

THE PV MARKET IN GREECE

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Abstract: This paper presents an overview of the PV market in Greece, the achievements so far and the prospects in view of the goals set for 2020. The implementation of the various PV programs along with the issues that affect their development are presented and discussed, as well as suggestions for improvement. The PV manufacturing activities are presented in short as well as a notable activity, the selection of a strategic partner by PPC Renewables for the construction and operation of a photovoltaic power production station with a capacity of approximately 200 MWp in the region of Kozani and the construction and operation of a photovoltaic systems manufacturing plant.

Keywords: PV Market, Funding and Incentives.

1. INTRODUCTION

The installed PV systems in Greece up to 2006 were mainly privately owned autonomous systems in remote locations where there is no grid. The grid connected market, besides a few demonstration projects, was relatively small. Although there was a legal framework for the RES market since 1994 the lack of a significant support scheme running over a long time, the involvement of many public services in order to receive a large number of licenses and the lack of concrete regulations for the market players have hampered the larger introduction of PV systems. The annual installed capacity of Photovoltaic systems in Greece before the law 3468/2006 which introduced profitable feed-in tariffs, excluding demonstration programs and research projects, did not exceed 200 to 300 kWp. Figure 1 presents the historic data for the installed capacity of PV systems in Greece. For the year 2011, it is a CRES estimate.

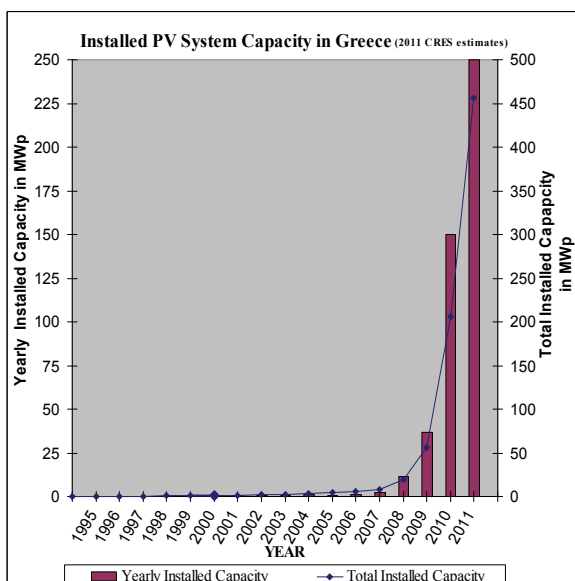


Figure 1: Historic PV market data, yearly and cumulative introduction of PV systems in Greece (CRES estimate for 2011).

In the year 2007, the installed PV system capacity was raised by 2.3 MWp, half of it coming from grid-

connected PV systems due to the law 3468/2006. For the years 2008 and 2009 an additional installed and connected capacity of 12 and 36.5 MWp, respectively, was introduced mostly in grid-connected PV systems. In the year of 2010 the installed capacity was raised by 148 MWp. The installed capacity in 2010 is divided in 107 MWp of systems installed in the mainland above 10 kWp, mostly ground mounted systems, about 5 MWp of PV systems on buildings up to 10kWp each and 36 MWp in PV systems up to 100 kWp installed in the non-interconnected islands. For the year 2011, due to the gradual maturity of the PV market and despite the economic situation, it is expected that the new PV installations may exceed 250 MWp.

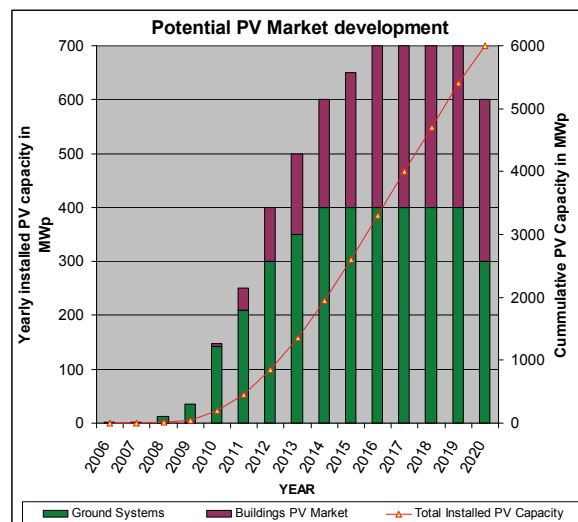


Figure 2: Potential PV systems market in Greece.

In figure 2, a potential scenario of the projected PV system introduction in Greece of 6000 MWp, a target that is supported by the Hellenic Association of PV Companies (HELAPCO, www.helapco.gr) and the European Photovoltaic Industry Association (EPIA), is presented. The author is presenting its own projection of PV capacity development and the breakdown between ground mounted and PV systems on buildings market in the years until 2020. The goal of this scenario is to reach a significant contribution, of the order of 10 to 12%, of the electricity consumed in Greece by 2020.

In early 2010, in order to simplify and remove obstacles for the introduction of RES in Greece, a new law 3851/2010, was introduced [1].

In July 2010, the National Renewable Energy Action Plan (NREAP) [2], in the scope of the directive 2009/28/EC, was presented. In chapter 5 “Assessments”, in Tables 10 a and b, of the NREAP, the estimated total contribution expected from each renewable energy technology to meet the national binding 2020 target, which is set at 40% of the gross final electricity consumption for all RES is presented. Regarding the solar energy contribution in electricity consumption, the estimated capacity for 2020 is 2200 MWp for Photovoltaic Systems and 250 MW for Concentrated Solar Power.

The low target proposed for photovoltaics (2.200 MWp in 2020), is clearly well behind the potential of the country and the already manifested investment interest. We note that RAE (the Regulatory Energy Authority) has received in the previous years, until 2010, a large number of PV system applications amounting to 3.700 MWp, of which, it is estimated, that around 2.000-2.500 MWp can be implemented.

On the basis of even the previous legislation, these projects must be implemented not later than 2013, otherwise their licenses are void. If in the previous numbers the new applications of the past 2 years are added, coming from the new categories added by the law (3851/2010), such as the PV systems by farmers, flarge PV systems by PPC (Public Power Corporation), installation in industrial zones, the industrial-commercial roof sector and the residential roof sector, it is clear that the proposed cap may be already covered in the next three years.

The argument for the limited capacity of photovoltaic systems is usually exhausted in the cost issues in relation to other technologies. The dynamics of the PV market is fortunately such that significant and rapid decrease in prices is expected, something that all analysts worldwide agree on. The cost decline together with the need to meet our CO₂ reduction and RES electricity contribution targets are in favor of PV, as a large number of distributed PV systems is a relatively short process to integrate to the grid increasing fast the RES electricity contribution in the energy mix. On the other hand, other RES projects that demand significant grid reinforcement and extension in order to be integrated to the grid, usually take a long time to be realized, due to the procedures and the local reactions to such projects.

In the following years, PV will achieve the so-called grid parity, meaning, the output of solar PV kWh will cost the same or less than conventional energy is sold to the consumers. In addition, photovoltaic systems have a very high social acceptance and they also help to develop a more decentralized and thus more stable electrical system and provide a greater flexibility to the integration of storage systems in the future for grid support.

In order to achieve the objectives of the country, the Hellenic PV Association (HELAPCO) and EPIA have promoted that the PV systems contribution should cover up to 12% of the electricity consumed in 2020. Since the estimate for electricity consumption in the proposed action plan in 2020 is 68,1 TWh, then this translates to 8,17 TWh of PV electricity or about 6000 MWp of photovoltaics. This goal will produce, among other

things, thousands of new jobs in a time period when the economy is in recession and the unemployment rate is rapidly increasing. Based on the German and Spanish PV market experience, the detailed theoretical approach of organizations, such as EPIA (www.epia.org) and REPP (http://www.repp.org/articles/static/1/binaries/LABOR_FINAL_REV.pdf) seems to confirm their estimates that for each new MWp of photovoltaic system, 40 to 50 employment man-years are created. A Greenpeace study in 2009 [3], projecting for Greece a cumulative PV capacity of 6.800 MWp in 2020, estimated that the existing PV workforce would be increased by 13800 new jobs.

2. OVERVIEW OF THE GREEK PV MARKET SEGMENTS

In February 2011, Public Power Corporation Renewables (www.ppcr.gr), a member of the PPC Group, announced an invitation for the submission of expressions of interest for the selection of a strategic partner for an energy restructuring plan for the Prefecture of Kozani, that includes the construction and operation of a Photovoltaic power production station with capacity of approximately 200 MWp in the region and the construction and operation of a Photovoltaic systems manufacturing plant, as well as a potential long term cooperation regarding joint development of other Renewable Energy Sources projects and other potential energy or technology-related initiatives in the region.

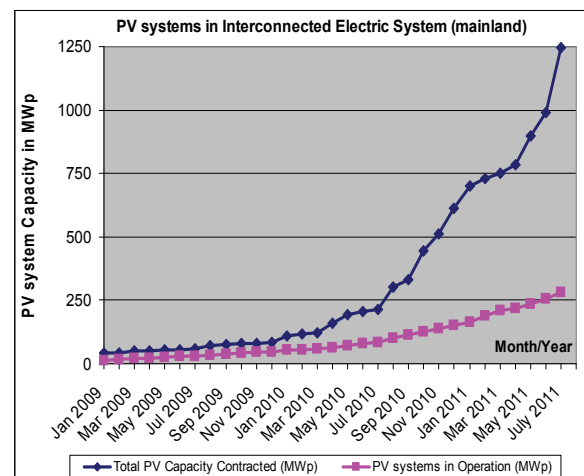


Figure 3: Monthly evolution of grid-connected PV systems in the Interconnected Electric System (mainland).

The first phase of selection was completed in the middle of July 2011, with 15 out of the 21 consortia that participated in the call satisfying the criteria set at the call. The second phase of the call will follow shortly, where these 15 consortia will be invited to submit complete bids in order to select the strategic partner.

In figure 3, the monthly evolution of the PV capacity of PV systems that their owners have signed a power purchase agreement and the actual operating PV systems in the Interconnected Electric System (mainland) are presented. It is noted that in the last year, the operating PV system introduction rate is increasingly lagging the contracted PV capacity, this may be the manifestation of

the difficult economic environment in Greece. The total energy produced by PV systems in 2010, in the interconnected electric system was 132 GWh, this number will be more than double in 2011 and it is expected that the PV system production will contribute more than 0,5% of the 2011 electricity consumption in Greece.

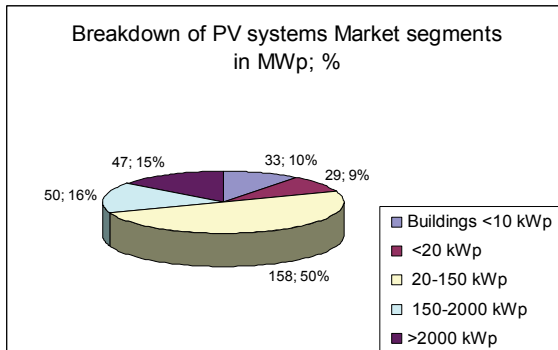


Figure 4: Breakdown of the Grid-connected PV systems market until June 2011.

In figure 4, the Grid-connected PV systems market breakdown until June 2011 is presented according to the different PV system sizes as listed by the Greek PV support programs and feed-in tariffs. Another PV segment was launched in June 2009, it was the PV systems on buildings under 10 kWp, with a feed-in tariff of 0.55 Euro/kWh, a 25 year contract and a simplified and straight forward administrative procedure that should not take more than a month to complete. The feed-in tariff will be reduced by 5% each year, starting from 2012.

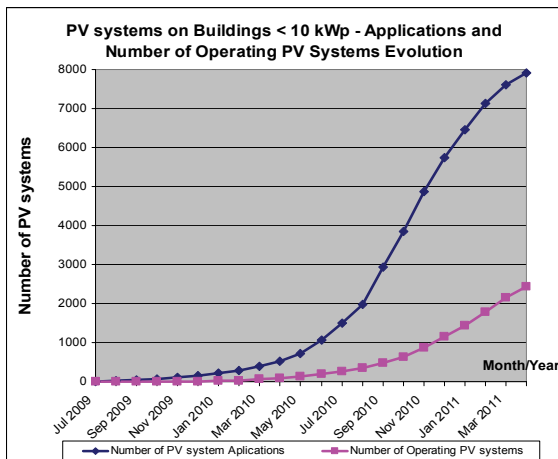


Figure 5: Number of applications and number of operating PV systems in buildings under 10 kWp in the mainland and interconnected islands.

The response of the market was enthusiastic as it is seen in figure 5. The number of applications until April 2011 has reached the number of 7907. Most banks have started to advertise attractive loan rates for the whole PV system cost and the public interest it is expected to intensify. Nevertheless, the difficult economic situation in Greece has an effect and it is seen in the last months as a decrease in the number of applications.

In order to promote good practices in designing, installing and safety issues of PV systems, in June 2009 the Ministry of Development, now called Ministry of Environment, Energy and Climatic Change (www.vpeka.gr) requested from CRES to prepare a “Guide for the installation of PV systems in buildings” (www.cres.gr/pvcatalog).

The guide was prepared by CRES and it was put in consultation with interested parties, such as, PPC (the largest electric utility and Distribution System Operator in Greece), the Hellenic Association of PV system companies (www.helapco.gr) and NTUA. Already more than 1120 companies, engineers and technicians have subscribed to CRES’s PV installers database (<http://www.cres.gr/pvcatalog/DoIt>), accepting to follow the technical guidelines in the published PV installation guide. These companies and technicians represent a total workforce of about 7500 people of which 4500 are involved directly with Photovoltaic systems.

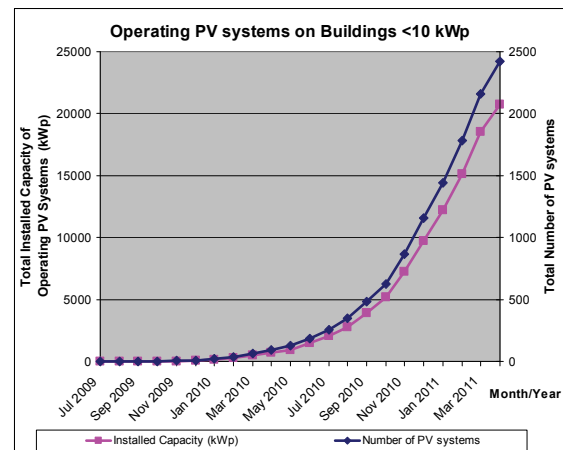


Figure 6: Installed capacity and number of operating PV systems in buildings under 10 kWp in the interconnected electric system.

In figure 6, the installed capacity and number of operating PV systems under 10 kWp in buildings is presented for the interconnected electric system of Greece. The average PV system size is 8.56 kWp.

Another PV market segment was also established by the law 3851/2010 regarding the professional farmers, as defined by the decision of the Minister of Rural Development and Food. The farmers have priority for licensing in the their own land PV power stations of maximum capacity of 100 kWp. There are approximately 6200 such applications, for a total capacity of about 620 MWp. Already more than 80% of those applications have received an offer for grid connection. An important question for the progress of this PV market segment is the issue of financing these investments through the banks and the associated interest rate.

2.1 Non-interconnected Insular Regions

In the summer of 2007, RAE (Regulatory Energy Authority, www.rae.gr) announced a call for application submissions for PV systems, for the non-interconnected islands. It was scheduled as follows: for Crete the call was open from 2nd of July to 31st of August 2007 and for all other islands from 1st of August to 28th of September 2007. The maximum allowed power capacity

per PV system is 150kWp but finally it was reduced to 80 kWp in order to allow more participants in the program.

In May 2009, RAE announced the results of the evaluation of the 1638 applications for the island of Crete. Out of those applications 1216 applications were evaluated positively and are proposed to receive the exemption from energy production licence from the Ministry of Development. The installation of the PV system is not possible before an environmental permit is received and a permit for the local office of planning for the works that will follow on the property. This last permit has to do with the allowed uses of the land and a minimum surface area for the property. For this reason, an environmental study for the impact of the PV system is prepared and approvals and opinions from all relevant authorities are collected. After the positive expression of all the authorities an environmental permit for the PV system is issued by the region environmental office. At this time the progress in the installations of PV systems in the non-interconnected islands is relatively progressing well. In 2009 the new PV installations in the non-interconnected islands were 1.15 MWp, of which 0.8 MWp of new PV installations in the island of Crete. In 2010, 36.1 MWp were installed in the non-interconnected islands and for the first 6 months of 2011, an additional 18.1 MWp have been installed.

Since September 2010, after a Minister's Decision (Φ1/18513 ΦΕΚ 1557 Β 22.09.2010), the program for the installation of PV systems on buildings was extended to the non-interconnected islands with the limitation that the PV systems should not exceed 5kWp per installation, except Crete where the 10kWp maximum capacity is still valid. On August 1st 2011, according to the Distribution System Operator of the non-interconnected islands (PPC), the installed capacity was 10.242 MWp, of which 6.947 MWp in Crete and 1.423 MWp in the island of Chios.

3. GREEK PV MANUFACTURING ACTIVITIES

In Greece, the commercial activities for the Photovoltaic power systems have grown considerably in the recent years, not only in the import sector of PV products and ready made technical solutions from countries that have a very strong industry in the Photovoltaic sector, but also in the frame of the domestic manufacturing of photovoltaic panels, wafers and cells, in the balance of systems, such as fixed and sun tracking mounting systems, monitoring systems, PV systems integration, electrical panels, cables, monitoring and security systems, telemetry, etc. These activities are stimulating the Greek entrepreneurship and the domestic labor market, which have resulted in the recent years to create so far around 5,000 new PV related jobs.

Specifically in the construction of photovoltaic modules there are 5 active companies of Greek interest, with a production capacity of about 250 MWp of PV modules per year.

4. CONCLUSIONS

It should be noted that there are opportunities for growth regarding the photovoltaic systems and their integration to the electricity grid. Globally, we are basically at the beginning of a transformation period for the energy

system and the electricity grids. The development of innovative products and services can give new impetus to our economy and multiple benefits to our society.

The recent proposition of the German minister of the economy for Greece to provide solar electricity to Germany, it is a challenge and opportunity for Greece to develop the right framework, procedures, and local benefits in order to advance this exciting idea, while creating new jobs and other potential synergies.

With regards to the introduction of Photovoltaic systems in Greece, although the introduction and preferential treatment of large PV systems built up the PV power capacity faster, as Greece is trailing in RES electricity production implementation, it is hoped that the introduced program for PV systems on buildings, commercial and industrial roofs, farmers and in industrial zones will have a serious impact on installed PV capacity. The building sector is considered as a key sector as it constitutes the "natural environment" for photovoltaic systems that can be coupled with storage and energy management and other ancillary services. The photovoltaic technology is suitable for building applications, making it the main component for a decentralized RES development model. In countries with developed photovoltaic markets, such as Germany, the small PV systems in buildings (<10 kWp) constitute 40% of the annual market, while globally the building sector has a share of the order of 90%. It is noted that the program "PV systems on buildings", put into effect in the summer of 2009, does not support building integrated photovoltaic systems. In Law 3734/2009, it was announced that the PV system in buildings program will support PV systems on roofs and facades according to the existing building code. It is obvious, that at the moment the building code does not permit the integration of PV systems on buildings (BIPV), this is a disappointment as the integration gives added value to the PV system and promotes the involvement of architects in the integration of PV systems, thus introducing BIPV in the mainstream of building design. In any case, action should be taken to modify the building code in Greece in order to allow PV integration on buildings. This will also bring benefits in the employment and the economy of the country as more jobs per MWp of PV system are created in this sector.

Finally, the national renewable energy action plan should and it will in the future consider the added benefits of the solar PV technology and in the next reassessment of the national action plan a more realistic and balanced power capacity allocation between RES technologies will be reached. Furthermore, it seems that there is a lack of information on the local impact of the RES technologies and the global advantages they offer. A more profound and balanced examination and information campaign should take place.

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