SICAM Applications -- MGC, PPC, LS, SOG & Dynamic Load Management

Walter Hoermann – Product Owner

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SICAM Applications

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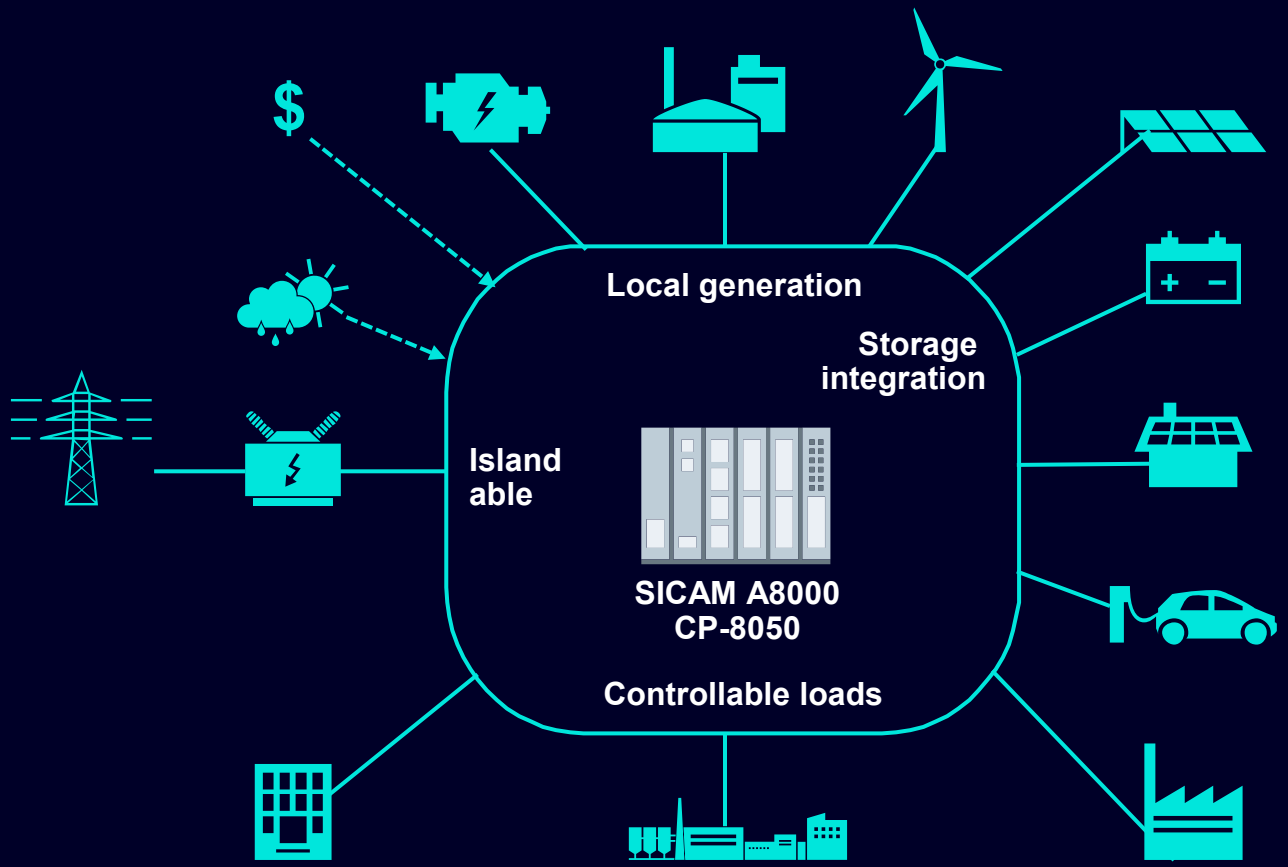
Microgrid Control – a SICAM application
enhances efficiency, resiliency and sustainability



Economic & energy efficiency

- Peak shaving
- Demand charge reduction
- OPEX optimization

Resiliency & reliability

- Blackout detection and black start
- Generation, storage and load control
- Grid synchronization

Sustainability

- Renewable integration
- Green footprint dispatch
- Generation and load forecast

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SICAM – a Siemens' global and reliable platform
with many experts worldwide

> 85.000 SICAM automation units world wide

> 600 integrated automation systems for renewable plants

> 1.000 substation automation systems

Heavy Industry (e.g. Oil & Gas) — Power Generation — Power Transmission & Distribution — Consumption

SICAM Applications	Load Shedding	Generation Control	Storage Control	Photovoltaic Control & Monitoring	Self Healing	Microgrid Control

SICAM platform

- One open standardized architecture and infrastructure
- Modular design and applications
- Integrated functionalities
- Easy future expansion

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Load Shedding – a SICAM application
ensuring sustainable power and avoiding outages

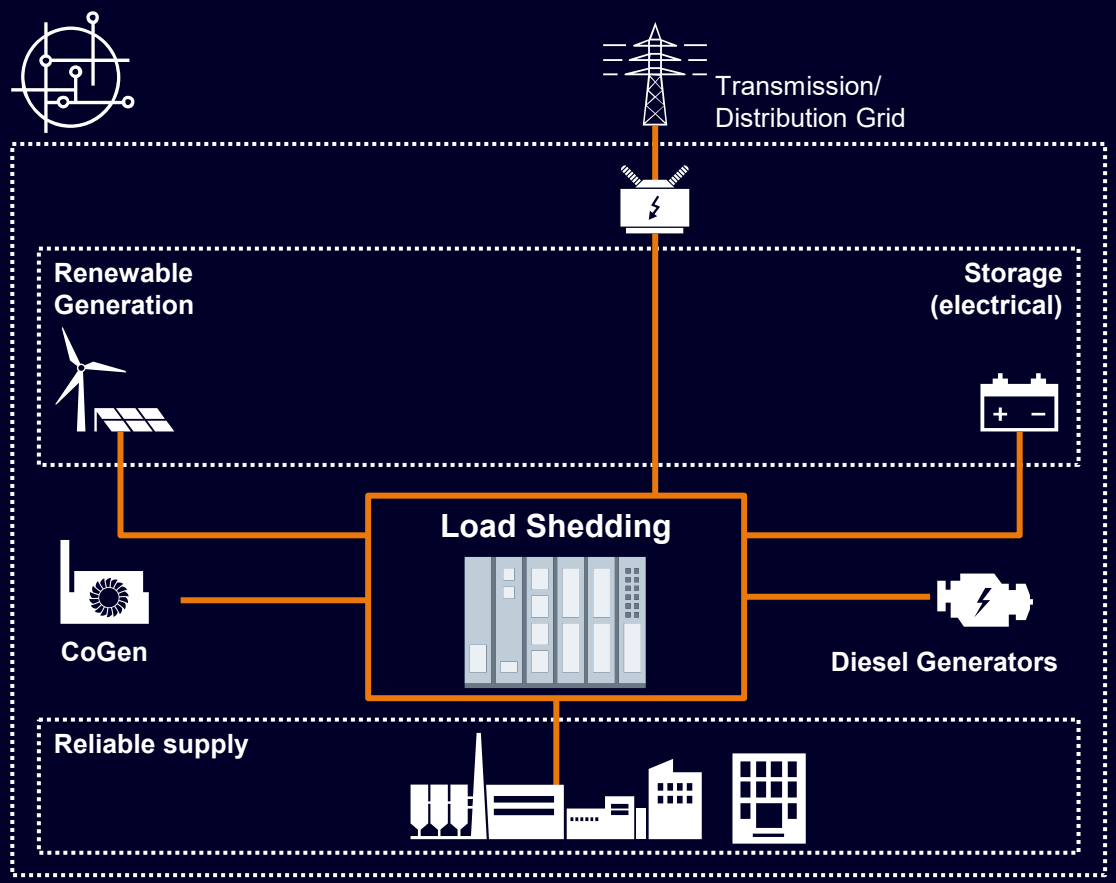
Basic Features

- Measuring
- Monitoring/ Reporting
- Load Control
- Archiving

Advanced Features

- Fast power-based load s.
- Dynamic load shedding
- Frequency based load s.
- Manual load shedding

Distribution grid with local generation, grid infeed and loads



Benefits of Load Shedding

- Based on IEC 61850 configurations – reduction of parallel wiring and future-proof investment
- Fast GOOSE communication for trigger events
  → reaction within 70 ms
- Joint HMI for SCADA and power management

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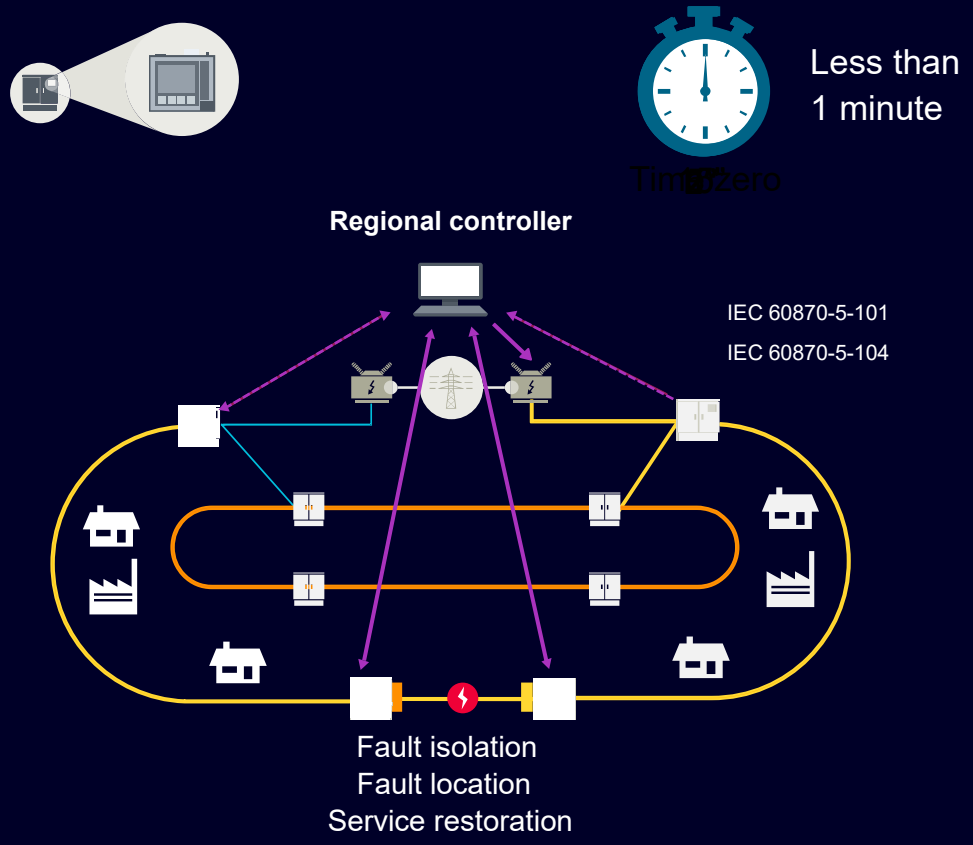
Self-healing grid – a SICAM application
that restores your distribution grid in seconds

Improved performance for distribution grids



Closed loop automated switching solution for isolation and service restoration with included load management

- Reduced fault localization costs
- Reduction of outage times, improvement of distribution grid reliability indicators (e.g. SAIDI, SAIFI)
- Open solution can flexibly adapt to existing secondary substations
- Extreme workload reduction in the event of several simultaneous faults, e.g. due to rough weather conditions

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Photovoltaic Plant Control – a SICAM application
Maximum efficiency in controlling Photovoltaic Power Plants

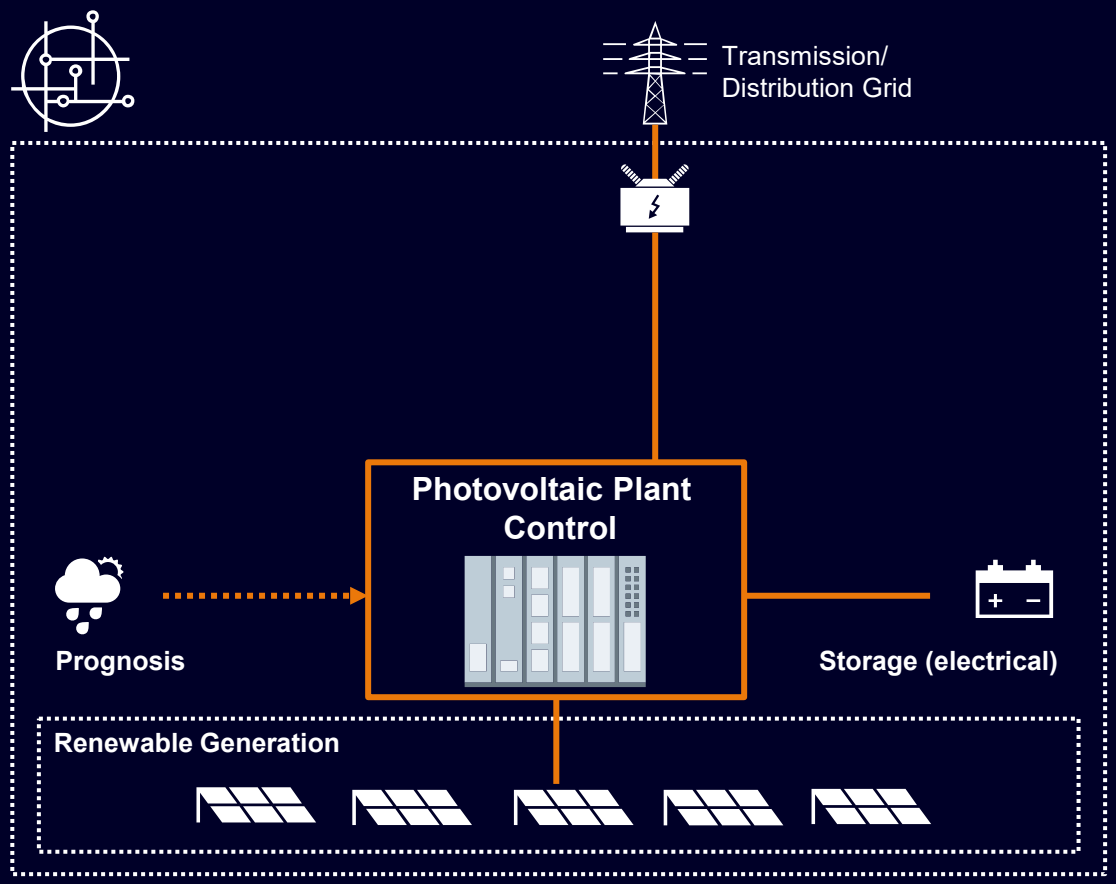
Basic Features

- Measuring
- Monitoring/ Reporting
- Storage Control
- Generation Control
- Archiving

Advanced Features

- Active power control
- Reactive power control
- Grid stability support

Photovoltaic Plant with renewable generation, grid infeed and storage



Benefits of Photovoltaic Plant Control

- Reliable, grid code conform control of supplied power by photovoltaic plants.
- Continuous supply of renewable energy by also integrating capacitor banks and battery storage systems
- Seamless integration and solid interplay between automation and remote control

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Microgrid Control – a SICAM application
enables higher reliability and reduced energy cost

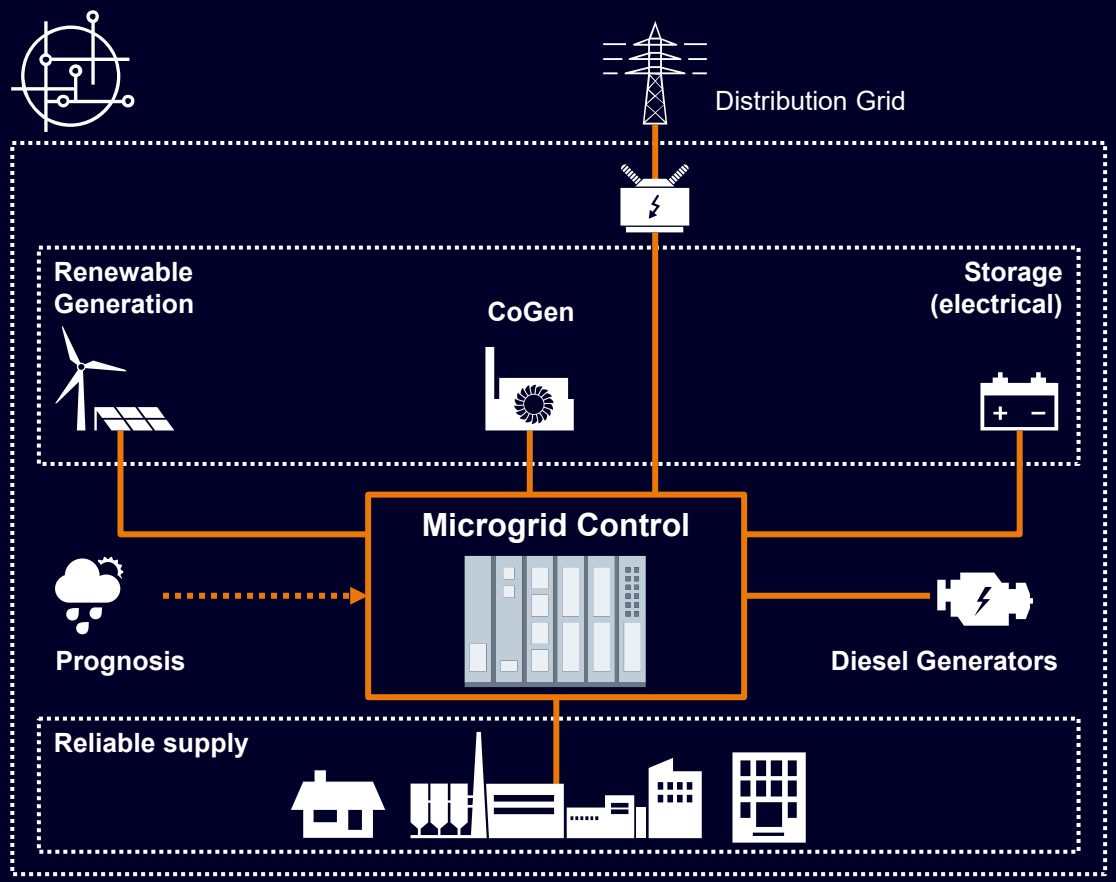
Basic Features

- Measuring
- Monitoring/ Reporting
- Storage Control
- Generation Control
- Archiving
- Load Control

Advanced Features

- Islanding / Black start
- Peak shaving
- Load forecasting
- Generation forecasting
- Load Management
- Generation Market access

Microgrid – Distribution grid with renewable generation, grid infeed and storage



Benefits of Microgrid Control

Own generation
- Ensures continuous load supply and production processes
- Increased independence from grid instabilities

Lower energy costs
- Economic optimization main grid supply vs. own generation

Decreasing CO_2 emissions
- Environmental optimization renewable vs. fossil generation

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DEMO – MGC Functionalities

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Dynamic Load Management

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Charging solutions – everywhere and in every form are requiring reliable dynamic load management

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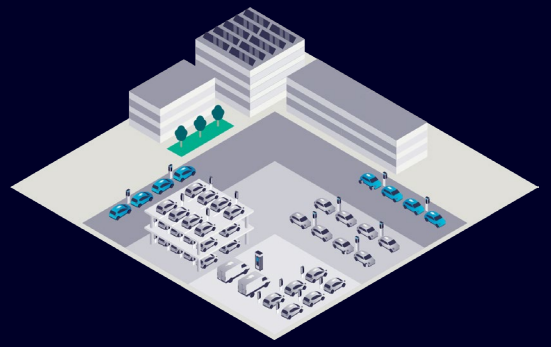
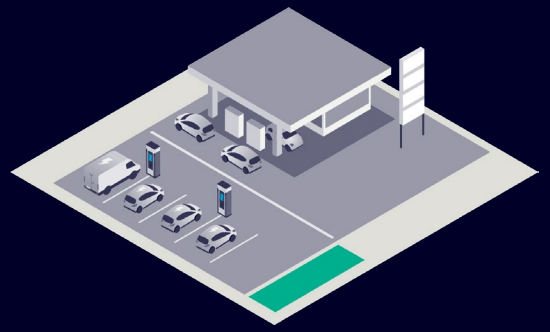
Integrating charging solutions to existing grid infrastructures often imposes various challenges

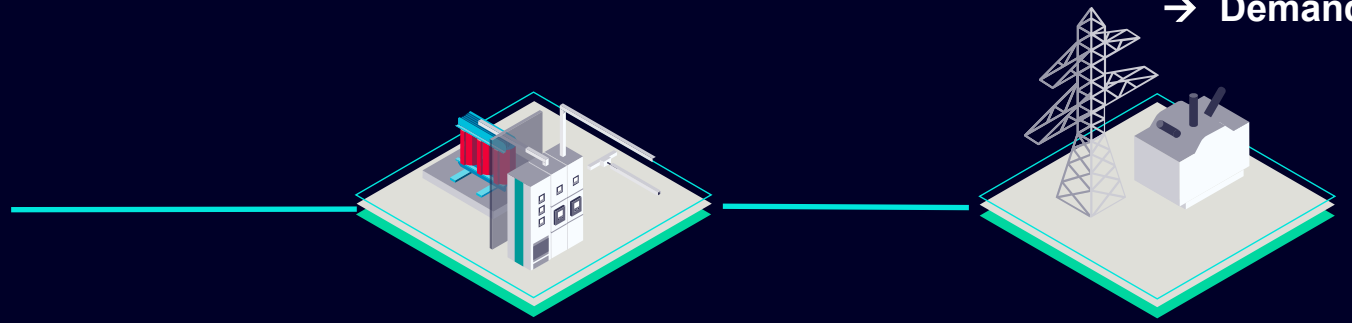


- Bus depots
- “Gas stations” and truck stops
- Logistic depots
- Parking garages and real estates
- Industrial and commercial sites



Avoid grid extension
Avoid transformer overload
→ **Peak shaving**

Peak demand charges
→ **Demand charge reduction**
Grid code (e.g. demand response)
→ **Demand reduction**



Dynamic Load Management

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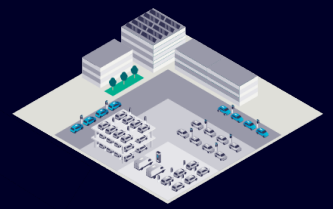
Local Dynamic Load Management for charging units based on SICAM A8000: Resilient, open and versatile



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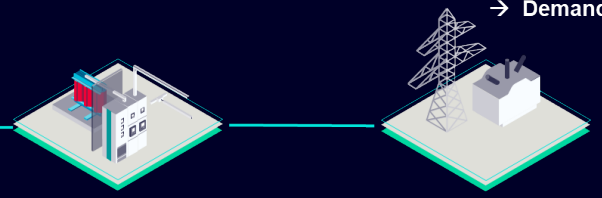
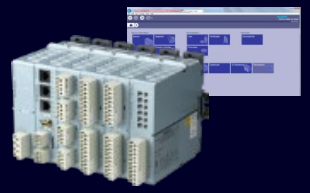


Dynamic Load Management



Various load management algorithms

- Split charging
- Split charging with priorities
- Round robin
- First in/ first out
- First in/ last out

Ambiguous connectivity

- OCPP 1.6J
- Modbus TCP
- IEC 60870-5-104, IEC 61850
- DNP 3

Resilient

- Not depending on cloud connectivity
- Rugged hardware

Efficient

- Flexible and open platform
- Minimum OPEX

Sustainable

- Minimum carbon footprint
- Efficient integration of on-site renewables

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Dynamic Load Management for Charging Units
Simple and straight forward configuration with SICAM Device Manager

SICAM Device Manager

SICAM A8000 CP-8031/ CP-8050

Engineering and configuration

Automation Functions, communication and dashboard

- Standardized load management logic
- Pre-configured dashboard
- Easy integration based on IEC 60870-5-101, IEC 60870-5-104, IEC 61850, Modbus RTU, Modbus TCP and OCPP1.6J

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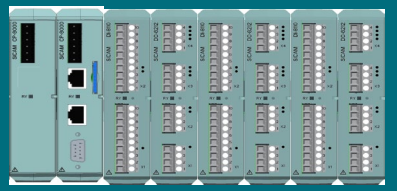
Dynamic Load Management for Charging Units
Versatile and open system architecture

SICAM A8000 CP-8031/ CP-8050



allows integration with many standard communication protocols e.g. IEC 60870-5, MODBUS, etc.

Modbus TCP, OCPP 1.6J

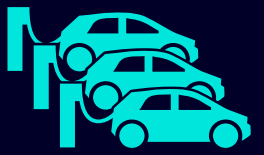
Human Machine Interface (optional)

Optional SICAM SCC HMI connected by IEC 60870-5-104

External Grid

P-measurement (total or per phase) from protection or measurement device

Charging Units



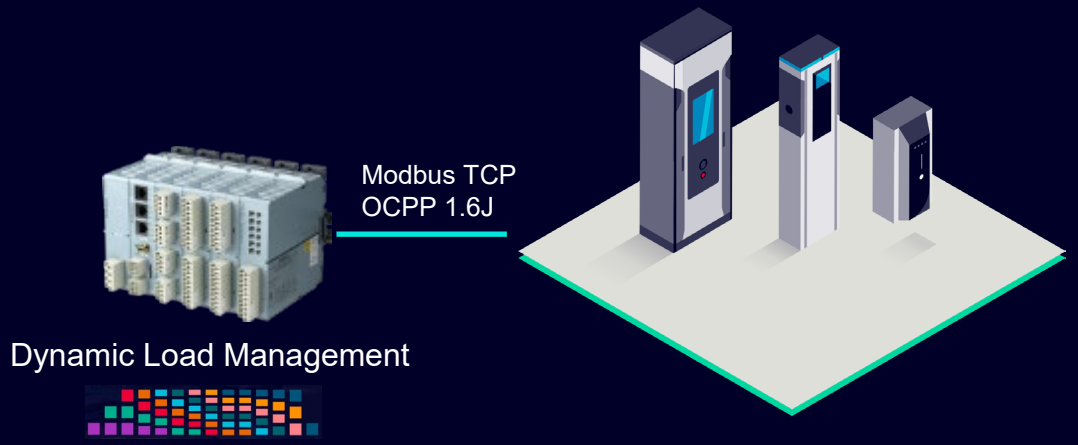
Up to 100[1)]

P-measurement (total or per phase) from charging unit or measurement device; charging units might also be grouped

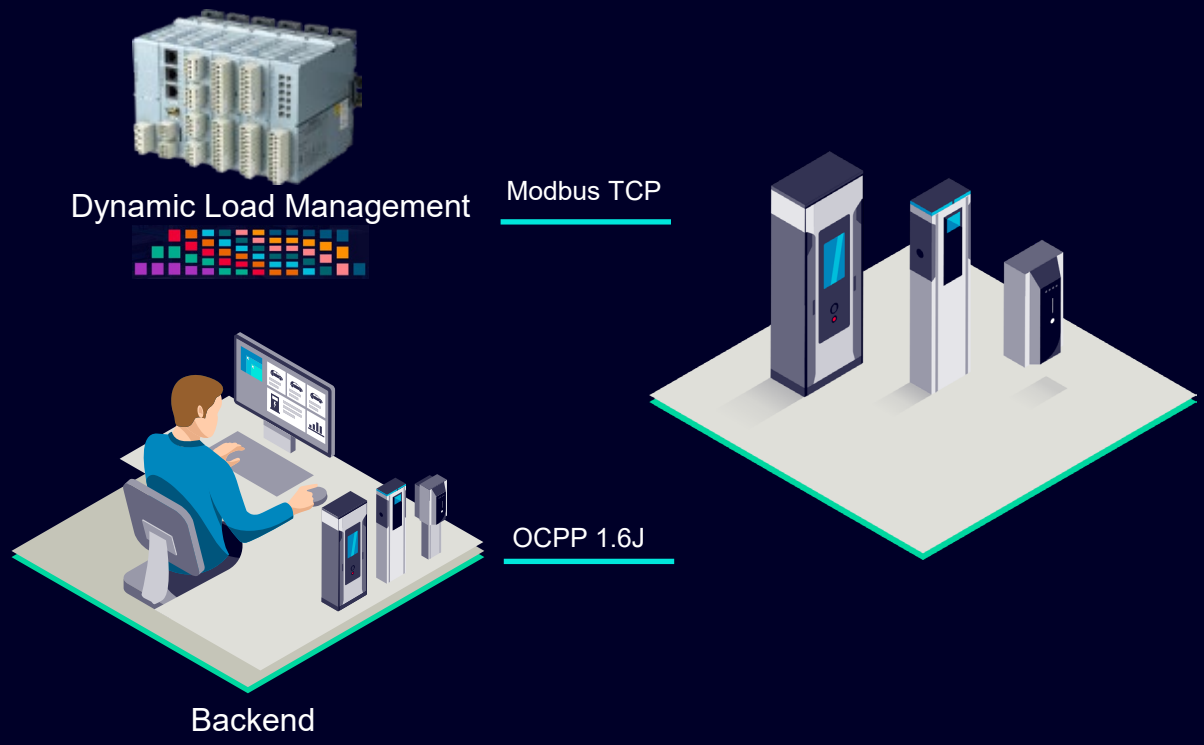
1) Modbus TCP with OCPP 1.6J max. 25

Dynamic Load Management
What is the communication protocol of choice?

Dynamic Load Management only
- Modbus TCP
- OCPP 1.6J



Dynamic Load Management and Backend[1)]
- Modbus TCP
- OCPP 1.6J



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Dynamic Load Management
Charging units integrated with Microgrid Control

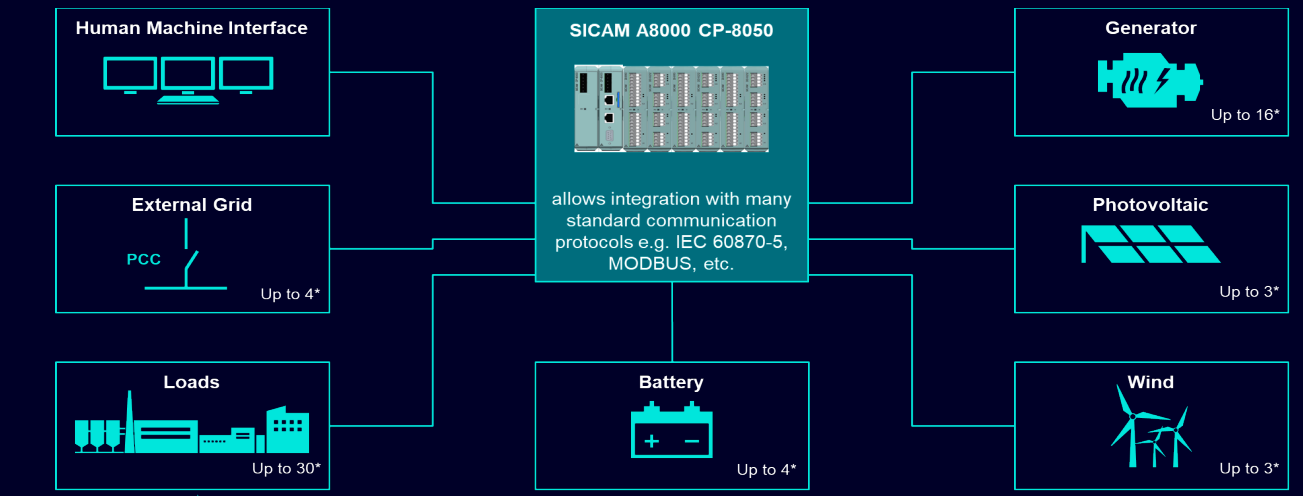
For Microgrid Control a subordinate A8000 with Dynamic Load Management for Charging Units is treated in the same way as other loads.

Microgrid Control

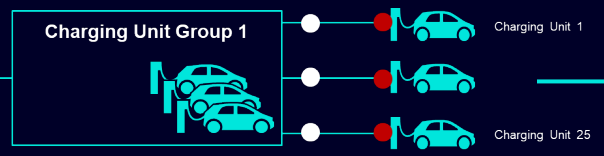
main controller

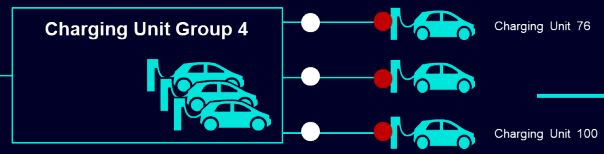
Dynamic Load Control for Charging Units

subordinate controller(s)



IEC 60870-5-104





eCar Operation Center

OCPP

Multiple A8000s running Dynamic Load Management for Charging Units can be connected to the main Microgrid Controller.

P Constraint P Measurement Status

*) standard configuration

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Contact

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