

Solar to the rescue

PV in hurricane-devastated US Gulf Coast shows need for broader action plan

Portable solar generators and solar lighting systems were used in hurricane recovery efforts, providing critical power at key sites. But with vast regions washed away by hurricanes Katrina and Rita, there may be a larger role for solar in rebuilding and revamping to better withstand the next season of destruction.

Oct. 1 marked the American Solar Energy Society's 10th annual National Solar Tour, showcasing homes across the United States with PV rooftops, solar hot-water heating, and backward-spinning meters. For two of the tour's local organizers – Jeff Shaw of Baton Rouge, Louisiana and Bill Ball of Little Rock, Arkansas – on Oct. 3, this trip was followed by what one might call the «Devastation Tour.» This second tour featured homes without rooftops, let alone electricity, in the hurricane-rattled region of southern Louisiana, where electricity infrastructures remained snarled more than five weeks after Hurricane Katrina slammed into the Gulf Coast on Aug. 29. It didn't help that another hurricane – this time, Rita – buffeted the region again on Sept. 24.

Together the two storms left well over a million customers without power in territories served by electric utility Entergy Corporation in Louisiana, Mississippi, and Texas. By the second week of October, over 300,000 customers remained without power. Almost half of them reside in New Orleans and other areas of southern Louisiana. Due to the destruction, these «may not be able to get power for some time,» according to Entergy. Many of the homes may simply be bulldozed. Considering that each «customer» could actually be a family of four, there are a lot of people still without house and home – and they may be but a foreshadowing of the number of tomorrow's environmental refugees in the Gulf of Mexico if the ferocity of hurricanes does intensify with climate change, as some scientists expect.



Powerless: Downed wires were a common sight in the hurricane disaster zone. Over one million citizens had no access to electricity, and for more than 100,000 the situation won't change for some time.

Shaw, who heads the Louisiana Solar Energy Society (LSES), made it through the first days after Katrina on a slim but vital energy diet provided by 489 W of PV panels, a 2 kW inverter, and batteries at his home in Baton Rouge. «Katrina hit us early in the morning,» explains Shaw. «Trees came down in our neighborhood and branches fell everywhere. By 9 am the grid power failed and we automatically went to batteries without even a blink of the TV.» In an account posted on the LSES website, Shaw describes the rush for gas and diesel generators in the aftermath of the storm, which at about \$500 apiece cost roughly one-tenth the price of his system. But gas stations lost power and could no longer pump – not to mention that the town also experienced a shortage of gas containers. Refugees streamed into his house, an oasis offering unspoiled food and a safe surrounding. «With solar power we had our normal lighting and not candles and flashlights, which gave a sense of normalcy to a bad situation.»

Shaw is also one of the few PV installers in Louisiana. In 2004, he hooked up the state's largest grid-tied system in New Orleans, a 6.1 kW fixed-tilt system that was largely uprooted by the Category 5 hurricane.

From the midst of the chaos, Shaw sought to lend a helping hand. Working with a state representative from St. Bernard Parish, a devastated coastal area in southern Louisiana, and National Solar Tour organizer Mike DiGrazia, Shaw went on the lookout for a portable PV generator to deliver to the temporary offices of the St. Bernard Port, Harbor & Terminal District in one of the most devastated areas of southern Louisiana. Bill Ball answered the call and on Oct. 3 they rushed to the scene with his 2.4 kW portable PV system.

The trailer, complete with a foldout array of 40 Solarex 60 W modules, a 3.6 kW inverter, and 16 kWh of battery storage, will remain the critical electricity supply for the port offices for as long as two months, powering computers and lighting needed for operations, while a diesel generator powers the air-conditioning load during the day. In more placid times, Ball's trailer supplies power to tools for his homebuilding business, Stellar Sun, with which he harnesses photons to build solar homes. Since arriving back in Little Rock, Ball has received several requests for more solar trailers, one from a state National Guard seeking two portable solar generators, and another inquiry from



With PV back up systems, operation of crucial infrastructure could have been continued in flooded New Orleans. But the Gulf Coast states hit by Katrina offer hardly incentives.



On line: Bill Ball (left) poses with port technician «Buddy» in front of his 2.4 kW mobile PV system, here powering equipment at a New Orleans port's temporary offices.

an unnamed organization with a need for wireless internet capability whose 80 gas generators were stolen – a frequent problem with generation sets.

Solar lighting companies also rushed to the scene, providing safety to rescue camps and transportation infrastructures.

Solar aided police forces from nine states at Louisiana's main emergency response and staging camp in Baton Rouge with security lighting systems supplied by Palm City, Florida-based SOL Inc., formerly Solar Outdoor Lighting Inc. Eighteen systems using panels donated from Sharp were installed by SOL employees; the components and labor were paid for through donations raised by SOL chairman Michael Sonnenfeldt. Another 12 systems were to be installed in other locations, but Rita delayed completion of the task. According to SOL's J.R. Finkle, who was onsite in Baton Rouge, the company was waiting for the invitation to return. «There are temporary villages going up in all areas without any [electric] infrastruc-

ture,» she says. «They will need lights.»

Customers of Canadian-headquartered Carmanah Technologies Corp. of Vancouver, British Columbia allowed their orders to be put on hold so the company could supply Louisiana with hundreds of its solar LED lights attached to buoys to restore direction in shipping channels as well as for bridge crossings on railways and landing strips at airports. «No one said 'no',» Carmanah's Mimi Dravic says of her customers. «We've had orders as a result of hurricanes in the past. But this was bigger and more serious than anything else.»

Some of the «solar to the rescue» tales involved several veterans of applying solar in disaster relief. Bill Young of the Florida State Energy Center (FSEC), who has responded to hurricanes with PV systems since 1992, was again on mission after Katrina. In partnership with the National Renewable Energy Laboratory (NREL), he brought one portable system to an Emergency Operation Center (EOC) in Kiln, which now uses a 500 W PV system with a battery bank and inverter to

transmit emergency information from a local radio station. While in Kiln, Young advised numerous rescuers at the EOC to apply to the Federal Energy Management Agency (FEMA) for appropriately sized solar systems for various applications. He helped one operator of a fuelling truck fill out the paperwork for a fuel-pumping system. «There was this guy with a fuelling truck using a battery to pump gas,» explains Young. «Everyday he was running all over trying to find a place to recharge the battery.» He doesn't know whether the fuel-pumping system ever came. Five days after arriving at the EOC in Kiln, the rescuers themselves were run out as Hurricane Rita came ashore.

In Pearllington, a small Mississippi town essentially washed away by Katrina that became a distribution center and shelter, Young delivered another portable system using panels removed from three homes on display at the Solar Decathlon in Washington, DC. Acquisition of the panels was orchestrated by NREL's head of the PV division Larry Kazmerski and the Department of Energy's Richard King. Among the benefactors were senior citizens living in a tent – including one gentleman using an oxygen concentrator powered by a diesel generator, the fumes of which he had to literally suck in as he gasped for air. «You really don't want that oxygen, noise, and pollution mixing in a tent,» says Young. The oxygen machine is now solar powered.

«Strategic Solar Energy Reserve»

As long as Young has been involved in hurricane disaster aid, he has spread the good word for solar. In more than two dozen training courses, he has instructed FEMA, Red Cross, Florida state officials and others on uses for PV in responding to hurricanes, floods, tornadoes, earthquakes and other natural menaces. «Are there wonderful benefits of solar in disasters? Yes, definitely,» he says. «Is it best in all disaster situations? That depends.» Young suggests that FEMA integrate PV applications into its disaster plans, creating appropriate designs with known small loads for specific needs, like PV generators for radio stations, gas pumping, and medical clinics, where a silent generator is a much appreciated alternative to buzzing generation sets for disaster-traumatized victims.

For a time it appeared that disaster responses might increasingly tap the power of the sun. One program initiated by the DOE in 1996 engaged FEMA to provide PV systems for disasters and led to the construction of eight mobile generators by Applied Power Corp. (now part of Schott Solar) and Sunwize Technologies Inc. in 1998. The program could have

served as the basis for something like a «Strategic Solar Energy Reserve,» which the government could add to its suite of strategic fossil fuel stockpiles, such as the Strategic Petroleum Reserve (SPR). To start, it could be made up of, say, 100 systems designed for specific applications in each state, and spread out across FEMA's 10 regional offices, feeding electricity into the grid while there is no disaster. Notably, Sec. 203 in the renewable energy title of the recently passed Energy Policy Act of 2005 requires that 3 percent of the federal government's energy consumption come from renewable energy between 2007 to 2009, growing to 7.5 percent by 2013 (see PI 9/2005, p. 46). Why not a strategic solar carve-out as a part of the new federal purchasing requirement? And different than the SPR, created after the 1973-74 oil embargo, a Strategic Solar Energy Reserve would serve the victims of disasters who are in the greatest state of emergency, not simply «to protect American consumers and our economy,» as Energy Secretary Samuel Bodman recently described the function of SPR, which on Oct. 4 he said would soon be tapped.

Dreaming? Though not in detail, Young says, «That's why these trailers were first acquired. [FEMA] has generator crews, but they don't have a solar team. The DOE was trying to sell it. Why it wasn't expanded I don't know.» Incidentally, not one of the eight generators was used in the recent hurricanes, says Young. Instead, four are located at FEMA's national emergency training center in Maryland, two are in Puerto Rico, and the remaining two at a FEMA regional office in Denton, Texas.

An ounce of prevention

But as the old truism says: an ounce of prevention is worth a pound of cure. Regardless of response and recovery efforts, the real role for PV, says Young, is in prevention, known as «mitigation» in bureaucracy-speak. Hospitals, notes Young, typically have gas or diesel backup systems, but high-level disasters can easily disrupt fuel supply lines, as was seen in the wake of Katrina. Small solar-powered generators will not be much help in this situation. «Hospitals should be solar powered before the disaster hits,» says Young.

Bill Ball agrees: «The trailer is just the tip of the iceberg. The real story is the complete devastation.» Ball points to the solar homes he builds with his solar trailer, which are well fortified custom-built homes «comparable in price to 'McMansions',» and designed to shift to off-grid mode. According to Young, a key problem is that current federal law simply requires that buildings be rebuilt using the latest codes that in many cases remain unaltered, even in the wake of devastation.



No fuel: In the aftermath of the storm, people rushed for diesel generators. But gas stations were either devastated or simply lost power and could no longer pump.



Let there be light: Solar aided police forces at Louisiana's main emergency camp in Baton Rouge with security PV lighting systems from SOL Inc., the modules were donated by Sharp.

«It does not advance the codes. They are rebuilding buildings they will have to rebuild again,» he says.

Unfortunately, FEMA's capacity to provide mitigation may be getting worse even as its lamentable disaster relief performance toppled top official Michael Brown. On Oct. 7, the US Senate sent to President George W. Bush a \$30.8 billion domestic security bill, including a FEMA budget of \$2.6 billion for «preparedness, mitigation, response and recovery,» but an ever-declining amount is going toward mitigation, and the base FEMA budget as a whole has fallen in recent years. These facts are laid bare in a recent Democratic staff report of the House Appropriations Committee entitled *A Story of Neglect: A Review of FEMA and the Army Corps of Engineers in the aftermath of Hurricane Katrina*. After the Sept. 11 terrorist attacks, FEMA was stripped of independent status and integrated into the newly created Department of Homeland Security, where, according to the report, FEMA's vital prevention programs have been diminished as staff and resources have

been rerouted to fighting terrorism, not natural disasters.

Young says the challenge will be for states, cities, and counties to improve their building codes. A grassroots push is already beginning to gain momentum for a sustainable rebuilding of New Orleans. A non-profit group called Alliance for Affordable Energy convened a meeting on Oct. 8 in Baton Rouge, attended by about 120 southern Louisianans, mostly refugees from New Orleans, to gather comments on a model the group is circulating for the post-Katrina rebuilding of the Crescent City. Part of the group's six-point proposal includes installing solar panels. Unfortunately, Louisiana, like several states in the Hurricane-prone Gulf Coast, offers very few incentives. Perhaps the massive destruction from a Category 5 hurricane will provide impetus for a rethinking of public policy. Solar energy and sustainable building advocates may have a new – albeit unfortunate – ally to help keep the pressure on: hurricane season returns every year.

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