

# Cogeneration

Combined Heat And Power Solutions  
For A Sustainable Future



# Cogeneration. Better For Your Business, Better For The World.

Stricter emissions regulations, fiercer competition and the need for greater efficiency: all are driving power users to rethink their energy strategies. Presented with these challenges, they need to maximize efficiency to cut energy consumption and operation costs while contributing to a cleaner, greener world.

In their quest for more sustainable, productive energy solutions, operators are turning to cogeneration systems - also called combined heat and power (CHP) systems – which simultaneously produce electrical and thermal energy from a single fuel source. Cogeneration not only drives efficiency and cuts costs, but helps users comply with emissions standards and, in some countries, earn 'green' credits, which they can sell or use to offset emissions.

As part of Cummins Power Generation, Cummins Energy Solutions Business (ESB) has the specialist expertise to help your organization convert all the benefits cogeneration offers.



The Cummins ESB Cogeneration Marque.  
Look for it on all our Cogeneration content  
and materials..

# Making Cost-Efficient And Sustainable Energy A Reality.

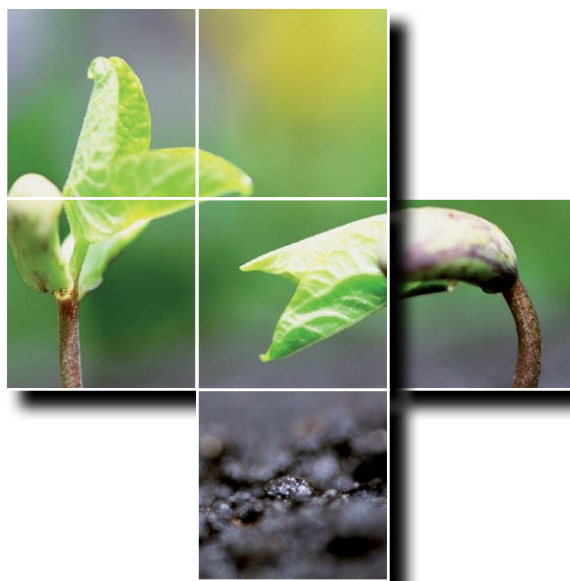
## Achieving today's energy goals

What if you could increase energy productivity and use less fuel, lower costs and reduce carbon emissions? Cogeneration makes it possible by generating electric power and reusing the waste heat created to provide steam, hot water and heating. The result is two forms of energy from one cost-efficient, low-emissions system. There is another option – trigeneration. This technology adds absorption chillers to the cogeneration process to create cooling for air conditioning or refrigeration.



Both enable operators to accelerate return on investment (ROI) and comply with emissions standards. Plus, in many countries, self-contained on-site cogeneration plants can protect against grid volatility, delivering required capacity while optimizing reliability. Operators may also be able to sell surplus cogeneration power to the grid or other users for extra revenue and, depending on where they are, take advantage of environmental incentives programs and credits which can be traded at a profit or used to offset emissions.

All these benefits make cogeneration a positive commercial and environmental step for organizations worldwide.



## Cummins ESB – your specialist partner

Cummins ESB is ideally qualified to help you realize the opportunities of cogeneration. Harnessing the world-leading expertise of Cummins Power Generation and building our solutions around robust and efficient Cummins lean-burn gas fueled generator sets, we have the capability to deliver complete cogeneration plants for applications from 300 kW to 20 MW, anywhere in the world.

## Solutions for diverse applications

Cummins ESB knows from experience how cogeneration delivers considerable benefits to a vast range of applications. Cogeneration and trigeneration are particularly suited to manufacturing and industrial projects such as food processing, mining and commercial greenhousing, as well as public facilities such as airports, schools and landfills.

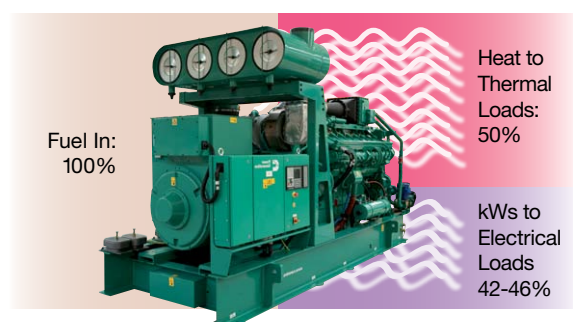


# How Cogeneration And Trigeneration Work.

**Our cogeneration and trigeneration solutions utilize Cummins lean-burn gas fueled generators to produce electricity, a heat recovery system to capture waste heat and with trigeneration, absorption chillers for cooling. Both approaches can achieve potential energy savings of 35% or more.**

## Cogeneration process

Our gas-fired cogeneration systems use proven Cummins engines to drive our lean-burn gas fueled generators to produce electricity. Waste heat from the engine exhaust flow and cooling circuits is extracted by a heat recovery system and used to produce steam or hot water for district heating, general heating or space heating.



## Trigeneration process

With trigeneration, absorption chillers are linked to the cogeneration process. These chillers use thermal energy streams generated by the heat recovery system to produce chilled water, which is then utilized for industrial process cooling, air conditioning and/or refrigeration.

## Powering diverse applications

Cogeneration and trigeneration are well suited to these facilities and more:

### Industrial

- Food, chemical & animal feed processing
- Manufacturing
- Paper mills
- Petroleum & coal products
- Pharmaceuticals
- Wood products

### Business

- Commercial bakeries
- Data centers
- Greenhouses
- Hospitals
- Hotels & health clubs
- Swimming pools & leisure resorts
- Offices
- Refrigerated warehouses

### Public projects

- Airports
- Government facilities
- Landfills & waste digesters
- Prisons
- Schools & colleges
- Water & wastewater plants

## How the energy can be used

The energy from cogeneration can be used for multiple purposes, from heating buildings and commercial greenhouses to producing heat for curing foodstuffs and hot water for industrial processes. Trigeneration, meanwhile, can provide cooling for everything from air conditioning to industrial processes.

# Getting More From Energy. Minimizing Costs And Emissions.

**By making optimal use of the energy within fuel and cutting emissions, cogeneration and trigeneration can increase operating efficiencies, create additional revenue and power a cleaner, better future.**

Cogeneration and trigeneration solutions from Cummins ESB offer these benefits:

## **Fuel efficiency**

Cogeneration systems can extract nearly three times the usable energy from a given amount of fuel compared to centralized coal-burning power plants, which only convert about 27% of fuel energy into usable electricity. On-site cogeneration plants, which burn natural gas or a variety of alternative gaseous fuels, with associated heat recovery, can provide up to 90% overall efficiency, maximizing ROI for power operators.

## **Reduced CO<sub>2</sub> and NOx**

When fuel is consumed in an on-site cogeneration plant, it produces almost 80% less carbon dioxide (CO<sub>2</sub>) per unit of energy compared to a centralized coal-fired power plant. This reduction is compounded by the fact that Cummins lean-burn gas fueled generator sets emit very low levels of oxides of nitrogen (NOx) and near-zero particulate (PM) matter. And because these generator sets operate with natural gas and alternative gaseous fuels, they also displace more carbon-intensive fuels. In all these ways, Cummins cogeneration solutions enhance sustainability and help ensure compliance with worldwide emissions standards, giving operators important reassurance.

## **Cost savings**

By making continuous use of electricity and thermal energy, cogeneration can deliver up to 35% of overall energy savings depending on application and local gas vs. electricity costs. Operators may also be able to save further by claiming government emission-reduction rebates or incentives such as 'green' credits, which they can sell at a profit.

## **Greater reliability plus revenue potential**

Grid-independent cogeneration plants heighten the control operators have over their energy, providing absolute reliability and protecting against rising energy costs. Surplus power can also be sold to the grid or other users for additional revenue. Plus, Cummins lean-burn gas fueled generators run on ultra-dependable pipeline natural gas, or waste-to-energy gaseous fuels, increasing reliability further.

## **Social responsibility**

By adopting cogeneration, power operators can demonstrate their environmental responsibility, critical in maintaining a positive image within the world's business and consumer communities.



# Why Cummins Energy Solutions Business?

**No one knows cogeneration better than Cummins ESB. Add our durable gas-powered technologies and we are ideally equipped to get your cogeneration or trigeneration plant up and running.**

## **Robust systems**

Cummins lean-burn gas fueled generators operate reliably in high ambient temperatures and altitudes, making them ultra-robust. Combined with superb fuel efficiency, high heat quality and extended maintenance intervals, it's the performance you need to gain optimal returns from your investment.

## **Seamless functionality**

From the gas engine to the switchgear, we design and manufacture every part of our power generation equipment. It means you benefit from seamless functionality and single-source Cummins support – an advantage we call The Power of One™.

## **High fuel reliability**

Our lean-burn gas fueled generator sets run on pipeline gas and various alternative gaseous fuels including landfill and other biogases. This use of dependable, abundant non-fossil fuel sources ensures high supply predictability and reliability.

## **Total capability**

Cummins ESB has the know-how and resources to meet a huge variety of customer needs. Our turnkey service spans everything from site evaluation to installation and ongoing operation.

## **Proven experience**

We have an impressive record of implementing cogeneration projects worldwide. Our systems power everything from sports centers in China to food plants in the US and other facilities across every continent.



**Cummins installed a cogeneration plant at the flagship Royal North Shore Hospital in Sydney, Australia. The plant provides 4 MWe of base load power at peak periods, meeting the client's cost and efficiency requirements while producing less than 250mg/NM3 of oxides of nitrogen (NOx) emissions**



## Expertise You Can Count On Worldwide.

**With our world-class service and global support, you can count on Cummins as your cogeneration partner. Whatever your application or location, we have the skills and strength to meet all your cogeneration challenges.**

### **Turnkey packages**

Whatever your requirements, we offer a full turnkey service tailored to your goals. We start with an in-depth analysis of your site and energy usage to determine whether cogeneration is right for your operation. Depending on the findings, we then supply the complete package from planning to installation and commissioning. Plus, depending on your location, we can offer flexible financing options and power availability guarantees.

### **Powerful lifecycle support**

With 550 distributor locations and 5,200 sales and service centers worldwide, our global service network has the reach and resources to keep your facility operating at peak efficiency, wherever its location. Our lifecycle support can include everything from technical back up to preventive and 24/7 emergency maintenance, together with comprehensive warranties, customized service agreements and extensive parts availability. It's everything you need to convert maximum longevity and value from your systems.

### **The next step**

To discuss your needs and explore how Cummins cogeneration and trigeneration solutions can work for your organization, contact your local Cummins Power Generation distributor or visit:

**[www.cumminspower.com](http://www.cumminspower.com)**

### **Serving you with...**

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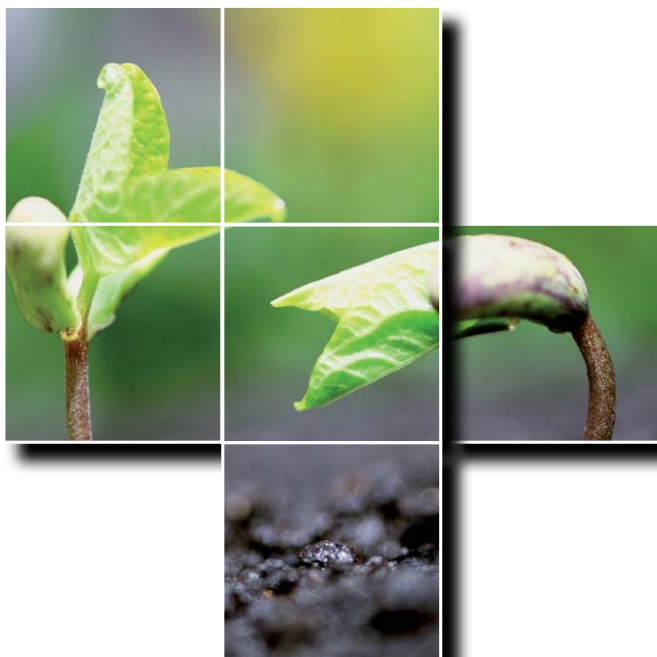
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**Africa**  
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Phone 27 11 589 8400  
 Fax 22 11 589 8468

**Asia Pacific**  
**10 Toh Guan Road, #07-01,**  
**TT International Tradepark**  
**Singapore 608838**

Phone 65 6417 2388  
 Fax 65 6417 2399

**Brazil**  
**Rua Jati, 310, Cumbica**  
**Guarulhos, SP 07180-900, Brazil**

Phone 55 11 2186 4195  
 Fax 55 11 2186 4729

**China**  
**No.2 Rongchang East Street**  
**Beijing Economic - Technological Development Area**  
**100176 P.R. China**

Phone 86 10 59023000  
 Fax 86 10 59023199

**Europe, CIS and Middle East**  
**Manston Park Columbus Ave.**  
**Manston Ramsgate, Kent CT12 5BF**  
**United Kingdom**

Phone 44 1843 255000  
 Fax 44 1843 255902

**India**  
**Power Generation Business Unit**  
**Down Town Centre**  
**8th Floor, B Wing**  
**Erandawana, India**  
**Pune 411 038**

Phone 91 (20) 3011 1274  
 Fax 91 (20) 6602 8090

**Latin America**  
**3350 Southwest 148th Ave.**  
**Suite 205, Miramar, FL 33027, USA**

Phone 1 954 431 5511  
 Fax 1 954 433 5797

**Mexico**  
**Eje 122 No. 200 Zona Industrial**  
**San Luis Potosí, S.L.P. 78395 Mexico**

Phone 52 444 870 6700  
 Fax 52 444 824 0082

**South Pacific**  
**2 Caribbean Drive, Scoresby,**  
**VIC 3179 Australia**

Phone 61 3 9765 3222  
 Fax 61 3 9765 3010

[www.cumminspower.com](http://www.cumminspower.com)



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