ANALYSIS OF PHOTOVOLTAIC SYSTEMS OPERATING AT MCAST CAMPUS, MALTA

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INTRODUCTION

Photovoltaics (PV) market is growing at a fast rate and PV systems are in need to be monitored for performance. Monitoring of PV systems is important to understand the system's sustained operation and to be able to understand and detect faults caused through the PV system operation as early as possible. Field performance analysis has been done analysing the seasonal behaviour [1], different PV technologies [2], different orientations [3]. However little is published on Maltese PV systems performance.

OBJECTIVES

I. To review methodologies used for renewable energy sources
II. To develop a framework for data analysis of existing solar energy systems
III. To analyse the data and performance related parameters

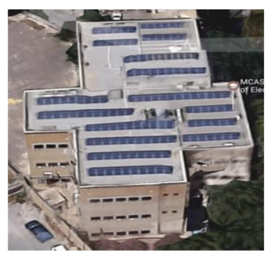
METHODOLOGY

Figure 1 shows three Campus building blocks with PV systems general configurations for data collection and analysis. Currently MCAST campus has over 200kWp PV systems. Each PV building system is configured through a number of small PV inverters.

Figure 2 shows the methodology approach of data collection, sorting, filtering and analysis. A detailed data analysis is done through a developed programme in addition to the standard PV systems manufacturer graphical user interface.

Block C
- 9 inverters of 3kWp SSB3000 TL-20.
- 111 solar panels of 220Wp .

Block AUTO
- 6 inverters of 3kWp SB 3000TL-20
- 9 inverters of 7kWp SMC 7000TL.
- 348 solar panels of 220Wp .



Block D(IEEE)
- 6 inverters of 3kWp SMA SB5000TL-20.
- 132 solar panels of 220Wp .

Figure 1: MCAST Campus PV systems (selection)

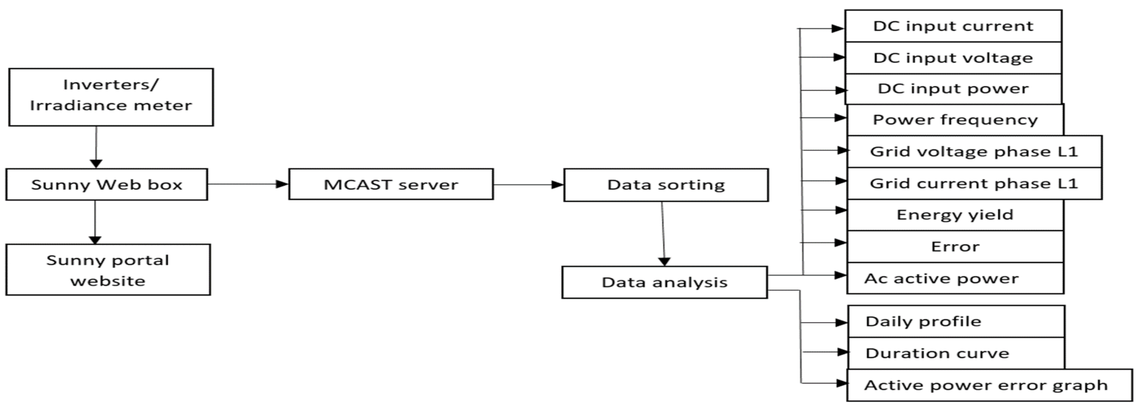


Figure 2: Framework for PV Living Laboratory data collection and analysis

RESULTS

Daily and monthly profiles have started being collected and analysed regularly for most of the Campus buildings since 2016. An example of a monthly profile, in Figure 3, exhibits possible data or communication loss and low performance days. Meanwhile, Figure 4 shows the PV DC current input daily profile where shadowing issues has been noticed on a number of inverters. The late start and early ending in the generation current profiles result in low performance and indicates clearly mitigation procedures to be adopted on system installation.

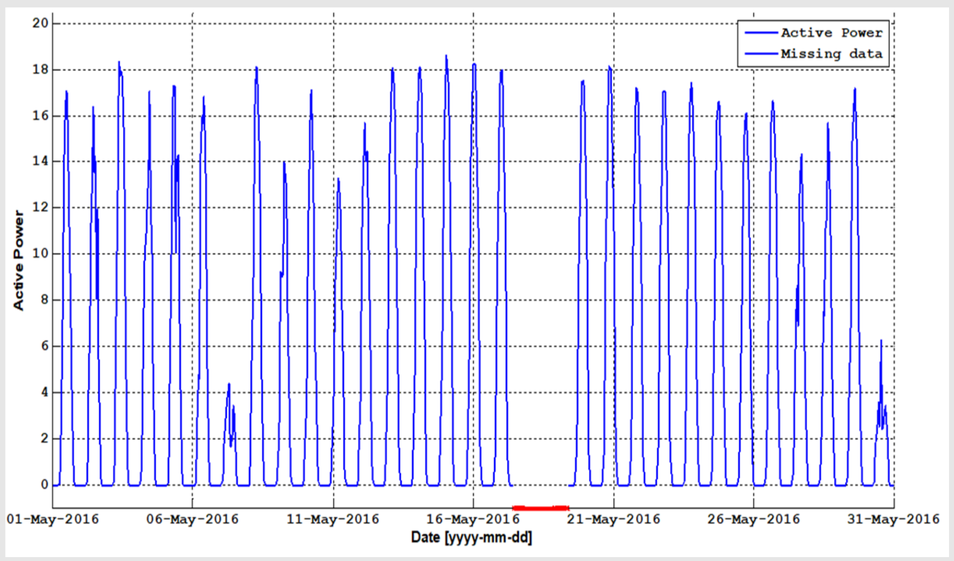


Figure 3: Monthly profile of complete PV system, May 2016

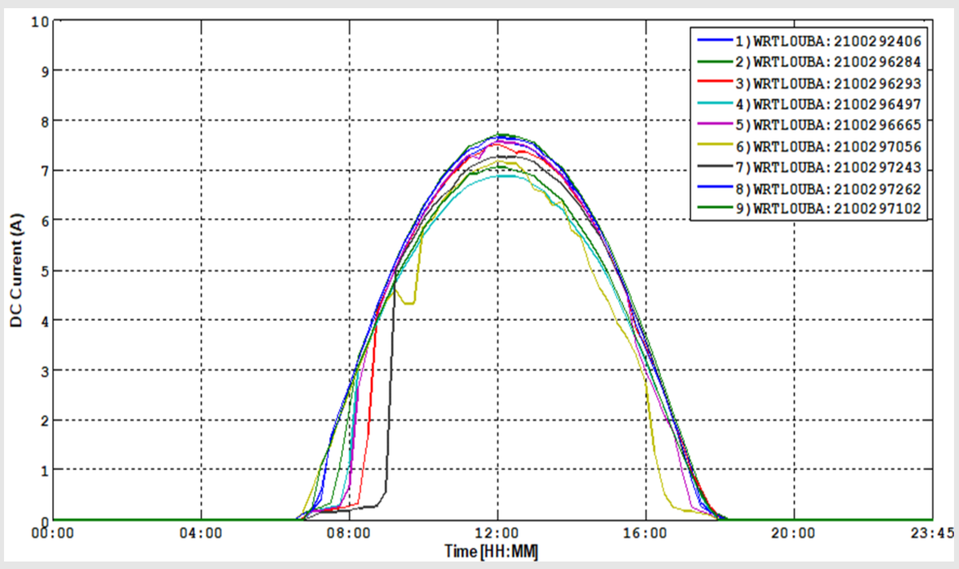


Figure 4: PV DC current input daily profile of one building per inverter

CONCLUSION

The need for data collection and analysis of PV system is crucial to understand any building development and current installed systems conditions which may impact the performance of PV. The automated data collection and analysis plays an important role in order to regularly assess the system performance. This study is a Living Laboratory data collection resource that is identifying errors, faults, performance issues and building issues.

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