Failures, Operation and Maintenance of grid connected photovoltaic systems

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Background

In view of global environmental problems, we must develop new energy recourses which are plentiful and provide substitutes for fossil fuels. The interest and importance in renewable energy has been aroused due to the Kyoto agreement on the global reduction of greenhouse emissions.

Renewable energy sources such as solar, wind and so forth are ideal because they are clean, inexhaustible, and available everywhere in the word. One of the most promising applications of renewable energy is solar energy.

The photovoltaic phenomenon according to M. Dakkat, A.Hirata, R. Muhida and Z. Kawasaki, was discovered in 1839 and was used for practical purposes at the end of the 1950's in space applications powering satellites. Moreover, photovoltaic systems (P/V) can convert solar energy to electricity. With the development of photovoltaic cell, the sun not only provides the heat to us, but also powers us by electricity. A typical P/V system is composed of a P/V module or solar electricity generator and the electronic systems which manage the electricity produced by the solar array. More and more 10kW level or 100kW level and even megawatt level photovoltaic power stations grows up in the world. These power stations can supply electricity to villages, towns in remote area and transmit to large grid.

In this project which is titled "Operation, Failures and Maintenance in grid photovoltaic systems", we will present an essential study regarding these three conditions.

First of all, as far as the operation of PV systems is concerned, we must make clear the difference between grid and off- grid connected systems. In our project, we will report about the first operation system technology. Grid – connected system, as Tim Meyer analyze in his report is a PV system that feeds power into the electricity grid using an inverter. After that, we will adduce the different types of photovoltaic modules. Concisely, there are three different types of PV modules as Richard Corkish from University of New South Wales, Sydney wrote in his project. These three types are: Mono-crystalline, Poly-crystalline and Amorphous.

At the second part of dissertation, we put out an analytical study as far as Operation and Maintenance are concerned. While a lot of attends are being made in order to photovoltaic technology extend into potential market, questions regarding PV systems lifecycle cost are bringing a renewed interest in the Operation and Maintenance (O&M) experience and costs from already installed systems. At a time when photovoltaics is being considered as a viable option for distributed energy generation, it is critical that maintenance experience be captured to identify lifecycle costs and/or levelized energy costs for these systems, as well as to identify areas for system and component improvements.

Below, at the third part of dissertation, we will analyze all the possible failures that might take place at a photovoltaic system. Some problems are caused due to grid connection and some others due to technical reasons. A photovoltaic module, before being sold to the public, gets through a strict quality test.

The obvious inference is that all manufactures and installers may give warranty for their products. A lot of insurance companies make contracts which are particularly for PV systems. Also in Greece, more and more banks are developed in the market of photovoltaic systems. Banks as "National Bank", "Piraeus" and "Alpha Bank" are the first banks which occupied with the renewable energy sources. We make meetings with banks and companies in order to make information about the PV market in Greece.

It should be mentioned at this point that this section presents only a preliminary literature review on similar to the proposed project works and it will be continued throughout the project.

Project Description

It is a theoretical work that, as we stated previously, it aims to give a solution in problems that concern the operation and the maintenance of photovoltaic systems. Beyond the articles and bibliography that we will use in primary stages for the comprehension of photovoltaic systems, our initial objective is the communication with persons that know and deal with the subject technology.

Hence, in the first place, interviews and meetings with propitious have been scheduled that will help us afterwards to study and upgrade in-depth this thesis. Mainly our objective is to communicate with companies that install photovoltaic systems and to learn all stages that follow until the complete installation. A basic section in this study is the analysis of the risk that it can have the manufacture as far as the photovoltaic he will use (eg technology and types of photovoltaic) in the installation but also the capital cost equipment for that investment. Afterwards the installation, we will wonder what happens with the Public Power Corporation and the system's interconnection. On the other hand, we will state the bank's position, especially what kind of bestowals they give and how secure is that kind of investment.

At the same time, we will visit bank propitious. There, we will try to learn and collect information with regard economical and legal issues for the safety of such investment.

Conclusion

It's clearly that the global PV market grows by some 30% each year and this evolution will generate important cost reductions in the future. Our future energy systems need to adapt to new market realities. Reserves of fossil fuels are limited and price increases are inevitable. All developed countries need to reduce their dependence on oil and renewable energy can contribute to this goal.

Photovoltaics one of the renewable energy sources must set in the global market. But, are PV modules the better investment? What about the maintenance lastly? Will photovoltaic operate ever, without maintenance or without failures? These are some questions which are unsolved for the moment. In the end of this study, we are ready to give the answers of these questions.

Aims and Objectives

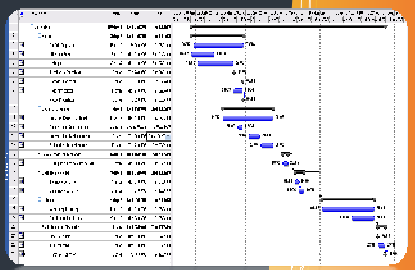
The aim of this project is to describe the failures, operation and maintenance of grid connected photovoltaic systems.

In order to achieve this aim, a set of objectives has been established, as follows:

Firstly is to find a balance point as far as the different options between installers, banks etc.

Also, the quantification of the investment risks, the maintenance problem, the owing expenses, and

Finally the insurance of this investment.



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