

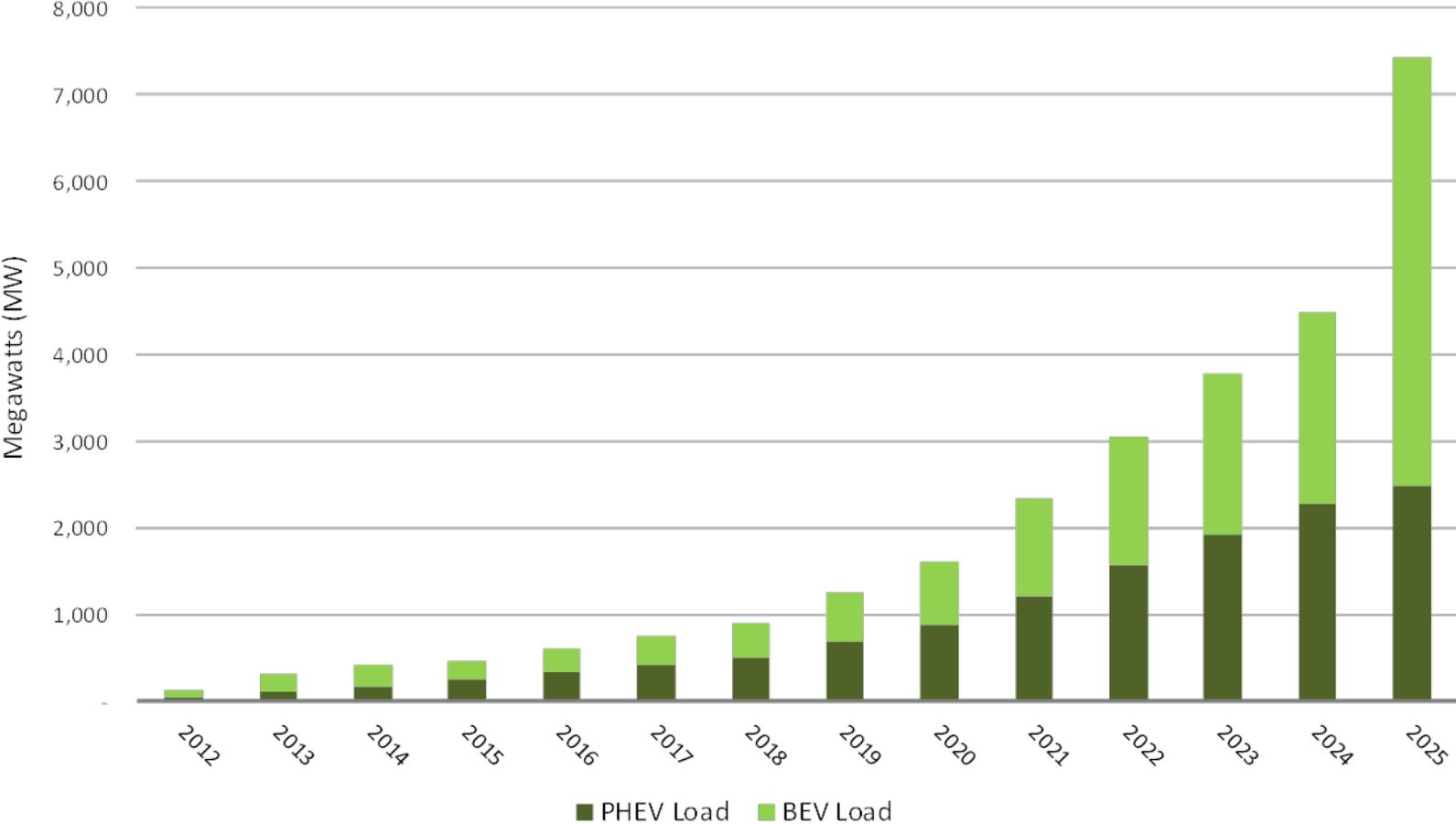
Vehicles as a Grid Resource

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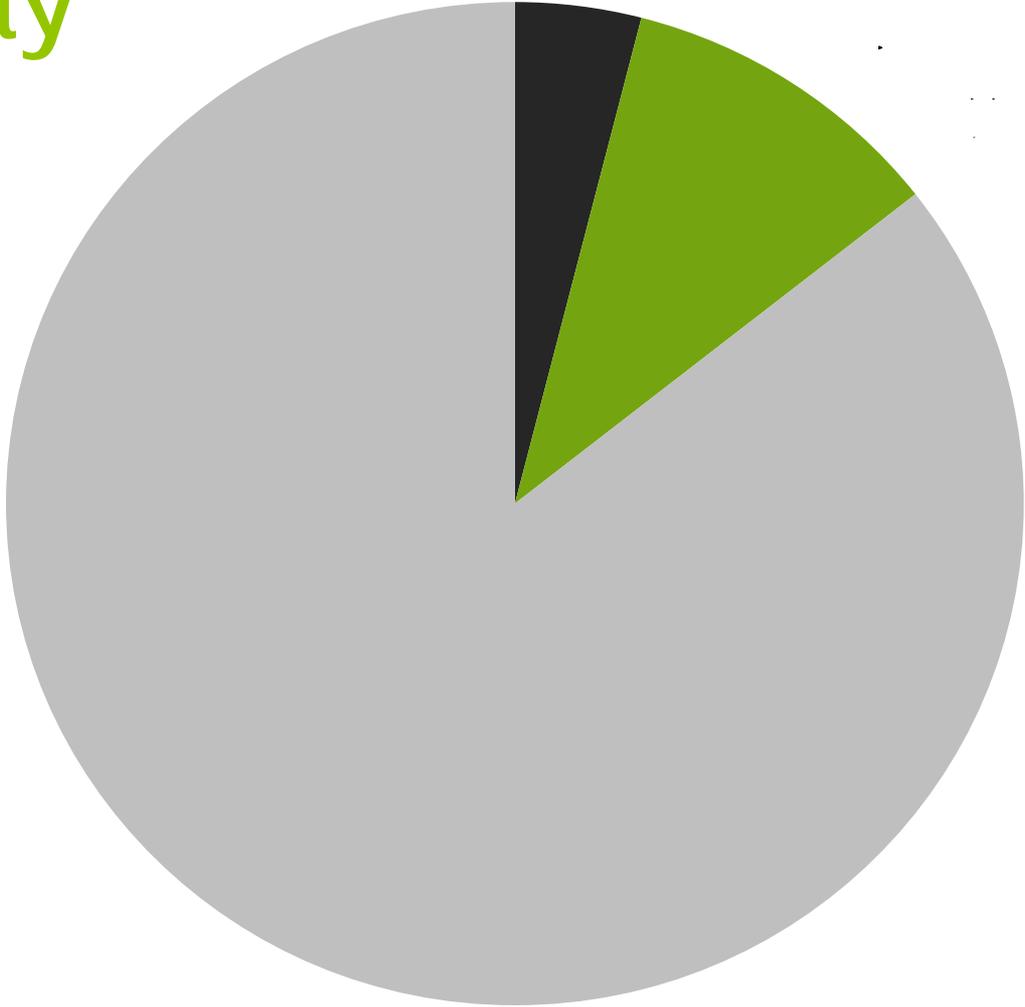
CEC IEPR Workshop
June 2014



Load Growth From Electric Vehicles

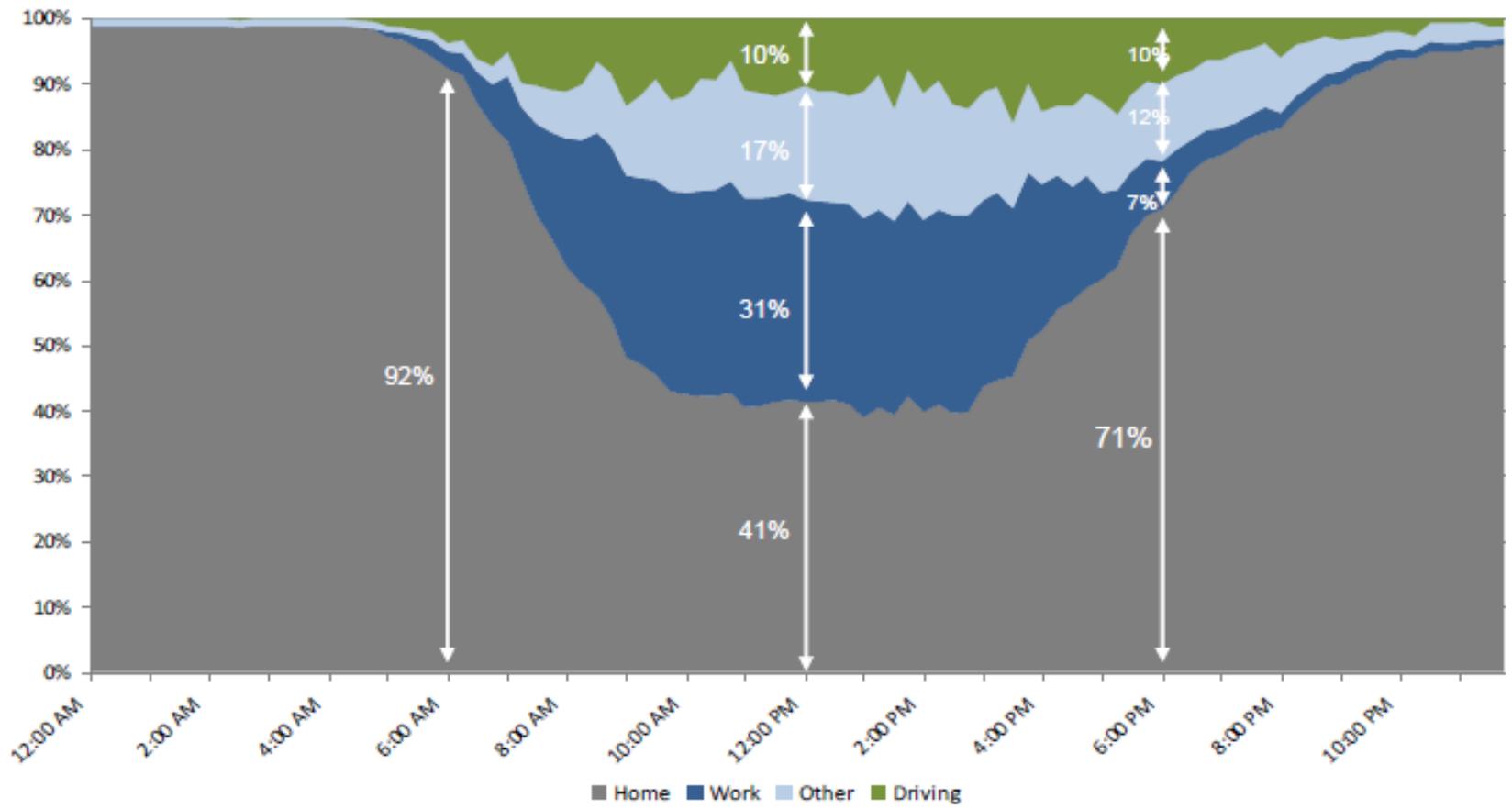


Grid Opportunity

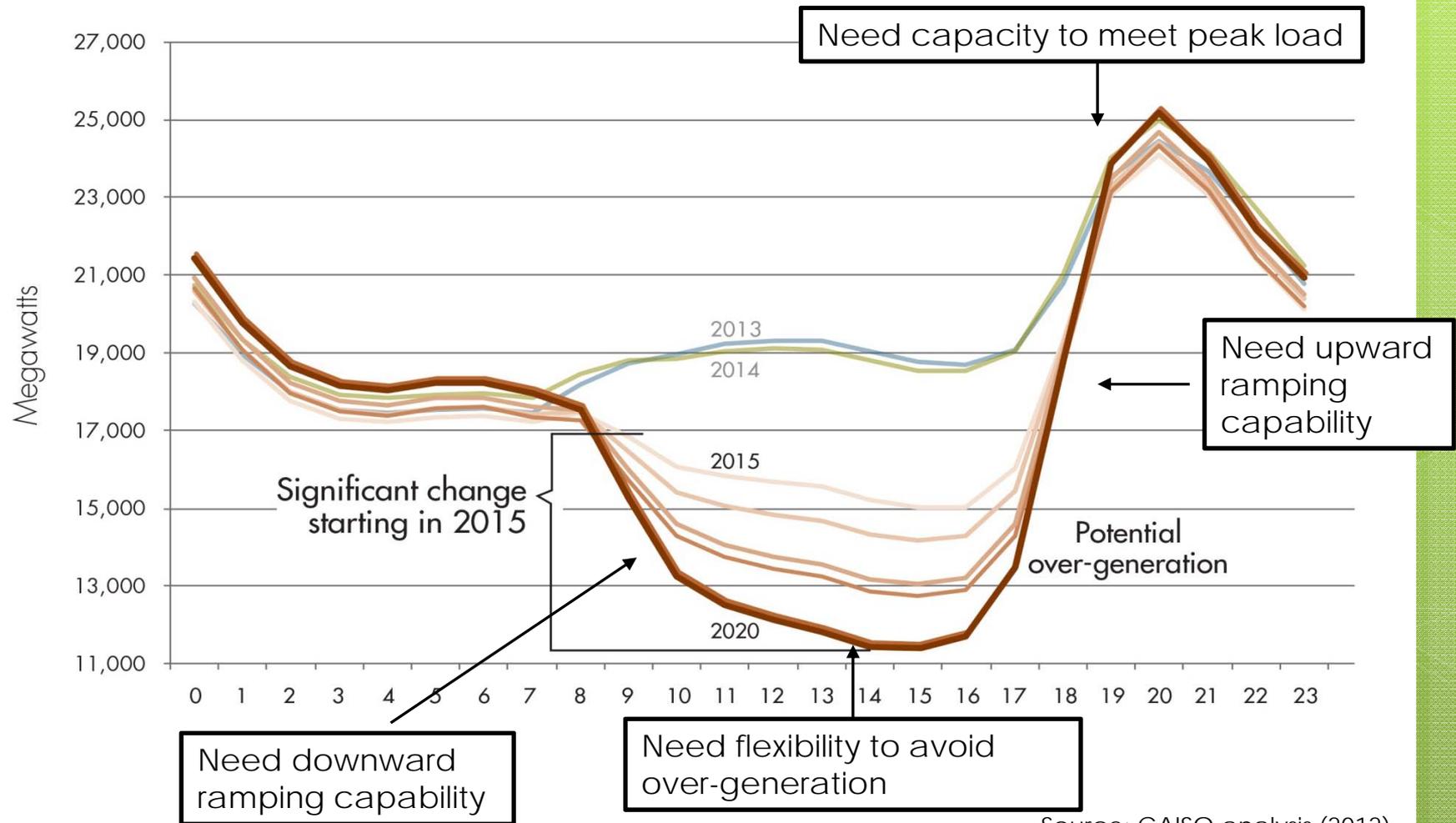


Data Sources: 2010 National Household Transportation Survey, EV Project

Figure 3: Share of Survey Respondents' vehicles, by location. (National Household Travel Survey 2009.)



PEVs Can Meet Many Grid Needs



Source: CAISO analysis (2012)

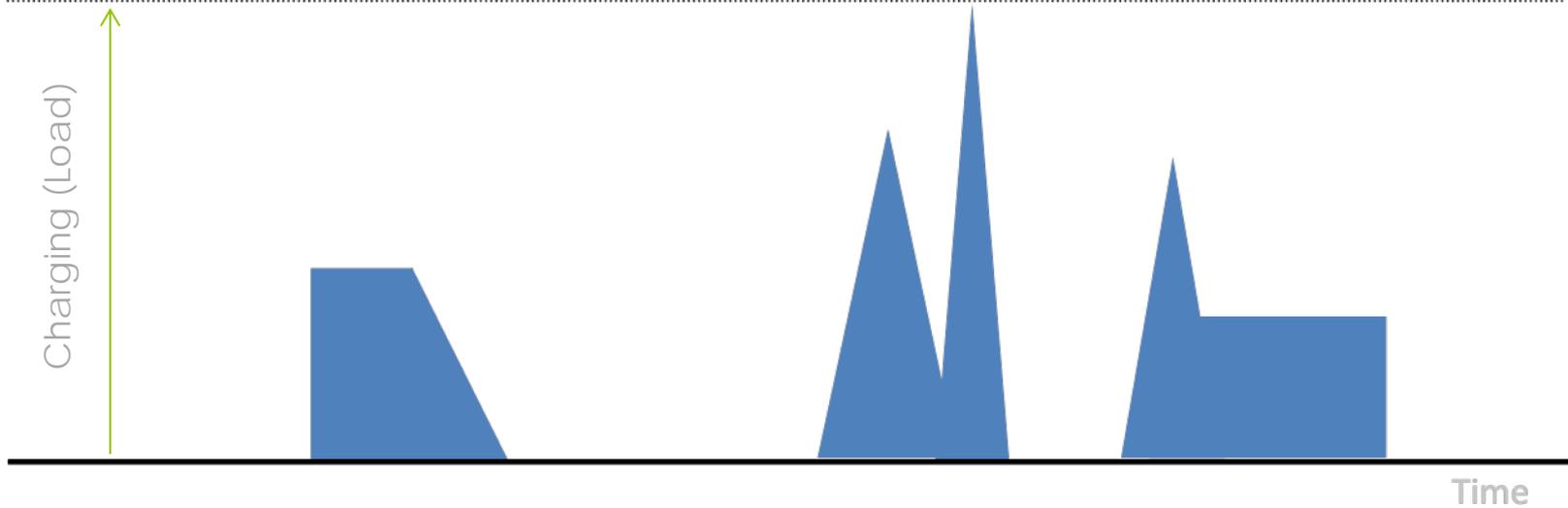
Controlled Charging: Easy Implementation, Less Value

Max Charging Level = 6.6 kW



Controlled Charging: Low Cost, Less Value

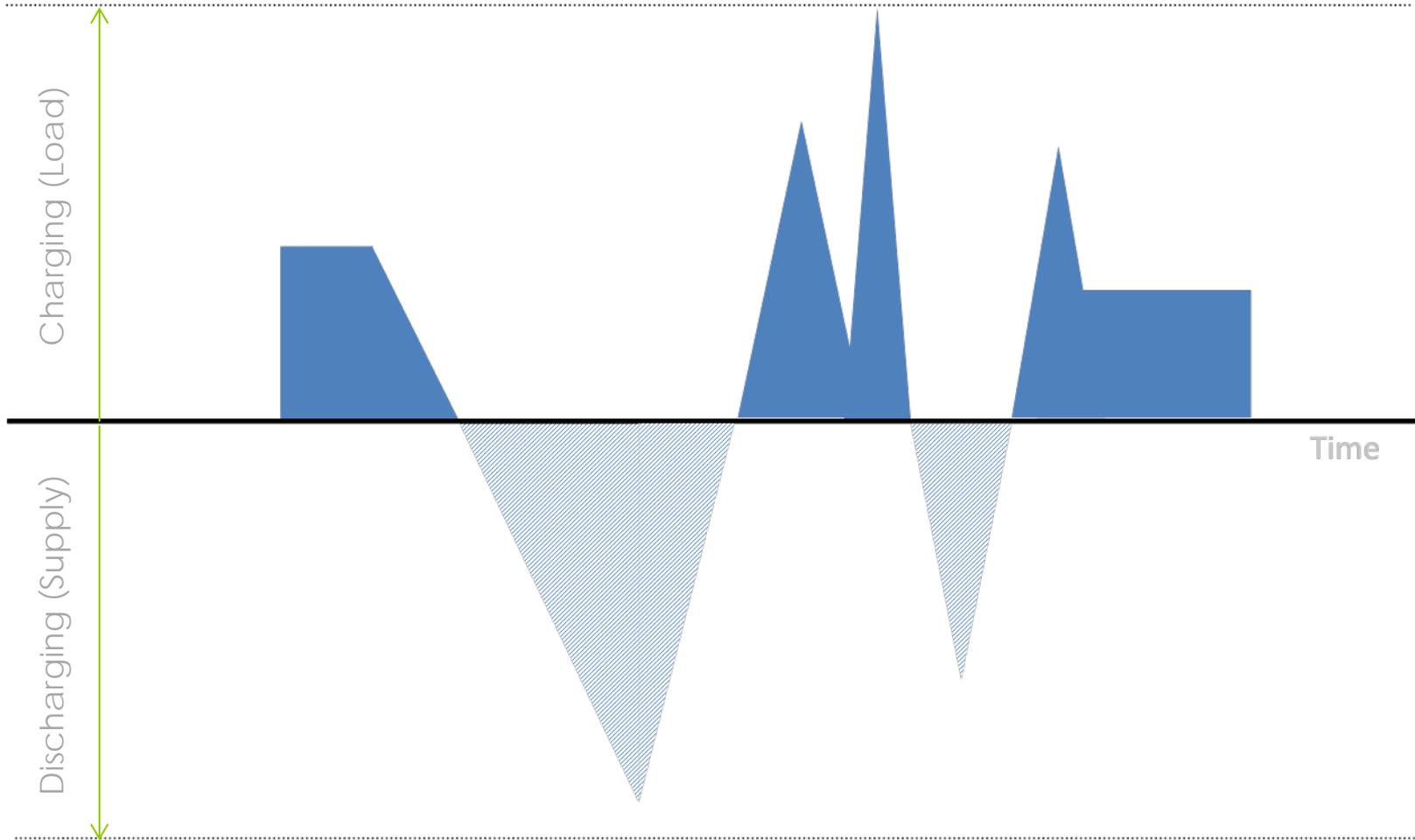
Max Charging Level = 6.6 kW



Max Discharging Level = 6.6 kW

Battery Discharge: More Value, Unclear Costs

Max Charging Level = 6.6 kW



Max Discharging Level = 6.6 kW

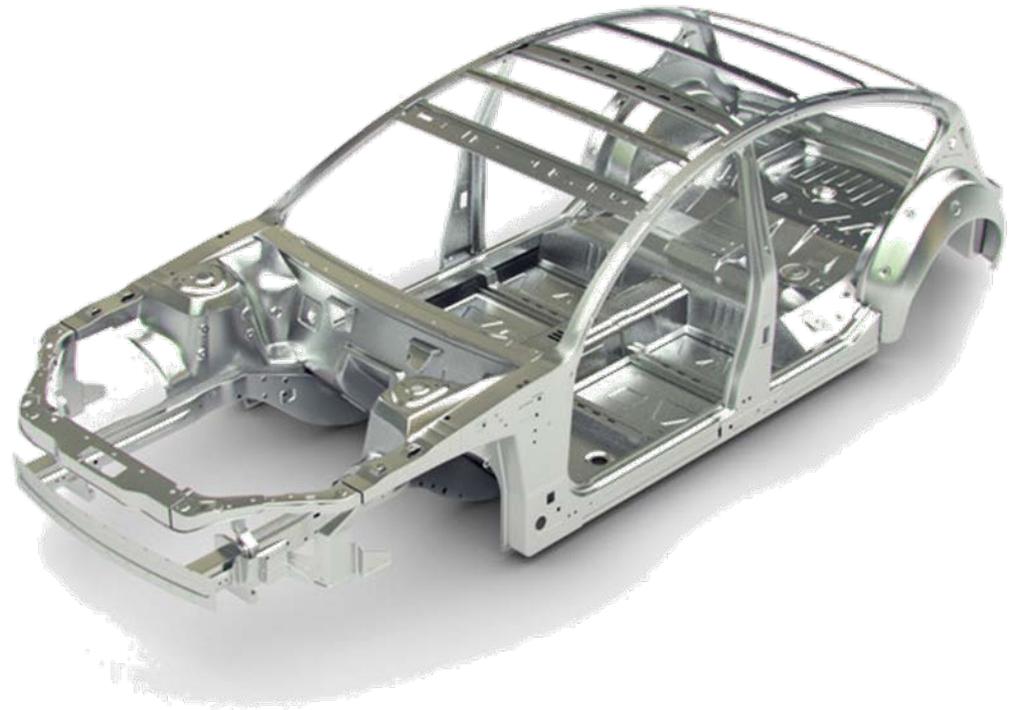
Regulatory Framework Is Needed

1 Defining the VGI Resource

2 Who Aggregates?

3 Determine how to capture distribution benefits

4 Ranking Primacy among VGI activities



Framework Determines Implementation

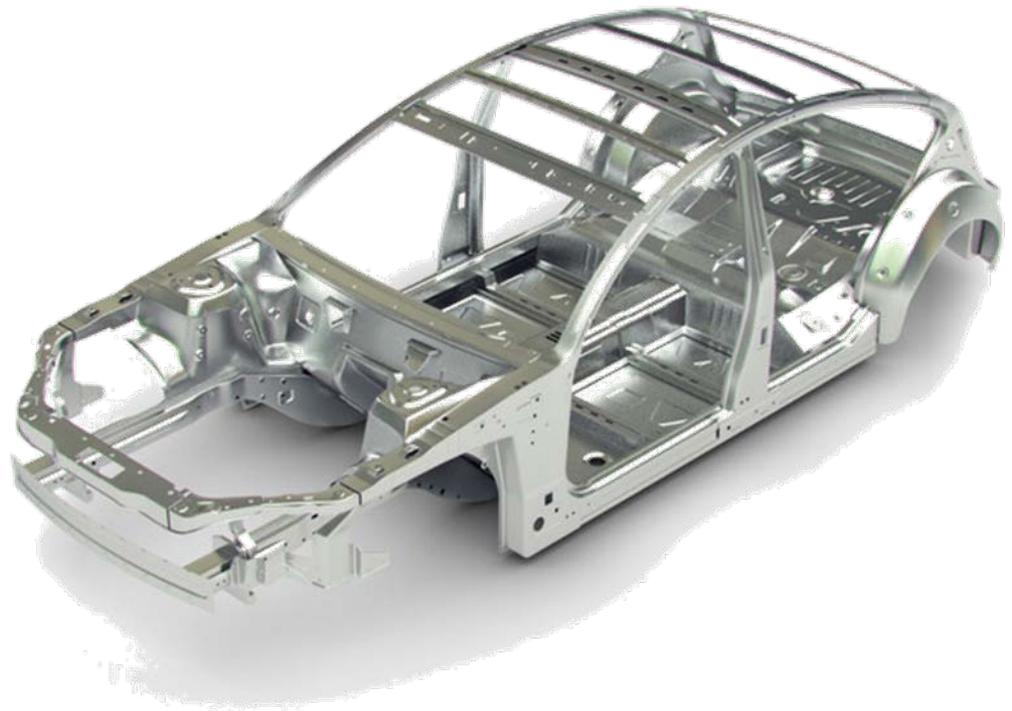
How Does a VGI Resource Interconnect?

What Utility Tariffs Do We Need?

What Metering is Necessary?

What Communication Requirements Are Needed?

How Do We Make Sure its Safe?



What Happens Next?

- CPUC Storage Proceeding is addressing definition of storage to determine if controlled charging is eligible for the storage mandate
- CPUC Alternative-Fueled Vehicle Proceeding is evaluating next steps to implement vehicle-grid integration
- Several Pilots are underway