

SOLAR ENERGY – THE ENERGY OF THE FUTURE

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Abstract

This article reviews international applications of solar energy technology and presents an argument for the development of a solar energy programme in Kyrgyzstan.

Introduction

The absence of significant deposits of hydrocarbon resources in the Republic raises the problem of energy supply. The utilization of renewable sources of energy is being implemented in many countries and has changed from being purely scientific research and experimentation to Government Energy Programmes. Twenty years ago one kilowatt of solar energy cost USD 2.5, while currently the cost has fallen to 20-25 cents. The cost of wind energy over the same period declined from 40 cents to 5 cents per kilowatt and approximated the price of a kilowatt of hydrocarbon and atomic energy. After studying the international energy policy it could be considered that with the decreasing stock of hydrocarbon resources and with many governments refusing to establish atomic stations, the cost of traditional energy will be increasing, while the costs of solar and wind energies will decline as a result of the new technology in their production. For example, in Germany wind energy production constitutes 6100 megawatts, which is equal to the production of twenty thermoelectric power stations of an average capacity.

The European Union adopted the Programme according to which by 2005 the renewable energy should constitute 8 per cent in the energy balance of the EU countries. In the USA the Million of Solar Roofs Programme is being implemented which foresees by the year 2010 the establishment of solar energy systems on the roofs of one million municipal and private buildings. Thus, international society is slowly moving to non-traditional sources of energy.

One of the first priorities of our Republic was, and remains, hydro energy development and the utilization of 90 per cent of our unused hydro energy capacity. Currently, there is no utilization of wind energy in the Republic. The work of the KUN Project in our Republic is mainly at an experimental and

laboratory testing level². The experience of European countries, in particular Germany's experience of biomass utilization for heating and other needs, has not been used.

In our mountainous Republic with many remote and, therefore, inhabited settlements difficult to access, the utilization of fully autonomous energy production independent of additional makeup fuel supply has to be studied in detail and the feasibility of its utilization has to be analyzed.

1. International Experience

The total volume of solar energy on the surface of the earth for one week exceeds the energy obtained from all world stocks of oil, gas, coal and uranium. The necessary preconditions for the utilization of solar energy are being established with the development of modern technologies and the invention of superconducting materials. The EU member states and other western economies have developed a whole range of government programmes to utilize non-traditional sources of energy production. For example, in Germany in 1980's the One Thousand Roofs Programme was adopted, according to which the specially established Commission studied 4000 projects of roof photoelectric systems. As a result, 2,250 systems were selected and allocated among the Landers. The One Thousand Roofs programme aimed at four main objectives:

- utilization of roofs for electricity production, so the architecture of the city remains in harmony;
- stimulation of electricity consumers to adopt energy-saving and to link energy consumption to the periods of solar energy radiation;
- optimization of all technical components by utilization of sub-programmes to ensure further improvement and specification of measures undertaken;

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² The Kyrgyz word Kun means sun.

- improvement of construction and equipment by using modern advances in this area, decreasing the cost of production and increasing the reliability and safety of equipment.

According to the standard programme of research all 2,250 systems of solar energy have been analyzed on their degree of efficiency during the changes over five years. Data was taken on a monthly basis from each equipment component the date and necessary recommendations and changes introduced. When conducting the programme one of the central objectives of the research was to study the efficiency of utilization of the solar equipment in different regions of the country. The implementation of a programme under Government supervision in Germany aimed to present the efficiency and the benefits of using solar energy to industries and future consumers. The objective was achieved. Currently, the production of solar energy equipment is increasing, the reliability and efficiency is well established and the volumes of exports are increasing. Other EU member states have followed the example of Germany and are developing their programmes for non-traditional energy use.

Germany and other EU countries have used international experience. In the Philippines more than half-a-billion of the country's population is supplied with energy produced by solar radiation. Large scale programmes are being implemented in Japan, Argentina, Chili, China and other countries. Most of the new construction, in Turkey and Israel are designed to obtain hot water and heating through solar energy. According to the calculations of Israeli specialists, one such construction saves about 2,000 kilowatt/hours per annum.

2. Solar Energy Programme in Kyrgyzstan

Thus, the international experience of solar radiation to produce energy is very wide. In our Republic, there was also some experience of solar energy utilization but the equipment used was bulky and had low output and used a lot of glass. It was designed for the summer season and the materials were not rust resistant thus decreasing the period of exploitation. There is also experience in the use of western

technologies in our Republic. For example, the German company AIG-IMPEX jointly with the Bishkek Kurulush Company in constructing a 24 apartments building in Bishkek the German equipment was installed to produce hot water and heating with the use of solar energy. This German company and the JSC Bishkek Kurulush will check in practice the efficiency of such equipment. However, there is little doubt that positive results will emerge. The equipment enables the demand to be met for hot water in summer time and in the winter period it supplies 30 per cent of the energy needs for heating and hot water. The equipment uses circular cycle heat-carrier, i.e. there is no need to fill or empty the tanks. The transfer of heat takes place through a heat exchanger. Such a modern equipment is durable for the long term. The important task is to start production of this type of equipment in Kyrgyzstan, so that it will be much cheaper and more accessible for the consumer.

The other important area which deserves an attention is the issue of adaptation of energy-saving experience. Currently, in our Republic the meters for hot water and heating are not used. However, the market economy sooner or later will introduce these attributes. The laws of the market economy dictate the approximation of local prices to world prices of energy and energy resources. In our circumstances this implies an increase in the tariffs for energy consumption. The development of alternative energy production, solar energy, is a necessity requirement of modern times.

Equipment imported from Germany and other EU countries are too costly for most of the population. Therefore, the possibilities of assembly and production of some spare parts of such equipment in Kyrgyzstan have to be considered. Similar equipment is produced in Russia. The capabilities of Russian enterprises should be studied. From my point of view it is time to search the ways of industrial applications of equipment to produce solar energy. The development of a government programme on implementation and development of technologies to use solar energy is a dictate of the time.