

# GRID NEUTRAL CALIFORNIA SCHOOLS

We are committed to achieving “grid neutrality” (i.e. zero net energy) in all new schools in California, a concept that means schools will not only self-generate all the energy they need, but will also put excess energy back into the grid. We are working closely with the State’s Green Action Team and the Office of Public School Construction to find ways to make this a reality.

The State of California is now clearly conscious of the need to conserve energy. While various efforts are currently under way to address California’s energy consumption at every level, we can both satisfy our need for more and improved teaching space, and have a significant impact on California’s energy efficiency.

The State has more than 1,000 school districts educating more than six million students. The energy purchased to operate these schools cost California school districts over \$1 billion per year and generates more than two million tons of CO<sup>2</sup> emissions each year.<sup>1</sup>

We are currently spending \$5 billion annually building and renovating approximately 15 million square feet of K-12 schools per year. With average energy costs running \$1.43 per square foot per year, a grid neutral environment using clean locally generated energy could save \$21.5 million per year and as much as 30 thousand tons of CO<sup>2</sup> emissions each year. The savings are calculated to reflect an estimated ten year payback for the initial investment in a solar generation system.

The impact over the next 10 or 20 years could be tremendous as we upgrade and eventually replace our older inefficient schools.

## **Legislative and Administrative Policy**

Energy conservation has for years been a noble cause. However, interest from both the Executive and Legislative branches of California’s government has significantly increased. Green efforts are more visible and more important to Californians than ever.

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<sup>1</sup> Based on information from a study completed in September 2004 for the California Green Building Action Plan

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In numerous speeches, Governor Schwarzenegger has reinforced California's commitment to the environment. To quote the Governor, "The environmental movement is about to get to the tipping point. And, the tipping point will be occurring when the environmental movement is no longer seen as a nag or as a scold, but as a positive force in people's lives. In California, we are doing everything that we can to tip the balance on the environment."

Under the Governor's leadership, the State is undertaking numerous efforts to promote and encourage environmentally friendly choices in every aspect of our lives. Evolving into a green California has become much more than recycling plastic, paper, glass and aluminum products. This past legislative session, there were more than 80 bills considered relating to energy conservation and sustainability. While recycling waste and using environmentally preferred products are important, the future will include paperless business operations, energy efficient appliances and machinery, onsite power generation and energy efficient buildings.

Demonstrating California's commitment to efficiency and sustainability, both the Governor and the Legislature have set timelines for California to reduce its energy consumption.

### Executive Order S-20-04

The State's current green efforts were ignited by California's Green Building Initiative, issued by Governor Schwarzenegger as Executive Order S-20-04. The Order, issued shortly after Governor Schwarzenegger was first elected, commits the State of California to reduce energy use in State-owned facilities by 20% by the year 2015. This order also encourages schools, cities, counties and commercial building owners to do the same. Among the several provisions of the Order, the Division of the State Architect is required to adopt guidelines to enable and encourage schools to be resource and energy efficient.

### AB 32

The California Global Warming Solutions Act (AB 32) was added to the California Health and Safety Code in 2006. Among its provisions, the California Air Resources

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Board (ARB) is required to set a limit for greenhouse gas emissions equivalent to 1990 levels that must be achieved by 2020. The ARB must also adopt regulations that require the reporting of greenhouse gas emissions and enforce compliance with the limit. This law also specifically requires the accounting for all emissions from electricity consumed in the State.

### **The Green Building Initiative**

Executive Order S-20-04 includes provisions geared toward several specific State agencies, charging each with particular tasks to accomplish the statewide goal of reducing energy consumption 20% by 2015. Acknowledging that high-performance schools reduce energy and resource consumption, and create safer and healthier learning environments, the Executive Order charged the Division of the State Architect with the responsibility of adopting guidelines that encourage school districts to build resource and energy efficient facilities. Fulfilling the requirement of the Executive Order, the Division of the State Architect adopted a standard modeled after the Collaborative for High Performance Schools (CHPS).

### **Sustainable and Energy Neutral Schools**

We have been making great strides designing and building schools to higher sustainability standards. More than twenty of our school districts have adopted CHPS as their standard (including the Los Angeles Unified School District), to improve the sustainable environment for our students and improving energy efficiency. This is a step in the right direction, but more is needed. Grid neutrality in schools is needed.

There are four key steps needed to achieve grid neutrality: a comprehensive design team, the most energy efficient designs, greater advances in energy generating technology and innovative financing methods.

### ***Comprehensive Planning***

The teams of planners, architects, engineers, construction managers, and school officials must include the utilities, energy specialists, financial specialists, maintenance managers and State agency representatives to be able to plan their facilities for the

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ultimate energy efficiency.

When we program a school or a renovation, we need to consider space requirements, budget, scheduling, funding sources, sustainability objectives and additional planning elements. We must also know the building's energy use profile, aim to implement all cost effective energy efficient measures, establish a zero net energy goal and implement a long term energy management program that includes the use of energy management systems.

New processes such as Building Information Modeling (BIM) and Integrated Project Delivery (IPD) are being developed and put in place to give these teams better resources to accomplish this greater goal.

## ***Energy Efficient Designs***

As the team designs the building they need to consider all of the building's energy users including lighting sources, heating and air conditioning systems and computers. The team must also consider all of the energy reducers, which include natural lighting sources, motion sensor controls, task lighting, straw bale insulation, under floor air distribution and controlled outside air systems. Brought together, these considerations should result in the *most energy efficient building possible*.

## ***Energy Generating Technology***

As part of their design, the team must identify technically feasible and cost effective clean and renewable onsite energy generation systems and consider both initial and operations/maintenance costs which include solar panels, photovoltaics, geothermal, wind, water, fuel cells, energy storage and other energy producers.

## ***Innovative Financing***

Integrating grid neutral design into the construction of new school facilities and the modification of existing school facilities is critical. How do we motivate school districts to incorporate energy efficiency goals into their facility designs? In addition to the \$100 million in matching funds available through Proposition 1D that encourages energy efficiency in our schools, additional alternatives under consideration include:

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- Encourage the establishment of utility tariffs that are more “friendly” to customer owned renewable power generation.
- Allow utilities to purchase Renewable Energy Credits from customer owned renewable generation and count them against their Renewable Portfolio Standard requirement.
- Support the continuation of utility incentive programs for energy efficiency and renewable power generation projects and technologies.
- Support bond programs that provide matching funds for life cycle cost effective energy efficiency and renewable energy generation projects.
- Promote the development of third party financing for life cycle cost effective energy efficiency and renewable generation projects.
- Advocate for the establishment of State tax incentives for energy efficiency and renewable energy projects. Support the extension of existing Federal tax credits.
- Encourage the utilization of the California Energy Commission (CEC) financing programs for life cycle cost effective energy projects.
- Allow customer generators of renewable power to sell energy back to the grid at the same tariff price that they purchase energy from the utility.

### **The Green Building Code**

Currently, the most effective way of moving schools districts toward green building design has been through incentives. However, California cannot rely on incentive programs forever; eventually new building standards must be adopted that require energy conscious design and construction of school facilities. While strict requirements for green building may not be in the immediate future, it is clear that green standards are under consideration. Recently, Governor Schwarzenegger vetoed AB 35, AB 888 and AB 1035, because the California Building Standards Commission is currently working on developing similar regulations.

### **Conclusion**

In order for the State to achieve grid neutrality in our schools, four elements must come

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together:

1. Comprehensive planning teams
2. The most energy efficient designs
3. Continued advances in energy generating technology
4. Innovative financing methods

We are planning a workshop this spring on grid neutrality for our schools where we will bring together educators, planners, architects, engineers, contractors, construction managers, energy specialists, utility representatives, building operators, financial specialists and State agency representatives to address these elements and better define the pathway to grid neutrality for California schools.

We truly believe we are in the midst of a revolution of significant change in how we live and how we treat our environment, and each of us needs to do our part in seeing that these changes happen. Grid neutrality can and will be a reality for California schools.

David F. Thorman, AIA, *California State Architect*