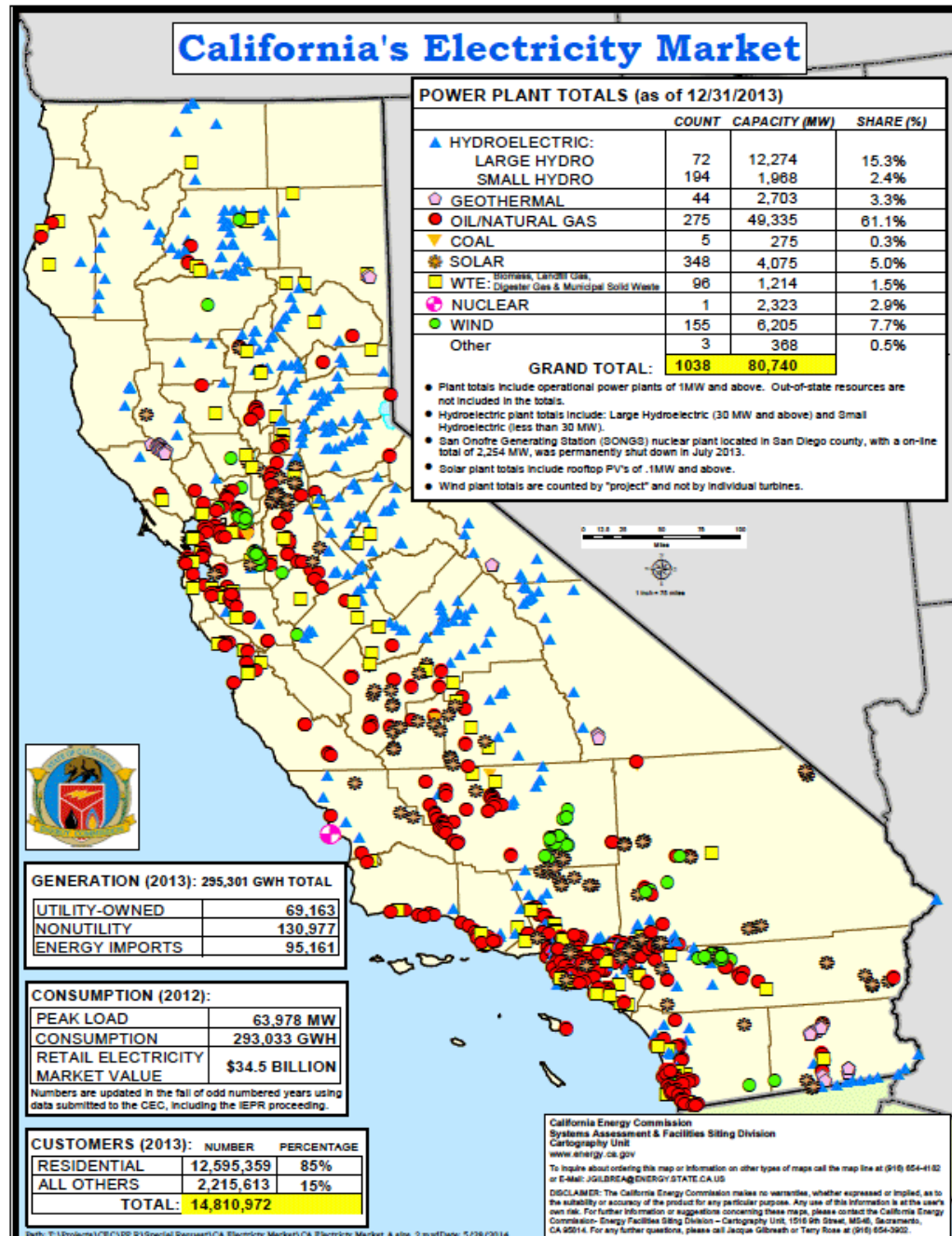
- Investor-Owned Utilities - 6
- Electricity Service Providers, such as for Direct Access customers - 22
- Publicly Owned Utilities - 46
- Rural Electricity Cooperatives - 4
- Community Choice Aggregators - 3

The five largest utilities and total electricity consumption (in 2013) were:

- Pacific Gas and Electric Company (PG&E) - 86,513 million kWh
- Southern California Edison Company (SCE) - 84,448 million kWh
- Los Angeles Department of Water and Power (LADWP) - 22,859 million kWh
- San Diego Gas & Electric (SDG&E) - 19,762 million kWh
- Sacramento Municipal Utility District (SMUD) - 10,467 million kWh

The Sellers

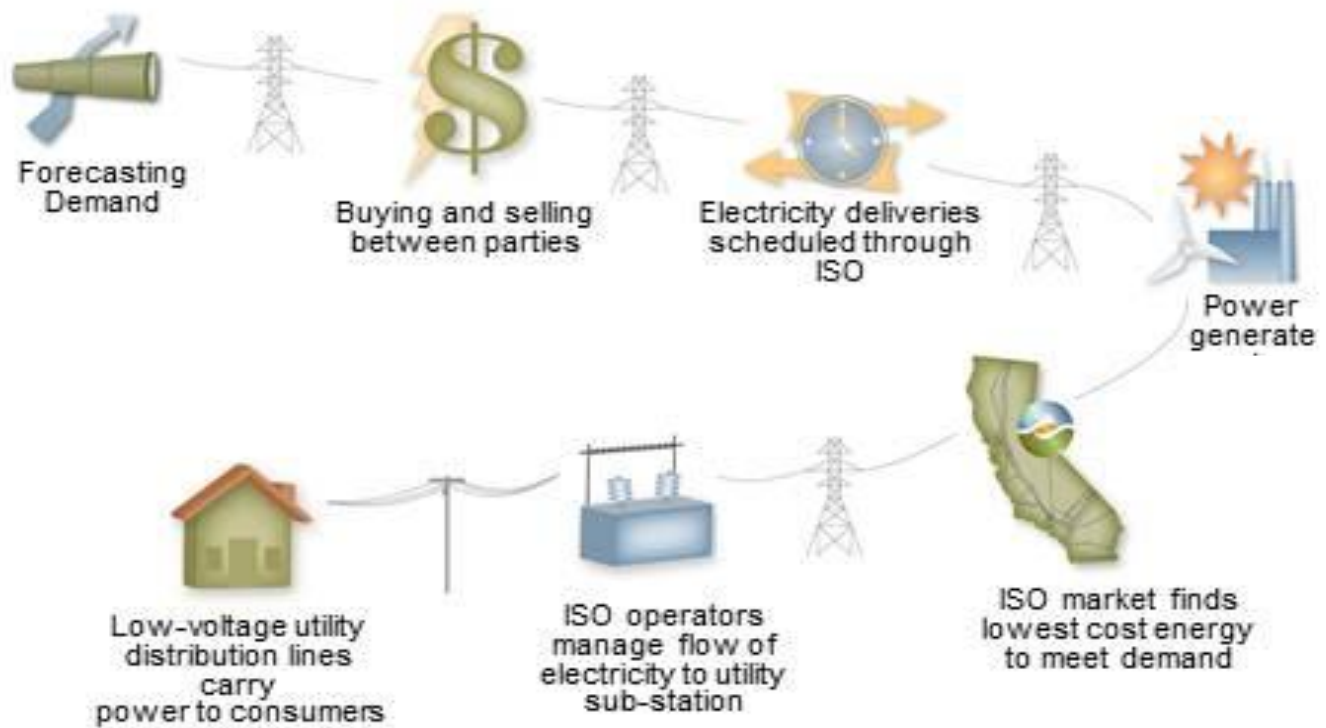
- Approx. 1,000 electric generating units over 1 MW in CA
- A typical 1 MW generator serves the annual needs of 1,000 homes.
- 79,000 MW of generating capacity.
- 58% of capacity is natural gas.
- **70% of CA's energy is produced in-state.**
- **Approximately 20% of CA's generating capacity uses renewable fuel sources.**
- 2,400 MW of distributed solar has been installed in CA.



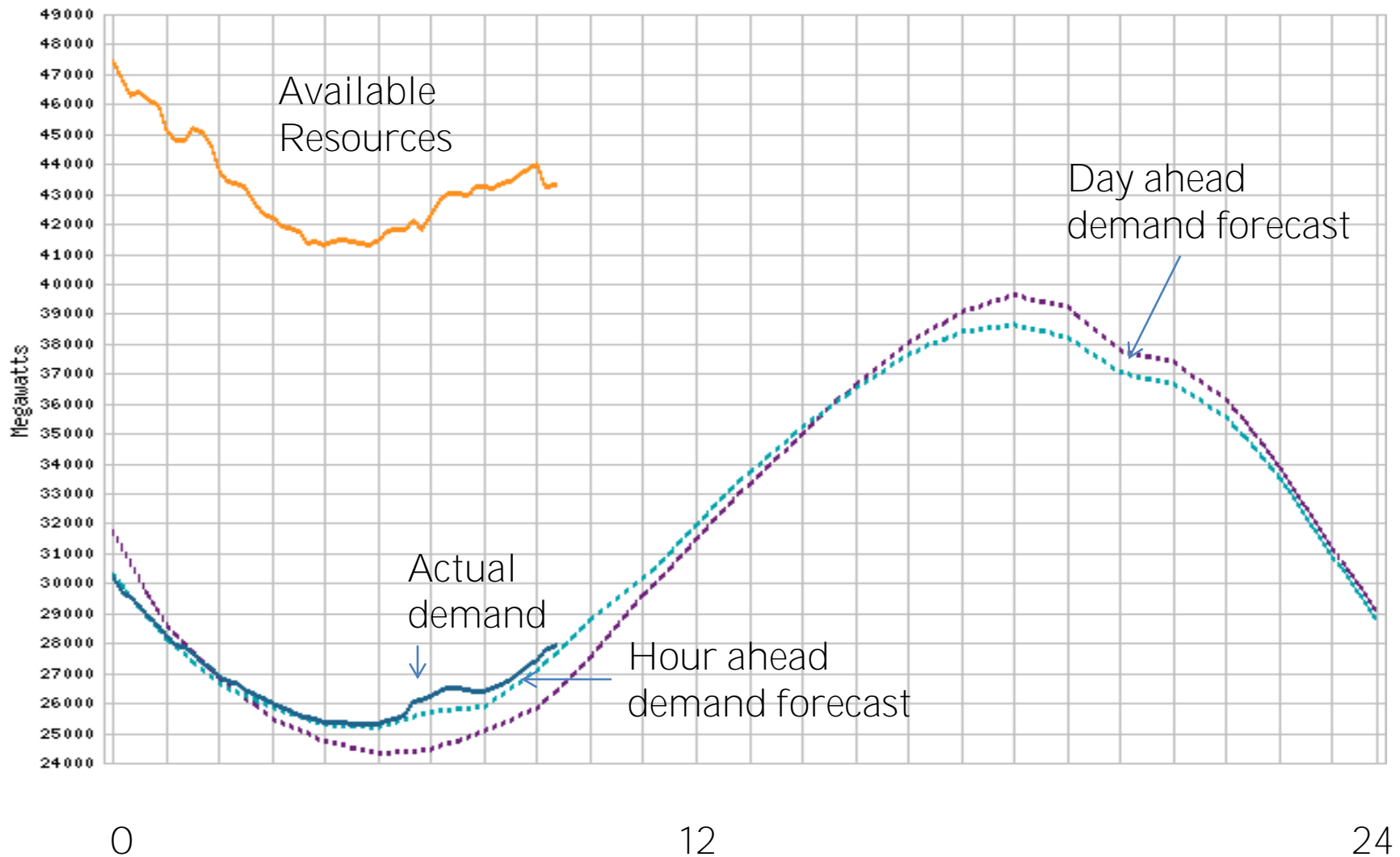
Wholesale Power Contracting

- Buyers and sellers can bid in both day-ahead and real-time market
- Buyers and sellers can also transact for future electricity deliveries through bilateral contracts.
- Forward contracts provide price certainty, reducing exposure to CAISO price volatility.
- Forward contracts often specify electricity delivery during defined time periods (i.e., peak, off-peak or around the clock) or based on generator availability, which may be intermittent.
- There are also custom **products, such as “shaped” electricity delivery** (which specify energy delivery during days/times of the buyers choosing).

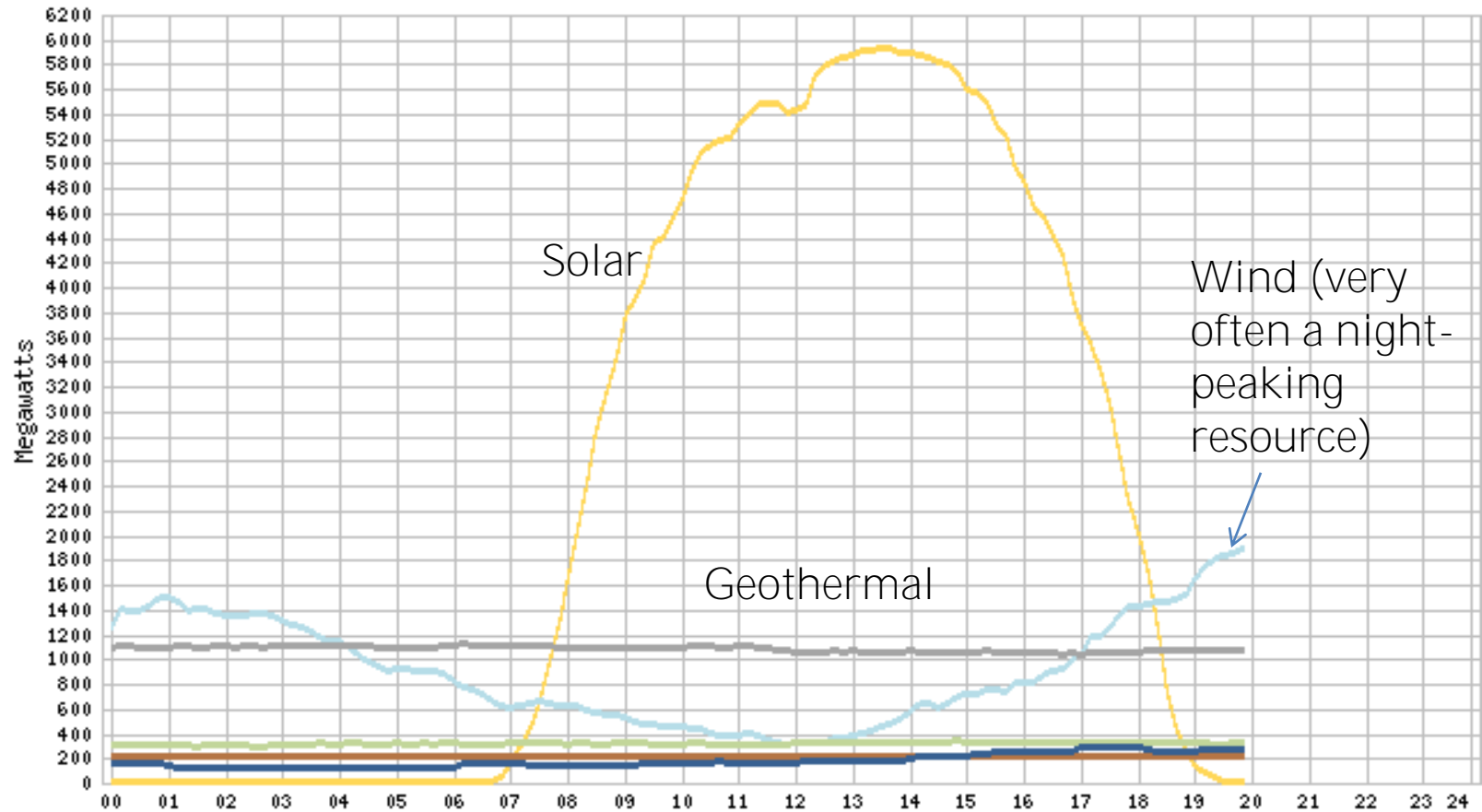
The flow of electricity



A Typical Day at the ISO (Sept 12, 2015 at 8:30 am)



Available Renewables (from ISO): Evening of Sept. 11



How does this relate to CCAs?

- As an LSE, CCAs have to negotiate forward contracts and participate in the wholesale market to meet electricity demands of its customers.
- Typically, CCAs have done this through an energy service provider (ESP) that is certified to act as a Scheduling Coordinator (SC). SC services schedule forecasted hourly load and settle transactions with the CAISO.
- Power procured through bilateral contracts mitigate price risk. Market purchases may reduce near-term costs but also expose CCAs to market volatility. Diversity of approaches hedges risk.
- CCAs must contract for 115% of their estimated demand to provide a cushion (resource adequacy). Procuring capacity reserves helps ensure that sufficient generation is available to maintain grid reliability.

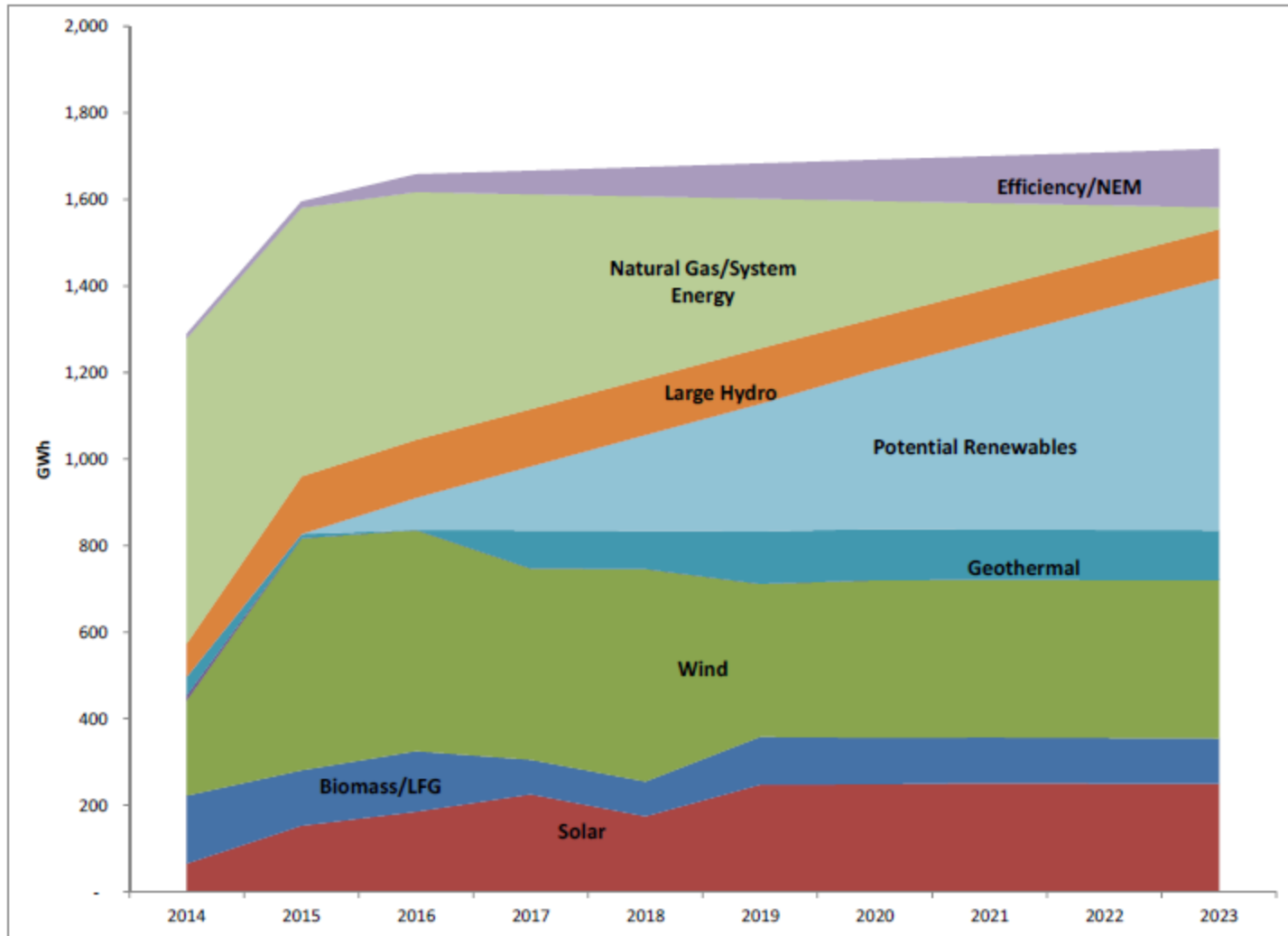
Renewable Energy Procurement

- RPS specifies renewable energy procurement obligations through 2030 (33% by 2020, and now, 50% by 2030).
- Eligible renewables include wind, solar, small hydro, biomass, biogas, tidal, geothermal. Large hydro does NOT count as renewable.
- All LSEs, including CCAs, must demonstrate percentage of annual electricity sales procured from qualifying renewable energy technologies.
- Compliance is demonstrated by ownership of renewable energy certificates or “**RECs**”.
- ALL renewable energy production is substantiated via REC ownership.
- In the western U.S., RECs are tracked through a centralized accounting system, known as WREGIS, to ensure that renewable energy purchases are not double counted.
- Compliance is measured over multi-year periods with interim progress reported and tracked annually.

Other CCA Functions

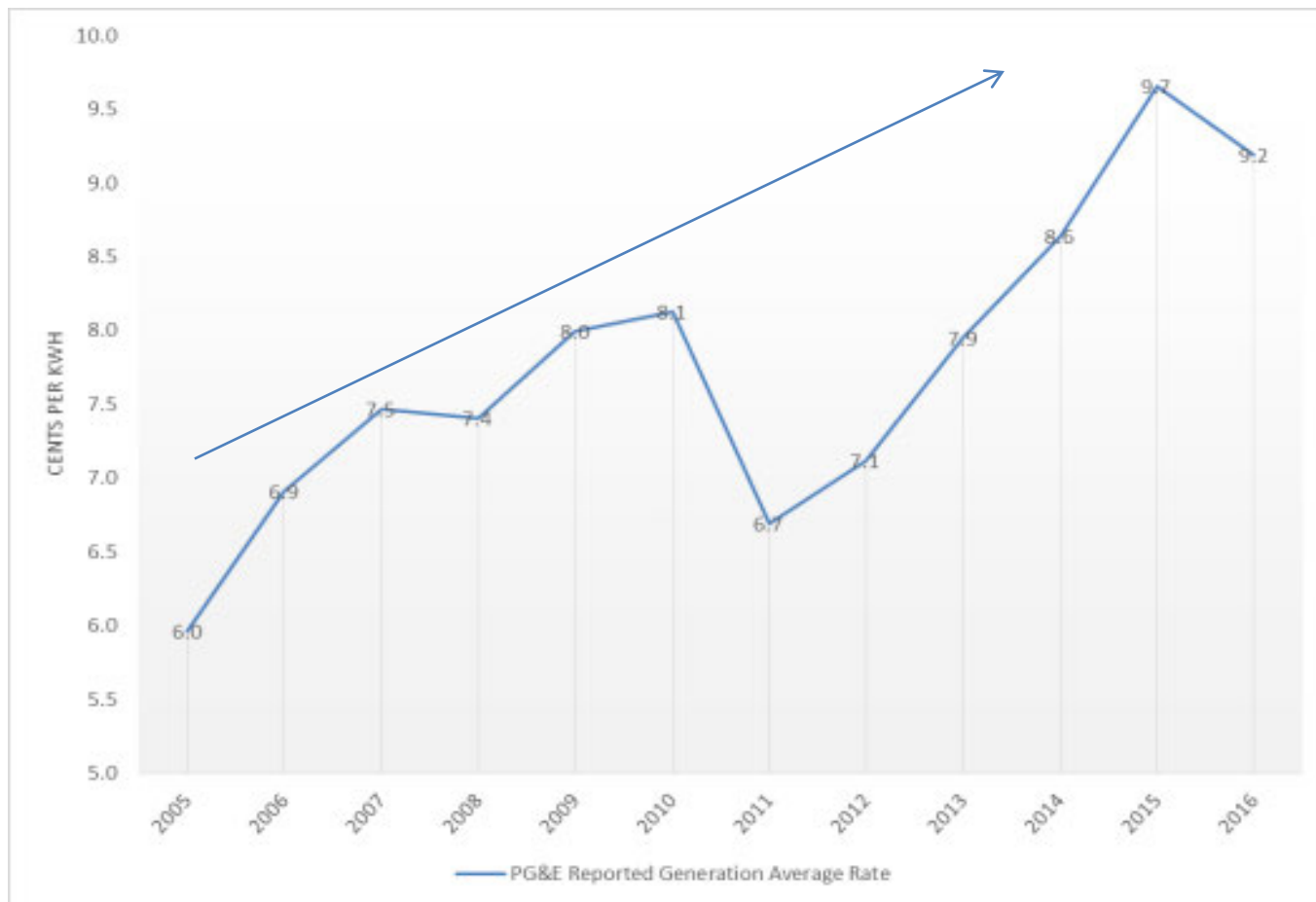
- Integrated Resource Planning: a long-term plan for how to procure both supply AND demand resources.
- Local energy programs, including net metering and energy efficiency.
- MCE has sought to become an energy efficiency program administrator, to implement programs funded out of the public purpose program fees.
- SCP has chosen, for the moment, NOT to go in that direction.
- More of a focus on load shifting, particularly with so much solar coming. Also, many county programs already providing EE programs.
- Distributed energy storage, nanogrids, microgrids and VPPs too

An Eventual CCA Resource Plan (MCE Example)

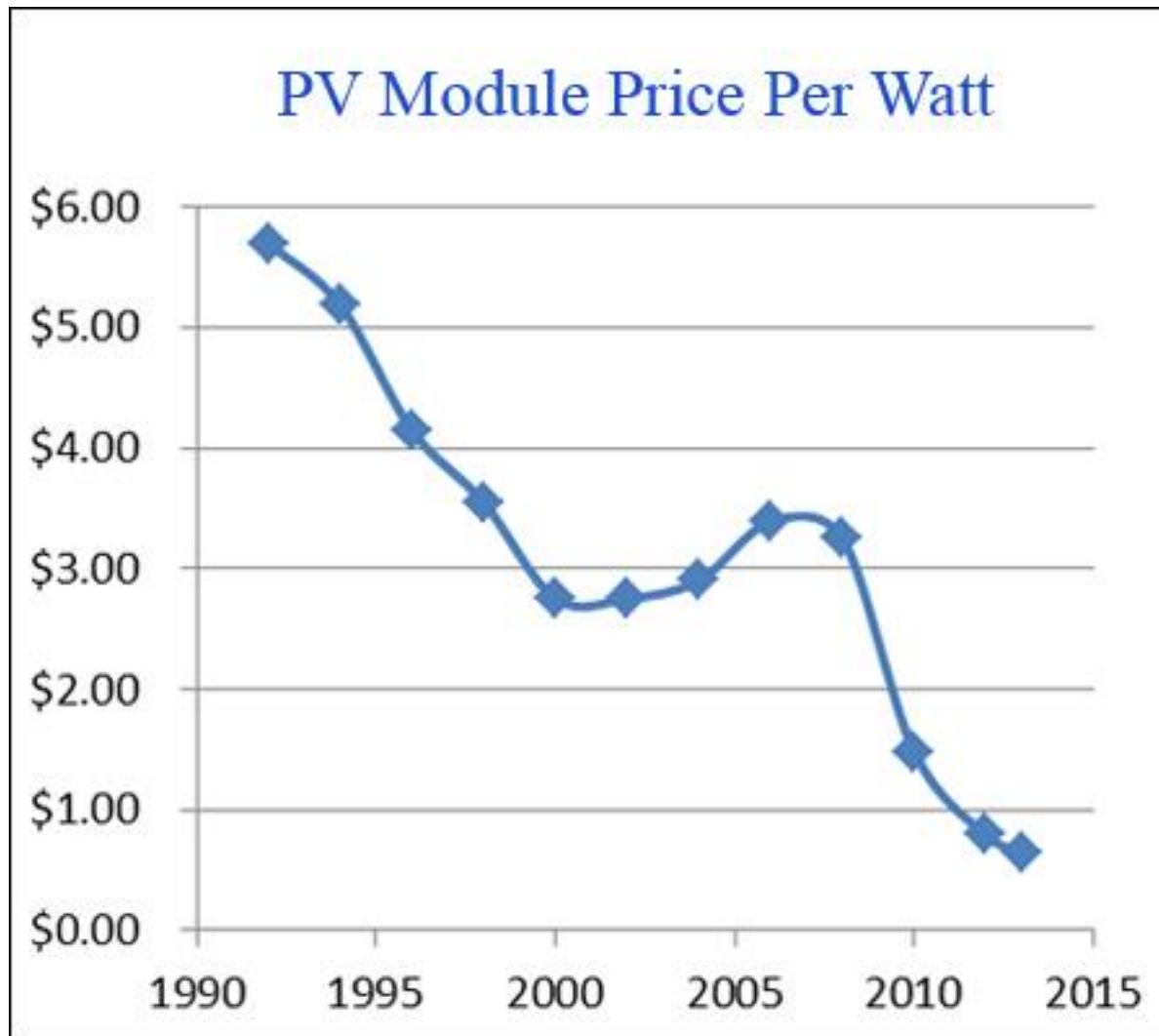


PG&E System Average Generation Rates

Rate competitiveness will be key: However, PCIA is likely to go up and generation rates will be lower next year. Need to keep in mind the long-term trend.



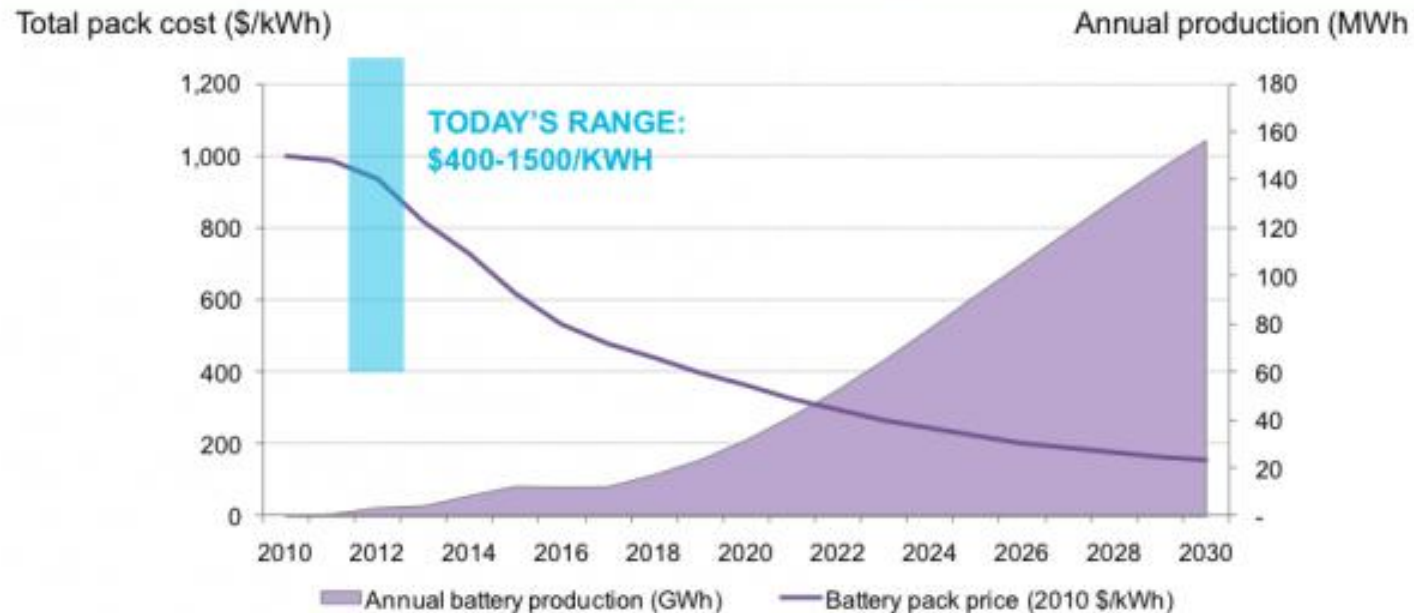
CCAs Taking Advantage of a Trend...



Declining Costs of Energy Storage A Game Changer?

Potential for nanogrids/microgrids and potential role for CCA

LI-ION BATTERY PACK COST AND PRODUCTION, 2010-30



Source: Bloomberg New Energy Finance



Policy Update: Impact of SB 350 on CCAs

- AB1110
- SB 350 raises the RPS to 50% by 2030
- CCAs must submit their integrated resource plans to CPUC for certification, but CCAs maintain autonomy over procurement
- By 2021, 65% of RPS procurement must be in contracts of 10 years or more
- IOU renewable energy integration costs through CAM
- CPUC will ensure that
 - IOU customers face no cost increases as a result of CCA departing load
 - CCA customers face no cost increases because of IOU cost allocation not directly related to departing load



Thank you!!

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