Accelerating the Advancement & Adoption of ZNE

CEC Webinar: Getting to Zero Net Energy Buildings: Present and Future

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Agenda

What is ZNE
ZNE Drivers in California
Emerging Technologies Coordinating Council (ETCC)
Emerging Technologies Program
Overview of SCE’s involvement with ZNE
Customer Perspectives
Key Takeways
Findings and Challenges
Committed to safely delivering reliable, affordable and clean energy to our customers.

- One of the nation’s largest investor-owned utilities.
- Providing electric service in the region for more than 125 years.
- Serving 15 million residents in a 50,000-square-mile service area.
- >23% Renewable Energy procured in 2014; 37% predicted for 2020.
What is ZNE?

Zero net energy is a general term applied to a building with a net energy consumption of zero over a typical year. To cope with fluctuations in demand, zero energy buildings are typically envisioned as connected to the grid, exporting electricity to the grid when there is a surplus, and drawing electricity when not enough electricity is being produced.

- The amount of energy provided by on-site renewable energy sources is equal to the amount of energy used by the building.
- A ZNE building may also consider embodied energy – the quantity of energy required to manufacture and supply to the point of use, the materials utilized for its building.
Policy Drivers

**Policy/Regulatory**
- CPUC’s California Long Term Energy Efficiency Strategic Plan
  - All new residential construction to ZNE by 2020
  - All new commercial construction to ZNE by 2030
  - 50% of existing commercial buildings to ZNE by 2030
- CEC’s California Energy Code – Building Energy Efficiency Standards
  - ZNE-compliant new residential construction by 2020
  - ZNE-compliant new commercial construction by 2030
- CPUC’s New Residential ZNE Action Plan

**Legislative**
- AB 32/SB 32 – California Global Warming Solutions Act of 2006
- California Clean Energy Jobs Act (Prop 39) – ZNE Schools Pilot
- Energy Efficiency Program for Existing Buildings (AB 758) – ZNE Retrofits
- Governor’s Executive Order B-18-12
  - 50% of new state buildings to ZNE by 2020*
  - All new state buildings to be ZNE by 2025*
  - 50% of existing state buildings to ZNE by 2025
Energy Efficiency Framework

ET and EE programs bridge “The Chasm.”

R&D Programs (CEC EPIC, etc.)

ET Programs (Screening)

EE Programs (Deployment & Dissemination)

C&S Programs (CASE Initiatives)

Codes & Standards (Federal and State)

The stage where this interface occurs will vary.

Energy Efficient Technology R&D Process

New technologies and applications may cycle between Product Engineering and Commercial Introduction several times until the correct mix of features, performance, price, availability, etc. are reached. Degree of failures and risk are high.
ETCC Purpose and Goals

ETCC Purpose

The ETCC supports the advancement of energy efficiency and demand response initiatives through its leadership, impact and influence in the emerging technology domain. It pursues this objective through strategic stakeholder engagement and effective and efficient coordination among ETCC members.

ETCC Goals

The ETCC operates to achieve the following four core goals:

- a. Strategic engagement of stakeholders
- b. Leadership and increased impact and influence
- c. Supporting advancement of energy efficiency and demand response initiatives
- d. Coordination among ETCC members
Emerging Technologies Program (ETP)

Mission
To support increased energy efficiency market demand and technology supply by contributing to development and deployment of new and underutilized energy efficiency (EE) and demand response (DR) measures (that is, technologies, practices, and tools), and by facilitating their adoption as measures supporting California’s aggressive energy and demand savings goals.

What is Emerging Technology?
A market-ready or near market-ready technology that needs validation, technical assistance, and/or increased visibility to succeed in the marketplace. ETs include hardware, software, design tools, strategies, and other services.
Technology Influence and Adoption Life Cycle

- **With ET Intervention**
  - Higher Adoption Rates
  - Time to Market Reduced

- **With Incentive Programs**

- **Business as Usual**

The diagram illustrates the influence curve for technology adoption over time. It shows the impact of external technology (ET) intervention, incentive programs, and business as usual scenarios on the time to market and adoption rates.
Technology Development Support—*Increase energy efficiency technology supply*
- Engage in targeted technology support efforts; increase developer outreach
Technology Assessments—*Increase the number of measures offered by programs*
- Assess energy efficient technologies; support technology transfer
Technology Introduction Support—*“seed” market demand*
- Conduct demonstrations and targeted field placements; help increase market knowledge of new technologies

Together, the three strategies work in concert to help technologies make the leap from idea to adoption. The visual below illustrates the diffusion of innovation—how ETP provides support across the lifecycle of technologies from the Innovators stage to Early Adopters and Early Majority.
SCE’s ZNE Demonstration Projects

There are a wide range of ZNE projects within SCE. These projects are being championed by a number of teams within SCE.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Sector</th>
<th>Vintage</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Low-Income Multifamily, Pomona</td>
<td>Residential</td>
<td>New Construction</td>
<td>Low-Income Community</td>
<td>In Progress</td>
</tr>
<tr>
<td>2 ZNE Schools Pilot (Prop 39)</td>
<td>Commercial</td>
<td>Retrofit</td>
<td>Education</td>
<td>In Progress</td>
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<tr>
<td>3 Low-Income Multifamily (LIMF), Lancaster</td>
<td>Residential</td>
<td>Retrofit</td>
<td>Low-Income Community</td>
<td>In Progress</td>
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<td>4 ZNE Training Facility Retrofit, ETI in Commerce</td>
<td>Commercial</td>
<td>Retrofit</td>
<td>Training Facility</td>
<td>In Progress</td>
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<td>5 Grid Integration of ZNE Communities, Fontana</td>
<td>Residential</td>
<td>New Construction</td>
<td>Production Community</td>
<td>In Progress</td>
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<tr>
<td>6 ZNE Office, South Pasadena</td>
<td>Commercial</td>
<td>New Construction</td>
<td>Office Development</td>
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<tr>
<td>7 ZNE New Home, Ontario</td>
<td>Residential</td>
<td>New Construction</td>
<td>Production Home</td>
<td>Complete</td>
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<tr>
<td>8 ZNE Recreation Facility Retrofit, UCSB</td>
<td>Commercial</td>
<td>Retrofit</td>
<td>College Recreation</td>
<td>Complete</td>
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<tr>
<td>9 Solar Decathlon Student Mentorship</td>
<td>Residential</td>
<td>New Construction</td>
<td>Residential Education</td>
<td>Complete</td>
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<tr>
<td>10 ABC Green Home 1.0, 2.0, 3.0</td>
<td>Residential</td>
<td>New Construction</td>
<td>Custom Homes</td>
<td>In Progress</td>
</tr>
<tr>
<td>11 Irvine Smart Grid Demonstration (ISGD)</td>
<td>Residential</td>
<td>Retrofit</td>
<td>Community</td>
<td>Complete</td>
</tr>
<tr>
<td>12 Low-Income Residential Retrofit, San Bernardino</td>
<td>Residential</td>
<td>Retrofit</td>
<td>Low-Income Home</td>
<td>Complete</td>
</tr>
</tbody>
</table>

*listing of relevant projects – not comprehensive
Customer Perspectives – MF Residents
LINC Low-income, near-ZNE housing retrofit research project in Lancaster

- For customers living in ultra-efficient or near zero homes, easy to use technologies and lower energy bills were cited as the greatest benefits

- Lower energy costs have a significant impact on low income customers, energy bills are the largest portion of their overall expenses

- Access to new, energy efficient technologies, can make it easier to save energy and encourages additional energy conservation and savings goals

- Set it and forget it, learning technology, mobile capabilities
Key Takeaways – ZNE Retrofit
LINC Low-income, near-ZNE housing retrofit research project in Lancaster

Key Takeaways

• Workforce skilled to install ZNE measures.

• Qualified construction management for cost-effective execution

• Understand hidden factors that could impact cost – hazardous materials

• Quantify non energy benefits - For example IAQ improvements lead to tenant satisfaction.

• Educate tenants on use/operation/benefits of efficient technologies

• Educate and train maintenance staff
SCE’s Initial Findings and Potential Challenges

Findings, opportunities and challenges may change as more ZNE projects are completed, and data is analyzed.

Initial Findings
• The number of ZNE builders/projects are increasing
• Skilled and Trained workforce required to install ZNE measures
• Prominent ZNE technologies include LED lighting, electric heat pumps for cooling, space and water heating applications, PV, foam insulation, controls
• Tenants value and adopt energy efficiency technologies
• Scalable and Replicable Retrofit Packages

Potential Challenges
• ZNE does not mean zero bills
• Understanding impacts (asset/liability) to the electrical grid
• Finance industry plays a key role in ZNE – comps do not exist for appraisers
• Energy simulation tools
• Standardized Permitting process for DERs
• Regulatory alignment between ZNE definition and ZNE implementation
Thank you!