



Rapidly Deployable Plug & Play Energy Storage Solutions

... for the Integration of High Renewable
Share in Off Grid Applications

Busso v. Bismarck

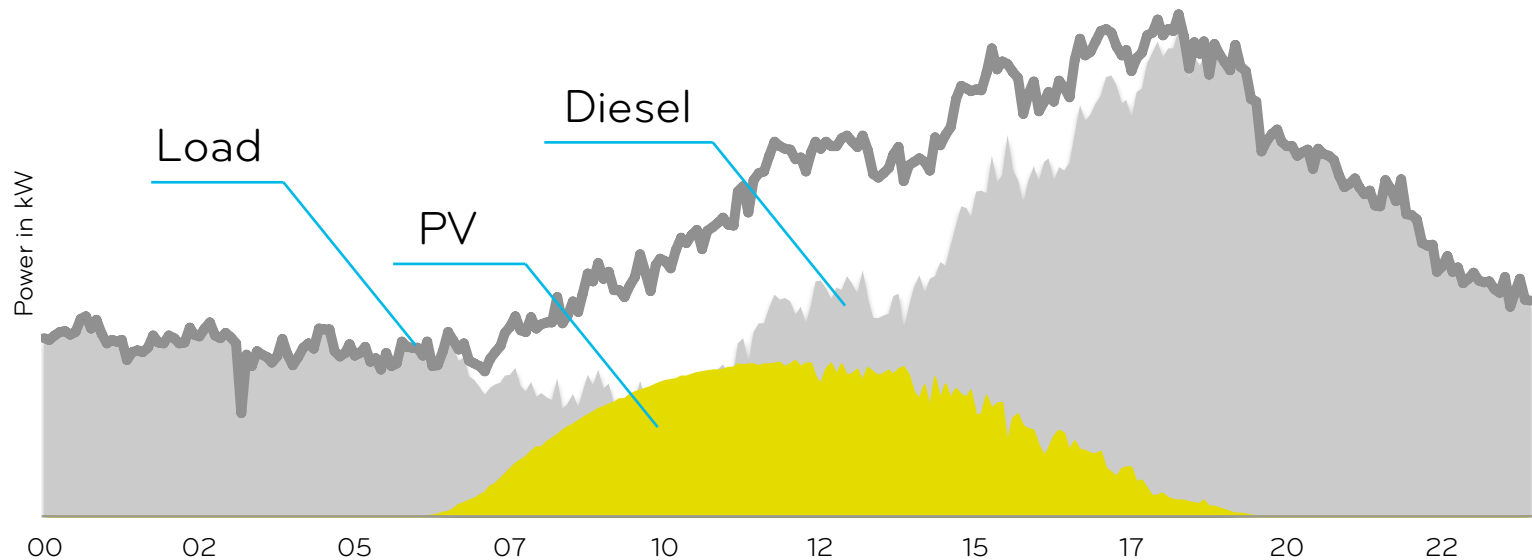


The Need for Energy Storage in the Context of different RE-Scenarios

Advantages of a standardized solution

References & Work in Progress

"Fuel Saver" Scenario



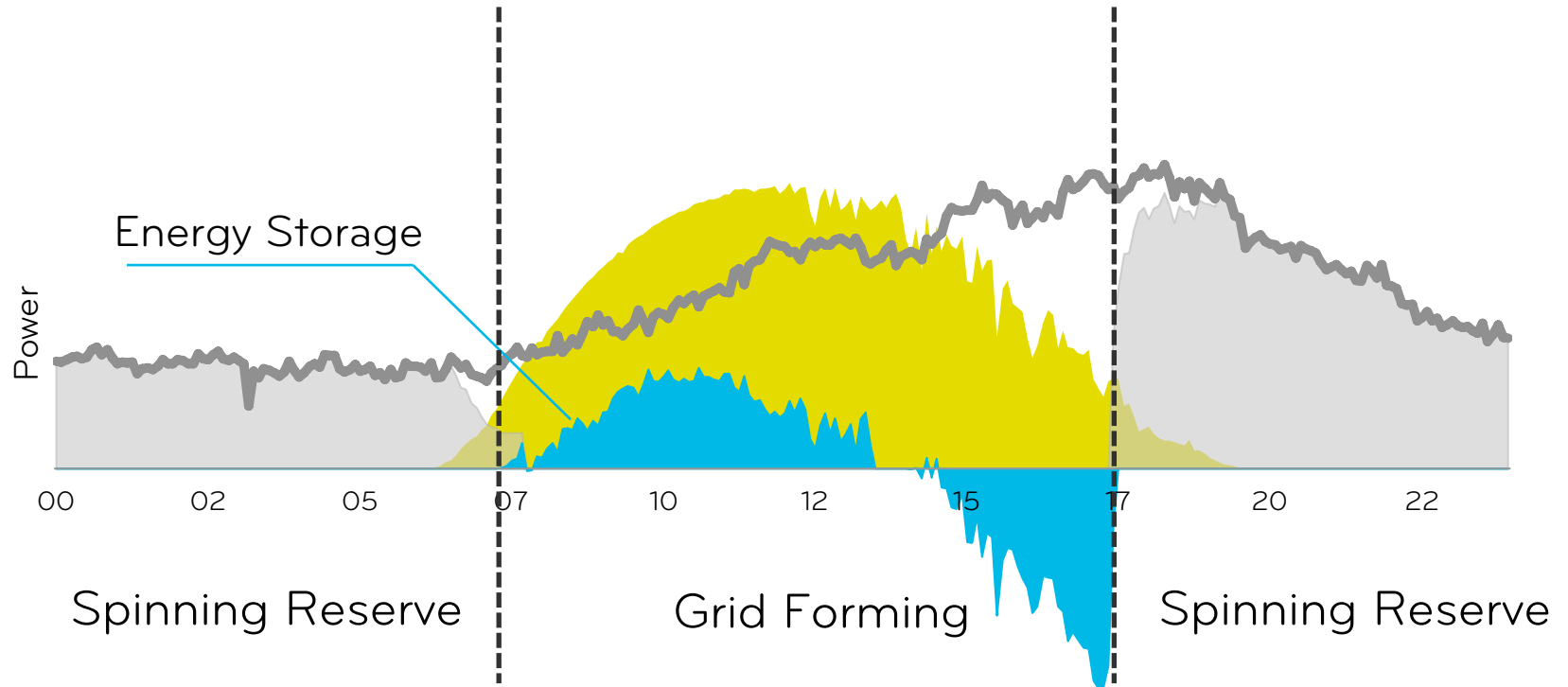
Benefits:

First experience with solar
15%-25% Diesel Savings

Down-Sites:

No reduction in diesel-running hours
Low-load diesel operation

“Lean Energy Storage” Scenario



Benefits:

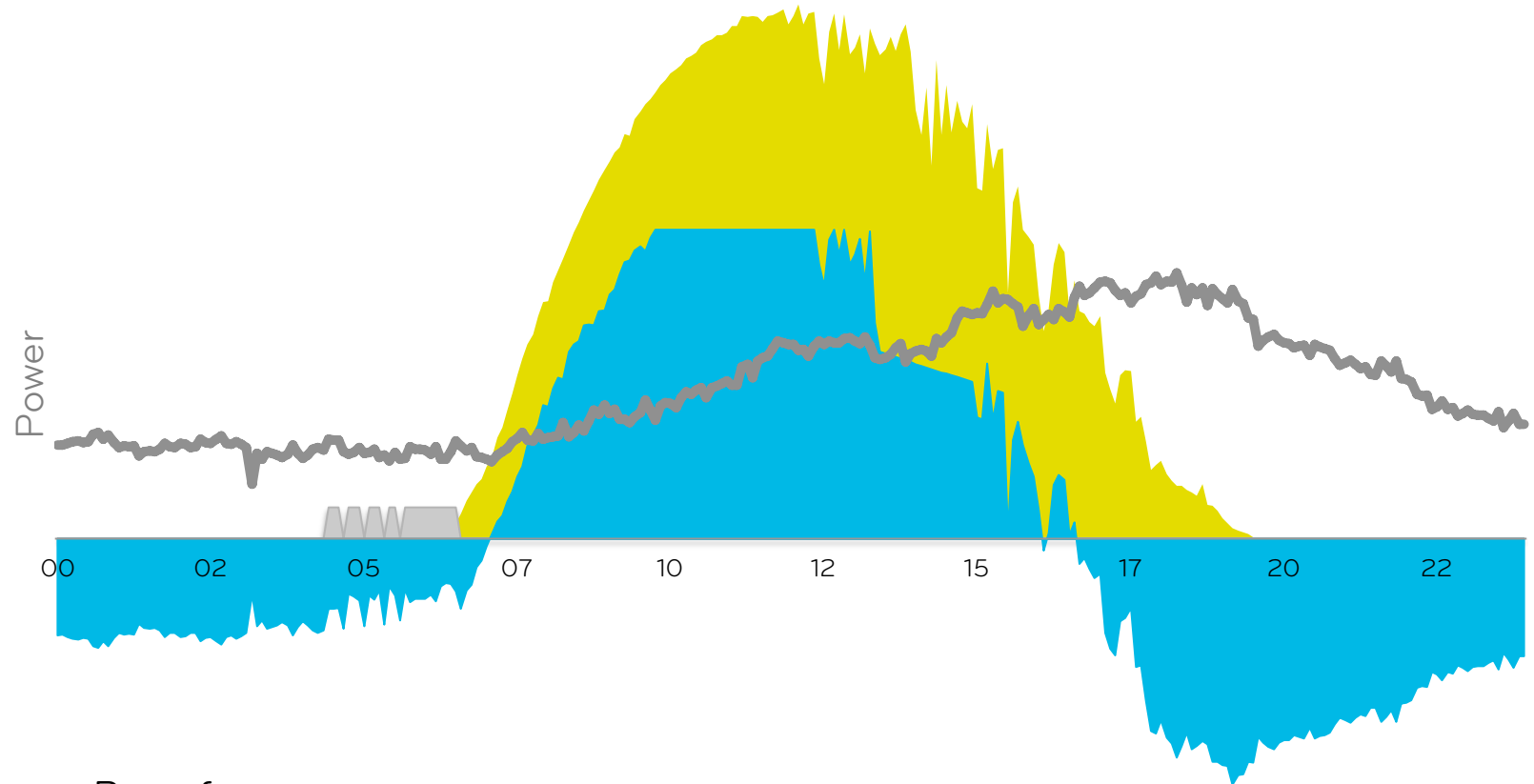
Diesel-off during sun-hours

30-50% Diesel Savings

Less Diesel-running hours

Increase in power quality

High RE Share Scenario

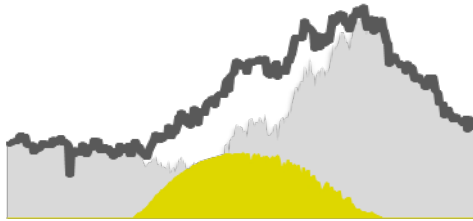


Benefits:

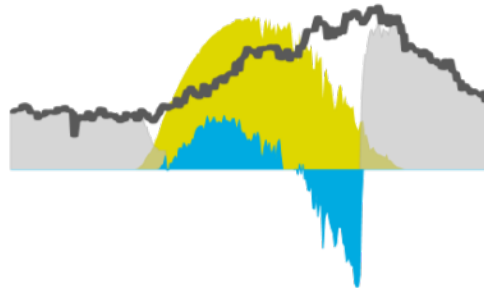
80-95% Diesel Savings

Nearly no Diesel-running hours

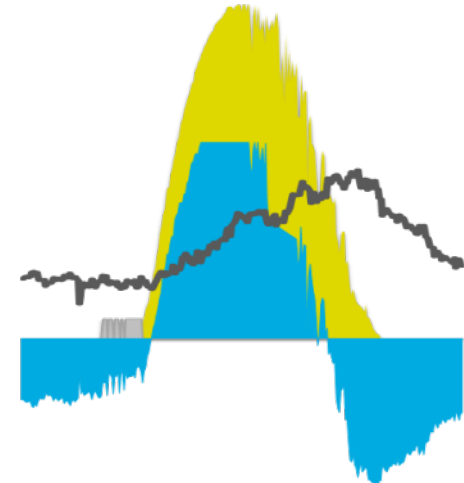
Standard fuel save
PV 40 kWp



Lithium-ion 168 kWh
PV 140 kWp



Aqueous Hybrid-ion 1,300 kWh
PV 300 kWp



Renewable share 15%

LCOE case 1 0.32\$/kWh
LCOE case 2 0.44\$/kWh

Renewable share 50%

LCOE case 1 **0.28\$/kWh**
LCOE case 2 0.36\$/kWh

Renewable share 95%

LCOE case 1 0.32\$/kWh
LCOE case 2 **0.33\$/kWh**

Savings to diesel-only

Case 1 (0,8\$/l) 0.01\$/kWh
Case 2 (1,3\$/l) 0.03\$/kWh

0,05 \$/kWh
0,11 \$/kWh

0.01\$/kW
0,14\$/kWh

- › Case 1: 0.80 \$/l with LCOE 0.33\$/kWh at diesel only case
- › Case 2: 1.27 \$/l with LCOE 0.47\$/kWh at diesel only case



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How We See The Situation Today

Systems are:

- individually designed
- assembled from single components on-site
 - High engineering effort
 - Risk of malfunctions on site causing delay

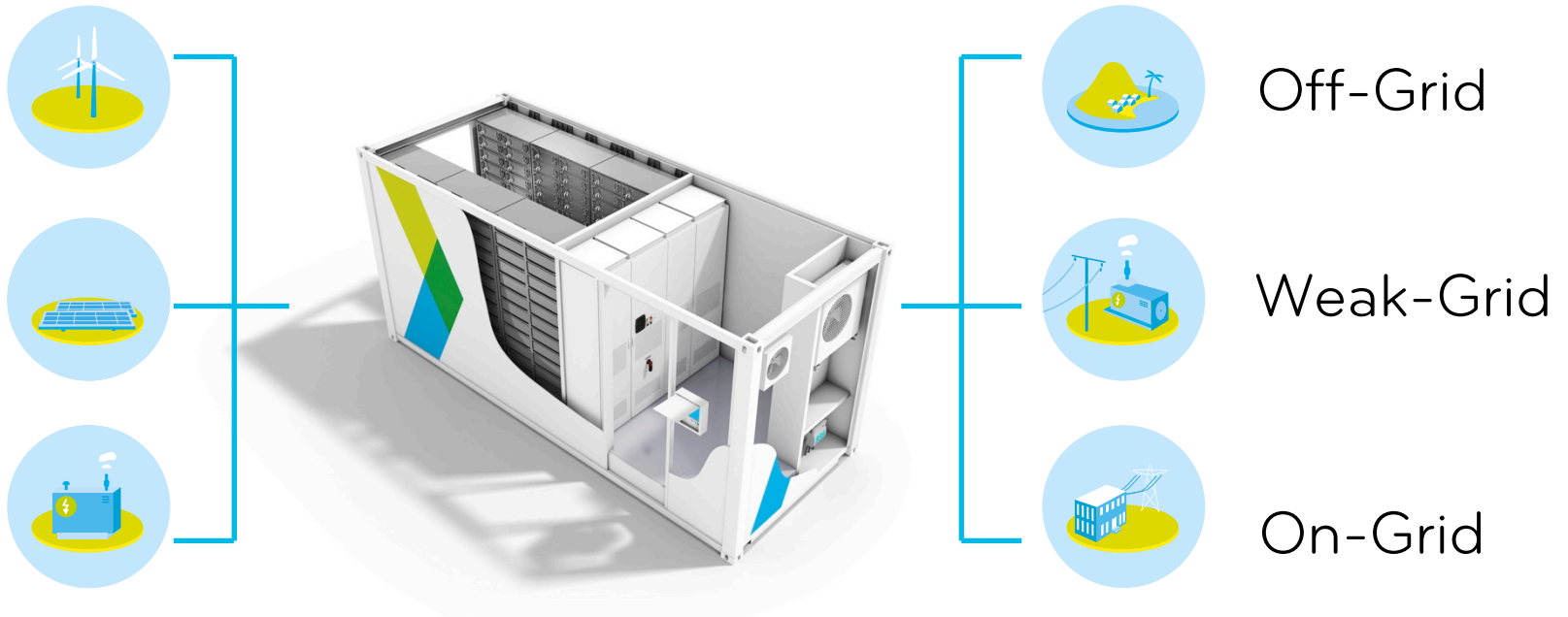
Use of lead acid batteries:

- low cycle life
- need for ventilation
 - Short life expectancy with problem of toxic materials
 - Allows no closed housing concept

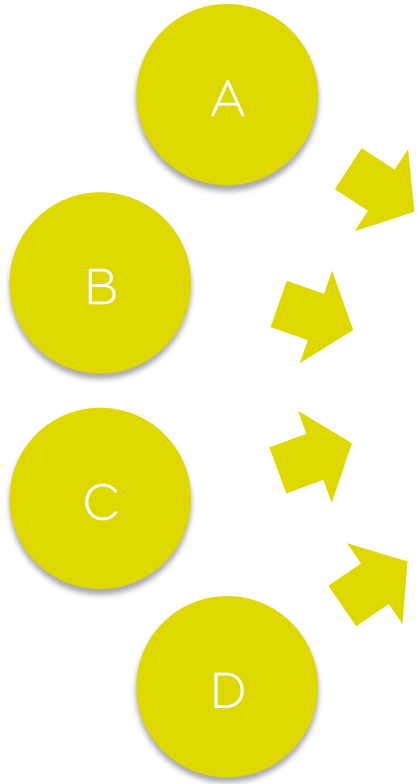


The Alternative: Qinous Rapidly Deployable Energy Storage Solutions

Intelligent Plug & Play Energy Storage Solution



All-in-One Energy Storage Solutions



Standardized

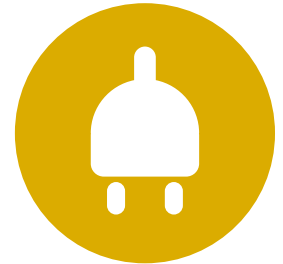
Pre-installed

Factory tested

Scalability

Reliable

Cost
competitive

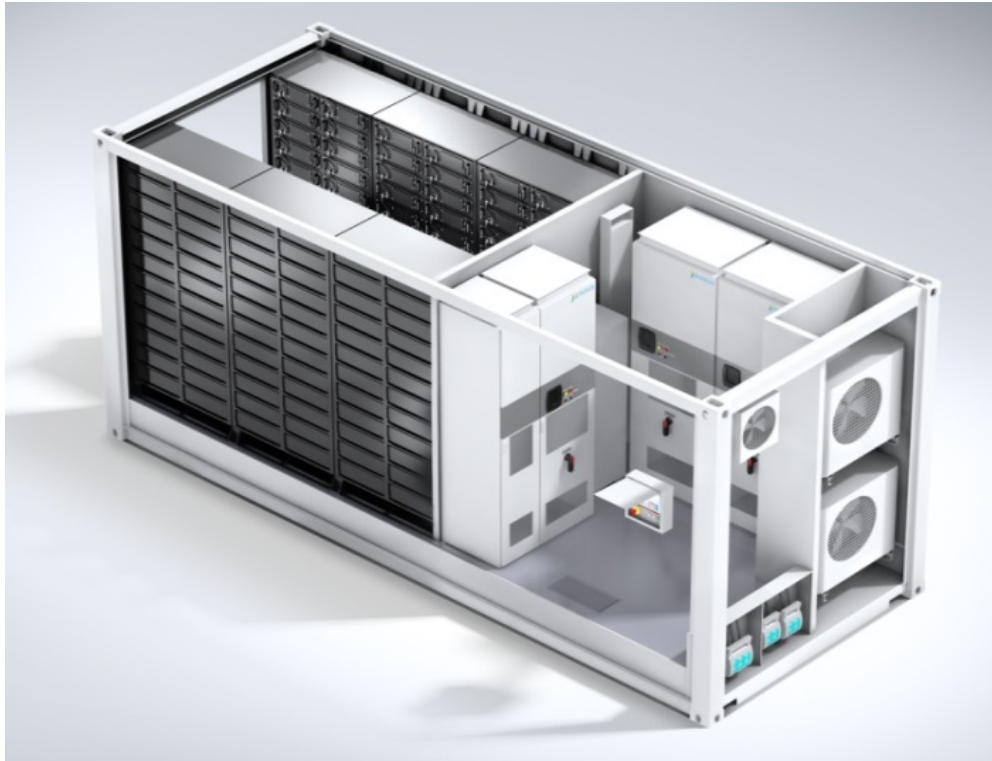


Battery, inverter, control
system, and other
component supplier

System integrator

EPC, IPP, project
developer, utility,

Functionality



Grid management

Battery management

Frequency and voltage regulation

Provision of reactive power

Provision of short-circuit current (200%) and support of in-rush currents

Grid formation and black-start capability

Provision of spinning reserve

Qinous site control and monitoring system.



User friendly interface

Generator control via droop

PV / wind turbine control

Grid and load control

Communication protocols (CAN, Modbus, 60870-5, BacNet)

Remote monitoring and control via GSM/ internet



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Reference:

100kW Mini-Grid Demonstrator

30kW/80kWh Ahi

100kW/112kWh Li

100kW PV

100kW Load
Simulator

100kW
Diesel Genset



SAMSUNG SDI



References: Stadtwerke Münster

Customer / location:	Municipal utility / Germany
Power / capacity :	55 kW / 112 kWh
Technology:	Lithium-ion energy storage
Application:	City electro bus fast charging station
Commissioned:	April 2015



Work in Progress:

Tabarre PV Mini Grid, Haiti



Source: Biohaus
Stiftung

Load:	3 Hospitals & Children Care Center
Power / capacity :	PV: 650kW/ ESS: 500 kW / 448 kWh (grid-forming)
Technology:	Lithium-ion
Application:	Off-grid
Commissioning:	planned Aug 2015
Annual saving:	estimated 440.000 USD Diesel

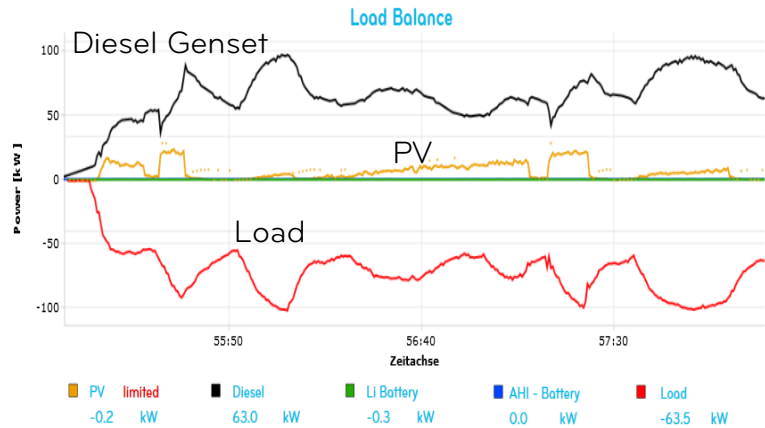


› Thank you for your Attention.

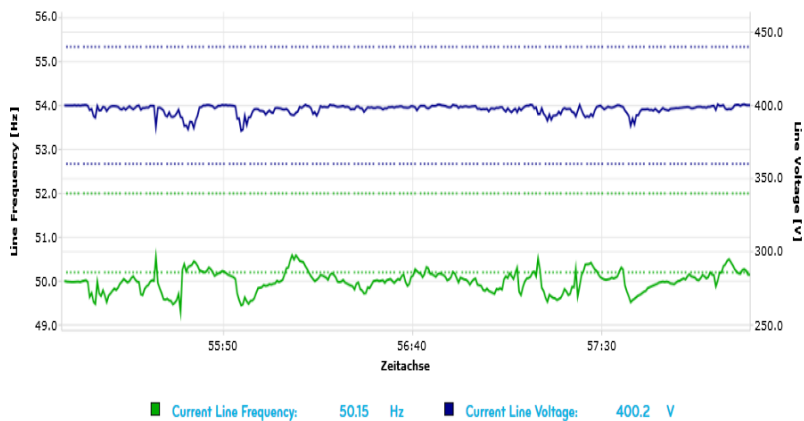
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Standardized Storage Solutions in action providing stable frequency and voltage in Microgrids

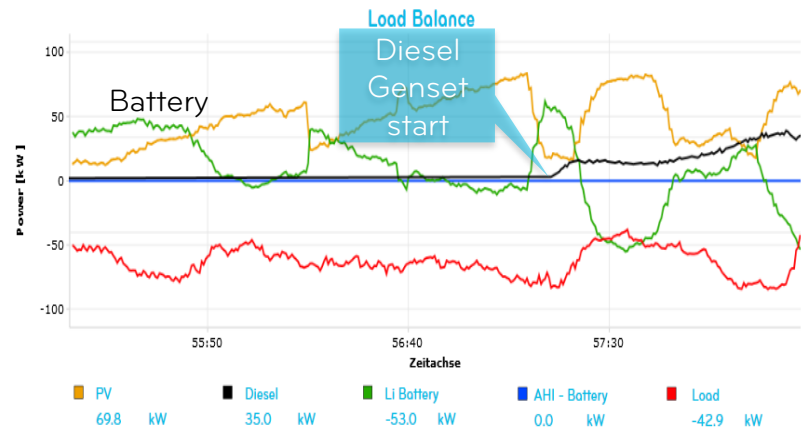
Diesel + PV + Load



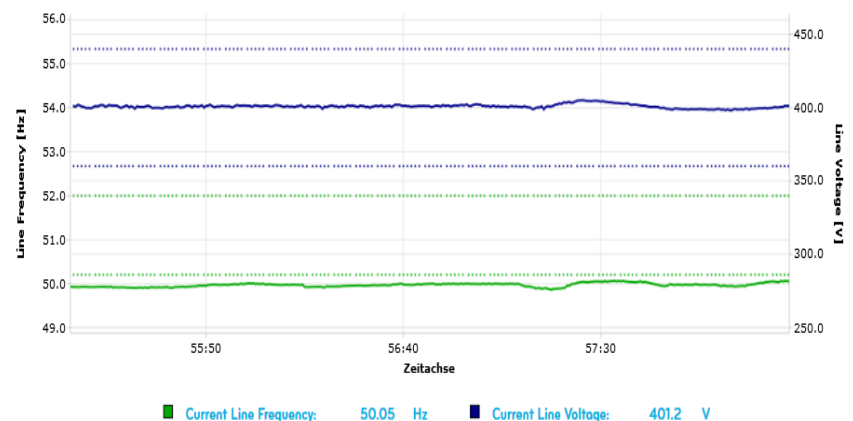
Line Frequency



Diesel + PV + BATTERY + Load



Line Frequency



the qinous site controller and Battery Solution in action pro-viding quickly short-circuit current to trigger the safety devices

