

A green data center with an autonomous power supply

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A new data center in the United States is generating electricity for its servers entirely from renewable sources, converting biogas from a sewage treatment plant into electricity and water. Siemens implemented the pilot project, which recently went into operation, together with Microsoft and FuelCell Energy. The data center is not connected to the public power grid. Siemens developed and installed intelligent control and monitoring technology for the plant as well as energy management

software so that the servers can be reliably supplied with electricity at all times. The partners intend to demonstrate that using intelligent hardware and software, even critical installations such as data centers can be reliably operated with alternative energy sources.

The small pilot system in Cheyenne, Wyoming, consists of 200 servers and is connected to the Supercomputing Center of the University of Wyoming. The methane used to generate [electricity](#) begins as biogas in the sewage treatment plant's digestion tanks. It is conducted to the data center, where a 300-kilowatt (kW) fuel cell converts the gas into electricity through an electrochemical and thus combustion-free process. The data center will use around 100 kW of the 250 kW of electricity produced for its own purposes. The [sewage treatment plant](#) will use the rest, thus lowering its own energy costs. The small pilot system must meet the same strict requirements as large data centers. The power supply to the servers must be absolutely reliable and uninterrupted in order to rule out expensive data losses. This also means that the power supply must meet high quality standards, since voltage peaks or dips lasting only a few milliseconds can cause an IT malfunction.

250 kilowatts of power from biogas and fuel cells

To maintain this level of reliability, Siemens developed the [energy management software](#) as well as intelligent control and monitoring technology for the entire [power supply](#). The system monitors the supply of biogas as well as the electricity produced and maintains a complete overview of fuel cell operation. The solution also ensures the necessary energy quality. In addition, the system issues early warnings to the data center operators if problems with the power quality occur or if the forecast power consumption exceeds the quantity generated.

Based on the information obtained with the monitoring system, the partners intend to demonstrate that [data centers](#) can be reliably supplied

with power through a combination of biogas and fuel cells. Siemens developed the solution specifically for this data center based on the parameters provided by Microsoft and the [fuel cell](#) manufacturer. The goal is to expand the project in a subsequent step from a pilot installation to a large-scale system.

Provided by Siemens

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