EUROPEAN DEFENCE AGENCY

Fact sheet

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Solar Photovoltaic Power Generation

Irish DF Transport Workshops with Solar PV

Need / Problem to be Solved

Military forces are dependent on a robust supply of energy in order to carry out their mission. In a hostile and unpredictable environment this can result in considerable operational risks being taken in order to ensure the security of supply.

Using Solar PV to provide electrical energy generation from renewable sources in a military environment can reduce both the risk to military personnel and the logistic burden for commanders. It may also have considerable financial benefits for the defence budget.

Description

Utilising Solar PV technology to provide power generation in a military environment in conjunction with, or instead of, fossil fuel power generation. This could form a part of an overall smart energy grid system combining RES technology with demand management and energy storage. This would maximise the utilisation of RES energy while at the same time minimising demand.

Applicability to the Defence Sector

Solar PV electricity generation could be used in a variety of military environments both at home and abroad such as:

- Temporary military camps either as part of an early entry force or as part of a main force semi-permanent camp.
- Critical infrastructure within deployed camps such as operations centres or medical facilities.
- Isolated military posts such as platoon positions or remote forward positions. These positions may be beyond the reach of wheeled logistical vehicles or subject to infrequent resupply.
- Providing energy resilience in an unpredictable or hostile environment. The changing nature of operations in theatre may preclude or interrupt resupply. Onsite energy generation can mitigate or negate the dependency on outside logistic support..

Benefits to the Defence Sector

- Reducing logistics requirement. Reducing fossil fuel demand results in fewer resupply convoys reducing the operational risks of a deployment.
- Reducing the carbon footprint of the defence sector.
- Reducing noise and IR radiation due to fossil fuel generators.
- Improving energy resilience of the overall mission. RES provides an energy source that is largely independent of outside influence..

Challenges

There are a number of challenges that need to be overcome in order for military forces to engage in the large scale utilisation of Solar PV.

- ***Physical robustness of technology***: Equipment must be both 'soldier proof' and 'plug and play' where possible. The operational requirements of the deploying force will dictate the permitted levels of ancillary equipment and its installation. An initial entry or early entry force will require a much simpler system than a follow-on larger deployment.
- ***Power output meeting demand***: The proof of Solar PV in a deployed environment is its ability to reduce dependency on fossil fuels. It must do so while

maintaining a practical physical footprint within a camp.

- ***Prioritising output to critical infrastructure:*** Utilising RES within a smart grid and energy storage system to ensure that critical infrastructure can be operated independently of conventional logistics supply.
- ***Decreased performance in high temperature environments***: Above 25º C performance of Solar PV cells decreases. Benchmarking outputs in different climatic conditions is required to allow commanders to make more informed decisions.
- ***Reducing up-front costs***: The highest cost of Solar PV is the initial installation. This may make it cost prohibitive in temporary camps.
- ***Creating a culture of energy efficiency:*** Demand management will maximise the suitability of RES technology in the military environment.

Examples

Existing equipment proven in the field:

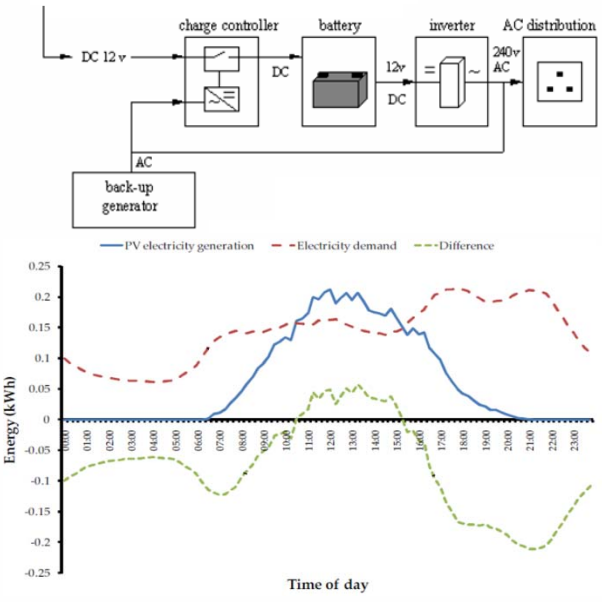
- The ***Smart Energy Camp Demonstrator*** deployed by the EDA at the EU Training Mission (EUTM) camp at Koulikoro, Mali (BAE Systems);
- Irish DF PSO deployment exercise.

Scope for Further Work

- Demonstrate the output of the system in different climactic conditions. The smart Energy Camps demonstrator which was deployed in Mali generated data which could be used to benchmark Solar PV outputs in that climate. Installing in other climates could provide output data which commanders could use when planning deployments.
- Solar PV in a Hybrid generation system. Installing as part of a smart grid system utilising both RES and fossil fuel generation combined with smart technology would maximise the outputs of Solar PV system. The applicability of this system to large scale, camp wide energy generation would require full scale testing.

Descriptive Figures / Drawings

Solar PV on Irish DF Deployed Kitchen Unit



Demand and PV output over one day

Latest update: 23.10.2017