EUROPEAN DEFENCE AGENCY

Fact sheet

www.eda.europa.eu

Smart Energy Camp Technical Demonstrator

Introduction

Between October 2015 and March 2016, a Smart Energy Camp Technical Demonstrator project was run by the European Defence Agency (EDA) at the European Union Training Mission (EUTM) to Mali.[1]

The purpose of the project was to test an intelligent power management system in a military environment.

Description of the project

The objectives of the twelve week project were to:

- Test the efficiency of various types of photovoltaic panels in specific climatic conditions;
- Test the integration of renewables with battery storage in a deployed scenario;
- Test demand management technology and its impact, if any, on inhabitants;
- Raise awareness of energy efficiency and renewable energy as a military capability;
- Encourage energy efficient behaviour among staff;
- Collect reliable data for analysis and sharing with other Member States and further work;
- Collect data to develop benchmarks for planning support tools for Common Security and Defence Policy operations.

Methodology and equipment installed

The elements installed included fixed solar photovoltaic panels on the test building (16KWp), 36.5kWh of energy storage, flexible soldier portable solar photovoltaic panels, and monitoring and metering equipment for water and electricity.

Table 1 shows the whole site power requirements in comparison to the smart system installed for the project in building 55.

System Scaling

The demonstration building was part of a much larger site, summarised in Table 1.

	Building 55	Whole Site
Peak Power Demand	31kW	400kW
Generator	Camp grid	1.5MVA
Microgrid and Energy Storage	1 Module (18kW) 36.5kWh batteries, run 50-90% state of charge	No Energy Storage
Demand Management	Metering throughout building, demand management routines controlling air-conditioning units and water heating	No site wide power management
Renewables	16kW peak solar	None
Demonstration Duration	20 weeks	

Table 1 – Summary of demonstration site power needs and SEC system size.

The system was monitoring and managed using a combination of an on-site team and from a remote monitoring facility.

[1] Smart Energy Camps Technical Demonstrator: EUTM Mali, 2016, EDA Report.

Results

The systems were integrated into the existing camp power architecture with minimal network reconfiguration.

The project demonstrated the concepts of Generator Management, Energy Storage, Demand Management and Renewable Power Integration. Both the management layer which coordinated the system, and the remote monitoring and control capability were also successfully demonstrated.

Although the equipment was operating in high ambient temperatures, there was no de-rating of micro-grid inverters observed and no measurable effect on the batteries used for storage.

Each of the elements demonstrated provided benefits in their own right and, when combined, support each other to provide greater building and base resilience.

Although demonstrated on a single building within the camp, all elements are scalable and can be deployed on a larger scale both for fixed and temporary infrastructure.

Specific results obtained from this project were:

- ***Rigid PV system*** on the roof supplied around ***80%*** of the building's peak load (middle of the day).
- ***The air conditioning*** load within the building demanded around ***73%*** of the total power requirement.
    - ***Demand Management*** used to reduce the average instantaneous demand through cycling each unit on/off.
    - Raising the building set point temperature from 20ºC to 24ºC meant systems could hold this temperature to within ±0.5ºC and provide a ***reduced energy demand of up to 50%***.
    - ***Centralised control*** of such large loads was recommended should a whole site installation be conducted.
- ***Monitoring***: lighting approximately ***11%*** and water heating approximately ***9%*** of the building load.
- ***Small portable PV*** systems tested achieved close to ***70%*** of rated output.
- ***Energy storage***: it was identified that a more cost effective option for future implementation would be to provide localised systems across the site coupled with PV.

Applicability to Defence Sector

The overall benefit of such systems are that they allow critical assets to remain operational whilst allowing other less critical items to remain powerless without requiring two distribution networks.

Although the project was conducted in a deployed scenario on a single building, the technologies used and results gained are equally applicable to defence infrastructure in at home scenarios.

This could include large military installations and those operating in more remote locations.

Scope for further work

The technology demonstrated focused purely on energy, although other environmental technologies could be explored for use in an integrated fashion including water management and further associated resource efficiency gains, and waste management technologies including waste to energy conversion.

Similarly, heat scavenging could be implemented for the generators but the heat utilisation would then likely require the installation of a hot water network.

Latest update: 23.10.2017