Scalable, Replicable and Possible?!
Retrofitting a school to ZNE with the Prop. 39 ZNE Pilot Program

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Proposition 39 Program Overview

Goals
- Leverage Prop 39 funds
- Retrofit ‘existing’ buildings in public schools & community colleges
- Establish “proof of concept” of feasibility across California
- Document findings & best practices
- Future program development

Values
- Socialize awareness to stakeholders
- Design Assistance
- Training & Education
- Promotion of on-going maintenance
What do they gain?

- Potential for EUI of 16-22 kBtu/sqft/year + renewable energy on-site generation
- Project currently has Prop. 39 funding or other Non-Prop 39 funds
- Savings-to-investment ratio
- ZNE viability
- Cost effectiveness
- Meet schedule
- Must meet pilot’s schedule and participate in Pre/Post evaluation, measurement & verification

Five school district projects were evaluated under the following criteria:

The report card

Project impact and project diversity were also considered in the evaluation
Garden Grove Unified School District

Project team

Santiago High Science Building

Ralston Intermediate MPR & Kitchen
The ideal candidate: round peg, round hole

<table>
<thead>
<tr>
<th>Culture of frugality</th>
<th>Leveraging Prop. 39 funds</th>
<th>Installing HVAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No/low-cost solutions</td>
<td>+ Modernization Bond funds and CREBs for PV Solar</td>
<td>Only 15% of campuses had HVAC</td>
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<tr>
<td>Modernization plan 2010-20122</td>
<td>Generate positive savings-to-investment ratios</td>
<td>Need solutions to reduce district’s anticipated energy costs</td>
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</table>
• Retrofit of an 8,096 square feet, science classroom
• Install low cost, replicable and scalable systems & measures for the school district

Reducing the existing energy footprint

<table>
<thead>
<tr>
<th>Measure</th>
<th>EUI (kBtu/ft²/yr)</th>
</tr>
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<tbody>
<tr>
<td>Roof Insulation</td>
<td>34</td>
</tr>
<tr>
<td>High Performance Windows</td>
<td>33</td>
</tr>
<tr>
<td>LED Lighting</td>
<td>30</td>
</tr>
<tr>
<td>Occupancy Sensors</td>
<td>28</td>
</tr>
<tr>
<td>Solatubes &amp; Daylighting</td>
<td>27</td>
</tr>
<tr>
<td>Gamification</td>
<td>26</td>
</tr>
<tr>
<td>Setback Temperature Optimization</td>
<td>25</td>
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</tbody>
</table>
**Offsetting with solar**

**ZNE Source instead of ZNE TDV definition:**

*A building that produces as much energy as it consumes over the course of a year, when accounted for at the energy generation source*

![Bar graph showing energy consumption in different categories.]

**Occupant engagement**

- Students becoming the ZNE champions in classrooms
- Education on building and measure control to promote energy savings
Challenges so far

- Federal Tax Policy
- CREBs
- PV Cost Effectiveness

Closing thoughts

Case studies provide invaluable examples of real time challenges for ZNE projects. There is not a one program fits all approach for ZNE.

For public buildings that leverage diverse funding sources that are limited, the cost of ZNE is a barrier.

Focus on project wins and achievements beyond standard: “small wins”