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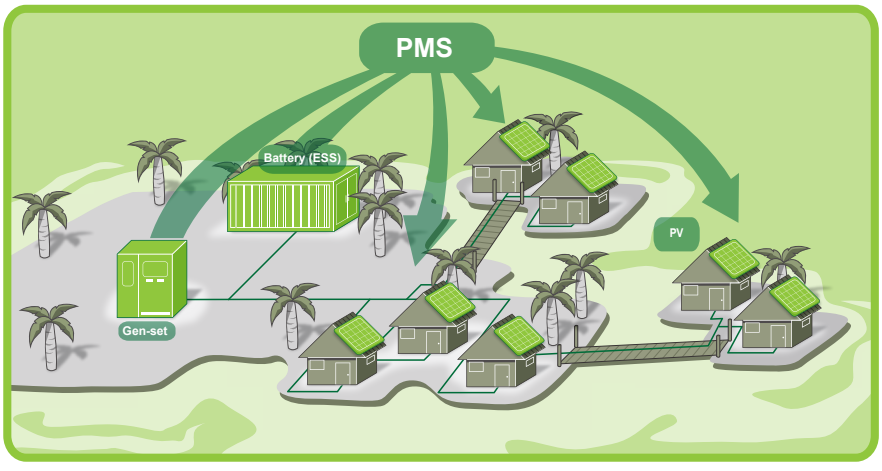
Case study
Smart Microgrid project - Maldive

Project Summary

Location: Gasfinolhu Island, Maldive
Customer: T&D (EPC)
Commissioning: October, 2014
Application: Smart Microgrid, Power Management System and Energy Storage
Grid components:
- 1 MWp photovoltaic plant installed on roofs of the resort
- No.4 diesel generators - Total of 2.6 MW
- 1.5 MWh energy storage system with 800 kVA Active Front End (AFE) AC/DC converter

Load Peak Demand: 600 kW unbalanced
Power Management System:
- ARTICS Smart Energy



Control system - Technical features

- System protection
- Charging management and adjustment
- Management and adjustment of discharge
- Control, monitoring and diagnostic of PCS's conversion cabins
- Software for monitoring and event recording

ARTICS Smart Energy is a flexible, high-performance platform that provides the control functions and monitoring tools to manage and optimize energy production from distributed generators and energy consumption from internal loads.

A fundamental function of the microgrid control is to ensure the stability of the electric network, but an equally important goal is to reduce energy consumption and promote the local generation of energy, particularly from renewable energy sources such as small-scale wind and solar.

In this critical application, the primary focus was on maximizing energy from the installed solar capacity, while maintaining grid stability and full electric functionality at this luxury resort.

Project description – Operating principle

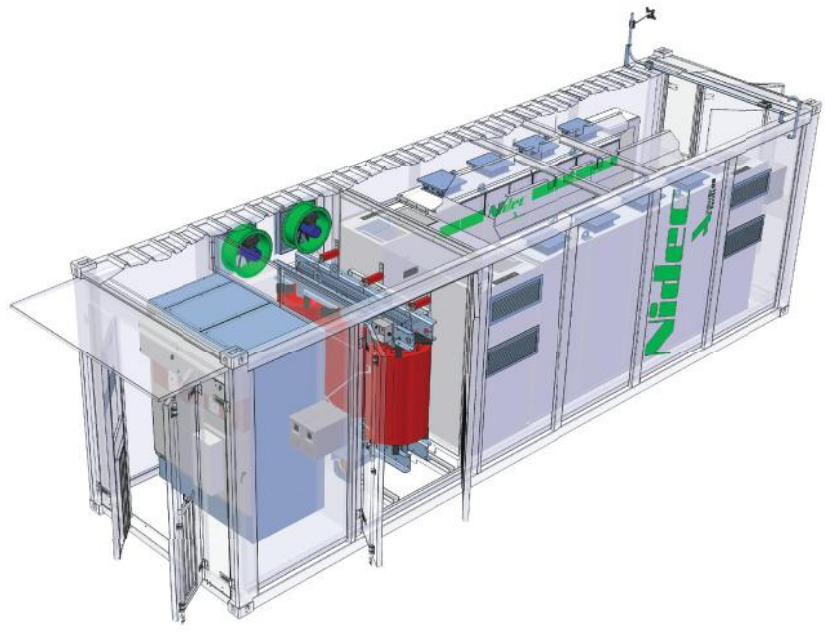
The micro grid relies on four diesel generators (2.6 megawatts in total) to start energy production. Once the grid reaches 240V/50Hz, the Energy Storage System (ESS) and loads are connected to the grid and ARTICS Smart Energy takes over to manage the overall system.

The diesel generators will be used for emergency mode in case of sudden outage. During normal operation loads are supplied by the micro grid and energy storage system.

Total energy produced by the photovoltaic modules installed on the bungalow rooftops and resort buildings are sufficient for the total energy demand - ARTICS Smart Energy controls the balance of energy and communicates to the PV system and the ESS how to manage the energy each produces:

- In case there is a lack in energy production, the Energy Storage System works as a generator, supplying the necessary energy to the loads, discharging the batteries.
- In case of excess energy production, the Energy Storage System works as a load which uses the excess energy produced by the PV system to charge the batteries.

Power Conversion System Converter technical data		
	Grid Side (AC voltage)	Battery Side (DC voltage)
Voltage	400 Vac	450 ~ 700 Vdc
Power	800 kVA	600 kW
Max Current	1156 Aac	1200Adc
Cooling system	Water cooled	



Scope of Supply

- Complete micro grid electrical design and load evaluation
- Qty.1 Power Management System (PMS) - ARTICS Smart Energy
- Qty.1 LV Board
- Qty.1 Water-cooled containerized Power Conversion System (PCS), consisting of:
  - 1 PCS Converter, composed by two parallel cabins
  - 1 PCS Controller

Advanced control & simplified monitoring