



mtu EnergetIQ

AUTOMATION & CONTROLS POWERING ENERGY SOLUTIONS



A Rolls-Royce
solution

Applications and benefits of automated plant control

INTEGRATING ASSETS AND OPTIMIZING OPERATION.

Growing demand, more flexible markets, decentralization, and renewable energy – all these factors are changing the way power plants are configured and run. The **mtu EnergetIQ Manager** masters these challenges by seamlessly integrating a power plant's diverse assets and automating the control of power generation, storage and demand. The optimized operation allows better planning, more efficiency, and saves money, fuel and emissions.

Essential drivers

**Power availability**

The combination of power generation management and active load management ensures availability of power, even at the limits of your plant's potential. Automated control of plants with little or no access to the public grid ensures the stability of electric power.

**Cost saving**

When your locally produced energy (electricity, heating and cooling) is less expensive than that from the grid, the **mtu EnergetIQ Manager** provides a complete control solution to manage your local resources.

**Electricity balancing market / Grid stabilizing**

If your plant is on-grid, the **mtu EnergetIQ Manager**, with its peak shaving and fast response functions, allows you to earn income by participating in the power balancing market.

**Grid Code Compliance**

Certified (German grid code), Grid operator interfaces: IEC 60870 / IEC 61850

Solutions for on-grid and off-grid applications

**Utilities**

The **mtu EnergetIQ Manager** helps you integrate new assets such as renewables, makes electricity production more cost effective and is ready for future digital business models.

**Industrial & manufacturing**

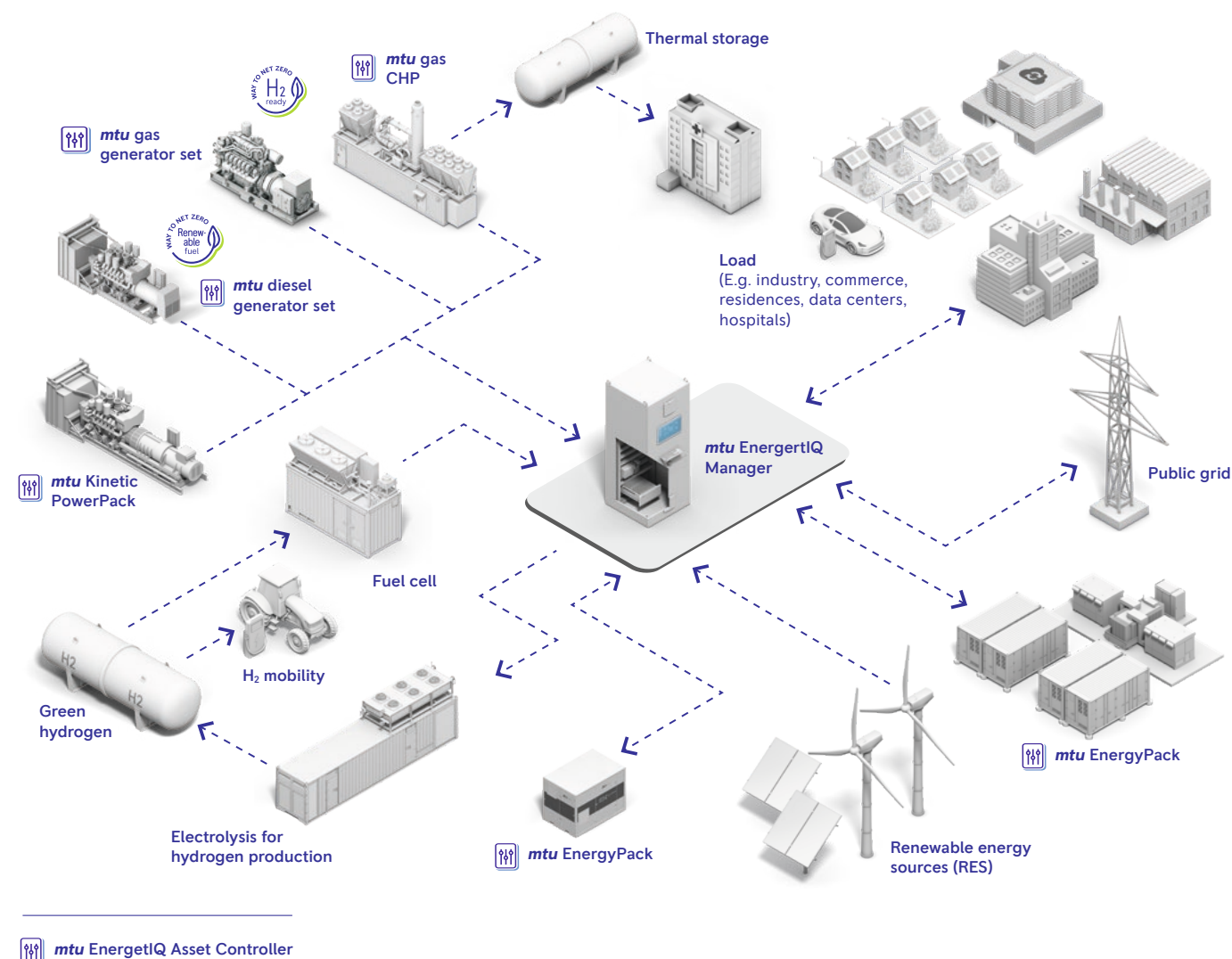
For businesses with high-power demands, the **mtu EnergetIQ Manager** ensures an independent power supply, the elimination of grid charges, a green image and emergency power supplies.

**Remote locations (e.g. mines)**

Off-grid businesses need year-round stable frequency and voltage even in installations (e.g. mines) with exceptional load profiles. An advanced power management function helps lower operational costs.

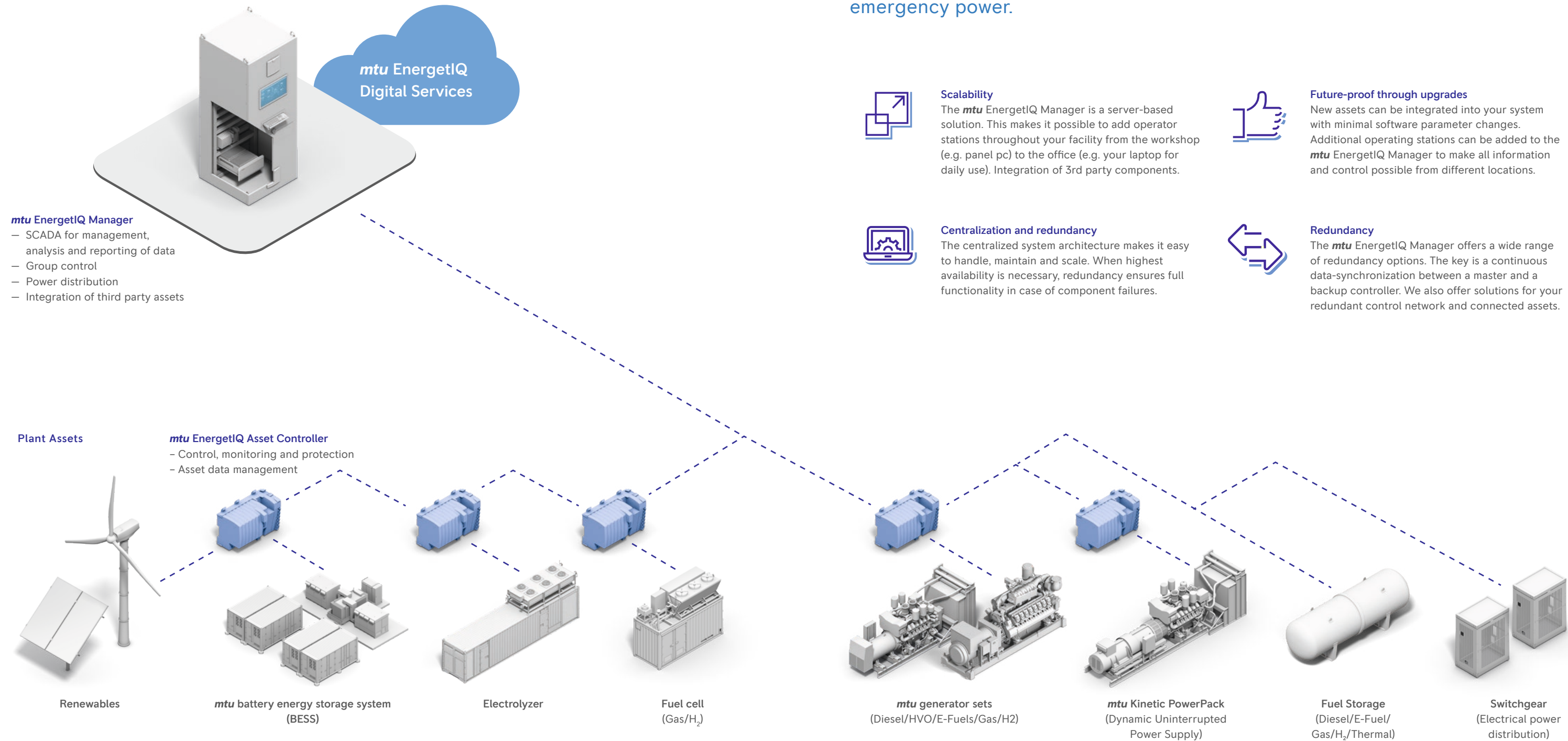
**Data centers**

When highest availability is the goal, the **mtu EnergetIQ Manager** allows full control of genset groups and tie breakers to disconnect the facilities from the grid and connect to the emergency power.



System architecture

CENTRALIZED, FLEXIBLE, SCALEABLE.



The new **mtu EnergetIQ Manager** is the brain of your power plant. It controls groups of power generation and storage assets and the distribution of power all the way from generation to your load. The **mtu EnergetIQ Manager** handles island installations and grid parallel installations to offer applications from response market to emergency power.



Scalability
The **mtu EnergetIQ Manager** is a server-based solution. This makes it possible to add operator stations throughout your facility from the workshop (e.g. panel pc) to the office (e.g. your laptop for daily use). Integration of 3rd party components.



Future-proof through upgrades
New assets can be integrated into your system with minimal software parameter changes. Additional operating stations can be added to the **mtu EnergetIQ Manager** to make all information and control possible from different locations.



Centralization and redundancy
The centralized system architecture makes it easy to handle, maintain and scale. When highest availability is necessary, redundancy ensures full functionality in case of component failures.



Redundancy
The **mtu EnergetIQ Manager** offers a wide range of redundancy options. The key is a continuous data-synchronization between a master and a backup controller. We also offer solutions for your redundant control network and connected assets.

mtu EnergetIQ Manager

KEY FEATURES AND BENEFITS.

The latest version of **mtu** EnergetIQ Manager combines security, intuitive use and customizability for reliable operation of your systems. From data, asset and user management to full control and monitoring of your system on one screen, you need look no further for a scalable solution to meet your needs.

Intuitive control

The **mtu** EnergetIQ Manager is your easy-to-use interface to manage entire systems or individual assets. Detailed insights are just a click away.

IT security

The system's security standards protect operation and allow precise permission regulation by user and asset.

Connectivity

The **mtu** EnergetIQ Manager offers the integration into your IT landscape system by serialized protocols (e.g. Modbus or OPC UA) and a restful API. Specific protocols can be added on demand.

Data & user management

All data in the system is ready for visualization and reporting. Manage your data according to different database standards and your users and their accesses based on groups, roles and persons.

Trending and reporting

Based on the internally stored system data the **mtu** EnergetIQ Manager offers you a wide range of predefined and configurable layouts for trending and reporting.

Alarm management

The **mtu** EnergetIQ Manager can handle alarms from different sources in one Alarm Management System.

Configuration management

The **mtu** EnergetIQ Manager brings an on-site tool to handle its own parameters and all parameters of further EnergetIQ asset control units within the local system.

Customizable functionality

As the central controller of your system, the **mtu** EnergetIQ Manager controls the complete energy system. It can be customized without limitation of assets and breakers for optimal system integration with highest performance.



PRODUCT MODEL **mtu** ENERGETIQ MANAGER
VARIANTS AND OPTIONS

Features

Basic

- Power Management: Load sharing, load shedding (priorities) and capacity management
- Up to 8 connected assets
- Up to 1 grid connection point and 1 bus bar

Advanced

- Energy Management: Rule based
- Power Management: Load sharing, load shedding (priorities) and capacity management
- Up to 32 connected assets
- Up to 1 grid connection point and 1 bus bar

Unlimited

- Energy Management: Online adaption of operating strategy based on weather forecasts and load prediction
- Extended Power Management: Combining priorities for power conversation and storage assets with load shedding
- Customer Specific Functions: Control, visualization and alarm management of customer equipment and auxiliaries. Additional applications, interfaces and features.
- Unlimited amount of assets: Above 64 connected assets additional hardware scaling might be necessary
- Up to 2 grid connection points and multiple busbars can be handled

Hardware

S

- Cabinet size: 400 x 400 x 300mm
- Industrial PC (IPC)
- Programmable Logic Controller (PLC)
- Minimum I/O: 2xDI, 4xDO, 1xAI, 1xAO, 2xCnt)

M

- Cabinet size: 1100 x 600 x 400mm
- Industrial PC (IPC) with screen 15" (optional)
- Programmable Logic Controller (PLC)
- Medium I/O: up to 1 Energy Measurement Modules, 12xDI, 12xDO, 2xAI, 2xAO, 2xAT)
- Uninterruptable power supply (UPS) >8h
- Controller redundancy (optional)
- Ethernet redundancy (optional)
- Fiber optic (optional)

L

- Cabinet size: 2000 x 800 x 600mm
- Industrial PC (IPC) with screen 24"
- Programmable Logic Controller (PLC)
- Max I/O: (in cabinet up to 10 Energy Measurement Modules, 12xDI, 12xDO, 4xAI, 4xAO, 4xAT), customizable (in cabinet) and scalable (remote I/O)
- Uninterruptable power supply (UPS) >8h
- Remote I/O (optional)
- Controller redundancy (optional)
- I/O redundancy (optional)
- Ethernet redundancy (optional)
- Fiber optic (optional)

Product Model

	S	M	L
Basic	Basic S	Basic M	
Advanced		Advanced M	Advanced L
Unlimited		Unlimited M	Unlimited L

Hardware extension by additional cabinets and remote I/O (customizing)

Functions

FULL RANGE OF FUNCTIONS.

Control, monitoring and protection

The *mtu* EnergetIQ Manager performs all necessary functions in real time to keep your plant stable in terms of frequency, voltage and power. It also ensures monitoring functions including protection and alarms.

Basic power management

This includes the selection of the necessary assets in each group (e.g. gensets) and load sharing between them. Connected loads are managed by add/shed mechanism. The microgrid function handles the power management between the different asset groups when different types of energy generation and storage are available.

Optimizer

Performs mathematical algorithms to optimize cost, fuel consumption, carbon footprint, usage of renewables and lifetime availability of power. With the use of weather prognosis, the optimizer calculates the amount of energy or power your renewable energy sources will deliver over the next days.

Emergency power

The *mtu* EnergetIQ Manager can be used to detect grid failure, start and synchronize assets, and provide the generated emergency power to your load. Back synchronization and load takeover are available when the grid is back and stable.

Switchgear control

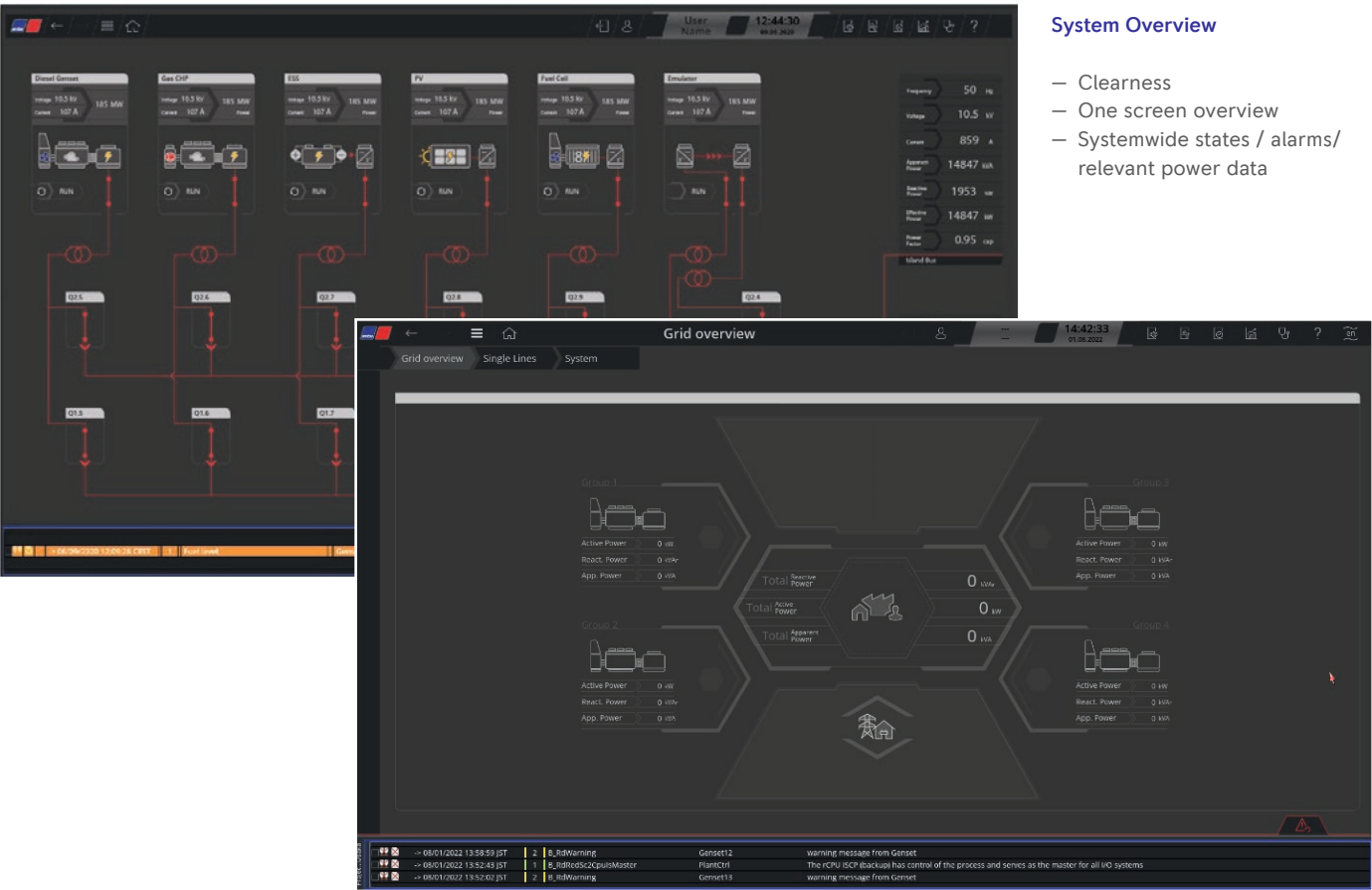
Control of your entire switchgear is available by configurable or customizable tie breaker control to meet the requirements of your installation.

Optional Custom Functions

More application functionalities are available as options or can be realized especially for specific customer needs.

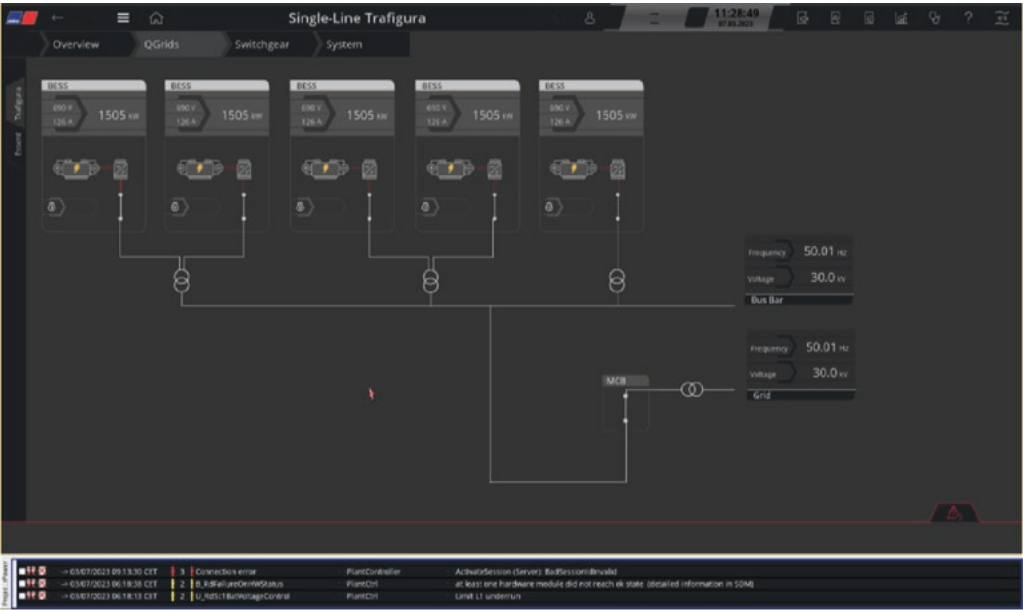
System Overview

- Clearness
- One screen overview
- Systemwide states / alarms / relevant power data



Style Switch

- Switchable symbols (ANSI / IEC)
- Switchable colors to accomplish worldwide visualization standards
- Customer styles available



Power plant overview

All the information is shown on one screen, including assets such as gensets, battery energy storage systems, photovoltaics and more.

- Clear information presentation
- Systemwide states / alarms / relevant power data
- Individual, region-specific settings are available (colors and symbols)

Faceplates

- opens by selecting assets in the overview screen
 - placed as moveable pop up window on the overview screen
 - standardized for different assets
-
- basic information like state, mode and power always available in left frame
 - content of main frame switchable



Available content for main frame

- value view
- gauge view
- control view
- trending view
- more content views available by customization

REFERENCE PROJECT: AN INDUSTRY PARK IN THE UK

Combining maximum reliability with sustainable power - that was the goal of the operator of an industrial park in the United Kingdom, north of London. To achieve it, a dedicated energy center, which includes a complete, extensive and resilient microgrid with **mtu** solutions, was set up at the park.

The realization of the project and the microgrid includes three **mtu** Combined Heat & Power (CHP) plants, two **mtu** EnergyPack battery containers and two **mtu** Series 2000 standby generators. The entire system, with the addition of renewable energy sources on the roofs of the park, allows for the storage of energy and its release at any time, depending on the needs of the grid. Operators of the park expect a long-term reduction in electricity costs of five to ten percent for resident companies.

For smart and flexible use of the individual components, they are all controlled by **mtu** EnergetIQ Manager. As a microgrid controller, **mtu** EnergetIQ Manager not only ensures optimal use and storage of energy in the microgrid, but also protects against fluctuations in the public grid and provides independence from sudden power loss in the event of power outages. Two microgrid controllers work in tandem to achieve this: One as active manager of the system, one as standby to step in immediately in case of outages.

mtu Solutions

mtu EnergetIQ Manager

mtu EnergetIQ Manager controls the entire system, ensures optimal use of available energy and reliability in the event of power fluctuations and failures.

mtu Combined heat & power plants

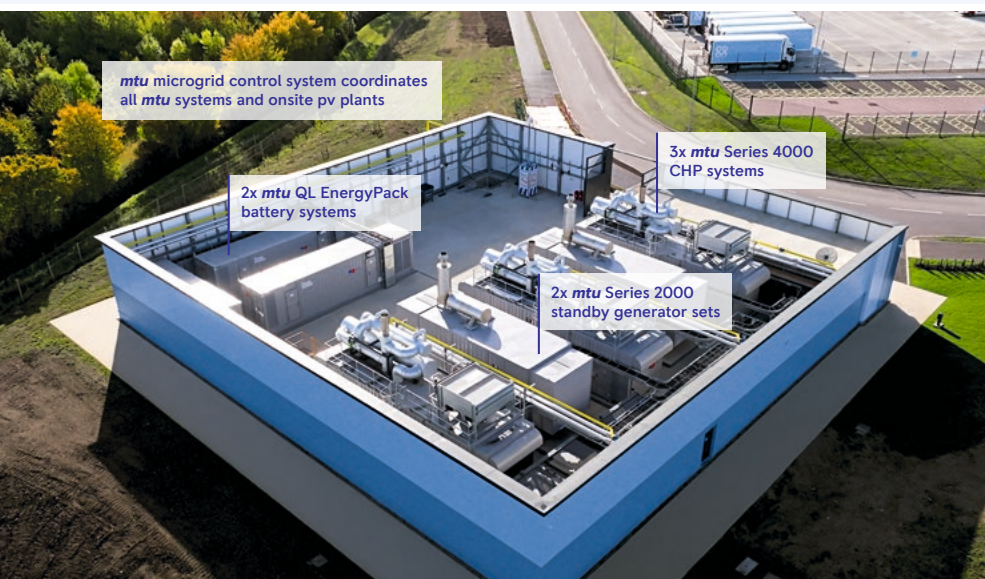
In addition to electricity, combined heat & power (CHP) plants also provide heating. This optimizes costs not only for electricity but also for the heating.

mtu Series 2000 standby generators

In the event of power outages or lack of power from renewable sources, standby generators can be powered up by **mtu** EnergetIQ Manager to provide electricity.

mtu EnergyPack battery containers

The heart of the microgrid. Battery solutions store energy from renewable sources during periods of low demand and release it when demand increases.



REFERENCE PROJECT: A DATA CENTER IN JAPAN

Data centers are among the operations with the highest reliability requirements regarding power supply. A Japanese data center relies on **mtu** solutions for this highest level of security in the future, managed by **mtu** EnergetIQ Manager for trouble-free operations.

In order to prepare for the worst case scenario, a power failure in the public grid, a data center in Japan uses **mtu** diesel gensets as a backup solution. 31 of these gensets will be successively installed over the next few years. The gensets are compactly housed in containers that include the diesel engine, the generator, a switchgear, and all other necessary connections and supply systems. Each of the gensets has 3 megavolt amps of power, which means that the data center can continue operating in an emergency.

A fully redundant **mtu** EnergetIQ Manager is used for the optimal control of all these gensets at the data center. In addition to controlling each individual diesel genset and visualizing all critical breakers, **mtu** EnergetIQ Manager also interacts with building management systems and starts the back-up sequence in the event of an incident: After starting the gensets in the event of a grid failure, the system takes over power management, checks grid stability and controls back-synchronization and load transfer.

mtu Solutions

mtu diesel gensets

Best performance, highest reliability, shortest start-up time. Controlled by **mtu** EnergetIQ Manager, the gensets take over the power supply to the data center in the event of power failures or grid fluctuations.

mtu EnergetIQ Manager

In addition to its role as microgrid controller, **mtu** EnergetIQ Manager can also provide power management for critical infrastructure and manage emergency power systems.



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