

## Fuel Cells and Natural Gas

Fuel cells generate electricity using an electrochemical reaction, not combustion, producing zero or near-zero polluting emissions, depending on the fuel source. For larger stationary fuel cell systems, natural gas is the most common feedstock, relying on the widespread infrastructure of natural gas pipelines throughout the U.S. Some natural gas-fueled fuel cells have been running for more than a decade.

### Fuel Cells and Natural Gas Benefits

Fuel cells are providing both primary power and back-up power to hundreds of sites across the country in a range of applications, including data centers, utilities, businesses, condominiums, grocers, hospitals, and more. Able to be installed as part of the electric grid, or in parallel to it, fuel cells provide seamless and reliable power without disruption due to grid failure or blackouts.

Within in the fuel cell system, hydrogen is stripped from natural gas, commonly via steam reformation, and then converted into electricity, with useful heat as by-product. Since this is a chemical reaction, not combustion, fuel cells are inherently more efficient than conventional technologies, reaching efficiencies of around 50%, much higher compared to combined cycle power plants, which are about 33% efficient. If configured as a combined heat and power (CHP) system, where the excess heat is captured for hot water, space heating, and cooling, fuel cells can reach efficiencies of 85-90%.

Fuel cells running off natural gas are also much cleaner than conventional power plants, creating less than one ounce of greenhouse gases per 1,000 kilowatt-hours of electricity produced, compared to 25 pounds for the same amount of electricity generated by conventional combustion technologies. Emissions from fuel cells are so low that some states have exempted natural gas-fueled fuel cells from air permitting requirements.

### Fuel Cells and Natural Gas in Operation

The impressive customer list for fuel cells keeps growing and includes Fortune 500 companies such as Walmart, Google, Coca-Cola, Verizon, Apple, eBay, AT&T, and more. States in storm-prone areas are also investing in resiliency and micro grid projects involving fuel cells to ensure constant power through inclement weather.

In Japan, there are now more than 100,000 natural gas fuel cells powering homes throughout the country, generating electricity, heat and hot water, with demand continuing to grow.

The largest U.S. fuel cell installations are used by utility companies to supplement power directly to the grid. Dominion Power operates 14.9 MW of natural gas fuel cells in Bridgeport, Connecticut and Delmarva Power operates 30 MW of natural gas fuel cells in Delaware. More large-scale installations are planned in several states, including a proposed 63 MW fuel cell power park in Beacon Falls, Connecticut.



Fuel cells in operation in Bridgeport for Dominion Power (top) – Fuel cells at AT&T facility (bottom)