



## Chapter 12

# Potential Evaluation and Best Practices of Solar Power Plant Application in Rural Areas

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### ABSTRACT

*Recreational rest and recovery zones require a daily hot water supply, and constant availability of electricity. Therefore, the need for renewable energy sources usage in the Lower Volga region is obvious and power plants with an environmentally friendly component significant in the region. An analysis of the theoretically calculated potential renewable energy makes it possible to optimistically assert that the region is promising for autonomous renewable energy source implementation. It may be noted that potential wind and solar energy, in spite of the fact that it is distributed unevenly, is sufficient to provide energy for remote rural communities and tourist facilities. An analysis was conducted on the availability of actinometric data required for heliotechnical calculations and identified areas of applicability and accuracy of the information received from various meteorological information sources.*

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## **INTRODUCTION**

Current trends in the development of the global energy industry and the ever-increasing energy consumption dictate the need to search for non-traditional energy sources.

Today, traditional energy resources (hydrocarbon fuels, water resources) and technologies that transform them into available forms of energy are not always able to provide the required level of energy consumption to the world economy and the population's need for it. In addition to the energy requirements, the economic sector also faces the exhaustion of raw materials and numerous environmental problems arising because of the extraction, production and transportation of energy.

The most promising energy supplier today and in the near future is renewable energy, which includes: solar, wind, geothermal energy, energy of sea waves, tides and ocean, biomass, wood, charcoal, peat, cattle, shale, tar sands and the hydropower of large and small watercourses. The economic potential of renewable energy sources is currently estimated at 200 billion tons of fuel equivalent per year, which equals twice the annual global production of all types of fossil fuels.

The main advantage of renewable energy sources is their inexhaustibility and environmental friendliness. The use of power plants that are operated on the fundamental principles of renewability does not change the energy balance of the planet and does not violate the whole picture of the earth's ecology. These qualities caused the rapid development of renewable energy industry in the world and very optimistic forecasts of its development in the coming decade. Renewable energy sources play a significant role in solving the three global problems that humanity faces: energy, ecology, food.

The development of renewable energy in Russia is often declarative, in spite of the fact that at the governmental level the development rates have been approved, and quantitative indicators have been agreed by year. At the same time, the concept of renewable energy is replaced by the concept of using secondary resources of industry and agriculture, which makes it possible to account for the fulfillment of the goals set – the development of hitherto unnecessary energy emitted into the atmosphere and the use of secondary components plunged into the production process at a new level for solving the corresponding tasks. But the development of this innovative industry of renewable energy application is, first of all, not the substitution of concepts, but a real application of modern facilities, modernization of existing ones, estimation of the potential for the use of renewable energy, the attempt to obtain economically beneficial energy that many remote settlements and territories need with quality indicators that can be predicted in advance.

Therefore, at present, experience in renewable energy application in rural areas, in the region of arid farming, in areas where agricultural production is widely developed, especially livestock farming, at remote territories where agricultural producers breed sheep farms, cattle farms, etc., is of particular importance in the country. These settlements are often located in the steppe zone and the ability to be connected to the centralized power supply is absent or requires such a great infusion of funds and monies, which makes farmers seriously think about stopping the continuation of the normal functioning of these industries. In these conditions renewable energy sources can really help them to solve the most part of described problems.

In order to characterize the region in terms of attractiveness for the renewable energy intrusion, it is necessary to assess the potential of renewable energy in these areas and, above all, assess the solar energy potential, identify regions that are promising for the application of autonomous sources of renewable energy. It can be noted that the energy potential of the Sun, despite the fact that it is distributed unevenly, is sufficient to provide energy to remote rural settlements.

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