SOLAR ENERGY FIELD WELCOMES NEW TRENDS IN THE EUROPEAN UNION. CASE STUDY: ROMANIA

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Abstract
In 2012 and 2013, solar energy has become the most important source of renewable energy in the European Union, whose main role is to produce electric power. Business models in the solar energy field, as well as the perception on the legal context, that is a major source of influence for the companies in the field, have been a main subject of debate in Romania and the European Union, but have not been scientifically researched. The purpose of this paper is to develop a comparative study on the situation of business models in the Romanian field of solar energy, between the years 2013 and 2014, as well as the development of photovoltaic industry forecasts in Romania in the coming years. In order to perform this study, we used the method of Delphi based on questionnaires and interviews with experts in this field of activity. This study is a continuation of the research carried out last year (Tanţău et al., 2014) and illustrate the major changes in the Romanian field of photovoltaic energy, after modifying the law No. 220/2008 by Emergency Ordinance of the Romanian Government No. 57/2013 and the appearance of Decision of the Government No. 994/2013. The study treats the new directions in the field of photovoltaic energy in Romania representing the basic pylon of the future trends of business models in the photovoltaic industry, that were not previously provided in the scientific literature.
Keywords: Photovoltaic, Photovoltaic business model, Solar energy.

1. INTRODUCTION

Existing economic and social relationships in a globalized world-wide economy, had demonstrated that in an increasingly polluted, unsafe, dynamic, turbulent, uncertain, risky environment, sometimes even chaotic and given the fact that the sources of energy based on fossil fuels are predictably exhaustible, it is no longer conceivable for any organization to conduct activities, without seeking sustainable long-term solutions to secure the energy produced with low carbon technologies, technologies based on renewable energies in particular on photovoltaic.

To be able to handle the intense changes taking place in all fields of activity, the competitions at both national and international level, the tastes and needs of the people, as well as trends in economy and society, economic organizations are obliged to reorganize and to continuously adapt to new requirements and conditions.

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The use of renewable energy resources is becoming more obvious, given that energy sources based on fossil fuels (crude oil, coal, natural gas, nuclear fuel fissionable fuels etc.) are predictably limited. Taking into account the evolution of costs and fossil fuel reserves, the prestigious Organization for the study of Scarcity of Petroleum and Natural Gas (A S P O), in the study which it has developed in 2005, estimated the time left until depletion of fossil fuels such as: Oil-45 years; Natural gas-66 years; Charcoal-206 years; Uranium-between 35 and 100 years.

Analyzing these estimates, the very short time until exhaustion of existing reserves, requires finding solutions fast and efficiently to replace the energy that can be produced by then from fossil fuels. The only plausible solution to this problem is the development and use of renewable energies, that are environmentally friendly, do not generate carbon dioxide emissions, are available in unlimited quantities, can be used topically, and represent the sustainable solutions for all needs (Bălan, 2007, p.13).

TABLE 1 - NREAPS VS. REALITY OF PV MARKETS IN THE EU 28 (GAËTANET ET AL., 2014)

	Cumulative installed capacity in 2013	NREAPs' 2020 target for PV	Necessary yearly market until 2020	Target reached in...	Market 2011	Market 2012	Market 2013
Austria	613	322	n/a	reached in 2012	92	1 75	250
Belgium	2,983	1 ,340	n/a	reached in 2011	996	683	215
Bulgaria	1,020	303	n/a	reached in 2012	135	843	10
Croatia	20	52	4.5	2014-2015	-	-	20
Czech Republic	2,175	1 ,695	n/a	reached in 2010	12	116	88
Denmark	548	6	n/a	reached in 2010	9.6	316	216
France	4,673	4,860	26.7	2014-2015	1,777	1,115	613
Germany	35,715	51 ,753	2,291.20	2014-2015	7,485	7,604	3,304
Greece	2,579	2,200	n/a	reached in 2013	426	912	1, 043
Hungary	22	63	5.9	2014-2015	2	8	10
Italy	17,928	8,000	n/a	reached in 2011	9,251	3,759	1, 448
Netherlands	665	722	8.1	2014-2015	58	195	305
Poland	7	2	n/a	reached in 2012	1.3	4	1
Portugal*	278	720	63.1	2016-2020	38	70	36
Romania	**1,151**	**260**	**n/a**	**2014-2015**	**1.6**	**46**	**1,100**
Slovakia	524	300	n/a	reached in 2011	321	15	0
Slovenia	212	139	n/a	reached in 2012	43	122	11
Spain	5,340	8,367	432.5	2016-2020	472	332	118
Sweden	40	8	n/a	reached in 2011	4	8	18
United Kingdom	3,375	2,680	n/a	reached in 2013	813	925	1, 546
Rest of EU 28	99	308	29.9	2016-2020	24	17	42
Total EU 28	**79,964**	**84,381**	**630.9**	**2014-2015**	**21,961**	**17,265**	**10,395**

The development of renewable energy is increasingly planned at local, regional and national level, in the context of sustainable development (Zamfir, 2011, 2012, 2013) and increased market competition

(Corbos, 2011). Moreover, Romania, has an important potential in terms of renewable energy, waiting to be exploited (Pîrlogea, 2012).

This paper explores one of the cleanest forms of energy on Earth, namely solar energy. The study on photovoltaic industry treats thee use of solar energy to produce electricity.

In recent years, this industry has been having an explosive growth benefiting from the financial support from Governments and because the technologies in this area have become more affordable.

Also, in Romania starting with 2008, the investment in this area has been encouraged after the law 220/2008 was issued, which claimed the development of renewable energy.

This optimistic perspective of investments in this area have been translated by the fact that at the end of 2013 in Romania were already installed projects totalling 1151 MWp, of which 95.5% were built in 2013 (Graham et al., 2008) (Table 1).

The experts' answers also noted that in terms of provision of such incentives more companies in this field have made long-term strategies for energy security.

This research is a study that I have developed during the reporting period 1 May-30 September 2013 (Tanţău et al., 2014) and focuses on investigating the period between October 1, 2013 and March 15, 2014, as well as new directions for business models in the Romania field of photovoltaic, using the Delphi method, applied with the key questions addressed to selected experts, investors and engineers working in this industry. The study shows how the Romanian photovoltaic market has developed during the period of October 1, 2013-March 15, 2014, and how it will evolve in the coming years, given the substantial reduction in the support system with green certificates.

2. THE MAIN ELEMENTS OF A BUSINESS MODEL

Business models are considered to be key elements in an organization, providing stability for the development of the company's activities, as well as flexibility, helping implement in a company.

In the literature many definitions are given for a business model, but there is no generally accepted definition by the researchers.

According to Osterwalder and Pigneur (2010), a business model includes parts of a business, which “creates, delivers, and captures” value.

Of the many pieces of business models presented in the literature, we consider as being the most

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representative, the model presented by Osterwalder and Pigneur in 2010 (Osterwalder and Pigneur, 2010). Structurally, the model contains 9 building blocks with essential elements of a business model (Figure 1).

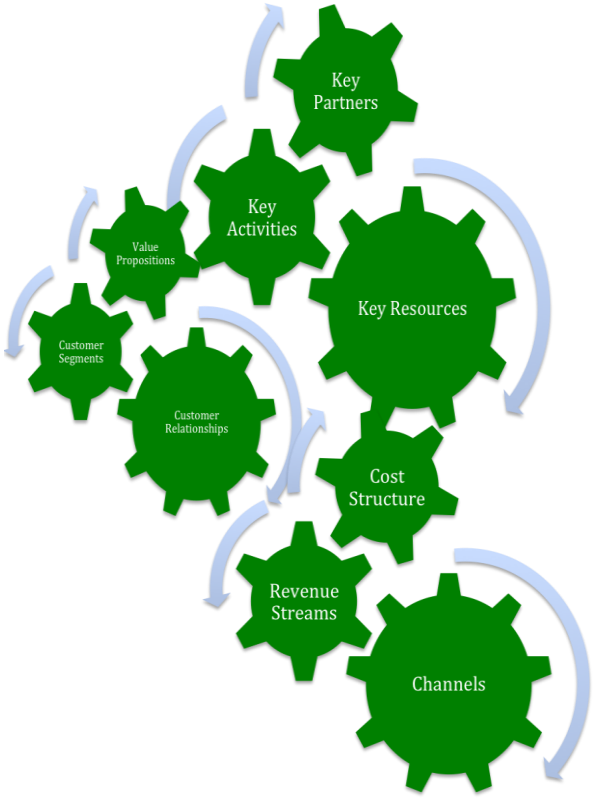

FIGURE 1 -NINE BLOCKS BUSINESS MODEL
Source: Osterwalder and Pigneur, 2010

From other perspective, a business model was defined by Richter (Richter, 2011), Johnson, Christensen and Kagermann (Johnson et al., 2008), Weil, P. and all (Weil et al., 2005) but from my point of view the most complete definition is made by Osterwalder & Pigneur in 2010 (Osterwalder & Pigneur, 2010).

I will refer to Mr. Osterwalder's business model canvas (Figure 1) to identify these key components. In order to find out the answers for all Osterwalder & Pigneur blocks, first of all we should put the right questions. Here we have a few questions to ask for each element.

I. Customer Segments. The target audience for a business' products and services.

II. Value Propositions. The bundle of products and services that create value for a specific customer segment.

III. Channels. Channels describe how a company communicates with and reaches its customer segments to deliver their value proposition.

IV. Customer Relationships. The links a company establishes between itself and its different customer segments.

V. Revenue Streams. The way a company makes money through a variety of revenue flows.

VI. Key Resources. The resources that is necessary to create value for the customer.

VII. Key Activities. The activities necessary to execute a company's business model.

VIII. Key Partners. The key partners describe the network of suppliers and partners that make a business model work.

IX. Cost Structure. All costs incurred to operate a business model.

Common to all definitions of business models is the way in which a company focuses in organizing activities to capture value, by depositing all efforts both within the company and in the market.

3. PHOTOVOLTAIC BUSINESS MODEL

Due to continuous decrease of production costs of solar energy and electricity price increase on several international markets, solar energy is an interesting area to explore. There are domestic customers of electricity, especially commercial and industrial consumers facing unforeseen price increases for electricity, network instability and high maintenance costs for diesel generators.

Until now, the majority of business models for solar energy industry still relies on government incentives but this is changing rapidly since the components PV prices continue to fall.

Today, photovoltaic energy has gone through the unconditional adoption stage and began to be considered even more as a stable investment opportunity. With the gradual reduction of incentives in the industry, you will need to upgrade to new business models in which individuals will not want to obtain solar energy because it is subsidized, but because that should be included in sustainable development. This will also happen through innovative forms of investment like group financing or/and investment group.

These forms of business represent an innovative investment model, because they allow access to everyone searching for opportunities. These opportunities were previously open only to wealthier classes. These are the visions of a more equitable and sustainable world.

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Business models in the field of photovoltaic in Romania can be divided into four categories:

A. The customer ownership. Customer is responsible for paying all costs and taking all the operational risks of the business, but they receive in the same time all income sources for electricity and the system of subsidies provided for solar energy production. In Romania this type of business is widely spread.

B. Third-party ownership. Power purchase agreements are made on a much larger scale. This type of business model is a growing part of PV markets and has the advantage of lower costs associated with larger-scale installations.

C. Utility ownership. Utility-driven distributed photovoltaic installations are very dynamic. This sector has the potential to create additional market expansion on the long run. There are several large projects implemented in this system and there are still some waiting for financing. Utilities must continue innovating in order to capture value in solar markets.

Utilities are responding to legislation, commission, management and customer or pricing needs.

D. Leasing programs. These financing options started to appear on the Romanian market opening the market for private consumers who will install solar panels on their homes or factories. This business model will be developed when the feed-in tariff will be implemented.

4. METHODOLOGY

Business models in the field of solar power in Romania were analyzed according to a theoretical model developed by Osterwalder and Pigneur (Osterwalder & Pigneur, 2010) using the Delphi method (Häder, 2009), following the classical phases of this method, namely: selection and definition of the key types of business models in the field of solar power in Romania, survey research achievement patterns for business in photovoltaic, the selection of experts to be interviewed, completion of the first round of interviews online as well as conducting individual interviews with experts, analysis of the results of the first round of questionnaires and interviews with experts and information about the results of the first stage of research, completion of the second stage of online interviews with experts, as well as individual interviews with experts, analysis of the results of the second stage of questionnaires and interviews with experts and information about the results of the second stage, followed by the elaboration of the report Delphi (Häder, 2009).

This method has been implemented for questioning experts and companies in order to understand the number of business models implemented in their own companies during this period and future trends in

this area.

Interviews were conducted with experts, members of the 25 companies in the photovoltaic field in Romania.

There were questionnaires formulated related to the elements of the model with the nine building blocks for interviewing experts in order to see how many models have been implemented in the given period by firms of photovoltaic as well as the potential for the development of these models in the future

5. FINDINGS AND ANALYSIS

For the purpose of exploring the fundamentals of the business model in the field of photovoltaic, our study was based on answers of mentioned authors, who illustrated a main schema of a technological flow of a successful business model.

In Romania the business models applied in the PV companies are the following: "(48%) stated that their company currently uses the "Photovoltaic plant that is the property of and operated by their own company with energy sales to a trading entity (other than the grid operator)", 17% prefer the "Photovoltaic plant that is the property of and operated by their own company with energy sales to the local grid operator (the one which the connection contract has been signed with)", while 10% apply the business model "Photovoltaic plant that is the property of and operated by their own company with energy sales to a third-party entity". Only 7% of the interviewed experts have implemented the "Photovoltaic plant that is the property of and operated by a local grid operator". The rest 17% apply other business models in their company, as shown in Figure 2".

The results concerning the assumptions in the field of photovoltaic in Romania differ from the situation in the previous year due to legislative changes that have taken place since 1 January 2014 when the support scheme for producers of photovoltaic industry was reduced to 3 green certificates. Based on the history of other European countries, that have had experience in this area, the natural next phase will be to support small systems with a maximum installed power of 1 MWp (by entering "feed-in tariff", that will facilitate the development of systems on the roof of buildings and dwellings). Even without the industry's support the scheme can increase based on some sound arguments such as energetic independence of consumer and contribution to environmental protection.

Another important part of the research was the experts' perception of the legal framework in Romania and its influence on the photovoltaic industry. If last year most experts (65%) saw the business context as one of convenience while (35%) saw it as one of weak and uncertain opportunities, this year only

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20% consider the current situation as an opportunity and 80% as being weak and uncertain opportunities. If last year 81% of experts have noted a certain degree of insecurity of legal developments in Romania this year, this percentage increased to 92% (Figure 2).

When we speak of the medium-term strategy regarding the operation of the assets differences have been found here in approaching major companies (2013 vs. 2014).

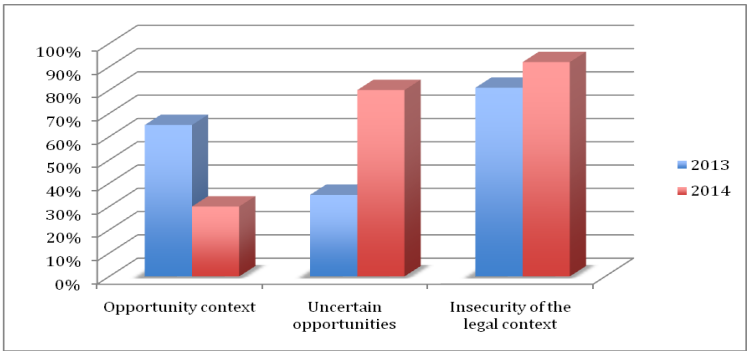

FIGURE 2 - PV BUSINESS CONTEXT IN ROMANIA

If in 2013 68% of respondents were not interested in selling the assets, their "(economic objects) in the field of photovoltaic, in the next 1-5 years that percentage fell to 36% and while 52% intended to sell some of these (compared to 16% last year), 12% intended to sell all assets (Figure 3).

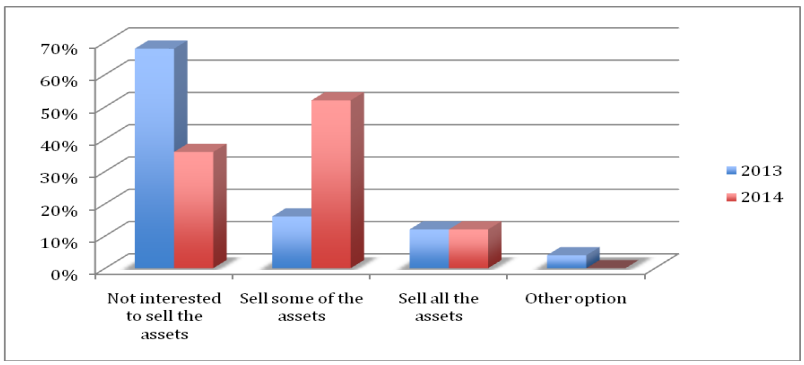

FIGURE 3 - PV CONTEXT IN ROMANIA INVESTOR'S OPTIONS

If last year 72% of experts stated that they would continue to invest in photovoltaic, in 2014 the percentage has shrunk dramatically from 32% and the percentage of those who do not want to invest increased from 28% to 68%.

6. CONCLUSIONS

In conclusion, the first assumption of the photovoltaic business most commonly implemented by companies in Romania was confirmed by the two models described: "photovoltaic plant that are the

property of and operated by their own company with energy sales to a trading entity (different than the grid operator)" and the photovoltaic plant that is property of and operated by their own company with energy sales to the local grid operator".

What is changing, however, is the perspective for the next 1-5 years on new projects that will be implemented. Business models of photovoltaic in Romania are changing making the transition to photovoltaic systems owned and operated by the final beneficiaries for their own consumption and photovoltaic systems that are owned and operated by companies specialized in photovoltaic with the sale of energy to a third-party for their internal consumption.

In 2013 the photovoltaic industry in Romania had a spectacular development, all projects implemented surpassing 1 GWp. Modification of the law on 1 July 2013 and thereafter on 1 January 2014 made all investors in this area to accelerate their investment processes by the end of 2013, and then a large proportion of them to lose interest and confidence in this industry in Romania.

One major problem was the Government's proposal to maintain the share of electricity produced from renewable sources to 11.1% (which will be part of green certificates system in 2014), leading to the agony of investors regarding the future of energy renewable in Romania.

In the past 5 years, the Romanian photovoltaic market has grown, passing from the uncertainties and lack of security in the beginning (in the years 2008-2011) into the optimism and effusion in 2013, followed by a slow down in 2014.

Medium and long term, considering the increase in the electricity price, the market for large projects (bigger than 1 MWp) will gradually be replaced by systems to small and medium scale, installed on roofs and by Off-grid systems.

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