THE ULTIMATE GUIDE TO STANDBY POWER GENERATION

A PATH TO MORE RESILIENT HOMES AND BUILDINGS.



INTRO: MORE RESILIENT HOMES AND BUILDINGS



More resilient homes and buildings

Constructing a home or designing a building today requires a leap of faith. How can we trust our built environments to last under the threat of storms, natural disasters, aging infrastructure, and even man-made hazards?

Resilient design provides a path forward, offering strategies for constructing more efficient, durable homes and buildings that can help protect people from weather events and extended losses of power or fuel.

The role of standby power

A reliable propane standby generator is a key part of resilient design. When the power is knocked out, standby power keeps heating and cooling, lighting, refrigeration, and other critical building amenities in operation.

Think about what a resilient home or building protected by standby power can do:

- Resist hazards brought on by major disasters, such as damage to electronics, spoiled food, loss of heat or air conditioning, and more.
- Continue providing the primary function of a home protecting your family after a disaster, and keep a business's employees engaged and productive during what would otherwise be downtime.

PROPANE FOR POWER GENERATION

- Why choose propane? The same propane that will power a home's generator can also power the other major appliances that make life less stressful during a power outage. A standby generator powered by propane offers advantages that other fuel sources simply can't match:
- Permanently installed and supplied by an aboveor belowground tank, it starts automatically the moment the power goes down.
- Supplies supplemental electricity in as little as 10 seconds after an outage.
- Propane doesn't degrade over time, unlike diesel or gasoline, making it an ideal standby power fuel.
- Reduce the magnitude or duration of a disruptive event to a property.

A differentiator for building pros

The fact that you've taken the step to download this ebook shows that you realize the importance of protecting your projects with standby power. By empowering your customers to overcome the fear, stress, and potential financial losses posed by outages, you'll build your authority as a trusted partner for your clients.

We're here to show you how to make the most of the new generator technologies and products available on the market and incorporate them into your business.

In the chapters that follow, we'll provide guidance and advice from pros designing cutting-edge applications that combine standby power with renewable resources like solar power and waste heat — both on and off the grid. And we'll show examples of some of the savviest projects using propane to run more reliably *and* more efficiently. With these strategies, your next project won't require a leap of faith — just a step toward a more resilient future.

Get access to exclusive research about your customers' greatest power outage concerns.

DOWNLOAD THE RESIDENTIAL OR Commercial brochure at: Buildwithpropane.com/ Propane-systems/ Generators/

BUNDLE PROPANE GENERATORS AND APPLIANCES



"On Thanksgiving, an electric stove with all four burners and oven on will pull half the capacity of a 20-kW generator just by itself," says generator installer Bob Camper. "In my own house, I'm going from electric to a gas cook stove."

Bundle propane generators and appliances for more affordable protection

Make standby generators an easier sell by using propane, rather than power-hungry electricity, for critical systems.

Until recently, homeowners hoping to protect their homes against blackouts had to choose a few select applications that would remain running during a power disruption. The refrigerator and heat, for instance, might keep running, but the rest of the house would be powerless in an outage. Today, however, several factors are combining to make whole-house standby protection a realistic possibility for most U.S. households. Recent improvements in generator load-monitoring technology have made it possible to keep power flowing throughout the whole house, even as demand surges and shifts. Now, if a generator gets to the point of overloading, it can automatically shut off non-essential appliances and bring them back on when demand subsides. As a result, many homeowners who initially hopped on the generator train with portable models are retrofitting their homes for whole-house standby units.

"When critical systems such as space heating and water heating are fueled by propane or natural gas, the standby generator can typically be downsized — and made more affordable."

Likewise, these propane generator features make it easier for commercial buildings to achieve more comprehensive protection without having to go through the fuel storage, maintenance, reliability, and emissions challenges of diesel-fueled generators.

"If you had asked me four years ago, I would say we were doing mostly partial-house installations," says Bob Camper, owner of AllInstall LLC, a Virginia-based installer of Generac standby generators. "We'd put in a subpanel with critical systems wired into the panel: heat, water pump, and refrigerator. Now, every machine we install can do load monitoring."

"These generators have a load monitoring switch with four levels of priority," Camper explains. "If a generator overloads, it immediately will drop off the four biggest electric draws, then reapply them one at a time to make sure it doesn't overload. For example, a 20-kW generator, which normally puts out 82 amps, can bump to as much as 125 amps to start an air conditioner, although it can't sustain that. If more than 80 amps are drawn for more than three seconds, then we'll automatically drop what we've selected to protect the generator."

Complementary propane systems

Builders and remodelers can also combine a propane generator with a suite of propane appliances to provide residential and commercial clients with whole-building standby protection at an affordable price. When critical systems such as space heating and water heating are fueled by propane or natural gas, the standby generator can typically be downsized — and made more affordable — because it isn't running power-hungry electrical heating appliances.

Customers can save as much as \$2,000 on the generator, according to Dave Dawson, CEO of Smart Homes of Virginia, a generator installer based in Charlottesville.

"On a typical electric indoor air-handler, the emergency heat strips will take as much as 10 kW or even more if the emergency heat kicks on," Dawson says. "So it takes a big generator — or they have to do without that heat or risk shutting the generator down." Alternatively, if the furnace runs on propane or natural gas, it uses minimal electrical power, he explains. "Not only does the heat come on when they want, but also instead of a 20-kW [generator], they might get away with a 14-kW, which will allow them to save \$1,500, even \$2,000 or more on a generator."

Bundling for savings

As installers do the energy-consumption audit needed to properly size a generator and pipe the house for propane, remodelers can offer homeowners the opportunity to convert other major systems to propane or natural gas to maximize energy efficiency and cost savings.

"It does make a big difference if they have at least one or two gas appliances," Camper says. "Because we're going to be doing a gas line to get the propane to the generator, it's an ideal time to upgrade heating, water heating, and cooking appliances. I'm encouraging people to switch to gas, to put in a gas heater, a gas tankless water heater in lieu of a water tank, and a gas cook stove."

Most of Camper's customers live in rural areas and use propane to fuel their generators. "About half our customers have buried tanks or will have us do so when we do the generator installation," he says. Both installers stress the importance of having a certified professional size and put in a whole-house generator because of the computerized load monitoring system that comes built into the switch. "If you overload generators you can easily burn them out, and then you are talking a couple of thousand dollars to fix them," Camper says.

PROPANE PARTNERS

By choosing propane for these building systems, you can reduce the building's reliance on standby power or even spec a smaller, more affordable backup unit. Most propane appliances require backup power only for the electronic ignition, if at all.

Space Heating: Propane forced-air furnaces provide airflow up to 25 degrees warmer than the average electric heat pump and typically last twice as long.

Water Heating: Condensing tankless water heaters can provide energy savings up to 40 percent over conventional, electric water heating systems while providing endless hot water delivery.

Fireplaces: There's no better way to ride out the storm than cozying up by a fireplace running on your onsite fuel source.

Cooking: Eating out every night of an outage can add up financially, and who wants to go out in a storm anyway? Propane cooking appliances won't strain your generator's capacity.

Clothes Drying: For hotels and other buildings with laundry facilities, propane dryers keep the fresh linens coming in a power outage.



RELIABLE POWER MAKES HAPPY CAMPERS



Reliable power makes happy campers

Camp Woodstock offer kids a getaway from the always-on connections of the everyday world. But while the camp may be isolated from city amenities, propane ensures campers remain warm and well fed in any weather.

For Anthony Gronski, summer camp is a training ground for life.

The executive director at YMCA Camp Woodstock, a summer camp and retreat center in Woodstock Valley, Connecticut, says today's kids are so electronically connected through texting and their phones that it's difficult for them to learn to build relationships face to face. Summer camp offers an opportunity to disconnect from the internet and bond with friends in a positive environment where kids can be kids. The camp's remote location, on a pristine 75-acre lake surrounded by woodlands and farms, is an ideal setting to create that environment. So even though there's no natural gas available and the electric grid can be unreliable, Gronski wouldn't change a thing. The camp simply turned to propane to fuel the generators, heating systems, and cooking appliances that keep them running in any weather condition.

For institutions and retreats like Camp Woodstock that consider a remote location to be a selling point rather than a turnoff, propane can play a unique role in offering high-efficiency heating systems and reliable power sources that wouldn't be available otherwise. That's particularly vital for non-profit organizations like the YMCA, where lost revenue from a weekend without power or uncomfortable and upset guests can wreak havoc on an operating budget.

Check out the video about Camp Woodstock at **buildwithpropane.com/institutions.**

Backup power protects budget and campers

Camp Woodstock, for instance, offers \$177,000 in financial aid and scholarships to campers each year. But losing a week of summer camp to a power outage could result in up to \$300,000 in losses — and that's not even including the loss of income from families who decide not to return.

To avoid that scenario, the camp employs eight propane generators, six mobile and two permanently installed, to keep the camp running in an outage. "Out here, we lose power," Gronski says. "We're mainly wooded and pretty much the way it was since it was incorporated in 1670." Because the nearby community is so spread out, it's frequently the lowest on the priority list when power is restored. "We were the last ones to get power the last time it went out. Everyone here is prepared for it. Everyone has generators." "The generators are critical to maintaining the camp's lighting, refrigeration, heating, and particularly the pumps for well water. "That's just such a comfort to have generators set up, because two things that really can stop camp is water and septic," Gronski says. "So those generators keep us operating and keep water flowing in both directions."

Gronski recalls one Labor Day weekend when the camp was hosting its family camp, one of the most popular and busy weekends of the year, and a hurricane came through and knocked out power for most of the state. "We immediately started calling all the families, letting them know, 'Hey, we're going to be operating. We've got generators. We're not going to let this prevent your family from having this weekend.' So we have the generators going, the families came out, and they had a great weekend. And really, that's one of the weekends I take the most pride in.

"I remember the last meal, one of the participants who has been coming to family camp for 30 years mentioned that the hum of the generators was a comfort to fall asleep to."

"We were the last ones to get power the last time it went out. Everyone here is prepared for it. Everyone has generators."

In addition to reliable power, Camp Woodstock uses propane throughout the 42 buildings onsite, including lodges, cabins, and meeting spaces. All of the buildings use propane furnaces or boilers for space heating. Three centralized bathhouses use boilers for hot water, and the lodges use propane storage tank water heaters for their bathrooms. Two of the lodges also have propane fireplaces. Just as crucial to the success of the camp, however, is a dining hall that serves three meals a day to 400 people onsite. The kitchen uses propane to fuel convection ovens, grills, and a large kettle that can handle 40 pounds of pasta. "It's really critical that our dining hall can maintain operation, regardless of the weather, without power," Gronski says. "We really rely on the propane to continue to flow even when we lose power."

COMMON CAUSES OF POWER OUTAGES



These five states had the most weather-related outages between 2008 and 2014, according to findings by B2B International Research¹: California (525 outages), New York (399), Texas (335), Michigan (328), and Pennsylvania (294).

1. Power Outage Impact Research, B2B International – 2015.

OFF THE GRID, WITH PEACE OF MIND



Rather than using electricity from the grid, Patricia Seaward's Maine home gets its power from solar panels (installed facing away from the camera) and a propane generator.

Off the grid, with peace of mind

A home powered solely by solar panels and a propane generator protects the environment — and takes care of the neighbors.

When the power's out in their neighborhood, Patricia Seaward's neighbors grind their coffee beans at her house. Her coffee grinder, and the rest of her off-grid home in Barters Island, Maine, keeps running in any weather condition thanks to two resilient sources of power: solar and propane.

Independent by nature, Seaward chose the off-grid lifestyle after a career working at the Maine Department of Environmental Protection.

"Once I received a quote from Central Maine Power, I realized that the components for solar electric were only a few thousand dollars more than being grid-tied," she says. "I rationalized where I worked and decided that I could lead by example. It was more the philosophy, doing my part for the environment, that attracted me."

Seaward hired Albert Monaco, an electrician experienced with solar generation, to design her home's off-grid, battery-based system. Monaco, owner of Oyster Creek Electric and Solar Options in Alna, Maine, installed a 2.5-kW solar photovoltaic array to power the home and charge the batteries.

But for peace of mind, and with the size of her roof limiting the number of solar panels that could be installed, both Monaco and Seaward knew the home would need a source of backup power. "Because of the days being so short in our winters, on some days you can't produce enough power [with the solar panels]," Monaco says.

To keep the home running year-round, Seaward turned to propane backup power as the most cost-effective and environmentally friendly option. "My job at the Maine Department of Environmental Protection entailed working with homeowners whose wells were at risk or contaminated by various petroleum products," she says. "As I live on the top of a hill, any petroleum spill could impact more than my property."



The home's domestic hot water and in-floor radiant heat are provided by a propane boiler, while a propane soapstone heater can be manually operated between seasons.

Her neighbors would have little use for their coffee grounds if their water supply was contaminated, and diesel fuel has the potential for contamination from spills and leaks that are retained in the soil. Propane doesn't spill, pool, or leave a residue, so it's not harmful to soil or water in the unlikely event of a tank leak. Seaward also considered wind-generated backup power, but the cost was prohibitive. Monaco installed a 2-kW propane generator with the start mechanism tied into the voltage of the batteries. When the batteries are depleted to a certain voltage, the generator automatically kicks on until the batteries are replenished to 80 percent.

Propane vs. diesel

In addition to its environmental benefits, propane has several other advantages over diesel, Monaco says. First, propane tanks are available in large sizes, so timely refueling isn't a concern. "Most people have a tank that will run them 100, 200 hours, and that usually is about the run time for a year," he says. Second, "Propane is also a whole lot cleaner, so maintenance on the machine is a lot less than if you were running on gasoline."

Propane also powers Seaward's refrigerator, a clothes dryer, a manually operated soapstone heater for between seasons, and a boiler that provides hot water for domestic use and in-floor radiant heat. By using propane in the five applications of the Propane Energy Pod, the home provides maximum performance, comfort, and efficiency.

A power outage costs a family an average of \$1,250



Financial Costs of Power Outages:

- · Spoiled food.
- · Eating at restaurants.
- Damage to electronics and homes.
- · Lost wages from home businesses.
- · Hotels and temporary relocation costs.
- **Emotional Costs of Power Outages:**
- Stress on families.
- · Financial demands.
- · Dangerous excesses of heat or cold.
- · Lack of phones, email, and communication.
- Inability to cook.
- · Loss of showers and bathrooms.

Monaco says Seaward is far from the only local homeowner who has decided to leave the grid behind — in fact, his home is off the grid, too. The local power company now has an owner in a foreign country and has cut back on local employees capable of quickly restoring power in an outage, he says. "We had a little snowstorm up here this winter, and we had winds 40, 50 miles per hour. But some people were out of power for three or four days because they just don't have the manpower."



Ward Cedar Log Homes of Houlton, Maine, supplied the northern white cedar for siding and purlins and pine for interior walls. The galley kitchen, designed for greater efficiency, includes a three-burner stove, broiler, and oven fueled by propane.

Monaco and Seaward won't have to worry about an electrical bill in retirement, and remaining blissfully unaware of power outages is also a major advantage. "I'll go down to the local coffee shop and realize, 'Oh, the power's out?" Monaco says. Owning one of the only homes with power has its perks. "That's a real nice benefit right there."

> Learn more about the Propane Energy Pod at:





Learn more at buildwithpropane.com

Propane standby power work in concert with a variety of other powerful propane systems to make homes and buildings more resilient. Visit **buildwithpropane.com** to access free tools and resources on all that building with propane has to offer.

GENERATOR RESOURCES

Download the commercial propane generators fact sheet, brochures with exclusive research about your customers' greatest power outage concerns, videos, and more. **buildwithpropane.com/propane-systems/generators/**

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Take this in-depth course at the Propane Training Academy to learn more about propane generator applications and the benefits of different fuel sources. Plus, you can earn credits from the AIA, NAHB, NARI, and USGBC. **buildwithpropane.com/training**

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