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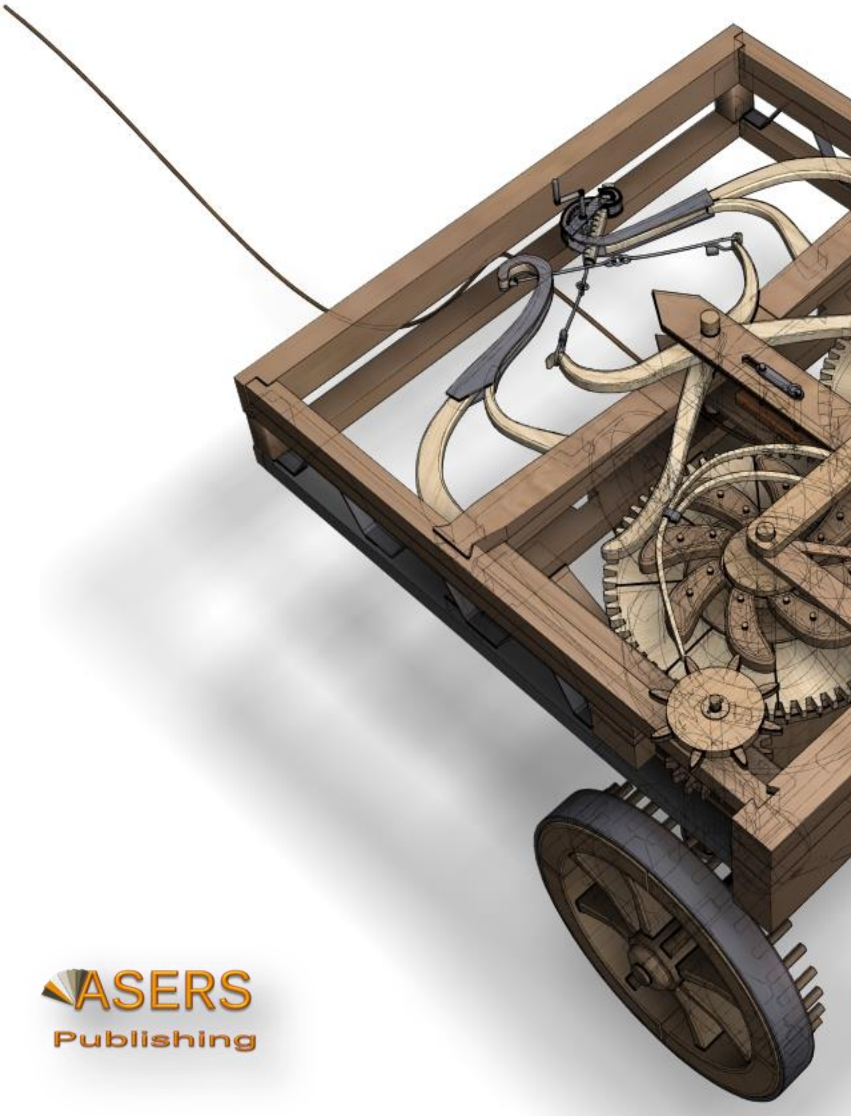

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REGIONAL DEVELOPMENT AND RENEWABLE ENERGY ENTERPRISES. A PORTER'S DIAMOND ANALYSIS

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Abstract:

The purpose of this paper is twofold. On the one hand, it aims to highlight the significant role of regional parameters when analyzing the competitive advantage of renewable energy enterprises in Greece by applying Porter's diamond model, and at the same time to implement the aforementioned model in the case of solar energy enterprises. The paper suggests that analysis should be spread to lower levels than the national one, because renewable energy production companies, either at the stage of installation or at the stage of operation, are fully affected by local conditions. Measuring or analyzing competiveness of this kind of enterprises is not always easy because there are essential differences in comparison with other types of industrial activity. In this paper, specific regional data are also incorporated in the analysis of the diamond model conditions, which affect competitiveness.

Keywords: regional, renewable energy, Porter, enterprises.

JEL Classification: O13; O18; R1

1. Introduction

The exploitation of renewable energy sources is a crucial matter for the improvement of the energy mix towards a sustainable economy, nationally, regionally, and locally. Key part of Greece's energy sector is the electricity production from lignite. The energy mix as presented for 2010 was 52% lignite, 20% Natural Gas, 12% Hydro, 12% Imports-Exports, 4.30% Oil and 4.30% Renewable Energy Sources (RES).

Electricity demand in Greece is expected to increase by 3.5% annually from 2010 to 2020. According to Greece's Energy Regulatory Authority (RAE), 6,000 MW of additional capacity will be needed by 2015. From 2010 to 2020 the growth of electricity demand is estimated at 3.5% annually.

In the first semester of 2011, the total installed capacity of RES stood at 2,022.2 MW, 75% of which came from wind energy production, 11.5% from solar, and the remaining 13.5% from biomass and hydro-electric production units.

According to the Greek government, the country's target is to produce electrical energy from RES at a 40% share of the total electrical power by 2020. Greece's net imports of electricity in 2009 was 4,367 GWh compared to 164 GWh in 1999. Electricity prices in Greek households and industry during the second semester of 2010 were among the lowest in the European Union. Electricity prices in EUR/100KWh for households was 12.1 with all taxes included when at the same time in Germany it was 24.4, in Belgium 19.7, in Italy 19.2 and in

Portugal 16.7. VAT and other taxes is 2.5 Eur/100KWh. The price in industry excluding all recoverable taxes is 10.3 EUR/100 KWh, non-recoverable tax is 1.5 EUR/100KWh. The Electricity price for an industry excluding all recoverable taxes ranges near the European average. At the same time, non recoverable taxes are higher than the European average. Only Germany (2.8), Italy (3.2), the Netherlands (1.8) and Austria (1.7) have higher prices of non-recoverable taxes than Greece.

Project HELIOS aims to provide the countries of central Europe with energy from solar energy. Greece will produce and export 10GW in a cost-effective way. The European Union and its organizations such as the European Network of Transmission System Operators have defined Greece as a priority country for solar energy production (European Union 2011; Greek Ministry for Environment, Energy and Climate Change 2011a, 2011b).

According to the European Photovoltaic Industry Association (2012), Greece is faced with three scenarios:

- Irradiation driven scenario: 20.600 MV;
- Current spatial distribution scenario: 16.000 MV;
- Consumption-driven scenario: 16.000MV.

The pholtovaique barometer of Eurobserv'ER (2011) ranks Greece at the 8th place of the photovoltaic power per inhabitant European Union -wide.

Greece could handle its economic crisis by exploiting its comparative advantage in renewable energy production and especially solar energy production. In a recent study, the energy sector has been presented as one of the most dynamic sectors which can lead Greece out of the crisis.[1] Although, the energy mix needs adjustments in order the cost to remain low, the EC2020 targets for renewable energies must be achieved. The renewable energy targets of complying with the EU aspirations are to reach the RES electricity, that is 16.97 TWh for 2015 and 27.27 TWh for 2020. Ernst and Young (2012) rank Greece in the 11th position, of solar index, globally[2]. The perspectives and the competiveness of enterprises which produce energy through renewable sources in Greece must be analyzed in depth.

Hence, the purpose of this paper is to examine solar energy production enterprises through a twofold interpenetrated framework. Thus, on the one hand, the aim is to highlight the significant role of regional parameters when analyzing the competitive advantage of renewable energy enterprises in Greece by applying Porter's diamond model, and on the other hand to implement the aforementioned model in the case of solar energy enterprises taking into account all possible regional parameters. Besides, as Porter (2008) mentions: "the enduring competitive advantages in global economy are often heavily local, arising from concentrations of highly specialized skills and knowledge"

In the next section, the theoretical discussion and the literature review are developed. Section three focuses on applying Porter's model. In section 4 the paper provides outcomes and policy remarks.

2. Theoretical discussion

Electricity production from renewable sources contains remotely the notion "local" or "regional". In contrast with fossil fuels which can be transferred as an energy source from one area to another for industrial process, electricity from renewable energy has local or regional characteristics depending on non-removable weather and/or physical conditions. Renewable energy production (solar, wind, hydroelectric, etc.) can be categorized under resource dependent industry in Porter's (2003) triple sortation of economic activity in regional economies, along with namely local industries and traded industries. Resource dependent industries, according to Porter, compete with other industries in domestic and international locations.

Focusing on rural region, OECD (2011) maintains that rural regions will gain a high percentage of the investments in renewable energy sources because rural areas fulfill the conditions of both available space and renewable energy sources. Energy efficiency and renewable energy may boost the local and regional growth, so it must be taken into consideration by local or national authorities (European Union, 2011b; European Parliament, 2012). Commission staff working document "Regions 2020" (Commission of European Communities, 2008) points that some regions may benefit from the production of renewable energies.

The attainment of local and regional development through the spread of renewable energy with the cooperation of local governance is also described by Radzi and Droege (2012). The governance model could be modified in order renewable energy sources to induce gains (Wiseman, 2011). Ratliff and Smith (2005) by

[1] See McKinsey report "Greece 10 years ahead" (2012).

[2] The index consider: Power offtake attractiveness (19%), Tax climate (11%), Grant or soft loan availability (9%), Market growth potential (18.5%), Current installed base (8%), Resource quality (19%), Project size (15.5%).

analyzing the external cost created by non-renewable energy, stress that the European countries successfully raised the cost of non-renewable energy production in order to internalize externalities. Furthermore, renewable energy could compete with the non-renewable sources on the energy market, in a cost-competitive way. The work by Platt and Judy (2011) presents the Regional Renewable Energy Procurement Project (R-REP) which is projected to produce 50 megawatts of power. The R-REP will generate more than 600 jobs and 200$ million in economic activity. The project will spur regional economy.

Likewise, Allan, Mcgregor, and Swales (2011) advocate that Scotland's economic development in peripheral areas could be intensified through the growth of renewable technology. Laurentis (2012) describes the renewable energy development of Wales not only in electricity production, but also in renewable energy technology. The region accounts for 769 companies, 13.700 employees, 467million or 4% of the UK's exports of this sector. The study suggests that regions can play a significant role in creating new demands for renewable energy systems and this can be achieved by creating new institutions, facilitating planning control, providing skills and business support. Barbiroli (2011) has also extensively analyzed the costs and advantages of a transition towards green and sustainable economies. He recognizes that low cost for traditional energy production cannot lead to alternative eco-compatible production. The transition to sustainability demands amendments in production procedure and in consumption schemes (Hoffmann, 2007). Renewable energy can produce more gains than conventional energy production (Bull and Bilman 2000). The gains from renewable energy installations will firstly enhance the local communities and regions.

Every region can produce renewable energy by exploiting its comparative advantage in natural resources, and as a result, installation can be constructed potentially in every region. Regions vary in terms of renewable resources, energy requirements, production methods, and consumption schemes (Feder, 2004). Every region has its own sources for renewable energy production and this can contribute to the development and the energy security at national level Bull and Bilman(2000).

Porter's model has been used by many researchers and academics. In renewable energy sector it is not broadly used. Dogl, Holtbrugge, and Schuster (2012), implemented Porter's diamond model to analyze German energy companies in China and India, while Zhao, Hu, and Zuo (2009) applied the diamond model on wind power energy performance in China. Demir *et al.* (2010) were occupied with Porter's factor conditions of wind energy industry of Turkey. Brooksbank and Pichernell (1999) argue that Porter's original diamond is an appropriate tool to analyze regional competitiveness. As Malecki (2012) mentions, Porter's model has been used in localities, regions and countries. Porter (1990) believes that a comparative advantage is created and sustained through a highly localized process. In Barcley's (2008) work about regional competiveness, it is advocated that Porter's diamond concept is used in regional competitive advantage.

3. Application of Porter's model and data analysis

According to Porter, the competitive advantage is determined by four main components, one for each corner of the diamond, the Factor Conditions, the Demand Conditions, the Related Supporting Industries and the Strategy, Structures and Rivarly. Natural resources, human resources, capital and infrastructure are used in this research in order to measure the factor conditions. The factor conditions determine significantly Porter's diamond model, as they are effectively its input parameters. Local demand, international demand and the size of the market refer to demand conditions. Strategy, structure and rivalry refer to the entrepreneurial competition, the institutional framework of entrepreneurship and the entrepreneurial strategies. The linkage to firms and suppliers in relevant areas and the existence of clusters determine the context of related and supporting industries. There are also 2 complementary factors, Chance and the Government (Figure 1).

3.1 Factor conditions

3.1.1 Human Recourses

From the beginning of the economic crisis, the labor cost of Greece decreased by 12.8%, when at the same time, the unemployment rates remain high. In Greece, there is a pool of high skilled personnel and low skilled workers with significant job experience. Between the first quarter of 2010 and the third quarter of 2011 total labor costs in the economy as a whole have decreased by 14.3% in nominal terms. In the energy sector the labor cost decreased by 24.7% (NILHR, 2011). This reduction is expected to boost competitiveness in all sectors. The labor cost of Greece, after the reductions which occurred in 2012, is one of the lowest in Europe and it is expected to equalize with that of the Balkan countries (Labour Institute of the Greek General Confederation, 2012).

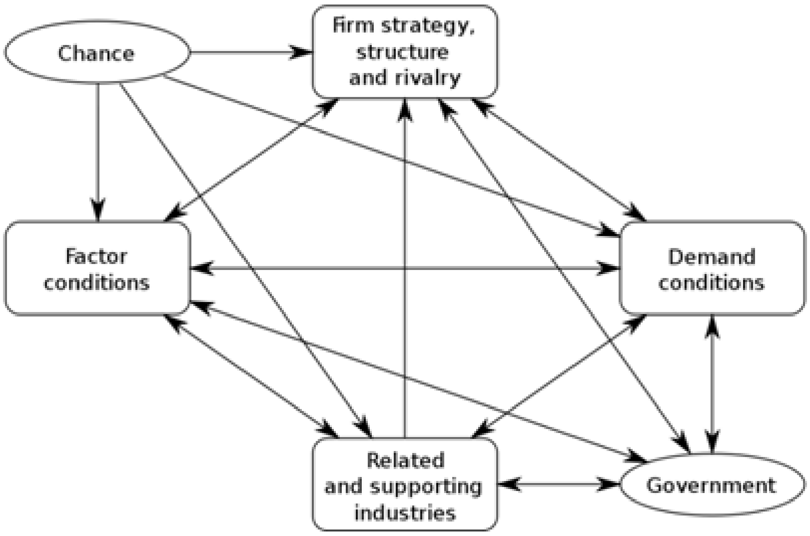

Figure 1: Porter's diamond model
Source: Porter (1998)

Greece's skilled employment rate of economic activity related to electricity, gas, steam and air conditioning supply, declined from 1.29 to 0.9 during 2008-2011. As far as the same European economic activity is concerned, its average is not far above Greece's for the same period, as presented in Table 1. According to this Table, Greece is presented to be advantageous over Portugal, Spain, Cyprus, while it exhibits performance close to the one of France and Malta.

Table 1: Specialization in electricity, gas, steam and air conditioning supply

Country	2008	2009	2010	2011
Euro area (17 countries)	**1,0**	**1,0**	**1,0**	**1,0**
Belgium	1,2	1,0	1,0	0,9
Denmark	0,9	0,8	0,8	0,9
Germany (including former GDR from 1991)	1,3	1,3	1,3	1,3
Greece	**1,26**	**1,0**	**0,9**	**0,9**
Spain	0,6	0,6	0,6	0,6
France	1,0	1,2	1,2	1,1
Italy	0,8	0,8	0,7	0,8
Cyprus	1,1	1,3	0,6	0,6
Austria	0,9	0,9	1,0	1,1
Portugal	0,8	0,7	0,5	0,6
Slovenia	1,6	1,2	1,1	1,4
Slovakia	2,0	1,9	1,7	1,6
Estonia	2,0	1,8	2,3	2,0
Finland	0,9	1,0	0,9	0,8
Malta	2,0	1,6	1,4	1,6
Netherlands	0,7	0,6	0,6	0,6
Luxembourg	0,9	0,8	0,6	0,6

Source: Eurostat (2011)

Engineers, guards, machine operators, builders, real estate agents, layers, financial agents, insurance consultants, environmentalists and other specialists are needed in order to complete the installation and operate a renewable energy solar park. The high technological demands in solar recourses require the business staff to be highly qualified (Dogl, Holtbrugge and Schuster, 2012).

There is a highly qualified working force in all regions of Greece but in Central Macedonia and Attiki the percentage of those who are employed and of those being unemployed is even higher than in other regions.

3.1.2 Physical recourses

According to Ernst &Young (2012), high levels of solar irradiation make Greece an attractive solar market. In the Presentation of Greece's project Helios (Greek Ministry of Environment, Energy and Climate Change, 2011) at the 26Th European Photovoltaic Solar Energy Conference and Exhibition, the ability of Greece to produce solar energy was highlighted: "Greece enjoys 300 days of sunshine a year and almost 50% more sun radiation than Germany, the global leader in solar PV".

However, as locality in RES plays a crucial role, regions of south Greece present higher sun radiation than regions of north Greece. Thus, south Greece's attractiveness in solar energy production investments is significantly higher. The average annual solar radiation is 1.800 kWh; consequently Greece's potential solar energy could be exploited by other European member states, either for economic purposes or in order to attain their goals within the scope of Europe 2020.

3.1.3 Infrastructure

Greece's network needs upgrading in order to meet the demands of RES. Extensive investments in grids and generating capacity are required (IEA, 2011). Investments in capacity are needed so as to attain renewable energy goals, while simultaneously, there could be an economic turnover to the regions of their installation. (Allan, Mcgregor and Swales, 2011)

The energy market in Greece is not liberated and the only provider is the Public Enterprise of Electricity. Consequently, the needed investments in networks are not economically efficient for private initiatives within the current regulatory framework. Lately, the capacity of networks has been minimized due to investments in RES.

As presented in Table 3, there are regions where network capacity for RES is zero or marginal. Besides the high irradiation, not all regions accomplish the conditions for investments because of the network capacity. Electricity network system is composed by an interconnected mainland system and non-interconnected islands. The interconnected mainland system in many regions as in West Macedonia and West Greece has been covered.

Table 3: Final possibility existing network considering all known requests for RES stations (operating or connection offer or under consideration)

REGIONS	Maximum margin only for PV (MW)	Sub region capacity
East Makedonia-Thraki	75	Evros (20) Kavala (55)
Central Makedonia	179	East Thesalonniki(57), West Thesalloniki(32), Pieria(5), Xalkidiki(85)
West Makedonia	0	
Ipeiros	0	
Thessalia	0	
West Greece	0	
Central Greece	0	
Attiki	51	
Peloponnesus	44	Korinthos (44)

Source: Public Enterprise of Electricity (2012), modified by authors.

Land availability plays an essential role as in Greece the land is splitted (IOBE, 2010) and there are also quite a few million acres of sustainable uncultivated land.

Table 2: Quality of human resources in Greek regions

	Percentage of employed by region as to the total of employees of each region holding a doctoral, master, university graduates. Graduates of higher technological schools					Percentage of unemployed by region as to the total of unemployed of each region holding a doctoral, master, university graduates. Graduates of higher technological schools				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
East Makedonia-Thraki	27,85%	28,18%	28,66%	34,10%	30,03%	21,19%	25,26%	22,46%	21,43%	22,73%
Central Makedonia	35,78%	36,44%	38,67%	39,30%	41,30%	36,31%	36,82%	34,66%	37,28%	34,87%
West Makedonia	26,87%	27,94%	29,84%	30,43%	31,83%	24,69%	22,54%	24,93%	28,65%	36,40%
Ipeiros	27,21%	27,22%	27,14%	31,85%	32,20%	32,77%	34,48%	33,76%	35,02%	28,33%
Thessalia	30,77%	34,15%	33,01%	31,76%	33,24%	44,85%	35,85%	37,29%	32,42%	35,22%
Ionia Islands	19,55%	20,04%	25,40%	26,77%	24,47%	13,38%	21,79%	28,79%	16,20%	16,64%
West Greece	27,95%	27,07%	28,09%	30,03%	28,92%	36,01%	21,35%	30,99%	30,32%	30,42%
Central Greece	23,48%	24,31%	24,16%	25,52%	28,22%	27,55%	25,47%	26,78%	26,77%	27,03%
Attiki	46,59%	47,21%	49,59%	49,90%	54,29%	47,05%	39,18%	41,71%	41,24%	39,97%
Peloponnisos	23,24%	20,57%	21,92%	24,02%	22,57%	25,80%	24,63%	26,08%	29,29%	29,01%
North Aegean	31,63%	36,26%	28,88%	29,65%	33,05%	18,16%	32,55%	32,70%	29,58%	24,29%
South Aegean	22,86%	22,64%	21,40%	26,13%	32,69%	17,67%	14,97%	14,72%	30,34%	22,27%
Kriti	29,60%	26,88%	26,49%	27,29%	29,44%	36,71%	31,24%	29,60%	29,53%	29,79%

Source: Eurostat (2012)

3.1.4 Capital

The financial availability is a fundamental factor for cautious investors (Ernst and Young, 2012). Barret (2011) points that EIB in 2011 financed with loans of € 5.5 billion renewable energy projects and with € 1.4 billion TEN-E projects.

Table 4: EIB's renewable energy financing in Europe 2007-2011(EURm)

Renewable Energy	EURm
Solar photovoltaic	2,216.03 (16%)
Hydroelectric	2,558.6 (19%)
Offshore Wind	3,231.17 (24%)
Onshore Wind	4,043.85 (30%)
Geothermal	547.5 (4%)
Biofuel/Biomasse	374.78 (3%)
Solar thermal energy	591.22 (4%)

Source: Barret(2011)

In the context of promoting and encouraging investments in RES from the EU, there are co-funded sources as the Intelligent Energy Europe (IEE) programme and the Rural Development Fund (EAFRD). There are also other funding programmes such as the Joint Assistance to Support Projects in European Regions (JASPERS), the Joint European Resources for Micro to Medium Enterprises (JEREMIE) and the Joint European Support for Sustainable Investment in City Areas (JESSICA). The ERDF funding in this sector is low, especially in support of energy grid investments (European Parliament, 2012), while the EARDF could provide financial sources towards such initiatives (European Union, 2011a).

3.2 Strategy and structures

Greece's National Plan for RES is based on 20/20/20 regulation of Europe 2020. Greece's targets in this sector are expected to be far above Europe 2020 (European Commission, 2010) sets. The main target is to cover its energy needs and sell energy to other countries through programs like HELIOS. The revenues will contribute to sovereign dept. payout. Huge solar parks are also constructed by the Public Enterprise of Electricity in order to reduce gradually its dependence on lignite.

Liberating energy market of obstacles and statism will contribute to the modernization of structures. The current structures are not friendly for investments from private initiative.

The growth of renewable energy is costly in relation to non-renewable, so for strategic reasons, the investments in solar energy production in Greece attractively subsidized during the previous years. There are regions where the percentage of the subsidies was higher than in others so as regions with low income to attract investments.

Through a feed in tariff policy in solar energy production after 2009, Greece tried to encourage investments. Greece's solar sector and producers enjoyed higher rates, from 0,35 euro to 0,4 euro per kilowatt hour (kWh), from 2010 to February 2012 compared to Germany where for the same period the rate ranged between 0.21 euro to 0,29 euro/kWh (Ernst & Young, 2012).

Table 5: Feed-in-tariffs for photovoltaics from 2009 to 2020

Year	Month	Mainland		Non-Interconnected Islands
		>100kW	10<=100kW	
2009	February	400,00	450,00	450,00
2009	August	400,00	450,00	450,00
2010	February	400,00	450,00	450,00
2010	August	392,04	441,05	441,05
2011	February	372,83	419,43	419,43

Year	Month	Mainland		Non-Interconnected Islands
2011	August	351,01	394,88	394,89
2012	February	333,81	375,53	375,54
2012	August	314,27	353,56	353,55
2013	February	298,87	336,23	336,23
2013	August	261,38	316,55	316,55
2014	February	268,94	302,56	302,56
2014	August	260,97	293,59	293,59
For each n year as of year 2015		1.3 ASMCn-1	1.4 ASMCn-1	1.4 ASMCn-1
ASMCn-1: Average System Marginal Cost during the previous year (n-1)				

Source: Greek Ministry for Environment, Energy and Climate Change (2010)

3.3 Demand conditions

According to Europe 2020 all European Union countries must achieve the target of 20% energy production from renewable energy sources. All the member states of the EU, but also other countries like the USA, China, Russia are trying to reduce energy dependence from non-renewable sources and increase the renewable energy production.

All the scenarios presented in the National Renewable Energy Action Plan (Greek Ministry for Environment, Energy and Climate Change, 2010) during the period 2010-2020 show a raise in electricity production from renewable energy in Greece.

Table 6: The possible scenarios of National Renewable Energy Plan 2010-2020

	2010			2015			2020		
	Reference	Compliance	Accelerated economic recovery	Reference	Compliance	Accelerated economic recovery	Reference	Compliance	Accelerated economic recovery
Electricity generation(TWh)	58,86	58,86	58,86	64,13	61,47	62,09	2,18	8,46	2,48
% RES in electricity generation	13%	13%	13%	22%	28%	29%	8%	0%	1%
RES installed capacity(GW)	4,11	4,11	4,11	7,13	8,66	9,33	9,91	3,27	4,72
Biomass/Biogas	0,06	0,06	0,06	0,05	0,12	0,12	0,05	0,25	0,25
Hydro(excluding pumping)	2,54	2,54	2,54	2,89	2,92	2,91	2,91	2,95	2,95
Wind	1,33	1,33	1,33	3,78	4,3	4,74	6,25	7,5	8,25
Solar PV	**0,18**	**0,18**	**0,18**	**0,41**	**1,27**	**1,51**	**0,7**	**2,2**	**2,9**
CSP	0,00	0,00	0,00	0,00	0,03	0,03	0,00	0,25	0,25
Geothermal	0,00	0,00	0,00	0,00	0,02	0,02	0,01	0,12	0,12

Source: Greek Ministry for Environment, Energy and Climate Change (2010)

Greece's electricity consumption during the previous 15 years was continuously growing (Table 7). Only the last two years due to the economic crisis did the consumption decrease slightly. The domestic demand is of decisive importance for the enterprise competiveness. According to McKinsey (2012) report regarding Greece: "Compared to other Southern markets and Germany, electricity consumption in the residential and commercial segments is up to 40% higher and fuel consumption for transportation is up to 10% higher".

Table 7: Greece's electricity consumption

YEAR	ELECTRICITY CONSUMPTION (kwh)
1998	44.766.000.000,00
1999	46.451.000.000,00
2000	49.559.000.000,00
2001	51.260.000.000,00
2002	53.525.000.000,00
2003	55.638.000.000,00
2004	56.967.000.000,00
2005	58.202.000.000,00
2006	59.891.000.000,00
2007	62.991.000.000,00
2008	64.309.000.000,00
2009	62.509.000.000,00
2010	59.315.000.000,00
2011	59.848.000.000,00

Source: World Bank
http://data.worldbank.org/indicator/EG.USE.ELEC.KH

3.4 Related supporting industries

In renewable energy production, there are many related supporting industries which are encountered in a wide range of economic activities. Industries constructing photovoltaic panels have been developed in Greece within the last years for two main reasons. Firstly, the domestic demand has increased, and as a result, many international companies transfer production units in Greece. Secondly, Greece's skilled workers and the strategic position of Greece are offered for exports in the Balkan region, North Africa and West Asia. Real estate companies support solar energy sector by detecting land that is available and satisfies the appropriate physical conditions. This is essential because in Greece land property is splitted. The constructing sector, such as engineering companies, is required during the installation process. Financial and insurance companies offer specialized products and services to investors. The only supplier at the moment is the Public Enterprise of Electricity and the distribution channels belong to HTSO-Hellenic Transmission System Operator which is its subsidiary company. All contracts of selling solar energy, which have duration of 20 years, are signed through HTSO.

3.5 Government

Greece's government plays an important role due to its statism and interventionism. The current regulatory framework presents shortfalls and is not applicable due to the bureaucracy. Despite the efforts to simplify the license procedures followed by the public services, the situation is still non-friendly for investors. The law 3581/2010 managed partly to set a renewable energy market. The priority that was given to farmers' applications, after political pressures on the government of Greece and the inability to examine the applications in time, delayed big investments in solar parks. The previous year the emergency taxes came up to 40% in order the Greek government to obtain revenues to accomplish its fiscal target. From August 2012 the procedure of administrating licenses for the installation of solar parks has temporarily been inhibited because the targets set by the Ministry of Environment until the year 2014 have been fulfilled.

3.6 Change

Physical phenomena and natural disasters may cause vulnerability in energy production from renewable energy sources. Climate change will affect the weather conditions in many regions within the next years, therefore structures in RES should weigh up climate change as an instrumental variable. As presented in Region 2020 (Commission of European Communities, 2008), the impact of climate change on the EU regions in the energy sector is crucial. In addition, all regions of Greece show high vulnerability to climate change and energy in medium term.

Conclusion

Greece's energy market reformation will contribute to the country's economic competiveness. Recourse efficiency may boost the economy (European Commission, 2011). Despite the comparative advantage which is created by the human recourses and the high irradiation, factors such as the infrastructure, the capital and the government also affect significantly the diamond model in the case of solar energy enterprises in Greece.

The infrastructure and the needed upgrading investments tend to hinder the widespread exploitation of renewable energy sources. Regional and sub-regional capacity of the existing network is a considerable variable for investments. The lack of credibility and the problems in the bank sector inhibit further development.

The government, as Porter (1990) mentions, plays an important role in influencing the diamond. In countries like Greece, where statism remains high and the constant interventions in energy market cause distortions, the role of the government became much more crucial. IEA (2009) maintains that the reduction of Greece's statism may advance the national economy. The additional taxation in high solar energy production enterprises, in conjunction with producer's payment delays from the system provider caused defaulted loan installments.

National competiveness of Greece in solar energy production, as indicated in several researches, is high due to physical recourses, knowledge and human resources. Nonetheless, entrepreneurship should be encouraged through friendly policies and by creating an appropriate regulatory framework. Greece should exploit its strategic position in the global map by providing the other European member states with renewable energy. To do so, comparative advantages of regions should be exploited in line with regional entrepreneurship policies.

Regional or local factors play an essential role as they affect either in a positive or a negative way the national competiveness. There is a pool of high qualified and skilled personnel in the regions of Attiki, Central Makedonia and West Makedonia. However, there is network capacity for investments in renewable energy production only in Attiki and Central Makedonia. The irradiation in the regions of north Greece (Central Makedonia, Thraki, West Makedonia) is lower than in south Greece (Attiki, Peloponnisos), therefore, competiveness at a national level especially in renewable energy firms depends, to a great extent, on locality.

The regional and sub-regional reformation in 2010 created new local policy targets about energy planning. Huge solar parks and other renewable energy projects such as the hydroelectric production are not always welcome from local communities as the internal stakeholders balances change. Regional strategies should underpin entrepreneurship competiveness and eliminate unnecessary obstacles (Huggins and Williams, 2010).

What emerges from the above analysis is that regional/local factors should be analyzed thoroughly when Porter's model is applied on renewable energy firms.

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