

C.A.S.H. 30TH ANNUAL CONFERENCE ON SCHOOL FACILITIES

30 YEARS OF SCHOOL FACILITIES LEADERSHIP ADVOCACY ♦ EDUCATION ♦ COLLABORATION

Thursday, February 26, 2009
9:00 a.m. - 10:00 a.m.
Sacramento Convention Center
Room 306

Workshop # 7

Grid Neutral: Electrical Independence for California Schools and Community Colleges

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GRID NEUTRAL

C.A.S.H. ANNUAL CONFERENCE, FEBRUARY 2009

Grid Neutral

Electrical Independence for Schools and Community Colleges

Coalition for Adequate School Housing
February 2009

Presenters



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Rob Cook
Executive Director, Office of Public School Construction

Moderator: Theresa Townsend, AIA, LEED AP
Senior Architect, Division of the State Architect



Grid Neutral Basics



Defining Grid Neutral



- A site that provides at least as much electricity as it consumes in a year.
- Different than “zero net energy,” which deals with both electricity and fossil fuels.



Why Go Grid Neutral?



- **Policy Objectives**
 - Greenhouse Gas Emissions
 - Renewable Energy
- **Manage Utility Costs**
 - Budgetary
 - Predictability
- **Cost Effective**
 - Alternative Financing Options
 - Can drive electricity costs to near zero
- **Future Regulations, Statutory Requirements, and Opportunities**
- **Educational Opportunities**



Key Steps to Achievement



Step 1:

New School: Set Energy Performance Goals

Existing: Measure Current Electricity Use, Set Performance Goals

Step 2:

Implement & Maintain Appropriate Energy Efficiency & Conservation Measures to Lower Electricity use

Step 3:

Install Solar or Wind Systems to Create Electricity to Meet Remaining Needs

Step 4:

Maintain Energy Systems

Monitor Electricity Consumption & Production



Grid Neutral Guidebook



- Guidebook available on DSA website:
www.dsa.dgs.ca.gov/OtherProg/gridneutral.htm
- Topics:
 - Comprehensive Planning
 - Energy-Efficient Design
 - Energy-Generating Technologies
 - Energy Measurement
 - Maintenance & Operations
 - Innovative Funding



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DAVID THORMAN
DIVISION OF THE STATE ARCHITECT

Comprehensive Planning



Assembling the Team



- **Sponsors:**
 - School board members
 - Utility companies
 - Community stakeholders & media
 - Federal, State, and Local Government Agencies
- **Beneficiaries:**
 - Students
 - Teachers
 - Administrators
 - Curriculum planners
 - General public (who might also use facilities)



Assembling the Team



- **Implementers**
 - School facility planners
 - Consultants and specialists
 - Maintenance and operations
 - Architectural and engineering team
 - Builder, construction team, and major subcontractors
- **Others to include:**
 - Custodians
 - School site staff
 - Local Fire Marshal
 - Waste management/recycling experts
 - Joint use partner
 - DSA-certified inspector



Project Delivery Methods



- Integrated Project Delivery (IPD) is based on collaboration and allows for input during the design phase.



- Building Information Modeling (BIM) supports IPD through collaboration by combining design, fabrication information, erection instructions, and project management logistics.



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ROY McBRAYER
GREEN ACTION TEAM

Energy Measurement



Measuring/Controlling Energy Use



- Benchmarking
 - Monthly usage
 - Peak demand
 - Load isolation and profiles
- Utility bill analysis
 - Utility for training programs
- Problem identification & correction
- Conservation program persistence



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Energy Efficient Design



Best Practices



- The Collaborative for High Performance Schools (CHPS)
- Leadership in Energy and Environmental Design (LEED)



Top 5 Efficiency Measures



- **Program & Planning**
 - Integrated Design
- **Site**
 - Building Orientation & Density
 - Passive Solar Design and Georexchange
- **Building**
 - Building Envelop, Day-Lighting, Cool Roofs
- **Furnishings, Fixtures, and Equipment**
 - Electrical & Plug Loads, Lighting Retrofits
 - Transformers
- **Systems**
 - Automatic Controls, Control System & Sequence Optimization
 - High Efficiency HVAC and A/C Duct Sealing
 - Boilers
 - Commissioning New and Recommissioning Existing Buildings





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Energy Generating Technology



Photovoltaic (PV) Systems



- Ground-Mounted
- Roof-Mounted
- Shade Structures
- Building-Integrated Photovoltaic (BIPV)
- Stand-Alone PV Structures



Butte College Program



- Goal: Grid Neutral by 2015.
- Phase 1: one-megawatt field that generates **1.6 million** kilowatt hours annually.
 - That is 25% of the college's total energy!
- The program implements specific criteria for each project.
 - Sets fixed annual payments for a defined payment period.
 - Must include a viable financial partner & contractual methodology.



Solar, Geothermal, Wind



- Solar thermal – domestic hot water, space heating, pool heating
 - Potential to meet 50-75% of water heating needs
- Geothermal heat pumps
 - Can reduce energy costs by 20 to 60%.
 - Can reduce maintenance costs by 20 to 50%.
 - Low life cycle costs.
- Wind



Maintenance & Operations



M&O Staff are Critical



- Involve maintenance & operations from the start
 - Pre-Construction
 - Planning
 - Project Design
 - Construction
 - Project Acceptance
 - Post Construction: Ongoing Operations



M&O Evaluations



- Facility Evaluation
 - Site
 - Building Use
 - Major Energy-Using Equipment
- Energy Evaluation
 - How much and where is energy being used?
 - Retrofitting Opportunities
 - Commissioning and Recommissioning
 - Evaluation Energy Management System
- Investment Grade Energy Audits



M&O: Training & Education



- Education (the “Why”)
 - Create Awareness
 - Foster Agents for Change
 - Emphasize Energy Conservation
 - Measure and Monitor Renewables
 - Develop Campus Guidebook
- Training (the “How”)
 - Operation of Controls, Energy Management System
 - Training Includes Teachers, Students, and Administrators
 - Energy Conservation Signs
 - Signs on How to Operate Controls in Classroom



Innovative Funding



Funding Options



- The use of energy generating technology raises an important question: “who will own the renewable energy system?”
 - The district?
 - Third party?
- There are several funding opportunities for energy efficiency projects.

“Free-Money” Programs



- OPSC and the State Allocation Board
- California Energy Commission Bright Schools Program & Emerging Renewable Program
- Utility Rebates & Incentives
- Savings-by-Design
- Mello-Roos
- California Solar Initiative
- Energy Efficiency Rebates
- Flex Your Power
- Individual Grants and Donations



Borrow-to-Buy Programs



- Tax-Exempt Financing
- California Energy Commission’s Energy Efficiency Financing Program
- Qualified Zone Academy Bonds (QZAB)
- Federal Clean Renewable Energy Bonds (CREB)



Self-Funding Options



- District General Fund
- Third-Party Power Purchase Agreement (PPA)
- Third-Party Financing (Energy Service Company)



Case Study: Elk Grove USD



- In 2006, \$6.2 **MILLION** was spent on electricity.
- Retrofits to lighting and heating/air conditioning systems could cut costs by **30%**.
- Entering a PPA to buy solar panels could lower costs by an additional **10%** in the FIRST YEAR!.
- Depending on the buyout agreement, in 15-20 years EGUSD could eliminate their entire electricity bill.
 - After paying base utility charges, **\$6 MILLION** could then be put to other use!





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QUESTIONS?



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THANK YOU!

*Images provided by:
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