

RENEWABLE ENERGY DEVELOPMENT OPPORTUNITY AS SMALL AND MEDIUM ENTERPRISES IN VIEW OF THE ECONOMIC, SOCIAL AND ENVIRONMENTAL SUSTAINABILITY

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Abstract

The theme of this work is very relevant, given that the development of renewable energy sources is a major challenge for the future of Europe and the world. The world economy is largely dependent on fossil, non-renewable sources of energy (oil, coal), as well as from nuclear power, which poses a potential threat to the environment and human health. Therefore the issue of energy security and stability has become in the last ten years, the most current from the economic, commercial and social aspects. The European Union, despite the high level of development and commitment issue of energy security is also facing the problem of reducing the environmental impact and role in reducing the human impact on climate. In this regard, one of the goals of this work is to prove the connection of the energy sector with konkurentošću economy. Model energy use and exploitation of natural resources to produce energy can be an engine for the development of a certain area or country, or if it does not take into account the environmental impacts in meeting energy needs, it can lead to the establishment of a completely unsustainable economic and social development. For this reason it is essential that further steps when it comes to planning the energy sector, to be implemented in a way that defines the priorities of the development of the energy sector, there is a public and professional support in order to simultaneously ensure economic development and to the principles of sustainable development. The sector of micro, small and medium enterprises, the base layer of the economy and represents an opportunity for development, but it is very important to promote and support the development of entrepreneurship in the economic field which is related to environmentally safe energy production. For the development of this sector requires good laws, effective procedures and predictable business environment. Projects relating to investment in renewable energy sources bring development opportunities or sustainable energy systems must include ecological, economic and social aspects of sustainability.

Keywords: Renewable energy, economic evaluation, SME environment,

JEL Classification: G23, Q25, Q28, Q42, Q48

Introduction

Already at the end of the twentieth century, the world was confronted, on the one hand with the growing need for energy, and on the other side with a relatively limited existing resources, and then starts to turn to other, alternative sources of energy and other possibilities. We are witnessing the beginning of a "boom" renewable energy sources. These energy sources are the only sustainable sources of energy and will have a central role in the future in energy. All research on new possibilities originating from one of the following sources: solar energy, geothermal energy from inside the earth, gravity and nuclear energy. The study Goldemberg (2004, pp.116) points out that by solar energy is the largest source of energy, and solar energy to the source several times higher than the rest of alternative energy sources, because it is inexhaustible, as long as there is sun (provided more than four billion years ago). However, the availability of the assigned resources, is not the only criterion by which to measure the energy source. It should take into account the following aspects: the way in which the source is converted into electrical energy, environmental impact and impact on health, both at local and at regional and global level. You should also discuss issues related to the guarantee of energy security, as well as the relationship between energy and poverty, jobs, sustainability of economic development based on the dominant participation of small and medium-sized enterprises.

1. Small and medium enterprises as the bearers of economic growth

In today's economy, small and medium enterprises are the carriers of economic growth in all areas of production. For example, in 2015 in Serbia as part of the entrepreneurial sector operating companies 324 272, representing 99.8% of the total number of companies (324,766). The small and medium enterprises and entrepreneurs 64.8% of the employment generated by the non-financial sector hiring 761,539 workers and 65.4% of turnover and 56.0% of GVA non-financial sector. It is estimated that in 2014, SMEs accounted for about 32% of the GDP of the Republic. But only 1% of these enterprises in the energy sector related to energy production from renewable sources. Understanding the importance and contribution of renewable energy sources to sustainable development of the economy, 2015-the year in Serbia declared the year of energy efficiency and the 2016. was declared the year of entrepreneurship. According to the policies presented in the documents mentioned above, one of the main objectives of the European Commission was to increase the share of renewable energy in the overall energy consumption from 6%, in 1997, to 12%, in 2010; this threshold was exceeded by many European countries, and by the UE28 average. (Eurostat, 2015) In December 2008, the European Union adopted a package of regulations on "climate and energy", which obliges Member States to implement measures that aim at increasing the share of renewable energy to over 20% of Europe's total energy production until 2020. (E.C., 2011)

It can be said that, at present, renewable energy demand for electricity reached a high level worldwide, particularly in Europe. According to Eurostat (2015), the share of renewable energy in total energy consumption across Europe has increased from year to year, from 2005 to 2014 the best result among the EU countries was registered in Sweden. (Source: <http://ec.europa.eu/eurostat/tgm/table.do>)

On 1 January 2007, only slightly more than 1% of the global electricity was provided by wind generators (approx. 74,000 MW) (Duma, 2007) As far as wind energy is concerned, which is an important renewable source of energy across Europe, in 2008, it represented approximately 4.8% of the total EU energy consumption (E.C., 2011). Based on these

figures, it is expected that, by the end of 2020, this percentage will exceed 12 units, and more than 34% of the total electricity consumption will be provided by renewable energy sources. (Condrea, E., Condrea, A., Stanciu, A. C., 2016 : 61). The planned pace of renewable energy sources in the coming period in the European countries is a necessity and a prerequisite for sustainable economic development. A large contribution to this process have a medium-sized enterprises, given that the organizational forms that are highly adaptable to changes in the environment, as well as the challenges related to environmental protection. In fact, small and medium enterprises, encouraged by government subsidies, very quickly they are able to convert the equipment manufacturer to use renewable energy sources for energy purposes as well as for the production of different types of energy from renewable, locally available sources.

2. Renewable energy resources – technical and economic evaluation

2.1. Solar energy

The use of solar energy on Earth depends on the location, season, time of day, weather conditions, etc. Europe is not perfect territory for exploitation, but despite that in Europe the use of solar energy on the rise, thanks to the policies of individual countries rather invest in renewable energy, especially solar energy. Fundamental principles of direct use of solar energy are: solar collectors (heating water and rooms), photovoltaic cells (the direct conversion of energy into electricity) and focusing solar energy (use in large power plants). The obvious advantages of solar energy is that once the equipment is purchased, the use of solar energy is free. Then, solar collectors and panels do not emit harmful gases into the air, and their work is safe and quiet. Energy is produced at the point where it consumes so no long wires and cables. On the other hand, the disadvantage is that there is no sun throughout the day, or at night. Although solar energy can be used on cloudy days, the amount of useful heat or electricity is much smaller. Also the equipment needed for using solar energy is expensive, but over time becomes cheaper and more accessible.

2.2 Hydro energy

For hydropower the biggest problem is to determine the available water to the pad, which determine the potential for the use of water energy. Precipitation and soil, as configurations, and determine the composition of both characteristics. It is common that for a given stream shows the mean value of the flow and dependence on altitude. For specific location is also a significant knowledge of a certain duration of water flow and usable pad. In order to obtain the flow duration curve, it is necessary to have access to multi-year measurements, as well as assessments of the sustainability of the watercourse, depending on the climate change and so on. Hydropower resources, it is possible to assess the knowledge or estimation of flow duration and reusable falls. The variability of flow has a significant impact on the ability to produce electricity at the plant economy, especially when the potential accumulation of water as small as is the case with small hydro power (SHP).

Using energy as a source of so-called position. mechanical power is known for centuries. Large hydropower plants can flood large field which could cause population displacement and to have undesirable environmental and social impacts, so that large hydro is not considered a renewable energy source, by some. Small hydropower plants usually do not cause these problems, which are typical for large hydro power plants. Small hydropower plants can contain all the elements that have a major facility and the biggest difference is significantly less need for extensive hydrological and topological studies, and to a lesser

extent the construction works. The turbine and generator are the most important and the most expensive components of hydro power plants. When it comes to work and choice of turbines, the difference between small and large hydro power plants is that the SHP is not necessary to use a dedicated ordered and manufactured turbine because there is already a large selection of finished and turbines and generators.

When designing MHE is very important to pay attention to the choice of location and equipment is cost-effective. It can be done only if it knows the usable flow duration curve, falling flow losses in the inlet, turbine efficiency, the volume of construction works and the most important is the ability to use electricity generated. Financial investment in the construction of hydro power plants depends on the location, strength, and includes the expenses of studies, provision of land, purchase of turbines, generators, construction, network connection, maintenance, etc.

2.3. Geothermal energy

Geothermal energy is clean, renewable energy source from which all over the world can get heat and electricity. It is considered a renewable source because the heat is released into the interior of the country and is essentially unlimited. Geothermal energy is manifested in the form of hot water or steam and can be used for heating, for electricity generation, and for the purposes of direct heating for the Home, a constant source of heat for the production of energy and is therefore considered as a base of constant energy. Given that some renewable energy sources can be used only under favorable weather conditions, it is considered to have limited availability to meet growing needs. However, the availability of geothermal energy is over 90%, which means that geothermal energy can be used during any period of time. In a study published Sljivac and Simic (2009, pp. 8) states that the simplest and most promising way of exploiting geothermal energy is the direct use of thermal energy for various purposes in agriculture, industry, municipal heating etc. Also, this type of energy can be combined with other conventional methods of production of thermal energy or production of electricity from geothermal sources. According to the study (2009, pp. 52), the world's capacity to direct use of geothermal energy is estimated at 15 GWt installed capacity. Direct application is the largest in the area of heating the housing stock, and right behind the sports facilities, greenhouses, etc. Industry. Each country has its own peculiarities depending not only on the potential of geothermal energy, but also on many other factors. A particular example of using geothermal energy among the countries of the Island which uses over 50% of geothermal energy, mainly for heating, but also for melting ice and snow. Well-known locations in Serbia with the hottest mineral water is spa. The water temperature in the spa reaches from 980S to an incredible 1110S at the source.

Geothermal energy is, as mentioned, a source who has a problem with volatility. The fact is that this source can only be used at the site where the site and this is a limitation, which further implies that this is a big problem with the direct use of the potential problem for cities that are not near an electrical energy grid. Another obstacle when it comes to geothermal energy is the height of the investment, since it is necessary to allocate significant funding, especially for research findings.

2.4. Biomass

Biomass consists of residues from industry, as well as municipal solid waste which can be used as fuel. Bio fuels are biogas, solid fuels, liquid fuels (biodiesel and ethanol), which are produced from oil seeds, as well as the energy generated from the fuel wood, etc. Bio fuels,

especially wood biomass in the last ten years, increasingly used for heating and electricity production. Mitic et al (2009, pp.86) concluded that the global potential of biomass such as to be out of it could provide twenty times more energy than the current demand for electricity.

Today in the world there are biomass / biogas and those using biomass / biogas for carrying out the activity of an electrical and / or thermal energy. There are small power plants up to 10 MW and large power plants over 10 MW. Then, the biomass in terms of fuel for power generation, which is considered a renewable source, are biodegradable material created, as mentioned in the agriculture, forestry and linked industry and includes plants and plant parts, residues and by-products of plants resulting in agriculture (straw, branches, seeds, etc.), the resulting residues of animal origin in agriculture, residues from deforestation, as well as a biodegradable residue in the food and wood industry, which do not contain hazardous substances. Biogas produced in the anaerobic processes of biomass, are fuel for energy production and is made of the residues in agriculture and residual biomass generated from the primary processing of agricultural products. Bio fuel is the only significant exchange for oil and diesel in the transport sector. In the case of biomass heating, use of renewable energy sources, obtained important dimension because it is justified due to the several advantages it has in comparison to other fuels, particularly oil and oil products. The use of biomass for energy purposes is justifiable from the economic, environmental and social reasons. From the economic point of view, increased use of biomass reduces the import and use of fossil fuels. On the environmental side, emission harmful gases classified in neutral biomass fuel. Then, the social aspect, the construction of factories for the production of biomass, and new jobs and accelerate the development of rural areas.

As a conclusion of this part it is important to point out that part of the waste may be used as the biomass, thereby significantly reducing the amount of waste that must be disposed of. At the landfill of waste, biogas plants prevent the release of harmful methane gas into the air and use it for the production of electricity and heat. Biomass does not depend on weather conditions, such as, for example, solar energy or wind power, and can be used at any time when the energy required. On the other hand, although biomass is a renewable energy source, it must be used carefully because the noise can not be cut without control.

2.5. Wind energy

According to research by the Intergovernmental Panel on Climate Change (Intergovernmental Panel on Climate Change - IPCC), by 2050 almost 80% of world energy needs could be produced from renewable energy sources. Only wind energy can contribute as much as 20% this future mix of renewable energy. Wind energy currently accounts for only 0.2% of energy production and covers about 2% of the demand for electricity. Although there are doubts about the permanence of the wind, they can be solved by combining wind with other renewable sources such as hydropower and solar energy. Wind power plants have very low emissions throughout the life, however, have a number of consequences for the environment, which could affect their potential. Some of the consequences of the noise that turbine products, but with the advancement of technology and design improvements, noise is significantly reduced. Then, as a result of allegations of electromagnetic interference. The wind turbines can dissipate electromagnetic signals causing interference to communication systems. This problem is easily solved by placing wind farms in appropriate locations. As one of the most important arguments of those who are against the construction of wind parks is the protection of birds, specifically from

previous examples constructed wind farms in the world, it has been noticed that a flock of birds can be hurt by the turbine blades. The solution is to store the turbine outside the paths of migratory birds. Also with the advancement of technology, the sensors that detect the convergence of birds and slow down the operation of the turbines.

However, there is no economic crisis has failed to stop a long-term orientation towards the use of wind energy. Wind energy recorded rapid growth because it is technically the most mature of all new, clean sources of energy, and it's also the most competitive.

To sum up, the wind is a renewable energy source. Wind farms do not emit polluting gases into the environment. The terrain on which it is built wind turbines can be used for other useful purposes, such as for agriculture.

3. Production of energy from renewable sources as a development chance for small and medium-sized enterprises

According to local regulations in force, which are largely harmonized with the EU legislation, the status of a privileged producer may acquire legal entities and entrepreneurs performing the activity of power consumption in the following types of plants:

1. Hydroelectric power plant with installed capacity of 30 MW; 2. Hydroelectric power plant on the existing infrastructure of installed power to 30 MW; 3. Plant biomass; 4. Biogas plant; 5. Biogas plant of animal origin; 6. The power plant using landfill gas and gas from sewage treatment of urban waste water; 7. The wind power plant; 8. The solar power plant, or plant on solar energy; 9. Geothermal power plant; 10. The power plant waste;

Maximum total installed capacity of solar power which can acquire the status of a privileged producer or temporary status of a privileged producer is limited to 10 MW, and it in the following way: 2 MW of solar power to energy facilities sunlight individual power up to 30 kW; 2 MW power plants in the energy of solar radiation on the properties of individual power of 30 kW to 500 kW; 6 MW in power plants to solar energy in the country. Incentive purchase price (c € / kWh) in Serbia depends on the type of plant:

- Solar power plants on buildings up to 30kW installed capacity - 20.66; Solar panels on the buildings from 30kW to 500kW installed capacity - 20.94; Solar panels on the ground over 500kW installed capacity - 16.25. It is the current campaign being conducted in the media to encourage the use of renewable energy through obtaining the status of privileged producer. Electricity that is produced photovoltaic systems sold to the public grid at a preferential rate. In any case, not only photovoltaic systems saves money, but it is possible and wages. What is the need of equipment to make a solar power plant? 1. Solar panels - turn sunlight into direct current. 2. Power inverter - DC current produced by the solar panels via the inverter converts to AC power compatible with electricity in the public network. 3. The meter electricity - networked counter system is installed next to the existing electricity meters. It measures the amount of electricity in kWh to be released to the public network and shows how much electricity is produced by a photovoltaic system. 4. Example: Solar power plant with installed capacity of 5 kW on the roof of the building - The system consists of 18 solar panels connected in such a way to make the total installed power of 4.68kW. Such a system of monthly returns, on average, earnings of about 15,000.00 dinars (€ 120). It should 29m² roof surfaces. Value system: € 5,894.40 (VAT included). The value of an investment does not include installation costs, construction and equipment for installation. Payback period is 5 to 7 years, depending on weather conditions. What is important from the perspective of small and medium enterprises jested for each job

provides a complete service starting from the design of the project, to the as-built design. Projects must be made by a licensed engineer.

The team must be employed by licensed engineers architects who follow the latest trends in the design of modern system which guarantees high-quality performance of all activities in the field of design. Customers must be given more support in the pre-sales phase of work, the preparation of preliminary projects and education in order to ensure maximum effectiveness of equipment within the system that is projected. Standard practice is mandatory production of built project for all projects to be performed.

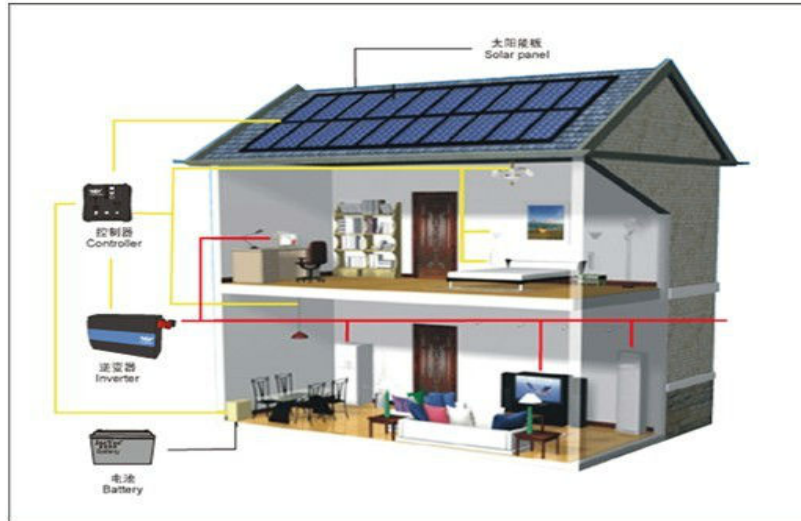


Figure no. 1: Solar Power System / Home System

It is important to establish what the situation in the countries of the European Union. “The political statements in Germany and the macroeconomic perspective present a big trend in expansion of new renewable energy plant. Especially institutional investors are looking for adequate returns of their investments to fulfill obligations in context with their statutes. With regard to the expected prolonged low-interest-rate phase within the European Union, further investments in alternative asset classes are planned in 2016. These alternative investments, particularly for institutional investors, are structured as closed-end funds, typically under the legal form of limited partnerships (Wassermeyer et al. 2015, pp.186). It will be differentiated between privileged investment funds and investment corporations. New regulations make it more difficult for investment funds to reach the privileged investment fund rules. The qualification of a privileged UCITS leads to a modified kind of net income method with special tax deferral effects of certain capital gains. Alternative Investment Funds (AIF) may also qualify as privileged investment funds, if they fulfill all necessary requirements. However, this failed because AIF typically are closed-end investment funds, which supply no right to return the shares regularly. The participation of a tax privileged institutional investor in a commercial partnership represent an own business within the scope of the investor’s activities, which means that the tax privileged investor solely loses its privileged status in the amount of the gain of that commercial partnership. Completely different, in the case of an investment in a limited partnership, where the partnership is asset managing, but deemed commercial, too. This leads for the

complete tax status of a privileged institutional investor like a pension fund to a complete commercial infection of all returns, the investor has generated. To find a way out of a partial or complete commercial infection of a tax privileged institutional investor, it is recommended to interpose a corporation (Maftei, M., Stiegler, T., Wiesener, A. U, 2016 : 188). Access to local sources of energy, their transformasanje into useful energy that has a secure client, in addition still ecologically pure and socially justified, represents a real opportunity for the development of the company, especially at the level of small and medium-sized enterprises.

4. Aspects of sustainability energy system

Sustainable Development of energy systems must include ecological, economical and social aspect of Sustainability, COP 21 (2015) –UN climate/195 countries about global warming reduction– or limiting temperature rise to 2 or 1,5°C by using RES.

Sustainability aspects of energy system: Economic sustainability: economic efficiency in all phases of production and exploitation of energy systems.

Investments in clean energy increased by even 17% › Markets of RES and oil are separate – 20% share of RES in production in the world electricity production

Economic sustainability: renewable electricity generation costs are dropping each year– the prices of PV modules have fallen by 60% wind turbines by 25% (relative to 2009).

Benefits: job creation, spin off benefits, etc. Combination of several energy types is necessary – rentability.

Environmental sustainability: responsible attitude towards resources, global warming, health the pollution. PROBLEM: harmful use of RES?! RES emit between 400 and 1000g CO₂ eq/kWh less than fossil fuels,, which is 14 and 134 times less , zero SO₂, NO_x, emissi.

Social sustainability: relationship of physical structure towards the changing needs of users.

› +/- social impacts – should be compared with conventional technologies, local economy improvement, energy independence – problem /wind turbines, solar fields.

Conclusion

Strategic commitment opening up of the possibility of direct usage of renewable electricity- in accordance with the requirements for the protection of natural and cultural values, reduce import dependency and the need for new energy sources – SPRS - SHPP (0,4MTen) , solar (2200 h/year-0,6MTen) and wind energy.

Recommendations: Adapt standards for the GHG emissions to the EU requirements, perform a detailed techno-economic analysis of RES, feasibility study for fossil fuels including transport, storage, the costs, strengthen the cooperation between the public and private sector, strategy for education and training of personnel who would work in renewable electricity generation systems, promote and raise public awareness. The main barriers to greater share of RES consumption lay in still not adapted legal framework and in inadequate stimulating policy, and prejudice of the local population - social factor is the has the main role in RES implementation. RES can be economically justified more economically viable than conventional energy sources – local initiatives needed.

References

- Condrea, E., Condrea, A., Stanciu, A.C., 2016. Wind energy – an opportunity for also small and medium investors. In *BASIQ International Conference: New Trends in Sustainable Business and Consumption. Conference proceedings, 2-3 June 2016, Konstanz, Germany*, p.61.
- Maftai, M., Stiegler, T., Wiesener, A. U., 2016. The current state of alternative investments in renewable Energies of institutional investors in Germany. In *BASIQ International Conference: New Trends in Sustainable Business and Consumption. Conference Proceedings 2-3 June 2016, Konstanz, Germany*, p.188.
- Stošić Mihajlović Lj., 2013. *Obnovljivi izvori energije kao factor održivog razvoja privrede Srbije*, doktorska disertacija, Univerzitet u Nišu, Niš.
- Stošić Mihajlović Lj., 2017. *Obnovljivi izvori energije*. Vranje: VŠPSS.
- Wassermeyer, F., Richter, S., Schnittker, H., ed., 2015. *Partnerships in International Tax Law*. 2nd edition. Köln: Schmidt.