

GAS GENSETS

much more than
you expect

THE GAS-POWERED SERIES 4000.
ECONOMICAL, SUSTAINABLE,
RELIABLE, FLEXIBLE.

www.mtuonsiteenergy.com



THE NEXT GENERATION SERIES 4000 FOR NATURAL GAS

OPERATIONAL FLEXIBILITY

// Quick ramp-up and ramp-down plus a wide range of partial load operation make this product a perfect match for grid stabilization applications.
// Fulfills the highest emission standards.

30% MORE POWER

// The new genset increases its performance by 30%, withstanding hot and humid conditions.
// Highly robust against derating.

LOW LIFECYCLE COSTS

// Good serviceability
// Favorable maintenance intervals
// Reduced oil consumption

UP TO 44.3% EL. EFFICIENCY

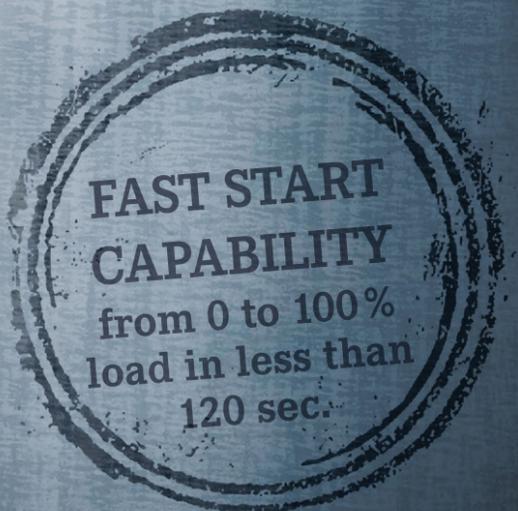
// An advanced, proven Series 4000 engine optimized for natural gas operation. Its combustion chambers ensure top levels of efficiency in its performance category.

IGNITION SYSTEM

// Ignition systems for individual cylinders allow for the most efficient level of operation for all cylinders, even with variable CH₄ content. The ignition voltage display gives customers information on the state of the spark plugs.

HEAT RECOVERY UNIT

// Well proven design perfectly suits the genset and provides the basis for optimized auxiliary efficiencies. The unit is fully integrated in the automation concept and is both safe and certified (CE).



GENERATOR

// Perfectly tuned to the engine and made by renowned manufacturers, the generator ensures a high level of reliability and optimum efficiency.

DIGITALLY CONNECTED

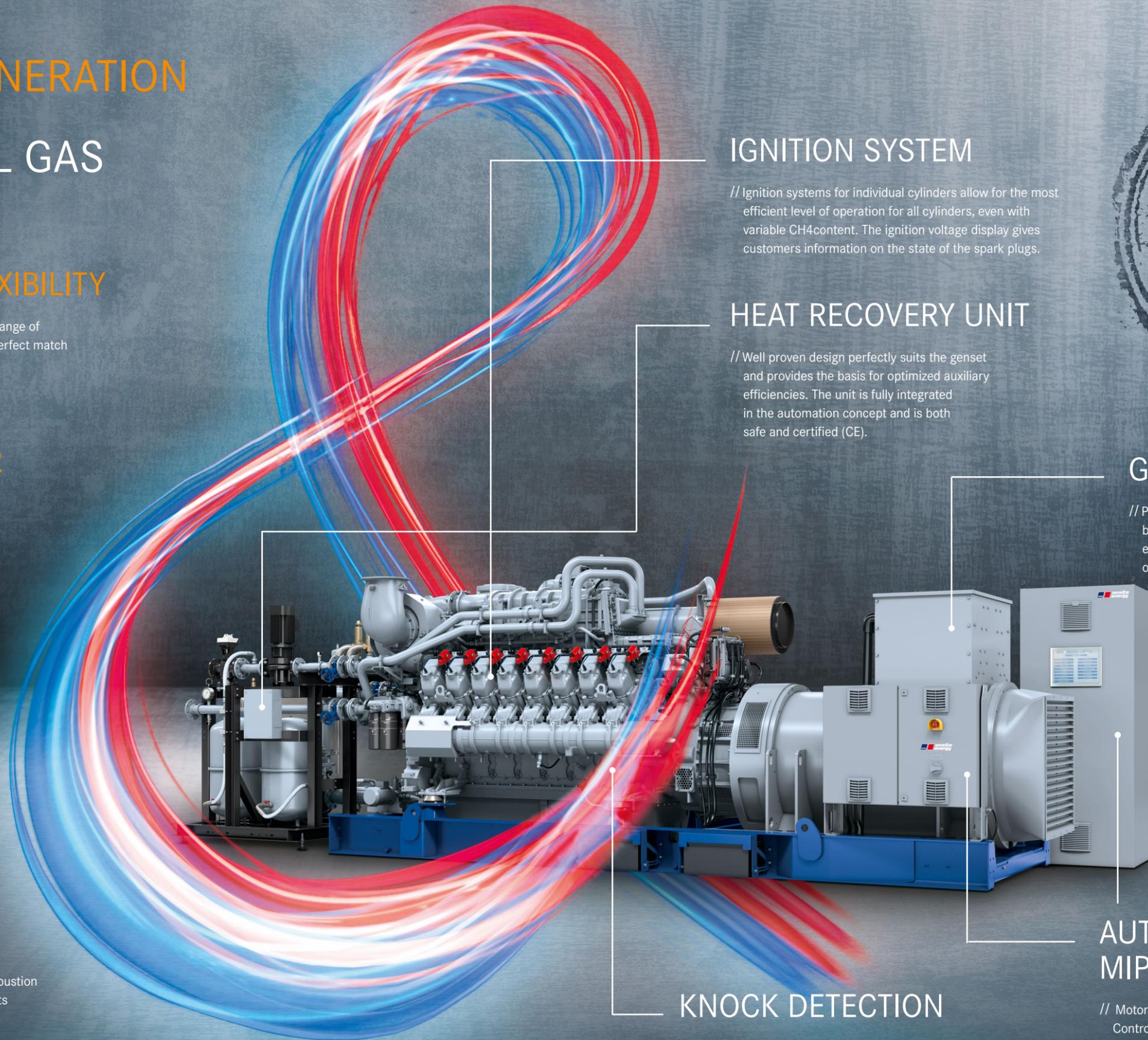
// The system is equipped with a data logger providing access to digital solutions from MTU, including remote monitoring, fast and reliable service support and – coming soon – further features such as predictive failure prevention and operational optimization.

AUTOMATION SYSTEMS MIP & MMC

// Motor interface panel (MIP) with stand-alone MTU Module Control (MMC). The MMC provides all the functions necessary for controlling the system. All the auxiliary drives required for the CHP system can be operated from here. The integrated power circuitry minimizes the customer's need for cabling on site.

KNOCK DETECTION

// Cylinder-specific knock detection and regulation protect the engine from abnormal operating conditions, and guarantee safe operation even with natural gas containing low levels of methane.



OVER 20 YEARS OF TOP PERFORMANCE

The new natural gas genset offers the highest power density and the highest kilowatt-per-square-foot ratio in its class. Its smaller footprint enables a 30% improvement in power density compared to its predecessor. In multi-generator sites, fewer gensets are needed to achieve a given power output. The new natural gas genset also has lower installation costs. The natural gas power genset is based on the successful 4000 series, delivers from 776-2,535 kW, and has been optimized for hot and humid environments.

TECHNICAL DATA (50 Hz)

Configuration		8V	12V	16V	20V
Bore/stroke	mm	170/210	170/210	170/210	170/210
Rated speed	rpm	1500	1500	1500	1500
Mean piston speed	m/s	10,5	10,5	10,5	10,5
Length	mm	4.200	5.000	5.500	6.600
Width	mm	2.000	2.000	2.000	2.000
Height	mm	2.300	2.300	2.300	2.400
Dry weight	kg	11.000	14.000	17.000	21.000

BENEFITS

DESIGNED FOR MAXIMUM PERFORMANCE:

The natural gas genset has an effective engine power of 130 kWm / cylinder - the highest power density in its class thanks to its compact design and small footprint. It offers superb performance at high temperatures and high humidity for use anywhere in the world and delivers 30% more power than its predecessor.

HIGH EFFICIENCY:

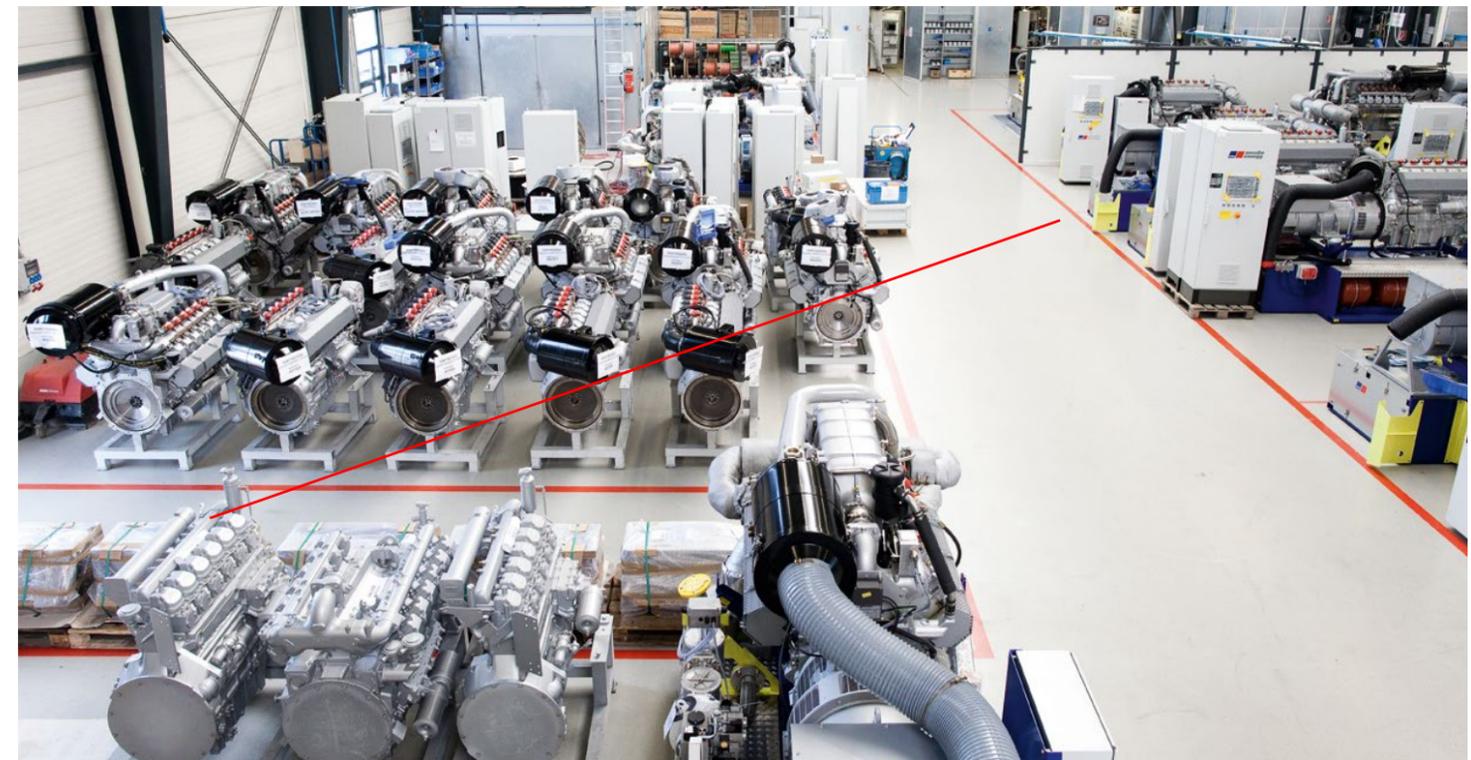
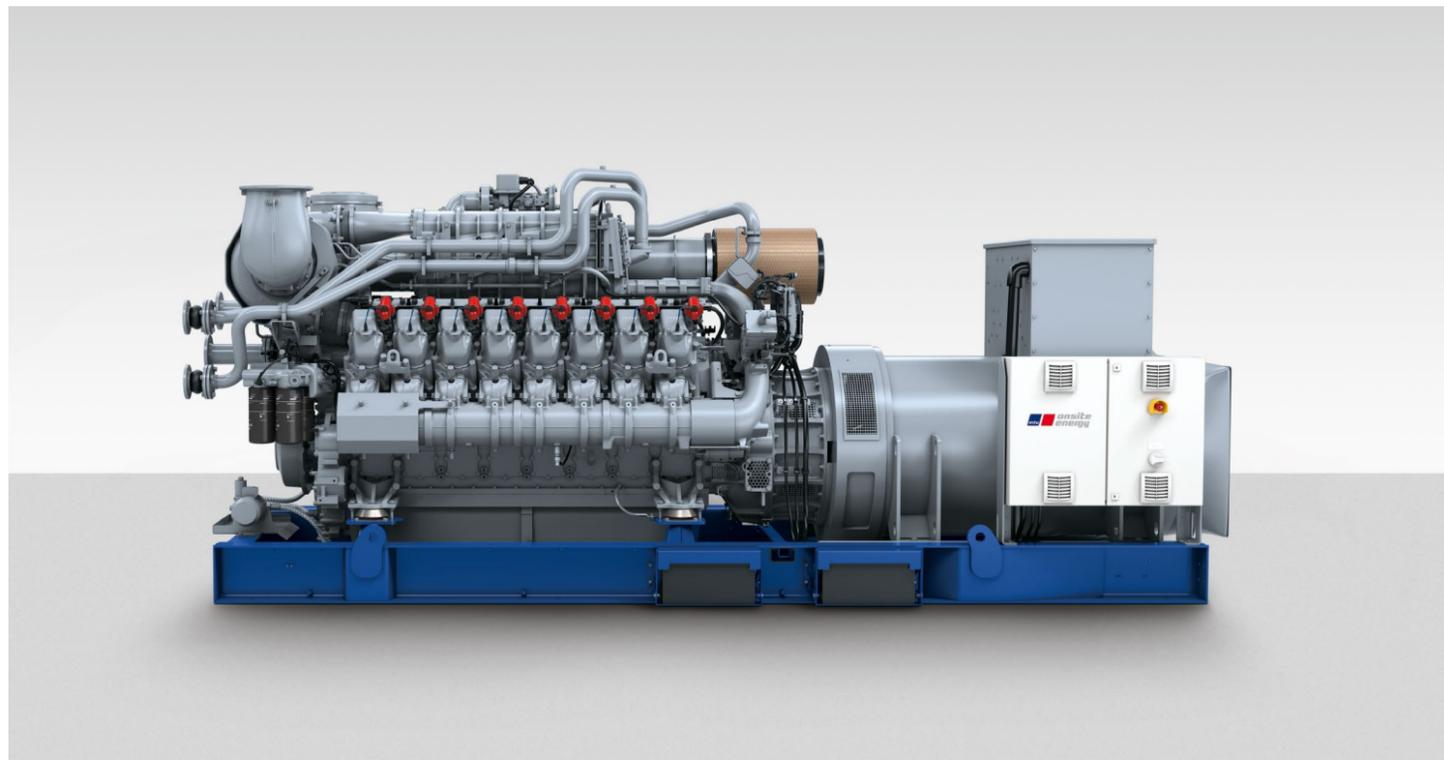
The natural gas genset achieves efficiencies of up to 44.3%, delivering a significant improvement in fuel/energy utilization at high temperatures.

REDUCED LIFECYCLE COSTS:

All natural gas genset components are fine-tuned to ensure long service lives and deliver maximum uptime. Long service intervals and easy-to-maintain components mean low maintenance costs. Fast availability of spare parts and low engine oil consumption also help keep lifecycle costs lower overall, with cylinder head lifetimes potentially equivalent to TBO.

CLEANER AND MORE FLEXIBLE:

A significant reduction in nitrous oxide emissions makes the natural gas genset a perfect fit for independent power producers (IPP) and combined heat and power (CHP) applications. With part-load performance down to 30% and a fast start option, its operational flexibility is also ideal for demand response applications. Low emissions - 250 mg/Nm³, 500mg/Nm³, (@5% O₂)NO_x - are achieved without external aftertreatment, even meeting the new expected German unburned THC emissions legislation (<1300mg@5%O₂).



PERFORMANCE / EFFICIENCY (STANDARD CONDITIONS)

Configuration (50Hz)	8V	12V	16V	20V	
Genset type	MTU 8V4000 GS	MTU 12V4000 GS	MTU 16V4000 GS*	MTU 20V4000 GS	
Engine Type	L64	L64	L64	L64	
Output					
Electrical output ¹	kW	1.012	1.523	2.028	2.530
Thermal output					
Engine heat ²	kW	475	712	965	1200
Exhaust heat (at 120°C) ³	kW	461	691	936	1.147
Low temperature (43°C) ⁴	kW	69	104	127	175
Input					
Energy Input	kW	2.298	3.438	4.574	5.748
Efficiency					
Total Efficiency ⁵	%	44	44,3	44,3	44,1
Fuel energy utilisation	%	84,8	85,1	85,9	84,8

* MTU 16V4000 GS L64 FNER
Available with fast start option

PERFORMANCE / EFFICIENCY (HOT & HUMID CONDITIONS)

Configuration (50Hz)	8V	12V	16V	20V
Genset type	MTU 8V4000 GS	MTU 12V4000 GS	MTU 16V4000 GS	MTU 20V4000 GS
Engine type	L64 FNER	L64 FNER	L64 FNER	L64 FNER
Output				
Electrical output ¹	kW		2.028	
Thermal output				
Engine heat ²	kW	Coming soon!	1.122	Coming soon!
Exhaust heat (at 120°C) ³	kW		980	
Low temperature (58°C) ⁴	kW		81	
Input				
Energy Input	kW		4.672	
Efficiency				
Electrical efficiency ⁵	%		43,4	
Total Efficiency	%		88,4	

NOx < 500 mg/mn³ at 5% O₂ dry
All data refers to maximum load.

- 1) cos-phi = 1,0
- 2) Heat output from engine cooling with tolerance of ± 8%
- 3) Heat output from exhaust (exhaust cooling to 120°C) with tolerance of ± 8%
- 4) 2nd stage mixture cooler inlet temperature
- 5) Methan number: 80

Any specifications, descriptions, values, data or other information related to dimensions, power or other technical performance criteria of the goods as provided in this general product information are to be understood as non-binding and may be subject to further changes such as but not limited to technical evolution at any time.



GAS POWER CASE STUDIES

GREENHOUSE / ROSES

A CHP plant from MTU Onsite Energy has been generating electric power and heat to ensure that the roses in the greenhouses of the family-run Wimceco Rose Nursery grow and thrive throughout the year. Greenhouse operator Van Nuffelen says, "We place great value on environmentally friendly and energy-efficient production."

The combined heat and power plant is based on high-speed 12V4000L64 gas-powered engine from MTU. With an electrical output of 1,523kWe and a thermal output of 1,912kW, it achieves a total efficiency level of 99.9%. The electric power is used primarily for the greenhouse lamps and, if required, is fed into the public grid. The greenhouses, which cover an area of 1.75 hectares, are heated using the heat extracted from the exhaust gas and the engine's cooling system. In addition, the cleaned exhaust gases from the engines are injected into the greenhouses to increase the level of CO₂ and boost plant growth.

- // **Who:** Wimceco Rose Nursery
- // **What:** Combined heat and power plant based on high-speed 12V4000L64 gas-powered engine from MTU.
- // **Where:** Boechout, Belgium



TRIGENERATION FOR INDUSTRY / LIGHTING

Osram is one of the world's leading lighting manufacturers. Its Eichstätt facility plays a major role in halogen lamp production. Apart from halogen lamps for normal lighting in buildings, Eichstätt also supplies car lamps and xenon short-arc lamps for use in cinemas.

A trigeneration gas genset from MTU Onsite Energy has been in service at the Osram plant in Eichstätt since January 2015. The system boasts low emissions and high efficiency and keeps the lighting manufacturer supplied with electrical power, heat and cooling.

The new plant does more than the conventional cogeneration module for combined heat and power (CHP). In winter, it provides heat for the production halls and in summer cools the machine control and laser systems with its absorption refrigerator. Generating cooling power in times of low heat demand enhances the capacity utilization of the plant.

- // **Who:** Osram halogen lamp production
- // **What:** Trigeneration module from based on a 16V Series 4000 L64 engine from MTU delivering 1999 kW of electrical power and around 1900 kW of heat.
- // **Where:** Eichstätt, Germany



READY TO GO CONTAINERIZED SOLUTIONS

As a system supplier, we offer a wide variety of solutions. As well as our gas engine systems for use in buildings, we also provide containerized turnkey units. Compact, complete, flexible and autonomous, they are ideally suitable for mobile power generation or for applications that do not offer enough space to accommodate a complete gas engine system. When producing power from natural gas, installing the generator set in a container can be a useful alternative to the more common option of permanently installing a static system in a generator room. Our standardized container generator set is designed to meet the requirements of a variety of applications.

THE CONTAINER INCLUDES:

- // The generator set
- // The switchgear including control and monitoring system
- // All necessary connection and supply systems (ventilation, lubricant supply, heat recovery, etc.)

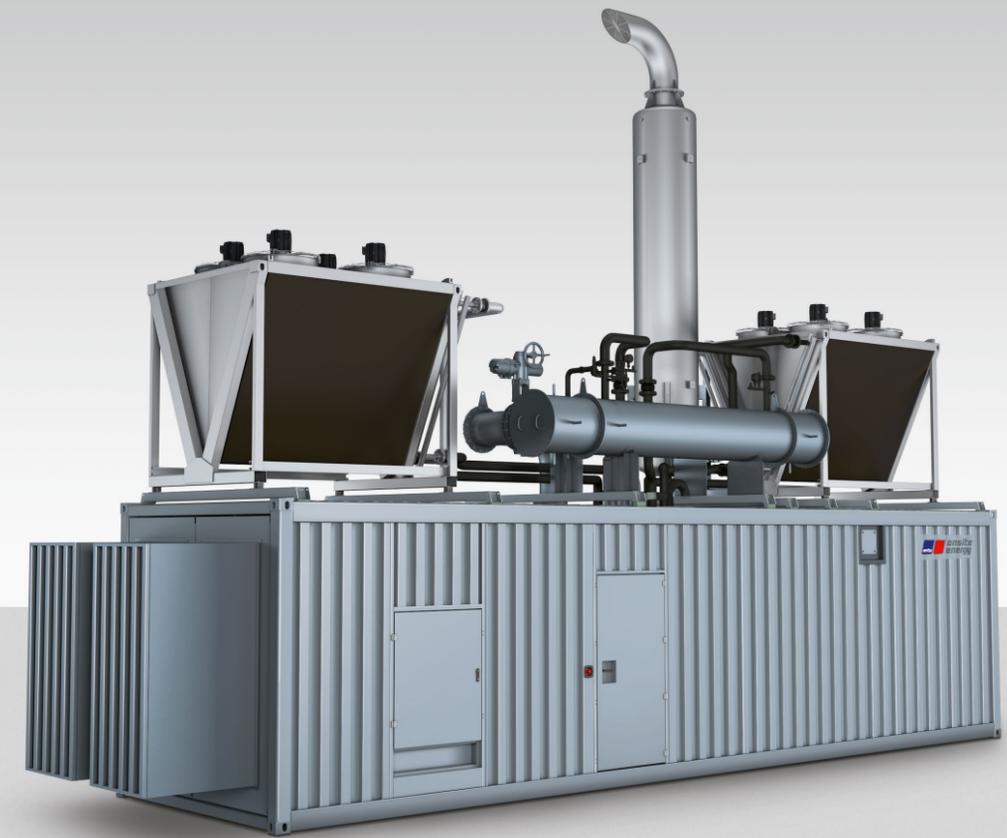
Like all MTU Onsite Energy systems, the standard container gensets are capable of fully automatic and continuous operation.

WE OFFER TWO TYPES OF CONTAINERS:

- // Power Containers generate electrical power only and are ideal for remote locations or areas with unreliable power supplies. They are often deployed in power stations.
- // Combined heat and power units (CHP) generate electricity and thermal energy, for example for operators whose processes require both heat and power.

ADVANTAGES OF CONTAINER UNITS:

- // Technically mature, proven and eco-friendly gas engine technology for maximum efficiency and reliability
- // Completely autonomous overall design that does not require an additional building
- // Flexible unit assembly system based on standardized modules and synchronized components
- // Readily available, compact turnkey plug & play solutions
- // Optimum support thanks to a worldwide service network
- // Quality certified to ISO 9001 and DIN EN ISO 14001



CHP/CCHP-CONTAINER



POWER-CONTAINER

MTU MODULE CONTROL: SYSTEM MONITORING – ANYTIME.

MTU Onsite Energy supplies you with the complete system engineering package for your installation. One of the most important aspects is the control system technology. If the generator set is the heart of the system, then the module controller (MMC) is its brain. Our industrial-computer-controlled and reliable electronics monitor the engine and the overall system to ensure optimum operation. The most important features are:

- // Drive and control via PLC (programmable logic controller)
- // Operation and visual display by means of industrial PC and touch-screen panel with color display

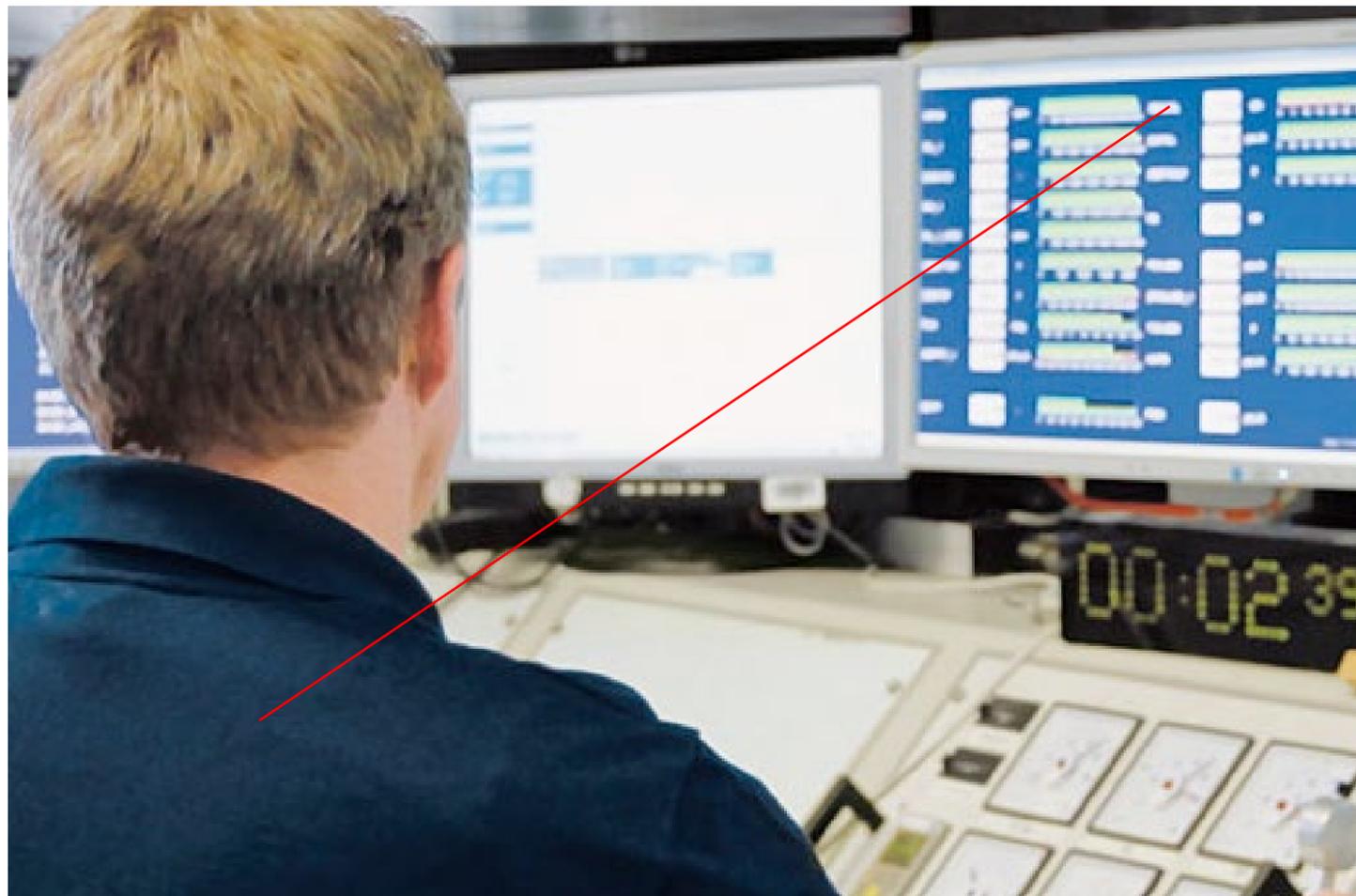
- // Visual display of all functional processes and controls
- // Numerous additional controls and functions can be integrated (CH4, gas tank, heat production mode, heat storage, mains power usage)
- // Networking of multi-module systems via Ethernet
- // Ability to be linked with master control system
- // Wide choice of interface protocols (Ethernet, Profibus DP, Modbus RTU, Modbus TCP/IP, Profinet)
- // Logging of all fault and status messages in a database (up to ~~six months~~ of data can be recorded)
- // Optional remote diagnosis via DSL ~~or ISDN~~
- // Optional integration of SMS / E-mail client (notification of faults, daily reporting of all meter readings)

CHP PROJECT PLANNING: INDIVIDUAL ADVICE FOR INDIVIDUAL SOLUTIONS.

Our support for your individual CHP system

Choosing of the appropriate CHP system for your demands depends on various factors. That's why we offer you comprehensive support, all the way from the project conception to implementation.

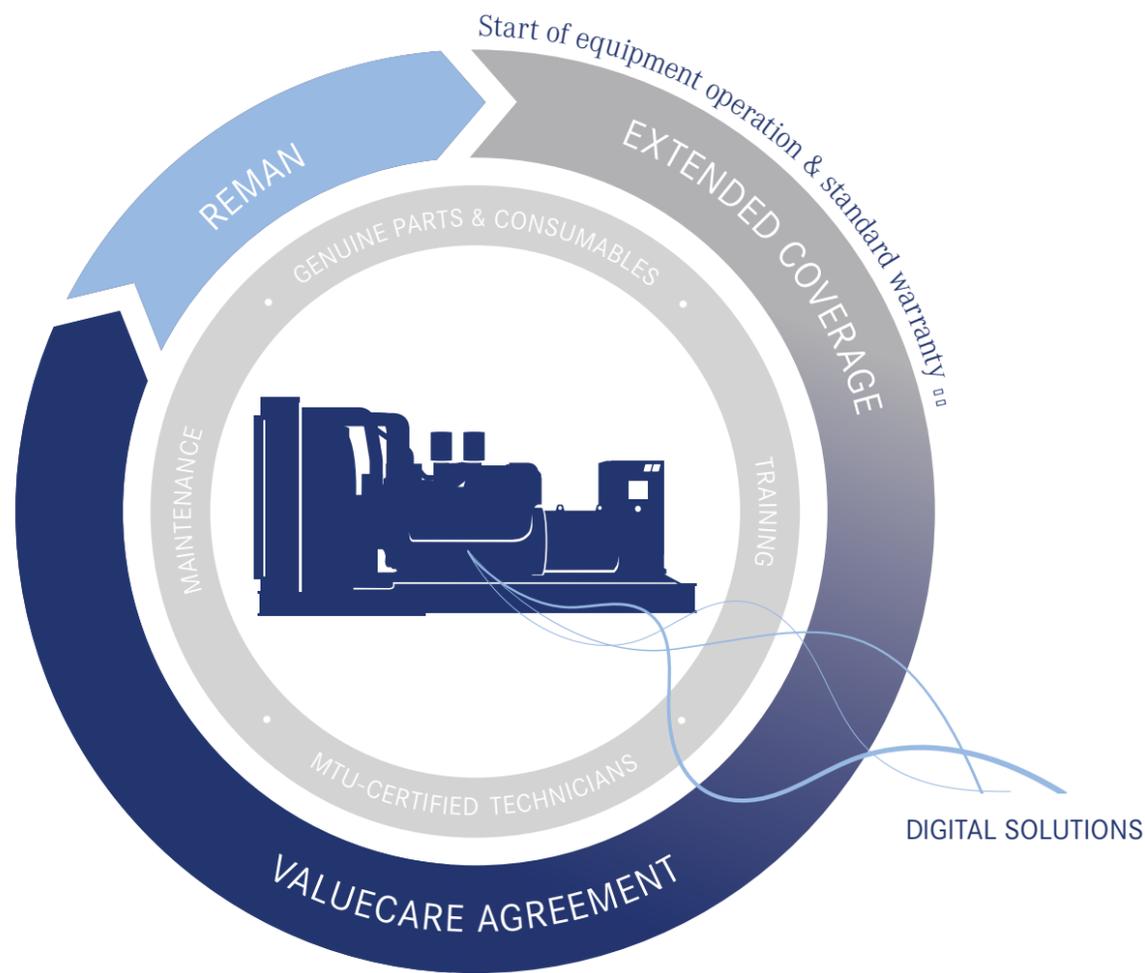
- // Help with planning your new CHP module
- // Expertise to help you incorporate the CHP module into your application
- // Explanations of the technology behind the engine, system and individual components
- // Proposal complete with budget price for planning stage and fixed price for implementation
- // Design and planning of peripheral systems
- // Advice on service solutions during the project stage
- // Help with questions on legal situations (EEG, formaldehyde bonus)



SERVICE SOLUTIONS DESIGNED AROUND YOUR PRIORITIES.

With MTU Onsite Energy you get the power, performance and peace of mind to focus on what matters most – your business. Our **digitally connected power systems, wrapped in ValueCare Agreements**, make it easy to keep your equipment operating reliably and reduce your total cost of ownership through proactive monitoring and preventive maintenance. So go ahead, focus on what matters most to you – and leave the rest to us.

MTU Onsite Energy. Partners in productivity.



ValueCare Agreements wrap around your investment—providing comprehensive support throughout the life of your equipment, for maximum uptime and optimized lifecycle costs.

ValueCare Agreements help you:

-  Increase operational uptime
-  Guarantee parts availability and service quality
-  Predict equipment-related costs
-  Optimize maintenance planning
-  Connect to MTU, 24/7



GOLD

Maximize operational uptime

- // Operational uptime commitment to meet or exceed your availability targets
- // Engine preservation management
- // Monthly reporting including availability and repair times
- // Annual performance meetings and trend analysis



SILVER

Eliminate unexpected maintenance costs

- // Predefined rate per operating hour for maintenance and repairs
- // Predefined prices for extended component maintenance and major overhauls
- // Quarterly reliability reporting
- // Proactive remote engine health monitoring, including maintenance planning and troubleshooting

Gold also includes all benefits of Silver level



BRONZE

Ensure parts availability & price stability

- // Only for customers with self-service maintenance capabilities
- // Predefined rate per operating hour for basic maintenance components
- // Automatic delivery of preventive spare parts based on operating hours
- // Quarterly maintenance reporting and maintenance forecast
- // Annual on-site engine health check

Silver also includes all benefits of Bronze level

Gold also includes all benefits of Bronze level

MTU Onsite Energy

Part of the Rolls-Royce Group

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