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ADVANCED TECHNOLOGY
Transmission & Distribution Business Unit

SCE Smart Grid Development

CEC IEPR Workshop

May 13, 2009

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SCE Strategy for a Clean Energy Future

Innovation in Energy & Information Technologies will Deliver Environmental Benefits & Customer Value

- SCE is doing its part to reduce greenhouse gas emissions by providing its customers with energy from renewable resources
- Smart power delivery is needed to manage greater diversity of supply and to optimize existing capacity
- Smart metering enables customers to increase energy conservation and reduce peaks while improving customer service and operational efficiency
- Plug-in electric vehicles will achieve transportation sustainability and enable distributed energy storage systems

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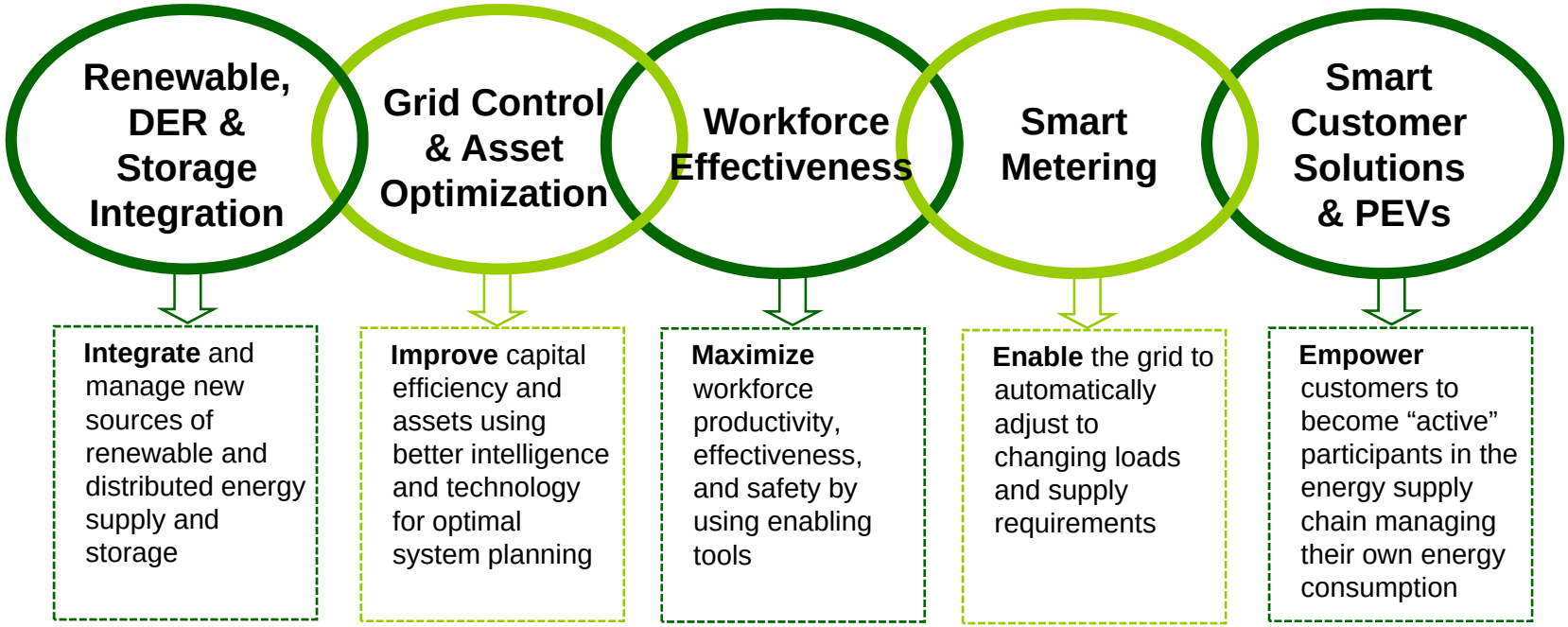
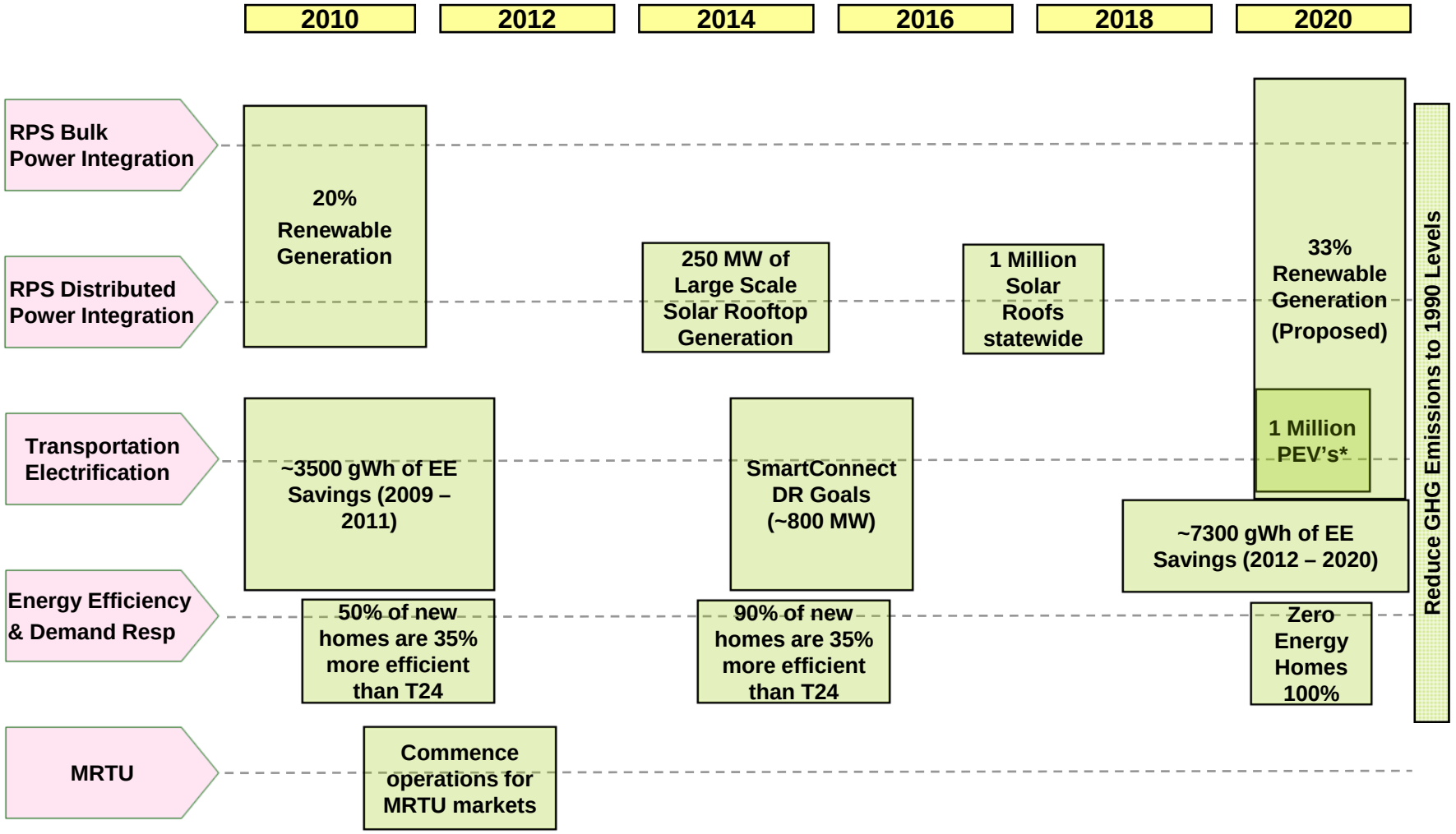
SCE Smart Grid Vision

A Smarter Grid will provide environmental benefits associated with improved asset, system, and energy efficiency



Key Energy Policy Goals 2010 - 2020



SCE Smart Grid Development

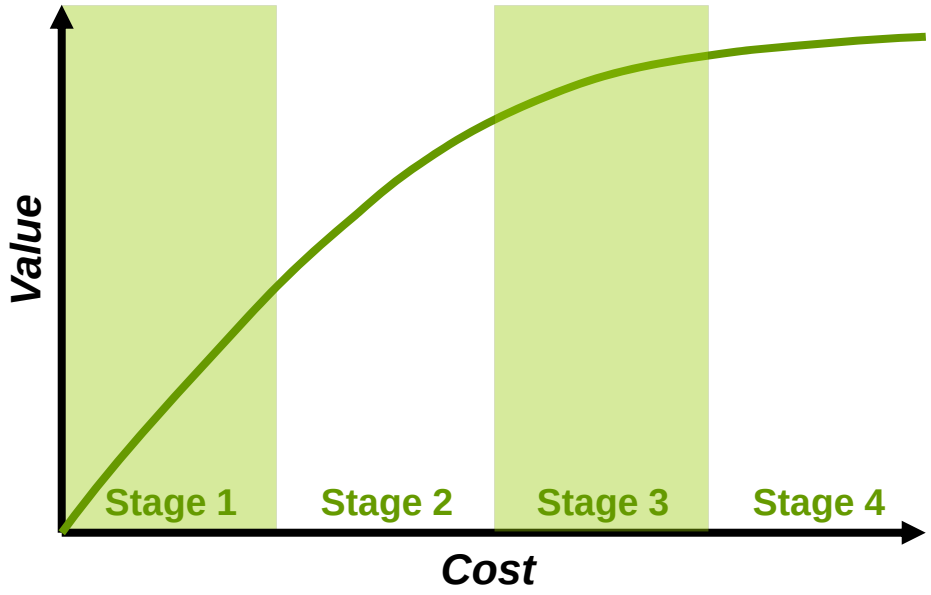
Information technologies and control systems

Stage 4: Micro-control (2020-2030)

Stage 3: Distributed Intelligence & Automation (2012-2019)

Stage 2: Measurement & Control Systems (2009-2012)

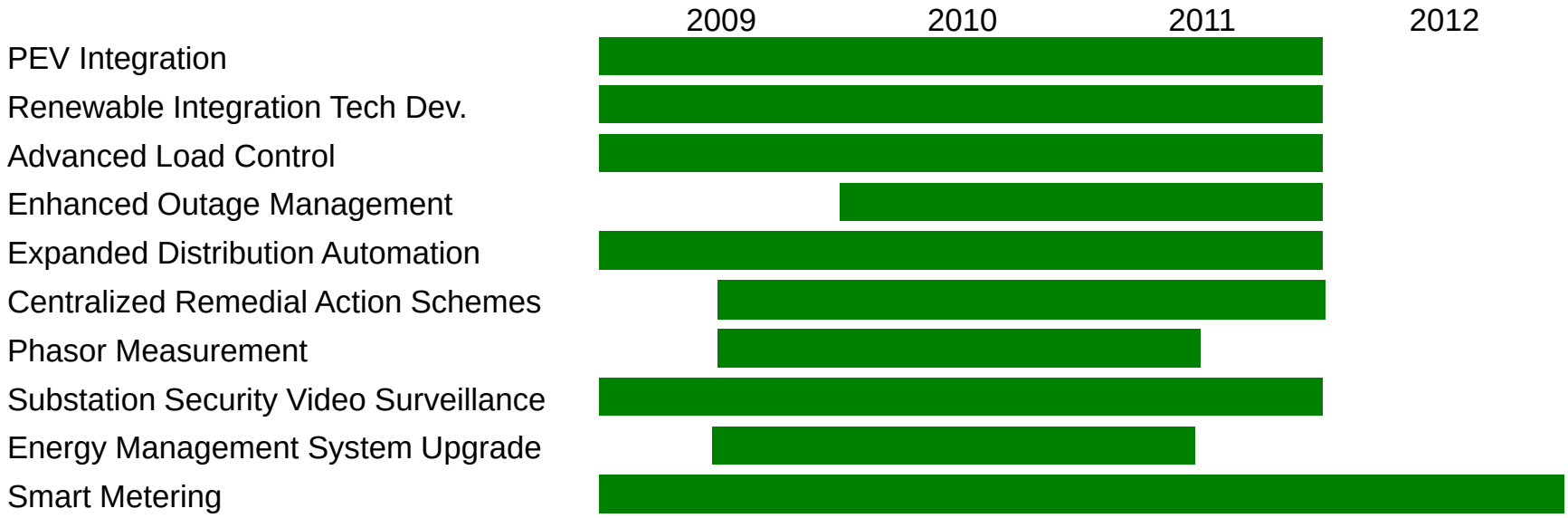
Stage 1: Foundation (1995-2008)



SCE Smart Grid Development (Stage 2)

Building on smart foundation established over the past decade

~$1.5 Billion Smart Grid Development Projects

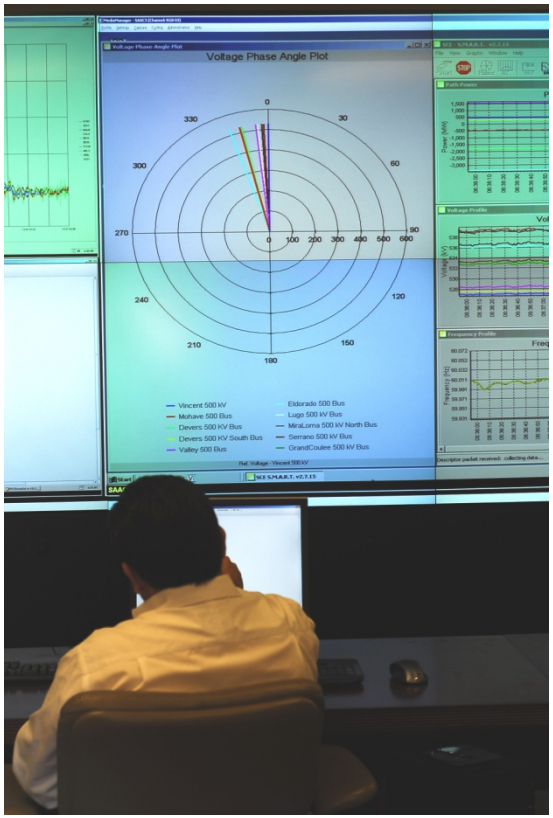


*** Includes CPUC approved SCE GRC project funding +**
SCE's $1.25b smart metering program was approved by CPUC in Sept. 2008

Synchronized Phasor Measurement System

Phasor technology enables real-time system monitoring and reduces the probability of major disturbances

- The growing complexity of interconnected electric grids increases the threat of blackouts and other operational challenges, facilitating the need for a smarter electric grid equipped with wide-area measurement units to monitor large grids
- Phasor measurement units (PMUs) help identify remote system disturbances in advance to prevent wide-scale power outages
- Power System Outlook (PSO) is a real-time tool that enables operators and engineers to quickly and affordably analyze phasor measurement system data



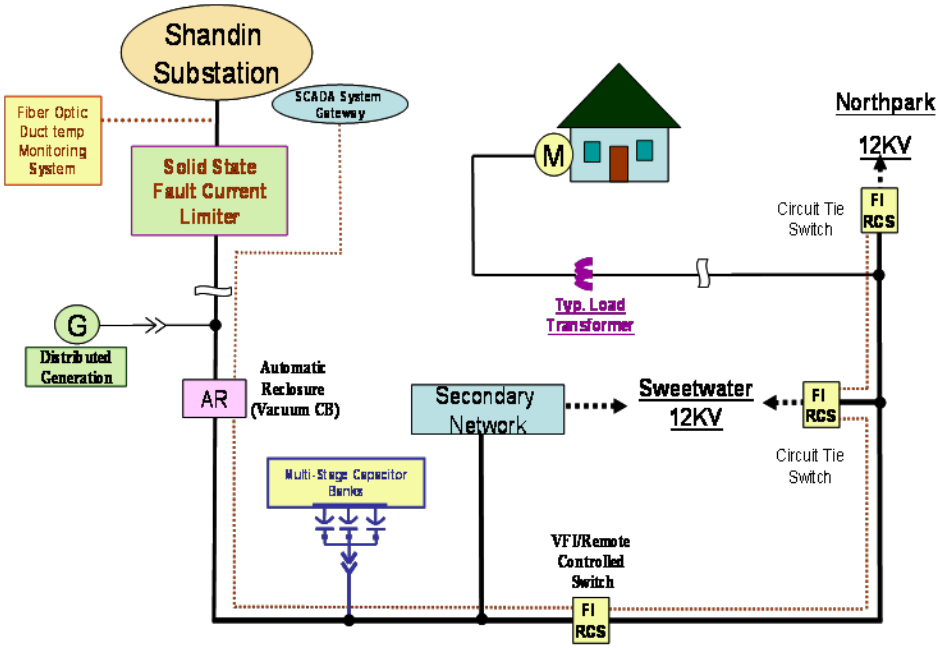
Energy Storage

- Identify storage technologies to enhance integration of wind on the transmission system.
- Evaluate storage solutions that will help us address frequency, voltage and stability problems, as well as path-congestion issues.
- Evaluate distributed storage as a means to improve system effectiveness of premise PV and distribution system performance.
- Bulk-storage technologies being evaluated include pumped storage and compressed air energy storage.
- Distributed storage technologies include flow and auto-derivative battery technologies

Transmission & Distribution Automation

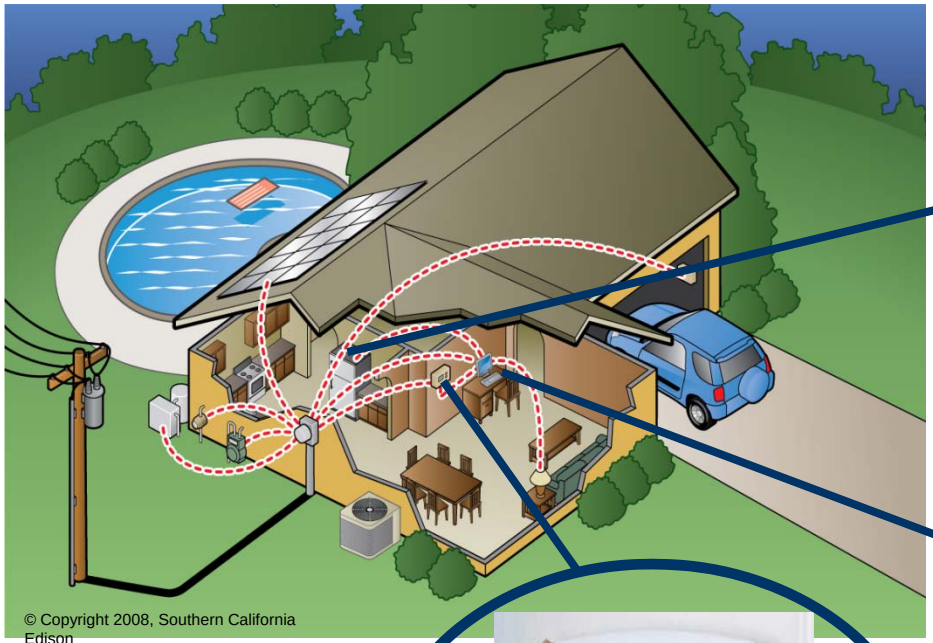
Expand smart technology deployment building on investments over the past decade

- Enable distributed energy resources and storage to support customer choice and improve grid stability
- Prevent catastrophic system failures through innovative real time power system analytics and grid technologies
- Minimize customer power disruptions due to distribution system failures through expansive automation



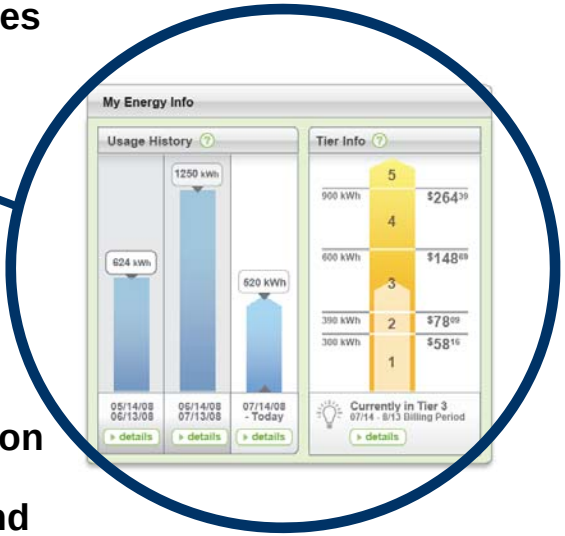
Avanti - Circuit of the Future

Reduce Energy Consumption & Demand



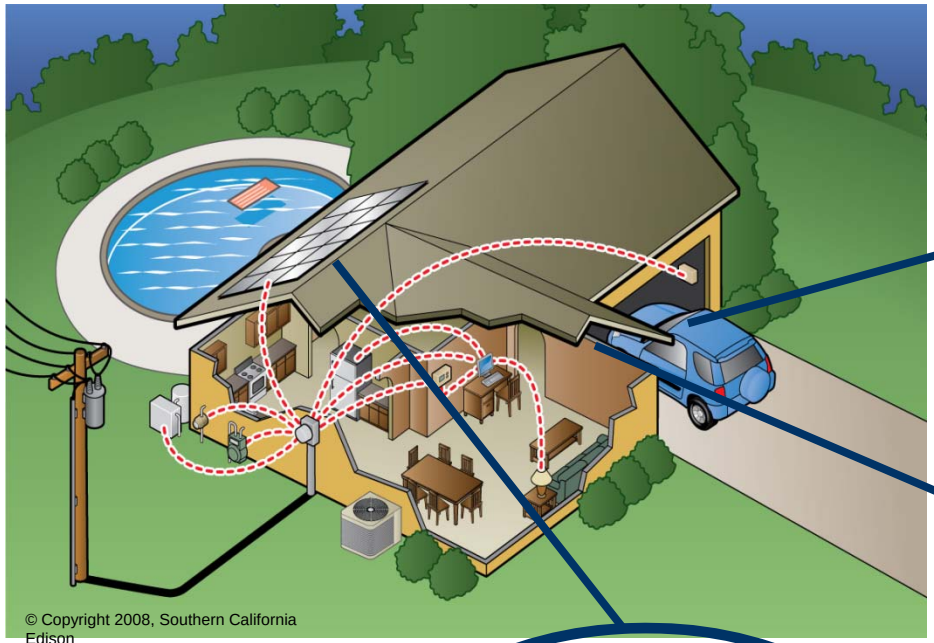
Customer Enabled Automated Response through Energy-Smart Appliances

Improved Load Management through Edison Smart Connect™ Technologies



Energy Information Drives Energy Conservation and GHG Reductions

Distributed Energy Resources



Discrete Metering, Incentive Programs, and Demand Response for PEVs

Enable Net Metering, Discrete metering and Integrated Energy Management w/Solar Panel

Home Energy Storage Creates Opportunities for Increased Renewables

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Smart Grid Communication Networks

- Clearly articulated business uses, value and requirements
- Regional & enterprise telecommunications architectures needed
  - Bridging diverse communication protocols
  - Various network component technology lifecycles
  - Designing networks prior to all uses being known
- Funding, given that benefits often don't acrue to a single party
- Development of a graceful transition plan between "as is" state and "to be" architecture.

Federal, State and Regional Integration

- Coordinated efforts of regulators and lawmakers on smart grid development and implementation
  - CEC, CPUC, California Legislature, U.S. Congress, U.S. Dept. of Energy and the Dept of Commerce (NIST)
  - Crucial that these various efforts proceed on an informed and coordinated basis, to avoid duplicative or contrary standards and policies
- Coordinate jurisdictional intersections in order to implement a comprehensive smart grid across the state and region, which includes municipal electric utilities and non-California WECC utilities
- Support interoperability & cyber security on a system-wide basis from the generator to the customer
  - Support NIST efforts to develop consensus, and make Smart Grid standards recommendations
  - Support national/international open collaborative efforts to encourage industry engagement through a variety of associations, forums, and standards groups