



What Is Renewable Energy?

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ABSTRACT

The article talks about types of renewable energy and their impact on nature. In general, renewable energies are one of the most normal and promising ways to save our limited resources and meet the needs of humanity in the future.

Keywords:

energy, sun, renewable, regenerative, green energy, hydroelectric, International Energy Agency, the International Energy Agency Renewable Energy, OECD, World Bank, International Finance Corporation, International Renewable Energy Network 2.

Introduction. Renewable or regenerative energy (Green energy) - Renewable energy - energy from sources that, according to human concepts, are inexhaustible. The basic principle of using renewable energy is to extract it from processes constantly occurring in the environment and provide it for technical use. Renewable energy is derived from natural resources - such as sunlight, wind, rain, tides and geothermal heat - that are replenished naturally. Estimatedly, about 18% of the world's energy consumption was met from renewable energy sources, with 13% from traditional biomass, such as wood burning. Hydroelectric power is the next largest source of renewable energy, providing 3% of the world's energy consumption and 15% of the world's electricity generation. Wind energy use is growing at about 30%/year, worldwide with an installed capacity of 196,600 MW in 2010 and is widely used in Europe and the USA. The annual production in the photovoltaic industry reached 6900 MW in 2008. Solar power plants are popular in Germany and Spain. Solar thermal power plants operate in the USA and

Spain, and the largest of them is the 354 MW Mojave Desert station. The world's largest geothermal installation is a geyser installation in California, with a nominal capacity of 750 MW. Brazil is conducting one of the largest renewable energy programs in the world related to the production of fuel ethanol from sugar cane. Ethyl alcohol currently covers 18% of the country's automotive fuel needs. Fuel ethanol is also widely distributed in the USA. Wind energy converts the kinetic energy of air masses in the atmosphere into electrical, thermal and any other form of energy. Hydropower specializes in the use of the potential energy of the water flow of rivers, formed by precipitation that has fallen on a hill. Tidal energy uses the energy of the tides, and in fact the kinetic energy of the rotation of the Earth. The energy of sea waves uses the potential energy of waves carried on the surface of the ocean. Wave power is estimated in kW/m.

The development of renewable energy sources (RES) is becoming an integral part of the transformation of global energy, which is

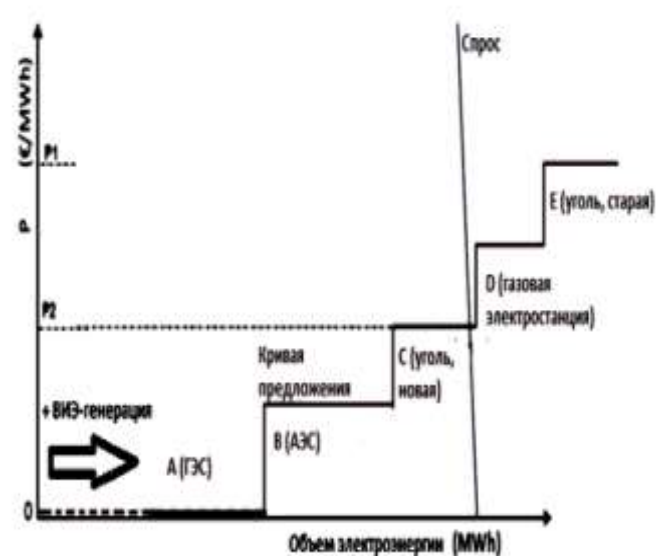
justified and confirmed both by the observed trends in the development of the global energy sector and the trends in the development of the renewable energy industry itself, as well as by the fundamental research of the International Energy Agency, the International Energy Agency Renewable Energy, OECD, World Bank, International Finance Corporation, International Renewable Energy Network 2.

The growing efficiency of renewable energy technologies, the reduction of their cost, on the one hand, and the increase in electricity prices, on the other, have allowed photovoltaic systems (photovoltaics) and onshore wind generation to reach new levels of cost competitiveness, i.e. competitiveness based on lower production costs. The most successful technologies of recent years have been solar photovoltaic systems (photovoltaics) and ground-based wind generation. In the period from 2009 to 2013, prices for solar photovoltaic modules decreased by 65-70%. Solar energy has reached grid parity in Germany, Italy and Spain; grid parity is expected to be reached in France and Mexico in the near future. As a result of market expansion and increased competition since 2008, the cost of wind turbines decreased by 30%, as a result, the average capital costs of onshore wind generation decreased by 18%.

One of the main indicators used for the economic evaluation of the cost of a generating system is the levelized cost of electricity (LCOE) production. This indicator is calculated as the sum of the costs of building and operating a power generator for the entire period of its operation (including initial investment, operating costs, repairs, fuel, capital costs, etc.) divided by the total amount of electricity generated during this period. In other words, the LCOE is the price at which electricity must be produced in order to pay off (cover the profitability threshold) during the life of the generating facility. Figure shows the LCOE values for various generation technologies in centralized and isolated power supply systems in OECD countries (black line indicates the average value).

As can be seen, among generation technologies, renewable energy sources are

often competitive with conventional energy, and in the case of isolated systems, much more cost-effective. However, due to high capital costs, in many cases renewable energy technologies turn out to be much more costly than traditional generation technologies. In most cases, the development of renewable energy sources is possible only with the support of the state in one form or another. And, nevertheless, the fact that the RES support policy is currently being implemented in almost all countries indicates that what has happened, at least the awareness economic, social and environmental benefits from the development of the renewable energy industry. Macroeconomic effects of the development of renewable energy sources. Reduction of average prices in the wholesale electricity market due to the replacement of high-margin traditional energy generators by renewable energy stations. The variable costs of many renewable energy technologies are practically zero, since we get the sun and wind for free. In order to support renewable energy producers, in many countries electricity generated from renewable energy has a privileged status: it enters the grid, is purchased and consumed in the first place. Thus, with the entry of renewable energy technologies into the market, the supply curve shifts to the right and the price falls to the P2 level, despite the fact that demand remains at a high level (Figure 1).



This theory is confirmed by practice. Since 2010, prices on the European spot electricity market have been falling, which, in turn, is reflected in the long-term segment of the electricity market. Price cuts have already been announced for long-term supply contracts until 2019: the price for the supply of kWh for the period 2014-2019. was below 4 cents, which is its historical low. Thus, contrary to all forecasts and expectations, since 2011, exchange prices for electricity have fallen by 40%. Improvement of trade balance. Solar, wind, hydro, geothermal and ocean energy are the internal resources of the country, so the development of renewable energy can have a positive impact on the trade balance if the reduction in energy imports is greater than the import of renewable energy technologies. For example, it is estimated that in 2010 in Spain, the domestic production of electricity from RES reduced the import of fossil fuels by \$2.8 billion, while in Germany in 2012 it was possible to save \$13.5 billion on imports of fuels.

Compared to wind and solar energy, wave energy has a higher power density. Although similar in nature to tidal energy and ocean currents, wave energy is a different source of renewable energy. Having blocked the bay, the strait, the mouth of the river flowing into the sea with a dam (having formed a reservoir, it is called the TPP basin), it is possible, with a sufficiently high tide amplitude (more than 4 m), to create a head sufficient for the rotation of hydraulic turbines and hydro generators connected to them, located in the body of the dam. With one pool and the correct semi-diurnal tide cycle, the PES can generate electricity continuously for 4-5 hours with interruptions, respectively, 2-1 hours 4 times / day (such a PES is called a 1-pool 2-way action). Solar energy converts electromagnetic solar radiation into electrical or thermal energy.

Expansion of access to energy supply for technologically isolated regions. Currently, more than 1.3 billion people do not have electricity. Autonomous energy systems based on RES are alternatives to centralized energy supply in developing regions where access to

electricity is difficult or impossible. The modular, decentralized nature of renewable energy technologies allows them to adapt to local conditions and provide a wide range of energy supply services, depending on the needs and purchasing power of the end user.

Geothermal energy uses water from hot geothermal sources as a heat carrier. Due to the absence of the need for water heating, geothermal power plants are largely more environmentally friendly than thermal power plants. Bioenergy specializes in the production of energy from biological raw materials.

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