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The Use Of Renewable Resources In Albania Economic Benefits

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Abstract: Today around the world are greatly increased needs to use the renewable energies. In this paper are mentioned primary energy, mainly solar energy. The use of solar energy brings economic and social development. Geographical and climate conditions in Albania are favorable for solar energy use. In our territory there is a considerable solar energy potential, especially in south west. In this paper are shown the use of solar systems to heat water in several countries and in Albania in the last decade. The data for different regions (according to the coordinates, the average number of hours of sunshine, solar radiation, etc.) are summarized in a database.The assessments have shown what the use of solar energy is a source with economic and ecological benefits for the world economy in general and in particular Albania.

Keywords: Solar energy, solar radiation, solar panels, the economic benefit

1 Primary Spirces of Energy

Sunlight is the main source of energy on earth, which can be used by many natural and synthetic processes. The most important process is photosynthesis (Fig. 1), that is used by plants to capture the energy of solar radiation.Photosynthesis (photo = light-s; synthesis = union) is the conversion of solar light energy into chemical energy by living organisms. Raw materials needed for conducting it are carbon dioxide and water, the energy source is sunlight, and obtained subjects are glucose and oxygen. Primary sources of energy can be classified as below :

- Non-renewable resources, which are exhaustible. They are: oil, natural gas and coal also known as "fossil fuels". The energy obtained from burning of solid waste and nuclear energy from radioactive breakdown. Introduced almost inexhaustible sources: geothermal energy and energy from reactions of thermonuclear synthesis.
- Renewable resources are energies that reach above the surface of the earth from the universe, virtually all come from the sun (a small percentage of marine currents). In renewables included: hydro energy, solar energy, wind energy, biomass energy, the energy of sea waves and tide and tidal energy.

Virtual energy sources are sources with previously accumulated energy.

1.1 What sources of energy should be used?

The fact that the energy source that should be used, based on the following conditions:

- economic,
- environmental
- safety conditions.

By obverse attention to all the above conditions, the energy that best meets them is solar energy. This energy can be used to heat water, thus for the sanitation needs in the residential and services sectors. Solar energy can also be converted directly into electricity through photovoltaic panels. The use of solar energy brings the development of electronics, biotechnology and other sciences. Renewable technology can move at rates faster than conventional technology. Equipments are built in factories, where it is easier to utilize techniques that facilitate cost reduction . We should not forget that there is no shortage of raw materials.

Renewable energy sources replace conventional energy in these areas:

- Production of electricity. The electricity generated from renewable energy sources in the value goes very high in some countries, such as Iceland, Norway, Brazil, Austria, etc..
- Heating & plumbing needs. Solar panels make an important contribution for heating and hot water in many countries, especially in China where they meet the needs for 50-60 million households. Worldwide contribution of operating systems for solar hot water reaches the removal of 70 million households. Also growing contribution is giving biomass. The same is true for geothermal energy.
- Transport. Biofuels have started to have a contribution to reduce the demand for fuel. So in 2009 they contributed 5% of world oil production.
- Energy in rural areas that are not connected to the national transmission networks for electricity.

2 Solar Radiation

Sun is a leading manufacturer of energy in our solar system. Some features about it:

- 74% of the sun is hydrogen, 25% helium and the remaining is with heavy elements.
- Sun has a temperature of about 5500 K and the radiation is white, but the distribution in space looks yellow.
- he has the shape of a ball and the center of its occurs nuclear fusion constantly.

Solar radiation drives all natural cycles and processes, such as rain, wind, photosynthesis, ocean currents, and many others, which are important for life.
The amount of collected light energy per unit time per square meter exposed to the sun is about 1360 W / m². As a result of the influence of the atmosphere, the value of reduced energy density of 1,000 W / m² on the ground.
The duration of sunlight and also its intensity depends on:

- periods of the year,
- weather conditions
- by geographic location.

The amount of direct solar radiation, scattered radiation and reflected radiation on the ground is called the total or global solar radiation.
Global radiation consists of:

- direct radiation, which is solar radiation from the sun that is not dispersed in the atmosphere, as in Fig. 2.
- diffuse radiation, is created from scattered sun rays on the atmosphere in all directions by different molecules, particles aerosols and clouds. The amount of diffuse radiation depends on climatic and geographical conditions.

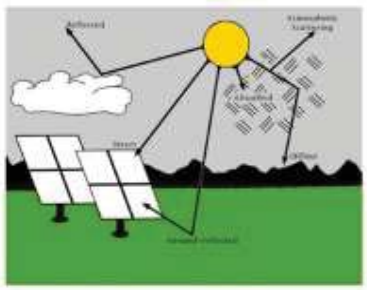

Fig. 1: A part of solar radiation that enters the Earth's atmosphere is absorbed and distributed. [Source: ENREL]

2.1 Annual Average Values Of Global Radiation On Earth

Average annual values of global radiation in earth are shown in Figure 3

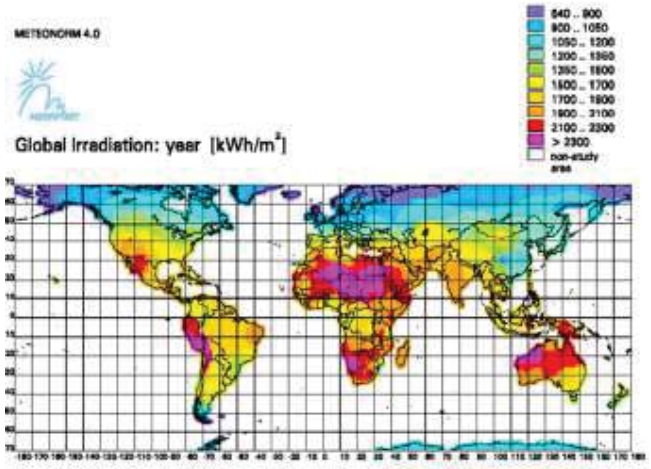

Fig. 2: Average annual values of global radiation on earth [Source: Meteonorm]

Global radiation and diffuse radiation ratio are affected by atmospheric conditions (for example, layers of smoke and dust over large cities) and the length of road of rays through the atmosphere. As the amount of diffuse radiation gets higher in value, so the energy of global solar radiation per unit area gets smaller in value . So it is a negative relation between these two types of radiations. Smaller the diffuse radiation Higher the Global solar radiation .
The data on solar radiation is obtained from meteorological stations and is usually part of the simulation programs. A global meteorological database for solar energy is provided by METEONORM -i, which is a global climatological database combined with a synthetic weather generator. Results are climatological methods and time series of typical years for every point on Earth. Global radiation on a horizontal surface and a slope with an angle of 45 ° for two dry days, at latitude 47 ° is shown in Figure 4. Also the figure below shows the ratio of diffuse radiation and environmental temperatures.

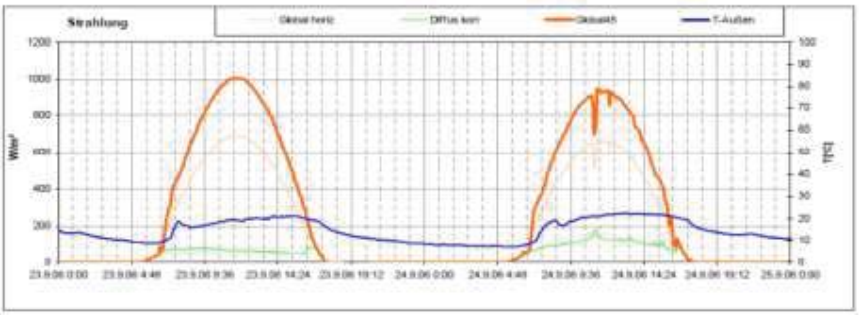

Fig. 3: Global radiation on a horizontal surface and a slope with an angle of 45 ° for two sober days, in latitude 47 °. [Source: ENREL]

2.2 Current Situation in Albania

Being in Albania with a very good geographical position and climatic conditions favorable brings the possibility of large-scale use of solar energy. The affecting factors are:

a) high intensity of solar radiation,

b) duration of this radiation,
c) temperature
d) Humidity air, etc..

Albania should use solar energy to produce hot water for domestic use, technological and electric ity production, because:

Solar energy is an inexhaustible natural resource;

Solar energy is the largest natural reserves of energy that is distributed throughout the world in quantities greater than our energy needs;

Solar energy is clean and its use cost nothing (except panel maintenance);

Solar energy poses no pollution threat to the environment.

T he current situation in Albania is such that the contribution of solar energy is <0.1% versus total energy sources . In many countries , for example in Bangladesh ,solar energy is concentrated in production hot water for domestic use. In Albania, the contribution of solar energy is focused on the acquisition of hot sanitary water. Also solar energy can be used for producing electricity. According to the 2011 installation of solar collectors to benefit of hot sanitary water is 23.5m2/1000 inhabitants, and for the installation of photovoltaic panels has no exact figures. In national energy strategy has prioritized increasing use of photovoltaic panels.

Economy, throughout the period 2009-2014, has taken over many tasks, connected with monitoring of solar thermal systems installed so far in Albania

Assessment of the future market for families, public housing and private services, as well as some subsectors of industry.

The use of solar energy based on "Study solar energy market", is issued by the ESTIF for Europe in 2010 (http://www.solarthermalworld.org). Austria leads all states in the installation of solar thermal systems per capita and cumulative area of SWH systems about 540.2 m2/1000 inhabitants (in late 2010). Albania has made progress also: Cumulative surface of SWH systems is 23.5 m2/1000 inhabitants (in late 2010). Data for the introduction of solar thermal energy in some countries, as seen below in Figure 5.

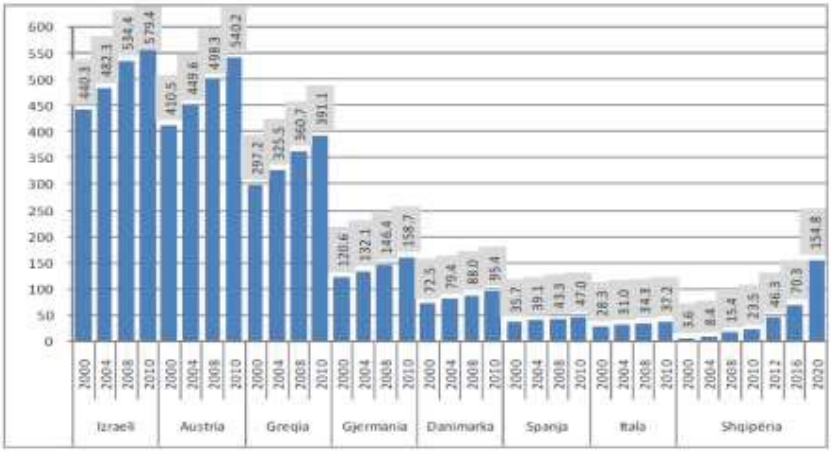

Fig. 4 The use of systems of solar collector for hot water preparation in different countries [m2/1000 residents]

Figures 6 and 7 represent respectively, the latest development of the market for solar panels hot water in the housing sector and total services in Albania on installed surface [m2] and energy produced [GWh] until 2010

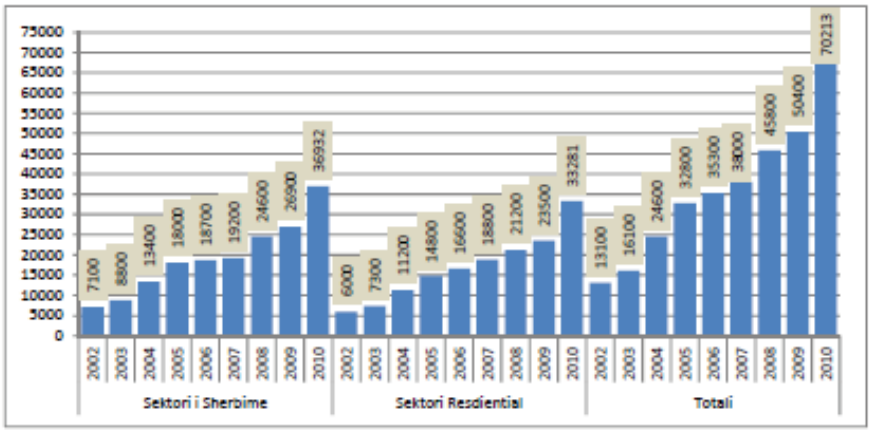

Fig. 5: Summary of SWH systems installed residential sector and services [m2]

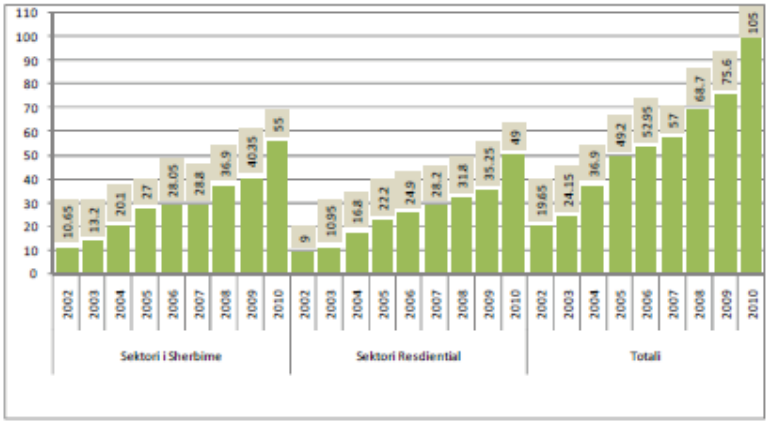

Fig. 6 The energy produced by SWH installed systems in the housing sector and the services [GWh]

2.3 Measurments Based on Data of Solar Radiation in Different Regions Of Albania

The territory of Albania lies in the western part of the Balkan Peninsula on the east coast of the Adriatic Sea and Ionian. It is located between latitude 39o38'-length 42o38'dhe 19o16'-21o04 '. Thanks to this geographical position, Albania belongs to the Mediterranean climate belt.The territory of the Republic of Albania is divided into four main climatic zones:

- Flat Mediterranean area;
- Hilly Mediterranean Area
- Pre-mountainous Mediterranean area;
- Mountainous Mediterranean area.

In the territory of our country there is a considerable potential for solar energy that runs from 1185 - 1700 [kWh/m2 / year], especially in the south west region which has a significant higher solar energy potential. Each m2 of horizontal surface in this part of the territory is likely to yield 2200 [kWh/m2]

per year (in this case you're talking about a weather condition anticyclonar). While in normal weather conditions, the same area yields an average around 1700 [kWh/m2] per year.

Fig. 7: Solar radiation [kWh/m2 year]

Fig. 8: The hours of sunshine [hours/year]

The estimates indicate that the preferred regions for natural energy potential are again western regions of our country. So every m2 flat surface in these regions during November-March actually receives up to 380 [kWh] per year, while average numbers for the same period for the is about 340 [kWh] per year (Figure 8).The quantity of sunny hours and especially those of relative Sun (when the sun is perpendicular to the panels) is a very important number. For the whole Albanian territory it's an average of 2400 hours, while the western part is over 2500 hours and reaches the peak value in the area of Myzeqe with 2700 hours (Figure 9).In the northeastern part of the country these numbers are significantly lower. So in Kukes the annual amount of direct sunshine hours is less than 2000 hours . The highest values of daily quantities of solar radiation is observed in the warm to hot period of the year and especially in the summer months . Specifically in December the daily amount of solar radiation is about 2.3 [kWh/m2/day] , while in July this value was about 8.03 [kWh/m2/day] .The sunshine hours / day in the western part of Albania is more than 5.5hours / day . Exception here are only three winter months when the numbers are lower. We emphasize that in practice days with daily sunshine not less than 5.5 hours are considered as " good days " . The calculations are also performed for " bad days " which are winter and cloudy days with less than 1.5 hours direct sunshine. Analyzing this parameter makes it clear that the western region of Albania is more favorable for solar energy production than the mid-region . (Table 1).

Muajt / Qytetet	Shkodër	Peshkopi	Tiranë	Vlorë	Ersekë	Sarandë
January	1,70	1,55	1,80	2,15	1,90	1,90
February	2,30	2,30	2,50	2,85	2,70	2,40
March	3,35	3,25	3,40	3,9	3,40	3,60
April	4,50	4,15	4,20	5,00	4,40	4,80
May	5,45	5,25	5,55	6,05	5,60	5,80
June	6,10	5,85	6,40	6,80	6,40	6,80
July	6,50	6,25	6,70	7,20	6,80	6,10
August	5,55	5,45	6,05	6,40	5,90	4,80
September	4,45	4,35	4,70	5,15	4,70	3,60
October	2,90	2,90	3,20	3,50	3,10	3,20
November	2,10	1,85	2,15	2,40	2,10	2,10
December	1,70	1,50	1,75	1,85	1,80	1,80

2.4 Determination of Radiation on Busy Areas Where Solar Is Installed

The geographical position is achieved by making full precision topographic measurements. It is recommended that the solar panels installed under the annual optimal angle (93.6% of maximum solar

energy). Changing the angle (summer or winter) is not profitable financial downturn (Table 2).The values of angles for optimal placement of solar collectors in Albania, expressed in (°)

Table 2: Source: Institute of Hydro-Meteorology

Optimal angle	Shkodra	Durrësi	Tirana	Vlora	Peshkopia	Saranda
Annual	38,57	38,33	37,87	37,72	37,43	36,23
Summer	29,53	29,24	28,98	28,78	28,24	27,40
Winter	57,72	57,67	57,29	57,22	57,20	55,52

It should be noted that to emphasize that radiation in the sloping surface is higher than radiation on a horizontal surface.

3 Using Solar Power

3.1 The use of solar energy for water heating

Solar energy is used in Albania since 1980 mainly for hot water production, then sanitary use and technological needs, heating facilities, swimming pools, etc. Plants that use solar energy for water heating are divided into:

- With thermosiphon (water accumulator mounted on the solar collector)

- Circulation pump (water accumulator mounted on the floor and below the solar collector. Here is a circulating pump required)

The latter are divided into:

- Open systems
- Closed systems with one circuit or two circuits
- Often plants can be used to combine heat and water facilities.

Area of installed solar thermal collectors for the period 2002-2010 is shown below (figure 10):

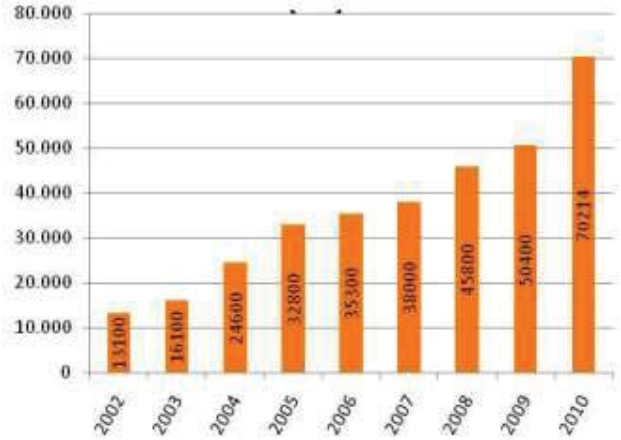

Fig. 9 Area of installed solar thermal collectors

Albanian government policies, as part of the Global Initiative for solar panels for hot water (GEF / HC / UNDP) provides exemption from customs duties and TVSH for systems / parts of solar thermal

systems. This will bring a potential reduction up to 300 MW of electricity that would be used for the production of hot water, and reduce CO2 emissions by about 800,000 tons if assessed in cumulative way by the end of 2020.

3.2 The use of solar energy for elektricity

Solar energy can be converted into electricity by means of photovoltaic panels. Photovoltaic solar panels are divided into panels connected to the grid and panels unrelated to grid
The principle of their work is based on photovoltaic effect applied on a photovoltaic cell, which is constructed from semiconductor layers of type-p and semiconductor layers of type-n. The value of solar radiation falling on the cell is proportional to the amount of electricity produced. Photovoltaic cells are grouped to create a photovoltaic module. Grouping of modules creates photovoltaic panels.Electricity produced by the use of solar panels depends on the number of hours of sunshine and in different seasons it has different values. If the energy produced exceeds the value of the energy needed in a building, it can be sold to distribution companies or can be accumulated.
Solar panels can be a new form of:

- photovoltaic roof-tile (produces electricity, protects the facade of weather conditions, there is no need for foundation support)
- photovoltaic panels (who need supportive foundation).
- Systems connected to the network
- As stated above if the electricity generated by the use of solar panels is a greater than the energy needed to power this apartment it can be sold to the company's distribution agreement. When the energy produced by solar panels is less than the energy required, this amount is offset by the network.

Parts of a system connected to the grid:

- Photovoltaic cells, grouping of which creates photovoltaic modules
- Inverter. It converts AC to DC power and regulates voltage and current, phase, frequency, power factor values appropriate for the network, provides information on the state of the system; STAKO system in case technical problems, etc..
- Balancer of the photovoltaic system
- distribution box, cable, Switch
- a meter, which records the amount of energy produced by the photovoltaic system
- Systems unrelated to network

These systems are used when the connection to the utility power grid is difficult.. Components of such a system are:

- photovoltaic cells
- inverter, which is not necessary for the continued power equipment
- The system balancer
- The inverter also regulates the charge of batteries. The electricity stored in the batteries can be used at night or during blackouts.

In conclusion: the assessments have shown that the use of solar energy is a source with economic and ecological benefits for the world economy in general and in particular Albania.

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