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SCIENTIFIC REVIEW

Renewable Energy Sources and the Possibility of Their Insurance

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ABSTRACT *– With the increase of population in the world is growing and demand for energy. Since non-renewable sources has fewer mankind in the future must turn to renewable energy sources. Identification, management and risk transfer are key components for projects related to renewable energy. In most situations, the funds for project will not be available except it's included component of insurance. The fundamental prerequsite for guiding and sustainable financial project is very effective identifcation and management of risk.*

Increasing knowledge and understanding of this area insurance companies will begin to respond to the challenges faced by professionals and this will enable the growth of the industry. Enough major role in financing and developing projects related to renewable energy sources, as well as in other areas of life, have insurance companies, which are more fully set out in the sequel.

KEY WORDS: *energy, resources, risk, security, natural, premium*

Introduction

Renewable energy sources are energy sources that come from nature and can be renewed. Today it is increasingly used because of its harmlessness to the environment.

Renewable energy, excluding hydropower, give less than 1% of total energy demand. In future, share of the renewable sources should be notably increased because damaging influence of non-renewable sources has racily increased.

Renewable energy

Renewable energy sources are energy sources that come from nature and can be renewed. Today it is increasingly used because of its harmlessness to the environment. It's important emphasis that renewable energy sources can be classified by biomass and large hydropower known as traditional sources and solar energy, wind energy, geothermal energy

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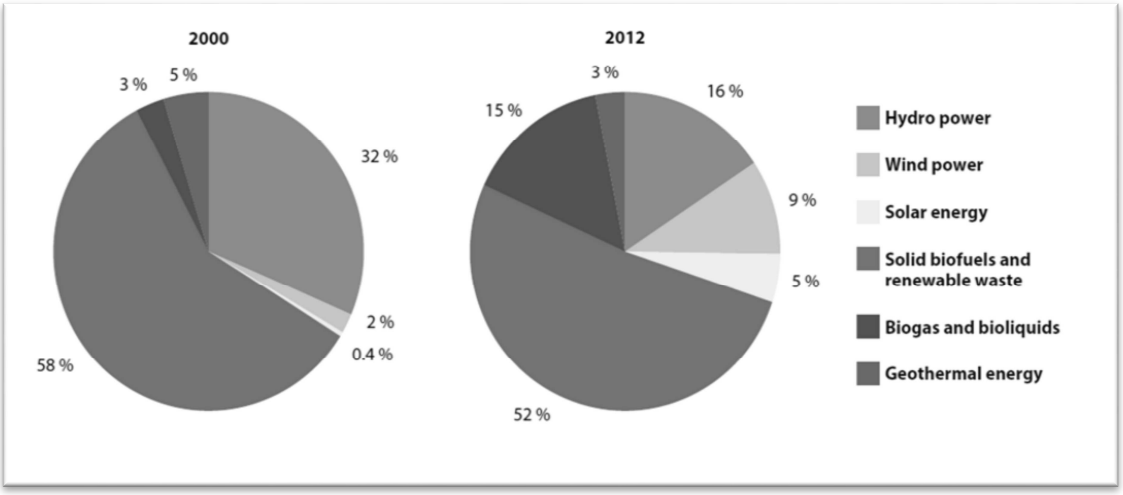
known as new renewables. Renewable energy sources, excluding hydropower, gives less than 1% of total energy demand. With population growth in the world, demand for energy is growing. Since a non-renewable source has less humanity in the future must turn to renewable energy sources.

Figure 1. Gross domestic consumption of renewable energy sources in Europe Member States at 2000 and 2012.



Source: www.foeeurope.org, (11.10.2016)

Positive feature of renewable energy sources is reduction emission of carbon dioxide (CO2) under an atmosphere and causing decrease of the greenhouse effect. Also, increase the participation of renewable energy resources helping to improve energy security supply and decrease import dependance of raw materials and electricity.

Negative characteristics of renewable energy sources are:

- Exploitation of renewable energy is more expensive and technologically demanding from non-renewable sources of energy,
- The amount of energy is much obtained using non-renewable energy sources.
- It' impossible to transport the natural shape unless you transform them into el. energy.

The target of 10% for the share of renewable energy sources in the transport sector represents a common goal for all countries for 2020 year. Directive 2009/28/EC determines that only biofuels and bioliquids should be included because of their sustainable characters. In some countries Their consumptions weren't be certified as compliant especially in period 2011-2013 because implementation of this Directive was late. It's relevant to say that share of renewable energy sources increased since 2004 but it's share in transport declined between 2010 and 2011. This can be attributed to the total abscence of compliant biofuels reported by several countries member of EU. Respecting accounting rules of this Directive, the share of energy renewable sources in transport reached 5.4% in 2013.[2] If all compliant and non-

[2] http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_from_renewable_sources,(21.05.2015.)

compliant biofuels consumed in the EU28 are taken into the account, their shares in transport will be above 5,8% in 2013.[3]

The central role of insurance

Identification, management and transfer risk are key components for projects related to renewable energy. In most situations, the funds for project will not be available except it's included component of insurance. That is why a potential risk will be less and ensure smooth and favorable outcome of the project. Finding a suitable quality assurance isn't always easy for owners and workers of projects and without that risk profile can be considered insufficient.

Many entrepreneurs need to understand the complexity of risk factors faced, as well as the belief that insurers will seek to ensure coverage at viable rates. Risks related to renewable energy and their priorities are higher than before. In addition, beginners can have a problem with complexity and innovation of this projects but with the ability to move much more "upside down". Prototype technology may be involved in these projects, but it is incredibly difficult to assess and secure.

Moreover, despite all new technologies for renewable energy sources, standards and practices in industry should be more developed which makes it difficult risk benchmarking. This standards are related to the safety and risk in operational activities. Owners of projects, often late in dilagoue with insurers, thereby be deprived of a significant contribution, which may seem a key challenges for success of their companies in the future.

The role of expertise and services insurers

Risks of renewable energy sources of all types of insurers require experience in risk management in many relevant sectors. In fact, only a small part of the insurer has the necessary experience and skills in the sector. Customers insurance, in this relatively new industry, should strive to learn the expertise of insurers, as well as the certainty that they will be able to honor its part of the contract when the insured event occurs.

Given that the purpose of insurance that pays a fee to sudden, unforeseen event, leading insurers and reinsurers has an aversion to risk so want to avoid the same. The analyses showed groups fo risk factors jointed with any kind of technology for renewable energy sources. It's assumed that this factors can jointly classified which leads to their relevance and this is important for level risk and it's construction.

Insurance policy is one of the complex area of the insurance. Insurers can predict the probability so there lawsuits may be contrary with determining policies and evaluate their products accordingly and after the introduction of new products, the costs are much higher for insurers.

[3] Scarlat, N., J.F. Dallemand, V. Motola, and F. Monforti-Ferrario. "Bioenergy production and use in Italy: Recent developments, perspectives and potential", Renewable Energy, 2013.

In order to make these decisions, insurers use actuarial science. Actuaries analyzes risk factors in technology and economy responsible for evolvent by statistics. Without using actuarial details, this factors can create a conceptual model available in insurance industry.

"A number of insurers had a bad experience with wind power in the 1980s and early 90s, and although the industry has experienced tremendous growth since then and science technology has matured considerably, many insurers are still reluctant to provide projects with wind power. However, there are some that will do it and fully fund the project and will cover today. Coverage of biomass energy is available for larger projects, but what is needed is a study - Project risk factors renewable energy affecting the insurance industry product to cover the security of supply of fuel. Funders want to secure the supply of fuel, but still there is a product that does it. The flows of rivers supplying hydro facilities, however, smaller size, and for the development of mini-hydro facilities sometimes find it difficult to cover"[4]

Insurance and renovated energy

Because of the relatively young nature of renewable energy sources, various experts working on the development of projects and continue to secure their financial support and safety.

Financial markets have a permanent problem with the difficulties in providing adequate management instruments for risk and new technology with renewable sources. One of primary conditions of accurate assessment are availability of historical actuarial data on risk factors, severity and frequency of key risk points.[5]

Increasing knowledge and understanding of insurance companies, insurance companies and insurance brokerage will begin to respond to the challenges faced by professionals in the insurance and thus will enable the growth of the industry. This model can subsequently be developed by the actuary, which includes statistical probability and making estimates of the corresponding premium. It can use often and become very powerful model if choice of insurance products and package will be increased.

Therefore, insurance companies have an increasing role in financing and investment in ecology and economically sustainable energy and infrastructure projects in Europe. Boredom is Allianz, Europe's biggest insurer, has invested about 1.5 billion euros in solar and wind power, while the reinsurer Munich Re separated 2.5 billion for investment in renewable energy by 2016. And domestic insurance companies are slowly joining their foreign counterparts in financing environmental projects.

However, a number of insurance companies in a range of its products have added security and renewable energy sources, because they possess the technical expertise and services to prevent losses in these projects. Some of these companies are ACE Insurance in the USA, Bruce Stevenson leading insurance broker in Scotland as well as RSA - one of the leading international insurance groups and others.

[4] Bratt G.,"Factors Influencing the Insurance Industry", 2010, str. 95.

[5] www.esru.strath.ac.uk,(11.10.2016)

The sun's energy

Solar energy is obtained from light and warmth of natural rays of sun. It's good to underline enormous potential for energy production. As a matter of fact, it;s estimated that enough energy from the sun reached Earth at only 70 minutes to come the dmeands of global energy. Instantly, there are two kind of technology that can transmute solar rays into electricity and solar collectors and photovoltaic cells. Solar collectors transform energy into thermal energy or water and process warming of water systems can be opened which water be heated and goes directly across a roof collector where it is filled antifreeze. Photovoltaic cells are semiconductor elements which directly transmute solar energy into electricity and they can be used as one of singular source of energy.

By providing the unlimited power, solar energy obviously has enormous potential for reduction to using fossil fuels. One of the fact is solar energy contributes only 0.02% of global energy but her increase is rapidly. Countries that lead in the introduction of photovoltaic power plants are Spain, Italy and Germany, where demand increased due to favorable feed-in tariffs and subsidies.

Table 1. Production of electricity from renewable sources per EU states (RES-E)

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU28	EU-28	14,3%	14,8%	15,3%	16,1%	17,0%	19,0%	19,6%	21,7%	23,5%	25,4%
BE	Belgium	1,7%	2,4%	3,1%	3,6%	4,6%	6,2%	7,1%	9,1%	11,3%	12,3%
BG	Bulgaria	9,1%	9,3%	9,3%	9,4%	10,0%	11,3%	12,7%	12,9%	15,8%	18,9%
CZ	Czech Republic	3,6%	3,7%	4,0%	4,6%	5,2%	6,4%	7,5%	10,6%	11,6%	12,8%
DK	Denmark	23,8%	24,7%	24,0%	25,0%	25,9%	28,3%	32,7%	35,9%	38,7%	43,1%
DE	Germany	9,4%	10,5%	11,8%	13,6%	15,1%	17,4%	18,1%	20,9%	23,6%	25,6%
EE	Estonia	0,6%	1,1%	1,5%	1,5%	2,1%	6,1%	10,4%	12,3%	15,8%	13,0%
IE	Ireland	6,0%	7,2%	8,7%	10,4%	11,2%	13,4%	14,5%	17,3%	19,5%	20,9%
EL	Greece	7,8%	8,2%	8,9%	9,3%	9,6%	11,0%	12,3%	13,8%	16,4%	21,2%
ES	Spain	19,0%	19,1%	20,0%	21,7%	23,7%	27,8%	29,8%	31,6%	33,5%	36,4%
FR	France	13,8%	13,8%	14,1%	14,4%	14,3%	15,0%	14,7%	16,2%	16,4%	16,9%
HR	Croatia	32,5%	32,8%	32,2%	30,9%	30,8%	32,6%	34,2%	34,2%	35,5%	38,7%
IT	Italy	16,1%	16,3%	15,9%	16,0%	16,6%	18,8%	20,1%	23,5%	27,4%	31,3%
CY	Cyprus	0,0%	0,0%	0,0%	0,1%	0,3%	0,6%	1,4%	3,4%	4,9%	6,6%
LV	Latvia	46,0%	43,0%	40,4%	38,6%	38,7%	41,9%	42,1%	44,7%	44,9%	48,8%
LT	Lithuania	3,6%	3,8%	4,0%	4,7%	4,9%	5,9%	7,4%	9,0%	10,9%	13,1%
LU	Luxembourg	2,8%	3,2%	3,2%	3,3%	3,6%	4,1%	3,8%	4,1%	4,6%	5,3%
HU	Hungary	2,2%	4,4%	3,5%	4,2%	5,3%	7,0%	7,1%	6,4%	6,1%	6,6%
MT	Malta	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,6%	1,0%	1,6%
NL	Netherlands	4,4%	6,3%	6,6%	6,0%	7,5%	9,1%	9,7%	9,8%	10,5%	10,1%
AT	Austria	61,9%	62,4%	62,4%	64,6%	65,2%	67,8%	65,7%	66,0%	66,5%	68,1%
PL	Poland	2,1%	2,7%	3,0%	3,5%	4,4%	5,8%	6,6%	8,2%	10,7%	10,7%
PT	Portugal	27,5%	27,7%	29,3%	32,3%	34,1%	37,6%	40,7%	45,9%	47,6%	49,2%
RO	Romania	28,4%	28,8%	28,1%	28,1%	28,1%	30,9%	30,4%	31,1%	33,6%	37,5%
SI	Slovenia	29,3%	28,7%	28,2%	27,7%	30,0%	33,8%	32,1%	30,8%	31,4%	32,8%
SK	Slovak Republic	12,4%	13,5%	15,1%	15,7%	16,7%	17,8%	17,8%	19,3%	20,1%	20,8%
FI	Finland	26,7%	26,9%	26,4%	25,5%	27,3%	27,3%	27,6%	29,4%	29,5%	31,1%
SE	Sweden	51,2%	50,9%	51,8%	53,2%	53,6%	58,3%	56,0%	59,9%	60,0%	61,8%
UK	United Kingdom	3,5%	4,1%	4,5%	4,8%	5,5%	6,7%	7,4%	8,8%	10,8%	13,9%
NO	Norway	97,3%	96,8%	100,2%	98,5%	99,6%	104,7%	97,8%	105,5%	104,4%	105,5%

Source: http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_from_renewable_sources, (12.05.2015.)

Further in 2013, renewable energy accounted for 16.5% of total energy use for heating and cooling in the EU 28. This is significant growth from 9.9% in 2004. and the biggest increase is in industrial sectors, services and building sectors. Aerothermal, geothermal and

hydrothermal heat energy taken by heat pumps is analyzed and reported by Member States of EU.[6]

The share of renewable energy sources in gross final consumption is increased from 8.3% to 15% for ten years 2004-2013. This is proof of a stable progress towards the target of 20% by Europe 2020. Some countries haven't yet fully implemented all provisions of the Renewable Energy Directive and some biofuels and bioliquids aren't counted as sustainable in the reporting period. The increased share between 2010 and 2011 isn't due to increased use of renewables but rather because of a decline in using of fossil energies, especially oil products and natural gas.[7]

Wind farms are attractive from the perspective of security. Homeowners insurance provides coverage damage and loss caused by fire, storm, theft, vandalism, earthquakes, landslides, eruptions, floods, tornadoes, typhoons and hurricanes.

Hydropower

The power plant is the production of electricity from hydroelectric facility water. A movement requires reliable flow of water and reasonable amounts falling water. In typical installations, water is stored from the tank across canal or tube in the turbo. The pressure of liquid water on the blades causes rotating shaft which is linked to electric generator and it's providesThis movement of that shaft. The world's largest renewable energy source is water power where providing almost 0,2 of the entire world's electricity.

Large hydropower facility or a group of some plants could be create serious impact to environment and society. However, small hydro power plants can be developed using existing dam or creating new water gates whose are focused to control the level of rivers and lakes-water or irrigation. Many projects mini-hydro power plants are based on downstream river flows and do not include the construction of dams. Mini-hydro plants will have less influence to the environment if they are normally created and designed.

Mini-hydropower is a technology for future with simple application and adequate equipment and design and it's expected her using for over 100 years. If we look from the perspective of security, there are physical damage of property and loss of income as a result and injury to third parties are one of the major scenarios which can lead complaints. The major risks in building of mini-hydropower plants are fire, food, earthquake, landslide, collapse damage to equipment in transit.

Biomass energy

Biogas produced bacteria which crash organic waste and that includes sludge, botanical waste and food waste. Anaerobic digestion and landfill gas represent two types of biogas power plants. First type reflects a form of interference which takes places in carefully controlled and constructed environment. On the other hand, landfill gas is similar with the main exception that initially takes place with oxygen. In this way the treated waste causes

[6] http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_from_renewable_sources, (11.03.2015)

[7] Isto,

mehtane rich biogas and the rest of nutrient-rich liquid and solid materials suitable for usiung as fertilizer at agricultural land.

Re-acquired energy from waste has been important ecologically because it enables reduction amount of material and generates relatively inexpensive and sustainable source of fuel. Likewise, we have point biodiesel and bioethanol as two form of biofuels. Biodiesel is made from vegetable oils or tallow obtained from animal's fats while bioethanol is derived in the process of fermentation of crops such as corn, maize and wheat together. In its report, the WWF predicts that we will need for production of bioenergy about 250 million hectares of crops or 0,16 of global land until 2050. In addition, some crops offered little benefit for reducing emissions and in order to WWF wants to see compulsory criteria of sustainability.

Biogas has many risks mild violence bioenergy. Due to the nature of raw material involved in biomass, fire risk tends to be bigger than biogas. Property coverage provides protection from explosions, fires, floods, theft, etc. Many countries require liability coverage because employees and other visitors have adequate protection and it's very significant for commercial production of bioenergy plants.

Conclusion

Mankind will soon have to find more environmentally friendly energy sources which will cover its energy needs. Currently, as an environmentally friendly solution offering renewable sources of energy, but it is not realistic to expect that these energy sources are sufficiently developed to a greater extent meet the growing energy needs of mankind.

Solar energy is not enough exploitable and is very expensive, wind energy is not available in sufficient quantities and energetic potentials of water are already heavily exploited. Bioenergy or biofuels are imposed as a substitute for traditional fossil fuels, but these fuels also causes the release of a variety of harmful gases and they are not completely ecologically acceptable. In addition to the biofuel is also one ethical problem. Since biofuels are produced from sugar cane, corn, soybean, canola and other plants that serve as food. Thus richer countries produce biofuels in ways that convert food into fuel, while the other side is extremely a lot of people on earth die of starvation and the same food would save their lives.

Environmental security, decrease emissions of greenhouse gas are the main reasons for the using renewable energy sources. Also, improving protection of energy, increase economic competitiveness and less dependence of imported energy are very important and their significance shouldn't be ignored.

Financial markets have a permanent problem with risk and their providing using adequate management instruments by new technology for renewable energy sources. That's why insurance plays a major role in these projects, which, regardless of their financial value, is of great importance for the preservation of the environment.

Using the examples of many international insurance companies, and domestic security should be to incorporate environmental projects in their portfolios, which would divert public attention from those problems, and to attract new investment. Of course, as long as they are legally within their states allow.

European Commission has established a global framework for promotion of renewable energy determining by Directive 2009/28/EC. This document settings required national targets of renewable energy for achievement a 20% a share in final energy consumption and a 10% share in transport by 2020. These goals are one of the main targets in European strategy for growth 2020. They contribute to Europe's industrial innovation and technological leadership, reduce greenhouse gas emissions, improve the security of our energy supply and reduce our energy import dependency.[8]

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[8] www.biobasedeconomy.nl, (11.10.2016.)