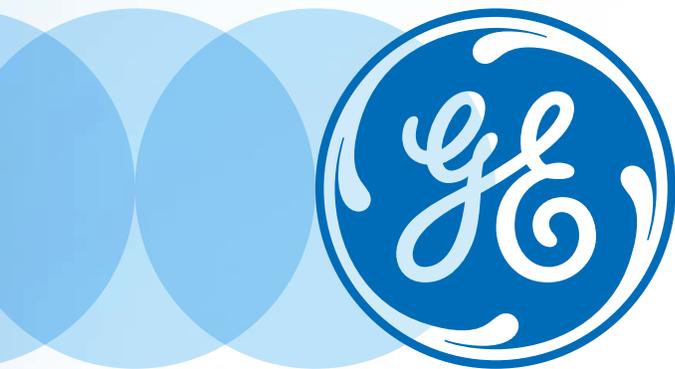


GE Power & Water
Distributed Power

Big Buildings lead to big savings

GE's combined heat and power solutions for commercial buildings and data centers can reduce your costs and emissions. Saving energy, money and the environment.



Your energy challenges

Shopping malls, hotels, data centers and office buildings—the structures that permeate cities in both developed and developing nations—are among the highest consumers of energy around the globe.

In the U.S. alone, more than 20 percent of all energy distributed each year is directed to commercial buildings, representing a significant proportion of their total operating costs.¹

As this sector is predicted to grow, the demand for energy is expected to increase with it. Commercial building developers, owners and users face steadily rising power costs, yet are faced with an increasingly limited ability to directly control grid electricity and fuel costs. Additional challenges include power shortages,

poor energy quality and stringent emissions standards, which can complicate planning, construction and operational issues for both large and small commercial buildings.

Data centers also struggle with insufficient power capacity from local or district electricity grids, as well as meeting stringent emissions and energy savings mandates. In fact, most of today's projects require developers to provide environmentally sensitive technologies.

The solution: Distributed Power from GE

It's time to consider a more efficient, sustainable, reliable, and profitable approach to maintaining the energy demands in your facility.

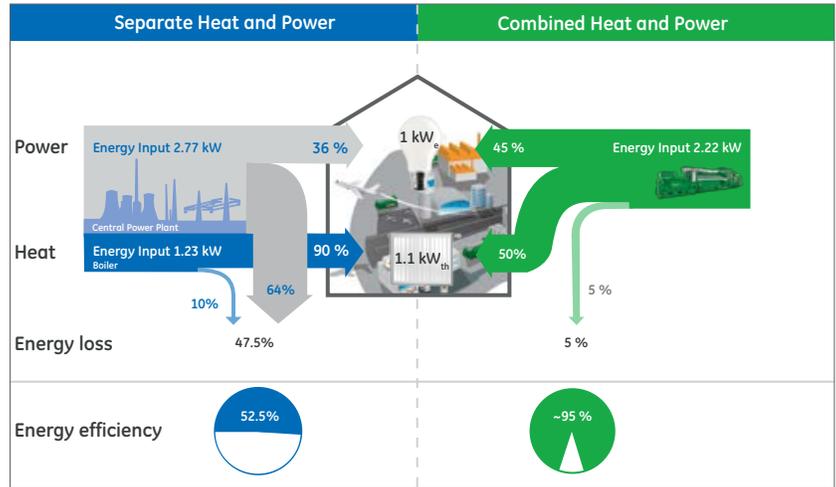
With a combined heat and power (CHP) system from GE's Distributed Power business, electricity and thermal energy are efficiently produced onsite for local consumption. CHP eliminates the wasteful process of purchasing electricity while separately burning fuel in an onsite boiler to produce heat. The system is further enhanced by avoiding the electricity losses that occur in the transport, transmission and distribution processes from the point of power generation to your facility.

CHP produces electrical and total (electrical + thermal) efficiencies of up to 45 percent and 95 percent, respectively. Thermal energy is released in the combustion process and can be used for preheating or generating steam, as well as a variety of process heating or cooling systems. In addition, surplus electricity can be exported to the power grid, often resulting in additional income. The result is a system that can provide significant efficiency, profitability and environmental advantages over individually generating heat and power for your facility.

¹ http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/cbea_annual_report_2012.pdf

How does CHP work in commercial buildings?

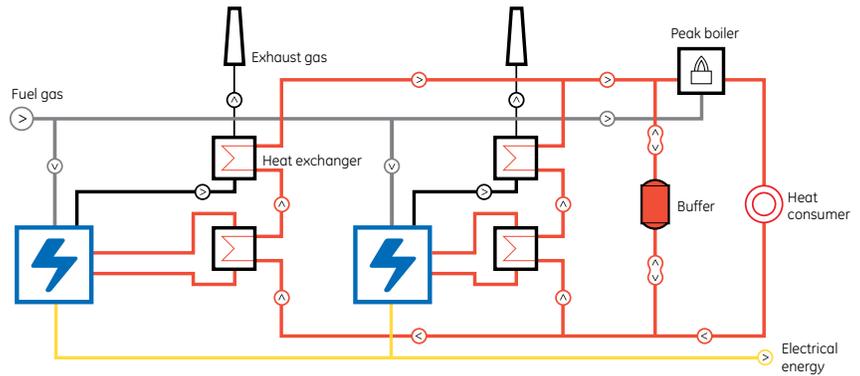
GE's CHP solutions generate electricity and thermal energy in a single, integrated system. Our systems can use most available heat sources, such as cooling water, lubricating oil, an air/fuel gas mixture, or exhaust gas. To meet thermal requirements, CHP plant modules can also be utilized with a boiler system or a heat storage medium, making the plant even more flexible and efficient.



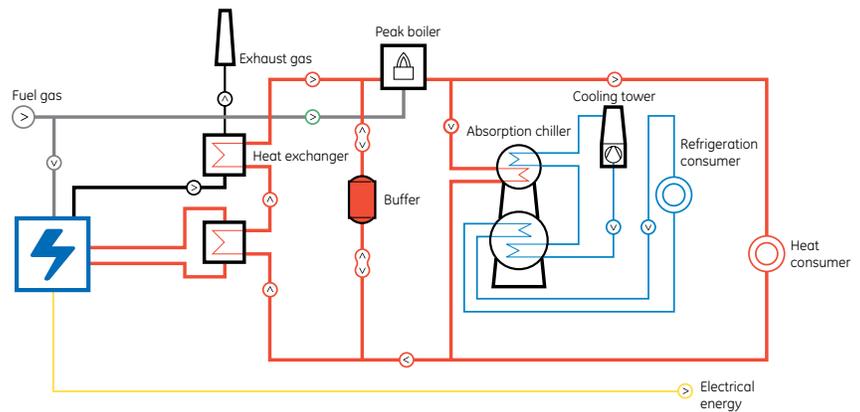
The above example depicts how combined heat and power can cut your energy use by more than 40 percent.

Beyond CHP: Trigeneration for commercial buildings

The combination of CHP with trigeneration creates a substantial advantage over traditional cooling methodology. With this system, an absorption chiller is linked to the CHP system using excess energy to generate chilled water for air conditioning or refrigeration. Absorption chillers have no moving parts—meaning no wear and lower maintenance expenses for you. Compared to compression chillers, the absorption system is nearly silent and offers low operating and life cycle costs. Since it uses water as a refrigerant, the absorption system releases no harmful substances into the atmosphere, im-proving the overall energy efficiency and environmental ratings of your buildings.



CHP based on natural gas



Trigeneration

 =   Aeroderivative gas turbine or Jenbacher gas engine

How does GE's CHP technology benefit you?



Energy cost savings

Up to 95 percent thermal efficiency can be achieved through our highly effective CHP solution. By maximizing power output based on local available fuel sources, energy costs can be lower and more controlled, resulting in less fuel burned per generated megawatt.



Environmental sustainability

The integrated combustion emissions control system helps commercial buildings meet stringent global regulations, resulting in a lower carbon footprint. During base load operation, partial power requirements, or even extreme hot weather conditions, GE's CHP solution follows mandated emissions regulations. For example, a 1 MW CHP solution using one of GE's reciprocating engines could displace the equivalent CO₂ emissions of 800 European cars annually.

Our CHP solutions are ecomagination* certified because of their reduced emissions, cost effectiveness and efficiency. Ecomagination certification is GE's commitment to building

innovation solutions that drive economic growth while addressing environmental challenges. To learn more about ecomagination, visit www.ge.com/ecomagination.



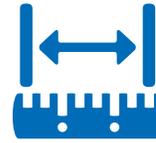
Flexible power

Power generated from a CHP system can be used onsite or delivered to the grid based on locational needs. Similarly, thermal energy that is generated can be managed to meet your specific requirements, stored for use later or used for tri-generation to meet your air conditioning or refrigeration demands. This flexibility minimizes system risk while maximizing your return on the investment.



Resilient power

GE's CHP solutions mean you don't have to rely on the grid alone to ensure your facility has the reliable power it needs 24/7. Our integrated systems can be designed to comply with International Building Code (IBC) standards for earthquakes and other natural disasters, providing additional energy security for your facilities.



Standardized design

The compact, modular design of our CHP products creates a smaller footprint and can be scaled to fit the unique requirements of your existing or new facilities.



Reliable

With more than 37,000 Distributed Power products installed in more than 170 countries, GE's technology is well proven throughout the globe.

GE's distributed power CHP product range



Framework requirements



Although GE's CHP solutions can be flexibly adapted to your individual site conditions, certain requirements may need to be met to build and successfully operate your facility. GE works with you to ensure your specific requirements are met, including:

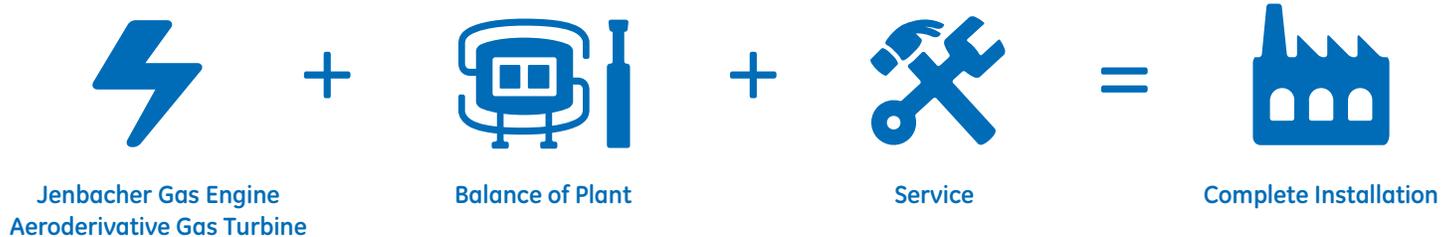
- License/permission
- Gas connection/LNG connection
- Electricity link to the grid
- Heat/refrigeration requirements
- Cooling requirements
- Balance-of-plant requirements

GE's convenient CHP package

Our standardized CHP package includes the GE range of reciprocating engines or aeroderivative gas turbines, as well as a number of easy-to-add optional components, including our catalytic converter, heat exchanger and all balance-of-plant equipment

and controls. GE's experts can help develop your balance-of-plant specifications and perform engineering and site design work to meet your individual requirements.

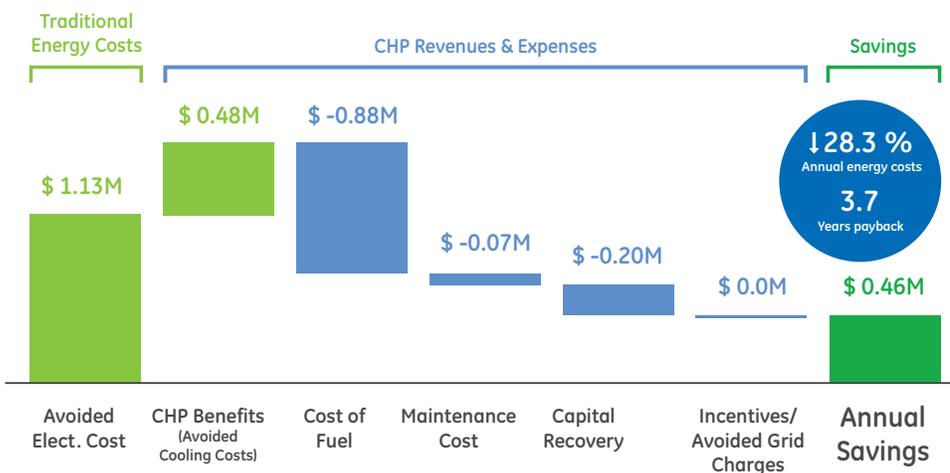
Our standardized packages make your service experience easier, too, since the generator and all other installation components can be removed at the same time.



The economics: How it all comes together

The following examples, based on typical projects in the United Kingdom and China, highlight the economic benefits of the CHP solution for a commercial building and data center. Please note that the results will vary according to local conditions, such as incentives and gas prices, as well as type of building.

UK Commercial Building

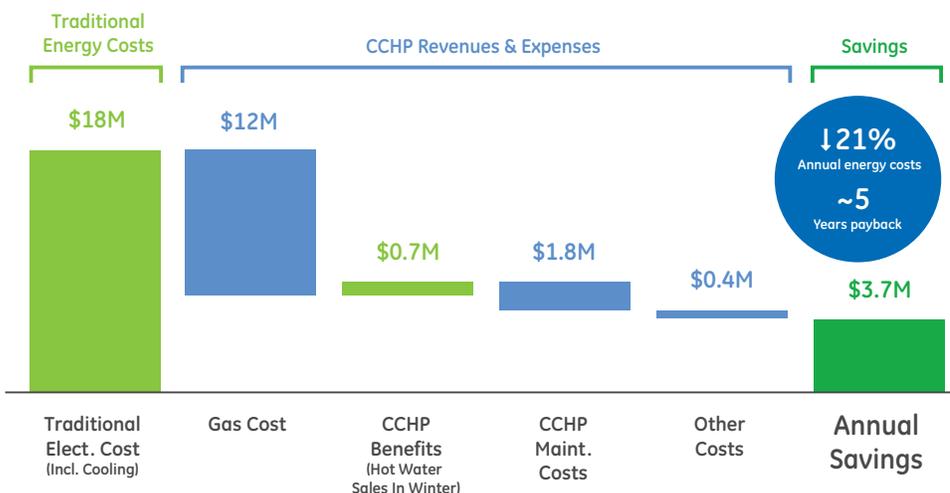


Key assumptions

Power load	1.78 MW
CHP Size	1.84 MW replacing 81% efficient boiler, heat optimized
CHP operations	5,300 hr/yr
Gas Price	\$11.72 MMBTU (LHV)
Commercial tariff	\$0.048/kWh
Maintenance cost	\$13.1/h
Payback Period	3.7 years

This commercial building example highlights the benefits of GE's CHP solution using two Jenbacher J412 gas engines. Results will vary according to local and regional conditions; gas and electricity prices are based on August 2014 economics.

Beijing Data Center



Key assumptions

CHP Power	13.3 MW (J620 x 4 + 1)
CHP operating hours	8,640 hr/yr
Gas price	\$12.26 MMBTU (Beijing CHP preferential price)
Commercial tariff	\$0.14/kWh (weighted average)
Heat price	\$0.04/kWh
Maintenance cost	\$0.016/kWh
<i>Absolute dollar values</i>	
Payback Period	~5 years

This data center example highlights the benefits of GE's trigeneration (CCHP) solution using five Jenbacher J620 gas engines. The analysis is based on an ongoing data center project in Beijing and not actual data center economics. Results will vary according to local and regional conditions; gas and electricity prices are based on August 2014 economics.

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

You operate your equipment around the clock and around the world, and GE is right at your service. With technology-based solutions and our global network of support engineers, we are ready 24/7 to provide assistance.

Remote monitoring & diagnostics

Power Advisor from GE Predictivity* cuts costs and boosts equipment availability with immediate intervention whenever and wherever you need our help. With remote monitoring & diagnostics, you get proactive data analysis, which includes pressures, temperatures and ignition parameters that provide important engine performance information and guide service planning. Power Advisor provides big advantages for your facility: reduced downtime, more plant availability, less corrective maintenance expense, online monitoring and control of engine parameters, and remote software updates for increased engine performance.

Global service distribution centers

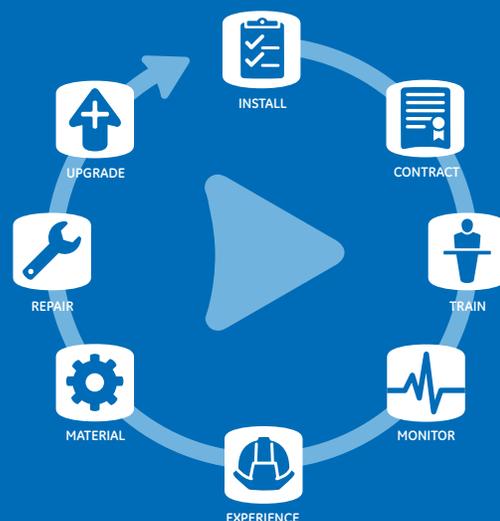
With both local and regional coverage, our global service distribution centers operate as centralized warehouses to provide higher availability of complete spare parts shipments and on-time delivery. This means you will benefit from faster processes and quicker fulfillment of your spare parts needs.

Global service network

In addition to our service locations, our global service network is supported by GE's authorized service providers in more than 170 countries. GE's services team provides the highest quality parts, tools and technical support to reduce your downtime and operating costs throughout the life cycle of your unit.

Exchange, overhaul and repowering programs

When your reciprocating engine or gas turbine reaches the end of its life cycle, we can replace it onsite with a new or overhauled unit, or we can repower your asset with an original GE unit. Our equipment meets the latest technology standards for your needs, and by upgrading, overhauling or replacing your existing equipment, you avoid the cost of new plant infrastructure while substantially improving thermal and fuel efficiency, power output, availability, and emissions control.



Full range of service offerings ... once it starts, we never stop.

Cases in point – Solving your challenges

CNPC Data Center China



Requirements

Total construction area	64,000 m ² (including data center 31,000 m ² , energy station 9,000 m ² , and office building 14,000 m ²)
Number of Racks	2,500 (phase I)
Power load (Peak)	14,323 kW
Cooling load	20,200 kW
Thermal load (Winter)	1,950 kW

Solution

CCHP gas engines	GE J620 x 5 (4 + 1)
CCHP power capacity	14.3 MW
Annual power output	100,146.5 MWh
Investor & Operator	Beijing Gas Company

Value

Data center availability	LEVEL A
Environmental benefits	Emission reduction of 61,800 tons of CO ₂ , and 5,100 tons of SO ₂ .

Cases in point – Solving your challenges

Coca-Cola Hellenic Bottling Company S.A. Romania



Requirements

To support the European Commission's goal of adopting stringent environmental targets to help member countries achieve a 20% reduction in emissions by 2020, Coca-Cola Hellenic Bottling Company and energy development company ContourGlobal needed to find an efficient solution to power their new plant in Romania.

Solution

CCHP gas engines	GE J620 x 2
CCHP power capacity	3 MW
Fuel	Natural gas
Hot Water	2,048 kW
Investor & Operator	Coca-Cola Hellenic Bottling Company S.A.
Commissioning	2009

Value

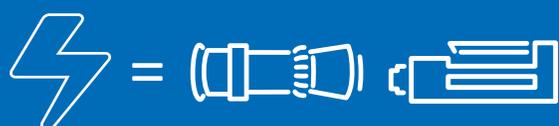
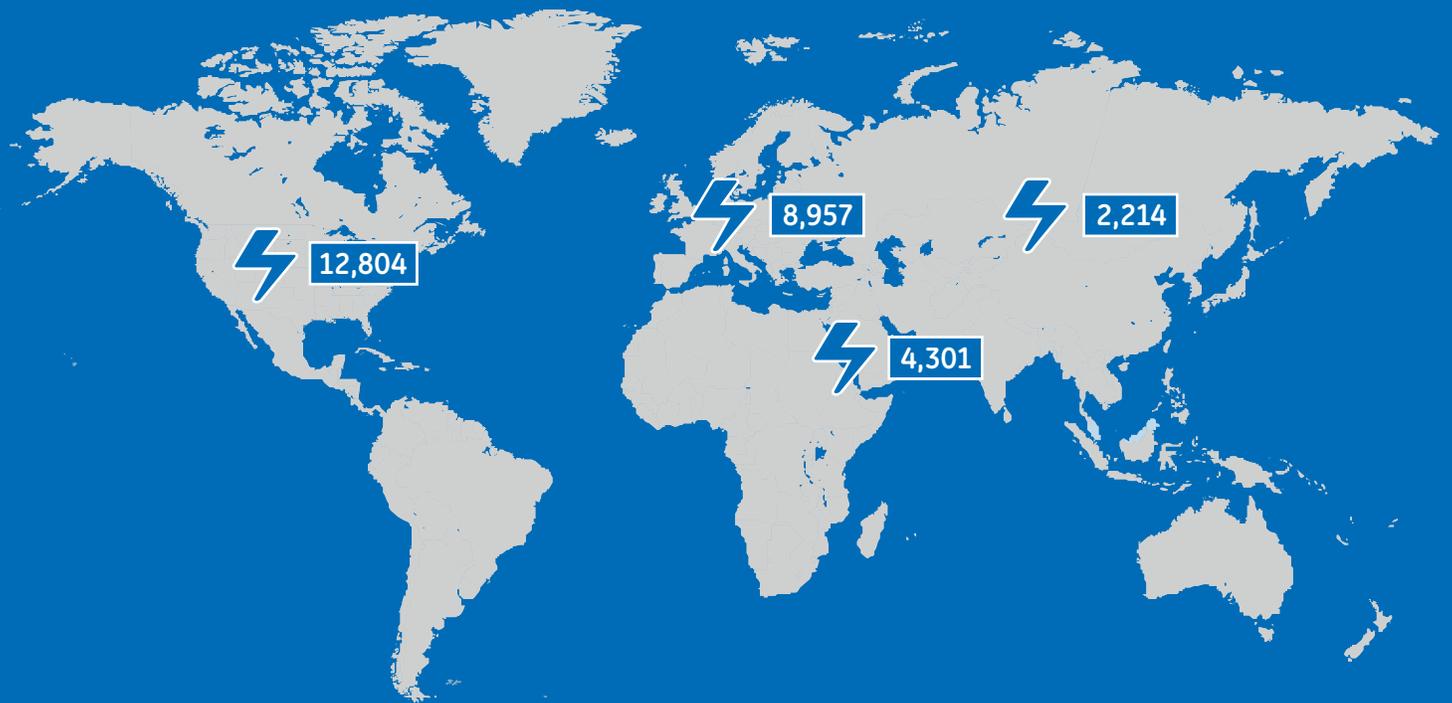
Electrical Efficiency	42.4%
Total Efficiency	90%+
Environmental benefits	Reduces CO ₂ emissions by 40%; supports European Commission's goal to achieve a 20% reduction in emissions by 2020; reduces operational costs

A tradition of innovation

At GE, seven global research centers and more than 1,400 engineers work on the technological advancement of our Distributed Power engines and turbines. Their task is to develop more flexible, efficient, powerful and reliable energy solutions—always with your needs in mind. Today, our products provide some of the most advanced technologies in the world, and we pride ourselves on working with you to determine local solutions to your toughest challenges.

Let GE's Distributed Power CHP solutions make your commercial building more efficient, sustainable, reliable and profitable—all while cutting carbon emissions.

GE's experience in combined heat and power and industrial applications spans the globe.



Aeroderivative gas turbine delivered units and Jenbacher gas engine delivered units



www.ge-distributedpower.com

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.

We provide lifecycle support for more than 37,000 aeroderivative gas turbines and reciprocating engines worldwide to help you meet your business challenges and success metrics – anywhere and anytime. GE's global service network connects with you locally for rapid response to your service needs.

Headquartered in Cincinnati, Ohio, Distributed Power employs about 5,000 people around the world.

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Imagination at work

