A Zero Net Ready Living Lab

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Martin Howell, Associate Principal | Energy, CEM, LEED AP, ARUP
Yash Patel, Sustainability & Energy Manager, SBCCD
Retrofitting the Building for Zero Net Energy
Zero Net Energy Approach
Zero Net Energy Approach

![Bar chart showing energy use for Existing Energy, Existing Source Energy, Proposed Source Energy, and On Site Renewable Energy (Source). The chart indicates a reduction in energy use with the inclusion of EEMs. The chart also distinguishes between electricity and natural gas with distinct colors.]
Zero Net Energy Approach
Installed Energy Conservation Measures

Additional Measures: Shut-off controls on HVAC, Boardroom LED retrofit, HVAC VVT to VAV in District Office.

<table>
<thead>
<tr>
<th>ECMs Proposed</th>
<th>ECMs Installed</th>
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</thead>
<tbody>
<tr>
<td>New HVAC controls</td>
<td>Customized Algorithm</td>
</tr>
<tr>
<td>New RTUs – District Office</td>
<td>Ultra-efficiency</td>
</tr>
<tr>
<td>Evaporative condenser add-on</td>
<td>Unique application for SBCCD</td>
</tr>
<tr>
<td>New RTUs – Training Center</td>
<td>Three new AC units with VAV</td>
</tr>
<tr>
<td>Convert units to VAV - District Office</td>
<td>Added VAV boxes and also converted VVT boxes to VAV boxes</td>
</tr>
<tr>
<td>New gas water heater</td>
<td>High-efficiency condensing tankless</td>
</tr>
<tr>
<td>Plug load management</td>
<td>Controllers on vending machines</td>
</tr>
<tr>
<td>LED lighting conversion</td>
<td>Retrofit kits (custom) with wireless controls</td>
</tr>
<tr>
<td>Automated shading</td>
<td>With additional thermal shading and controls</td>
</tr>
<tr>
<td>Light pipes</td>
<td>17 Solatubes with motorized dampers and controls</td>
</tr>
</tbody>
</table>
Approach to ZNE District | Energy Analytics Dashboard

Yash Patel
Sustainability & Energy Manager, CEM
San Bernardino CCD
Steps to Achieve ZNE

Step 1: Maximize Energy Efficiency
Step 2: Identify Future Needs for Electrification and EV Charging
Step 3: Renewable Energy Feasibility Analysis
Step 4: Roadmap for ZNE Implementation Plan
Step 5: Steps Towards ZNC District
Energy Dashboard

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Sustainability Planning and Implementation

Martin Howell
Associate Principal | Energy, CEM, LEED AP
ARUP
SBCCD Sustainability Plan 2021 (Draft)

Carbon Mitigation
- Achieve carbon neutrality for scope 1 and 2 emissions by 2050. Manage scope 3 emissions through the implementation of a Sustainability Task Force

Energy
- Continue to expand existing building efficiency efforts
- Maximize the amount of on-site renewable energy generation
- Move towards an all-electric approach for new construction and major renovations
- Conduct a zero-net-energy (ZNE) campus feasibility study and implement initiatives to move towards a ZNE district, starting with Valley College
- Consider establishing a Community Resilience Hub on each campus
- Collaborate with local utilities and other organizations to maximize cost-effectiveness of energy initiatives

Water
- Improve indoor water efficiency for existing buildings and new construction
- Utilize native and adaptive vegetation to minimize irrigation water use
- Expand the use of alternative water supplies to reduce potable water use
- Reduce potable water use by 20% by 2025, and 25% by 2030

Transportation
- Establish a transportation demand management plan to encourage alternative modes of transport and reduce single-occupancy vehicles (SOVs) demand
- All new purchases of fleet vehicles shall be zero emissions by 2025, to achieve a full conversion of the fleet by 2040
- Install electric vehicle (EV) charging infrastructure to promote the use of EVs within the local community

Materials
- Reduce waste going to landfill by 25% compared to current levels by 2025, and 50% by 2030
- Increase procurement of sustainable products and services by 20% compared to current levels by 2025, and 25% by 2030, on a cost basis

Curriculum
- Enhance curricular educational opportunities for sustainability
- Establish both campuses as a living laboratory by using sustainability initiatives as an opportunity for hands-on learning

Ongoing Engagement & Transparency
- Track and report ongoing sustainability performance against goals every five years starting in 2025
- For all new construction and major renovations over 30k sqft, achieve CALGreen Tier 1 and LEED Gold at a minimum, and CALGreen Tier 2 and LEED Platinum where possible
Quality Process

• Districtwide Owners Project Requirements
  • Stakeholder engagement
  • Updated per building

• High performance building
  • Basic + enhanced
  • Envelope commissioning
  • Measurement & verification

• COVID-19 design review
  • ASHRAE / REHVA / WHO guidelines
  • Air changes
  • OSA
  • Filtration
Higher Education Energy Efficiency Partnership
Partnerships

HMC Architects

SCE: SBD + ET

SBCCD

Arup Commissioning
Higher Education Energy Efficiency Partnerships

These collaborative partnerships are designed to:

- Identify **energy saving** opportunities
- Provide **funding and support** for energy efficient projects
- Provide a **framework** to implement a comprehensive sustainability policy

Partnerships include:

- All four investor owned utilities (IOUs): PG&E, SCE, SDG&E, SCG
- California Community Colleges (CCC)
- California State University (CSU)
- University of California (UC)
Summary

• Higher Education Energy Efficiency Partnerships are here to help you fund your projects
• Most campuses are already taking advantage of the program, but the Partnerships are always ready to do more!
• For more information, contact your Energy Manager, Facilities Manager, IOU Representative
High Performance Building Design Defined

Eera Babtiwale
Associate Principal | VP of Sustainability
HMC Architects

Simon Solis
Architect, LEED® AP
HMC Architects
Overview

1. High Performance Defined
   - SBCCD Net Zero Pilot Program and Sustainability Program
   - SBVC TEC Project Goals
   - Commissioning

2. Partnerships
   - SBCCD
   - SCE
     - Savings By Design
     - Emerging Tech
     - Self Generation
   - Commissioning

3. Design Process
   - Net Zero Ready
   - Evidence Based Design
   - Living Lab
   - Commissioning
High Performance Design Defined
Design Process
Sustainability Analysis & Design Features

LEGEND

01 Thermal Chimney
02 Tubular Skylights
03 Light Wall
04 PV Canopy
05 PV Deck
06 PV ReadyRoof
07 Sun Shade Devices
08 Light Monitor
09 Phase Change Material
10 High Velocity Low Speed Fans
11 Condensate Recovery & Water Storage
12 Modular Wetlands
Whole Building Baseline

$1,377,984
COST FOR SELECTED OPTIONS
120 kBtu/ft²/yr
EUI