Renewable Energy: Clean, Secure, Reliable

Using Schools as Community Emergency Centers

"Under an extreme national disaster scenario, schools could provide a safe haven for up to 25 to 50 million citizens, or about 9%–18% of the U.S. resident population." DOE estimate

Disasters Happen!

Hurricane-force winds. Blizzards and ice storms. Heat waves.

These are just some of the natural disasters that can strike us where we live without much warning. Even less warning is afforded by human-caused accidents or by disasters caused by terrorists. And the devastation left behind can cause severe problems for your community for days, weeks, or even months to come.

Just consider some actual events from the last several years. In 1992, Southern Florida felt the fury of Hurricane Andrew. Utility service was severed, plunging communities across a far-flung region into darkness and hindering rescue and recovery operations. Diesel generators provided some emergency power, but not without the accompanying noise and pollution, which contributed to the stress of the catastrophe. People needed to be able to pump clean water, use stoves for cooking, and have lighting. Bottom line, they needed essential services.

Or consider a portion of Quebec, which was hit by a devastating ice storm in 1998 that snapped power poles and lines. As a result, the loss of grid power had people struggling to find ways to meet their basic needs for light, heat, and power.

At the other climatic extreme, Chicagoans endured heat waves in both 1995 and 1999. The high demand for air-conditioning overtaxed the power supply, leading to widespread power failures. Some people, even if they had power, may not have had access to air-conditioning. Those especially at risk for heat-related health problems were the older population, and heat-related deaths numbered in the hundreds.

Such examples point out that disasters often affect large numbers of people in diverse locales and that essential services may not be restored for days. Furthermore, in nearly all severe disasters—whether caused by nature or humans—the grid has proven vulnerable to disruption or even complete failure.

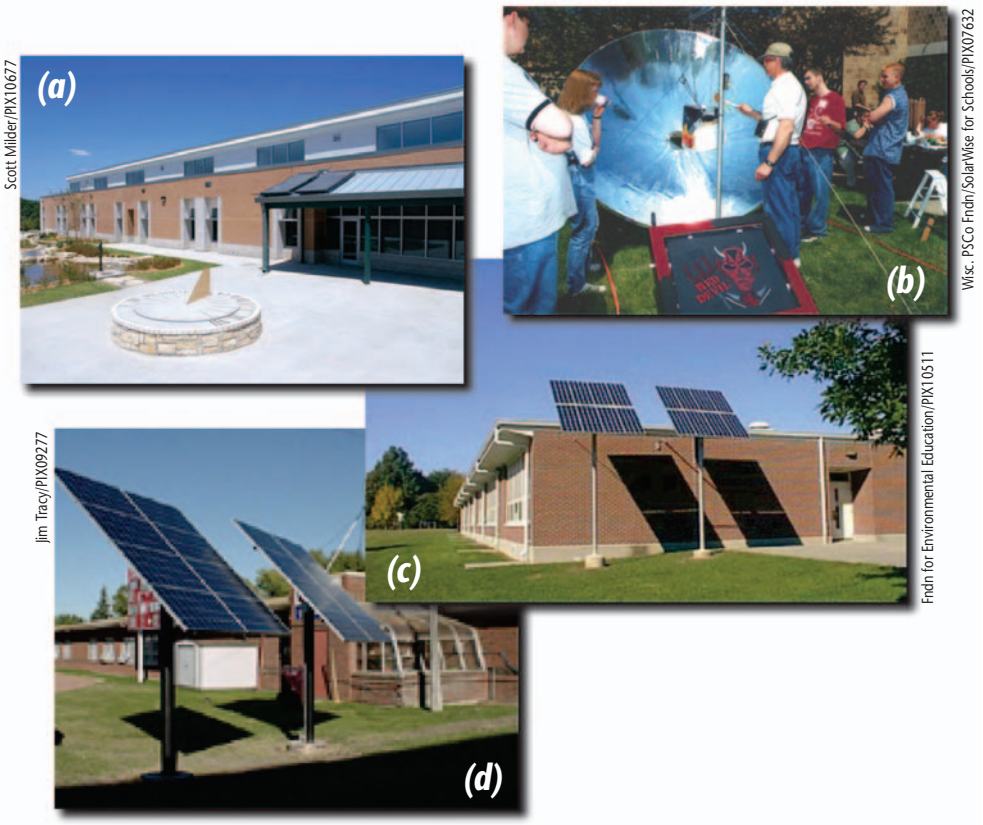
Schools to the Rescue

But there are facilities within most communities that can hold numerous people and—if designed properly—can provide these people with power, heat, and other basic needs during emergencies. These valuable facilities? Schools!

Schools often depend on their utility's centralized generation plant and distribution grid for electricity, just like we do for our homes. Decades ago, however, schools were constructed to be self-sufficient, capable of maintaining basic operations independent of the grid. And we can retrofit existing schools or design new schools to regain this independence, which we value now more than ever.

Electricity—which can be provided from the sun by using solar-electric systems—can be counted on for necessary lighting, heating (for powering blowers, for example), and food preparation and cooking. Solar water heaters can create and store adequate volumes of hot water for heating, washing, and cooking. And buildings designed with passive solar features yield benefits of natural lighting, heating, and cooling.

In addition, a school's overall energy consumption can be greatly reduced by considering measures that boost energy efficiency. The facility will require less energy, and this energy can then be generated more cost effectively by solar or other renewable technologies. Whether retrofitting an existing school or building a new one, your facility can incorporate daylighting, passive solar, and solar hot-water heating, along with energy-efficient lighting, appliances, air-conditioning, and other equipment. In fact, energy consumption can actually be reduced by one-third to even one-half the typical amount. And this savings is realized every day throughout the year, not just during a disaster.



(a) Roy Lee Walker Elementary School (McKinney, TX) includes daylighting, rainwater collection, solar-water heating, wind energy, and high-efficiency lighting as part of EnergySmart Schools. (b) Green Bay Each High School (Green Bay, WI) installed a parabolic dish and solar water heater in the SolarWise for Schools program. (c) Kenwood Elementary School (Bowling Green, OH) has a solar-electric system installed in the Ohio Schools Going Green program. (d) Fort Benton High School (Fort Benton, MT) uses a solar-electric system as part of a Sun4Schools project.

Making sure that schools are energy independent, with their own basic heating and electrical-generation systems, is one of the best ways to provide emergency shelters for your community. Another option is to install a solar-electric system on the roof of every residence in the community, capable of supplying at least a subsistence level of emergency power. But the cost to individual homeowners is generally prohibitive at this time. Even less appealing is the use of small gasoline, propane, or diesel generators, which may create safety issues related to burns, fuel explosions, asphyxiation, and excessive noise.

It's Being Done Now

You don't need to be the trendsetter in following this approach to community emergency shelters. Several communities have already been involved in this work, and others are making plans for the near future.

As mentioned earlier, the heat wave that Chicagoans endured in 1995 left several hundred people dead as a direct result of the heat. City council members decided to face this problem and other future disaster situations by retrofitting some schools to be emergency community shelters.

Frank W. Reilly Elementary School serves as one specific facility where officials took this principle to heart, leading to the installation of a 10-kilowatt solar-electric system. The project was funded by the Illinois Department of Commerce and Community Affairs, City of Chicago Department of Environment, ComEd, and the Chicago Public School capital fund. And the U.S. Department of Energy helped facilitate this collaboration as part of the Million Solar Roofs Initiative. The system was in place just in time for the heat wave of 1999, and Chicago's mayor credited such facilities with helping to save lives. Additional schools continue to be equipped to play a critical role as community shelters during potential crises.

Commonwealth Edison/PIX09513

Reilly Elementary School (Chicago, IL) installed a 10.2-kilowatt solar-electric system.

Robert Flynn/PIX08835

Durant Middle School (Raleigh, NC) has fantastic daylighting, coupled with a modern energy-management system.

Educating the Mind, Sheltering the Public

Stepping back from your town or community and looking across the continental United States, we can see some 115,000 elementary and secondary schools that could serve as emergency shelters.

The U.S. Department of Energy (DOE) has estimated that it would take $500 million to equip 10% of these schools—that is, 11,500 facilities—with 1-kilowatt solar-electric systems, connected to the grid, and having battery backup. During times of normal operation, most of the electricity would be supplied from the utility. But the small self-sustaining solar-electric systems would provide the security of essential operations even when grid power might be unavailable because of some emergency. This arrangement allows the best of both worlds.

Currently, more than 35 states and the District of Columbia have solar energy programs or projects in place that focus specifically on schools. Between 300 and 400 solar projects have been implemented in schools and universities across the nation.

EnergySmart Schools, a part of DOE's Rebuild America program, has the goal of helping schools plan and install energy-saving measures in their facilities, with the goal of drastically lower operational costs over the long haul. But the benefits also include more money to spend on education and a facility that also has great value to the community during difficult times.

We don't need to laugh in the face of disasters and emergencies. But at least we know that we can be better prepared for whatever situations may arise. And we can reap the benefits of getting dual use out of our schools—as buildings paid for and supported by public dollars.

Students are receiving an education in our schools. But the whole community can reap the benefits of these facilities—especially in times of emergencies—if we have the foresight to include energy-efficient and renewable–energy technologies.

Solar Electric Power Assn/PIX10901

Ferry Pass Middle School (Pensacola, FL) uses a solar-electric unit as part of their Sol Mates project.

Web Sites and Information Resources

U.S. DOE Office of Energy Efficiency and Renewable Energy
Through this site, you can access literally hundreds of pages containing information and resources on renewable energy technologies.
www.eere.energy.gov

EnergySmart Schools
This site provides information to district planners, builders, architects, and engineers who are making decisions on building and maintaining energy-efficient schools.
www.eere.energy.gov/energysmartschools

Interstate Renewable Energy Council (IREC)
This site has a section on Schools Going Solar, which provides information on what's going on in your state.
http://www.irecusa.org/schools/index.html

"Homeland Security: Safeguarding America's Future with Energy Efficiency and Renewable Energy Technologies"
This August 2002 report by the State Energy Advisory Board (STEAB) focuses on how we can make our energy infrastructure more resilient and less vulnerable.
www.steab.org/docs/STEAB_Report_2002.pdf

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