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ELECTRICAL AND HEAT SUPPLY OF THE OBJECT BY MEANS OF INNOVATIVE MEANS - WIND-SOLAR STATION (BCC) OF MEDIUM POWER AND ELECTRIC ENERGY SOURCE

Abstract. Over the past decade, interest in renewable energy has been steadily increasing since it is practically unlimited. As fuel supplies become less reliable and more expensive, these sources become more attractive and more economical. The increase in oil and gas prices was the main reason that people again turned their attention to water, wind and the Sun. Interest in the problem of using solar energy has increased dramatically. The potentialities of energy based on the use of direct solar radiation are extremely high. Regardless of whether we use renewable energy or not, this will not affect the Earth's energy balance and the state of the biosphere.

Keywords: power supply, heat supply, innovation, wind, sun, source, energy.

INTRODUCTION

Solar energy is the kinetic energy of radiation (mainly light), generated as a result of reactions in the bowels of the sun, its reserves are practically inexhaustible. In natural ecosystems, only a small fraction of the solar energy is captured and stored in the form of potential energy of organic substances. Due to their decomposition, the energy needs of all other ecosystem components are satisfied.

Using only 0.5% of the energy of the Sun could completely cover the needs for the future world energy. The sun is a very powerful source of energy. Only 22 days of sunshine in terms of total power coming to Earth are equal to all the reserves of organic fuel on the planet. In Central Asia, for every square meter of surface perpendicular to the sun's rays, energy drops of about 1 kW per 1 hour. This is the amount of energy that is needed for a ten ton truck to accelerate from a standstill to a speed of 100 km / h.

MAIN PART

Using solar energy can be useful in several ways. First, replacing fossil fuels reduces air and water pollution. Secondly, replacing fossil fuels means reducing fuel imports, especially oil. Thirdly, replacing nuclear fuel, we reduce the threat of proliferation of nuclear weapons. Finally, solar sources can provide us with some protection by reducing our dependence on a continuous fuel supply. Undoubtedly, some damage to the environment can also be caused by ore mining, the manufacture of batteries and the much larger number of wires and transmission lines needed to collect electricity from its many sources. But in general, if we consider all the costs of protecting the environment, they will be very small.

Solar energy must be captured on a relatively large area, concentrated and turned into a form that can be used for industrial, domestic and transportation needs. In addition, one must be able to store solar energy in order to maintain energy supply both at night and on cloudy days. The listed difficulties and costs necessary to overcome them have led to the opinion that this energy resource is impractical, at least today. However, in many cases the problem is exaggerated. The main thing is to use solar energy so that its cost is minimal or even equal to zero. With the improvement of technologies and the rise in price of traditional energy resources, this energy will find new areas of application.

In practice, solar radiation can be converted into electricity directly or indirectly. Indirect conversion can be accomplished by concentrating radiation using servo mirrors to turn water into steam and then

using steam to generate electricity by conventional methods. Such a system can only work in direct sunlight. Direct conversion of solar energy into electrical energy can be carried out using the photoelectric effect. Elements made of a special semiconductor material, such as silicone, in direct sunlight expose the difference in voltage on the surface, i.e. the presence of electric current. The method of using solar energy without using a battery system, based on the conversion of temperature differences on the surface and in the depths of the ocean into electrical energy.

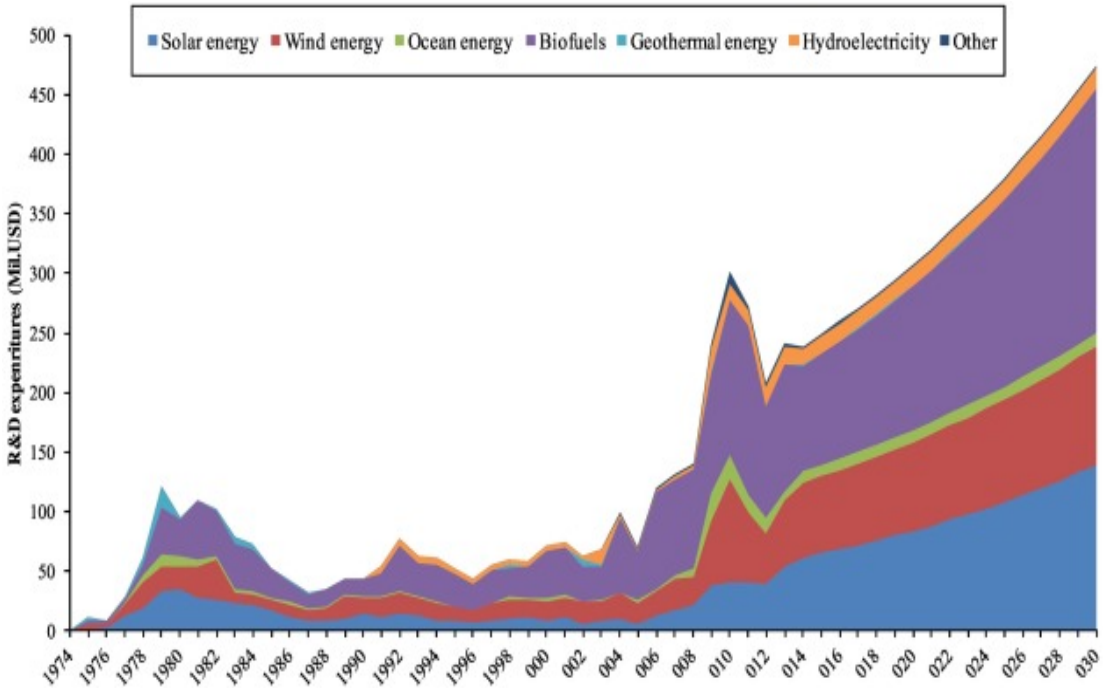

Figure 1 - The impact of public R&D and the dissemination of knowledge on the development of renewable energy sources

To show the application of the model, the Nordic countries as one of the pioneers in renewable technologies have been chosen. Results show the cumulative knowledge stock will increase to 2.4 billion USD until 2030, by focusing on biofuels, solar and wind energy. Results also indicate that the knowledge spillovers reduce the domestic R&D investment and may strengthen the knowledge stock. These impacts of knowledge spillovers are more effective when the absorptive capacity of the country becomes greater. The model helps policy makers to design effective policies for creating a balance between domestic R&D expenditures and knowledge spillovers. Finally, some important policy insights and some recommendations for further research are concluded.

American experts consider solar thermal energy to be promising, for the production of which solar reflectors are used, which collect and concentrate heat and light, through which water is heated.

Most solar heating systems are equipped with a solar collector. Only in the USA, solar collectors with an area of 10 million m2 are operated, which provides annual fuel savings of up to 1.5 million tons.

It appears that the direct conversion of solar energy will become the cornerstone of the energy system. Although photovoltaic solar systems are currently ineffective and the energy received is 4 times more expensive than solar thermal systems, they are nevertheless used in many remote areas. It is likely that the cost of electricity generated by this method will decrease rapidly. In the near future, systems with efficiency approaching 20% may appear, and by the end of the current decade, scientists hope to bring the cost of 1 kW. h of electricity up to 10 cents.

The energy of the Sun, experts believe, is the quintessence of energy, since photovoltaic installations do not affect the environment, are silent, do not have moving parts, require minimal maintenance, and do not need water. They can be mounted in remote or arid areas, the power of such plants ranges from several watts (portable modules for communications and measuring instruments) to many megawatts (an area of several million square meters).

Technically, the concentration of solar radiation can be achieved using various optical elements - mirrors, lenses, optical fibers, etc. The main energy indicator of a solar concentrator is the concentration coefficient.

The most economical way to use solar energy is to direct it to receive secondary types of energy in the solar regions of the globe. The resulting liquid or gaseous fuel can be pumped through pipelines or transported by tankers to other areas.

A review of various alternative energy sources shows that solar panels are on the verge of widespread industrial adoption. If you add energy saving to this, there is hope to solve the emerging energy problems in such a way as to significantly reduce the construction of new nuclear and thermal power plants. As for the distant future, first of all, it is necessary to develop systems for storing energy produced by solar and wind stations.

To collect and use the energy of the sun to heat water, you can use solar water heaters - collectors of various designs. The peculiarity of the collectors is that the radiant surface is treated with components that provide maximum heat perception due to their selectivity to the thermal spectrum of the solar flux and heat the water passing through the tubes inside. The solar water heater-collector consists of a box with a coil, a cold-water tank, a storage tank and pipes. The box is stationary installed at an angle of 30-500 with orientation to the south side. Cold, heavier water constantly enters the lower part of the box, where it heats up and, displaced by cold water, enters the storage tank. It can be used for heating, for showers or for other domestic needs.

To heat 100 liters of water, a solar installation should have 2-3 m2 of solar collectors. Such a water heater on a sunny day will provide water heating to a temperature of 90 ° C. In winter - up to 50 ° C.

In the climatic conditions of Central Asia, solar collector water heaters are especially effective.

A flat solar water heater-collector is a flat heat-absorbing panel - an absorber, with an area of 1-2 m2, in which there are channels for liquid. The surface of this panel facing the Sun is black for better heating. To reduce heat loss, it is installed in a housing made in the form of a flat frame. The bottom panel is thermally insulated, and the top is protected by transparent insulation - special glass, plastic or film.

As a heat-receiving panel, you can use any metal or plastic sheet with channels for the coolant. Metal absorbers are made of aluminum or steel of two types: sheet-pipe and stamped panels (pipe in sheet). Plastic panels are not widely used due to rapid aging under the influence of sunlight and low thermal conductivity.

To achieve higher coolant temperatures, the surface of the panel is coated with spectrally selective layers that actively absorb the short-wave radiation of the sun and reduce its own thermal radiation in the long-wave part of the spectrum. The layers are created on the basis of “black nickel”, “black chromium”, copper oxide on aluminum, copper oxide on copper.

Another way to improve the performance of flat collectors is to create a vacuum between the heat-receiving panel and transparent insulation to reduce heat loss (fourth-generation vacuum solar collectors).

In a vacuum water heater-collector, the volume in which the black surface absorbs solar radiation is separated from the environment by a vacuum space, which allows almost completely eliminating heat loss to the environment due to heat conduction and convection. Radiation loss is largely suppressed by the use of selective coating. Since the total loss coefficient in the vacuum manifold is small, the coolant in it can be heated to temperatures of 120 - 160 ° C.

There are several types of solar collector vacuum water heaters:

Vacuum solar water heater-collector of low pressure (open circuit) with thermosiphon system.

Thermosiphon systems operate on the principle of natural convection when warm water tends to rise. In thermosiphon systems, the tank should be located above the collector. When the water in the manifold tubes is heated, it becomes lighter and naturally rises to the top of the tank. In the meantime, the cooler water in the tank flows down into the tubes, thus circulating throughout the system. In small systems, the tank is combined with a collector and is not designed for main pressure, so thermosyphon systems must be used either with water from an upstream tank or through pressure reducing gears.

A thermosiphon with an integrated heat exchanger provides the ability to work at main pressure. The heat carrier is heated through a heat exchanger from a spiral copper pipe located inside the heat accumulator. The principle of operation of this type of solar water heater is the same as that of a conventional low-pressure thermosiphon.

But instead of using water directly in the heat accumulator, the main pressure collector uses a copper spiral heat exchanger in the tank. The advantage is that the system can be used with low water quality, because there is practically no corrosion and scale formation inside the vacuum tubes and heat accumulator. For areas with low temperatures, the heat accumulator is filled with antifreeze.

The most efficient and common solar water heaters. Easily integrates into existing heating or hot water systems. Suitable for all types of climate and recommended for areas with low temperatures (up to -50 ° C) and low values of solar radiation. Equipped with a controller, the collector automatically maintains the most optimal circulation parameters, has an anti-freeze mode, and provides a predetermined temperature. In case of insufficient solar activity, the controller may include an additional electric heater installed in the heat accumulator.

The combination of the use of solar and wind energy in these installations allows us to provide consumers with electricity during virtually any weather conditions during the calendar year.

• In cloudy weather or at night, when there is no sun, but there is wind, wind turbines are the main source of electricity.

• In sunny weather, when the wind subsides, the proportion of electricity generated by photovoltaic panels increases.

• In the absence of favorable conditions (for example, cloudy, windless weather, nighttime without wind), consumers are supplied with batteries from the power station. With sufficient wind-solar activity, when energy is supplied to consumers from wind generators and solar panels, the excess electricity generated at that time is stored in batteries and can be used to cover power shortages in adverse weather conditions.

Wind-solar power stations have the technical prospect of using the company mainly in areas where solar and wind potentials are high enough to generate electricity.

At present, the fundamental possibility of using wind-solar energy at oil production facilities of the company, where the main consumers of electricity are:

- high-voltage electric motors of pumping units for oil preparation and transport systems;
- high-voltage electric motors of pumping stations of the reservoir pressure maintenance system;
- electric motors of submersible pumping units for oil and water wells;
- electric heating system for field and trunk pipelines;
- industrial and repair bases, shift housing estates.

The company makes high demands on the reliability and uninterrupted power supply of this category of consumers in order to: prevent a halt and violation of a complex technological process, the restoration of which in the event of a power outage requires large time costs; prevention of environmental disaster and the danger of a threat to the life and health of staff; exclusion of a possible stop of production and under-supply of oil products.

To ensure the required level of reliability of power supply to consumers, the company must use mutually redundant power sources that provide 24-hour load coverage at any time of the year, as well as a stable supply of energy with short-term increases in load due to the launch of powerful electric motors.

Wind-solar power plants, considered as the main sources of electricity for the company's facilities, should ensure the reliability of power supply to these consumers.

Currently, the most serious drawbacks that cast doubt on the feasibility of using wind-solar power plants as the main power sources are the following.

Wind-solar energy refers to unregulated energy sources, the generation of electricity of which directly depends on the strength of the wind and solar radiation (factors that are very volatile in the regions where the company operates).

The impossibility of accurate forecasting of electricity production and changes in the capacity of a power plant.

The need to use land plots of a large area ten times larger than the area for traditional power sources (for example, the specific area for traditional gas piston and gas turbine power plants is 0.06–0.08 ha / MW, for wind-solar power plants this figure reaches 1 ha / MW). This circumstance leads to an increase in land allotment areas and the volume of engineering training in hard-to-reach areas.

The installed capacity of a wind-solar power plant is several times higher than the required installed capacity of traditional sources with the same connected loads. As part of a wind-solar power plant, it is

necessary to provide for a large number of solar panels and wind generators, whose total power in conditions of inconsistent wind-solar activity should provide objects with electricity in normal mode and at the same time accumulate it in battery packs for guaranteed power supply to consumers in adverse weather conditions.

Wind power plants of large installed capacity lag significantly behind traditional sources in economic terms. Today, the unit cost of building a power plant based on alternative energy sources in Russia is approximately 100–120 million rubles / MW, which is commensurate with the unit cost of building a gas turbine power plant equal to 90–110 million rubles / MW. However, with a comparable unit cost, a significant increase in the total cost of constructing alternative power plants arises from the fact that their installed capacity and the number of units of generating equipment significantly exceed the performance of traditional sources.

CONCLUSION

The use of wind-solar power plants as the main source of power for energy-intensive oil facilities will require additional costs for the utilization of oil gas, previously expected to be used to generate electricity in gas power plants.

Despite the significant advantage of traditional power supplies over wind-solar power supplies for large consumers, the use of alternative energy sources can be the most rational and economical solution. The best option for the use of wind-solar power plants at the company's facilities is their use as AIP of remote linear objects of small power

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ОБЪЕКТІНІ ЭЛЕКТР ЖӘНЕ ЖЫЛУ ҚАУІПСІЗДІГІ - ИННОВАЦИЯЛЫҚ МӘСЕЛЕЛЕР - ЖОЛ ЖӘНЕ ЖОҒАРЫ СТАНЦИЯ (ЭЦК) ОРТА ҚУАТ ПЕН ЭЛЕКТР ЭНЕРГИЯ КӨЗІ

Аннотация. Соңғы он жылдықта жаңартылатын энергияға деген қызығушылық тұрақты түрде артып келеді, өйткені ол іс жүзінде шектеусіз. Жанармай жеткізілімі аз және қымбат болған сайын, бұл көздер тартымды және үнемді бола бастайды. Мұнай мен газ бағасының өсуі адамдардың назарын су, жел мен күнге аударуының басты себебі болды. Күн энергиясын пайдалану проблемасына қызығушылық айтарлық тай өсті. Тікелей күн радиациясын қолдануға негізделген энергияның мүмкіндіктері өте жоғары. Жаңартылатын энергияны қолданатындығымызға қарамастан, бұл Жердің энергетикалық балансына және биосфераның күйіне әсеретпейді.

Түйін сөздер: электрменжабдықтау, жылуменқамтамасызету, инновация, жел, күн, энергия, энергия.

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ЭЛЕКТРО И ТЕПЛОСНАБЖЕНИЕ ОБЪЕКТА С ПОМОЩЬЮ ИННОВАЦИОННЫХ СРЕДСТВ-ВЕТРО-СОЛНЕЧНОЙ СТАНЦИЕЙ(ВСС) СРЕДНЕЙ МОЩНОСТИ И ЭЛЕКТРИЧЕСКОГО ИСТОЧНИКА ЭНЕРГИИ

Аннотация. В последнее десятилетие интерес к возобновляемым источникам энергии постоянно возрастает, поскольку практически они неограниченны**.** По мере того, как поставки топлива становятся менее надежными и более дорогостоящими, эти источники становятся все более привлекательными и более экономичными. Повышение цен на нефть и газ послужило главной причиной того, что человек вновь обратил свое внимание на воду, ветер и Солнце. Интерес к проблеме использования солнечной энергии резко возрос. Потенциальные возможности энергетики, основанной на применении непосредственно солнечного излучения, чрезвычайно велики. Независимо от того, будем мы использовать возобновляемую энергию или нет, на энергетическом балансе Земли и состоянии биосферы это никак не отразится.

Ключевые слова: электроснабжение, теплоснабжение, инновации, ветер, солнце, источник, энергия

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