Healthy hospitals use combined heat and power

By improving your hospital’s efficiency and the health of your bottom line using combined heat and power solutions, you’ll also create a healthier environment for your community.
Better health for your hospital with gas engines

Facing significant challenges

You know from experience that hospitals are large energy consumers. With 24/7 energy demand, including heating and cooling, the typical hospital uses up to three times the energy of a commercial building. With such high energy usage, more efficient energy consumption can mean big savings. In fact, $1 million in energy savings translates to $34 million a hospital no longer has to raise in revenues to create profit. At present, healthcare is responsible for 8 percent of the carbon footprint and proposed emissions taxes in some places could add to the high energy costs hospitals already pay.

Despite the need for steady power, outages at hospitals aren’t unusual, and when they occur, lives can be in danger. Between 2002 and 2011, 1,450 hospitals in the U.S. were exposed to hurricanes, and more than three-quarters of the power outages associated with hurricanes lasted over 24 hours. In addition to the increased frequency and intensity of extreme weather, grid deterioration can cause power loss. Hospitals literally can’t afford to lose power. A typical 800-bed hospital loses $9.2 million per day in revenue if it has no power. Obviously, energy factors—from high costs and a high carbon footprint to the possibility of power losses—can have a major effect on the health of your hospital’s bottom line. You need to make yourself more resilient, while saving money and carbon at the same time.

Faster growth with gas engines

GE’s combined heat and power (CHP) solutions not only provide onsite electricity, heat and cooling for hospitals, but they are also more resilient and are less susceptible to natural disasters than are more traditional power technologies. That means your hospital will be able to deliver its services both pre- and post-disaster. Combined heat and power uses a gas engine to generate electricity, and it uses the waste heat of the engine to heat and cool your hospital. It can increase fuel efficiency from 45% to 95% or more. So you’ll use less energy and save carbon—a cost saving for you and an environmental saving for your community. Lack of capital is not a barrier either. With our financing approach, you need no up-front capital, and the project is paid for out of savings. That means you can concentrate on healthcare, and we’ll help you with a healthy bottom line and a healthier environment.

How does CHP work in hospitals?

Who couldn’t use an insurance policy that delivers a payout, even if there isn’t a disaster? That’s the theory behind GE’s combined heat and power solutions, which start with ... The Jenbacher concept

CHP systems use the waste heat incurred during engine operation to generate overall plant efficiencies of up to 95 percent. By using both the heat and the power generated by the Jenbacher gas engine, the hospital can achieve primary energy savings of around 40 percent, as shown on the right.

Most hospitals need cooling in addition to heat and power to ensure critical systems can operate and to provide a suitable patient environment. A trigeneration solution is also available, as seen here.

<table>
<thead>
<tr>
<th>Fuel gas</th>
<th>Condenser plant</th>
<th>Heat exchanger</th>
<th>Cooling tower</th>
<th>Buffer</th>
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<tbody>
<tr>
<td>1.25 kWh</td>
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Framework requirements

The Jenbacher solution delivers the highest efficiency, quality and cost savings when it is sized to deliver the baseload of the hospital and is able to run 24/7. Combined heat and power is suitable for almost all hospitals but works best when the base electrical load is 500 KW or more and use for heat and cooling is diverse.

Information needed for CHP energy study

- Data on energy consumption and cost (heat and electricity)
- Changes in infrastructure (medium and long term) that affect energy consumption
- Determination of whether or not existing equipment can cover increased demand for cooling and air conditioning
- Information on your plans to:
  - Develop new operating rooms, clinics, etc.
  - Lower heating demand through efficiency measures at the building
  - Outsourcing or increasing size of the laundry or the kitchen facility
- Status of your boiler: aging and requiring replacement, or under-designed

Jenbacher technology advantages

Efficient
The system achieves overall efficiency levels of up to 95 percent.

Flexible
Upgrades can take place in most preexisting sites as well as in new built sites.

Reliable
With more than 14,500 Jenbacher systems installed globally, the technology is well proven around the globe.

Resilient and robust
GE’s solution means you don’t have to rely on the grid alone to ensure your hospital has the power it needs 24/7.

Cost and carbon savings
With combined heat and power from GE, your savings of both costs and carbon can be significant. Plus, with GE, a lack of capital is not prohibitive; with our financing approach, you need no up-front capital, and the project is paid for out of savings.
GE’s distributed power hospital cogeneration product range

GE’s Jenbacher gas engines have a track record of more than half a century and over 14,500 installations. The main production facility, located in Jenbach, Austria, leads the development and production of gas-fueled reciprocating engines, packaged generator sets, and cogeneration units for the efficient generation of power and heat. With a power range of 200 kW to 9.5 MW, Jenbacher engines run on either natural gas or a variety of other gases (e.g., biogas, landfill gas, coal mine gas, sewage gas, combustible industrial waste gases). For higher power needs, one of our reliable, flexible, highly efficient aeroderivative gas turbines based on GE’s long-lasting Aviation heritage can be an interesting option. At the Texas Medical Center in Houston, Texas, GE’s LM6000 PD Sprint* aeroderivative gas turbine is providing 48 MW of power since 2010. The turbine exhaust is used to generate steam for the physical plant at the medical facility.

GE’s convenient Hospital package

With our standardized approach to hospital cogeneration technology, the Jenbacher gas engine, catalytic converter, heat exchanger and all balance-of-plant equipment and controls are provided in one convenient package. GE’s hospital experts can help develop your balance-of-plant specifications and perform engineering and site design work to meet your spatial requirements. Our standardized package makes your service experience easier, too, since the generator and all other installations can be removed at the same time.

A smart addition: Delivering a healthier financial bottom line

With Jenbacher CHP solutions, payback is typically in two to five years. You’ll experience 10 to 20 percent—or 6 cents/kWh—in electricity cost reduction, and gas and electricity costs will be reduced by 30 percent. Your insurance premiums will go down, too. Finally, with our financing approach, you could need no up-front capital, and the project is paid for out of savings.

GE’s Jenbacher hospital solutions deliver resilient infrastructure and keep hospitals running during disasters. For example, despite having diesel backups, many hospitals went dark during Hurricane Sandy in 2012. While six New York City hospitals and 12 New Jersey residential care facilities closed, areas sites where CHP was designed to operate during a grid outage did not stop working.
We are at your service

With a full range of product offerings and a global network of service providers, Distributed Power from GE can help ensure your reciprocating engines or gas turbines run reliably – anywhere and anytime. As a user of GE’s Distributed Power products, you can benefit from a comprehensive portfolio of service offerings that can reduce your maintenance costs and help ensure the availability of your equipment.

Higher asset availability with advanced technology

Our Conversion, Modification and Upgrade (CM&U) offerings provide several performance improvements in reliability, availability, maintainability, efficiency, performance, emissions reduction and safety. Additionally, GE Predictivity solutions harness the power of Big Data to lift existing assets to new levels of performance and profitability. The collection of Predictivity assets provides real-time information to forecast service events, analyze issues, and take proactive steps to achieve your desired operating, compliance and safety outcomes.

Lower costs, less downtime, and 24/7 global service

You operate your equipment around the clock and around the world, and GE is right there at your service. Our Remote Monitoring & Diagnostic (RM&D) technology cuts costs and boosts equipment availability with immediate intervention whenever and wherever you need our help. Additionally, GE’s services network is supported by our authorized service providers in more than 170 countries. When your reciprocating engine or gas turbine reaches the end of its life cycle, we can replace it onsite with a new or overhauled engine or gas turbine, or repower your asset with an original GE unit.

Versatile service agreements fit maintenance to your needs

GE’s contractual service agreements (CSAs) help distribute the costs of major maintenance events across the life of your equipment while reducing risk with customizable performance guarantees. Our CSAs cost-effectively integrate the latest OEM technical knowledge, a full range of remote monitoring and diagnostics solutions, field service, original spare parts and repairs. In addition, we can protect your investment by improving operational productivity through guaranteed availability and reduced costs.

Experience

At GE, our tradition is innovation. We have three global research centers at our disposal. Plus, more than 400 engineers continuously work on the technological development of reciprocating engines. Their task is to develop more flexible, efficient, powerful and reliable energy solutions—always with your needs in mind.

Working with the leading engineers in the healthcare sector and our colleagues at GE Healthcare, we have developed a range of solutions that meet your specific needs. We can make your hospital more resilient, even as you reduce your non-clinical costs. And, in addition to saving you money, we can help reduce your carbon emissions. With GE’s plan, lack of capital isn’t a barrier, either—so you can focus on your core business of providing health care.

Seeking to reduce its energy costs and environmental impacts, London’s Guy’s and St. Thomas’ NHS Foundation Trust installed GE’s natural gas-fired CHP plants at Guy’s Hospital and St. Thomas’ Hospital in 2009. This saves more than 2.5 million USD in energy costs annually.

*Trademark of General Electric Company
GE Power & Water’s Distributed Power business is a leading provider of power equipment, engines and services, focused on power generation at or near the point of use. Distributed Power’s product portfolio includes highly efficient industrial reciprocating engines and aeroderivative gas turbines that generate 100 kW to 100 MW of power for numerous industries globally. Headquartered in Cincinnati, Ohio, Distributed Power from GE employs about 5,000 people around the world.

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