

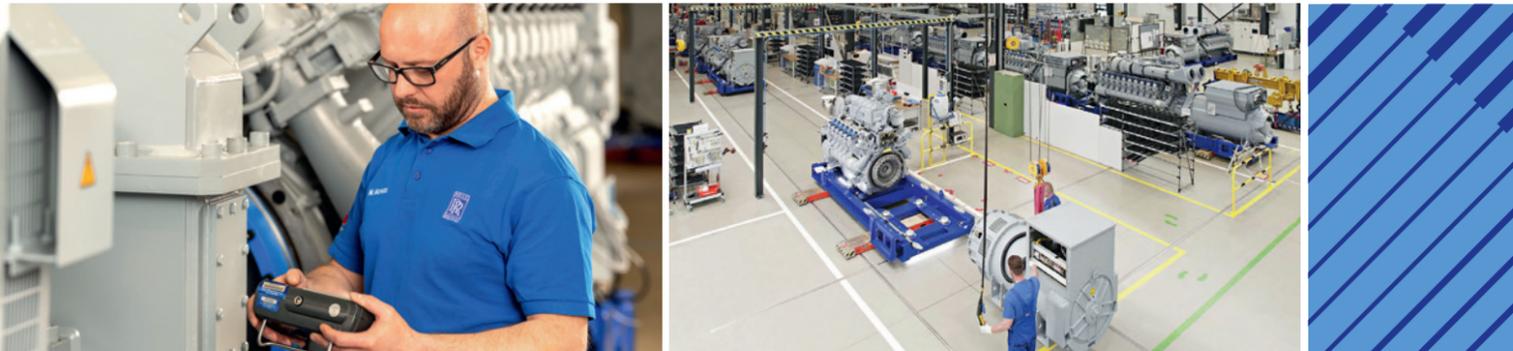


Power Generation

# BIOGAS - SUSTAINABLE FUEL AND RELIABLE SOURCE OF INCOME



A Rolls-Royce  
solution



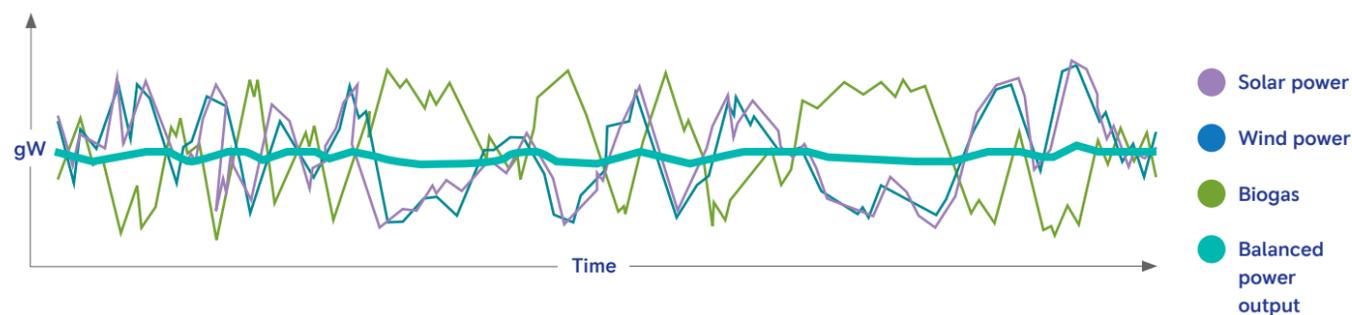
# GENERATING A SUSTAINABLE SOURCE OF INCOME WITH AGRICULTURAL WASTE

Our latest generation of **mtu** gas gensets allows for cost-saving, sustainable and efficient operation using biogas. And best of all: It also creates the potential for a new revenue stream through a wide range of waste-to-energy applications.

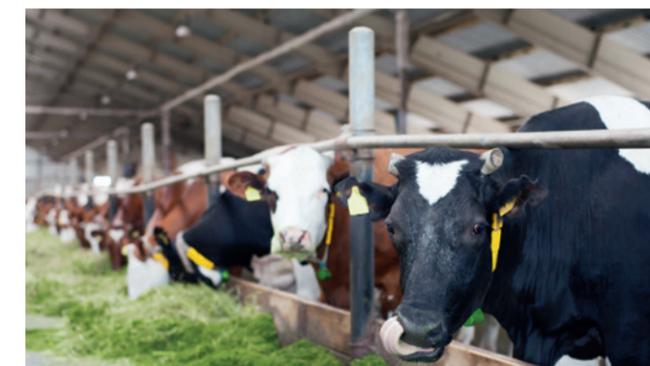
## FROM BIOMASS TO MEGAWATTS

The energy transition is already beginning around the globe and across all markets. It brings with it many challenges, but also numerous opportunities for positive change. One very promising fuel for generating clean, economical and sustainable electricity and heat is biogas.

Biogas has three major advantages: It can be stored, it is very economical to produce, and it is very eco-friendly.



Biogas plants have particularly valuable characteristics with their possibilities for flexible electricity production. Accordingly, biogas plants can compensate for the weather-dependent generation of solar and wind power plants.



### Livestock Operations

With **mtu** biogas combined heat and power (CHP) systems, confined livestock operations can put organic material to efficient use. Our proven CHP systems provide renewable energy with lower emissions and reduced lifecycle costs.



### Sewage / Waste water treatment plants

The use of combined heat and power plants in wastewater treatment is an economical and environmentally friendly solution for generating electricity and heat from sewage gas. Like landfill gas, sewage gas is an extremely productive fuel that is free and readily available.



### Farming and Agriculture

Yet another source of renewable energy – sugar industry waste – can also be used to produce biogas. As a substitute for fossil fuels, biogas can generate electricity and heat, thereby offering a double benefit for plant owners.

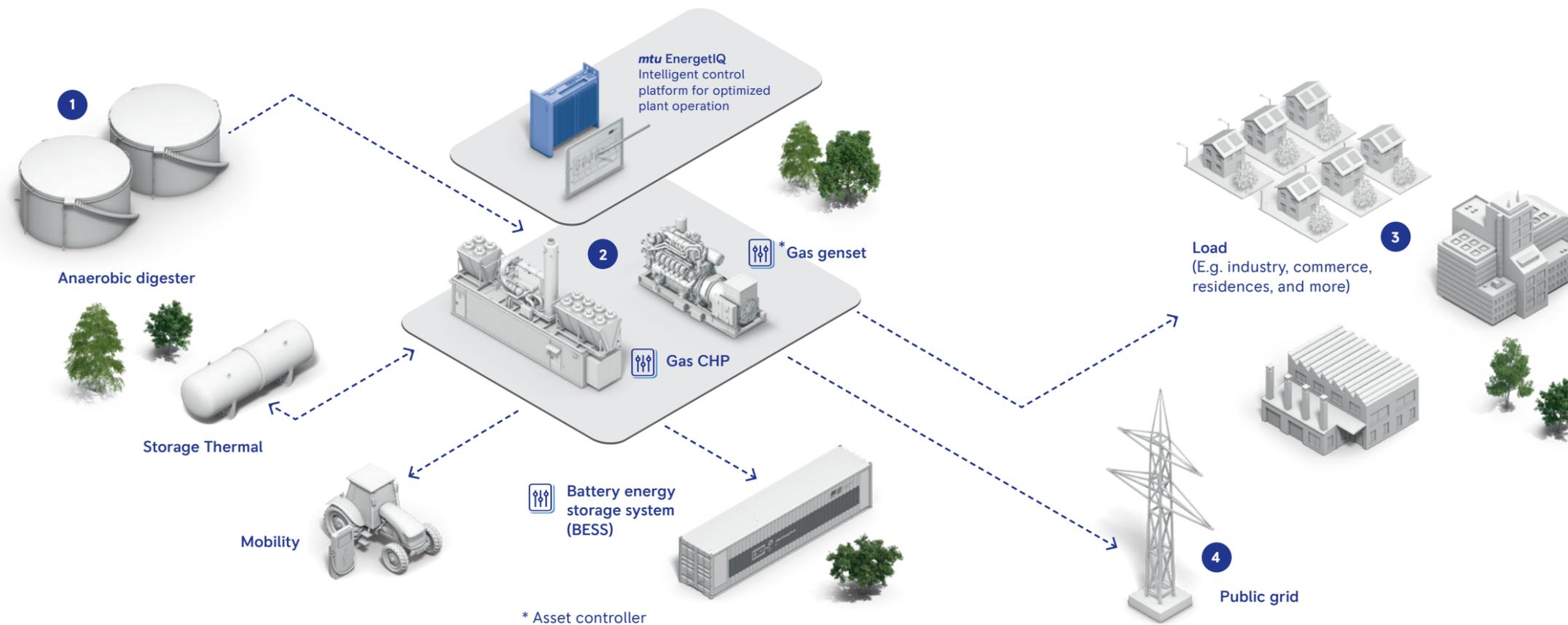


### Waste-to-energy operators

Landfill gas is a mix of methane and carbon dioxide. Instead of being emitted into the atmosphere as a harmful greenhouse gas for the environment, it can be collected directly at the landfill and used to produce renewable energy.

# INDUSTRIES AND LOCATIONS MAY VARY, BUT THE NEED FOR CONSTANT POWER NEVER CHANGES.

**mtu** gas-powered generator sets provide you with continuous, economical, reliable, and future-ready power. Utilizing biogas and other biological gases, **mtu** generator sets feature cutting-edge technology for combined heat and power (CHP), as well as combined heat, power and cooling (CHPC) solutions. All of our gas gensets feature high efficiency and low emissions in the 760 kWe - 2,547 kWe electrical power range.



### 1 Storable fuel solution

Biogas as a fuel is available 24/7, all year round, and can be accessed as needed. Biogas gensets can contribute to continuous power generation or meet additional demand during peak energy periods.

### 2 **mtu** Series 4000 Biogas Gensets

The **mtu** Series 4000, our latest generation of biogas gensets, has a 25-year track record of success. Combining the highest reliability and efficiency with excellent energy density, they deliver all the power you need for your operation.

### 3 Load

Our biogas solutions provide highly reliable and efficient local power and heat, both on-grid and off-grid, without the need for significant investment in grid infrastructure. Our biogas gensets are ideal for primary power supply and load balancing.

### 4 Grid balancing

Biogas plants can make an important contribution to balancing the public electricity grid. With MTU EnergetIQ, our intelligent plant control system, your biogas plant, even as part of a microgrid, can feed energy into the grid continuously or on demand for grid stabilization.

# mtu SERIES 4000 BIOGAS GENSET

44.1%  
EL-EFFICIENCY  
OUTSTANDING  
PERFORMANCE

### Low lifecycle costs

- Good serviceability
- Favorable maintenance intervals
- Reduced oil consumption
- No additional exchange of cylinder heads necessary before major overhaul (TBO)
- 84,000 operating hours before major overhaul (TBO)

### 30 % more power

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

### Up to 44.1% el. efficiency

- An advanced, proven *mtu* Series 4000 engine optimized for biogas operation. Its combustion chambers ensure top levels of efficiency in its performance category.

### Full power output with different fuels possible:

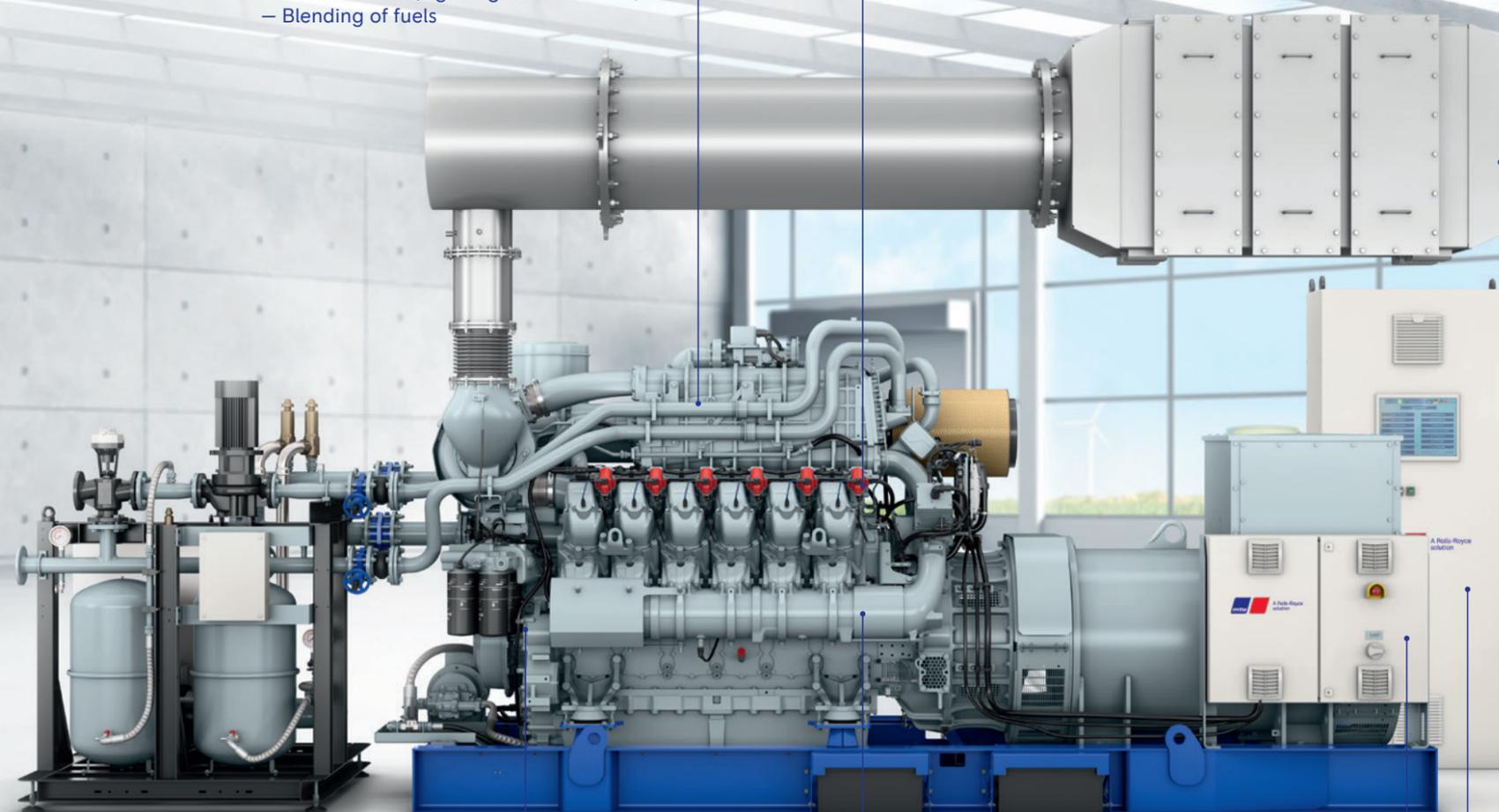
- Dual Gas Fuel (e.g. Biogas/Natural Gas) or
- Blending of fuels

### Ignition system

- Ignition systems for individual cylinders allow for the most efficient level of operation for all cylinders, even with variable methane (CH<sub>4</sub>) content. The ignition voltage display gives customers information on the state of the spark plugs.

### EGAT system

- Developed in-house, the exhaust gas aftertreatment system (EGAT) is a perfect match for *mtu* engines. Designed for efficient operation and maximum performance, it can be flexibly integrated into a variety of different plants.



**Corrosion protection**  
Sulfur resistant bearings

### Knock detection

- Cylinder-specific knock detection and regulation sensors protect the engine against damage and ensure safe operation, even with biogas containing low levels of methane (CH<sub>4</sub>).

### Automation systems MIP & MMC

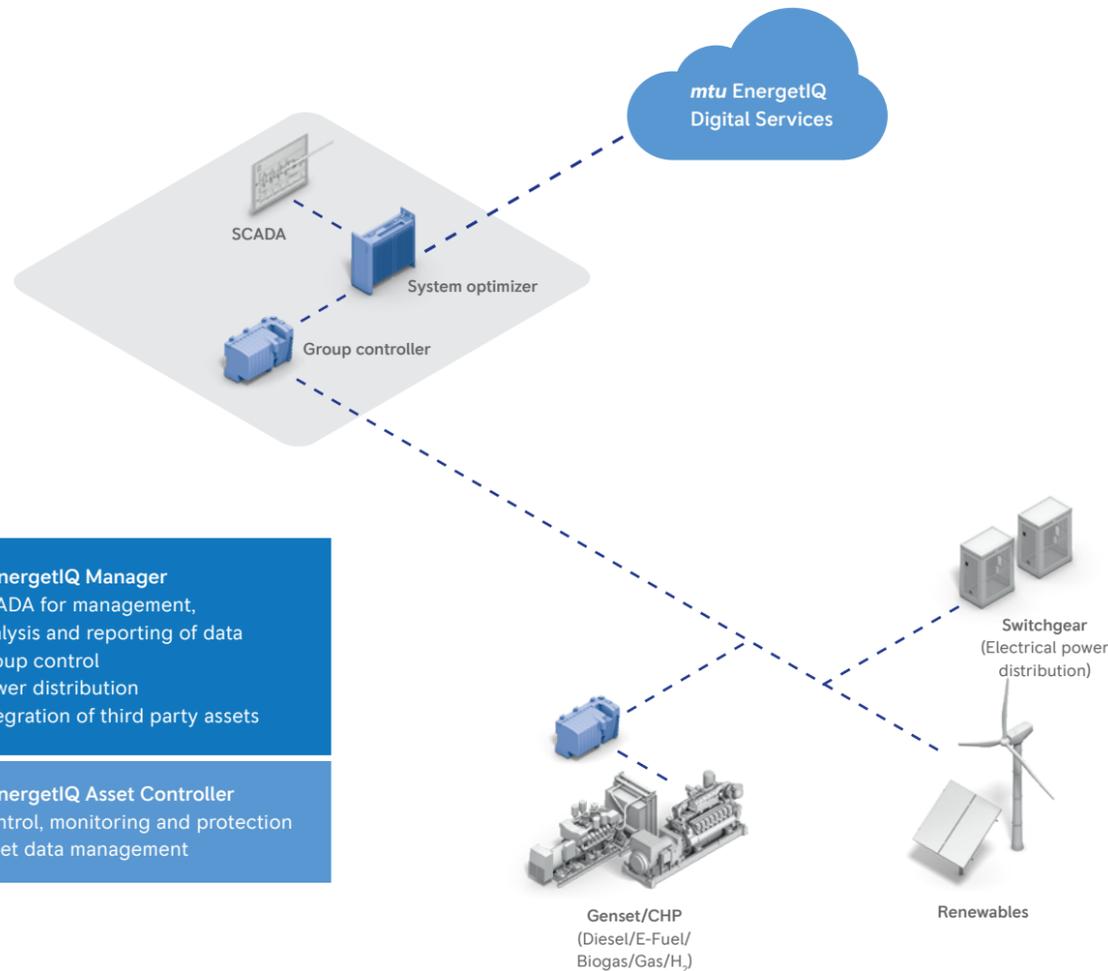
- The motor interface panel (MIP) with stand-alone *mtu* Module Control (MMC) provides all of the functions needed to control CHP system operation, including all of the auxiliary drives. The integrated power circuitry also minimizes the need for on-site cabling.

Technical data	
Power range	776 - 2,535 kWe (50 Hz) 760 - 2,520 kWe (60 Hz)
Available as	8V, 12V, 16V and 20V
Optional	Efficiency optimized NOx setting possible (enriched data setting) in combination with <i>mtu</i> Exhaust gas after treatment systems



# AUTOMATION & CONTROLS FOR ENERGY PLANTS

The **mtu EnergetIQ Manager** effectively addresses seamlessly integrating diverse power plant assets and by automatically controlling the power generation, storage and demand. The optimized operation allows for better planning and greater efficiency while reducing costs, fuel and emissions.



- mtu EnergetIQ Manager**
- SCADA for management, analysis and reporting of data
  - Group control
  - Power distribution
  - Integration of third party assets

- mtu EnergetIQ Asset Controller**
- Control, monitoring and protection
  - Asset data management

Offering	Characteristics
System-wide services	<ul style="list-style-type: none"> <li>– One common user interface for all different assets</li> <li>– Easy SCADA system integration and customization options</li> <li>– User management with audit trail to control and record access to plant manager and assets</li> <li>– IT security concepts according to project specific analysis</li> </ul>
Data management	<ul style="list-style-type: none"> <li>– Data acquisition of connected assets, switchgear and grid</li> <li>– SQL database with access by web-based query technology</li> <li>– Modular data analysis including correlation to external data</li> <li>– Data visualization and reporting with dashboards and interactive Jasper reports</li> </ul>
Functions	<ul style="list-style-type: none"> <li>– Real-time control, monitoring and protection</li> <li>– Asset health analytics</li> <li>– Multiple BESS applications covered, such as, the reserve market, energy storage control, spinning reserve, load shedding, sector coupling etc.</li> <li>– Wide range of predefined and configurable layouts for trending and reporting</li> </ul>



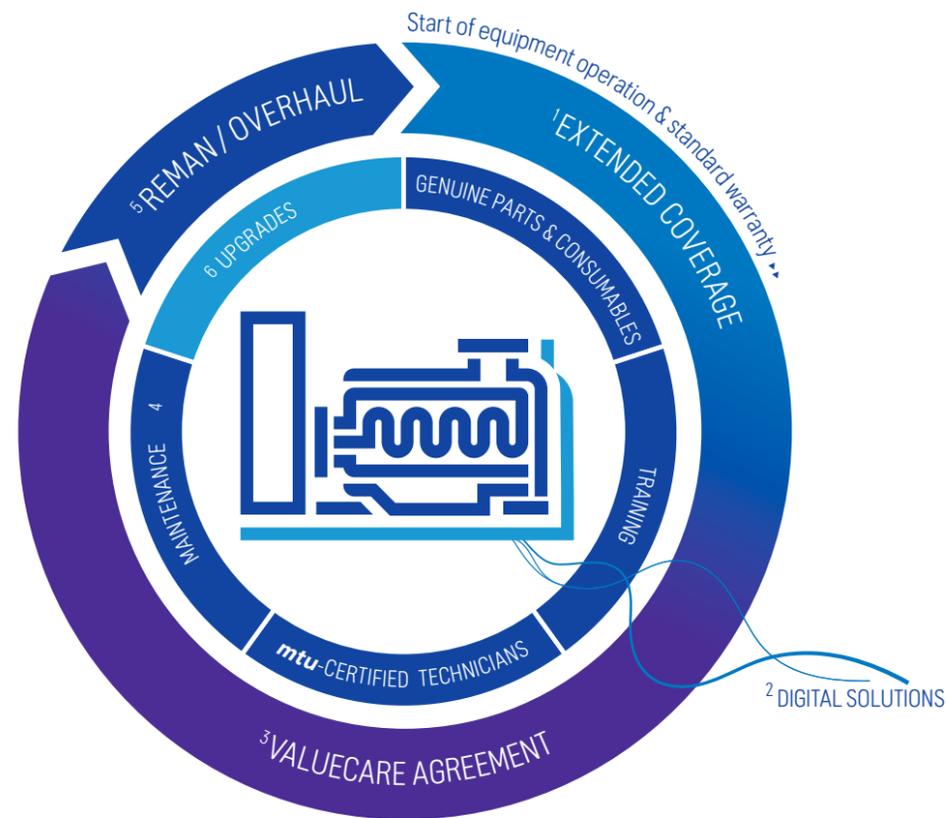
All data on one screen, including assets such as gensets, BESS, photovoltaics and more.

- Comprehensive presentation of information
- System-wide states / alarms / relevant power data
- Individual, region-specific settings are available (colors and symbols)

Service solutions

# FOCUS ON YOUR OPERATIONS. LEAVE THE REST TO US.

You've got a tough job. With us as your partner, you'll get the power, performance and peace of mind to get it done right. Our digitally-enabled ValueCare Agreements make it easy to keep your business running smoothly and reduce total cost of ownership by maximizing uptime, optimizing lifecycle costs and helping you avoid equipment-related business disruptions through preventive maintenance.



- 1 Avoid the unexpected with added protection beyond the standard warranty.
- 2 Make better decisions faster with digitally-enhanced tools.
- 3 Maximize availability and optimize lifecycle costs with a ValueCare Agreement.
- 4 Improve system performance and extend equipment life with on-demand support.
- 5 Keep a good thing going with factory reman/overhaul solutions.
- 6 Maximize the value of your equipment with custom upgrades for changing needs.

## Service solutions designed around your priorities

With tailored solutions to meet your needs, there is a ValueCare Agreement that is just right for you.

	<b>Bronze</b> Ensure parts availability and price stability
	<b>Silver</b> Eliminate unexpected maintenance costs
	<b>Gold</b> Maximize operational uptime



### mtu Upgrade Solutions

mtu Exhaust gas Aftertreatment systems for reduced emissions from a single source

**Perfect interaction for higher efficiency**  
To ensure that your gas systems are as cost-efficient, trouble-free and low emissions as possible, we offer an in-house developed exhaust gas aftertreatment system (EGAT), which is optimally adapted to the engines. As a

reliable partner, we analyze the respective requirements, installation conditions, necessary installation space, and accessibility for operation and maintenance. We supervise the implementation up to commissioning - and are also happy to ensure a smooth life cycle for the entire system.



Stay posted with more powerful information  
and follow **mtusolutions** under:



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