



# ***Smart Grid--What is it and how will it help California?***

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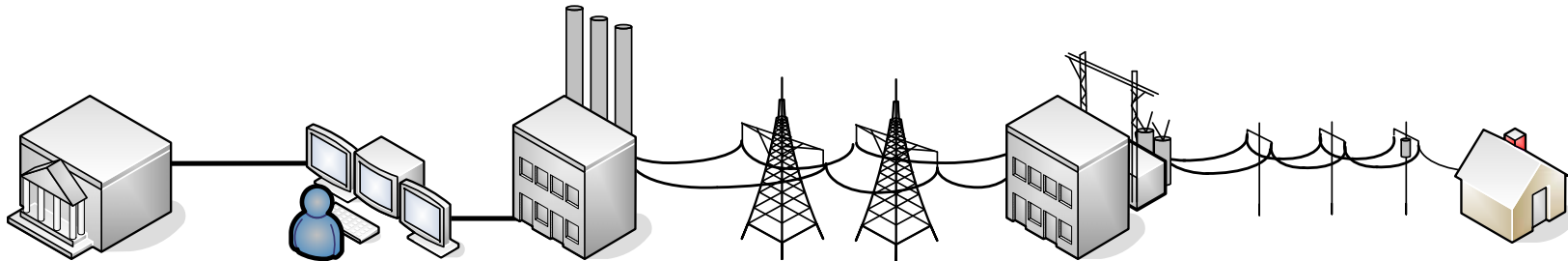
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# Overview



- What is Smart Grid?
- What is a California Smart Grid?
- California Smart Grid Research Efforts
- Smart Grid Economic Stimulus Package
- How will Smart Grid help California?

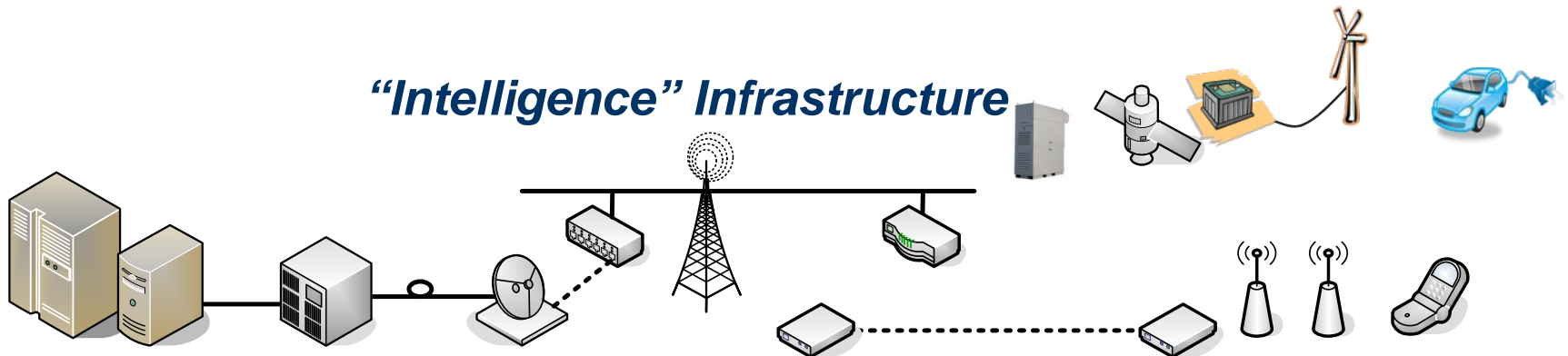
# Merging Two Infrastructures



***Electrical Infrastructure***



***"Intelligence" Infrastructure***



# What is a Smart Grid



A smart grid delivers electricity from suppliers to consumers using *digital technology* to *save energy, reduce cost and increase reliability*. Such a modernized electric network is being promoted by many governments as a way of addressing *energy independence or global warming issues*



# Why Smart Grid?

# Why Smart Grid

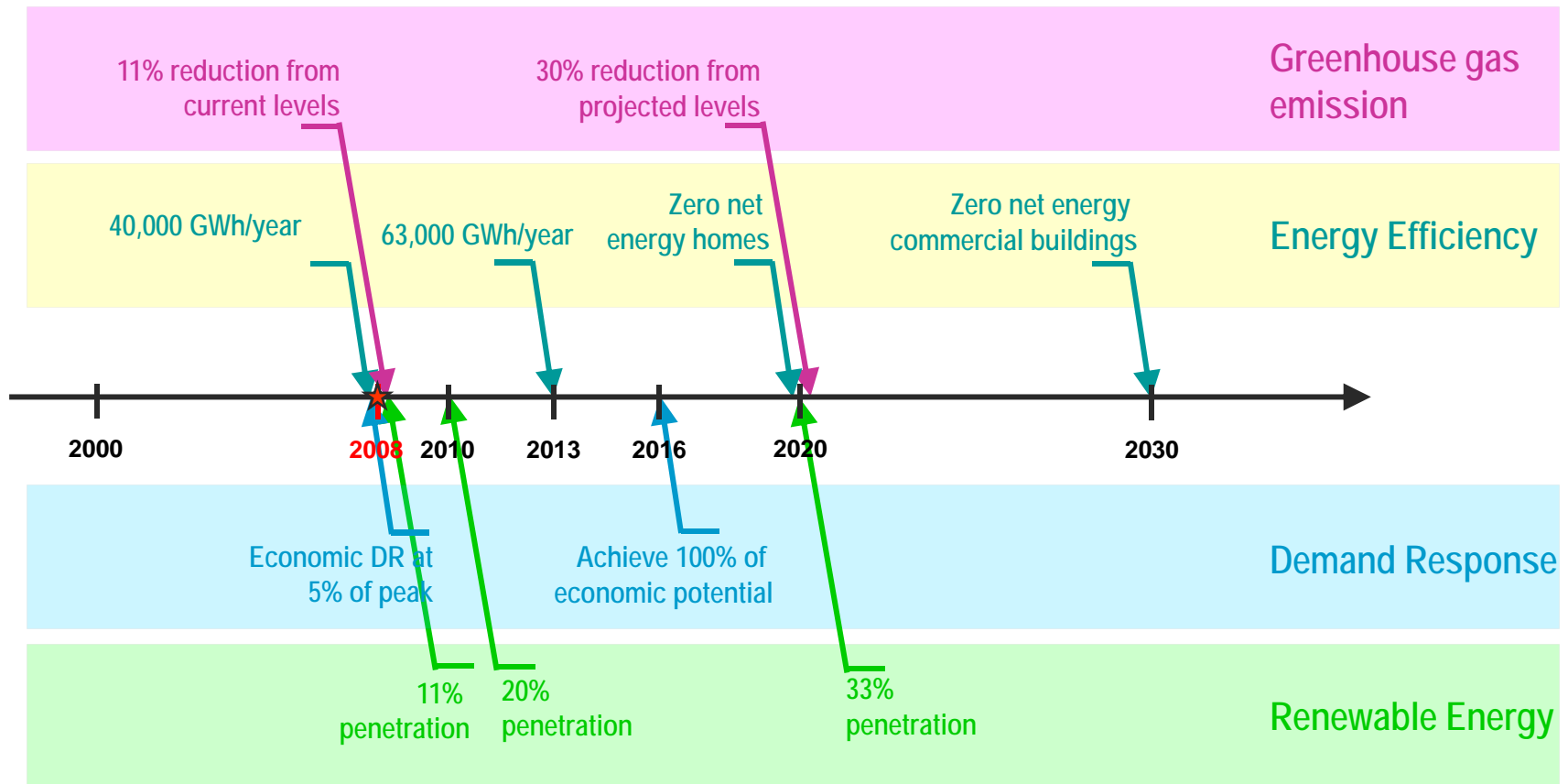


- **Good for the Environment**
  - Provides new options to reduce emissions & improve overall efficiency
  - Makes Green Grid a Reality
- **Cleaner, Lower Cost Operations, More Efficient**
  - New cost lowering technologies
  - Increased efficiency in operating existing systems--higher utilization rates
- **Improved Grid Operations**
  - Higher reliability
  - Less outage time / shorter outages / smarter decisions
- **More Options for Consumers**
  - Lower overall energy costs
  - More choices on how to meet individual consumer needs
  - Dynamic rates to better integrate needs of grid and consumer



# What is a Smart Grid for California?

# California Energy Policy Targets





# California Advanced Metering Initiative Summary

	Pacific Gas & Electric	San Diego Gas & Electric	Southern California Edison
# of Electric Meters	5.1M	1.4M	5.3M
# of Gas Meters	4.2M	0.9M	Gas Utility may connect to AMI
Costs Approved	\$1.7B in July 2006	\$0.6B in April 2007	\$1.7B
Costs Pending Approval	\$0.6B to upgrade	-	-
Deployment Schedule	2006 to 2012	2008 to 2011	2009 to 2012

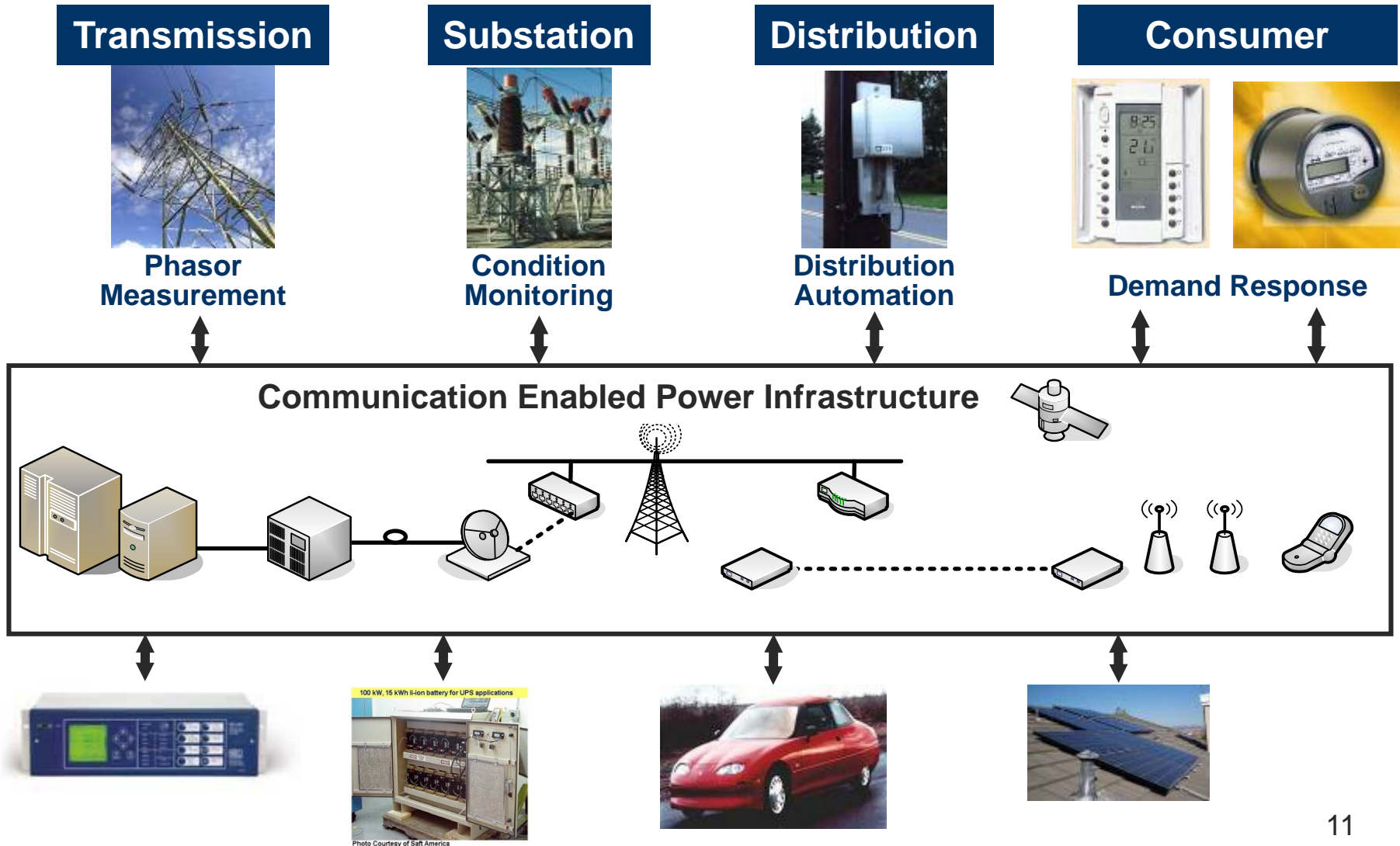
- Note: The table pertains to meters for utility customers with maximum load less than 200 kW. Customers with maximum load greater than 200 kW already have advanced meters.

# California Smart Grid Factors

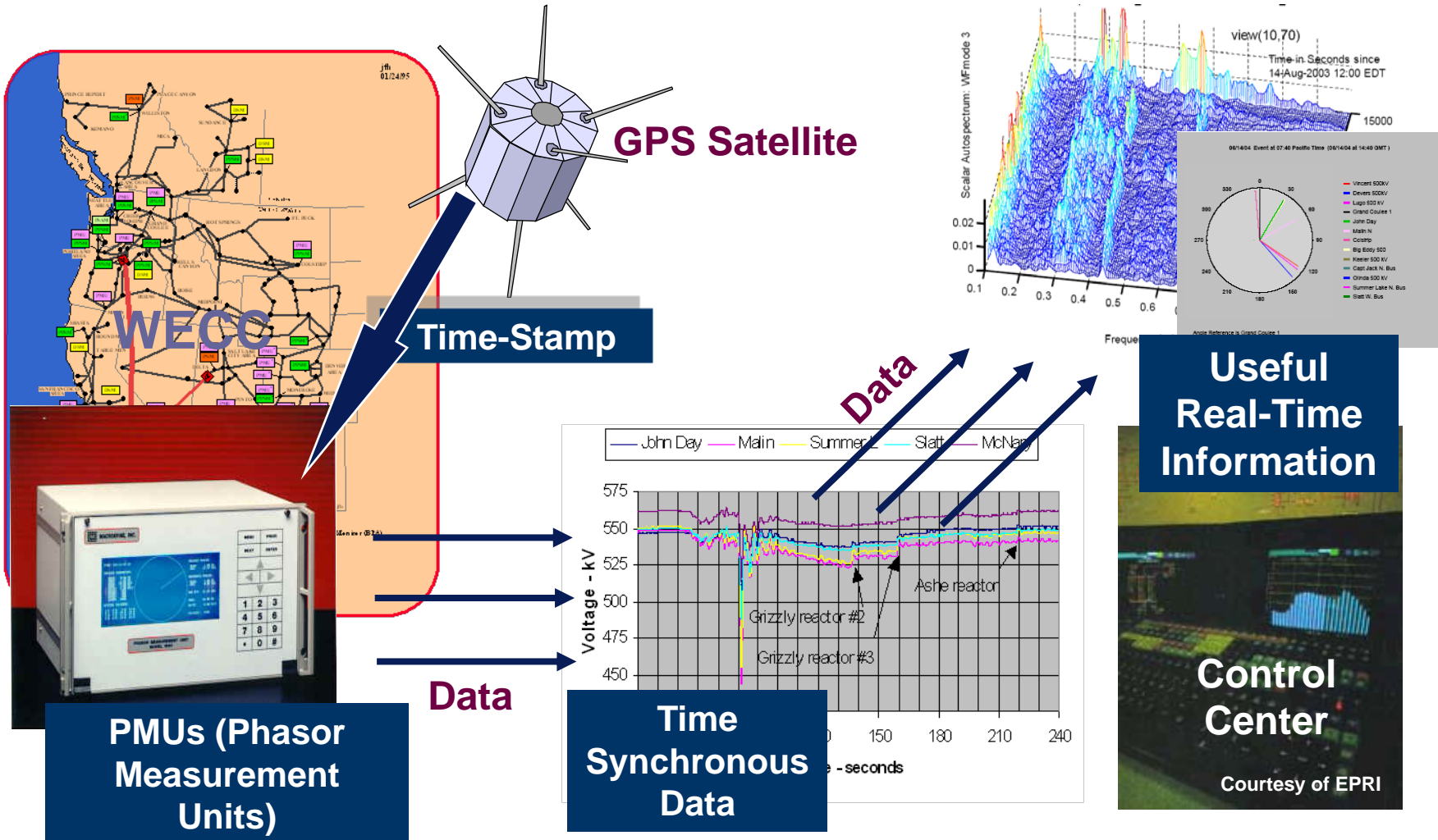


- California energy policy
- Ongoing California deployments
- California future energy growth needs
- California energy use profile
- Impact of rapid insertion of ARRA Smart Grid funding

# Applications at all levels will be enabled



# Synchrophasor Measurement – The Heart of the Smart Grid Transmission



Ultimately, Smart Grid required for maximum renewables deployment.



# Energy Storage Technologies Applying Smart Grid Technologies



Photo Courtesy of Salt America

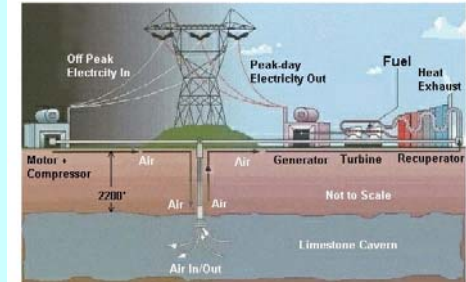


Photo Courtesy of CAES Development Company



# Demand Response Automation by Sector



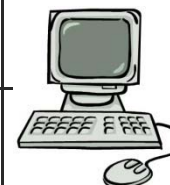
## Communicating Thermostat



## Demand Response Automation Client



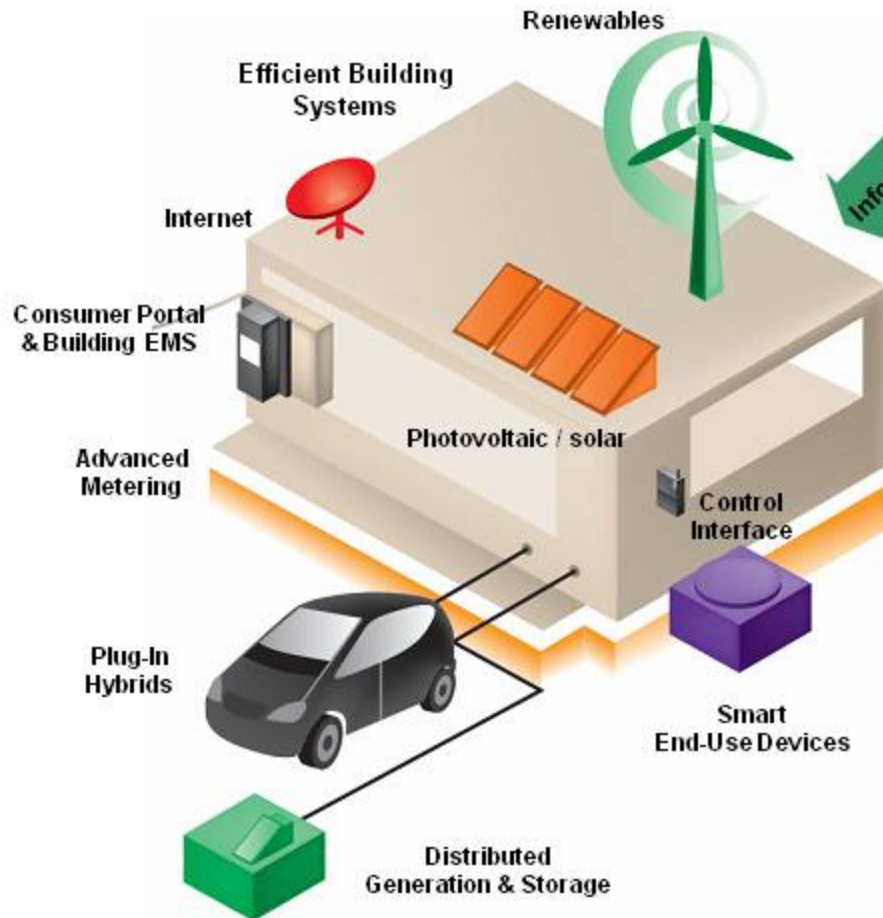
## Demand Response Automation Client



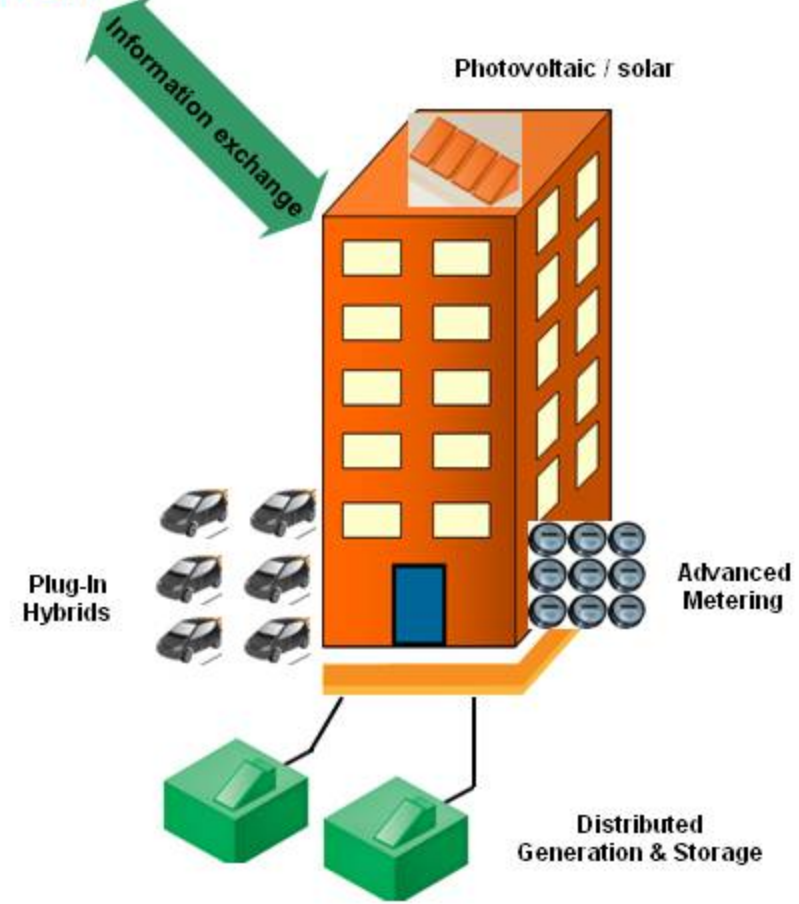


# Smart Grid Customer Opportunities

## Single home example



## Multi-Dwelling Unit example



# Upcoming Smart Grid Activities



- PIER Request for Proposal:
  - *Defining the Pathway to the California Smart Grid of 2020*
- PIER Funded RD&D Activities:
  - Micro-Grid demonstrations of Smart Grid technologies
  - White Paper on defining the Smart Grid standards, codes and protocols
  - White Paper on the Smart Grid technologies that will accelerate the fielding or increase the penetration of renewables in California
  - White Paper on how Smart Grid technologies will make electricity energy storage more useful in meeting California's goals
- Upcoming CPUC Rulemaking on Smart Grid





# Smart Grid

## Economic Stimulus Funds

# Smart Grid Related Economic Stimulus Funds--\$11B in New Efforts



- DOE Funding Opportunity Announcement (FOA) Smart Grid Demonstrations--\$615M
- Notice of Intent to Issue an FOA for Smart Grid Investment Grants--\$3.375B
- Bonneville Power Administration--\$3.25B in additional borrowing authority
- Western Area Power Administration--\$3.25B in loan guarantees

# How Smart Grid helps California Meet Future State Energy Goals



- Provides Green Grid that is more efficiency, produces less emissions, operates more reliably and lowers cost for all
- Provides vehicle to support more renewables, increased energy efficiency, better blend of distributed and central generation assets, higher penetrations of PHEVs and hybrids, and lowers dependence of foreign imports
- Increases data access at all levels and allows for quicker and more effective decisions at the appropriate level
- Fosters innovation, improvements and better services for the consumer

# Follow-up Questions



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