

What are the benefits of renewable energy deployment on sustainable rural development?

The energy intensity of agricultural products in Russia is three times higher, the energy intensity of labor is three times lower than in European countries, and 3-4 times less energy is consumed per rural resident per year than in urban areas. Biowaste is used inefficiently as secondary energy resources and poses a threat to the environment. The energy resource of renewable energy sources in rural areas where agricultural enterprises are located is not evaluated or used.

The most serious drawback of centralized energy is the significant loss of energy when it is delivered from producers to agricultural consumers. At certain intervals, various natural disasters occur (wind, snowfall, floods, floods and mudslides), which disable certain elements of traditional power supply systems (high-voltage power lines, transformer substations, etc.), which leads to disruption of their stable operation.

These disadvantages of centralized power supply systems (they are almost the same in all countries of the world) have determined the need for the development and construction of distributed energy facilities.

The essence of distributed energy is that energy producers (heat, cold, and electricity) are as close as possible to consumers and are balanced with them in terms of load. Generating equipment of renewable energy sources (for example, wind, solar, biofuels, geothermal energy, micro-hydroelectric power stations, etc.) are located directly in the place of energy consumption. Today, this process is developing intensively in most countries of the world.

Renewable energy sources include the following sources: solar energy, geothermal energy, light energy, wind energy, tidal energy, wave energy and thermal gradient of the sea, biomass conversion energy, energy obtained from the burning of fuelwood, charcoal, peat, oil shale, bituminous sandstones, draft animal energy, and hydropower.

The importance of energy as a factor of sustainable rural development is obvious and does not need special confirmation. Moreover, the specifics of agricultural enterprises oblige us to consider its energy supply taking into account the structure of fixed assets, types of production, waste, environmental requirements, local market conditions and other aspects. In particular, occupied territories not only determine the potential of renewable energy sources, but also can contain a significant resource of renewable bioenergy.

Until recently, for a variety of reasons, relatively little attention was paid to the development of renewable energy sources in energy policy. In recent years, the situation has begun to change markedly. The need to fight for a better environment, new opportunities to improve the quality of life of people, participation in the global development of advanced technologies, the desire to increase the energy efficiency of economic development, the logic of international cooperation – these and other considerations contribute to the intensification of national efforts to create a greener energy and move towards a low-carbon economy.

When developing new rural areas and previously populated territories, an energy assessment of the potential and availability of renewable energy sources is required. Due to the fact that the development of rural areas involves the organization of such production processes that require continuous energy consumption, the problem of energy production using renewable energy

sources based on the integrated use of the potential of various types of source (wind-diesel power plants, generation, etc.) becomes urgent.

Renewable energy sources should be considered as an addition to traditional sources of energy supply for industrial and residential complexes in rural areas. Energy produced using renewable energy sources is more expensive than traditional ones, and it can only be used in consumer systems that are in a state of highest energy efficiency. To do this, it is necessary to conduct energy audits in the consumer energy system in order to improve the energy efficiency of the energy technological process.

To determine the potential of renewable energy sources, a long-term registration of their energy parameters is required, i.e. an information and measurement system must be used that combines technical and technological accounting of energy and some data processing functions in accordance with the main provisions of the energy saving theory.

Both stationary and mobile power plants can be used for energy supply to individual consumers of dehqan (farm) farms and small-scale mechanization facilities, for example, for processing orchards and vineyards (sprayers, secateurs, electric cultivators, etc.), as well as apiaries and shepherds' camps (shearing machines, lifting and desalination of water, etc.). For this purpose, a mobile renewable power plant of a combined type has been developed.

The experience of implementing distributed energy using renewable energy sources in the world practice has shown environmental advantages and constantly developing technologies to improve environmental safety and energy security of rural areas.

[View](#)

[Can Hydrogen fuel become reliable renewable energy resource?](#)

[Which Will be the Best Energy Source in the Future; Biofuel, Solar, Wind or Water?](#)

How solar energy is useful in agricultural practices?

1. Write short note on (any five) (a) Energy audit

(b) Solar heating and cooling of buildings.

(c) Prospects of geothermal energy in context to India.

(d) Which wind data are taken into consideration and site selection of wind mills?

(e) Factors affecting biogas production.

(f) Strategy for meeting the and future energy requirements in India.

(20 marks)

2(a) What is Betz coefficient? Show that the ideal maximum theoretical efficiency is 59% for a horizontal axis windmill.

(8 marks)

2(b) Describe construction and working thermosyphon solar water heating system.

(6 marks)

2(c) What are liquid dominated hydrothermal resources? How these can be utilised in high temperature wet steam system?

(6 marks)

3(a) Determine the average value of solar radiation on horizontal surface for June 21, at latitude of 10°N , if persons a and b are given as equal to 0.30 and 0.51 respectively and ratio $n_{\text{N}} = 0.55$.

(8 marks)

3(b) Describe construction and working of floating dome type biogas plant with the help of neat sketch.

(6 marks)

3(c) Derive an equation for average tidal power generation per unit area of basin in terms of tidal range.

(6 marks)

4(a) Describe working of Darrieus type machines with help of neat sketch and its characteristics.

(8 marks)

4(b) Explain wave energy conversion devices?

(6 marks)

4(c) Describe the photo voltaic-solar cells and its applications.

(6 marks)

5(a) Wind at 1 bar and 20°C has a velocity of 12m/s calculate:

(i) Total power density in wind stream

(ii) maximum power density

(iii) A reasonable obtainable power density

(iv) Total power produced if a rotor diameter is 60m and it runs at 50 rpm.

(v) The torque and axial stress produced at maximum efficiency.

(10 marks)

5(b) Describe working of Closed Cycle OTEC system with the help of neat sketch.

(6 marks)

5(c) Explain energy consumption as a measure of Nation's development.

(4 marks)

(8 marks)

6(b) Explain the term 'slope' and surface azimuth angle of a surface facing the sun and bring out how sunset hour angle is affected by the slope

(6 marks)

6(c) Explain vapour dominated system belongs to geothermal energy.

(4 marks)