

Fuel Cells for Backup Power

California Stationary Fuel Cell Collaborative

What is fuel cell backup power and how does it work?

- Small backup power fuel cell systems reduce risk by ensuring that communications, data transfer, traffic signals and railroad crossings are operating during extended outage
- Used to provide backup power in remote locations and on-site to businesses that depend on an uninterrupted supply of electrical power, including telecommunications and highway/railway signaling
- Fuel cell backup power solutions are able to meet critical backup power needs for markets with both low-power and high-power requirements and a variety of applications.
- Offer an unparalleled degree of flexibility in addressing the space and runtime constraints of customer locations, with both indoor and outdoor cabinet or container options.

Fuel Cell Companies

- Bloom Energy
4353 North First Street
San Jose, CA 95134
Telephone: (408) 543-1500
www.bloomenergy.com

Bloom Energy offers always-on power, the grid becomes the backup solution. The solution removes the need for diesel generators and allows organizations to become both clean and reliable.

Bloom provides clean on-site power—the 21st century answer to long grid outages (planned or unplanned) and extreme weather disruption. In 2018 alone, Bloom microgrids powered facilities through 550+ outages.

AlwaysON Microgrid's simple and elegant design offers protection from outages and is available as a service with no upfront costs.

	 Grid	 Diesel Generator	 Battery	 Solar + Battery	 Bloom Energy
Duration	---	24 hours	2 hours	2 hours+	AlwaysON
Reliability	Above Ground Power Lines	Cold Start Issues	Needs to be Charged	Intermittent	AlwaysON
Fuel Supply	---	Storage Tank or Delivery Truck	Charges from Grid	Dependent on Sun	AlwaysON
Pollution	NOx, SOx, PM	NOx, SOx, PM	None	None	None

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- Plug Power
968 Albany Shaker Road
Latham, New York 12110
Telephone: 518-782-7700
www.plugpower.com

GenSure Fuel Cell Generator

Designed for megawatt-scale applications, the GenSure fuel cell generator delivers efficient, reliable, and environmentally-responsible energy for backup power applications. Fueled by hydrogen, they provide stable, long-duration, extended emission-free runtime for critical equipment required for data centers, microgrids, and other power-intensive applications. With more than **100 million installed hours** of site power protection, GenSure fuel cell products are field-proven.

Fifty-one of Plug Power's GenSure fuel cells were on the front lines during the **Hurricane Sally storm (September 2020)** and after it passed, providing backup power that enabled the people in the path of the storm to keep in touch with each other, check on family members and do the work to get power back to the more than **540,000 customers** who had outages.

Plug Power's 51 GenSure fuel cells provided more than **1,573 run-hours of backup power** for communications equipment – with **the longest run duration being 7 days**. The length of time served by each fuel cell was primarily determined by how quickly the primary utility power was restored, with average time being 30 hours. Hydrogen refueling was provided as needed by our GenFuel hydrogen team to twelve of the sites while they continued to provide critical power.

- Ballard Power Systems
20756 High Desert Court, Suite 6
Bend, OR 97701
Telephone: 541-639-8640
www.ballard.com

FCgen®-H2PM

Hydrogen-fueled stationary systems provide reliable, clean and quiet backup power to critical infrastructure.

Small footprint, quiet operation and low weight allows for **flexible indoor/outdoor installation**

Remote monitoring allows the customer to monitor fuel volume and performance data and

range can be extended indefinitely through onsite hydrogen storage

Zero-emission operation with low noise and no vibration

Customizable power output up to 60kW or higher for special customer requirements

7,000 hours operating lifetime for typical backup power applications

Fully integrated power management system

Programmable self-test ensures system readiness

Available 'cold climate kit' for operation in extreme climates

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FUEL CELL STACKS		TYPICAL APPLICATIONS		
PRODUCT TYPE	PRODUCT NAME	Backup Power	Material Handling Equipment	Motive Power
AIR-COOLED	FCgen-1020ACS	✓	✓	
	FCgen-HPS			✓
LIQUID-COOLED	FCgen-LCS			✓
	FCVelocity-955L		✓	✓

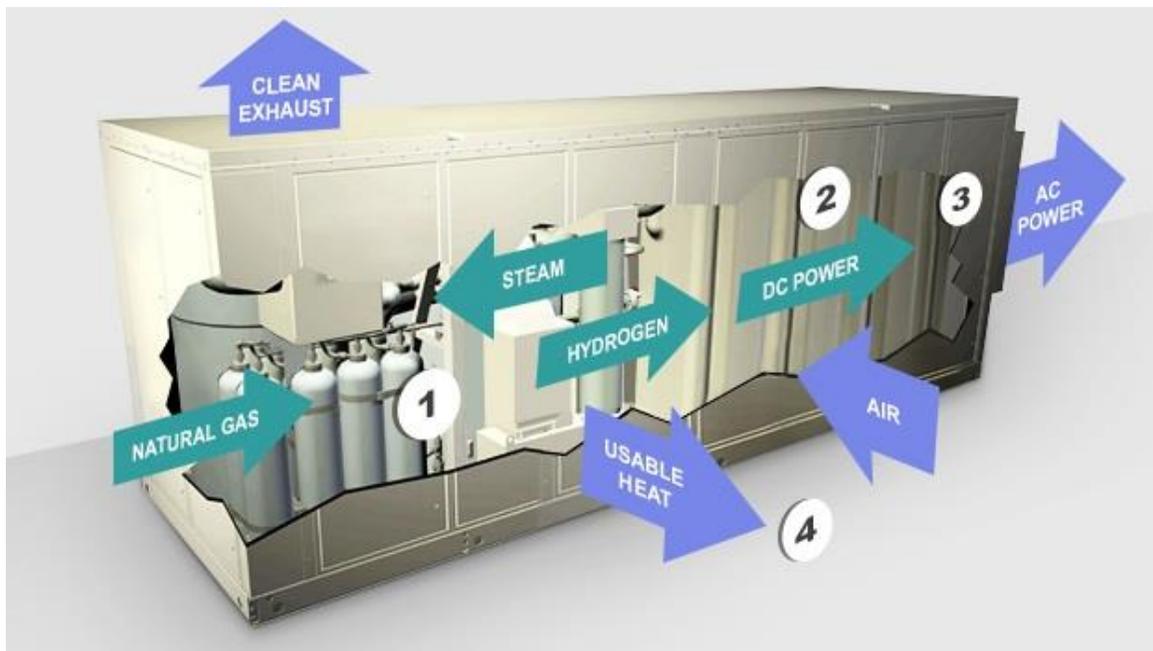
- Doosan Fuel Cell America, Inc.
195 Governor's Highway
South Windsor, CT 06074
Telephone: (860) 727-2253
www.doosanfuelcellamerica.com

The **Doosan PureCell® System** is a complete energy solution for **generating clean electricity and heat** with a market-leading energy efficiency and reliability.

PureCell® Systems can provide electricity and heat completely independent from the utility grid, keeping **critical operations running** in the face of power outages from **manmade and natural disasters**.

23 PureCell® Systems provided power in the face of massive black outs when **Super Storm Sandy** devastated the eastern seaboard (2012). A year earlier when a colossal winter storm hit Connecticut, knocking out utility power for more than ten days, **PureCell® Systems provided non-stop power for three local emergency shelters**. Also in 2011, when a **blackout** left thousands of **San Diego** area residents in the dark, a **lone grocery store, powered by a PureCell Model 400**, served as a beacon to an otherwise frightened community.

PureCell Systems are an ongoing, **cost savings energy** strategy that stands resilient in the face of catastrophe. Pure Cell Systems offer **freedom** from the noise and **pollution of a backup generator**.



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- FuelCell Energy
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Danbury, CT 06810
Telephone: 203-825-6000
www.fuelcellenergy.com

Carbonate SureSource™ products from FuelCell Energy deliver **ultra-clean distributed power** efficiently and economically. These fuel cell solutions provide distinct advantages over other forms of distributed power generation, including:

- **Fuel flexibility** with the ability to operate on readily available **natural gas or renewable biogas**
- Virtually no pollution as SureSource plants emit only trace levels of nitrogen oxide (NOx), sulfur oxide (SOx) or particulate matter
-

The clean air profile of the SureSource product facilitates clean air permitting, reducing permitting costs and approval time. The **SureSource 3000 and SureSource 1500** are designated as **“Ultra-Clean”** under 2007 **California Air Resources Board (CARB) standards**, reinforcing the environmental benefits of fuel cells.

These versatile power generation solutions are available in **different sizes and configurations** to address a customer’s specific needs, including natural gas letdown station energy recovery, **fuel cell carbon capture**, and **distributed hydrogen**

Featuring **ultra-low emissions, quiet operation and minimal space requirements** (about the size of a tennis court), the SureSource 1500 is suitable for locations where combustion-based traditional power generation technologies are not feasible or desirable, such as next to buildings or in space-constrained urban locations

- Nedstack fuel cell technology BV
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The Netherlands
Telephone: +31 (0)26 319 7600
www.nedstack.com

Nedstack produces **Proton Exchange Membrane (PEM) hydrogen fuel cells**, the most versatile type of fuel cells available. Nedstack’s customers integrate these into systems to power various applications:

- **Backup electricity supply for telecom, rail and utilities, as a replacement for batteries.** Fuel cells are environmentally friendly and have a very high reliability and life span

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- **Continuous power** supply for **telecom base stations** and radio towers in developing countries, to replace diesel generators. Fuel cells have low fuel and maintenance costs, and generate no noise or fine particles.
- Continuous energy supply in the chlorine, caustic soda and sodium chlorate industries through conversion of the by-product hydrogen
- **Electricity supply for electric city buses**, as a replacement for diesel-powered vehicles, trolleys and trams.
- Nedstack is the **largest independent PEM fuel cell producer** in **Europe** and the **second worldwide**.

