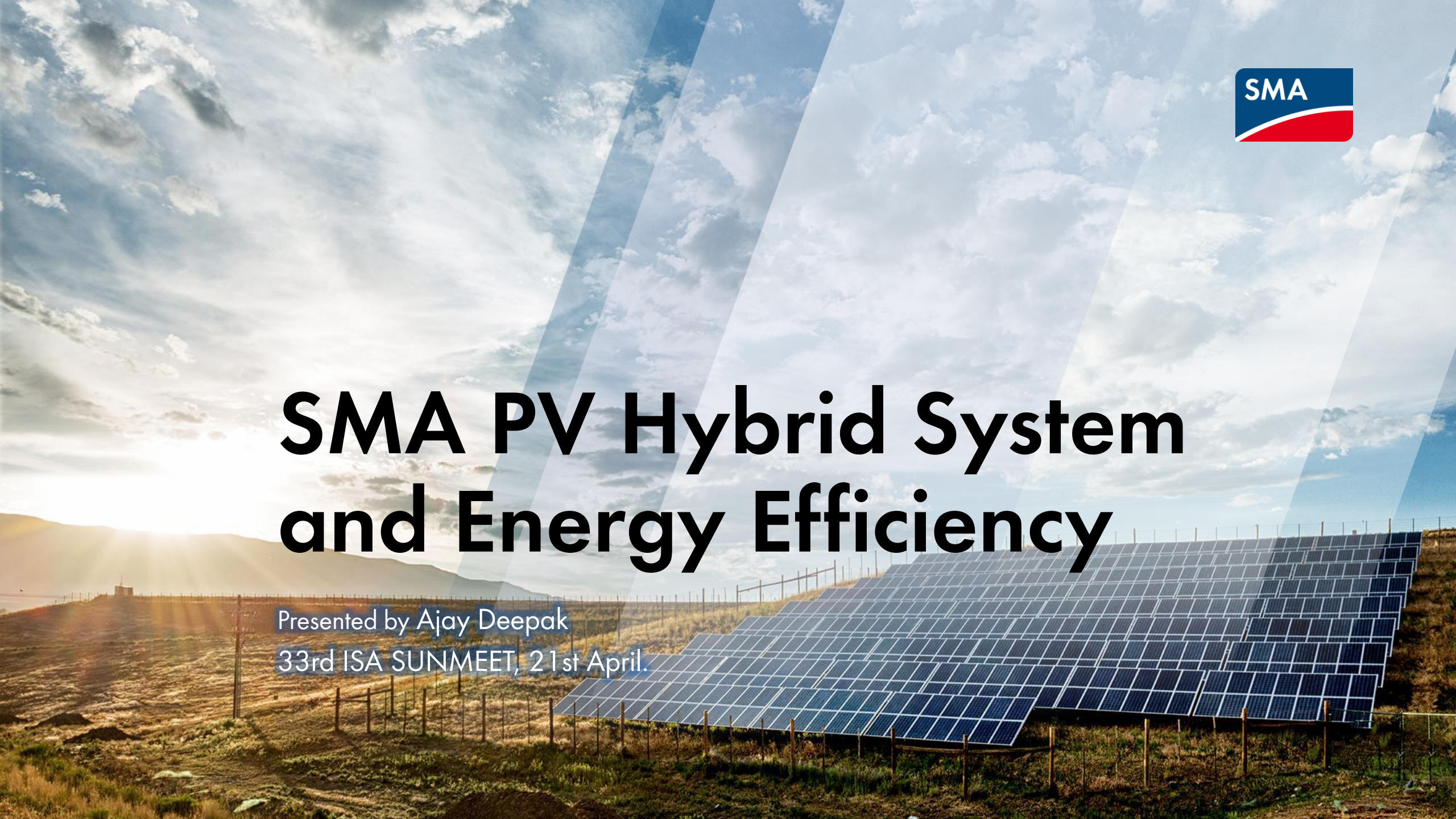

SMA PV Hybrid System and Energy Efficiency

Presented by Ajay Deepak

33rd ISA SUNMEET, 21st April.

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SMA IS THE GLOBAL MARKET LEADER

- Headquartered in Germany, established in 1981
- > 100 GW in more than 190 countries worldwide
- First company with >3GW of storage
- More than 3,000 SMA employees in 18 countries, more than 650 sales and service teams
- More than 1500 patents, 500 R&D personnel, high proportion of technological innovation
- Annual SMA production capacity: 15 GW (in Germany)
- Since 2008, listed on the Prime Standard of the Frankfurt Stock Exchange (S92) and is listed in the SDAX index

How to achieve Energy Efficiency in Hybrid projects?

100% Renewable integration in Hybrid system

>> Grid + DG + PV + Battery

Type of DG Hybrid Projects

Category 1:

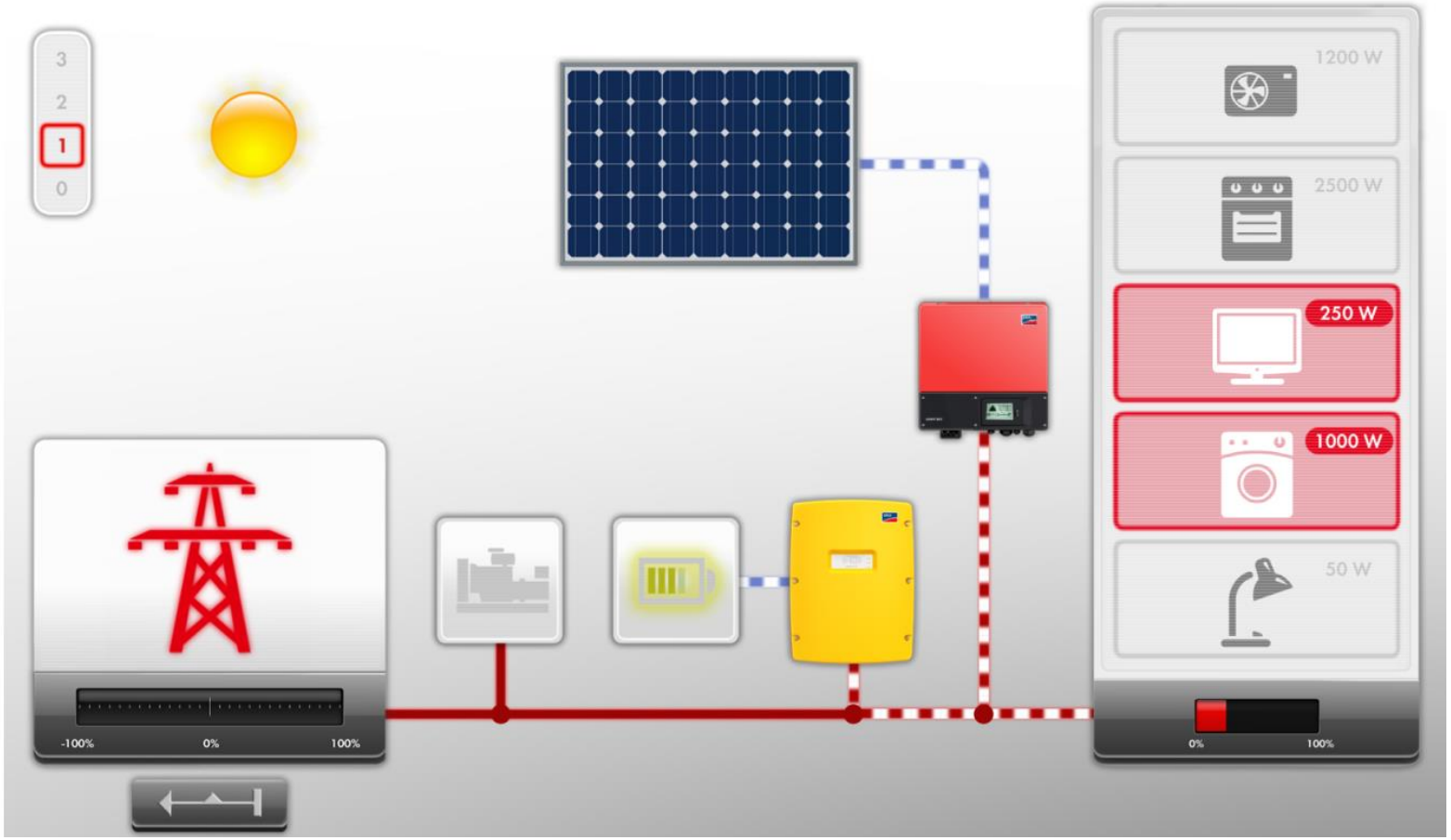
Large Residential and Commercial (Hotel, Resorts,..)

Category 2:

Industrial and Island Electrification (Remote areas,..)

>> Energy Management concept for both systems remain almost same.

Category 1: Large Residential and Small commercial



Coupled to the public grid:

The loads are supplied first by PV-energy, then from the grid and then by the batteries.

https://www.sma.de/fileadmin/content/global/specials/sunbelt/exponat/index.html

Reference site “Lady Elliot Island“ (Australia)

- **Power supply of Eco Resort**
- System power 50 kW
- PV-power 20 kWp
- Battery capacity 288 kWh

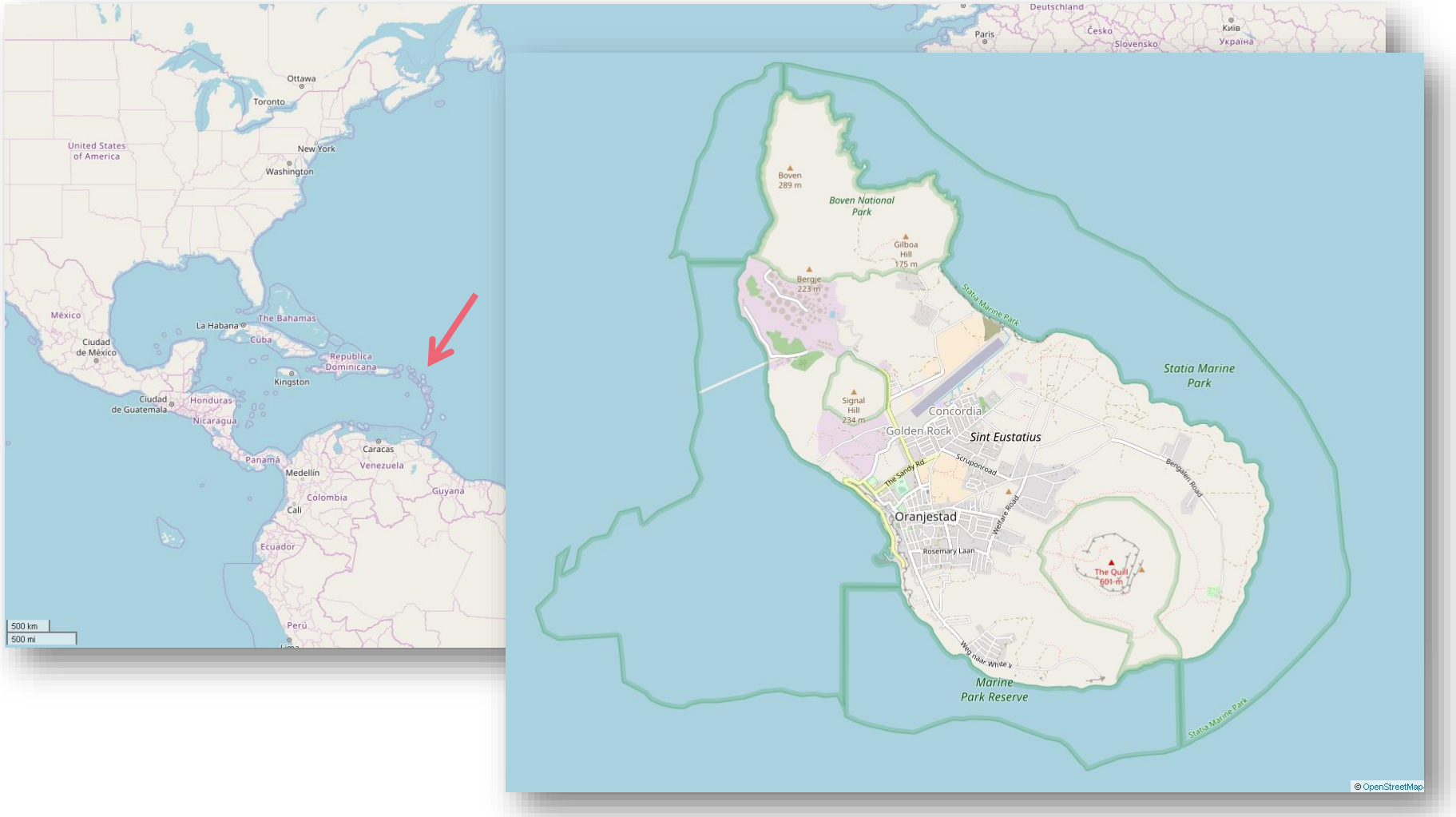
Reference site “Reao Island“ (French Polynesia)

- **Island Electrification**
- System power 220 kW
- PV-power 140 kWp
- Battery capacity 1728 kWh

Reference site “Long Bedian” (Malaysia)

- **Village electrification**
- System power 220 kW
- PV-Power 198 kWp
- Battery capacity 975 kWh

Category 2: Actual Project: St. Eustatius Phase 1+2



› **Special municipality in the Netherlands, 21 km², Approximately. 4000 Residents**

Actual Project: St. Eustatius Phase 1+2

Today, solar energy covers 46% of St. Eustatius' total electricity need. Grid Forming SCS 2200 inverters allow to operate the island grid for 10.5 hours in Diesel Off-Mode operation with 100% Solar Power Fraction. In total a 5.9MWh Li-Ion storage facility has been integrated for energy shifting and grid services. Thanks to the SMA Fuel Solution about 4,560 tons CO2 per year can be saved.

Project "St. Eustatius Phase 1+2"

- Location: St. Eustatius, Caribbean
- Commissioning: November 2017
- Requirements: Grid Forming Inverter, overall power and energy management system

Plant information

- **Installed PV power:** **4.15 MWp**
- **Installed Storage capacity:** **5.9 MWh**
- **Annual diesel savings** **1,700,000L**
- **Island Load:** **~2MW**

System Technology

- Battery: **2 x SCS 2200 Grid Forming** in 2 x MVPS 2200 and 1xSCS 1000 in MVPS 1000
- Control: **FSC 2.0 with Automatic Genset Shutdown (PPM)**

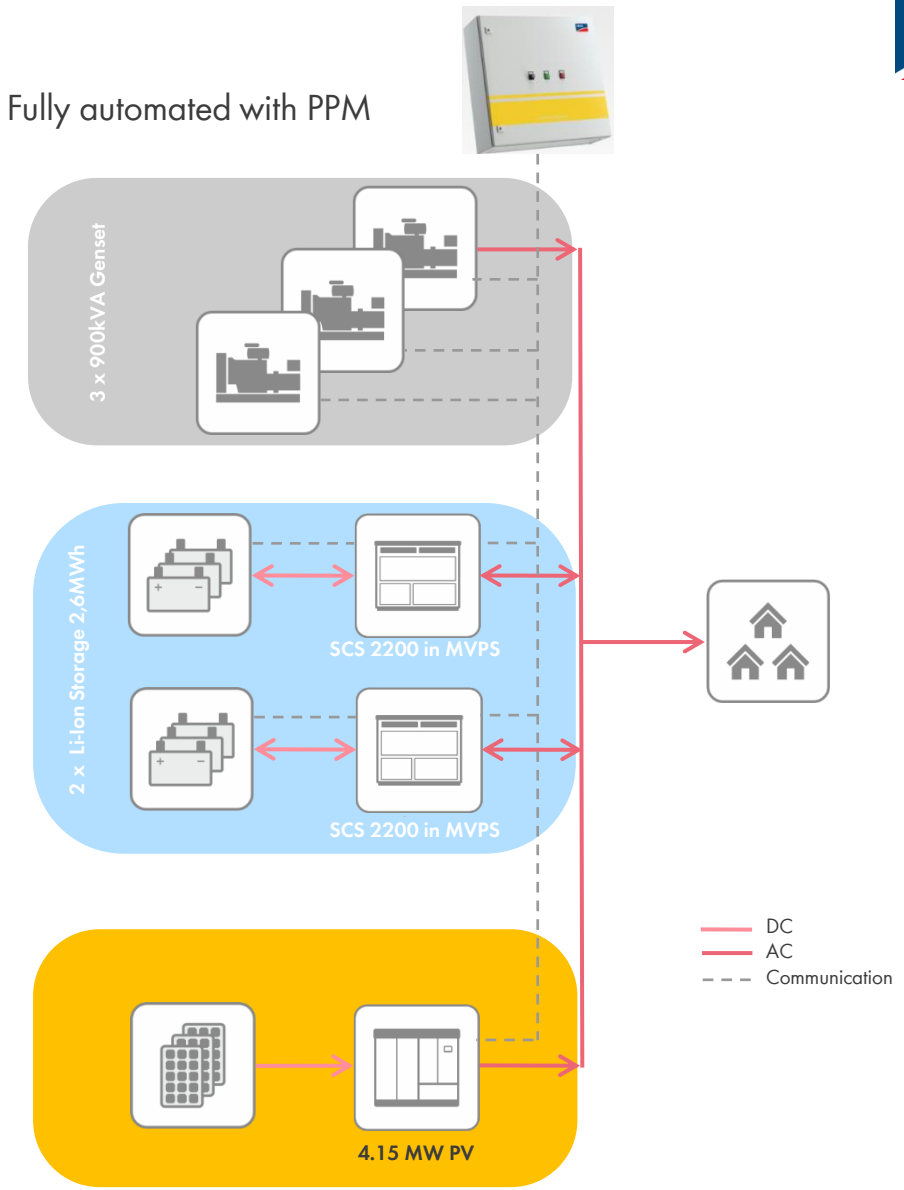
SMA system solutions for hybrid applications

How it works ? - Technical Overview

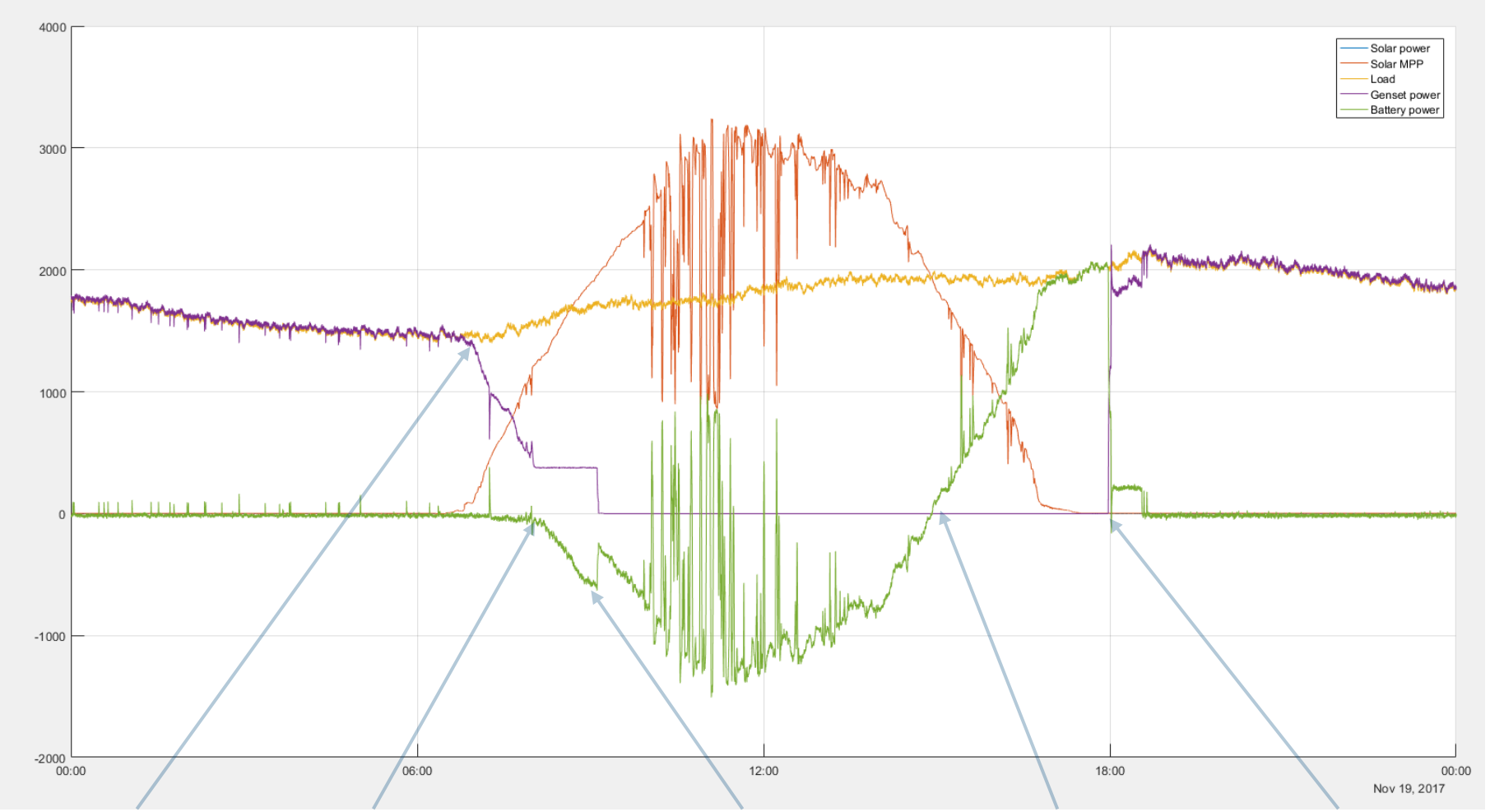
Day operation without Diesel Generators
Full redundancy for generator operation
→ UPS in Diesel-On-Mode

- **Voltage & Frequency Control**
- Spinning Reserve Provision
- Synchronisation Diesel On-Mode
- Diesel Off-Mode

St. Eustatius II	
Estimated fuel savings	1 728 000 liters/a
Solar Energy Produced (net)	6,4 GWh /a
CO2 savings	4,561 ton CO^2/a
Used PV energy	6 494 547 kWh
Solar energy fraction	46%



How it works ? – Day Overview



PV on sunrise begins reducing fuel consumption

Genset at minimum load. Battery begins to charge

Battery energy sufficient for some minutes of genset-off
➔ Automatic transition to genset-off

Solar output drops – battery covers missing energy

Battery depleted ➔ Automatic transition to genset-on

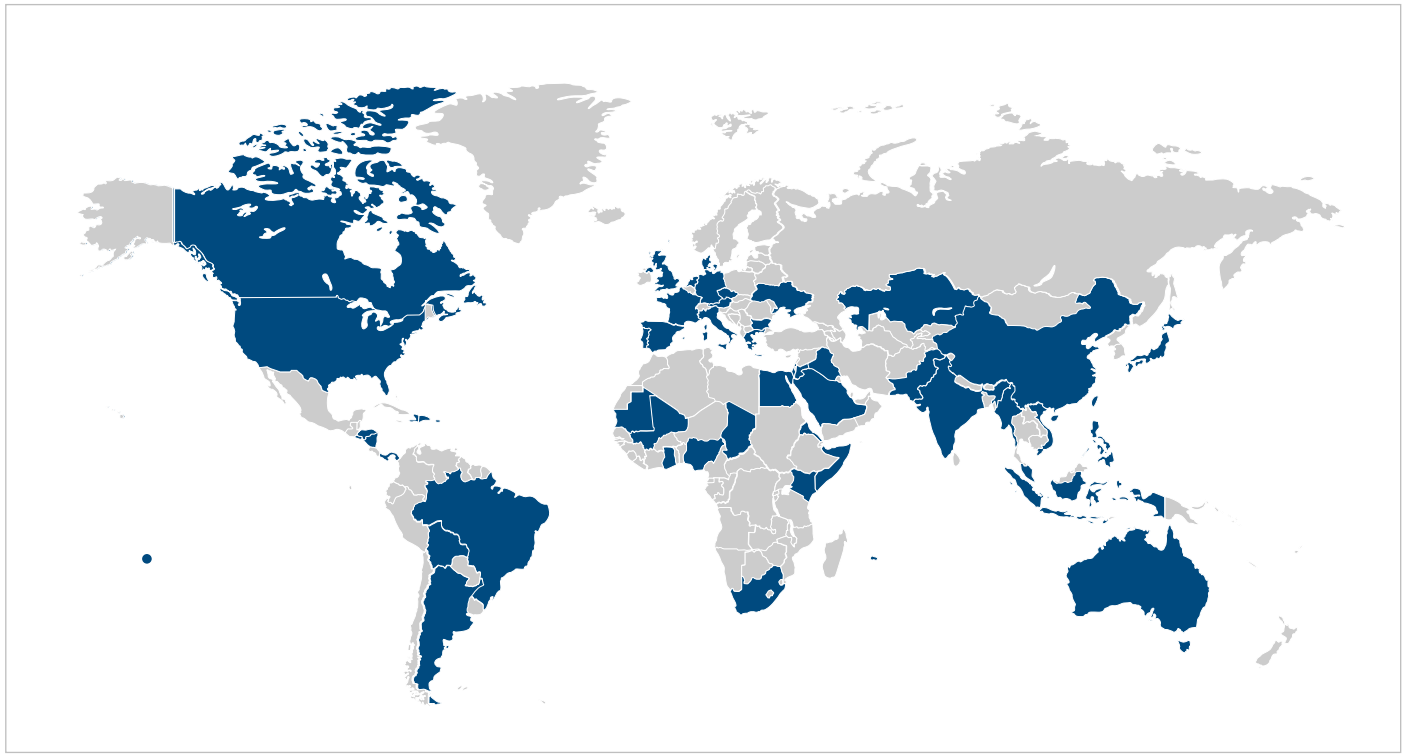
Installed SMA plant control solutions

Worldwide installations[1]

Over 300 plants with more than **5 GW**

Applications

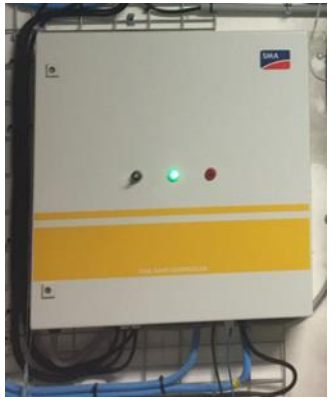
- Central / String inverters
- On-grid and Off-grid
- Microgrids
- PV-diesel (-storage) systems
- Storage systems



1. Power Plant Controller, Fuel Save Controller and Hybrid Controller

HYBRID ENERGY SUPPLY – HAITI, 2016
HÔPITAL UNIVERSITAIRE DE MIREBALAIS

CREF AWARDS 2018
NEWENERGYEVENTS



The Mirebalais University Hospital is a 300-bed teaching hospital that provides primary care services to about 185,000 people. Clinicians see more than 700 patients per day. Build Health International designs, builds, and equips high-quality, sustainable health-care facilities in impoverished regions of the world.
Reducing the costs for the electrical consumption by approx. 30 % using the SMA Fuel Save Controller controlling the 509,5 kWp system give room for further needed expansion of the hospital.

Project

- Location: Mirebalais, Haiti
- Commissioning: November 2016
- EPC: Build Health International, SMA Sunbelt
- Operator: Build Health International

Build Health International

Partners In Health

Plant information

- Installed PV power: 509,5 kWp
- Diesel generator rating: 1,900 kW
- Annual Diesel Savings: approx. 25.000 liters

System Technology

- 20 x Sunny Tripower 20000TL-30
- 1 x SMA Fuel Controller
- 2 x CAT C27 gensets, 1 x CAT C9 genset
- 2 x Solon Blue XT 280 PV modules

Thank you.

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