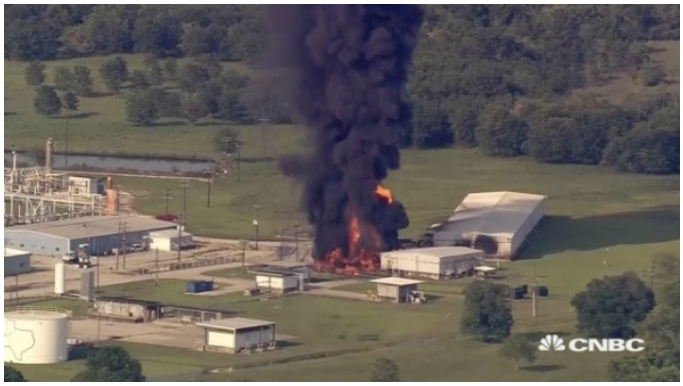
Solar + Storage Powers Communities after Disasters

When the Grid Goes Down

What happens when the power goes out following a natural disaster? In Florida, in the aftermath of Hurricane Irma, elderly people died in a nursing home without cooling. In Crosby, Texas, following Hurricane Harvey, toxic chemicals spewed from the Arkema chemical plant after the grid went down and two backup generator systems failed, sending first responders to the hospital and forcing the evacuation of the surrounding area.

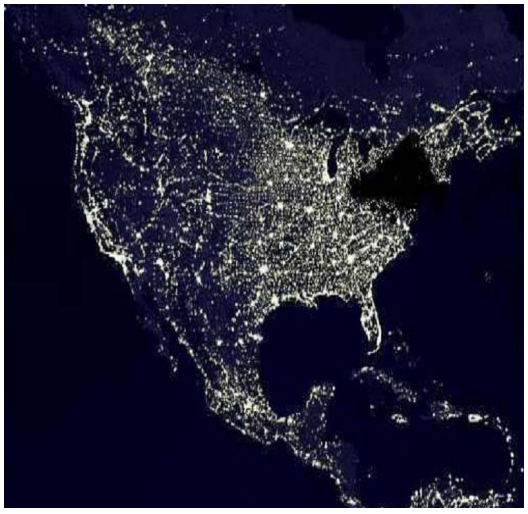
Nature is not the only one to blame for disastrous blackouts. Northern California's 2015 Butte Fire, which burned for 22 days, killing two people, destroying 549 homes and charring 70,868 acres, was sparked by poor power line maintenance by utility PG&E.[1] Downed power lines and transformers from high winds are also suspected in the fires that devastated California's wine country in October 2017.[2] And the country's biggest blackout, in 2003, started when a branch shorted out a power line in Ohio after a utility delayed tree trimming. A software bug at a utility control center then sent the outage cascading across eight U.S. states and two Canadian provinces. Within eight minutes, 55 million people were out of power.[3]



Arkema chemical plant, Crosby, Texas, Sept. 1, 2017

The loss of power can make it harder to battle a natural disaster. During the 1991 Oakland, California Firestorm, which killed 25 people and burned more than 3,000 homes, fire departments ran out of water because they were unable to refill water reservoirs after the fire took out power lines to seventeen pumping stations in the Oakland water system.[4]

Not all power outages are unintentional. Security professionals now agree that an organized cyber espionage campaign has attacked over two-dozen utilities in the U.S. and Europe. For a real-life


Where's New York? A tree branch and a software bug combine to black out 55 million people in 2003. (Photo: NASA)

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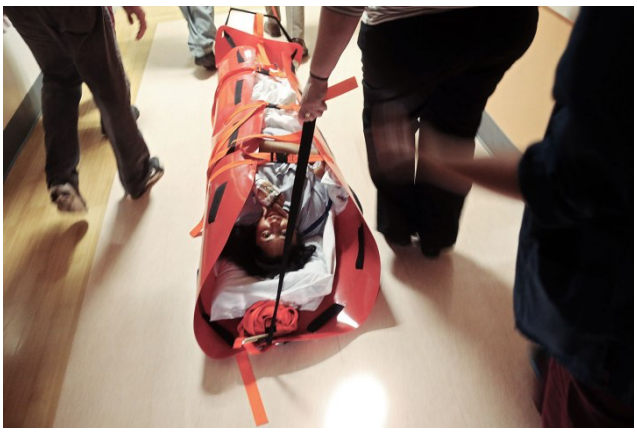
example of the impact of hacking the grid, the security experts point to December 2015, during Russia's war on Ukraine, when hackers infiltrated Ukraine's electric grid, shutting off the power to 225,000 people there.

How Often Do The Lights Go Out?

The power goes out in the U.S. more often than most people realize. In 2016, there were 4,000 blackouts, affecting 17 million people, according to the Eaton Blackout Tracker. [5] That's a 45% increase since 2008. The cost to the U.S. economy averages $150 billion each year.

We Can Rely on our Backup Generators, Right?

Well, maybe. During the east coast power outage of 2003, half of New York City's 58 hospitals suffered failures in their backup generators. A decade later, not much had changed: when Hurricane Sandy hit in October 2012, every single hospital in the lower half of Manhattan, except one, was closed and evacuated because of flooding and generator failures.[6]



Hospital workers evacuate a patient from NYU Langone Medical Center in lower Manhattan during Hurricane Sandy on Oct. 29, 2012. (Photo: Time Magazine)

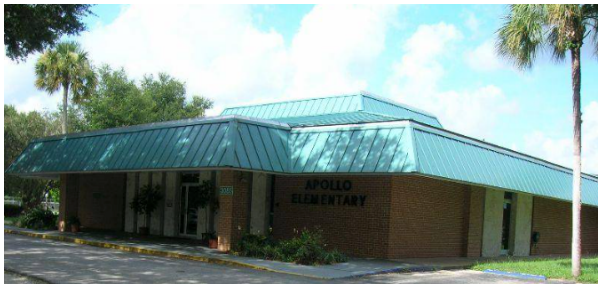
Even when generators keep running, they're dependent on their fuel supply. During the power outages that followed Hurricane Sandy, many New Jersey residents with generators couldn't find a gas station that had power, so they couldn't refill their tanks.

First responders such as police and fire stations and medical facilities may be able to refill their tanks if city or county supply trucks can reach them. If not, they'll soon be out of power too, and out on the streets along with everyone else looking for a gas station that can still pump. Take a typical fire station, like Lake Oswego Fire Department's Station 210. The 95-gallon tank on its diesel generator will keep the power on at the station for about 18 hours – fine for a short-term incident, but not nearly enough in the aftermath of a major earthquake.

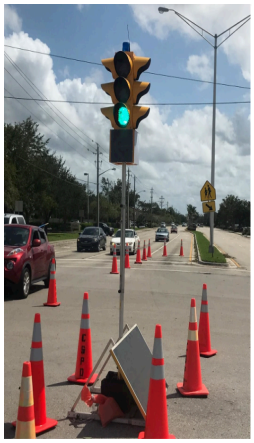
Solar + Storage Keeps the Lights On

Many people are surprised to learn that solar panels automatically disconnect and stop providing power to a building when the grid goes down. Adding batteries to a solar system, however, means it can continue to provide power during a grid outage. That can be extremely valuable during a disaster. While 4.4 million Florida Power & Light customers were out of power following Hurricane Irma in September 2017, 115 schools

across Florida were able to provide emergency power, thanks to solar + battery systems installed earlier. Residents seeking shelter there were able to charge their cell phones, make coffee, and stay in touch with the rest of the world by ham radio.[7] And solar powered traffic lights, with batteries, kept traffic flowing smoothly in Coral Springs, Florida, after Hurricane Irma in 2017.



Apollo Elementary School in Titusville, FL, one of 115 schools in Florida that had power during Hurricane Irma, thanks to solar + batteries.



Solar traffic lights kept traffic moving at 13 intersections in Coral Springs, FL after Hurricane Irma.

Solar + Storage… and Generators?

Adding solar and battery storage doesn't mean you have to get rid of your generator. In fact, the combination can keep buildings up and running far longer than relying on either one by itself.

Take Mt. Rainier National Park's White River ranger station in Washington, for example. The completely off-grid facility used to be powered entirely by a propane generator. By adding 15.5 kW of solar, the ranger station reduced its reliance on the generator from 3,500 hours a year to 150 hours.[8] And after Hurricane Sandy, a combination of solar and gas generators at Princeton University provided power to the school and turned it into a hub for emergency service workers.[9]

A ranger station in Mt. Rainier National Park slashed the number of hours its propane generator each year runs by adding solar. (Photo: Associated Press)

The Grid of the Future

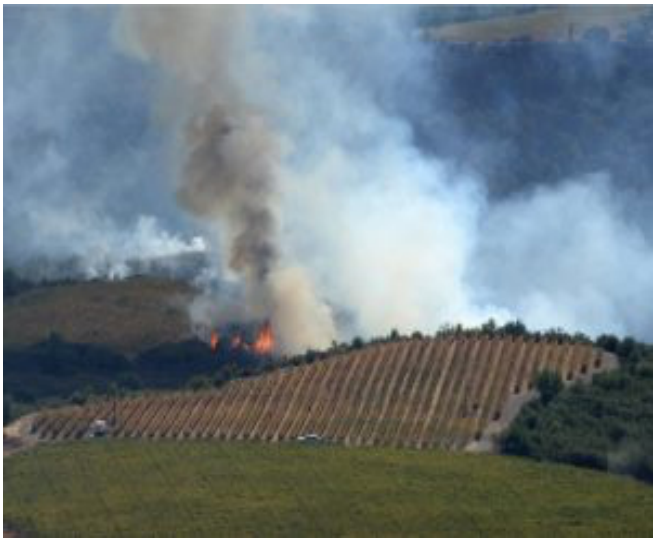
The rapidly falling cost of battery storage, and the clear benefits of having distributed power during grid blackouts, makes it highly likely that within the next decade nearly every solar installation will include battery storage. In some places, like Hawaii, that's already happening. Adding batteries to solar installations may mean a large battery bank in a utility substation or at a school or office building – or it could mean the batteries in the electric car in your garage. Many of these systems will be connected in local micro-grids, such as PGE's demonstration smart grid in South Salem, which integrates solar, fossil fuel generators and five megawatts of

laptop batteries in a local high-reliability zone. The project has had real-life benefits even in the absence of any natural disasters: when power sagged briefly on the regional transmission network in February 2015, the batteries fed power back onto the grid to help stabilize grid frequency.[10] And the microgrid at Stone Edge Farm, near Sonoma, California, which includes solar, eight different types of batteries, and a natural gas microturbine, operated for ten days in spite of a grid outage from the 2017 Wine Country fires. The owners turned the microgrid on remotely, after they'd been forced to flee because of the fires.

PGE's microgrid project in Salem links together solar, generators and 5 MW of lithium-ion batteries. (Photo: PGE)

Preparing for Cascadia

Oregon has fires, floods and the occasional volcano – not to mention the prospect of the Cascadia Event, which FEMA predicts could kill 27,000 people, and leave another million homeless. Having distributed sources of renewable power available in Oregon communities after any of these events would help people communicate with each other and the outside world, keep essential medications cool, and allow first responders and local governments to maintain basic functions after fossil fuels run out. The Oregon Clean Power Cooperative is actively seeking sites to host renewable energy and storage projects. We believe that together, we can prepare today for a safer tomorrow.



The microgrid at Stone Edge Farm near Sonoma, Calif., kept irrigation pumps and other vital systems running for 10 days in the midst of the 2017 Wine Country fires. (Photo: California National Guard)

The Oregon Clean Power Cooperative is the first state-wide cooperative in the U.S. dedicated solely to renewable energy. Our member-financed projects keep capital circulating locally, create green jobs, and enable Oregon communities to become more self-reliant through locally-generated clean power.

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