

DOCKETED

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California at the Clean Energy Crossroad

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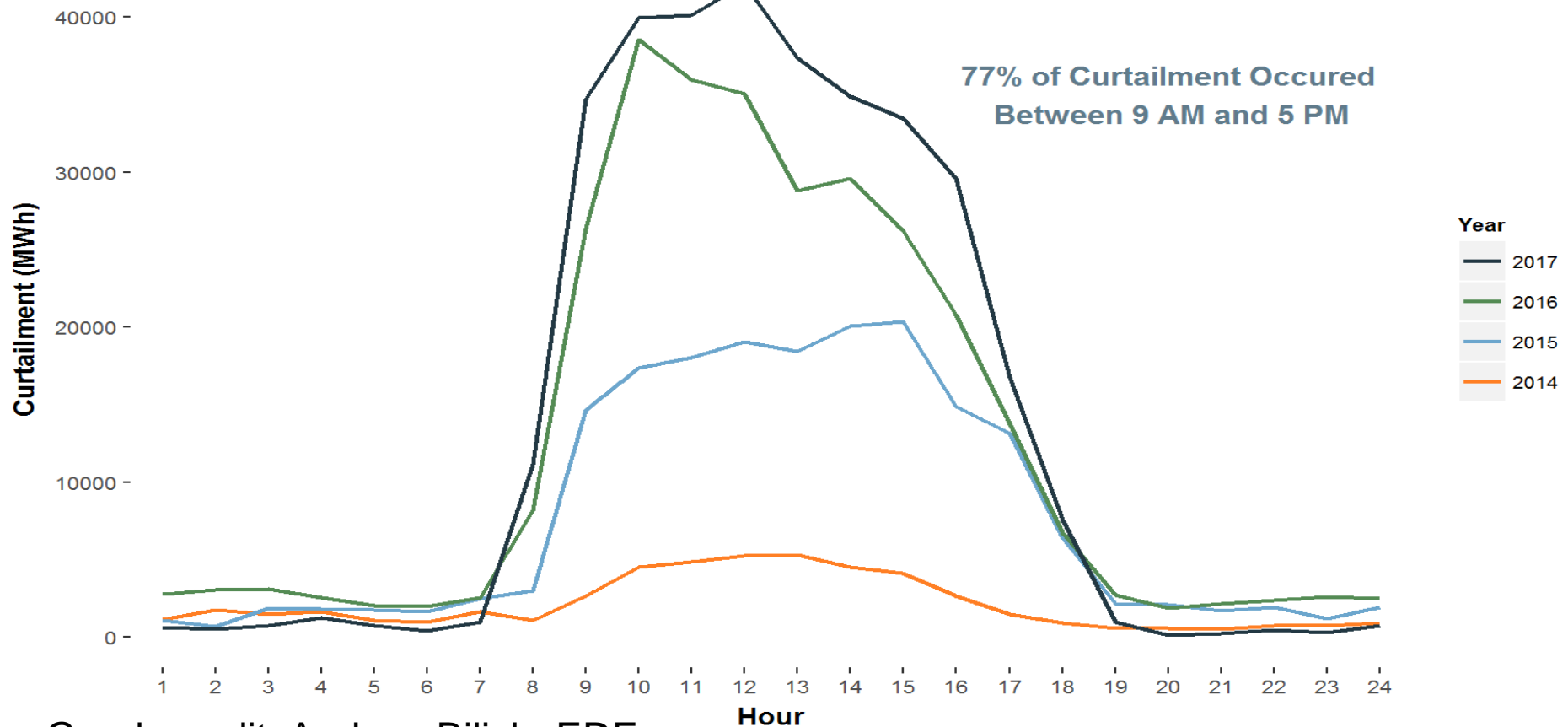


Discussion Questions

- Solutions for cohesive policy framework?
 - Increasing time, place and product type precision in pricing
 - At the distribution edge
 - At the planning horizon
- Leverage VGI as DER?
 - Recognize what is possible
 - Need planning timelines and willingness to change price/message
- Consistent procurement and program requirements?
 - Trust that market actors will respond to information and incentives
- Changes to utility business?
 - Deemphasize rate-of-return shareholder rewards
 - Reward performance, not technologies
 - Open door for service-related fees

Renewables Integration via Curtailment

CAISO Hourly Curtailment of Wind and Solar May 2014 to Present



Graph credit: Andrew Bilich, EDF

Data source: CAISO

CA can Embrace the Duck

- TOU is a start
 - Vulnerable homes aren't ready
 - TOU only hints at the duck
- The Opportunity:
 - EVs as a mobility and energy (storage) resource...and much more
 - Household, community & regional scales

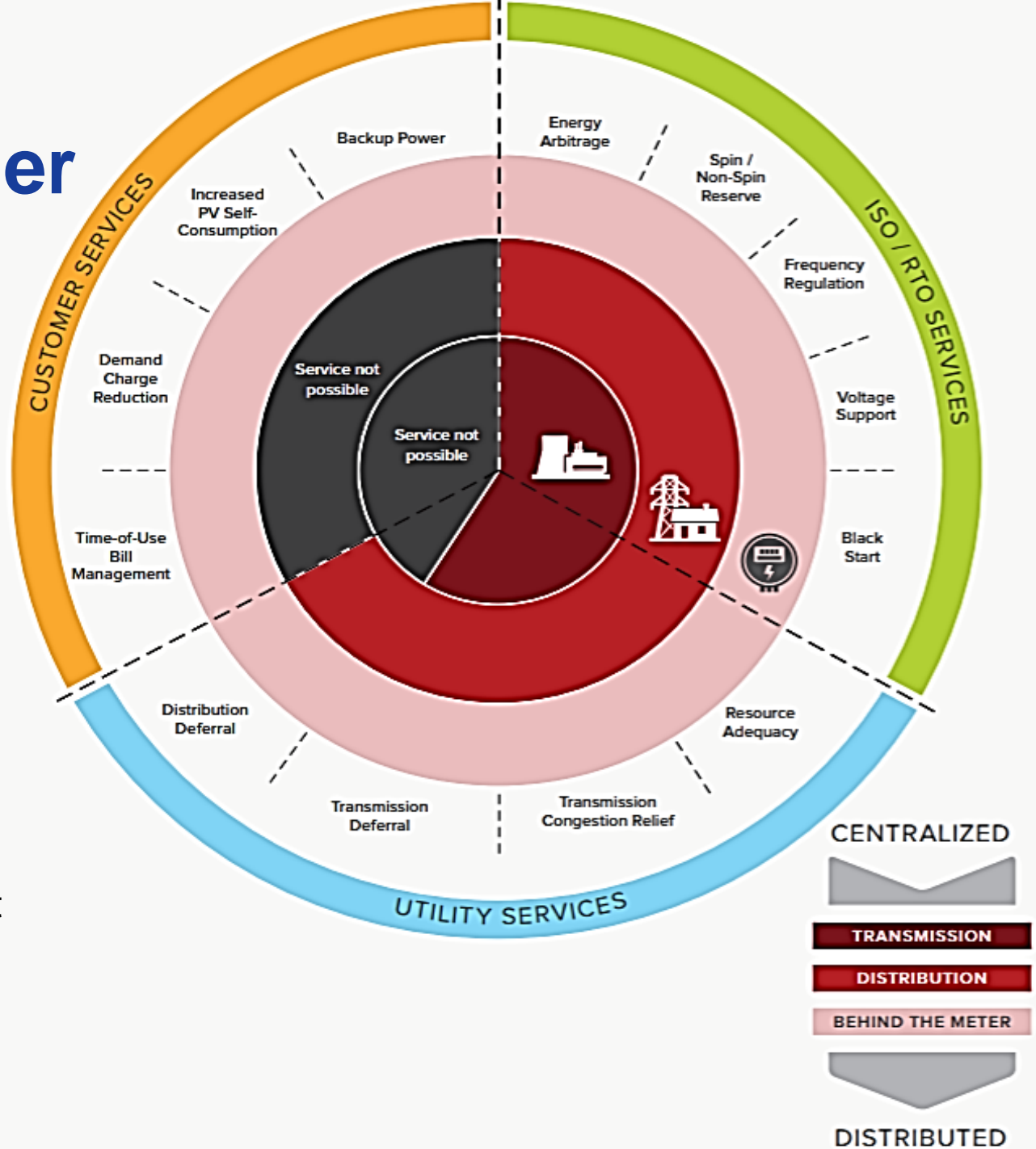


EDF's VGI Roadmap

Recommendations

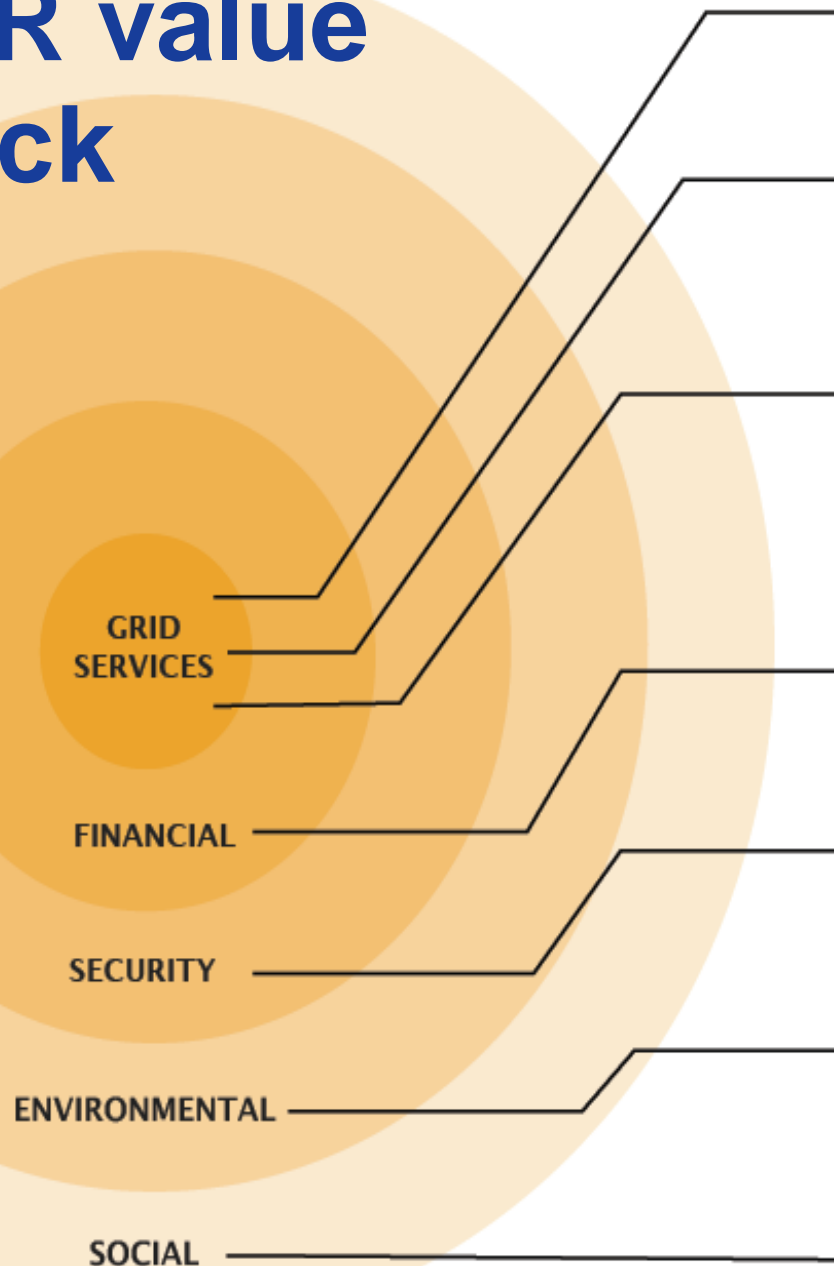
- Establish V2G markets
 - New market commodities (e.g., flexible ramping)
 - Open existing (PJM capacity markets for DR) for V2G
- Open full value stack of storage capabilities
 - Distributed
 - Aggregated (or not)
 - Standards (visibility, dispatchability, ...)
 - Planned for as **capacity probabilistically**

Batteries: 3 Stakeholder groups for 13 Services



Credit: RMI, 2015 Report

DER value stack



ENERGY

- energy
- system losses

CAPACITY

- generation capacity
- transmission & distribution capacity
- DPV installed capacity

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GRID SUPPORT SERVICES

- reactive supply & voltage control
- regulation & frequency response
- energy & generator imbalance
- synchronized & supplemental operating reserves
- scheduling, forecasting, and system control & dispatch

FINANCIAL RISK

- fuel price hedge
- market price response

SECURITY RISK

- reliability & resilience

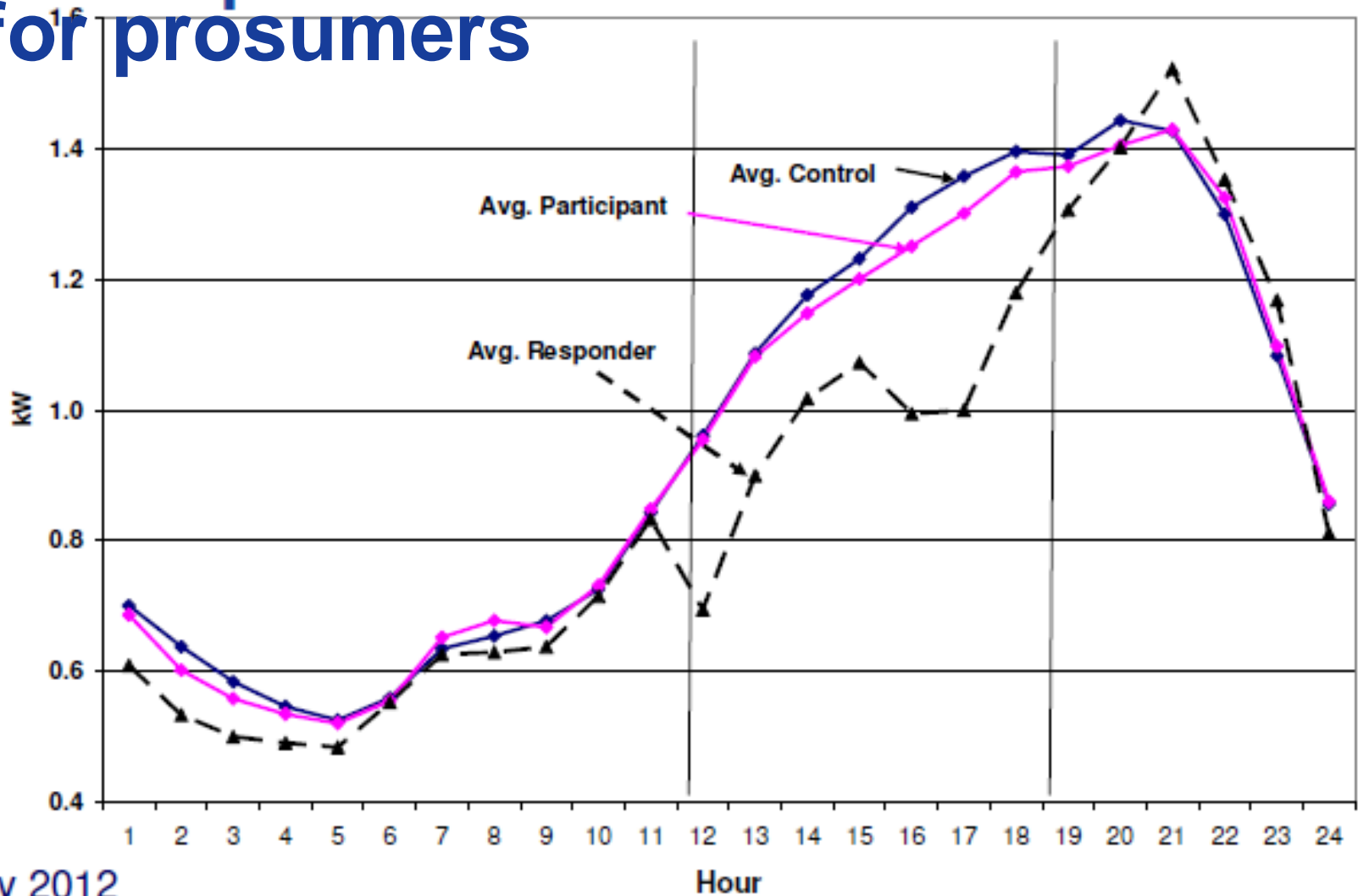
ENVIRONMENTAL

- carbon emissions (CO₂)
- criteria air pollutants (SO₂, NO_x, PM)
- water
- land

SOCIAL

- economic development (jobs and tax revenues)

Dynamic prices are attractive ... for prosumers

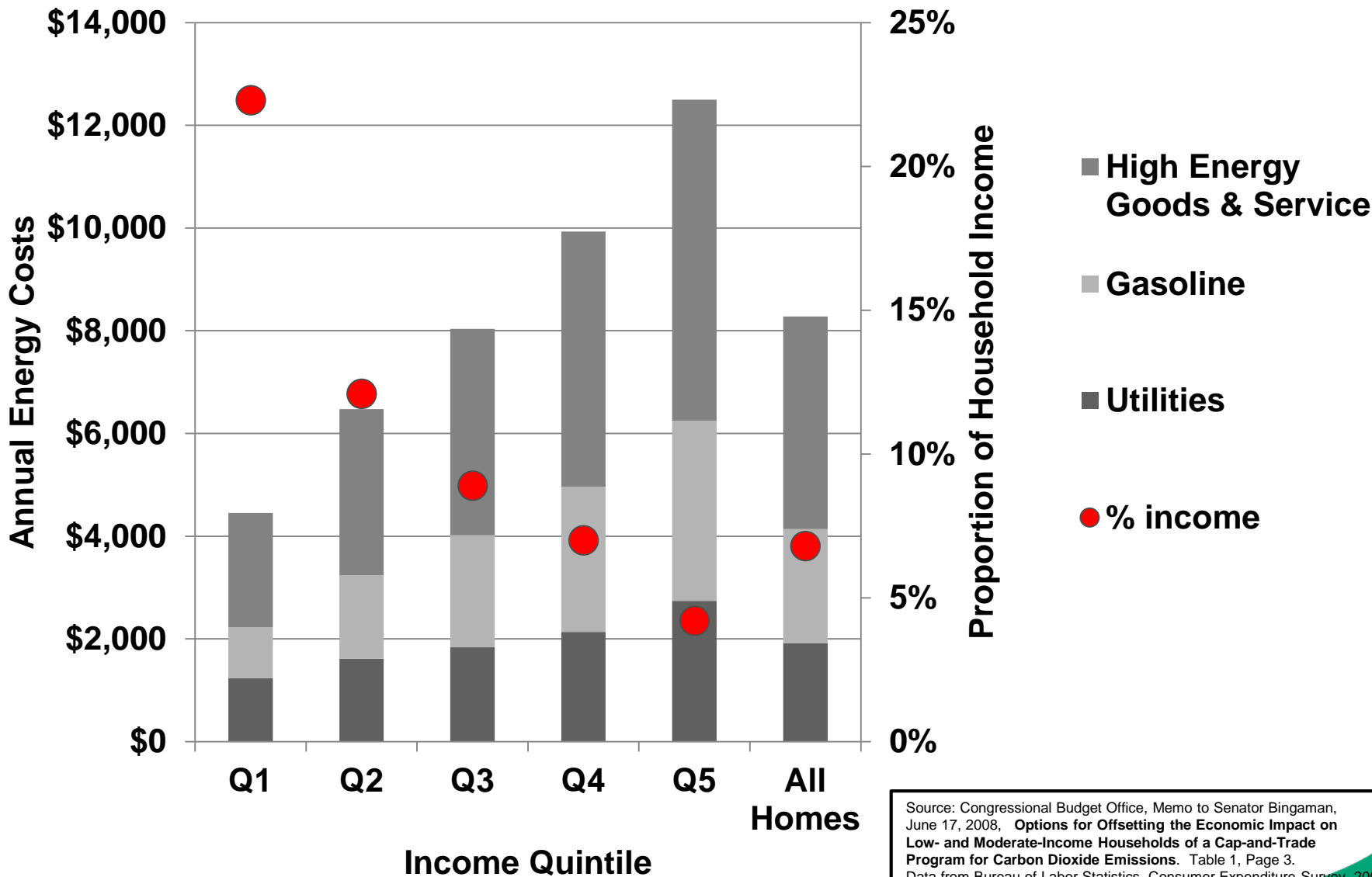


July 2012

Source: SCE, Kim, Jan 26, 2015, EUCI conference

Solution #3: Help vulnerable homes first.

U.S. Energy Costs by Household Income



Source: Congressional Budget Office, Memo to Senator Bingaman, June 17, 2008, **Options for Offsetting the Economic Impact on Low- and Moderate-Income Households of a Cap-and-Trade Program for Carbon Dioxide Emissions.** Table 1, Page 3. Data from Bureau of Labor Statistics, Consumer Expenditure Survey, 2006



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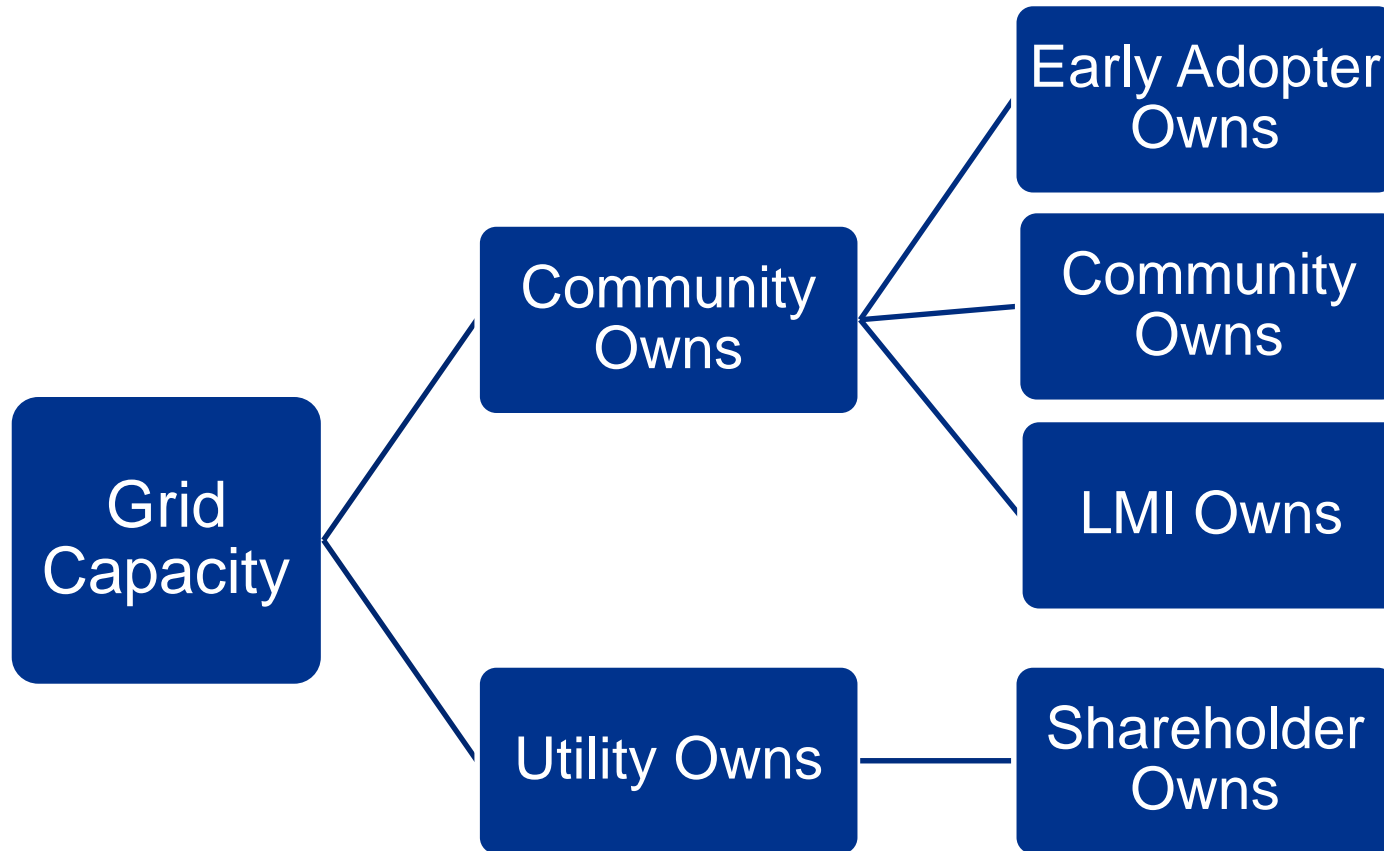
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DER Incentives for IOUs

- How to incent IOUs to source DERs?
 - It isn't PBR or Fees for Services (aka, DISO)
 - Answer is: **both**...but we are only testing PBR
- Utility RFOs violate rules for a free market
 - Monopsony power
 - Most of DER value will go unused
 - Administratively “expensive”
- Solutions
 - **Source** DERs with forward looking pricing (rates & incentives)
 - DISOs/IOUs earn fees for services
 - Incentives for DERs to optimize distribution system

Who will own DERs?



DER Values: Community and Individual Ownership

