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Public attitudes towards photovoltaic developments: Case study from Greece

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HIGHLIGHTS

- The circumstances for RES are favorable both in the EU and in Greece.
- The growth of renewable energy sources, particularly photovoltaic systems, is provenly following an upward trend.
- The photovoltaic electricity production is an environmentally-friendly, sustainable and socially acceptable answer to the future energy requirements of society.
- The Greek citizens state that they are adequately informed and sufficiently willing to invest in photovoltaic systems either residentially or in a plot of land.

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ABSTRACT

The present decade is considered to be vitally important both as regards addressing energy requirements and for environmental protection purposes. The decisions taken, both on an individual and a collective level, will have a decisive impact on the environment, and primarily on climate change, due to the increased energy demands and the need to reduce carbon use in energy generation.

The present study was designed and carried out while an extensive debate was ongoing in Greece regarding changes to the legislative framework that would specifically disallow new applications for the installation of photovoltaic systems; its aim is to depict the attitude of Greek citizens, through the completion of 1068 questionnaires. The research results show that over half the respondents are informed about the use of photovoltaic systems for electricity generation. Furthermore, almost half are willing to invest in such systems, either at home or on a plot of land. The factors contributing to the installation of photovoltaic systems are mainly "environmental", "financial" and "social". Finally, the citizens who are most willing to invest in residential photovoltaic systems are mainly university or technical school graduates; they would rather take such a decision after being motivated by institutional bodies and would do so for reasons of recognition.

1. Introduction

Until the last few decades, fossil fuels have played a major role in global energy demand. However, both the increase in carbon dioxide and the geographical distribution of fossil resources necessitate a search for alternative energy sources on a global level (De Vries et al., 2007; Wolsink, 2007; Labis et al., 2011; Tampakis et al., 2013). In addition, as the increase in population numbers signifies higher energy use due to new consumer demands, a shift to alternative forms of energy is deemed imperative, and can also be viewed as an answer that could minimize several environmental problems, including climate change (Schiermeier et al., 2008; Von Borgstede et al., 2013) and the rising needs for energy, along with the self-sufficiency of insular regions. Insular energy systems are essential when an area is unable to connect to existing electricity generators and consumers through a transmission grid that is situated in another area, due to its small size and/or remote location. As a result, such areas do not have electricity networks in their proximity that they can use to their advantage, that could provide increased efficiency (Fokaides and Kylili, 2014).

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Out of the various renewable energy sources available, photovoltaic electricity production constitutes an environmentally-friendly, sustainable and socially acceptable answer to the future energy requirements of society (Pearce, 2002). Although investments in RES technologies are viewed as an effective measure to accelerate growth in view of the recent economic crisis, nevertheless the dissemination of RES projects still lies below expectations, despite the policies implemented for their promotion (Masini and Menichetti, 2012).

There are many cases where the availability of suitable sites for the installation of such applications is frequently questioned, since society sets additional barriers in numerous high-capacity areas suitable for RES use (Kaldellis et al., 2012a). It is a common conviction that the views and attitudes of stakeholders need to be modified, in order to ensure a sustainable energy future, in accordance with the global scientific community that is systematically promoting the use of RES (Kaldellis, 2005; Liu et al., 2013).

In the case of investments in renewable energy sources, circumstances are favourable both in the EU and in Greece. More specifically, an EU survey regarding the acceptance of various energy sources has shown that European citizens are extremely positive towards renewable energy sources. In fact, 80% support the use of solar power, 71% wind power, 65% hydroelectric power, 60% ocean energy (waves, tides etc) and 55% promote the use of biomass. The relevant rates are greatly reduced regarding the acceptance of conventional fuels, with nuclear power coming out last, with an acceptance rate of only 20% (EC, 2006). In the case of Greece, after a relevant study carried out in six Greek cities, it was found that society views renewable energy sources in a positive light, but the main obstacle is the cost of the relevant technology, since people are not well-informed in making the distinction between low-cost and high-cost technologies. They expect to obtain this information from the Media and the state, along with funding and subsidies that will promote the said technologies (Kaldellis, 2005; Tzanakaki and Mavrogiorgou, 2005; Kaldellis et al., 2013).

Despite the fact that governments and research institutes take an overall positive stand towards renewable energy sources, it has been observed that certain renewable energy source projects face a reaction from the local population (Upreti and Horst, 2004; Kaldellis, 2005). This information from public opinion surveys is a significant tool for planning energy policies and instituting effective measures for the promotion of renewable energy sources (Kontogianni et al., 2013).

In Greece, the first incentives for photovoltaic systems were introduced in 2006 through law No 3468/2006. The response from the Greek market was practically immediate, and took less than 2 years. Two successive laws provided the opportunity for an even more attractive investment and licensing climate for the sector of building installations, through the introduction of additional guarantees for improved procedures regarding grid connections. However, the unexpectedly large number of applications submitted by 2011, with a total photovoltaic capacity which exceeded the national goals for 2020, led to huge delays in the grid connection procedures (Karteris and Papadopoulos, 2013). This was the scenario up to 2012. In August 2012, the Ministry of the Environment, Energy and Climate Change announced the temporary suspension of the licensing procedures for certain photovoltaic categories. More specifically, it decided to suspend the submission of new applications for production licenses and grid connection quotations and also to suspend the assessment of pending applications for production licenses and grid connection quotations (JMD B 2317/2012).

The purpose of this study is to outline the views of Greek citizens on a series of issues related to investments in photovoltaic systems. The data, collected through a structured questionnaire, are important due to the fact that they depict the attitude of Greek citizens before governmental decisions were taken to suspend applications for new licenses. The evaluation of the citizens' views at this crucial point in time, could serve as a starting point and a tool for changes to be made to the government's decisions, in line with the current situation.

2. Literature review

The views of society on issues related to the environment largely affect environmental actions carried out among the population. In other words, citizen attitudes have a major impact on energy policy planning (Viklund, 2004). In a study conducted in Australia, citizens who were environmentally-aware were willing to proceed with the adoption of green technologies in order to turn their convictions into practice. Furthermore, according to Islam (2014), households do not only take into account the particular features of the relevant technology but are also affected by psychological, social and institutional factors. Another equally important parameter is the Feed-In Tariff (FiT) scheme, according to which owners are paid for the electricity they generate in kilowatt-hour (kW h) over a contract period of 20 years, as a rule. The aim of such incentives is to encourage an increase in the use of renewable energy sources, especially in the case of low-level electricity generation (Muhammad-Sukki et al., 2011).

On the other hand, citizens who are opposed to such types of action can create a considerable barrier against the implementation of RES projects. In addition, the environmental behaviour of members of a society cannot be easily influenced by state policies and incentives, however much one might expect a different outcome (Gadenne et al., 2011). In order to minimize the problems and maximize the expected results, and prior to the strategic plans being drawn up and governmental decisions taken, it is imperative to research public opinion. In this way, the possibility of failed governmental decisions is minimized (Tampakis et al., 2013).

The incorporation of RES is an essential requirement for the European Union (EU) in order to fulfill its objectives for 2020 (when 20% of the gross national energy consumption and 40% of the gross national electricity consumption must be covered by RES). In view of this challenge, many countries are in the course of preparing ambitious plans. One such example is Scotland, which has set its goals far above EU requirements, and where energy production from renewable sources by 2020 is expected to reach 50% (Warren and McFadyen, 2010). Nevertheless, there are many cases where studies have highlighted a contradiction between high-level objectives and limited acceptance by society, mainly related to social recognition issues and income (Batley, et al., 2001). More specifically, the gap between national goals and the increased share of renewable energy sources and social acceptance has been discussed by several researchers, who have come to the conclusion that social disapproval can function as a restricting factor in achieving a government's ambitious objectives (Wóstenhagen et al., 2007). The behaviour displayed by citizens vis-à-vis public support of an environmental decision is related to social psychological constructs (Kaldellis, 2005; Barr and Gilg, 2006; Poortinga et al., 2006; Jobert et al., 2007; Schultz et al., 2007). Studies have indicated there is a medium to strong overall public support for renewable energy sources, such as wind power (Krohn and Damborg, 1999; Wolsink, 2007). Other studies conclude that the social acceptance of renewable energy sources tends to vary and views differ depending on the size of the project. The majority of studies which attempt to analyze public opinion are quantitative and view the public as a homogeneous whole. On the contrary, others use qualitative research to try and put together issues related to the acceptance of renewable energy sources, and specifically discuss the provision of economic incentives, the

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