



Electricity's Future

Paul Delaney

ET Summit

San Francisco, CA

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Overview

- **SCE Background**
- **CLTEESP**
- **The Demand Profile**
- **Zero Net Energy**
- **ZNE Examples**



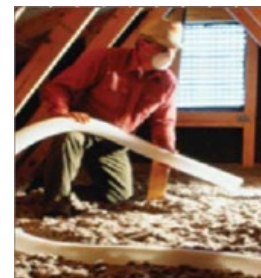
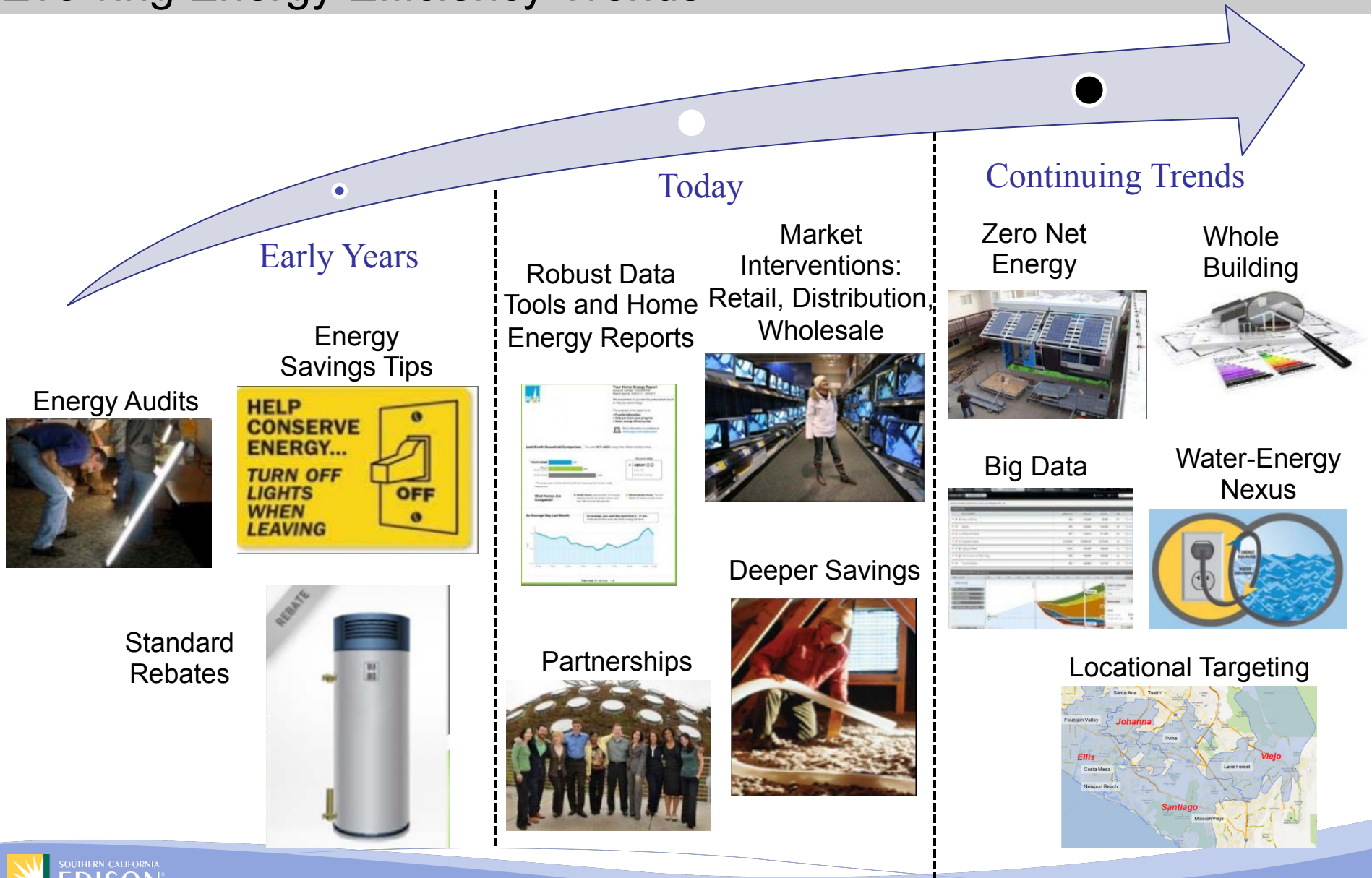
SCE Background



- One of the nation's largest electric utilities
- Nearly 14 million residents in service territory
- Approximately 5 million customer accounts
- 50,000 square-mile service area
- Over 103,000 miles of distribution and transmission lines
- Over 125 years of experience
- Exploring innovative Demand-Side Management offerings to address locational needs

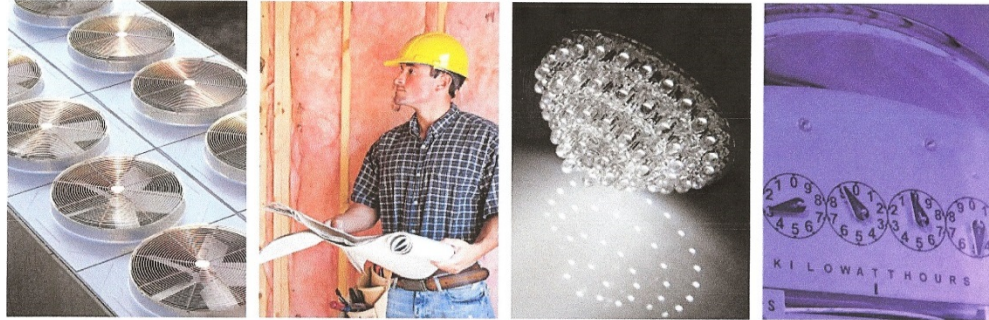


Evolving Energy Efficiency Trends





California Goals



CA | Energy Efficiency
Strategic Plan

January 2011 Update

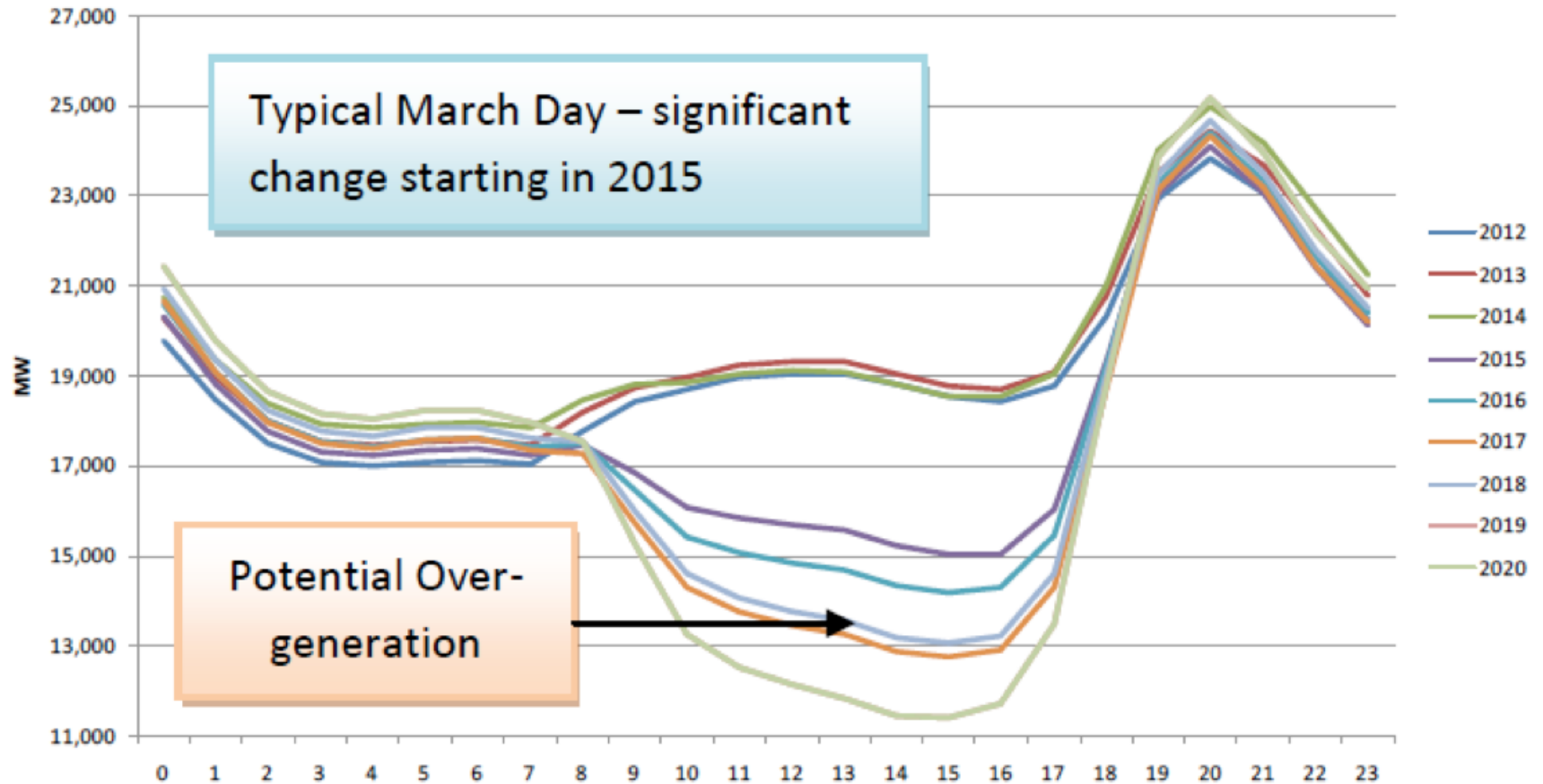
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The Duck Curve

CAISO Net Load --- 2012 through 2020



“Our goal is to foster and enable new technologies to modernize and green the electric grid. The entire ISO is committed to advancing the organization toward a sustainable energy future.”...Steve Berberich, CEO, CAISO



Zero Net Energy...

California Long-Term Energy Efficiency Strategic Plan (CLTEESP)

- *New Residences ZNE by 2020*
- *New Commercial Buildings ZNE by 2030*
- *Heating, Ventilation and Air Conditioning (HVAC) Transformed for Optimal Energy Performance in California's Climate*
- *Universities and Colleges by 2025*



How Do We Get There?

- Energy Efficiency
- Demand Response and permanent load shifting
- Renewable Resources
- Distributed Generation/energy storage



New Single Family Home – Ontario, California

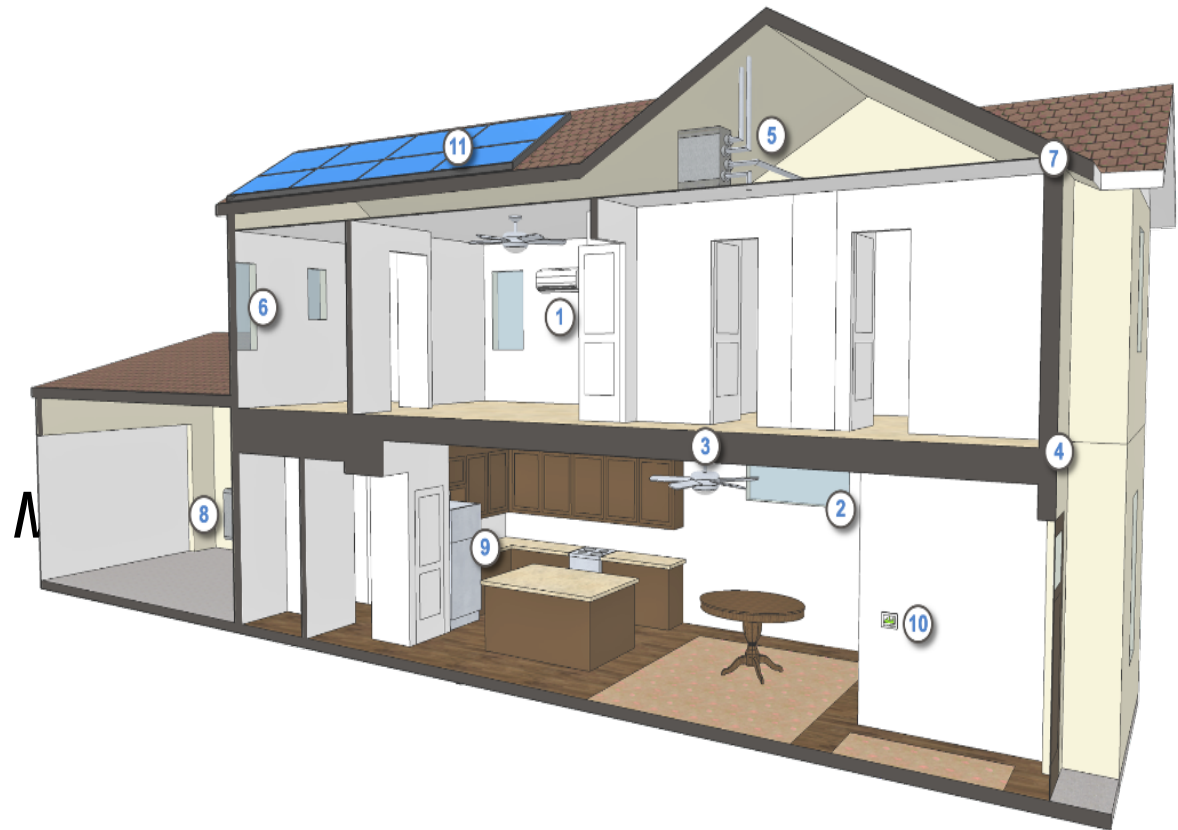
*Adjacent to Identical Houses,
Which Were Built Using Standard Design Practices*





New Single Family Home – Ontario, California

- 1 Mini Split Air-Conditioners
- 2 Abundant Daylighting
- 3 LED Lighting & Ceiling Fans
- 4 Airtight Envelope
- 5 Fresh Air Ventilator
- 6 High Performance Windows
- 7 Foam Insulation
- 8 Tankless Water Heater
- 9 High Efficiency Appliances
- 10 In-Home Energy Display
- 11 Solar Electric System





New Single Family Home – Ontario, California

Questions?

- ZNE Achieved? – *Yes*
- Cutting-Edge Technologies? – *No*
- Cost Premium? - \$30,000 (9%)
- House Sold for \$12,000 Premium
- Cost Premium Would Be Minimal if Construction Techniques Became Standard Practice
- Workforce Education & Training



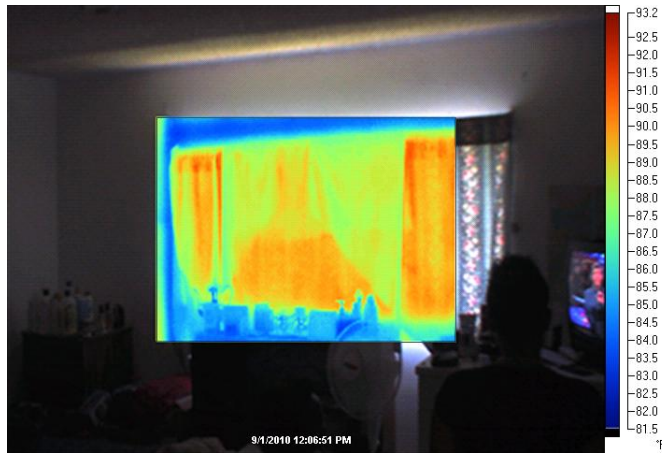
Existing Single Family Home – San Bernardino, California



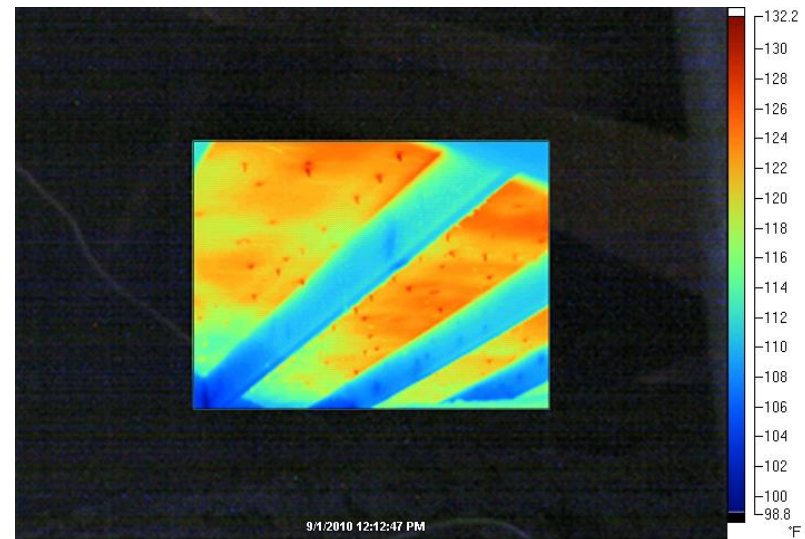


Existing Single Family Home – San Bernardino, California

New Windows



Wall and Roof Insulation





Existing Single Family Home – San Bernardino, California

- Energy-Efficient Heating/Cooling
- Energy-Efficient Lighting
- Appliances





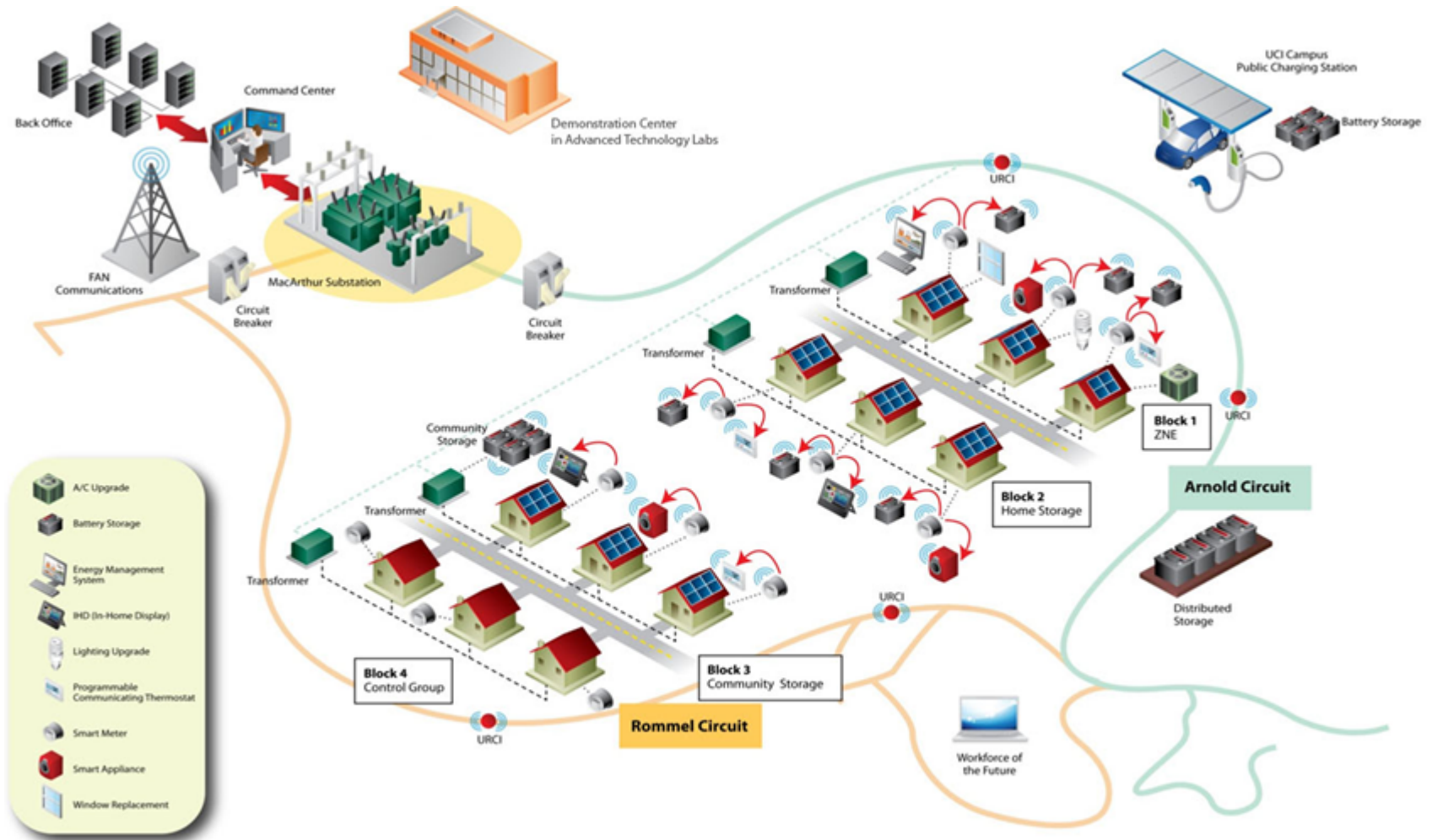
Existing Single Family Home – San Bernardino, California

challenges

- Construction Cost
- Disruption to Home-Owner
- Plug Loads Become Large Proportion of Energy Usage
 - ✓ Televisions, electronics
 - ✓ White goods
 - ✓ Computers, tablets, cell phones

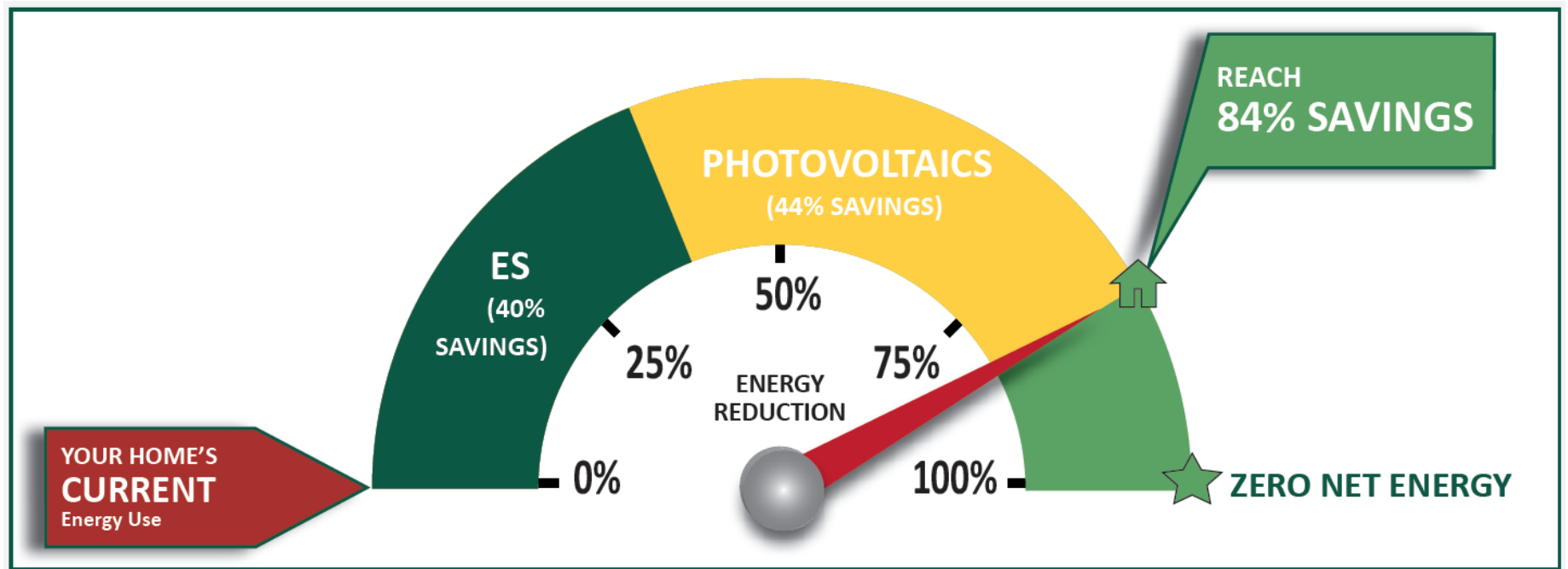


Existing Single Family Neighborhoods – Irvine, California





Existing Single Family Neighborhoods – Irvine, California





Existing Single Family Neighborhoods – Irvine, California



Residential Energy Storage Unit (Battery)



Smart Appliances



Electric Vehicle Charging Station

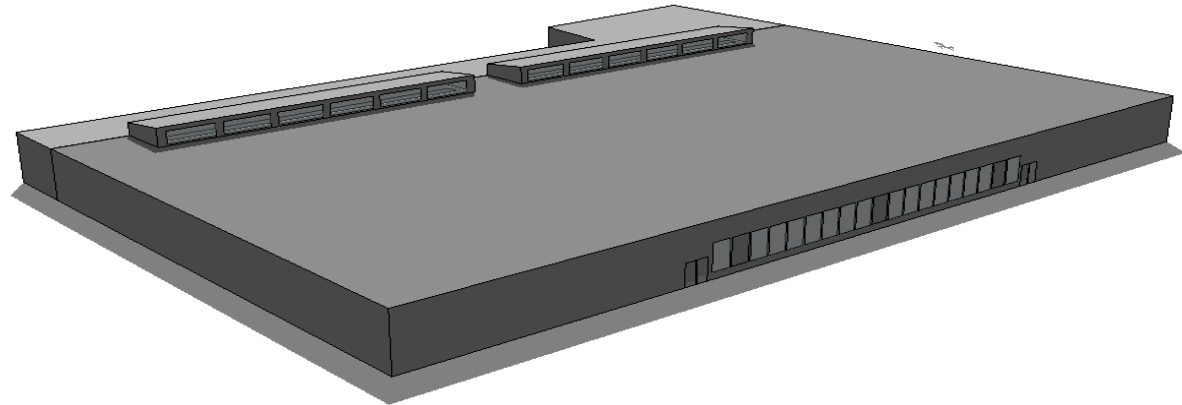


Sustainable Supermarket – Carpinteria, CA

Size: 45,000 SF grocery retail store

Initial sustainability goals:

- Zero-net energy
- Zero-waste
- Lighting efficiency
- Natural ventilation
- Natural refrigerant



Sustainable Supermarket – Carpinteria, CA

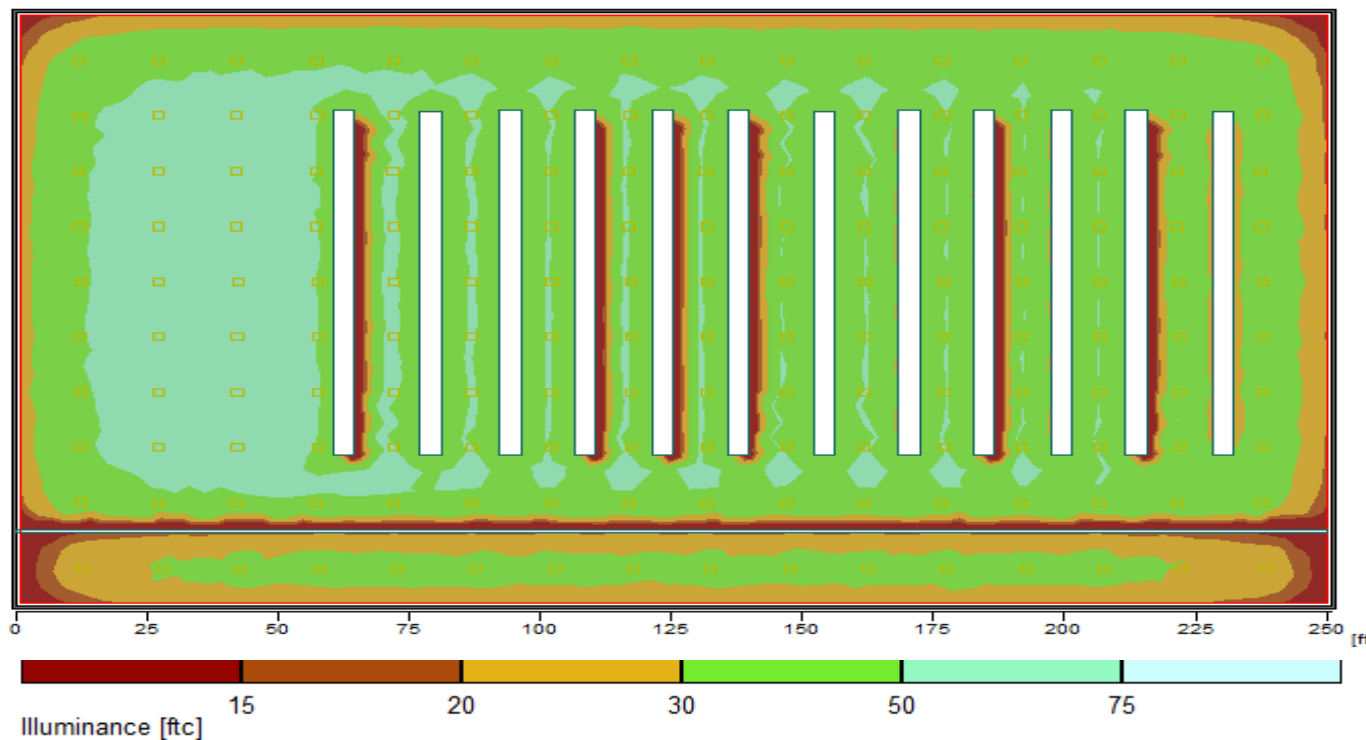
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Lighting Efficiency

– Successes

- 100% LED lighting design
- Daylighting analysis resulted in the inclusion of Solatube fixtures and the reduction in light fixtures





Sustainable Supermarket – Carpinteria, CA

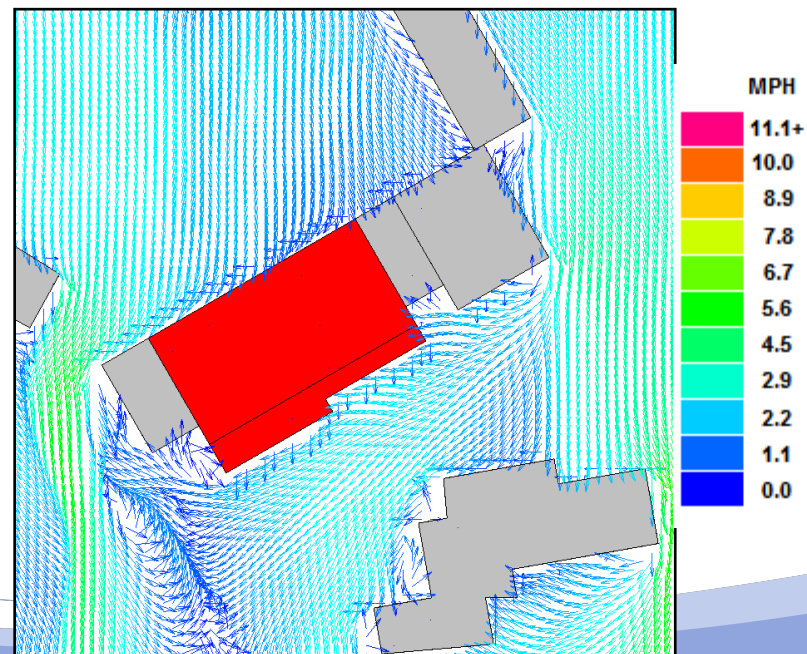
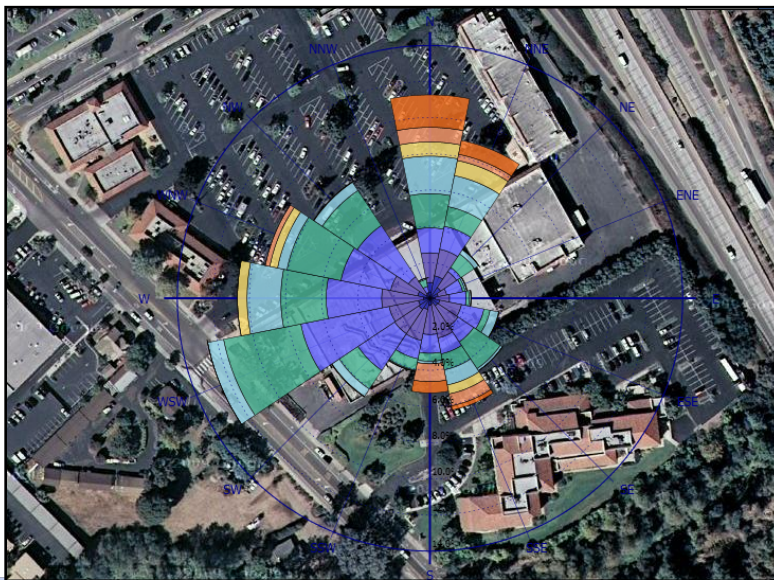
❖ Natural Ventilation

▪ Successes:

- Provided usable detail on air flow and wind conditions
- Presented natural ventilation as a viable option for supermarkets located in temperate zones

▪ Barriers

- Corporate resistance to natural ventilation system





Electrical Training Institute – NZE+ Renovation





ETI Project

EEM TABLE		
Measure #	Measure Description	New Curriculum Opportunity
E-1	Daylighting	Controls, Fixtures, Lamps, DC Integration
E-2	East Wall Performance	Electro-chromic Glass
E-3	Building Entry	Building Integrated PV & Energy Dashboard
E-8	VRF & DOAS HVAC	Equipment Connection
E-9	Comprehensive DC Microgrid	Comprehensive DC Microgrid
E-10	Class & Warehouse Building Roof Insulation	
E-12	High Efficiency Plug Equip	Outlet Controls Retrofit
E-13	Operable Windows	Window Operator Installation
E-14	Warehouse Ventilation & Daylight	
E-15	Lighting Redesign	State of the Art Extensive System Components
E-16	Battery Storage	Battery Storage
OP-1	Increased Range Set points	
OP-2	Day Class Location Tailoring	
C-1	Building Automation	Building Automation Controls
R-1	Fuel Cell	Fuel Cell System
R-2	Microgrid Building Integration	
R-3	Wind Energy	Wind System Installation & Maintenance
R-4	Additional PV / Retrofit	



Cal State Campus

Existing systems

- 4.5 MW of co-generation
- 1.2 MW of Photo Voltaics

SGIP and NPD&L and....

- .5 MW battery storage with software.
- Level 1&2 vehicle charging stations
- +.7 MW battery storage as part of EPIC project...
- Project to evaluate software to manage energy flows.



Real Estate/Technology Demo Project-

- Target Market
 - Commercial real estate
 - Municipalities
 - Public transportation
- Drivers
 - ✓ LCR, local jobs, new market and investment tax credits to fund energy efficiency/storage projects
 - ✓ Real estate technology investment (ROI), vehicle charging, electric transportation
 - ✓ Reduce vehicle miles traveled, remissions reduction, traffic congestion, jobs creation
- Macerich – REIT, BID
- BID – consortia operates parking lots
- City of Santa Monica Traffic Department
 - ✓ 800,000 sq ft retail
 - ✓ 500,000 sq ft office
 - ✓ 400,000 sq ft hotel

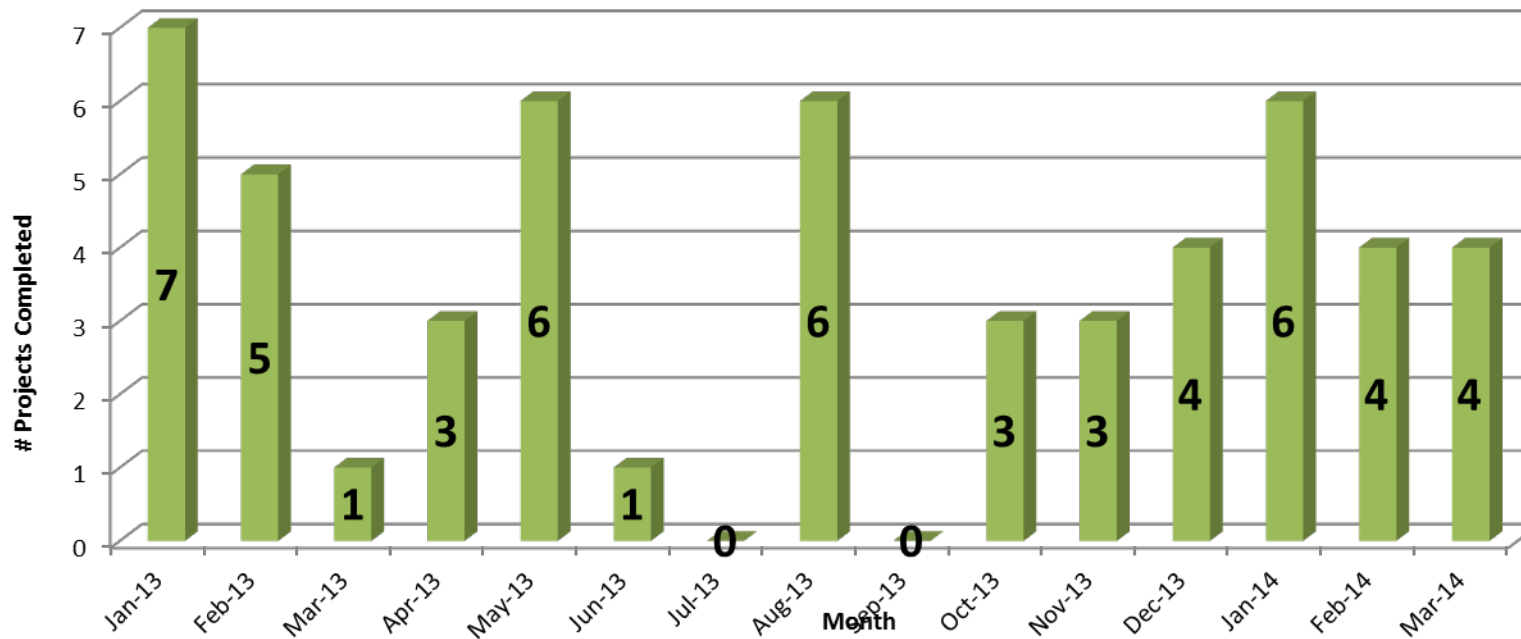


Serial Projects Action Team (SPAT) – Update

Total SPAT Completed	106
Total SPAT completed in 2012	53
Total SPAT completed in 2013 (GOAL = 60)	39
Total SPAT completed in 2014	14
Total SPAT Pending	25

2013 - 2014 SPAT Complete

39 SPAT total Completed in 2013
 14 SPAT total Completed in 2014





Tehachapi Grid Side Storage Project

- Largest in North America
- 604,800 Cells
- 10,800 Modules - 14 series/4 parallel cells per module
- 600 Racks - 18 modules per rack
- One 32 MWh system





This is the end...

Thank you...