



Power Generation

# MICROGRID SOLUTIONS FROM A SINGLE SOURCE



A Rolls-Royce  
solution



## Market trends

# TRIGGERING GLOBAL DEMAND FOR NEW SOLUTIONS

Economic growth and population growth are increasing the demand for power. Increased pressure to decarbonize, and growing demand for more flexible, sustainable, cost-effective energy solutions are guiding governments and industry away from traditional energy sources like coal and gas, and toward renewable energies such as solar and wind power.

### Four megatrends are transforming the energy world:

- **Globalization** – the urbanization and industrialization of developing countries coupled with population growth – has driven major economic growth but has been accompanied by a rise in carbon emissions.
- **Decarbonization** is part of a global effort to prevent climate change by keeping temperatures from rising. Ambitious targets have been set by governments and companies around the world.
- **Electrification** is a necessary step in meeting decarbonization targets: heavy-polluting industries can be cleaned up by electrifying processes that previously ran on fossil fuel.

– **Digitalization** offers a host of new solutions and opportunities, but the resultant huge data volumes create enormous power demand.

These four factors are driving growth in energy demand, and encouraging the development of innovative, cost-effective decentralized solutions.

## PIONEERING THE POWER THAT MATTERS

We at Rolls-Royce provide world-class power solutions and full life-cycle support under our product and solution brand MTU. By utilizing the potential of digitalization and electrification, we strive to develop climate-neutral power delivery and power generation solutions that are even cleaner and smarter, thus providing answers to the challenges posed by climate change and by society's rapidly growing demands for energy and mobility. We supply and maintain comprehensive, powerful and reliable systems based on customer needs, including energy storage systems, biogas and natural gas engines, diesel engines, and renewable energy solutions.



# SAVING MONEY WITH RELIABLE AND SUSTAINABLE SOLUTIONS

Microgrids are decentralized energy systems consisting of a combination of renewable power generation, power storage and conventional power generation in order to meet a given demand. A microgrid may be off-grid or on-grid, and a centralized controller is in place to optimize the way the system operates.

By combining different components, microgrid solutions can be tailored to every customer need. The MTU microgrid controller can be used to optimize solutions, reducing operational expenditures and securing several further important benefits.

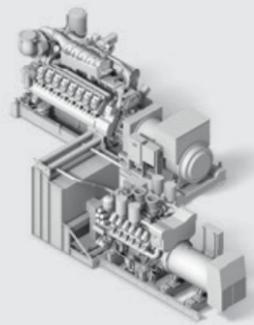
**Key benefits:**

- Reliability: Independent access to power, better security of supply, higher quality of supply
- Sustainability: CO<sub>2</sub> avoidance and the ability to add on renewable energy sources
- Economy: Energy cost optimization and new revenue streams



**Microgrid controller**

The MTU microgrid controller seamlessly integrates power generation, storage and demand. It optimizes the production and use of energy to meet a user's requirements, whether their priority is cost, carbon footprint or availability.



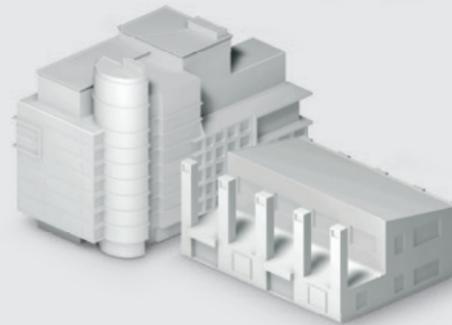
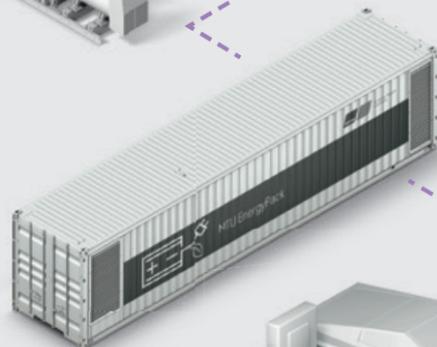
**Gas and diesel generators**

MTU gas and diesel generator sets provide power on demand – and do so reliably and quickly. Their load flexibility adapts output quickly to the customer's needs. They also provide emergency backup and help cope with load peaks. Our gas gensets are also suitable for combined heat and power applications (CHP).



**Energy storage**

MTU battery storage systems are a great complement to systems using renewable energies that cannot be ramped up and down at will. They provide grid stability, voltage and frequency control, instantaneous power, plus the ability to de-couple peaks in generation from peaks in demand. Operation and maintenance costs are low.



**Scalable solutions**

Whether on-grid or off, microgrid solutions are scalable. Use cases range from a single hotel to a remote mine, from large factories to urban utilities, and can include heating and cooling applications for industrial or residential purposes.



**On-grid / off-grid**

A microgrid can run while connected to a public power grid (on-grid) and can be used to safeguard stability of supply and optimize both cost and the operator's environmental footprint. Fully independent (off-grid) microgrids can be used to power remote communities and industries or to provide energy independence from the grid.



**Renewable energy sources (RES)**

Solar power, wind power and other renewables that are not always dispatchable offer key benefits – zero carbon emissions, low operating costs and low fuel expenses – but there are some drawbacks as they are dependent on weather and time-of-day, can suffer output fluctuations, and often require major capital investment. A smart microgrid uses storage and/or complementary generation technologies to optimize the use of renewables.



Microgrid applications

# CUSTOMERS, CONFIGURATIONS AND BENEFITS

**Grid & utility service provider**

Examples: grid system operators, utilities, independent power producers



Microgrids allow the avoidance of significant investment in grid infrastructure e.g. to enable a scale-up of electric vehicle charging. Additionally, solar or wind power can be made more reliable and dispatchable, while enabling gas or diesel power plants to operate more efficiently when combined with battery storage facilities.

Typical configuration: 

**Community**

Examples: remote communities, urban district-/town solutions



Microgrids make urban areas more self-sufficient and provide reliable backup power in the event of grid failure. In areas unconnected to the public grid, they ensure high quality power supplies and allow the integration of renewable energies to reduce carbon footprint and save fuel.

Typical configuration: 

**Industry**

Examples: agriculture, manufacturing, mining, commodities



Remote industrial operations currently running on fossil fuels without grid connections can reduce their fuel consumption and meet legal or company environmental standards more easily. When connected to the public grid, using gas-powered CHPs and adding renewables can reduce power demand charges and so offset rising energy costs. And, being independent, any growth in electricity demand is not limited by the capacity of the public grid.

Typical configuration: 

**Commercial**

Examples: offices, retail & warehouses, data centers, infrastructure & transport, hotels & restaurants



Facilities connected to public grids can reduce energy costs and increase self-sufficiency by diversifying their energy sources, taking advantage of time-of-day electricity tariffs and having backup power on tap whenever it's needed.

Typical configuration: 

**Public sector**

Examples: military base, healthcare, institutional & education



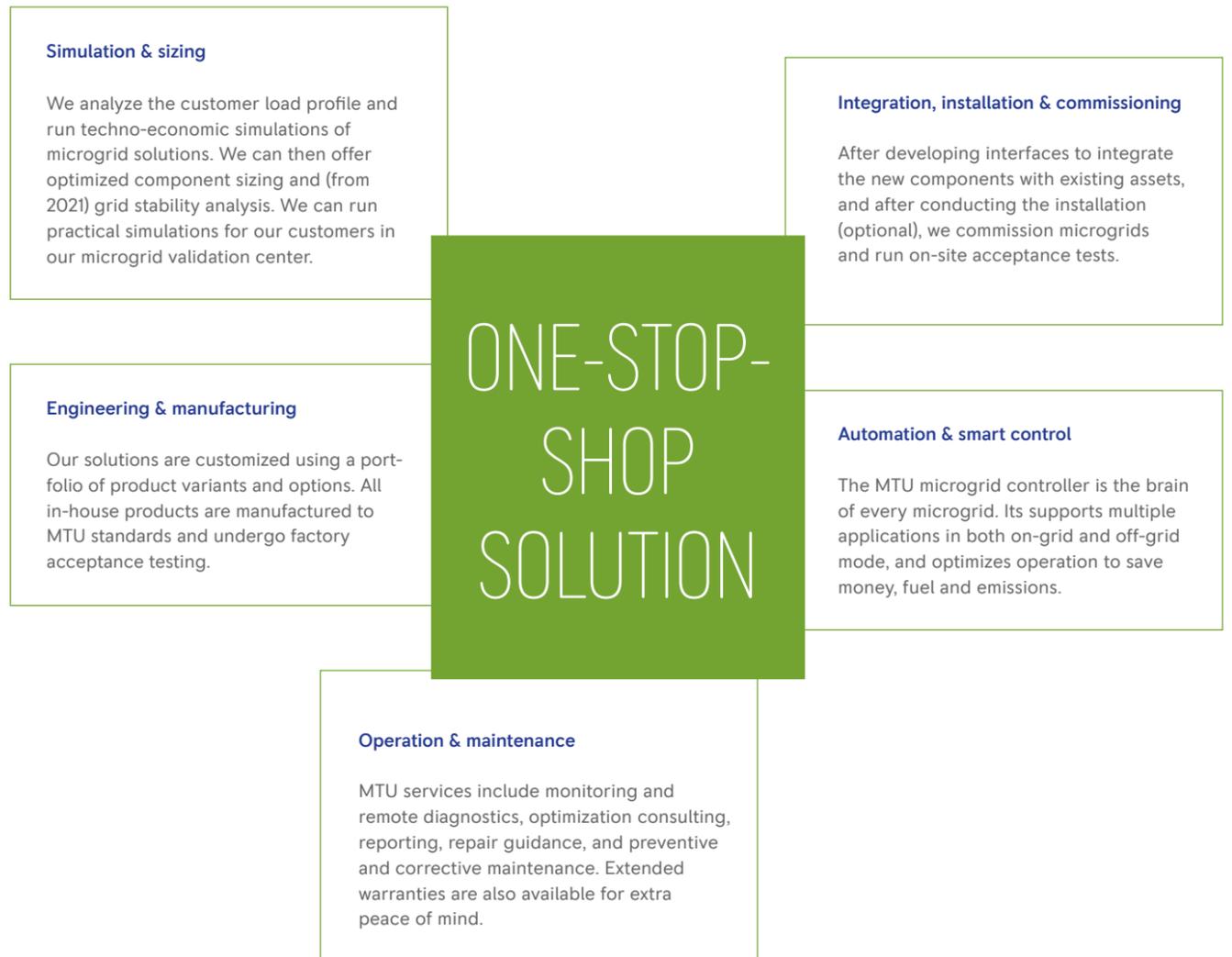
Where a grid connection is not reliable, microgrid solutions increase security and quality of supply for public facilities. Stability of existing power plants can be improved by spinning reserve power (say, from batteries), and solar arrays can be built in to reduce fuel consumption. If grid-connected, own-use of solar power can be increased to lower the amount of power drawn from the grid.

Typical configuration: 

Complete solutions

# MICROGRID SERVICES, SYSTEM INTEGRATION AND SMART CONTROL

MTU microgrid systems offer a wide variety of solutions and service products. And each can be individually designed to serve specific needs. Special microgrid services include consulting, planning, the single-source supply of hardware and software, as well as installation and maintenance.





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