Project to target the best and most cost efficient use of PV technology in the Mediterranean countries

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INTRODUCTION

The project, "Promotion of PV energy through net metering optimization" (PV-NET), is aimed at developing better energy policy for the promotion of renewable energies in the Mediterranean countries, targeting the best and most cost efficient use of PV technology. To do so an optimization tool is to be developed in order to optimize the net-metering policy of a region based on various factors. Some of this factors include the environmental profile and the electricity consumption behavior of the people in the investigated region. Therefore, pilot sites were implemented in three regions that participate in the project (Cyprus, Slovenia and Algarve in Portugal) to gather the aforementioned data.

The pilot sites are divided into two parts. The first part is the weather station were the POA irradiance, ambient and module temperature are measured. The other part is the smart meter solution, were smart-meters are installed in domestic or public buildings owning a PV system measuring the electricity consumed and produced. The data are gathered remotely every 15 minutes and are stored, monitored and analyzed using VDV. The data is viewable and downloadable online.

CR200 connected to Apogee SP-110, Pyranometer and Campbell 109

Google Map showing locations of the Weather stations and Smart-Meter stations

VDV REVIEW

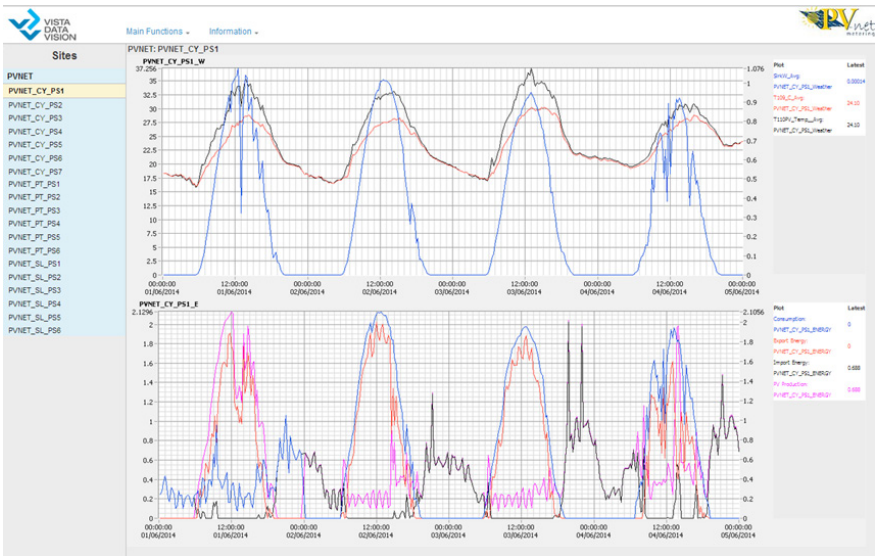
The PVNET project decided to use the VDV software as it covers all the needs of the project. Our first concern was with the capability of the Database Software accepting different file formats. The VDV Software accepts .dat files, but different file formats can also be used after converting them using the VDV File converter to .dat files.

In this way we were able to add all of the data collected from the pilot sites to the VDV Database.
For the weather stations in Cyprus the dataloggers used to gather the data are from Campbell Scientific and are fully compatible with VDV.

Also, when working with live data gathered remotely it is of great importance to be informed if

anything goes wrong at any time. With the alarm feature of the VDV software we can monitor the data in our absence. The alarm toolkit inform us if anything goes wrong with the gathered data (i.e. if the battery level is below 11 V). In this way it is not needed for a person to monitor the data in real time.

"With the alarm feature of the VDV software we can monitor the data in our absence"



Above plot: Showing Irradiance, module and ambient temperature
Plot below: Showing Energy consumption, Export, Import and Production.

FILE CONVERTER

Another problem VDV solved was the data being collected in a different file format.
The data collected from the smart meters end up to the server in a CSV (comma separated values) file format and cannot be included into the database. Therefore we use the VDV File converter to convert this data files (.csv format) to .dat format easily and conveniently. Every time we get new data and the csv files are updated, the VDV file converter automatically detects it and the new data are imported to the database.

GOOGLE MAP

Furthermore, the project required the data gathered from the Pilot sites from all three regions to be displayed live on the project's website. Due to the geographical spread of the project, covering all the Mediterranean region, map tool was also needed in order to give the user the ability to navigate through the map to all pilot locations and see the latest data gathered. This was accomplished using the Google Map toolkit. Setting up the web browser and the Google map toolkit was extremely easy.

ACCESS CONTROL

Finally, the access to the data needed to be controlled. Various users were created with different access capabilities. One of the best features of the access control is the option to choose what data each user can see and download from the internet. Also, using the access control feature an administrator user was created with access to all data and features speeding the process of data monitoring and changing the options of the software.

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PILOT SITES (CYPRUS)

The datalogger used to gather the data from the weather stations is the CR200 Data-logger from Campbell Scientific. The CR200 datalogger takes a sample of the weather data every 1 minute with 15 minutes average and sent using the GSM/GPRC modem. The sensors used for measuring the POA irradiance, ambient and module temperature are the Apogee SP-110 Pyranometer, Campbell Scientific 109 Temperature probe and the Campbell Scientific 110PV Surface Temperature Probe respectively.

The energy data is gathered from domestic customers in Cyprus using smart-meters equipped with a GPRS modules in order to gather the data remotely. In the case of Cyprus the pilot sites are domestic customers under the "PV net-metering" scheme. Therefore two smart meters are installed per pilot site, one bidirectional smart meter measures the import and export power to and from the electricity grid and the other smart meter measures the AC power produced by the PV system (3 kWp system). This data is sent every 15 minutes to the server hosting the weather data. The VDV file converter is used to convert the .csv file into .dat file.

PILOT SITES (SLOVENIA & PORTUGAL)

The pilot sites in Slovenia and Portugal are also equipped with a weather station measuring the POA irradiance, ambient and module temperature and a smart meter solution measuring the electricity consumption and production of a building. The data from this pilot sites are gathered once a month and are imported to the VDV database after the data files (in csv format) are converted into .dat files.