Electricity's Future in Southern California

Cal Poly - San Luis Obispo
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Jay Madden and Paul Delaney
New Product Development and Launch
Overview

- SCE Background
- CLTEESP
- The Demand Profile
- Zero Net Energy
- Examples of ZNE
- Questions and hopefully some answers
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

Early Years
- Energy Audits
- Energy Savings Tips
- Standard Rebates

Today
- Robust Data Tools and Home Energy Reports
- Market Interventions: Retail, Distribution, Wholesale
- Deeper Savings
- Partnerships

Continuing Trends
- Zero Net Energy
- Whole Building
- Big Data
- Water-Energy Nexus
- Locational Targeting
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
What is Zero Net Energy (ZNE)?

- Electricity + gas <= generation
- Site Feeds Electricity into the Grid During the Day
- Site Draws Electricity from the Grid During the Night
How Do We Get There?

**Loading Order**

- Energy Efficiency
- Demand Response
- Renewable Resources
- Distributed Generation
How Do We Get There?

• Existing, Cost-Effective Technologies and Construction Techniques
• 2/3 Energy Efficiency Measures, Followed by
• 1/3 Sustainable Power Generation
New Single Family Home – Ontario, California

Adjacent to Identical Houses, Which Were Built Using Standard Design Practices
Measures Built Into House

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
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
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

- Residential Energy Storage Unit (Battery)
- Smart Appliances
- LED Lighting
- 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
• Lighting Efficiency
  – Successes
    • 100% LED lighting design
    • Daylighting analysis resulted in the inclusion of Solatube fixtures and the reduction in light fixtures
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
## EEM TABLE

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<td>R-4</td>
<td>Additional PV / Retrofit</td>
<td>Wind System Installation &amp; Maintenance</td>
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</table>
• Existing systems
  – 4.5 MW of co-generation
  – 1.2 MW of Photo Voltaics
• SGIP and NPD&L and….
  – .5 MW battery storage
  – Level 2 vehicle charging stations
  – +.7 MW battery storage from Tesla with software
  – Project to evaluate software to manage energy flows.
Q&A

Jay Madden
jay.madden@sce.com
(626) 302-0829
Paul Delaney
paul.delaney@sce.com
(626) 827-7059