



2G. References.

Worldwide success with combined heat and power generation.

2G. Cogeneration.



In 40 countries

of the world, thousands of 2G power plants reliably supply buildings, industrial facilities and city districts with electricity and heat.

Millions of savings

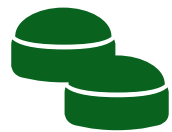
in energy costs, much to the delight of 2G power plant owners and operators all over the world.

10 billion kilowatt hours

of efficient, environmentally friendly electricity have been produced by 2G power plants since 1995.

Millions of tons of CO₂

have been saved by 2G power plants since 1995.



Biogas plants



Office and administration buildings



Chemical and petrochemical industry



Landfill sites



Shopping centers



Horticultural businesses



Hotels



Industry and commerce



Sewage treatment plants



Hospitals



Agricultural businesses



Food industry



Public facilities



Computing centers



Schools and universities



Swimming pools



Senior citizen centers



Sports and event centers



Heating networks



Hydrogen



Residential buildings

Wide-ranging fields of application.

2G power plants have demonstrated their strengths in many places: such as residential buildings, office and administrative buildings, schools, hotels, senior centres, hospitals and in a diverse array of industrial and commercial zones. Virtually any business is able to use combined heat and power generation.



Merck lives for innovation.

Founded in Darmstadt in 1668, Merck is the oldest pharmaceutical/chemical company in the world and currently has roughly 39,000 employees worldwide. The company stands for nearly 350 years of innovation with the goal of constantly improving people's quality of life. The people at Merck also focus on innovation in energy supply.

Innovative energy for pharmacy and chemistry.

The construction of a new tri-generation energy centre on the premises of Merck's main plant in Darmstadt, where 8,900 people work, will supply the pharmaceutical production and parts of the research division with self-produced electricity, heat and chilled water. Two avus 1500c combined heat and power plants were installed in the energy centre, each producing 1,560 kW of electrical power and 1,586 kW of thermal energy for heating and cooling requirements. Power, heat and cooling cogenerated in the CHP will save approx. 2,500 tons of CO₂ from being produced each year.

2G Energy AG: well-prepared for large-scale projects.

2G executive board member Ludger Holtkamp is in charge of production and project management. He considers the completion of the project to be another milestone in the history of 2G: "The plant at Merck once again demonstrates our expertise in the field of energy supply technology and reflects our ability to execute large-scale projects." The energy centre was opened by Germany's Minister of Economics and Merck CEO Karl-Ludwig Kley at a celebration in July 2014.

Customer/operator:	Merck KGaA
Field of use:	Chemical and pharmaceutical industry
Location:	Darmstadt Germany
CHP type:	2 x avus 1500c
Gas type:	Natural gas
Electrical output:	2 x 1,560 kW
Thermal output:	2 x 1,586 kW
Installation:	Engine room
Accessories:	Absorption chiller





THREE RIVERS LANDFILL



Highly practical pilot project.

An avus 1000c performs genuine pioneering work in renewable energy in Pontotoc, Mississippi: The high-performance module takes advantage of the gas which builds up in the Three Rivers Solid Waste Landfill and uses it to supply nearly 1,000 households in the area with electricity and heat.

Landfill gas supplies 1,000 houses with energy.

The avus 1000c with an electrical output of 1.2 MW was successfully installed and put into commission in Pontotoc, Mississippi, for a pilot renewable energy project in the region. The module uses the gas which builds up at the Three Rivers Solid Waste Landfill in a highly efficient manner and can supply up to 1,000 households in the area with electricity and heat. It accomplishes this by using gas collectors and a connected piping system to route the accumulated gas to the 2G CHP module where it is transformed into electricity and heat.

Easy access to the entire plant complex.

Major features that set this project apart include the plant's easy accessibility and highly practical planning. For instance, the plant complex allows you to walk from the office straight to the control room, or access the 2G module's engine room directly from the workshop. The plant's peripherals also make use of the established German technology such as. 2G's gas treatment modules that are used to remove moisture and contamination to ensure optimal gas quality is delivered to the CHP to ensure the operating life of the engine is not compromised.

Innovative plants like the one in Pontotoc make a major contribution towards raising awareness in the USA of the possibilities which combined heat & power generation has to offer, thus helping to increase its enormous market potential.

Customer/operator:	Three Rivers Solid Waste Landfill
Field of use:	Landfill
Location:	Pontotoc, MS USA
CHP type:	avus 1000c
Gas type:	Landfill gas
Electrical output:	1,200 kW
Thermal output:	1,196 kW
Installation:	Container
Accessories:	Gas treatment system (cooling & activated carbon filtration)





High-grade energy out of waste.

One of the first 2G plants in Estonia is producing heat and power from gas produced from rotting household waste. The gas known as landfill gas accumulates when organic household waste decomposes. With using this gas within a 2G CHP, Uikala prügila AS of Kukruse, Estonia, is making an important contribution towards protecting the climate.

Clean solution with added value.

When waste decomposes in a landfill, the biochemical processes (primarily in the organic material in the waste) gives off various gases, which are collectively referred to as “landfill gas.” The main components of landfill gas are methane (CH₄) and carbon dioxide (CO₂). Methane, like carbon dioxide, also contributes to the greenhouse effect. Reclaiming landfill gas for utilisation in a CHP plant provides valuable energy, and contributes towards protecting the climate.

The 2G filius with intelligent control.

The landfill makes use of two filius CHPs with an electrical output of 150 kW each. The two high-performance compact modules were delivered connection-ready in a single container. The plant runs at full load unless the methane content in the landfill gas is not sufficient, in which case the 2G special control unit detect the methane level and regulates the modules’ output to maintain optimal performance. The electricity produced in the cogeneration process is fed into the public power grid and the available engine and exhaust heat is used to heat the administrative building on the landfill premises.

Customer/operator: Uikala prügila AS
Field of use: Landfill
Location: Kukruse | Estonia
CHP type: 2 x filius 206
Gas type: Landfill gas
Electrical output: 2 x 150 kW
Thermal output: 2 x 179 kW
Installation: filius container





Power is a by-product.

Every big city in Germany has a METRO Cash & Carry wholesale market to serve the needs of commercial customers. The markets in Düsseldorf and Berlin-Marienfelde produce their own heat and power in cooperation with E.ON Connecting Energies, an E.ON subsidiary specialising in integrated energy solutions.

Ensure supply and reduce energy costs.

A METRO Cash & Carry wholesale market consumes a lot of energy – for refrigeration, lighting, air conditioning, heating and IT. In light of rising energy costs, it's no wonder that energy efficiency is becoming a major issue throughout the entire corporation. The goal is to deliver secure low carbon energy supply for the long term and reduce costs at the same time. Heat & power cogeneration is an important element in the corporation's energy strategy. What this means for the METRO markets is: the wholesale markets' need for heat determines the CHP's operation – the electricity is a "by-product." The main focus is thus on high-efficiency heat energy generation.

Energy partnership METRO and E.ON.

With E.ON Connecting Energies GmbH (ECT), a specialist in integrated energy solutions in the field of decentralised generation and energy efficiency, METRO has gained a long-term cooperation partner for the project. The E.ON subsidiary designs and implements measures for sustainably reducing energy and operating costs for its customers. With the agenitor 306 from 2G, METRO produces roughly a quarter of the markets' electricity requirements and all of the heat energy it needs for heating, air conditioning and hot water supply on its own. 2G delivered the plant as a factory built containerised unit to ECT's specification which allowed for simple installation and commissioning by ECT. The total efficiency level is more than 85 percent, which significantly reduces energy expenses. In addition, the 2G machines reduce CO₂ emissions by nearly 20 percent, thus making an important contribution to climate protection as well. ECT's control centre monitors the plants to ensure optimal operation. METRO AG Energy Management organises gas procurement for the two power plants, while METRO Cash & Carry handles electricity and heat production itself.

Operator:	METRO Cash & Carry Deutschland GmbH
Operations management:	E.ON Connecting Energies GmbH
Field of use:	Shopping centre
Location:	Berlin and Düsseldorf Germany
CHP type:	agenitor 306
Gas type:	Natural gas
Electrical output:	250 kW
Thermal output:	290 kW
Installation:	Container





From the g-box to the company car.

Hotels and restaurants use large amounts of energy all year round so there is a drive in the sector to support technologies that offer energy savings. The Hotel Driland team used the g-box 20 to implement a highly original energy savings concept: it even powers up the company car.

g-box 20 provides power for e-vehicle.

Hotels' high year-round heating requirements makes them an ideal place to use CHP systems. The Hotel Driland in the Westphalian town of Gronau succeeded in increasing its share of energy for internal consumption in a highly innovative way: A g-box 20 provides the energy needed for daytime business at the hotel and restaurant. At night, when less electricity is needed, the 2G CHP is used to charge up the company car, a sporty Tesla S85. "By connecting the g-box to our in-house charging station for the company car, we've significantly increased our self-supply efficiency," explains hotel owner Thomas Berning-Motzkuhn.

An innovative contribution to environmental protection.

To round off the hotel's ecological approach, there is a 30 kW photovoltaic system on the roof to complement the CHP and the use of the electric car. "Our hotel's relatively high energy requirements have made way for a host of innovative concepts, which we are happy to take advantage of. Our team is proud of its collective contribution to climate protection," emphasises Berning-Motzkuhn.

Customer/operator:	Gasthof Driland
Field of use:	Hotel
Location:	Gronau Germany
CHP type:	g-box 20
Gas type:	Natural gas
Electrical output:	20 kW
Thermal output:	43 kW
Installation:	Engine room





Modernising a castle hotel.

The SportSchloss Velen is a four-star superior hotel in the Münsterland town of Velen. Built in 1240, the castle has delighted people with its fairytale-like charm. Today, modern gas condensing boilers in combination with a g-box 50 supply the hotel complex with electricity and heat.

€ 4,000 less energy expenses each month.

Opened in 1988, the hotel complex has 102 comfortable rooms and suites, 19 event rooms and two restaurants. The old boiler was replaced with a cascade of three gas condensing boilers in the first step of the modernisation in 2009. In the second stage of expansion in 2012, a combination of heat & power cogeneration and condensing was used: a cascade of two 115 kW gas condensing boilers and a g-box 50 with 50 kW of electrical output and 100 kW of thermal output. The g-box was estimated to run for 8,000 hours a year. The combination of condensing boiler with the g-box will save roughly € 4,000 in energy expenses each month.

Environmentally friendly heat for the swimming pool.

The output of the g-box 50 running on natural gas covers the hotel's base load in the summer months. The electricity generated is mostly used by the hotel itself. The heat is used to heat the swimming pool, amongst other things.

The g-box 50 was housed in a space-saving, purpose-built underground bunker next to the castle hotel's orangery, and can be accessed through a service passage. All that has to be done for the inspection due in ten years is to remove the bunker's cover plate and lift out the module with a crane. To connect the g-box 50 to the castle, a 170-metre-long trenchless pipeline was laid through the castle park and beneath the moat at a depth of three metres.

- Customer/operator:** Hotel SportSchloss Velen
- Field of use:** Hotel
- Location:** Velen | Germany
- CHP type:** g-box 50
- Gas type:** Natural gas
- Electrical output:** 50 kW
- Thermal output:** 100 kW
- Installation:** Engine room





Bavarian conviviality.

Opened in 2005, the Kempinski Hotel Berchtesgaden, (known as the InterContinental Berchtesgaden Resort until 2014) is a luxury-class hotel. The five-star superior hotel has 126 rooms and twelve suites, as well as three restaurants and a wellness and spa area. And a high-performance 2G power plant.

Holiday and work at 1,000 metre altitude.

With its exclusive location, the Kempinski Hotel Berchtesgaden is a very special kind of retreat and a great place to take a break from the everyday routine. Guests looking for exercise and fitness are also at the right address here: in addition to a generous spa section, the hotel offers breath-taking sport activities. All 138 rooms and suites offer a panoramic view of the Alps and lovely furnishings to match. Those who are hungry, thirsty or just looking to unwind can visit one of the many restaurants or bars and those on business trips will surely enjoy the refreshing opportunity to hold their meetings at an altitude of 1,000 metres in the modern convention area.

Extremely high efficiency enables feeding into the grid.

Travelling business people aren't the only ones driven to work at these airy heights. With the agenitor 406, a CHP from 2G dependably does its duty against the picturesque mountain backdrop. The operator uses the electrical and thermal energy generated to cover the luxury hotel's energy demand. Thanks to the agenitor series' outstanding efficiency, it regularly produces a surplus of electrical energy, which is then fed into the grid for a profit. The 2G CHP module was fitted within a sound capsule to ensure that when it was integrated into the hotel's existing heating rooms there would be no issue with noise generation.

Customer/operator:	Kempinski Hotel Berchtesgaden
Field of use:	Hotel
Location:	Berchtesgaden Germany
CHP type:	agenitor 406
Gas type:	Natural gas
Electrical output:	250 kW
Thermal output:	264 kW
Installation:	Sound capsule in an engine room





Eco-conscious printing.

The Essen-Kettwig Offsetdruckerei offset printing plant produces roughly one million newspapers of various titles each day. In addition to its modern production processes, the Axel Springer SE printing plant sets itself apart with its active approach to environmental protection.

A g-box 50 for greater energy efficiency.

Axel Springer SE is a front runner in the printing and publishing industry when it comes to environmental protection. Conserving natural resources is a major focus, examples of this in practice include reaching an agreement with paper suppliers on forest usage standards as well as the use of printing paper containing recycled paper, and chemical-free printing plates. Ways to increase energy efficiency and save energy in energy management at the Essen-Kettwig offset printing plant were carefully examined in early 2012. This has led the plant to use a g-box CHP.

Hot water processing and heater support.

The g-box 50, with an electrical output of 50 kW and a heat output of 100 kW, is a clean solution for combined heat and power generation. The modules are especially low in pollutant emissions thanks to a three-way catalytic converter. The g-box 50 makes do with 40% less primary energy compared with conventional systems which produce power and heat separately. At the Essen-Kettwig offset printer, the g-box 50 is used to supply electricity, heat water and provide heating support.

Customer/operator:	Axel Springer offset printer Kettwig GmbH & Co. KG
Field of use:	Industry and trade
Location:	Essen Germany
CHP type:	g-box 50
Gas type:	Natural gas
Electrical output:	50 kW
Thermal output:	100 kW
Installation:	Engine room





VORWEG GEHEN



Innovation connects.

EMSA GmbH is one of Germany's most innovative medium-sized companies. This manufacturer of vacuum bottles, food storage containers and other clever kitchen aids and garden items was awarded the title of top innovator in Germany's medium-sized business sector two times in a row (2014 and 2015). And the company is also equipped with innovative technology when it comes to energy supply: the latest generation of agenitor.

Out of responsibility for mankind and the environment.

EMSA has combined leading brand quality with responsibility for mankind and environment for over 65 years. Sustainability determines the entire value creation chain – from the use of certified raw materials and energy-efficient production systems to the strictest quality controls.

So it only follows that EMSA also focused on sustainability in its heat and electricity supply and thus decided to use highly efficient combined heat and power technology. For instance, an agenitor at EMSA's headquarters in the Münsterland town of Emsdetten produces decentralised electrical energy and heat which is entirely used for internal consumption.

EMSA and RWE: an energy partnership.

EMSA has long valued RWE as a competent partner. For instance, it has already had a heat supply contracting agreement in place with RWE Energiedienstleistungen GmbH since 2011. In addition to a modern heating system, RWE has also installed a highly efficient agenitor 406 CHP which runs on natural gas.

The agenitor has an electrical output of 250 kW and a thermal output of 264 kW. 100% of the energy is used for internal consumption, primarily to regulate temperatures in the production halls. The plant is heat-controlled and stores the excess thermal energy in a 10 m³ buffer tank, from which it can be dispensed as needed. With a total efficiency level of over 87%, the CHP is one of the most cost-effective and above all, ecological systems of its kind.

Customer/operator:	EMSA GmbH RWE Energiedienstleistungen GmbH
Field of use:	Industry and trade
Location:	Emsdetten Germany
CHP type:	agenitor 406
Gas type:	Natural gas
Electrical output:	250 kW
Thermal output:	264 kW
Installation:	Engine room





Plastics processing firm opts for CHP.

The internationally active Utz Group produces sustainable reusable storage and transport containers made of plastics. Its site in Schüttorf employs 500 people. Since plastic production consumes large quantities of energy, Utz decided to produce a portion of the energy it needs in-house using combined heat and power generation.

avus 2000a: the in-house energy provider.

Georg Utz GmbH in Schüttorf, Lower Saxony, is the German production facility of the Swiss company Georg Utz Holding AG. The company produces storage and transport containers, palettes, workpiece carriers and technical parts made of reusable plastics. The plant in Schüttorf has existed since 1971 and employs a workforce of 500. The corporation has around 1,000 employees worldwide. Utz places great emphasis on quality and environmental protection. This is reflected firstly in its in-house quality management. Secondly, Utz produces reusable products – entirely in the interest of environmental protection. In the future, it will produce energy in-house with its own combined heat and power system, primarily to help conserve valuable natural resources.

Isolated operation ensures seamless supply.

If necessary, the avus 2000a combined heat and power plant can be used self-sufficiently, i.e. completely independently of other electrical energy sources. Known as “island mode operation,” this type of installation provides the company with a continuous supply of electrical energy and – crucial to production – thermal energy completely independently of the public grid.

The avus 2000a has an electrical output of 2,000 kW and a thermal output of 1,977 kW. The total efficiency level amounts to roughly 86.9% (43.7% electrical and 43.2% thermal). The unit for Utz was installed in a purpose-built machine house on the side of the road opposite the company premises. In addition, a steam generator and absorption chiller were installed in this machine house to supply the Utz production systems with steam and cooling energy. The energy produced is used exclusively by Utz itself.

Customer/operator:	Georg Utz GmbH
Field of use:	Industry and trade
Location:	Schüttorf Germany
CHP type:	avus 2000a
Gas type:	Natural gas
Electrical output:	2,000 kW
Thermal output:	1,977 kW
Installation:	Engine room
Accessories:	Island mode, steam generator, absorption chiller





A clever solution.

Sustainable production and business processes have always been an absolute must for the agricultural engineering experts at LEMKEN. The Niederrhein company and its workforce of 1,200 are continuing on this path by installing two avus 800b CHPs and an absorption chiller.

Two avus 800b CHPs ensure greater sustainability.

LEMKEN is one of Europe's leading manufacturers of devices for soil cultivation, seeding and plant protection. With over 1,200 employees worldwide, LEMKEN brought in a turnover of € 344 million in 2014. As a specialist for professional crop cultivation, LEMKEN is committed to environmental protection. For instance, soil protection plays just as great a role in LEMKEN's technology as the durability of its machines, the conservation of resources and reduction of CO₂ emissions. The company has now taken a further step towards environmental protection by commissioning two avus 800b combined heat and power plants at its Alpen location. The two plants each have an electrical output of 889 kW and a thermal output of 891 kW. The two units were each installed in a concrete sound hood in order to keep the system's noise level down to 45 dB (A) at 10m.

Absorption chiller as a worthwhile addition.

The energy produced is used to supply the administrative and training building with power and heat supply, as well as for parts of the production facilities. But LEMKEN's production process doesn't just require power and heat. The hot shaping and hardening processes require enormous amounts of cooling energy to quench the parts and cool down the power units. To accomplish this, an absorption chiller (1,000 kW), which can transform heat into cooling energy, makes good use of the exhaust heat from the combined heat and power plants. This combined energy system also cools the server rooms of the new development facility. Plant manager Rudi Vervoort is proud of the system's overall design: "When we at LEMKEN make investments, we always pay attention to make sure that the ecological perspectives are taken into account alongside the economic aspects."

Customer/operator:	LEMKEN GmbH & co. KG
Field of use:	Industry and trade
Location:	Alpen Germany
CHP type:	2 x avus 800b
Gas type:	Natural gas
Electrical output:	2 x 889 kW
Thermal output:	2 x 891 kW
Installation:	Concrete acoustic enclosure
Accessories:	Absorption chiller





Nothing but the crème de la crème.

With its tradition of over 100 years, the Naarmann private dairy of Neuenkirchen is a specialist in long-life dairy products for large-scale customers in the gastronomy and food product industries. The owner-run company promises nothing but the crème de la crème!

A traditional company opting for cutting-edge technology.

The Naarmann private dairy is continuously expanding its portfolio and increasing its processing capacity by investing extensively in the latest technologies. In addition, the company has committed to conserving natural resources and reducing its energy consumption. Since the production requires large amounts of energy, the saving potential in this field is not insignificant. Not least, extensive self-sufficiency increases security and flexibility in energy supply.

For these reasons, the Naarmann private dairy has invested in heat and power cogeneration technology. By combining heat and power product in a single combined heat and power plant, the fuel is used with great efficiency and carbon dioxides emissions are reduced.

Process heat available at any time on demand.

The patruus 400 combined heat and power plant is run on natural gas and generates 504 kW of thermal energy, which is used for hot water provision, product heating and cleaning the production facility. Furthermore, the heat can be temporarily stored in a 100 m³ buffer tank so that it can be accessed any time it is needed.

The heat and the majority of the electricity is used within the dairy, any excess electricity is fed into the public grid and paid for by the local energy supplier.

The patruus 400 was installed in a Highline container, the high-grade container offers very good noise suppression properties achieving 45 dB (A) at a distance of 10 metres.

Customer/operator:	Privatmolkerei Naarmann GmbH
Field of use:	Industry and trade
Location:	Neuenkirchen Germany
CHP type:	patruus 400
Gas type:	Natural gas
Electrical output:	400 kW
Thermal output:	504 kW
Installation:	Highline container





US company becomes self-sufficient.

In 2002, 2G completed a genuine showcase project in the USA which made clear the high performance and flexibility of combined heat and power.

avus for industry in the USA.

Based in Fitchburg, Massachusetts, sawblade manufacturer Simonds International gets its power and heat from three avus 500c CHPs with a total electrical output of 1,800 kW. With the plant's total annual capacity (approx. 15,000 MW electrical/ approx. 18,000 kW thermal), the company can now fully cover its energy requirements with the CHP plant installed. At the same time, the customer was impressed by the very short time it took to install the modules: since Simonds International's buildings had enough space available, the three containers could simply be installed next to one another.

Completely self-sufficient energy supply.

With their very high availability, the modules serve as a fully self-sufficient redundant system. This isolated solution in mains parallel operation makes the facility completely independent from the local grid. With this project, Simonds is also setting new standards for innovation in the use of thermal energy in the USA. While the heat is used to heat up the production area in winter, the 2G machine is connected to an absorption chiller in the summer to provide air conditioning for the site.

Customer/operator:	Simonds International
Field of use:	Industry and trade
Location:	Fitchburg, MA USA
CHP type:	3 x avus 500c
Gas type:	Natural gas
Electrical output:	3 x 600 kW
Thermal output:	3 x 681 kW
Installation:	Container
Accessories:	Island mode, absorption chiller





Power and heat from sewage sludge.

2G has installed an avus 800b power plant at the Apeldoorn waste water treatment plant for highly efficient power and heat production from sewage sludge at the largest sewage treatment plant in the Vallei en Veluwe water association.

avus 800b fed with biogas from sewage sludge.

The Apeldoorn wastewater treatment plant purifies wastewater from Apeldoorn, Beekbergen, Ernst, Hoenderlo, Hoeg Soeren, Oosterhuizen, Vaassen and Wenum-Wiesel. Built in 2003, the plant is one of the largest waste water treatment plants in the Netherlands. In cooperation with its partner Van der Wiel Biogas BV, 2G Energy AG commissioned an avus 800b combined heat and power plant that runs on biogenic material. The aim of the project was to make use of the gas obtained from the sewage sludge in the entire drainage area as efficiently as possible. The avus 800b uses the sewage gas to produce power and heat with the heat used to promote the fermentation process and the power used to operate the water treatment plant. The CHP paid for itself in a very short time.

A special thermal solution put into practice.

The avus series from 2G was specifically developed for high power requirements. A notable feature of this project is that the exhaust gas is cooled to a temperature level of 110 °C as well as an increased supply temperature of 95 °C. With 889 kW at an efficiency rating of 42%, the avus 800b is also a reliable partner when it comes to electrical output.

In addition to the special thermal solution, the CHP is distinguished by a special form of access: a specially made stairway with safety railing provides access to the roof of the container. Painted red and white, the container also blends in well with the surroundings on site.

Customer/operator:	Waterschap Vallei en Veluwe
Field of use:	Waste water treatment plant
Location:	Apeldoorn The Netherlands
CHP type:	avus 800b
Gas type:	Sewage gas
Electrical output:	889 kW
Thermal output:	875 kW
Installation:	Container





A 2G biogas power plant right in the middle of town.

A nearby biogas plant produces climate-neutral power and heat not far from the hospital in Stadtlohn. The excess biogas is routed through a microgas network to the CHP at the hospital about 2 km away. Here, an agenitor 212 decentrally transforms the biogas into power and heat for the hospital. The hospital's inner-city location and the high building density this entails proved a challenge in carrying out the project. For instance, the planning phase had to factor in not only noise protection requirements, but also the question of how to best integrate the agenitor into its surroundings on a visual level.

Optimal location in the hospital parking structure.

While the noise protection requirements were met by using a super-silent concrete sound hood with a wall-thickness of 160 mm (noise emissions of max. 45 dB (A) at a distance of 10 m), there was an equally impressive solution for the installation's appearance: the concrete sound hood together with the agenitor were inserted into the hospital's parking structure. To do so, a recess was made in the top deck, through which all of the components were lowered in using a crane. The colour of the concrete sound hood was matched to the colour of the parking structure.

A discrete long-term partner.

A combined heat and power plant from 2G provides the Maria Hilf hospital in Stadtlohn with a highly efficient supply of power and heat from a nearby biogas plant. The hospital's parking structure proved to be the perfect place to house it.

Customer/operator:	Maria-Hilf Foundation Stadtlohn
Field of use:	Hospital
Location:	Stadtlohn Germany
CHP type:	agenitor 212
Gas type:	Biogas
Electrical output:	400 kW
Thermal output:	445 kW
Installation:	Concrete acoustic enclosure
Accessories:	Micro gas network





BOSCH



Sustainability and a regional focus.

albi is a medium-sized family-owned company with long-standing tradition and has become one of Germany's leading manufacturers of premium fruit juices. Quality, sustainability and a regional focus all play a major role here. And they apply to energy supply as well.

albi: consistent quality since 1928.

With an annual turnover of over € 100 million, albi is one of Germany's leading manufacturers of premium fruit juices. From its headquarters in Berghülen-Bühlenhausen, the medium-sized family-owned company supplies traditional food product retailers, discounters, specialty beverage retailers and airline catering companies under the brands albi, MULTI 12 and Samanta, as well as under various trademarks.

Since its establishment in 1928, albi has produced exclusively in Germany and predominately uses a large proportion of domestic raw materials.

Steam and cooling industry aid in production.

Sustainability and quality awareness are also important to albi when it comes to energy supply. That's why the company decided to install two agenitor 406 plants, each in a concrete sound hood. In addition, a steam generator and an absorption chiller were each installed in a separate container. The steam and cooling energy generated are fed into the production process. 100% of the energy produced in the 2G power plants on site is used for internal consumption.

Customer/operator:	albi GmbH & Co. KG Bosch Energy and Building Solutions GmbH
Field of use:	Food industry
Location:	Berghülen Germany
CHP type:	2 x agenitor 406
Gas type:	Natural gas
Electrical output:	2 x 250 kW
Thermal output:	2 x 264 kW
Installation:	Concrete acoustic enclosure & container
Accessories:	Steam generator, absorption chiller





CHP turns up the steam.

The H. & E. Reinert group hails from the Westphalian town of Versmold, where brothers Hermann and Ewald Reinert started a butchery in 1931. Today, Reinert produces high-quality raw sausage products, boiled sausage specialties and cured meats which are sold throughout Europe. The main factory in Versmold has been using a modern CHP plant with steam generator since 2014.

Clean energy for high-consumption cleaning.

Quality, hygiene, as well as conscientious handling of natural resources, all take top priority at Reinert's traditional operation. The production facility in Versmold is thoroughly cleaned several times a day. Large amounts of energy are therefore needed to produce the sausage and cured meat products and to clean the production facilities. Reinert has been able to use heat and power from in-house production since October 2014: the avus 1500b combined heat and power plant runs on natural gas. It supplies 1,487 kW of electrical power and 1,484 kW of thermal power.

Plant pays for itself in no time.

The heat is produced directly on site to produce steam (730 kg/h, 9.5 bar). For this reason, the CHP module was installed directly next to the 2G steam generator in a container. A medium-voltage switchgear is also integrated in the container. Thanks to the plug-and-play container solution, the installation was completed within a very short time.

The avus 1500b from 2G is a high-performance power plant which sets itself apart with its efficient operation and long service life. The plant paid for itself in just 2.5 years.

Customer/operator:	H. & E. Reinert Westfälische Privat-Fleischerei GmbH
Field of use:	Food industry
Location:	Versmold Germany
CHP type:	avus 1500b
Gas type:	Natural gas
Electrical output:	1,487 kW
Thermal output:	1,484 kW
Installation:	Container & Highline Container
Accessories:	Steam generator





Secure and sustainable.

Resource conservation, as well as environmental and climate friendliness, are a key focus of the Krombacher brewery's heat and power supply concept. The avus from 2G has now increased the security of supply at the company's headquarters in Kreuztal-Krombach.

Consistently sustainable operation at the Krombacher brewery.

The CHP plant commissioned at the Krombacher brewery is a highly successful combination of cost-effectiveness, efficiency and climate protection, fitting seamlessly into the Krombacher brewery's sustainability strategy. The Siegerland brewers had already switched the entire energy procurement to green electricity certified by the OK Power label in 2012, the commissioning of the new CHP plant takes them another step forward with in meeting the company's sustainability objectives which they have announced in their own sustainability report.

A further milestone reached with combined heat and power.

The avus 2000a high-efficiency energy plant, with a medium-voltage generator and a rated electrical output of 2 MW, was installed in an existing boiler house with an additional noise insulation hood. Krombacher made its supplementary investment with the goal of using the CHP plant to cover the base load of the energy supply. The internal power supply is to reduce the amount of electricity purchased by 25%. Beyond that, the avus supplied the Krombacher brewery with climate-friendly heating and process heat. This contributes to the security of supply at the site in Kreuztal with its emergency power mode option.

Helmut Schaller, Technology Manager at Krombacher: "With this CHP plant, we've reached another milestone in our sustainability strategy in terms of resource conservation and environmental compatibility."

Customer/operator:	Krombacher Brauerei GmbH & Co. KG
Field of use:	Food industry
Location:	Kreuztal-Krombach Germany
CHP type:	avus 2000a
Gas type:	Natural gas
Electrical output:	2,000 kW
Thermal output:	1,977 kW
Installation:	Engine room





Turning milk into cheese.

Lactoprot is one of the world's leading producers of caseinate from raw milk. Lactoprot's products are used in the food industry for purposes such as stabilising the properties of dairy products. 2G provided a tri-generation plant delivering electricity, steam and cooling energy with an 2G avus series engine at its heart.

Power, steam and cooling energy for Lactoprot in Leezen.

Since 2003, Lactoprot Germany has been producing casein from raw milk in a fully automated system at its site in Leezen. Casein makes up the majority of the proteins in cheese and curd, it also serves as a binder and pharmaceutical excipient.

Since 2014, an avus 1500b has provided electricity, steam and heat for cooling in conjunction with an absorption chiller with a cooling output of 450 kW. With an electrical output of 1,487 kW and a thermal output of 1,484 kW, it covers all of the production facility's demands.

More efficient than compression cooling.

On one hand, large quantities of steam are needed to extend the shelf life of the end products through thermal treatment. On the other hand, a temperature level of 5 °C must be maintained for storage. For that reason, a portion of the exhaust heat the CHP produces is feed into a steam generator. Another portion is routed into a residual gas heat exchanger, where it is heated up to a supply temperature of 95° in order to provide a continuous process water temperature of 5° for the production process using an absorption cooling system. This technology offers considerable efficiency advantages over conventional cooling energy generation in compression cooling systems.

Customer/operator:	Lactoprot Deutschland GmbH
Field of use:	Food industry
Location:	Leezen Germany
CHP type:	avus 1500b
Gas type:	Natural gas
Electrical output:	1,487 kW
Thermal output:	1,484 kW
Installation:	Container
Accessories:	Absorption chiller, steam generator





Efficient craft brewing from overseas.

Over 4 million hectolitres of beer are brewed each year in this, one of the most popular breweries in the USA. The Yuengling Brewery in Pottsville, Pennsylvania, doesn't just make barley juice. Thanks to the patruus 400, the company now produces 20 percent of the power it needs on its own.

Brewery on its way to self-sufficiency.

Yuengling beer hails from Pottsville, a town in Pennsylvania which was heavily influenced by German immigrants in the 20th century. Still under family ownership, it is America's oldest brewery and boasts an annual output of 4.43 million hectolitres, making Yuengling the sixth largest brewery in the USA.

In March, the brewery decided to start supplying its own energy, thanks to the 400 kW electrical output from the patruus 400 installed, the brewery will be able to produce 20 percent of the electricity it needs for production.

High efficiency ratings ensure effectiveness.

The plant's thermal output of 545 kW also supplies the pasteurisation process, which requires large amounts of heat. The biogas which the plant runs on comes directly from the plant's own wastewater treatment plant, thereby putting the residue from the brewing process to productive use. The energy provided by the patruus 400 doesn't just safeguard the brewery's supply, the CHP also helps keep costs down. Thanks to its high electrical and thermal efficiency ratings (37.2 and 50.7 percent, respectively) the patruus makes use of nearly 90 percent of the energy which the gas contains, making the machine a front runner when it comes to efficiency.

The CHP was installed in a container and is located next to the brewery building.

Customer/operator:	Yuengling & Son Inc.
Field of use:	Food industry
Location:	Pottsville, Pennsylvania USA
CHP type:	patruus 400
Gas type:	Biogas
Electrical output:	400 kW
Thermal output:	545 kW
Installation:	Container





Organic energy for organic dairy.

The Söbbeke organic dairy processes about 50 million litres of organic milk each year and transforms it into cheese and yogurt specialties, as well as dairy products of all kinds. True to the company philosophy, that its “every action is to serve the environment and our fellow human beings,” Söbbeke has already been working with renewable energy since 2006.

1.2 kilometre biogas line to the heat consumer.

The biogas is produced roughly 1.2 kilometres away from the Söbbeke dairy, and not all of the biogas is used in the biogas plant. Only a small CHP is connected to the fermenter itself, which requires heat for the fermentation process. In order to make optimal use of the surplus gas, it is routed to the dairy, where it is transformed into heat and power by way of a “satellite CHP.”

Hot water for cleaning reusable glasses.

The avus 500b, with an electrical output of 624 kW and supply temperature of 95 °C, feeds a 150,000 litre buffer tank and provides thermal energy for cleaning reusable glasses and bottles, as well as tanks, filling machines and more. Roughly one third of the heat consumption is covered by the CHP plant.

This project demonstrates the great potential of renewable heat & power cogeneration. Thanks to the optimal combination of energy production, transport and conversion, the plant concept is an ideal match for the philosophy of the Söbbeke organic dairy.

Customer/operator:	Molkerei Söbbeke GmbH Bioenergie Sunderhook GmbH & Co. KG
Field of use:	Food industry, biogas plant
Location:	Gronau-Epe Germany
CHP type:	avus 500b
Gas type:	Biogas
Electrical output:	624 kW
Thermal output:	700 kW
Installation:	Concrete acoustic enclosure





Energy from manure.

Howla Hay Farm is a mixed agricultural operation in Guisborough, in the northeast of England. II, it doesn't just dispose of all the manure that builds up from the farming of cattle and pigsinstead, it transforms it into green energy and valuable organic fertiliser.

Green energy: a secure source of revenue.

As a mixed agricultural operation, Howla Hay Farm is ideally suited for running a biogas plant. The plant is used to ferment pig and cattle manure, grass and maize silage, as well as fodder beet producing biogas, which is used to run a high-performance agenitor combined heat and power plant. The agenitor 306 generates 250 kW of electricity and 265 kW of heat per hour. The residue left over from the fermentation process is then used on the farm as organic fertiliser.

In light of strict environmental requirements and increasing retail price competition, this ecologically produced energy makes a secure long term source of revenue for the agricultural enterprise.

Plug and play: for rapid installation.

The agenitor 306 has an electrical efficiency rating of 41.0% and a thermal efficiency of 47.4%. Its total efficiency rating of 88.4% makes the agenitor highly profitable. Thanks to its high wear-resistant engine components, it is extremely reliable and requires little maintenance.

2G delivered the compact 2G module in a container as a connection-ready "plug and play" solution. The connections for the gas and power supply are all that have to be provided on location.

Customer/operator:	Howla Hay Farm
Field of use:	Biogas plant
Location:	Guisborough United Kingdom
CHP type:	agenitor 306
Gas type:	Biogas
Electrical output:	250 kW
Thermal output:	265 kW
Installation:	Container





Fun and responsibility.

At the triangle where Germany, France and Switzerland come together lies one of the most beautiful leisure parks in the world. Over 5 million visitors from all nations enjoy themselves every year at Europa Park and marvel at more than one hundred attractions (including eleven rollercoasters) and the largest connected hotel resort in Germany. But at the same time, energy consumption is to be kept as low as possible.

Europa Park conserves resources.

Running the many attractions, shows, workshops and administrative offices at one of the largest fun parks in the world requires large amounts of electrical and thermal energy. Europa Park generally endeavours to handle resources sparingly. For instance, it is making increasing use of energy-saving lights and electric vehicles for transportation. Some of the theme hotels are heated and cooled in the summertime using a ground water heat pump. A 300 m long photovoltaic system produces 280,000 kWh of electricity each year. In addition, the park's own waterworks produces more than three times as much environmentally friendly energy as that. So the two 2G agenitor power plants are in good company here.

Producing power under the rollercoaster.

Each of the two 2G power plants have an electrical output of 220 kW and a thermal output of 253 kW. The total efficiency rating of 85% is plain to see. One agenitor was installed in a concrete sound hood beneath one of the eleven rollercoasters. With its low noise emissions of only 35 dB (A) at a distance of 10 meters, it is hardly noticed. The second agenitor (also noise-insulated) was installed in a compact building of its own in the Portuguese theme area. Both units ensure that temperatures will be pleasant for the hotel guests at all times of the year. A buffer tank stores the surplus thermal energy produced so that it can be used at any time as needed.

Customer/operator:	Europa-Park GmbH & Co Mack KG
Field of use:	Public institution
Location:	Rust Germany
CHP type:	2 x agenitor 206
Gas type:	Natural gas
Electrical output:	2 x 220 kW
Thermal output:	2 x 253 kW
Installation:	Concrete acoustic enclosure & engine room





Green energy for a zoo.

The Osnabrück Zoo (then known as the Heimat-Tiergarten Osnabrück) was founded by the consortium Heimattiergarten e. V. Osnabrück in 1936. Over the years, the zoo has become home to more than 300 species of animals from all over the world and, with over one million visitors each year, one of the most popular zoos in Germany.

Osnabrück “Energy Conservation Zoo” campaign.

Housing this many animals all year round at the Osnabrück Zoo requires large amounts of energy. After all, specially designed and air-conditioned habitats must be created in order to accommodate the widely different needs of the various species. The “Energy Conservation Zoo” campaign was launched in 2009 to rectify structural shortcomings in the buildings and keep energy costs down. Initial small-scale measures introduced in 2009 already saved € 68,200 in energy expenses. They also reduced carbon dioxide emissions by roughly 250 tons. After several successful years with a positive response, the decision to use a CHP plant was the logical consequence.

Front runner in efficiency.

The newly installed combined heat and power plant blends in seamlessly with the new conditions of its surroundings: the agenitor 406 feeds electricity into the general supply grid and heats the existing room, the Takamanda Africa area and the museum.

With its electrical efficiency rating of 42.5%, the agenitor 406 is one of 2G’s efficiency leaders. The engine takes advantage of the benefits of the 4-valve technology, which enables better gas exchange and more efficient combustion. The module is also equipped with high-performance steel pistons, which significantly reduce heat losses during the combustion process and minimise friction, which is detrimental to efficiency.

Customer/operator:	Zoo Osnabrück gGmbH
Field of use:	Public institution
Location:	Osnabrück Germany
CHP type:	agenitor 406
Gas type:	Natural gas
Electrical output:	250 kW
Thermal output:	268 kW
Installation:	Container





Innovation meets tradition.

The Don Bosco Institute of the Madonna di San Luca in Bologna is one of the most famous public schools in Italy and was founded in the year 800. In the process of renewing the heating system, a diesel boiler was replaced with a cutting-edge combined heat and power plant from 2G.

The patruus provides dependable heating for the ancient school building.

The patruus 100 from 2G runs on natural gas and is installed in an existing building. The CHP has an electrical output of 100 kW and a thermal output of 130 kW. To keep noise down, the unit was installed in a sound cap which reduces sound emissions to roughly 65 dB (A) at a distance of one metre from the plant. Supplying the school with heat is especially important in the winter. This makes it understandable that the installation called not only for a high-performance system, but also one requiring very little maintenance to make sure that the school can run without interruptions.

The investment will pay off in just a few years.

The patruus 100 is a reliable and highly efficient system with a total efficiency rating of nearly 85 percent. The plant supplies a good three quarters of the heating energy the school needs. 70 percent of the electrical energy which the CHP generates is for internal consumption, while the remaining 30 percent is fed into the public grid.

Even though the combined heat and power plant is only operated from October to May, investors estimate a payback period of just five years.

Customer/operator:	Instituto Salesiano
Field of use:	School
Location:	Bologna Italy
CHP type:	patruus 100
Gas type:	Natural gas
Electrical output:	100 kW
Thermal output:	130 kW
Installation:	Engine room





steag



Sustainability in paradise.

Since it opened in 1999, Therme Erding has become one of Germany's most popular waterparks and attracts more than 1.6 million visitors a year with its total area of 185,000 square metres. In just 15 years, it has grown to become one of the largest waterparks in the world. Therme Erding also focuses on innovation when it comes to energy.

Combined heat & power provides more than just a good feeling.

Therme Erding is one of the 50 most successful enterprises in Bavaria. 750 employees in the 14.5 hectare premises make sure that the guests enjoy themselves and that everything runs smoothly. In 2014, Therme Erding was expanded by the addition of a visionary hotel ensemble with wave pool: the Hotel Victory Therme Erding, a gigantic replica of Lord Nelson's legendary flagship. Part of Therme Erding's concept is that recreation and ecology stand in harmony with one another throughout the entire complex. So it's only logical that the park is heading in new directions with heat and energy generation: with highly efficient combined heat and power technology, for instance.

Magnificently economical and climate-friendly.

Two avus 800b power plants from 2G do their work behind the extraordinary scenery. The avus 800b has an electrical output of 889 kW and a thermal output of 891 kW. The plants supply decentralised heat and electricity for the Hotel Victory and the wave pool with a radiant total efficiency rating of 86.5 percent. The heat is used to support the heating system and warm up the water in the wave pool. The new plant is owned and operated by STEAG New Energies GmbH in Saarbrücken.

Customer/operator:	Therme Erding GmbH STEAG New Energies GmbH
Field of use:	Swimming pool
Location:	Erding Germany
CHP type:	2 x avus 800b
Gas type:	Natural gas
Electrical output:	2 x 889 kW
Thermal output:	2 x 891 kW
Installation:	Engine room





Necessity is the mother of invention: the CHP goes on the roof.

In order to reduce energy costs over the long term, the Talma Borgh senior centre in Apeldoorn decided to use highly efficient heat & power cogeneration and carried out the project in cooperation with a Dutch energy service provider. Since the structural conditions on site prevent installation in the building's basement, an alternative location for the CHP had to be found. This resulted in an unusual solution: The CHP was installed in a 2G container on the building's roof. Thanks to careful planning by 2G specialists, the project was executed without a hitch. But the process of placing the plant on the 15-metre-high roof of the senior centre still made for a spectacular event.

A patruus provides cosy warmth.

The container holds a patruus 140 power plant from 2G: The CHP plant runs on natural gas and is equipped with an aspirated engine, which provided the ideal solution in planning the Talma Borgh project. Thanks to the aspirated engine used, the patruus 140 offers high thermal outputs and efficiency levels. The plant produces an electrical output of 140 kW and a thermal output of 207 kW, thus achieving a thermal efficiency rating of 47.9%. The patruus therefore provides a highly efficient contribution to heat supply at the Talma Borgh senior centre.

2G power plant at airy heights.

One project in the Dutch province of Gelderland is an impressive example of how combined heat and power plants don't always have to be down-to-earth. The Talma Borgh senior citizen centre in Apeldoorn has long struggled with the rising prices of electricity and oil. That's why they decided to go with CHP technology.

Customer/operator:	Woon-zorgcentrum Talma Borgh
Field of use:	Senior centre
Location:	Apeldoorn The Netherlands
CHP type:	patruus 140
Gas type:	Natural gas
Electrical output:	140 kW
Thermal output:	207 kW
Installation:	Container





First-class energy in a stadium.

With its long-standing tradition, An der Alten Försterei stadium is home to the second division football team 1st FC Union Berlin. After many decades, the only dedicated football stadium in the German capital was extensively modernised. One of the many changes was the switch to a modern energy supply.

„Alte Försterei“ with new heating station.

More than 2,300 volunteers and business partners took part in the expansion and conversion work, which was 100% privately financed. The goal was to make the stadium fit for the national league and to meet the special requirements of the German Football League (DFL). The most important construction measures included installing turf heating systems, modernising the floodlighting and building a canopy over the standing places. In order to ensure a permanent, efficient heat supply for the stadium complex, it was also necessary to build a new energy station. This was handled by Kofler Energies, an integrated service provider which also invested in 400 metres of district heating pipework, heat storage system, control technology and transformer and power distribution systems for backup power generation, as well as loudspeaker and floodlight systems. This led to a 325 m² utility room, which three gas condensing boilers and a g-box 50 CHP plant were installed

in. The plant supplies the heating systems and the central hot water supply of the new grandstand. In addition, the existing turf heating systems at An der Alten Försterei stadium and on the training field were supplied with energy from the combined heat and power plant.

Carbon dioxide emissions reduced by 600 tons a year.

The switch from heating oil to natural gas at An der Alten Försterei stadium will save 600 tons of CO₂ a year. The decentralised power generation supplies roughly 300 MWh per year – enough to provide for 120 two-person households. A further benefit of this state-of-the-art system: all of the energy produced by the CHP plant is used directly on-site.

Customer/operator:	1. FC Union Berlin Kofler Energies Contracting GmbH
Field of use:	Sport and event centre
Location:	Berlin Germany
CHP type:	g-box 50
Gas type:	Natural gas
Electrical output:	50 kW
Thermal output:	100 kW
Installation:	Engine room





A star behind the scenes.

The dash for the puck, the unbridled energy of international basketball giants and gripping concerts from world stars thrill hundreds of thousands at the Arena Riga. The two patruus engines the silent stars behind the scenes.

Arena Riga produces its energy on its own.

The Arena Riga was built in the Latvian capital for the 70th World Ice Hockey Championship in 2006. Since then, it has become a highly sought venue for international sports, music and cultural events. The stadium can accommodate up to 14,500 people. Since 2014, the arena has produced most of the energy it needs itself.

Two 2G patruus series CHP plants running on natural gas were installed as a duo in a Twin Pack container. Together, they provide a total electrical output of 600 kW and thermal output of 760 kW. Both the electricity and the heat are used one hundred percent on site.

Ice production expenses significantly reduced.

Ice rinks are generally known to require large amounts of energy. The main potential for optimisation here lies in the generation of cooling energy for the ice. That's why the Arena Riga uses most of the energy produced by its CHP plants for pre-cooling in ice production. The use of two modules in different sizes means the energy production can always be adjusted flexibly as needed. Not least, it significantly reduces energy expenses.

Customer/operator:	Arena Riga
Field of use:	Sport and event centre
Location:	Riga Latvia
CHP type:	patruus 400 & patruus 200
Gas type:	Natural gas
Electrical output:	400 & 200 kW
Thermal output:	504 & 256 kW
Installation:	Container Twin Pack





A masterpiece of logistics.

Each agenitor is installed in a nine-metre container and connected to a 2.5 MW hydraulic shunt where the heat connections converge. A transfer pump was also installed downstream of the shunt, so that all of the heat generated is fed into the heat grid. In addition to the highly efficient operation, the organisation of the entire project can be called a logistical masterpiece. Delivery was conducted on five consecutive days with two trucks each. All modules were fully installed within a week.

Flawless function at 32 degrees below zero.

The location's outdoor conditions posed a special challenge: the high availability one expects from a 2G plant had to be ensured at temperatures down to -32 °C during the Latvian winter. This is where it pays off that 2G has such strict demands for top quality in all components it uses. This allows us to carry out projects in extreme climates (be it warm or cold) without trouble.

A heat grid in the snow.

Five 400 kW modules from 2G with a total output of 2,000 kW were installed in the icy north of Latvia. All are agenitor 212 models, which are at the top of their class with an electrical efficiency rating of 40.1%.

Customer/operator:	Grow Energy
Field of use:	Heat grid, biogas plant
Location:	Limbažu Novads Latvia
CHP type:	5 x agenitor 212
Gas type:	Biogas
Electrical output:	5 x 400 kW
Thermal output:	5 x 445 kW
Installation:	Container





Sophisticated solution for the district heat network.

By the end of 2013, it was high time to modernise the energy and district heat system in Bad Lauterberg. Four aging CHPs from 1991 were thus quickly replaced by two high-performance avus 1000a plants from 2G, which feature very long service lives. The clever thing about the new solution: the additional installation of a heat pump takes advantage of the heat radiation from the two plants as well. The total 160 kW of radiated heat which the two combined heat and power plants produce in the installation room is drawn in through the recirculation system by a fan from the two cooling batteries so that it can then be re-cooled and discharged into the installation room. The heat pump is installed on the second level of the generation plant, as is an energy storage unit, which the energy gained from the cooling batteries is fed into.

The CHPs meets a wide range of requirements.

The heat pump springs into action once a temperature of 28 °C has been reached in the storage unit, thus routing the thermal energy which this process has generated (amounting to approx. 200 kW) through a control system and into the return line of the Bad Lauterberg Municipal Utilities' district heating network. This increases the temperature level in the return line from 60 °C to 63 °C. The plant's total efficiency level is a handsome 87 percent, and the efficient, low-emission heat it produces benefits 200 households. Executive board member and head of project management Ludger Holtkamp is enthusiastic about the innovative yet complex project: "The project we completed with the Municipal Utilities of Bad Lauterberg showed once again what a wide range of energy requirements can be fulfilled using combined heat and power technology. Supplying the district heating network creates the ideal conditions for the combination of CHP and heat pump."

Intelligently combined.

The Municipal Utilities in Bad Lauterberg (Harz region) use a heat pump coupled to two CHPs for the district heating network – with an impressive total efficiency rating of 87 percent. This system supplies 200 households in the spa town of Bad Lauterberg with highly efficient, low-emission heat.

Customer/operator:	Municipal Utilities in Bad Lauterberg
Field of use:	Heat grid
Location:	Bad Lauterberg Germany
CHP type:	2 x avus 1000a
Gas type:	Natural gas
Electrical output:	2 x 1,063 kW
Thermal output:	2 x 1,208 kW
Installation:	Engine room
Accessories:	Integrated heat pump





Energy company STEAG invests in green energy.

The heating plant was commissioned in 1979 and was fired with domestic coal for a long time. A portion of the heating plant has now been converted to renewable energy generation. It is operated with the renewable fuel biomethane (processed biogas) and uses heat and power cogeneration to produce 35,000 megawatt hours of electricity a year in addition to heat with great efficiency. This enables it to provide 8,900 households with electricity. The heat is fed into STEAG's district heating grid. The annual heat production of roughly 33,000 megawatt hours is enough to supply more than 4,000 households.

CHP prevents more than 25,000 t of carbon dioxide from being emitted.

Dr. Stephan Nahrath, spokesman of the STEAG New Energies management board, summarises: "Biogas is replacing fossil fuels, and the heat and power cogeneration process guarantees a high level of fuel efficiency. This conserves our natural raw material resources. We are also making great achievements when it comes to climate protection. The CHP prevents more than 25,000 tons of carbon dioxide from being emitted each year." This is one reason why the state government of North Rhine-Westphalia seeks to increase the proportion of electricity from heat and power cogeneration to at least 25 percent by 2020.

25,000 tons less CO₂ each year.

STEAG of Essen is one of Germany's largest electricity providers. Founded in 1937, the company has roughly 6,400 employees. In addition to conventional power plants, STEAG makes use of decentralised sources of energy. The company already runs more than 200 decentral plants, including a 4.4 megawatt decentral plant from 2G.

Customer/operator:	STEAG New Energies GmbH
Field of use:	Heat grid, public power grid
Location:	Essen Germany
CHP type:	avus 4000a
Gas type:	Biomethane
Electrical output:	4,400 kW
Thermal output:	4,100 kW
Installation:	Engine room

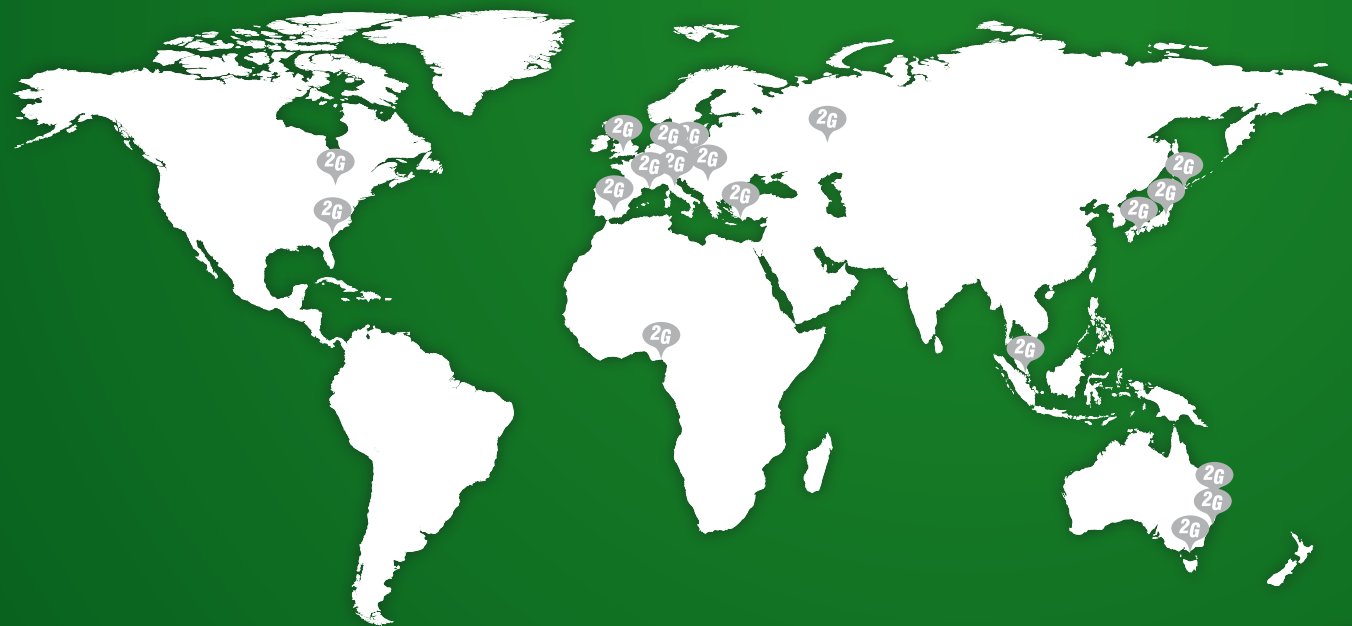




Creating the energy supply of the future – with 2G.

As energy supply markets began to transform, more and more companies decided to invest in their own power plants and to supply their own electricity, process heat and process cooling energy. They are gaining independence from the rising cost of energy, reducing their operating expenses and making a significant contribution towards climate protection. Decentralised power plants from 2G alone have produced nearly 10 billion kilowatt hours of electricity worldwide over the past two decades through the use of highly efficient heat and power cogeneration.

We have been a dependable partner for our customers for years – with our high-quality, reliable decentralised power plants and excellent service. We will be glad to arrange an appointment with you so that you can see our performance capabilities for yourself.



Are you looking to produce your own electricity, heat and/or cooling in the future as well as reduce energy costs for your business in the long-term?

Then contact us!

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