

LARGE OFF-GRID SOLUTIONS WITH NEW MULTICLUSTER TECHNOLOGY 2.0



Dr. Frank Thim, SMA Solar Technology AG

OVERVIEW



1. Introduction: What is Multicluster-Technology
2. What is the New Multicluster-Technology 2.0
3. Overview: Field Experience with Modular AC-Coupled Multicluster-Systems
4. Summary



WHAT IS MULTICLUSTER-TECHNOLOGY?



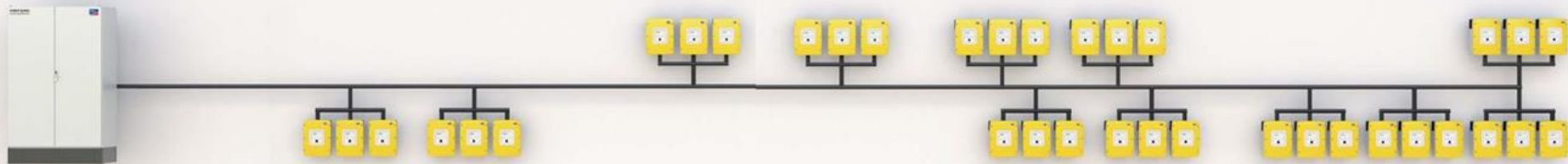
Multicuster Box 6 for a maximum of 2 clusters

MC-Box 12 for 3 ...

... or 4 clusters

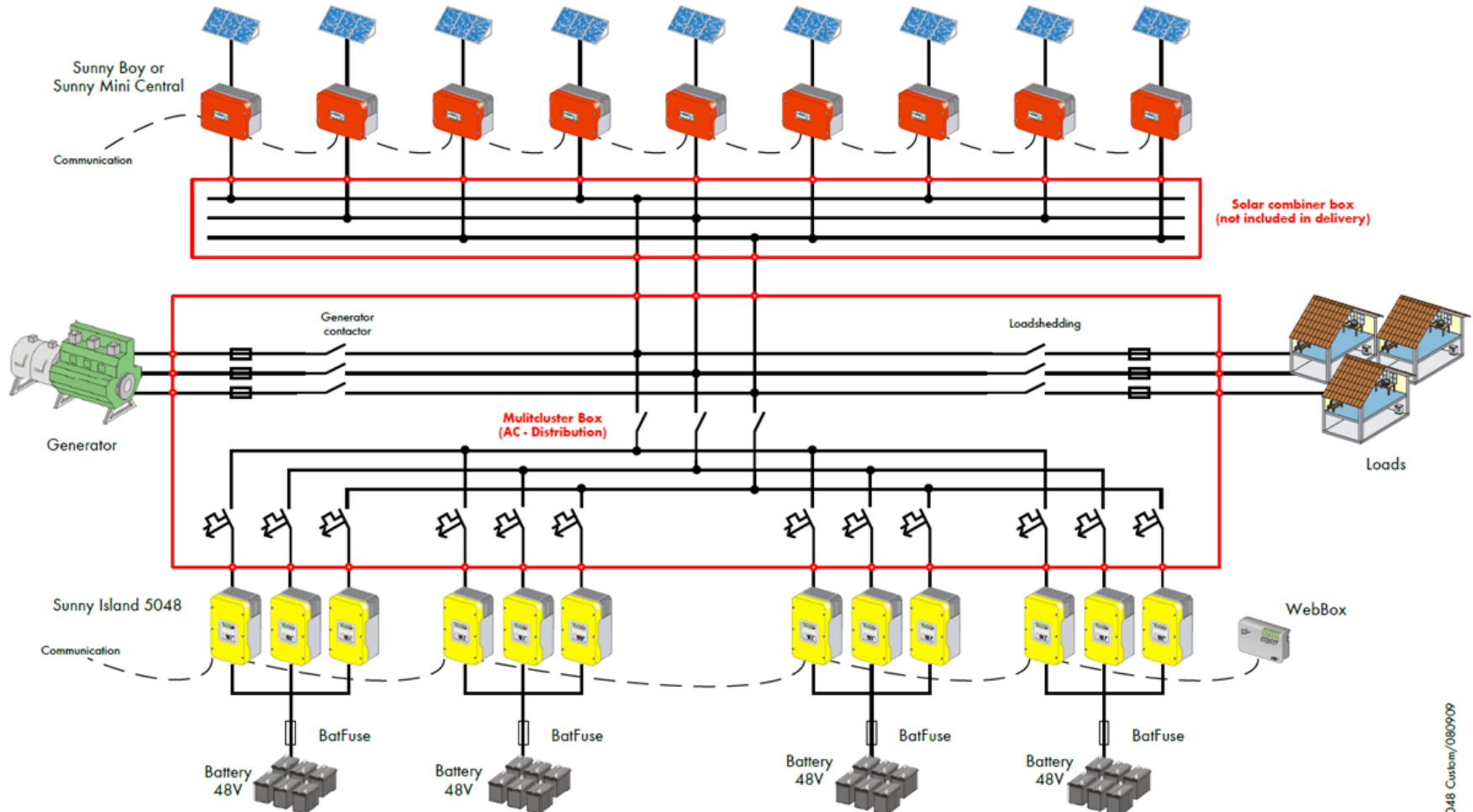
MC-Box 36 for 5, 6, 7, 8 ...

... 9, 10, 11 or 12 clusters



- > Pre-configured AC distribution
- > Easy connection of all AC components
- > Between two and twelve clusters
- > Each made up of three Sunny Island inverters and one Battery

WHAT IS MULTICLUSTER-TECHNOLOGY?

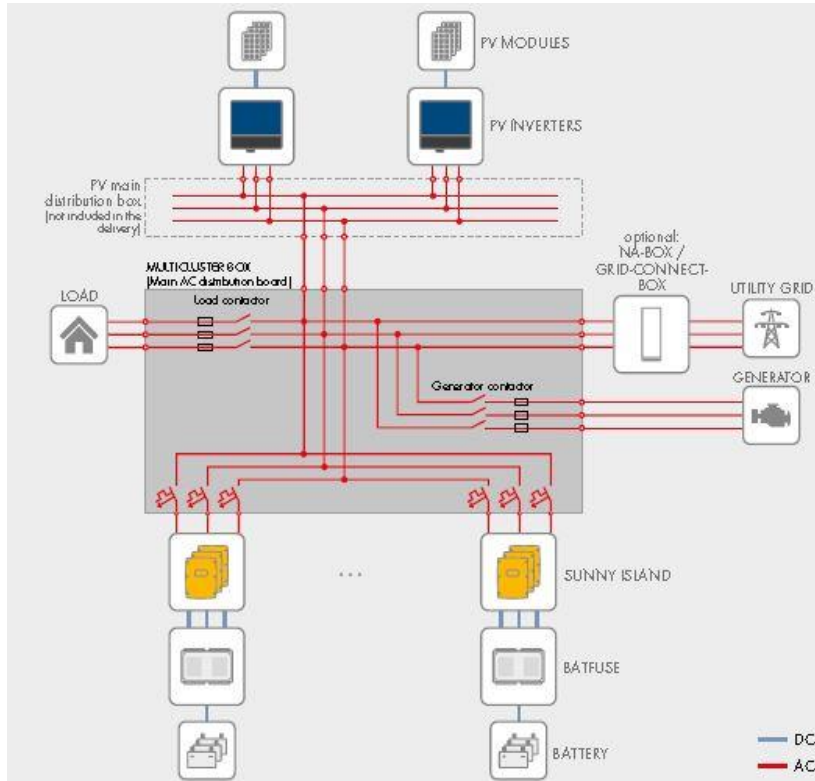


> Only for Off-Grid applications

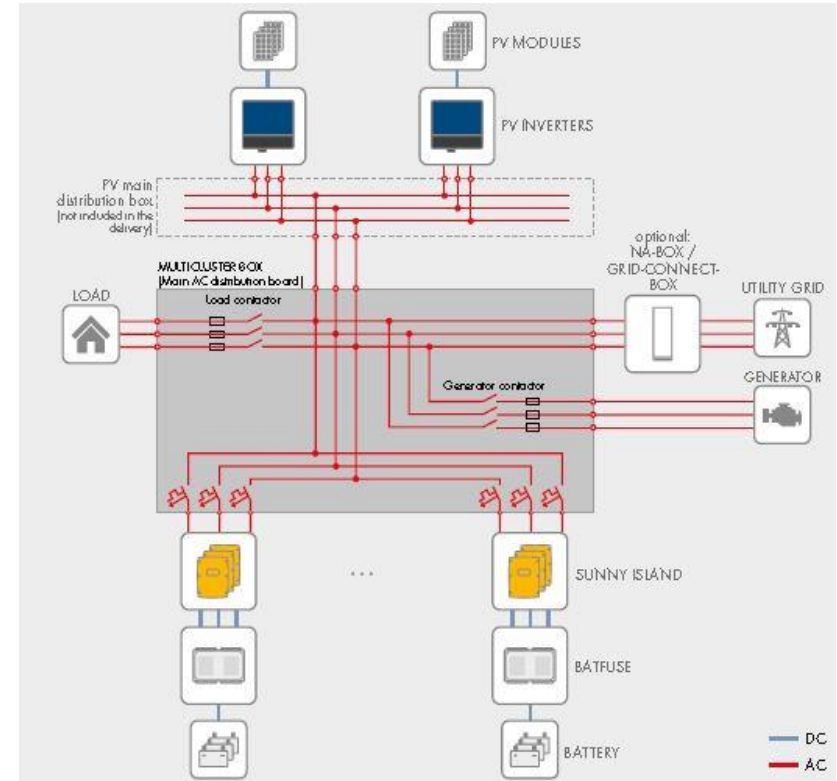
MC-BOX-12.3 & GRID-BOX-12.3-20



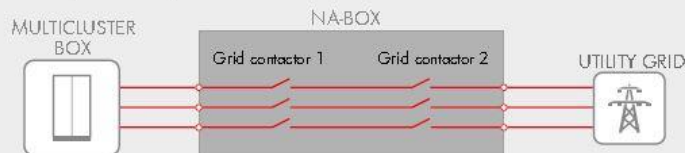
MC-BOX-12.3 & NA-BOX-12.3-20



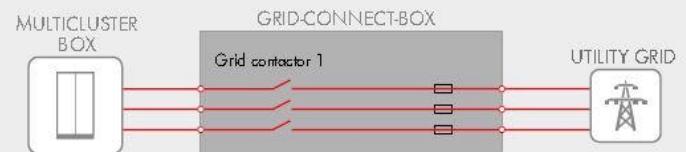
MC-BOX-12.3 & Grid-BOX-12.3-20



CONNECTION OF NA-BOX (OPTIONAL)



CONNECTION OF GRID-CONNECT-BOX (OPTIONAL)



> **New: Retrofittable with optional NA- or GRID-BOX for On-Grid applications**

NEW MULTICLUSTER TECHNOLOGY 2.0



Multicluster System 12



Technical Data

AC Power (Load, Gen)	138 kW
PV-Power	138 kW (DE 100 kW)
AC Voltage	230 V / 400 V
Weight	200 kg + 100 kg
Grid	TN + TT

A new box for new application areas

- > To remind: The old Multicluster Boxes 6/12/36 are not allowed to be connected to the public grid
- > The new Multicluster-Box (MC-BOX-12.3-20) replaces the old Multicluster-Box 12.3 for Off-Grid applications
- > New: The new Multicluster-Box can be extended with either the NA- or GRID-BOX for On-Grid applications.

Main Benefits

- > Flexible for Off-, On-Grid and Backup systems
- > Easy to install AC-Distribution
- > Fullfills the German AR-N 4105

> **Available End of August 2015**

NEW MULTICLUSTER-TECHNOLOGY 2.0 NOW FOR ON-GRID AS WELL



Multiclustert System 12 consists of:

MC-BOX-12.3-20

Application:

- > Worldwide for 3-phase Off-Grid Systems with 230 / 400 V
- > Sunny Island 6.0H / 8.0H (Firmware > 3.5)

Benefits:

- > 16 % more Power
- > TN- and TT-Grid
- > Extended temperature range
- > Better and easier service during device exchange

NA-BOX-12.3-20

Application:

- > Supplements the Multiclustert-Box due to grid connection
- > For self-consumption and Backup systems

Benefits:

- > Integrated grid and plant protection
- > Integrated, redundant, all-pole grid-contactors
- > Fulfills VDE-AR-N 4105

Grid-BOX-12.3

Application:

- > Supplements the Multiclustert-Box due to grid connection
- > For self-consumption and Backup systems

Benefits:

- > Integrated grid fuse
- > Integrated all-pole or one-pole grid disconnection
- > Robust due to extended temperature range

> **Worldwide, flexible for On- and Off-Grid Applications**

TARGET MARKETS FOR OFF-GRID CUSTOMERS

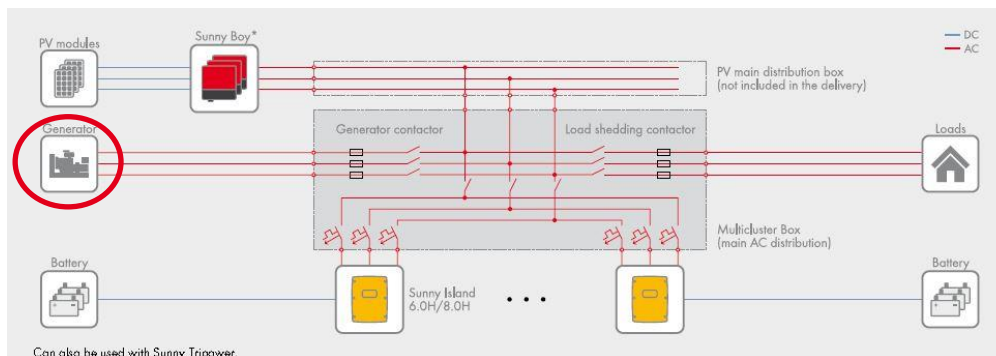


Target Markets

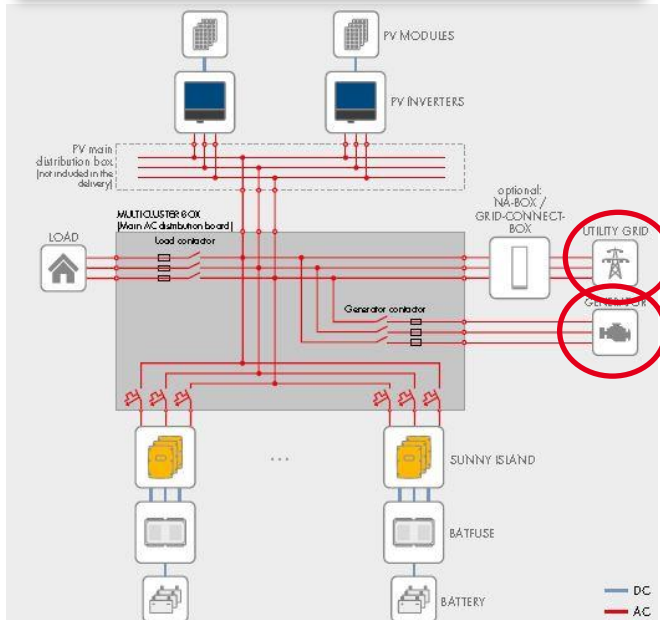
- > Worldwide
(exc. US, JP: no certificate UL & Jet)

Target Applications

- > Rural electrification
- > Village power supply



TARGET MARKETS FOR BAD-GRID CUSTOMERS



Target Markets

- > Worldwide
(exc. US, JP: no certificate UL & Jet)
- > Diesel and grid available
- > Bad grids (several hours without electricity per day)

Target Applications

- > Village power supply
- > Office buildings
- > Hotels
- > Agriculture
- > Supermarkets

TARGET MARKETS FOR ON-GRID CUSTOMERS

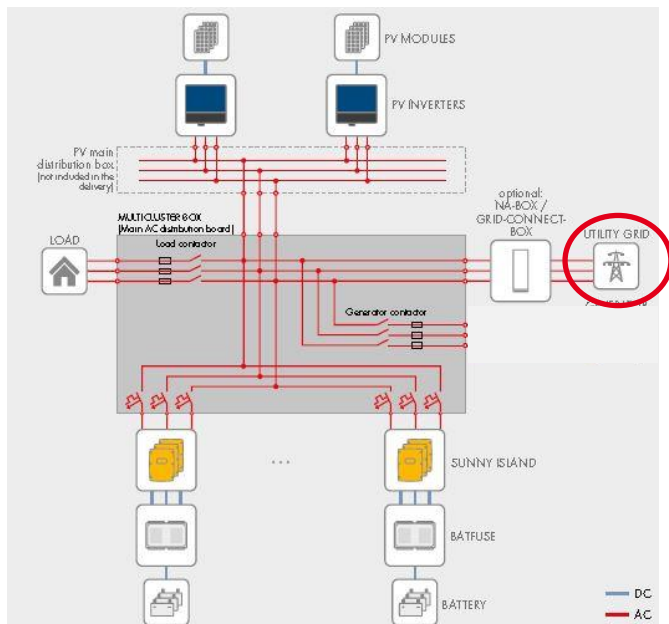


Target Markets

- > Worldwide
(exc. US, JP: no certificate UL & Jet)

Target Applications

- > Commercial, self-consumption and backup
- > Office buildings
- > Hotels
- > Agriculture
- > Supermarkets



EXPANDING SYSTEMS SIZES: MINI GRID ON THE ISLE OF EIGG



> Harboring around 100 residents

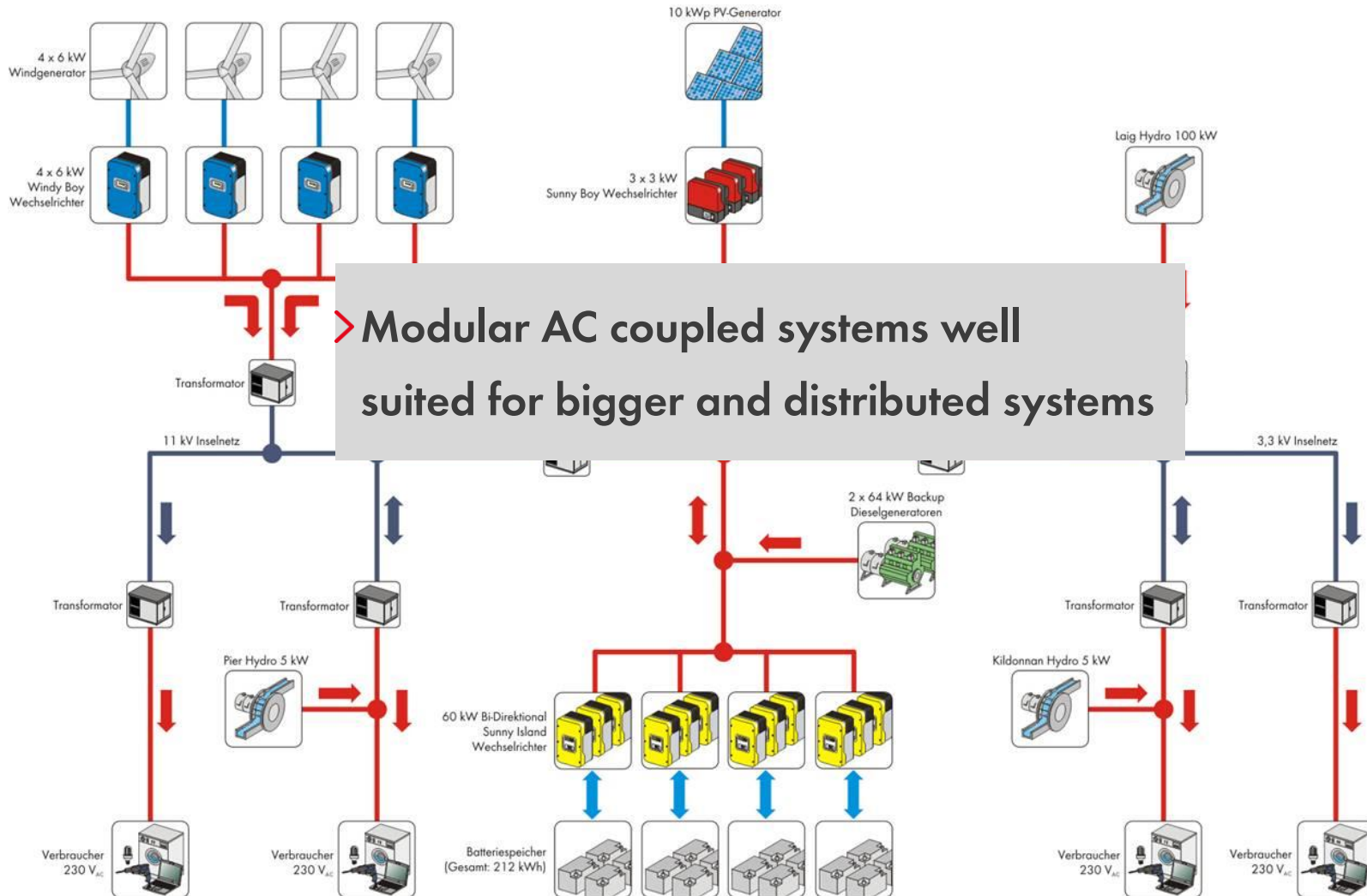
Multiple power sources

- > Hydro (110 kW)
- > Wind (24 kW)
- > Solar (32 kWp)
- > Diesel generator (2 x 64 kW)
- > These power sources are distributed and coupled by a medium voltage grid over several kilometers



> **Implemented grid functionalities like FSPC are applicable even for distributed systems**

DISTRIBUTED GRIDS: PROVIDING ENERGY ALL OVER EIGG ISLAND



MODULAR SYSTEM TECHNOLOGY: THE SOLUTION FOR LARGE SCALE SYSTEMS IN REAO



- > First systems installed in French Polynesia,
1.000 miles away from Tahiti
 → Transport of Diesel fuel !!
- > Harboring around 250 people
- > Battery: 1440 kWh
- > 120 kWp PV and 100 kVA backup diesel generator
- > System runs automatically



> **Sunny Island as a standard battery inverter enables modular systems up to 300 kW**

ONE OF THE WORLD'S LARGEST MODULAR OFF-GRID SOLAR SYSTEM IN MOZAMBIQUE



- > 5,400 PV modules
- > 159 Sunny Island battery inverters
- > 120 Sunny Mini Central PV inverters
- > Loads: streetlights, schools, public offices and private homes
- > 3 Systems with MC-BOX 36

> **In total 1,3 MW PV**



MORXDORF - THE FIRST ON-GRID APPLICATION



Company: TESVOLT

2 Cluster (6 Sunny Island 6.0)

- > Multiclust-Box12
- > NA-BOX 12

4 x STP 17000

2 x STP 15000

98 kVA PV

Battery: 2 x 96 kWh

> **For On-Grid Self-Consumption
and Backup**



MULTICLUSTER TECHNOLOGY ON-GRID



Application:

- > Loads: Refrigerating storage house
- > Self-consumption, Backup
- > Running self-sufficient in Backup-mode at TESVOLT booth



TESVOLT: Booth B1.534

SMA: Booth B2.210



SMA OFF- & ON-GRID HYBRID SYSTEMS WORLD WIDE

