



JOIN THE JOURNEY TO NET ZERO

Power Generation Symposium | Europe



A Rolls-Royce
solution



mtu EnergetIQ

Introduction

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In this presentation, we will introduce our new control platform EnergetIQ and explore the importance of intelligent controls in effectively managing distributed energy resources to create a high-performing system. You will learn how intelligent controls are critical for designing, optimizing and integrating a distributed energy system such as a microgrid.

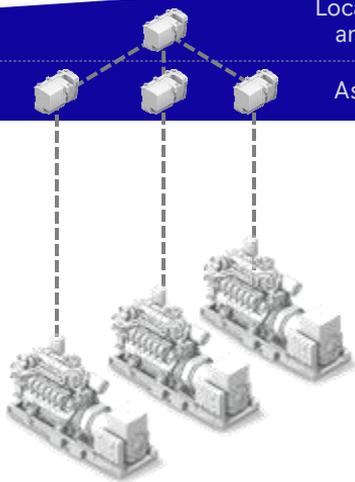
***mtu* EnergetIQ**
automation and controls
powering energy solutions



Transformation from engine specialist to energy solution provider

- New in-house automation platform **mtu EnergetIQ** to meet this challenge
- Scalability from single asset to complex systems
- Consistent and user friendly UI/UX, diagnostics and connectivity
- Optimized for **mtu** assets with advanced optimization algorithms to maximize system efficiency

Business scope



Yesterday

Single and multiple assets (Gas & Diesel)

Local management, optimization and control of energy systems
Asset control and optimization

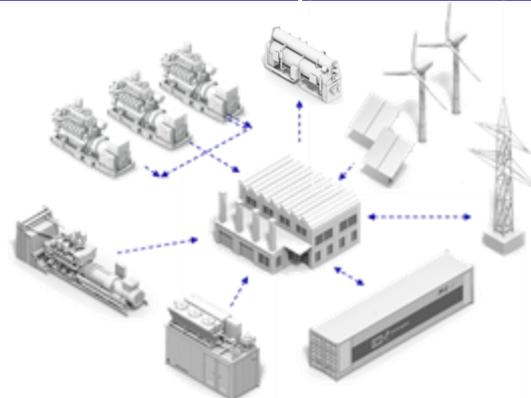


Today

Complex Systems (Groups, Plants, Microgrids)

mtu EnergetIQ

mtu GO



Tomorrow

Full stack (Seamless sensor to cloud)



mtu EnergetIQ | Applications and Features

- On grid
- Off grid
- Microgrid (on/off)

- Continuous power
- Energy conversion
- Critical Infrastructure

- Reliability / Availability
- Customization
- Scalability



Grid services

Increase of self consumption

Peak shaving

Hydrogen / E-Fuel production

Backup power

Customer specific applications

Centralized system, easy to handle and maintain

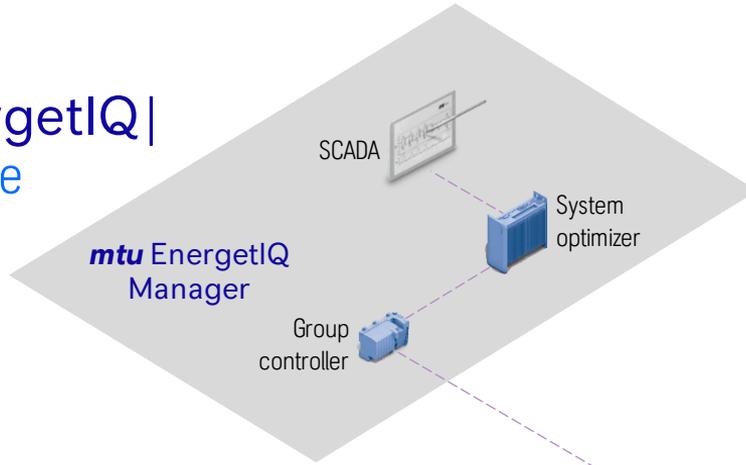
Reliable, highly available & secure control system with wide range of redundancy options

Customization w/ no limitation of connected assets

Scalability through easy integration of new assets w/ no limitation of connected assets



mtu EnergetIQ | Architecture



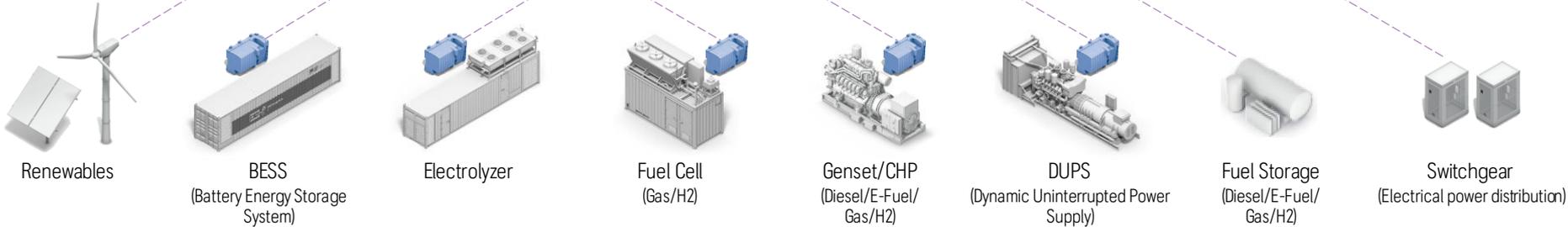
mtu EnergetIQ Manager

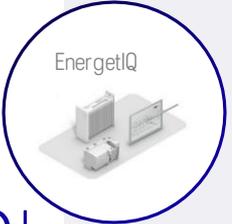
- SCADA for management, analysis and reporting of data
- Optimization for energy system and operating points of assets
- Group control
- Power distribution
- Integration of 3rd party assets
- Redundancy (optional)

mtu EnergetIQ Asset Controller

- Applications (grid services, peak shaving, setpoint control)
- Control, monitoring & protection
- Asset data management

mtu EnergetIQ Asset Controller

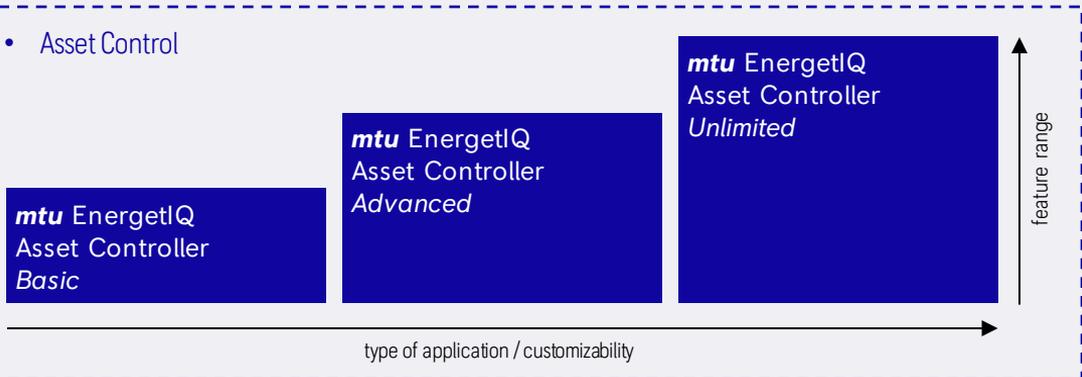
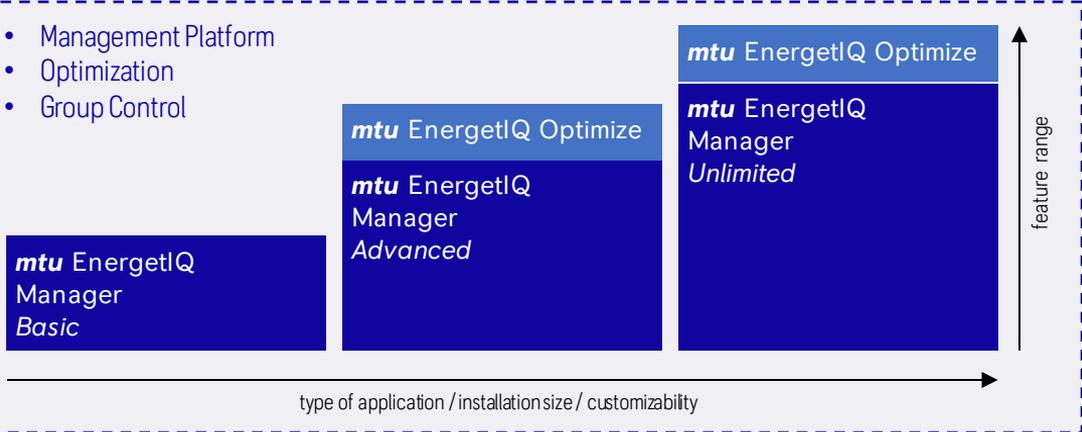




mtu EnergetIQ | Portfolio

Automation and controls for energy system and assets.

Serial, customized and specific solutions.



option
product variant





mtu EnergetIQ | Functions

mtu EnergetIQ provides seamless integration of a power plant's diverse assets and automates the control of power generation, storage, distribution and demand.

The optimized operation allows for better planning, more efficiency and saves money, fuel and emissions.



Offering

Characteristics

Systemwide services

- **User management with Audit Trail** to control and record access to Plant Manager and assets
- **IT security** by hardened OS, secure boot, firewalls, LDAP, TLS encryption and trusted platform module
- **Connectivity** to assets, switchgear, protection devices and remote systems

Data management

- **Data acquisition** of connected assets, switchgear and grid
- **SQL database** w/ access by web-based query technology
- **Modular data analyzing** incl. correlation to external data
- **Data visualization and reporting** with dashboards and interactive Jasper reports

Functions

- Real time **control, monitoring & protection**
- **Basic power mgmt.** between connected assets
- **Algorithm-based optimization**, incl. cost & carbon footprint
- Detection of grid failure & provision of **emergency power**
- **Participation in energy market**, e.g., via peak shaving

Asset details and control

- One **common user interface** for all different assets
- **System-wide** states, alarms, and data dashboards
- Easy SCADA **system integration** & customization options
- Wide range of **pre-defined and configurable layouts** for trending and reporting



Outlook | Advanced Features / Runtime Optimization

Why is this important?

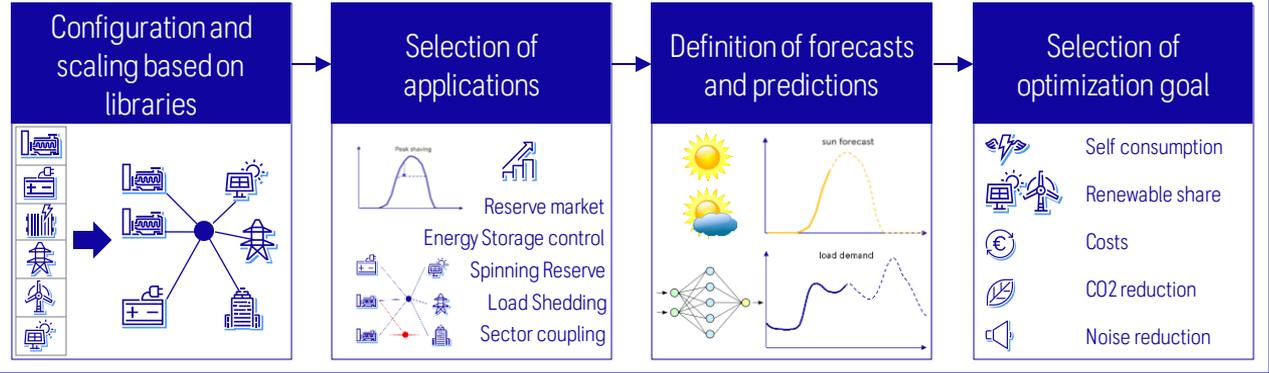
- Customers want to minimize or maximize things whilst preserving stability - costs, CO2, noise, availability
- Hand written rules not feasible / sub-optimal for complex systems
- Degree of optimality is key → directly translates to a (financial) gain
- Useful in many different applications, used in other industries, e.g. process automation
- Many advantages, e.g. easy deployment, no tuning required, direct spec. of goal
- Key challenges: Modelling, simulation and finding good goals / cost functions

mtu EnergetIQ | Optimize

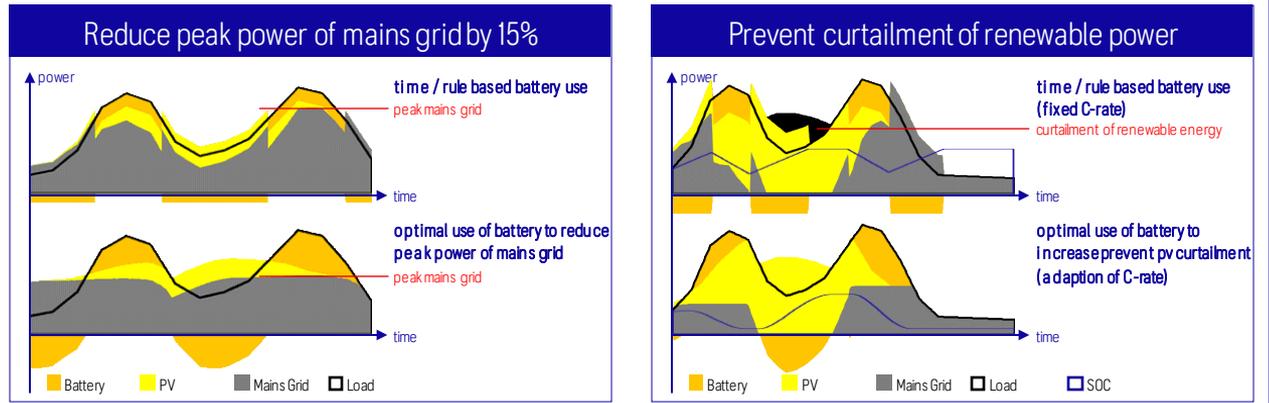
mtu solution for runtime optimization

- Configuration
- Application
- Forecasts/predictions
- Optimization goals
- Optimization algorithms

Configuration of *mtu* EnergetIQ Optimize



Operation of *mtu* EnergetIQ Optimize





Questions

Discussion



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