



CHP Journal

June 2018

Newsletter of 2G Energy AG



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Preface



Christian Grotholt

Dear readers,

The 2018 year is already moving purposefully into the summer, and the CHP market is gaining momentum. The German biogas market has proven itself to be especially strong this year as a consequence of the flexibilization of existing biogas plants. With our broad product portfolio and large range of technical 2G solutions, we are extraordinarily pleased to offer the right design for each of our customer's individual plant expansion or flexibilization plans.

We have been looking back to Berlin with excitement in the last several weeks and months. Now that the government has formed successfully, we are waiting on concrete implementation plans for the next steps of the energy revolution. The initial signals from the Federal Ministry of Economics are allowing us to look positively at the future, and we welcome the explicit emphasis of the CHP within the future German energy mix from the coalition agreement.

Despite everything that is happening on the political stage in Berlin, we in Heek and our global subsidiaries are focused on those things we can influence: developing reliable, durable products and continuously expanding the 2G network in Germany and abroad. The constantly growing number of sales and service partners, who distribute and service our products 24/7 around the globe with joy and devotion, are precisely the foundation from which we look to the future so confidently.

As in the last edition of the CHP Journal, here we would like to introduce you to one of our partners from the 2G network: White Harvest Energy from the USA. A partner that was able to sell an 8 MW plant to a hospital in Tennessee when our partnership was just beginning. To that I say: respect and thanks to my colleagues!

I hope you enjoy reading.

A handwritten signature in blue ink that reads 'Christian Grotholt'.

Christian Grotholt
CEO of 2G Energy AG

From troubleshooting to predicting interruptions

Today, more than 70% of operational deviations are rectified online

Whether it's in Germany, the USA, or Japan, with our highly trained troubleshooting team from 2G Service on one hand and our innovative digital infrastructure on the other, 2G ensures that CHP plants are maximally available around the world and that unplanned deviations from operating parameters are corrected as quickly as possible.

The right employees with the right equipment

Each employee at 2G Troubleshooting has a well-founded technical education, many years of practical experience as a technician with 2G, and uses the latest analysis and communication technology. Three shifts mean that the team is available on the 24/7 service hotline around the clock. These employees ensure that emerging interruptions are rectified immediately and coordinate, as necessary, the deployment of a well-trained service technician to the field. Like their colleagues in the back office, field technicians have the latest analysis and communication tools. All service technicians also have at least a level 20 dongle as a technical authorization level for servicing.

Digital tools from our own R&D forges

Karl-Heinz Gausling, an employee from the first hour and head of the Troubleshooting team, knows precisely what 2G troubleshooting is known for: "In addition

to our technical distinguishment, it is the philosophy we live every day that makes 2G Troubleshooting so special. Compared to other service providers, our goal is not to earn money in the event a service team is sent out because of an interruption. We are fully committed to avoiding the deployment of service teams through the use of our high-tech communication tools. This enables the customer to save cash and increase profits due to the increased plant availability."

"We are fully committed to avoiding the deployment of service teams in advance through the use of our high-tech communication tools."

Karl-Heinz Gausling | Head of
2G Troubleshooting

These digital tools were largely programmed and/or codeveloped by the 2G Research and Development department in order to perfectly adapt them to the needs of the plants. One example is 2G POWER PLANT. This is a tool that immediately reports unplanned deviations of an operating parameter to the 2G Troubleshooting team without operator input. The team then implements corresponding measures to reestablish



Karl-Heinz Gausling, Manager, 2G Troubleshooting

normal operation. The system not only reports operational interruptions, it also provides solution suggestions to rectify the interruption via an intelligent evaluation system. This saves time. A good 70 % of operating deviations reported worldwide can be solved from the Service Center in Heek using this remote connection.

Intelligent interruption prediction system in development

However, we can go even further. 2G Drives, the research and development company of 2G, is currently working on developing an intelligent interruption prediction system called the IRIS (Intelligent Reporting Information System). IRIS collects historic interruption reports and the associated CHP data. Based on this, the IRIS evaluates live data from a CHP and is able to predict potential parameter deviations. "With this system, we in Troubleshooting no longer have to just react in the future, we can introduce measures to rectify a potential interruption before it even arises", explains Karl-Heinz Gausling happily. "Potential stoppages or even damage can be avoided, which in turn positively affects the availability and efficiency of the plant."

Service is a flagship of 2G also thanks to their strong Troubleshooting team. This department is subject to constant development in order to continuously increase customer benefit. "With regard to changing market conditions, such as the flexibilization of the biogas sector in Germany and the continued internationalization of 2G, it helps to keep your finger on the pulse of the latest developments", says Karl-Heinz Gausling.



Olaf Huchthausen, Service Manager

"Our competitors are not asleep", says Olaf Huchthausen, Service Manager, knowingly. "The only way to efficiently develop troubleshooting to the highest level for our customers is for them to remain loyal to us as a replacement parts vendor as well. Digitization and the associated acceleration of internal processes also contributes to Service's cost efficiency. Every development here serves to create the maximum benefit for customers."

Training for customers and partners around the world

2G Training Center provides practice-based technical knowledge on CHPs

2G does not just offer training on the cogeneration of heat and energy in Germany alone. In other countries, CHP operators, technical planners, and 2G partners make use of the courses offered by the 2G Training Center in order to deepen their technical knowledge, and to strengthen their ability to inspect, maintain, and rectify interruptions of CHPs and make them state-of-the-art. In the future, preparation courses will be offered as webinars, allowing for more special attention to be paid to the practical portion of on-site training.

One hundred course participants in France

In France alone, 2G Energie SAS trained over one hundred participants in small groups. "The participants left with a much better understanding and greater certainty with respect to working with CHP technology in the field," sums up Jürgen Klein, CEO of the French 2G subsidiary.

Practice-based course program

The 2G Training Center (formerly 2G Education) course program includes sales training as well as servicing or



In 2017, more than 100 CHP operators and 2G partners were trained at the French 2G location in Nantes.



Inspecting, maintaining, and rectifying faults in combined heat and power units are the focus of the practical 2G service training programs.

maintenance training. They are designed to be very practice-oriented and normally consist of a theoretical and a practical portion, are held both in Heek and at subsidiary facilities, and last up to five days. All training courses are offered in German or English. Other languages are possible through the use of a translator.

Service training for operators and 2G partners

The service training programs are aimed at CHP operators as well as 2G partners. They qualify participants to conduct, depending on the training level, clearly defined servicing and maintenance work, from operating the system panel to carrying out a large inspection. The

basic and advanced training programs are conducted by experienced and specially trained 2G technicians. They also participate in regular advanced training programs so that they always understand the latest technology.

Sales training for 2G partners

Basic knowledge of CHP technology and sales-related topics are given in the sales training programs for 2G partners. This includes theoretical knowledge on engine technology, electrical technology, controlling, software, and heat extraction as well as how to design and calculate the efficiency of a CHP project. The instructors are 2G employees from the departments of Sales, Project Management, Business



Andre Banken, Head of 2G Business Development East

Development, Electrical Technology, and Research and Development.

Knowledge sharing and networking

“Of course, the transmission of knowledge and skills is the primary goal, but the human aspect is just as important to us,” says Andre Banken, Head of 2G Business Development East and one of the instructors at the 2G Training Center.

“Of course, the transmission of knowledge and skills is the primary goal, but the human aspect is just as important to us.”

Andre Banken | Manager, 2G Business Development East

“The cozy togetherness and related personal exchanges of experience at the end of the training day make the training a real event. In the end, the exchange of concerns and desires leads to a higher degree of identification on both sides.”

Future preparation courses at home on your own computer

Since 2017, it has been possible to book training online via the digital 2G platform my.2-g.com. The continued digitization will lead to additional changes in the near future and make some things easier. So, 2G will offer online training preparation courses. If training participants work on the basic training content from their own computers beforehand, the theoretical portion can be shortened in favor of the practical portion at the 2G Training Center.

You can find each training series incl. online booking options at my.2-g.com

Operating hours rent instead of investment

The energy service provider EKT replaces existing CHP with vieras solution

“The first thing that convinced me about the vieras model from 2G was that we can use a combined heat and power unit over the funding period of the Combined Heat and Power Generation Act (KWKG) and then simply return it to the manufacturer. And secondly that we do not have to pay for the entire unit thanks to the rental concept.” These two key facts were decisive for Dr. Hartmut Liebisch, Managing Director of Danpower GmbH in Potsdam, when the decision was made to replace a combined heat and power unit from the 1990s in the boiler house “Am Kupferberg” of Danpower subsidiary EKT in Großenhain (Saxony). In autumn 2017, EKT Energie und Kommunal-Technologie GmbH and 2G Rental GmbH in Heek signed a vieras rental agreement for the supply of the agenitor 408, which is currently being commissioned.

EKT is an energy service provider with core competencies in local and district heating supply as well as contracting for heating, cooling and electricity. Among its customers are housing associations, public institutions and commercial customers. In Großenhain near Dresden, EKT supplies around 3,500 apartments and public facilities with heat. The electricity is fed

into the public grid. The existing module in the “Am Kupferberg” boiler house had a thermal output of over 600 kW and was thus designed for a noticeably higher thermal output than the vieras module from 2G with a thermal output of 440 kW (360 kW electrical). In Großenhain, the heat-optimized bt80 version of the agenitor 408 with an increased thermal efficiency of 48.5 % is used.



Thomas Gawlowski, Managing Director of 2G Rental GmbH

For Thomas Gawlowski, Managing Director of 2G Rental GmbH, one of the advantages of the vieras model is the fact that you can use the evaluation of the actual demand for a generator configuration when

replacing existing output: “While in the past financing and depreciation requirements meant that power generation systems could only be evaluated every ten years or longer, they can now be evaluated every three to five years thanks to the possibility of renting a CHP for a limited period. We are thus responding to the strong needs of power plant operators to be able to respond flexibly to changed market conditions or shifts in their own service portfolio.”

Two brothers want to bring the energy revolution to the USA

White Harvest has been a licensed 2G partner since August 2017

White Harvest Energy, LLC is the newest sales partner of 2G Energy Inc. in the USA and markets 2G plants in Texas, Tennessee, Kentucky, North Carolina, parts of Mississippi, Alabama, and Georgia.



Ben Edgar

Ben Edgar founded White Harvest Energy in 2014 after he had determined that companies increasingly desire clean, reliable, and inexpensive power but there is hardly a corresponding supply on the part of energy providers. While large planning companies were too immobile to consider decentralized power generation, small-scale industry was not well informed about the new technologies. Ben Edgar effectively applied the experience that he had previously collected in the private and public energy sector to his new company.

In 2016, his brother Doug joined the company. Today, he is responsible for business development and project

management. Doug Edgar also comes from the energy sector. He worked for a larger engineering company. His experience in supporting utility companies, cooperatives, independent system providers, and energy management companies through the evaluation of the costs and benefits of alternative power generation processes is supremely valuable for understanding the market with respect to decentralized generation.



Doug Edgar

White Harvest Energy has been a licensed 2G sales and service partner since August 2017. The first success of the partnership came just a bit later: an 8 Megawatt CHP plant for the Erlanger Baroness Hospital in Chattanooga, Tennessee (see page 11).

White Harvest Energy receives major order

Erlanger Baroness Hospital expects a reduction in energy costs of more than 20 %

A good example of the successful 2G partner concept is the order from Erlanger Health Systems, Tennessee, one of the largest public health organizations in the USA, for four natural gas-operated CHP plants from the avus 2000 series with an electrical output of 8 MW in total. The order is worth around 6.6 million USD. The 2G sales partner White Harvest Energy, Tennessee received the order.

The plants are being produced by the 2G subsidiary in St. Augustine, Florida. White Harvest Energy also handles the on-site installation of the containerized CHP plants in addition to project planning and implementation. Within the framework of the partner concept, White Harvest Energy markets 2G plants in Tennessee, Kentucky, North and South Carolina, parts of Mississippi, Alabama, Georgia, and all of Texas. White Harvest also handles the ongoing servicing of the system with its own personnel trained by 2G, relying on the digital support on the my.2-g.com platform in the process.

For the client, Erlanger Health System, the benefit of the CHP system is given by the annual cost savings of around 20 % due to the highly efficient, combined generation of electricity, heat, cold, and steam. One of the four CHP units is available on demand and as a backup system so that the system can be operated around the clock and all year. Erlanger expects a pay back period of less than four years.

“Here, we have a highly efficient CHP system with load shedding capabilities and the modular design is also groundbreaking”, explains White Harvest CEO Ben Edgar happily. “We hope the Erlanger project will be a model for other companies in the USA.”



A successful partnership for all involved. The licensed 2G sales partner White Harvest Energy and the client Erlanger Health System in front of one of the avus 2000 CHP systems (from the left): Ben Edgar (owner, White Harvest Energy), John Loetscher (Erlanger Health System), and Doug Edgar (owner, White Harvest Energy).

German Biogas plants with new raison d'être

Flexibilization as an investment in the future with added value

In the past, biogas-powered combined heat and power plants were operated non-stop at full load in order to generate a maximum amount of electricity from the biogas plant. This efficient operation of the plant ensured that in Germany operators received the EEG (Renewable Energy Sources Act) remuneration.

The massive expansion of solar and wind energy and the possibility of storing the biogas produced and, if required, using it to generate energy through combined heat and power, gives the biogas plant a new right to exist. In the future, combined heat and power units powered by biogas will add flexibility to the electricity market by producing electricity only when the injected wind and solar energy leads to strong fluctuations in the grid. CHP plants will also compensate peak loads in order to ensure a reliable and constant energy supply.

What exactly does flexibilization mean?

Flexibilization refers to the adaptation or expansion of combined heat and power plants, including biogas plants. An existing CHP plant is extended by one to five additional CHPs. The individual maximum rated limit of a plant is distributed among the installed plants. This maximum rated limit is legally defined as the amount of electricity generated in the most productive year of the existing plant. Here is an example: An existing plant with an output of 250 kW generated in its most powerful

year about 2 MW/h of electrical energy (= maximum rated limit) in 8,000 operating hours. The plant operator decides to make the plant more flexible and extends the existing plant by two CHP units, each with an electrical output of 500 kW. Each of the added plants only requires 2,000 flexible operating hours in order to reach the maximum rated limit of 2 MW/h.

What is the benefit of flexibilization?

Better electricity prices

When electricity is fed in continuously (full load operation), the electricity price at the electricity exchange is determined based on the average value of all hours fed in. If you only feed in when the demand is highest, you achieve significantly higher electricity prices.

Always ready to produce

By adding one or more combined heat and power units with a higher output, the plant operator not only increases the capacity of the entire plant, the plant is also ready for operation at any time in the event of maintenance or failure of one of the combined heat and power units. In case of failure of the entire biogas plant, the deficit can be compensated by the additional power, which would not be possible with just one CHP.

No biogas loss through flaring

In the event of overproduction, the biogas produced at high cost must be flared off

when generated with only one CHP. By making the existing plant for flexible, this problem hardly exists any more, since a CHP plant is always ready to convert the biogas produced into electricity through cogeneration.

Less use of substrate

By using state-of-the-art technology and thus increasing efficiency of the combined heat and power plant, operators can save substrate costs to a high degree every year.

Longer service life

By redistributing the production load of the maximum rated limit to several combined heat and power units, each unit will only have run part of its total operating hours at the end of the ten-year funding period, and thus remains operational even without any major overhaul.

Continue to claim the flex premium

By extending their plant multiple times, operators can continue to claim their flex premium.

The 2G-Biogas-Flex-Quick-Check will give you an idea whether flexibilization pays off for you. Contact: info@2-g.de



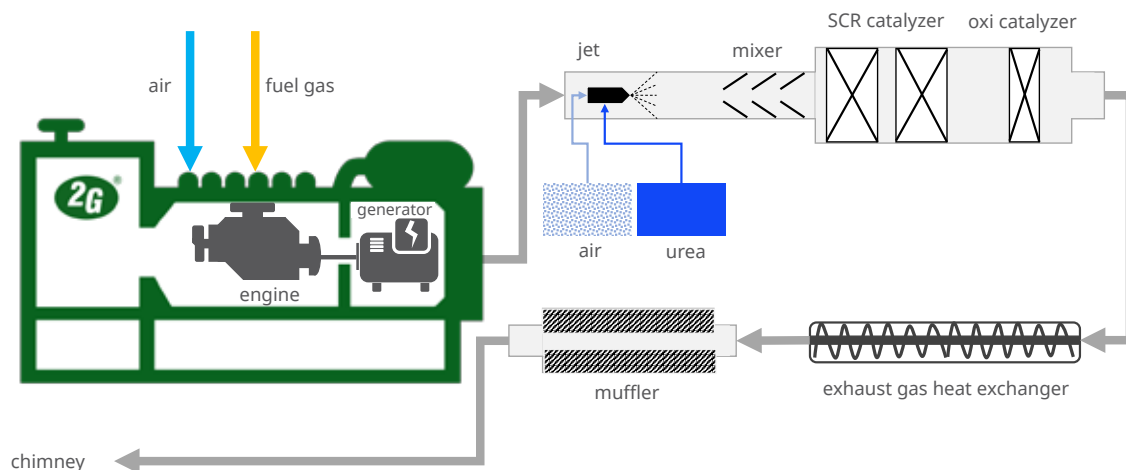
The massive growth of solar and wind energy gives the biogas plant a new raison d'être.

With the 2G solution, plant operators can comply with statutory NO_x values

2G SCR system is directly linked to the controller of the 2G power plant

The German legal requirement to keep the air clean (TA-Luft) is expected to be amended again this year. The new German TA-Luft also targets a reduction in the nitrogen oxide (NO_x) emissions of plants in Germany that require licensing. Consequently, natural gas-operated combined heat and power units are expected to comply with a maximum emission of <100 mg NO_x/Nm³ (related to 5 % oxygen in the exhaust gas) in the future.

What makes the 2G SCR system special is not the catalyzer itself, but the integrated controller and optimal interplay between the operating behavior of the CHP and exhaust gas treatment. The 2G SCR system communicates with the CHP and reacts to changes in system parameters in order to ensure perfect operation of the SCR catalyzer at all times. Thanks to the system unit design, the system can be accessed and controlled using the standard 2G touch panel.



In order to comply with these provisions with lean burning, a special exhaust treatment process using an SCR catalyzer (Selective Catalytic Reduction) is required. This is because such low limit values cannot be achieved by making changes inside the engine.

If you would like more information on this topic, please contact us at info@2-g.de

Italian cattle breeder values the reliability and efficiency of 2G

agenitor 408 stands out with high degree of effectiveness

The cooperative of Gemerello in Cavour in Italy's Province of Turin is a combination of agricultural operations that grow fruit and grains as well as raise cattle. This also includes Marco Busso with his "La Maddalena" operation. His family has raised cattle for generations. The farmer has operated a biogas system with a standard CHP with an electrical output of 250 Kilowatts for several years. In December of 2017, he replaced this CHP with a high-performance CHP from 2G: an agenitor 408.

"We decided on 2G and the agenitor 408 primarily for two reasons: reliability first and efficiency second", explains Marco Busso. "The efficiency gains of the agenitor 408 compared to the old device are enormous. And, what's more, it is also very environmentally-friendly."

The 8-cylinder engine has an electrical output of 360 kW and a thermal output of 345 kW.

The plant concept used in Italy is hardly different from that used in Germany. Electrical energy is fed into the public power network and remunerated accordingly. The heat is used to support the fermentation process.

In addition to Marco Busso, Christian Manca, CEO of 2G Italia Srl., was also very

pleased with the process as well as the results of the project. So it should come as no surprise that 2G will also handle servicing of the system in the future.



In this biogas plant in the Province of Turin, a standard CHP unit was replaced by a highly-efficient agenitor 408.

You can find additional reference projects at www.2-g.com/en/references

2G Italia at the Fiera Agricola

Service and my.2-g.com in focus



The expo team from 2G Italia was able to make good contacts at the Fiera Agricola.

The agricultural expo Fiera Agricola took place in Verona from January 31st to February 3rd. The Italian subsidiary 2G Italia Srl, which has installed more than 150 CHP systems since its founding in 2011, focused on service products. “The Fiera Agricola was a home game for us”, reports Christian Manca, CEO of 2G Italia.

“The focus of interest was the digital 2G partner portal my.2-g.com, which offers certified 2G partners and system operators useful tools to manage their systems in a transparent and efficient manner and to continuously optimize system operation.”

2G at the Energy Now Expo in England

Biogas CHPs from 2G score with their high electrical output

The Energy Now Expo is the only renewable energy exposition in Great Britain that is dedicated exclusively to the agricultural industry. The expo brings together farmers and experts on renewable energy.



At this year's Energy Now Expo at the beginning of February, 2G Energy Ltd. was represented with its own booth. 2G is able to score with its high electrical output particularly in the area of biogas. Ian Fortsyth, 2G Sales Manager at 2G Energy Ltd., views the expo as a complete success. He plans to participate in 2019 as well.



2G was represented with its own booth at this year's Energy Now Expo in the Telford International Centre.

Visit us at the trade fair!

The next trade fair dates

28/06/2018	mcTer	Milan	Italy
11/07 - 12/07/2018	ADBA	Birmingham	England
17/10/2018	mcTer	Verona	Italy
13/11 - 16/11/2018	Energy Decentral	Hanover	Germany
21/11 - 22/11/2018	EMEX	London	England

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