

# Modular, decentralized storage system topologies for the rural electrification



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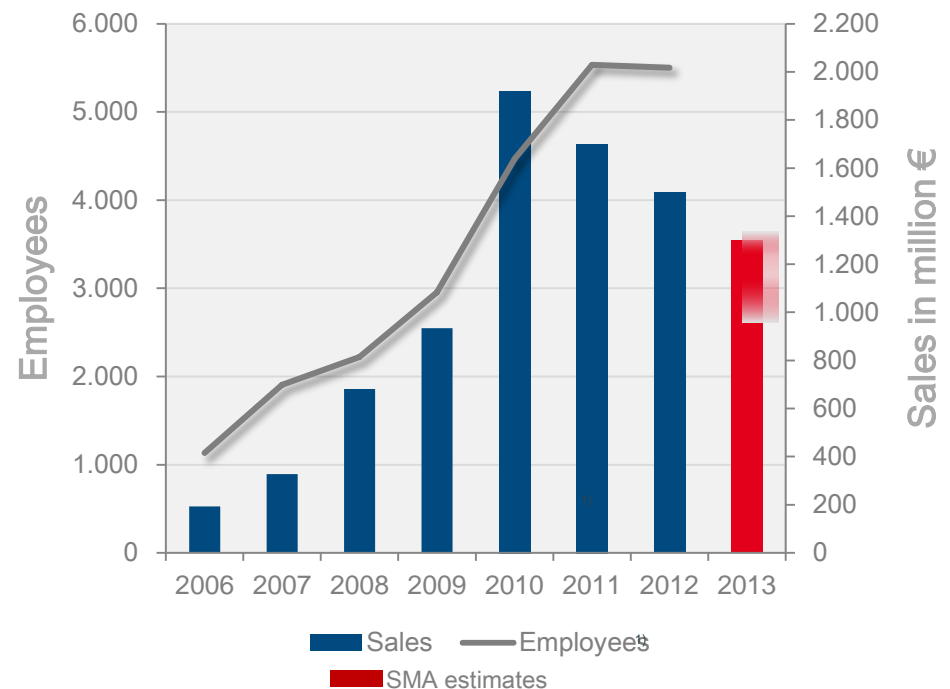
# SMA Solar Technology



# SMA is a true growth story – more than 60 % p.a. sales increase in last five years

- > Founded in 1981
- > Sales 2012 EUR 1.5 billion and shares in exports of 56.3 %
- > More than 5,000<sup>1)</sup> employees
- > More than 25 GW of inverter output sold worldwide
- > Represented in 21 countries\* all over the globe
- > Best efficiency worldwide (99 %)

SMA sales and employee development



> SMA was again customers' first choice in 2012



# SMA serves all market segments worldwide

## All PV applications



On-grid



Off-grid



Backup

## All performance ranges



Residential  
< 2 kW



Residential  
2 kW to 30 kW

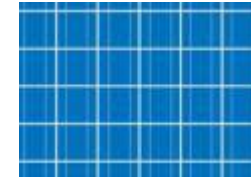


Commercial  
30 kW to 500 kW

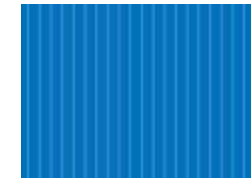


Industrial  
To > 1 MW

## All module types



Crystalline  
modules



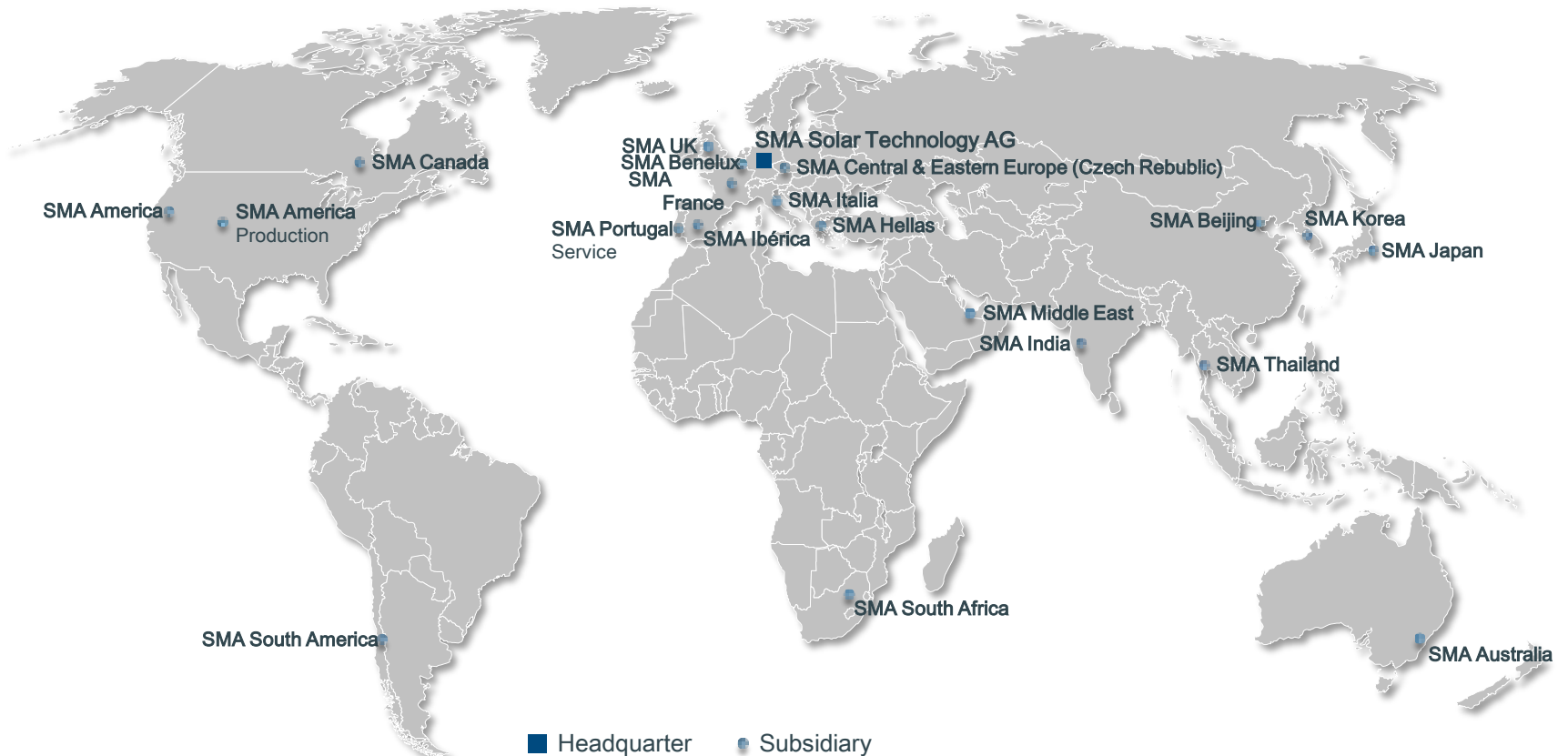
Thin film



Concentrator  
modules

> Every market segment has different product requirements

# Best coverage with more than 1300 sales and service professionals worldwide

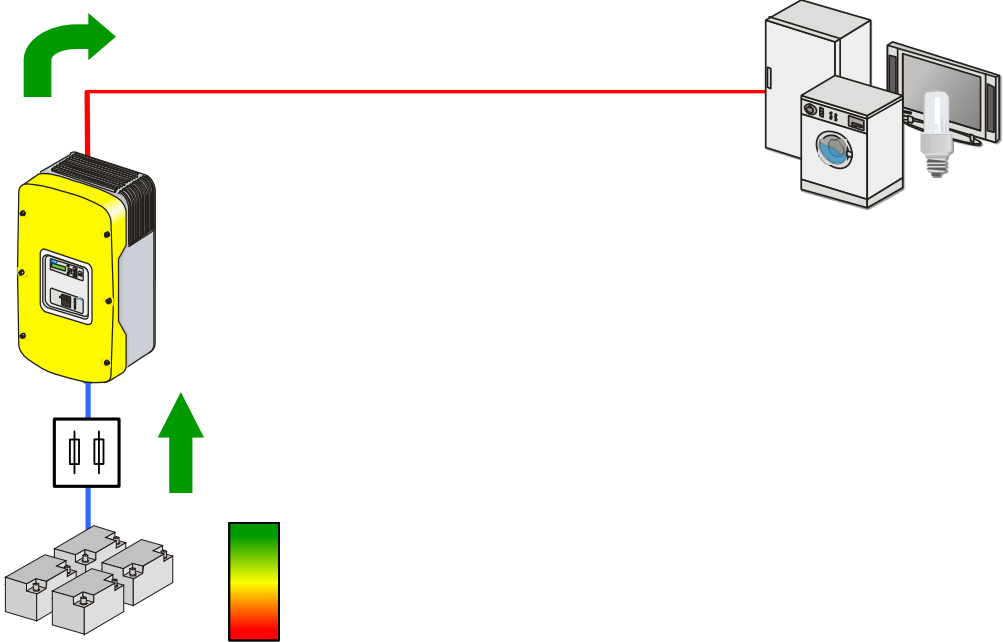
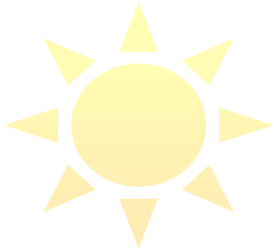


> SMA is and will be present locally in all relevant PV-markets

# SMA modular, decentralized solutions

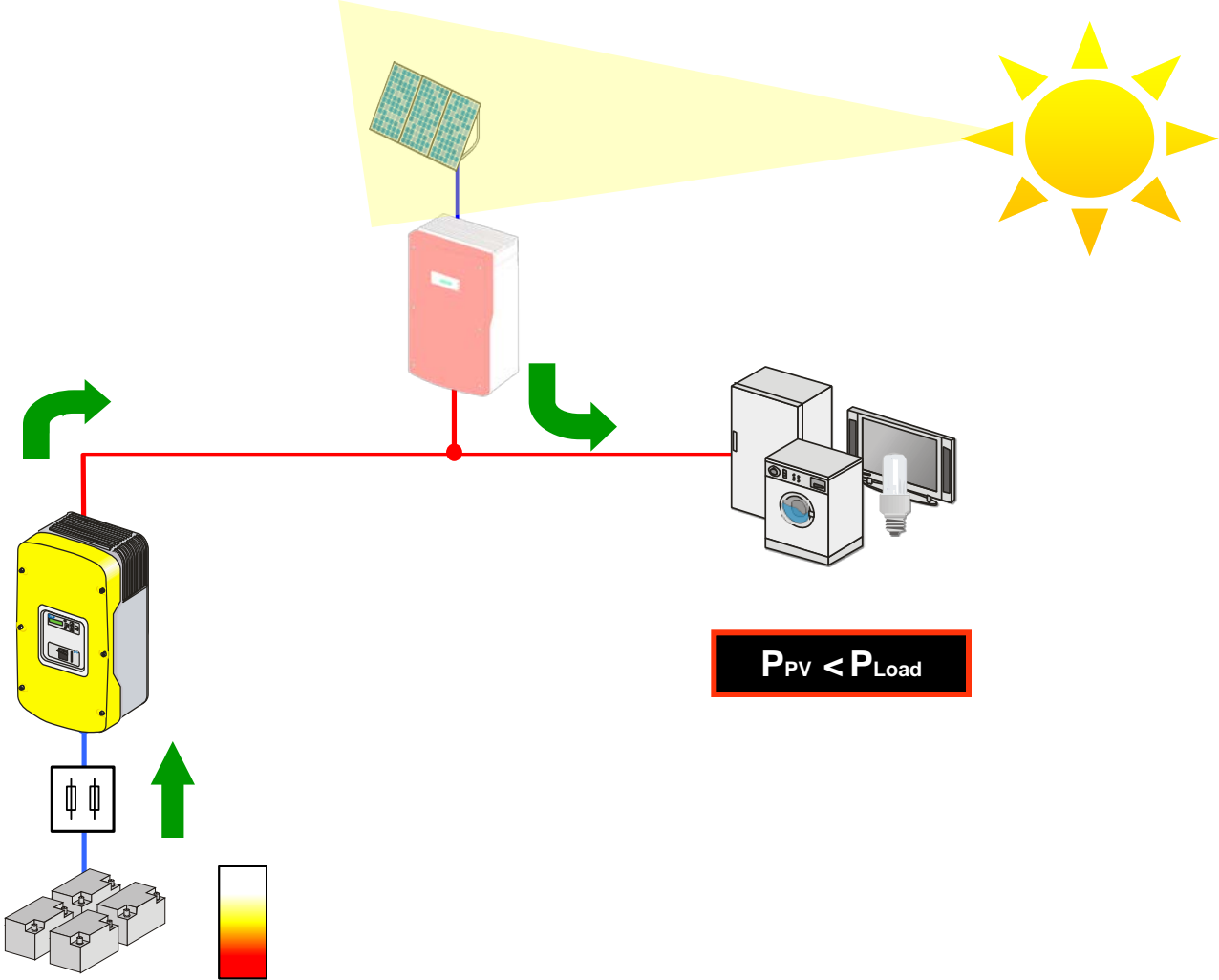


# Basic principle of battery supply

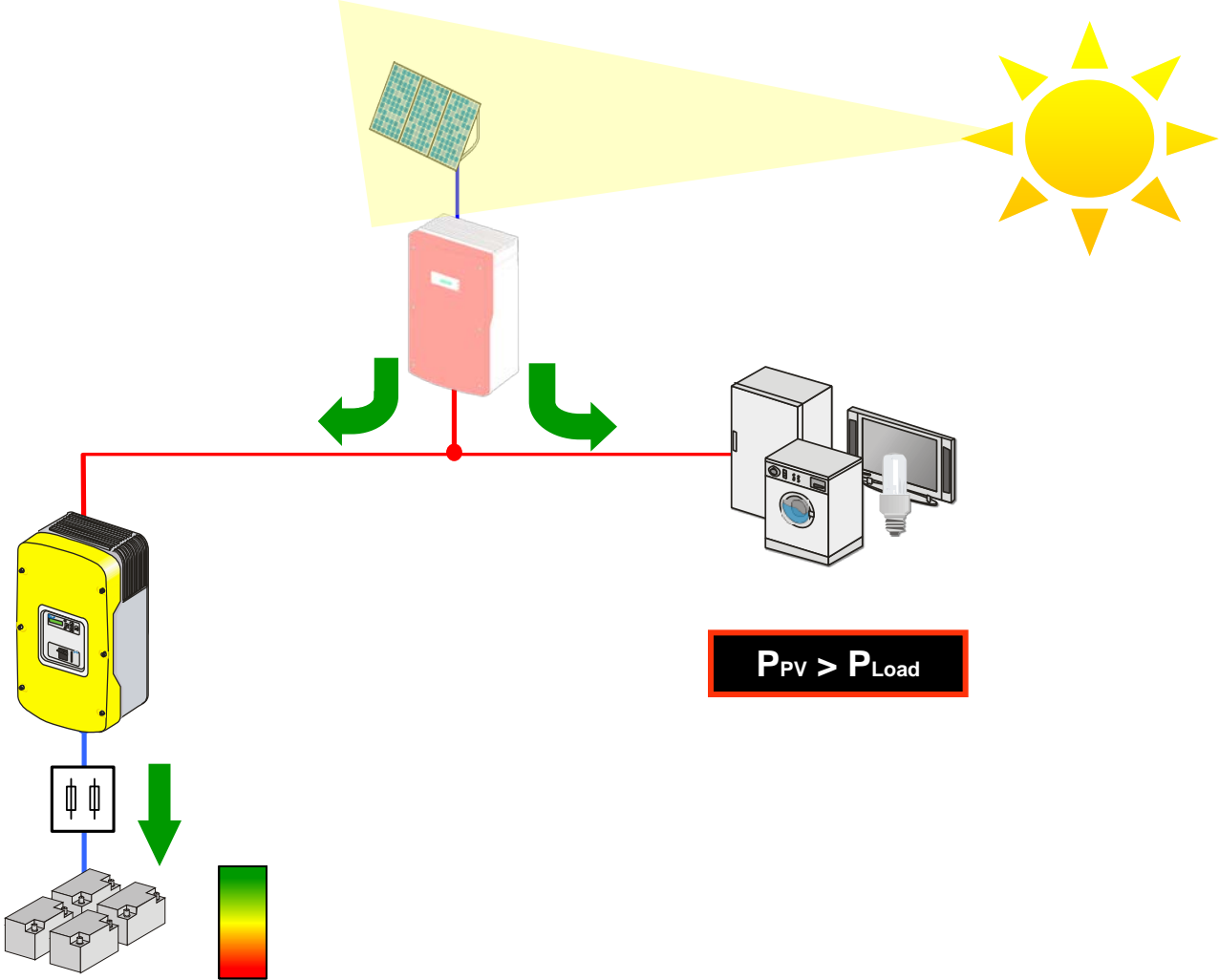




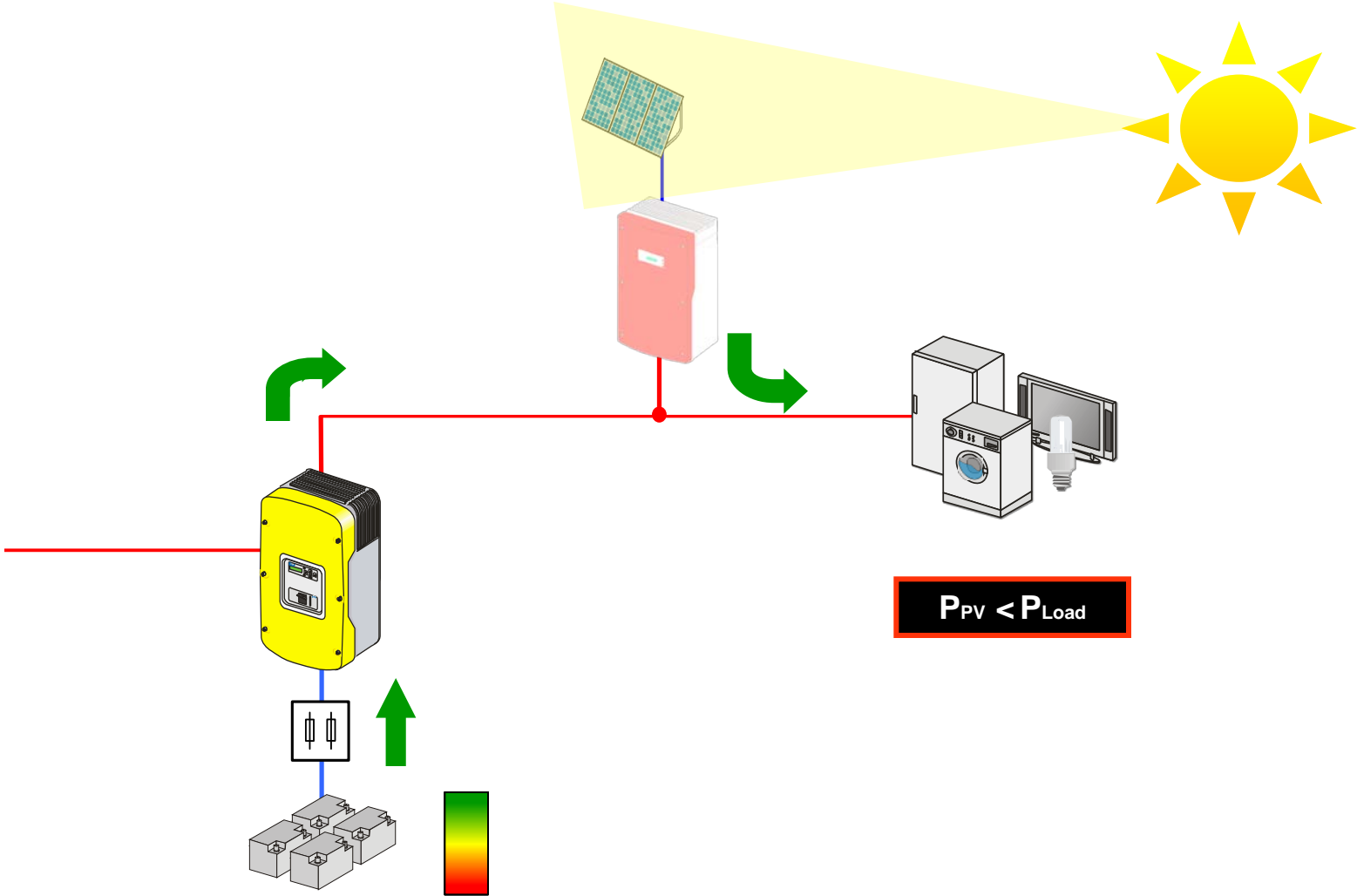
# Off-Grid system with solar power



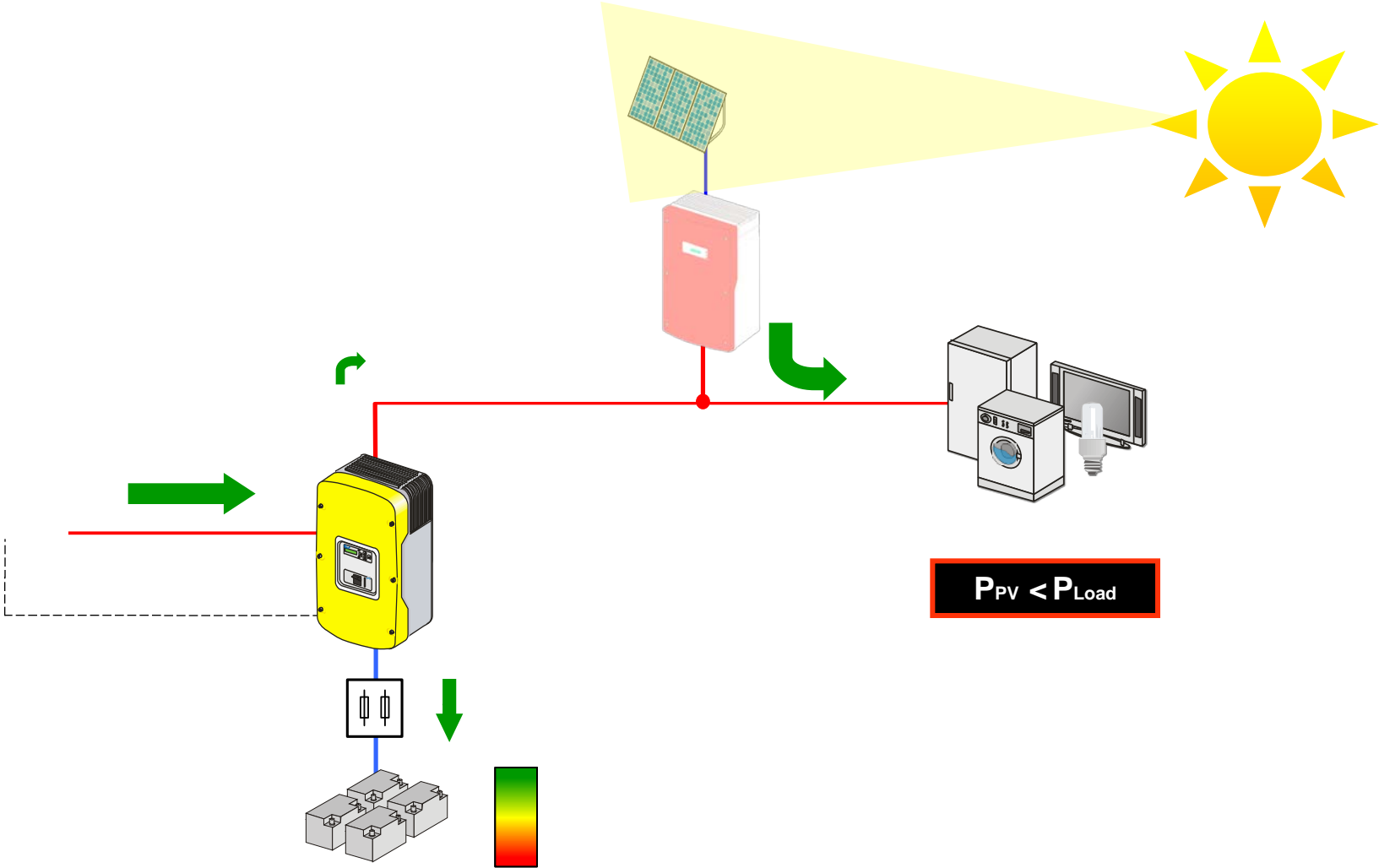
# Off-Grid system with solar power



# Off-Grid system with solar and generator power



# Off-Grid system with solar and genset

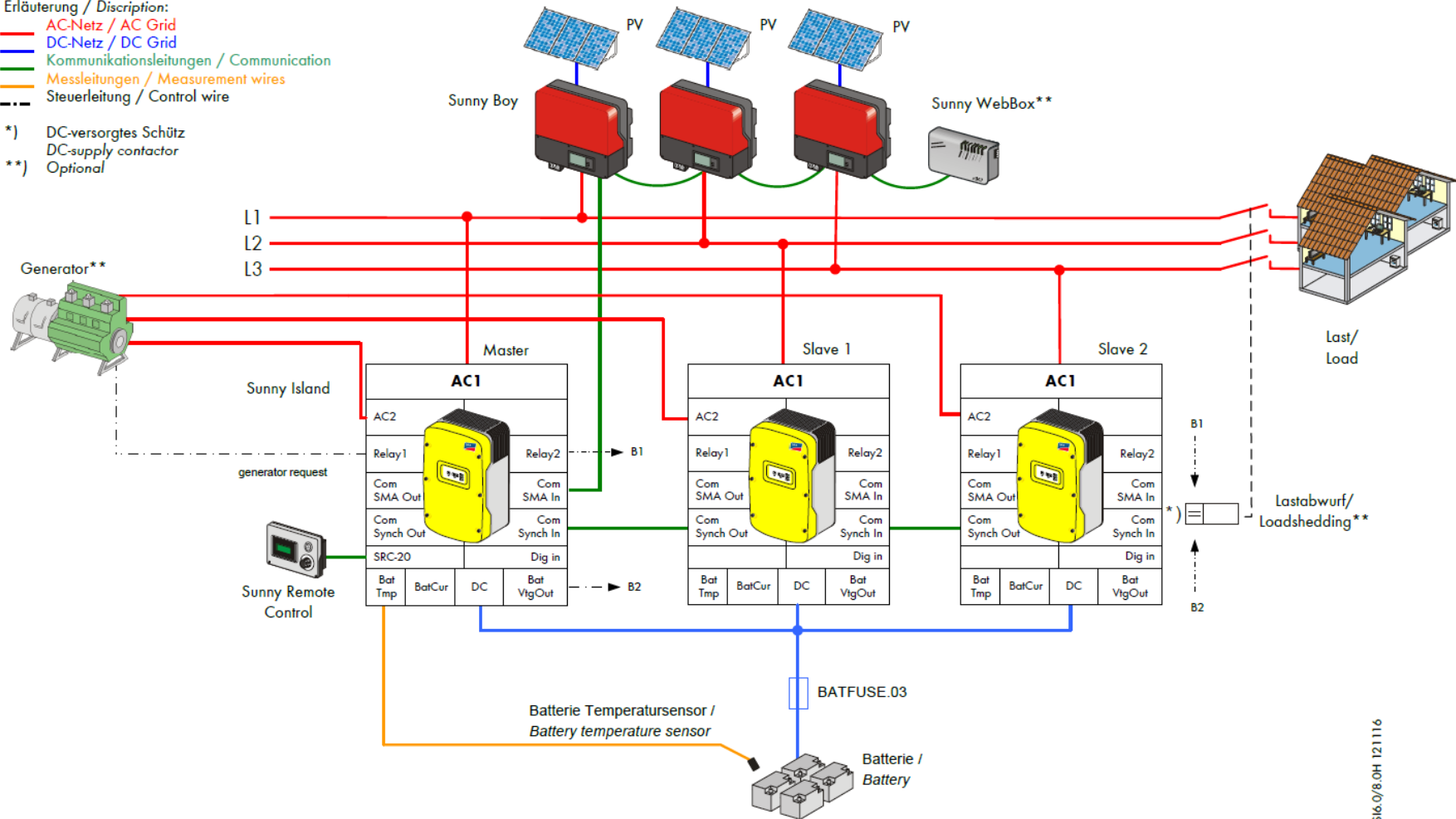


# Three Phase Off-Grid system with solar and genset power

Erläuterung / Discription:

- AC-Netz / AC Grid
- DC-Netz / DC Grid
- Kommunikationsleitungen / Communication
- Messleitungen / Measurement wires
- - - Steuerleitung / Control wire

- \*) DC-versorgtes Schütz  
DC-supply contactor
- \*\*\*) Optional

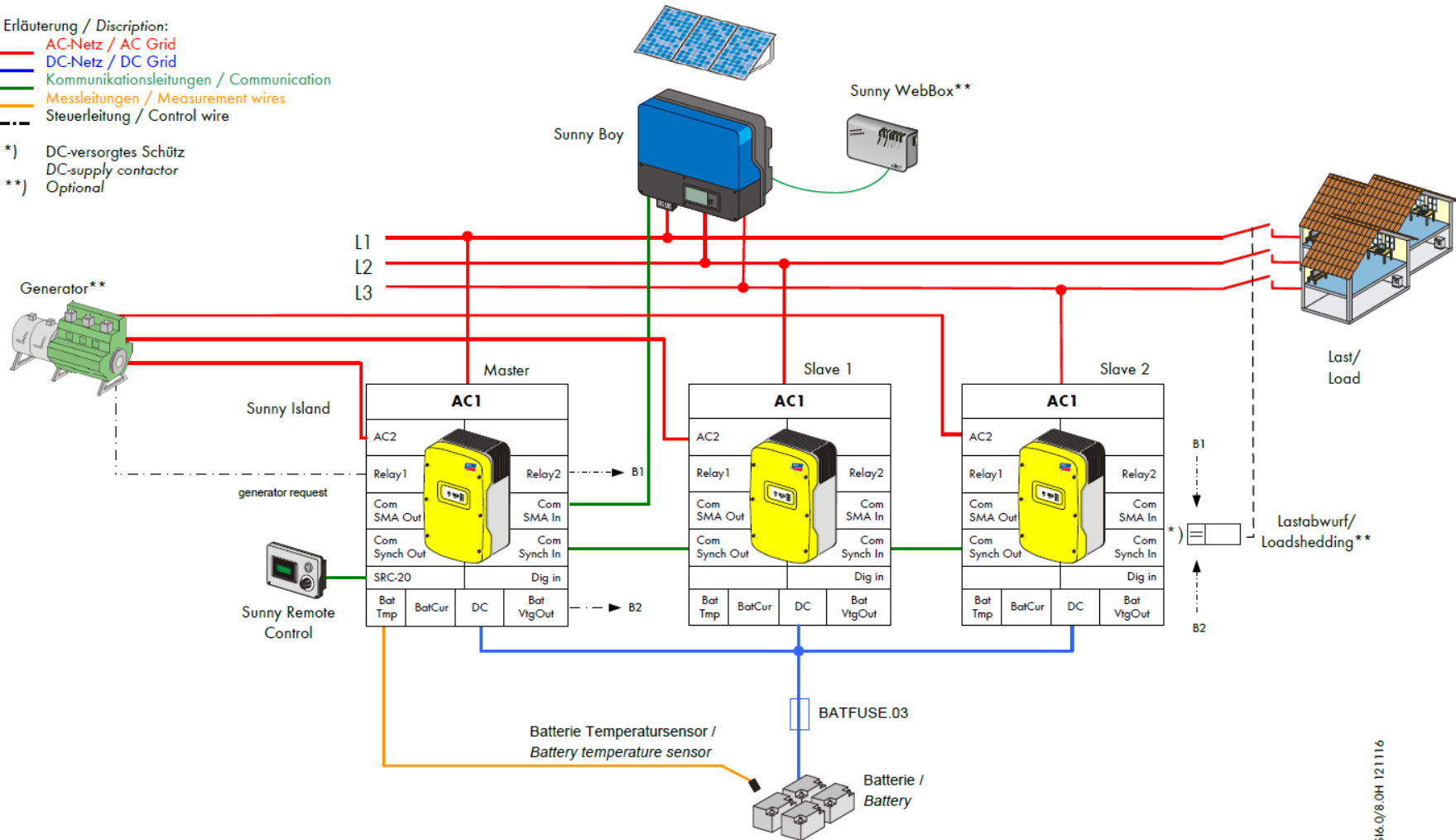


# Three Phase Off-Grid system with solar and genset power

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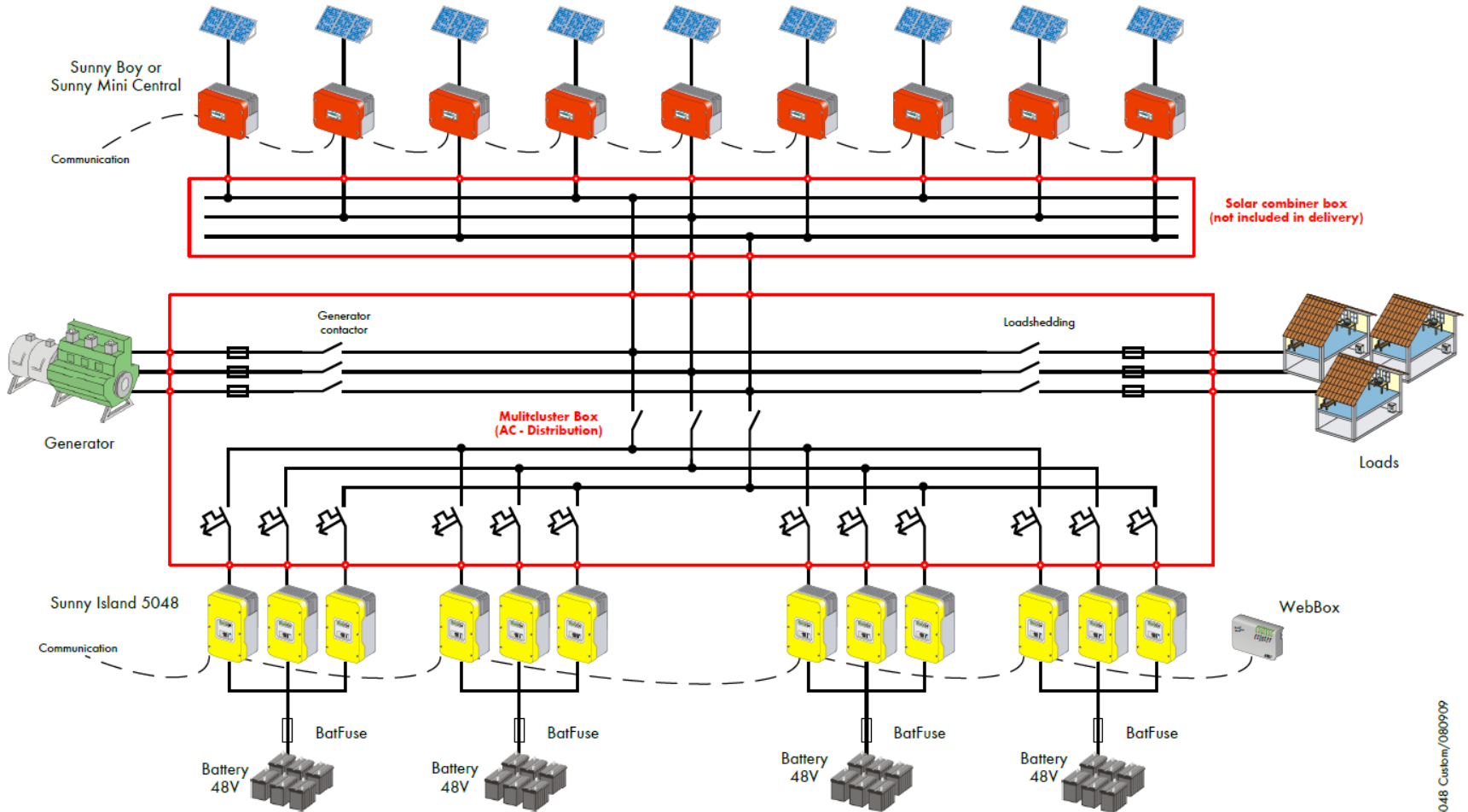
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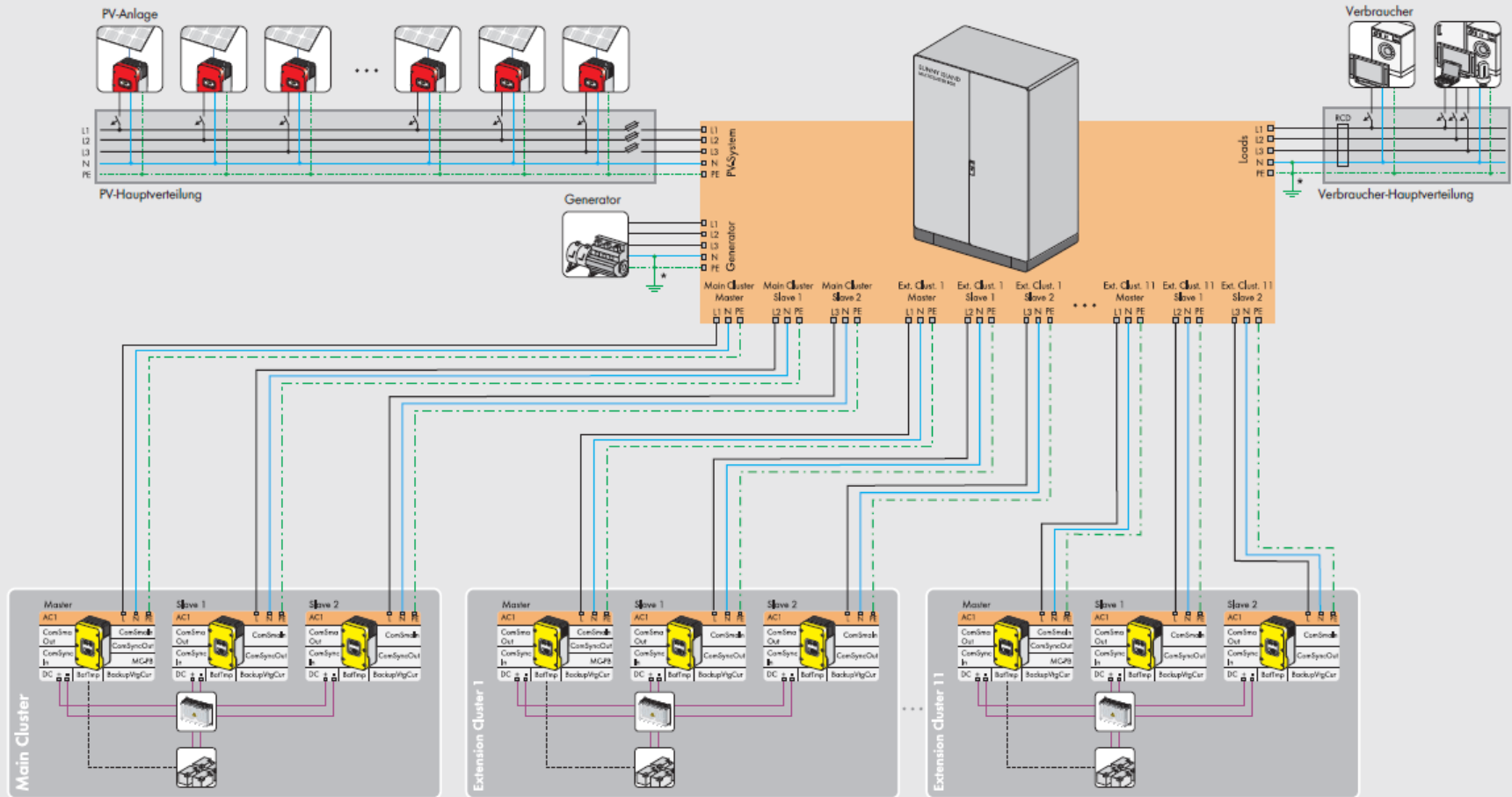




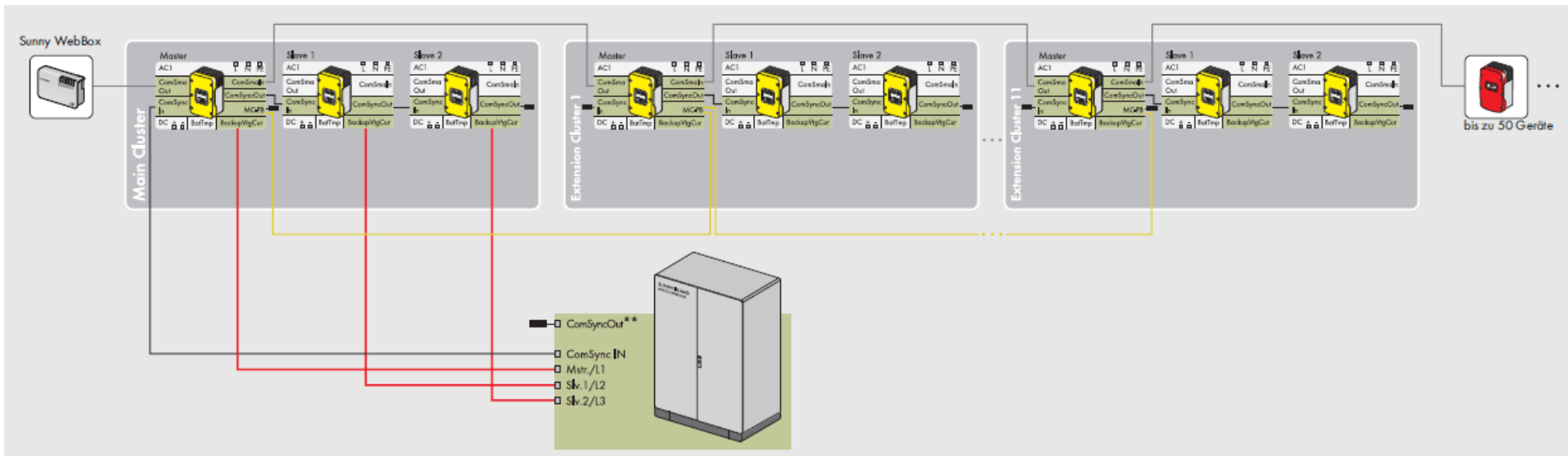
# Off-Grid system in 100 kW range



# Multi Cluster System up to 36 Sunny Island Power lines connection

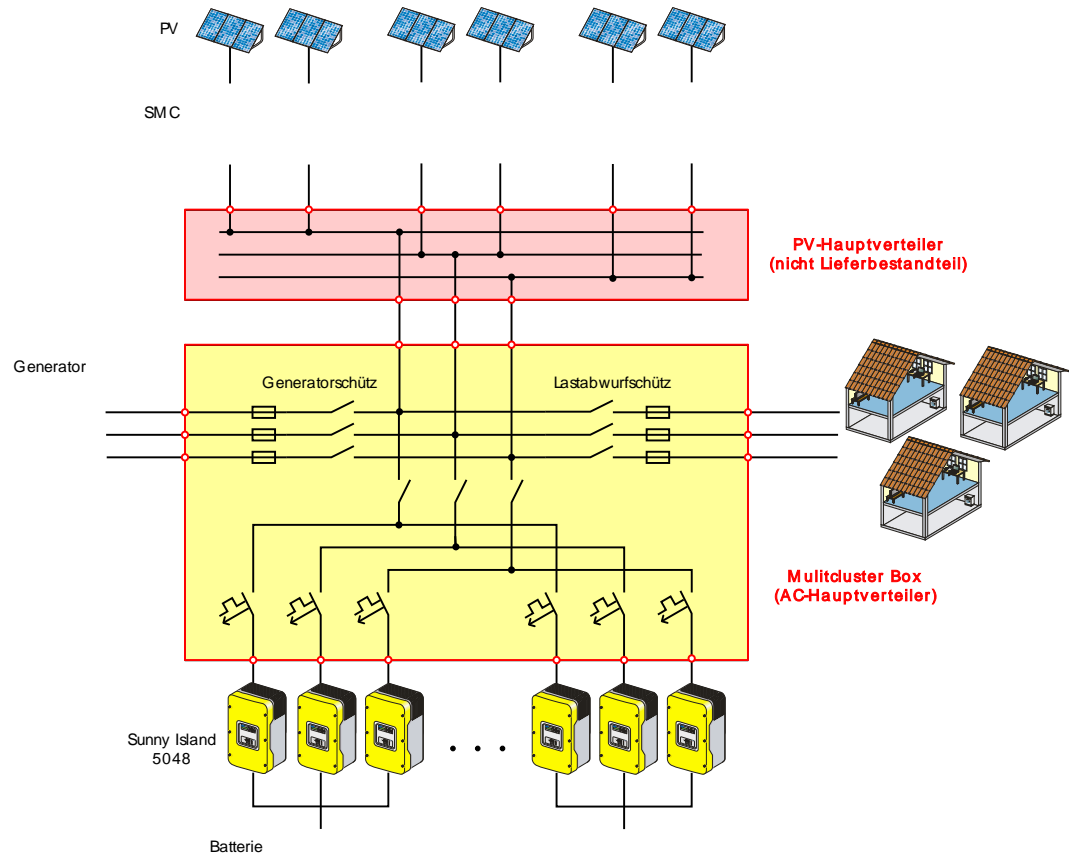


# Multi Cluster System up to 36 Sunny Island Communication lines connection



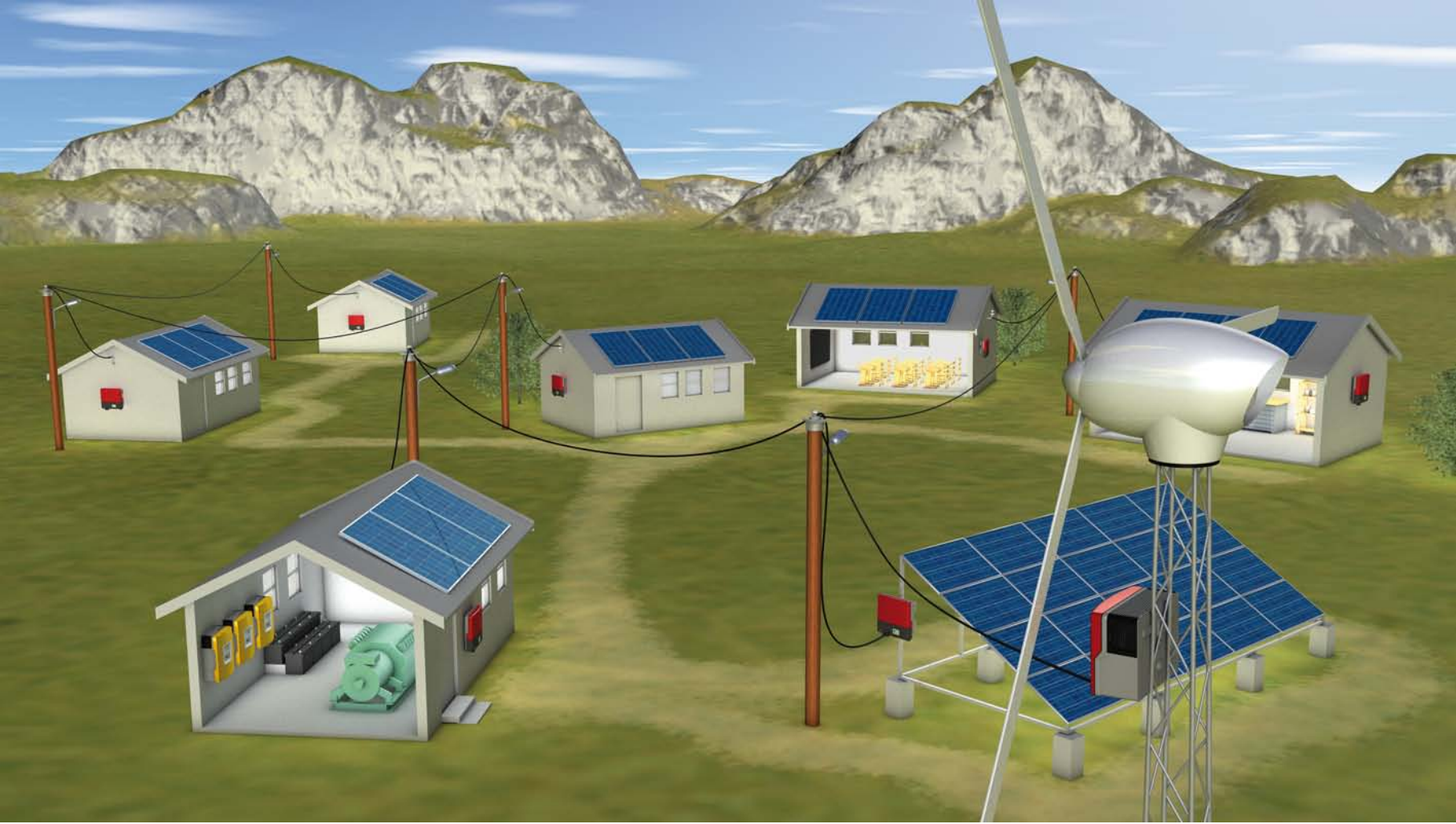
# In a Multicluster System is all inclusive

- > Up to 300 kW
- > Integrated circuit breaker for all SI
- > Integrated generator contactor!
- > Integrated load shedding contactor!
- > Integrated main connection for PV
- > 5 years warranty
- > Single Point of operation –  
All communication cable included!

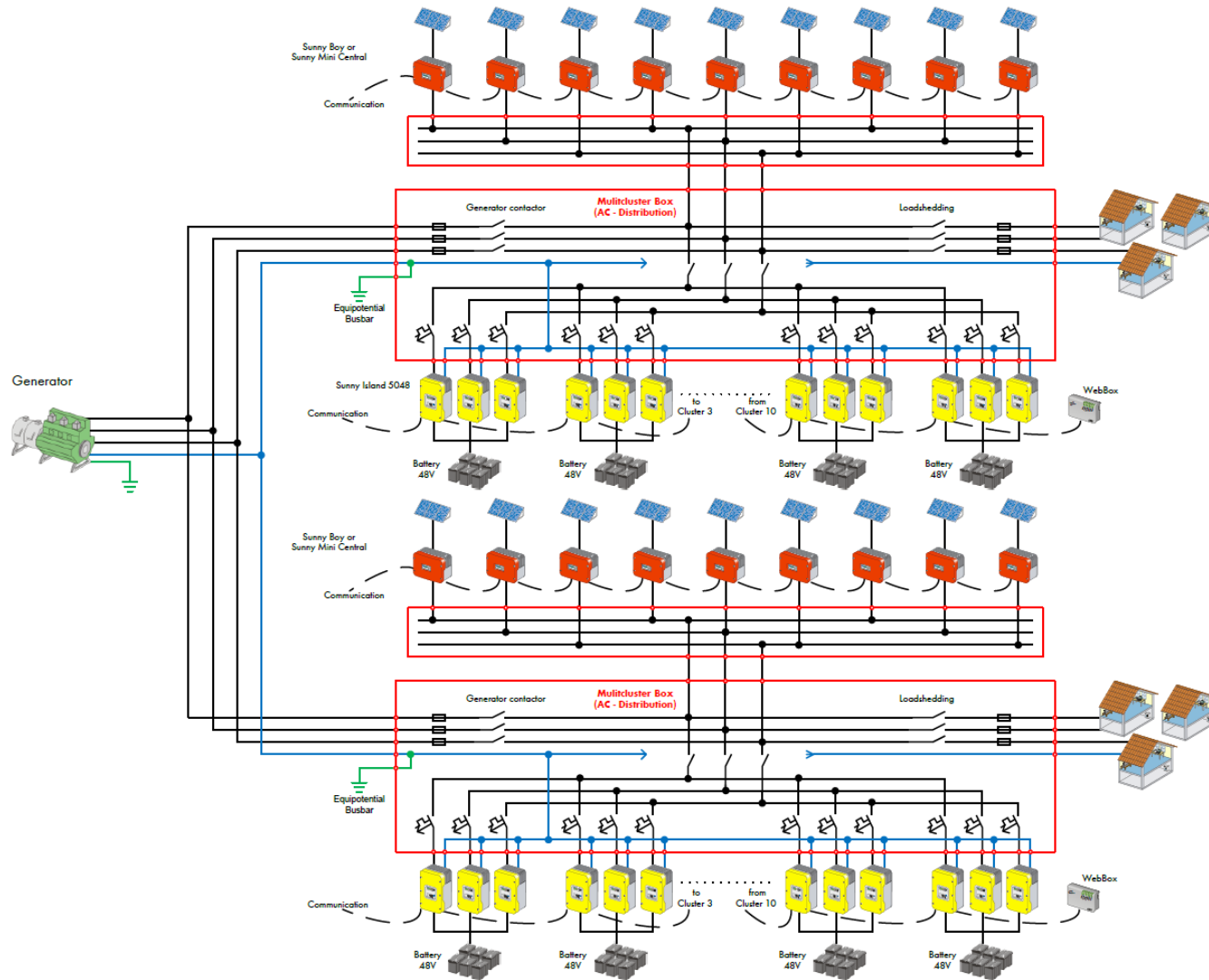




# Customized system topologies

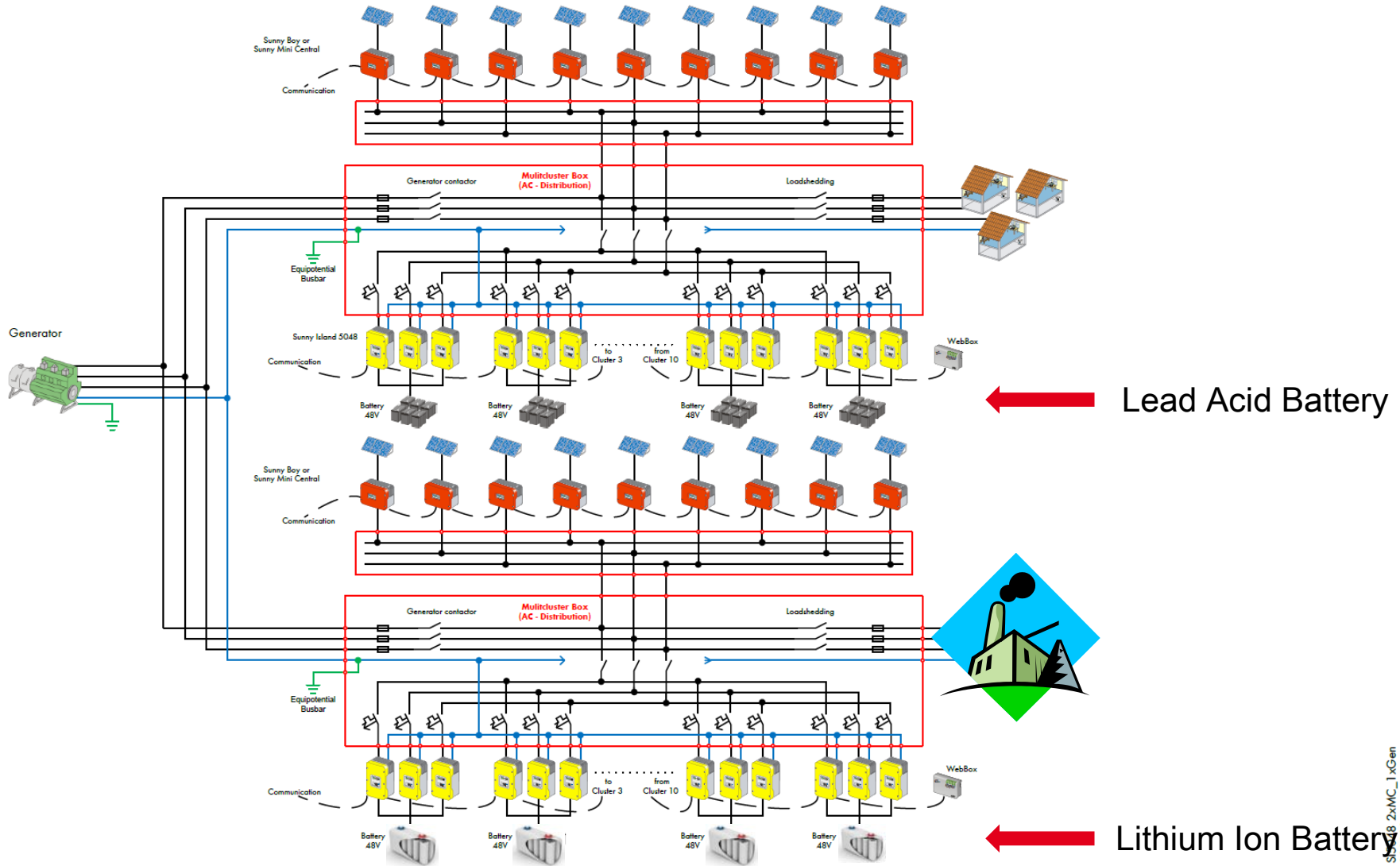


# Use of more Multiclusters for different Sub-Mini-Grids

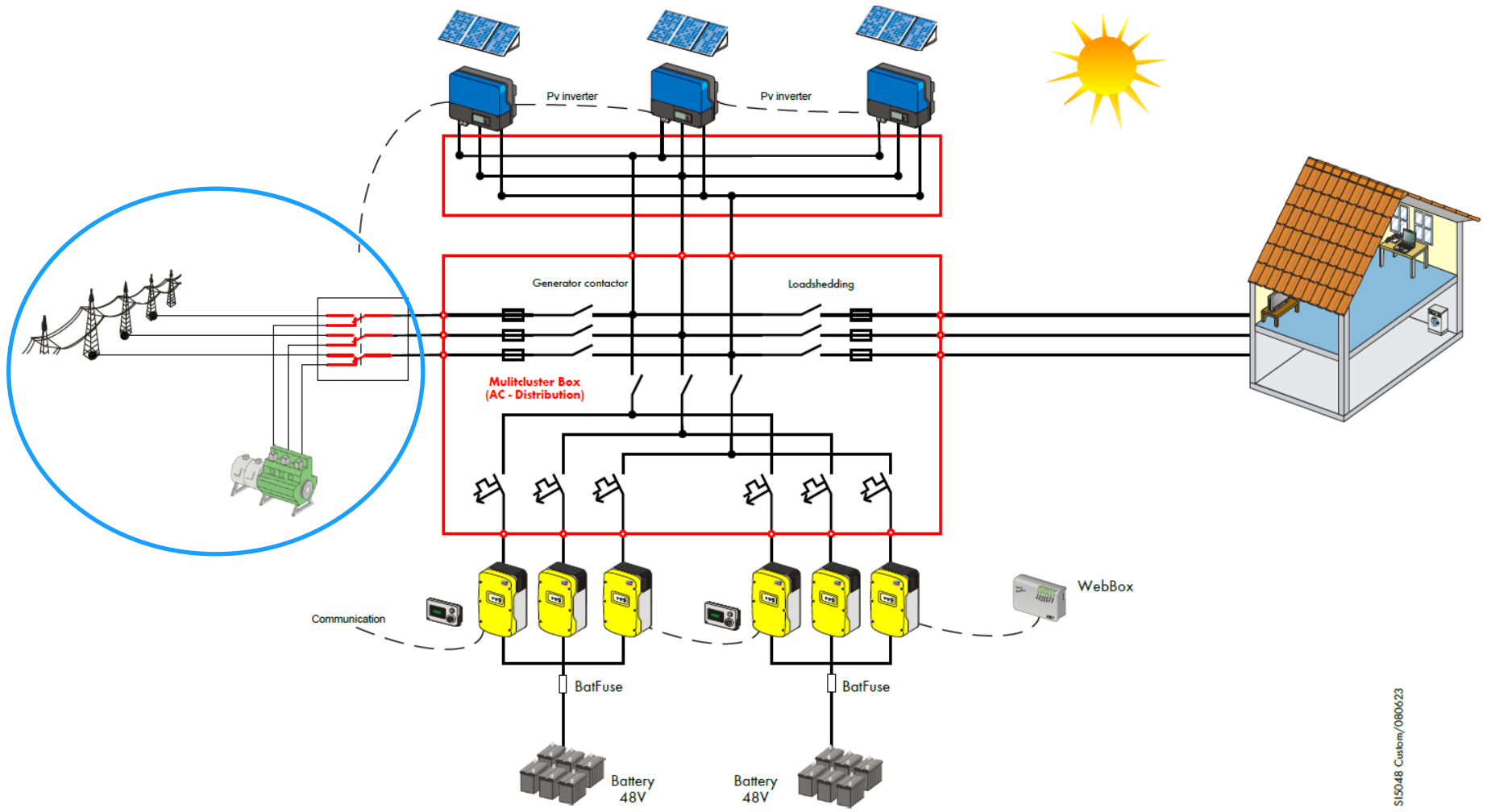




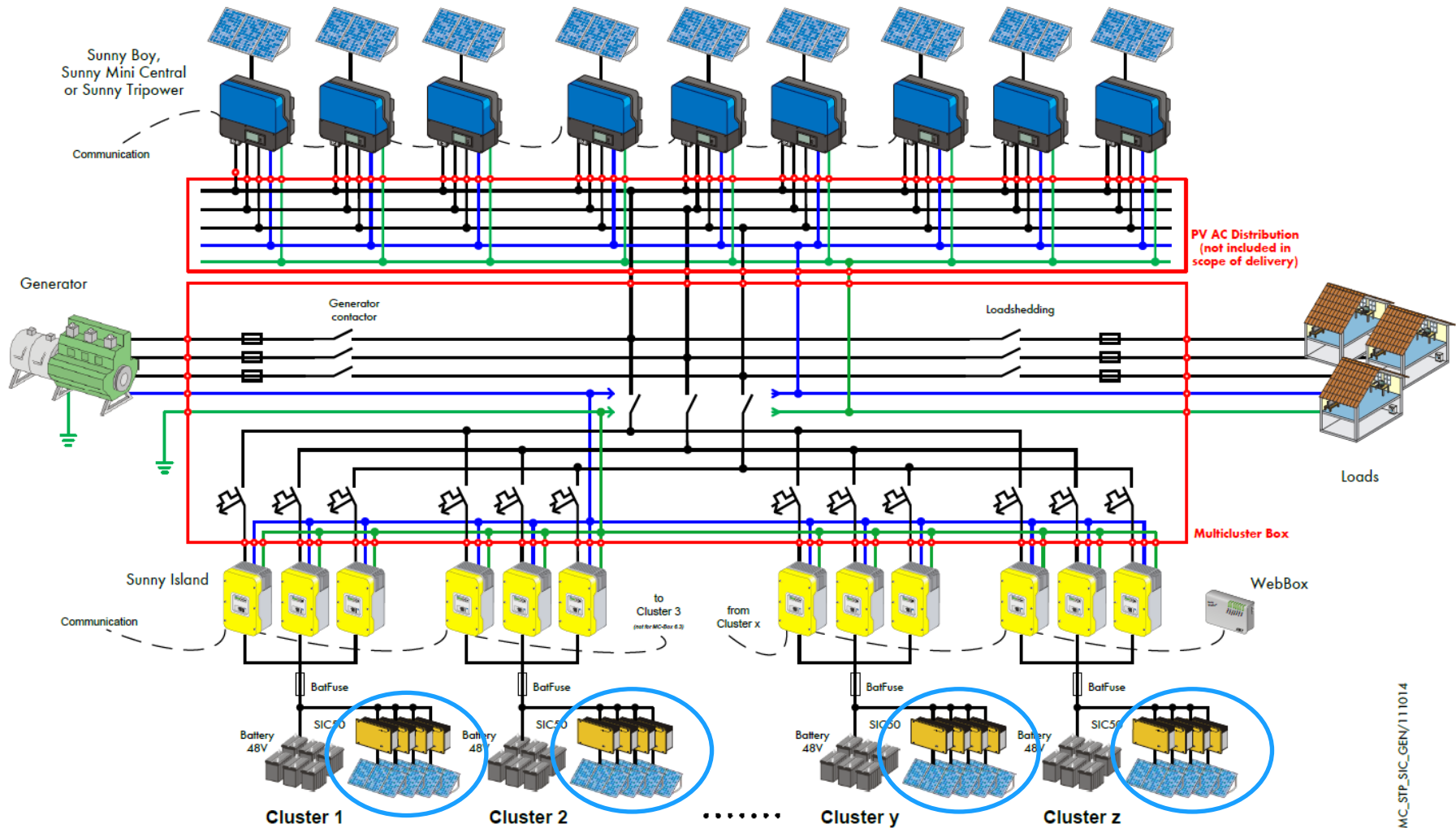
# Use of different type of Batteries



# Bad-Grids



# Higher PV penetration by AC/DC coupling



MC\_STP\_SIC\_GEN/111014

# Case studies



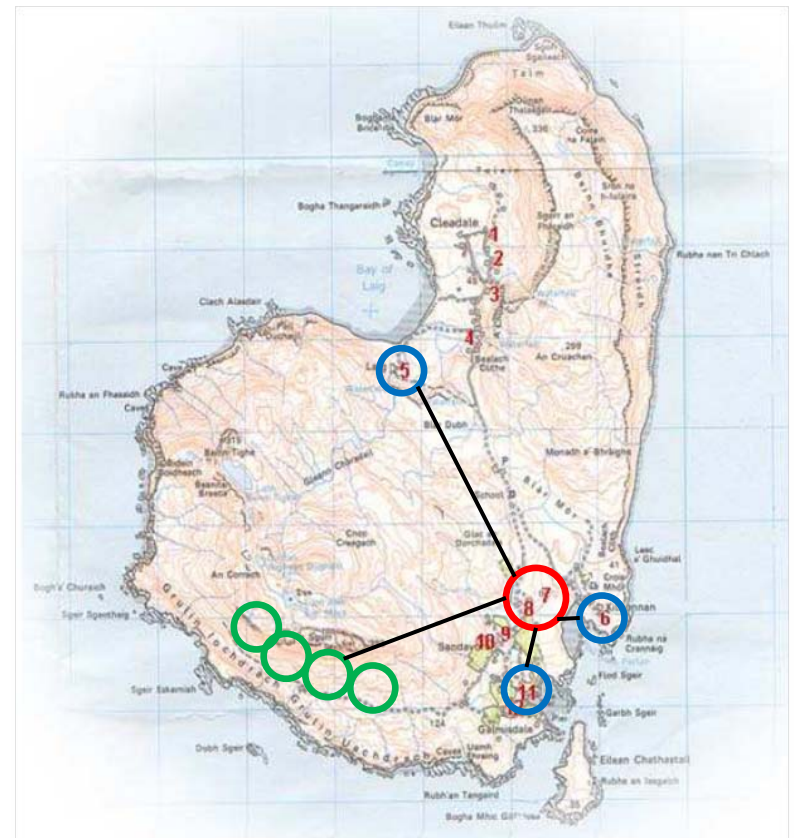
Picture: Off-Grid Building in Niestetal/Germany „SMA Solar Academy“

## Isle of Eigg / Scotland

This system integrates multiple renewable power sources

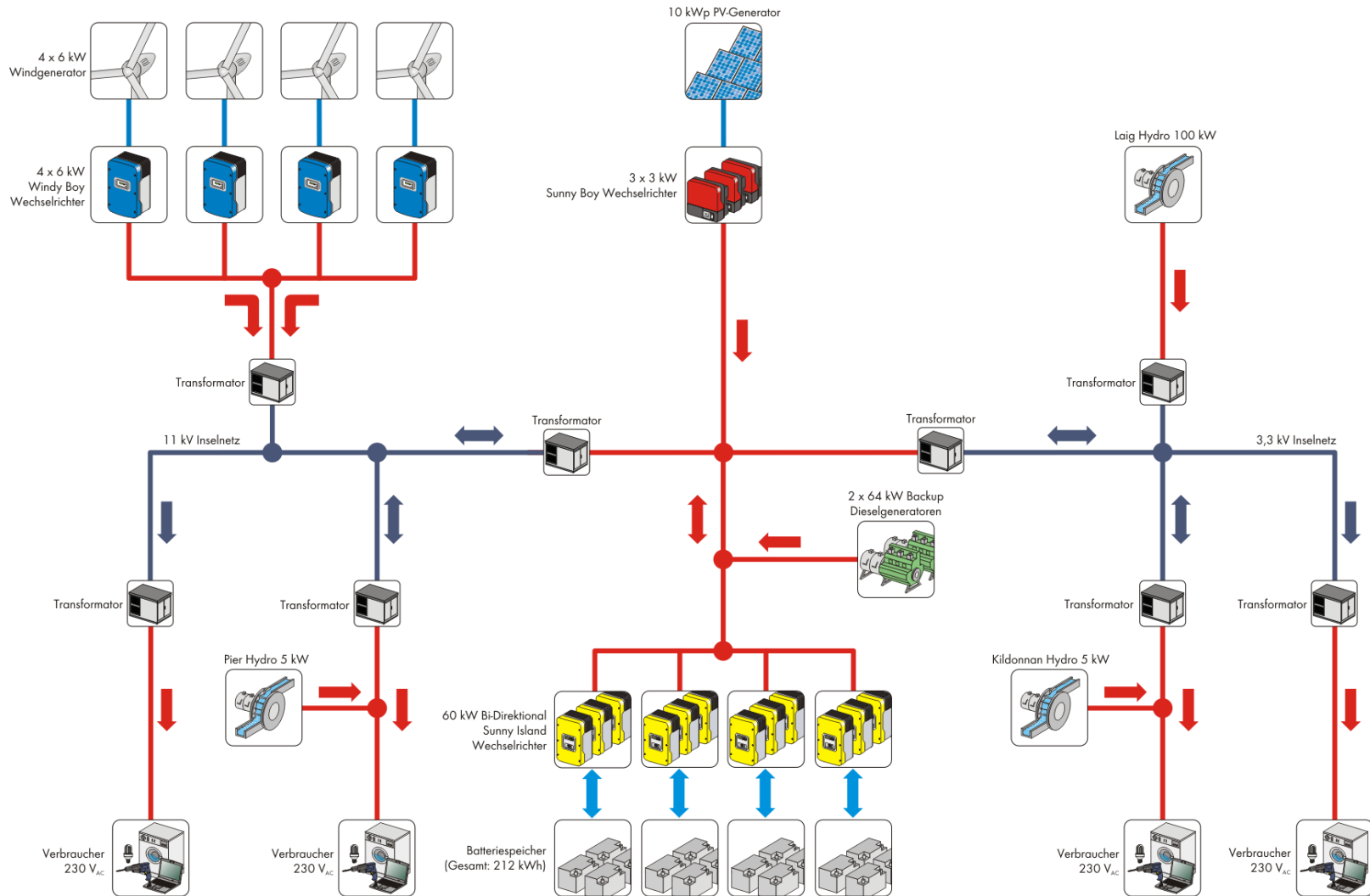
- > Hydro (110 kW)
- > Wind (24 kW)
- > Solar (32 kWp)

- ▶▶ Distributed, medium voltage grid
- ▶▶ Modular AC coupled system





# Schematic for Isle of Eigg





# One of the World's largest modular off-grid solar system in Mozambique

159 Battery Inverters (Sunny Island)

120 PV Inverters (Sunny Mini Central)



Source: SMA Blog



# Bamyan Renewable Energy Programme in Afghanistan



50 PV Inverters / 1MWp (Sunny Tripower)

114 Battery Inverters (Sunny Island)

750 kVA Genset



Source: SMA Blog



# Tokelau – The first country with 100% renewable Energy



Source: SMA Blog

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