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PROSPECTS FOR THE DEVELOPMENT OF CLEAN ENERGY

At the moment, one of the main energy problems of the present century is the decline in the value of the world's proven hydrocarbon reserves. Against the background of fluctuating prices for petroleum products and coal and a corresponding decline in activity in these industries, renewable energy sources began to come out of the shadows and actively considered as a potential replacement for classical energy sources. Investments in renewable energy have set new records. At the moment, they exceed the global investment in fossil fuels by almost two times and are equal to \$ 286 billion. This is due to the development of technologies in general and, as a result, to a decrease in the price of renewable energy reproduction. The International Renewable Energy Agency expects a further reduction in the cost of renewable energy by 43-59% by 2025 [1].

In addition to the growing competitiveness of renewable energy sources, an important factor in choosing a strategy for the development of the electric power industry with the help of renewable sources is to reduce the level of emissions into the atmosphere by replacing the use of fossil resources with "green energy". The relatively high cost of renewable energy installations can be partially offset by the lack of environmental consequences from the burning of coal, oil or gas. Thus, over the past decade, the cost of energy production from renewable sources has decreased several times, and in the future, their decline can be traced due to the sharp development of technologies. With the promotion of private investment, the renewable energy sector is quite competitive and may be a good competitor to the oil and gas complex in the future. In some countries, the competitiveness of renewable energy sources has already

been achieved, and then, investments in alternative energy sources will be even more profitable [2].

The global trend towards the transition to renewable energy sources has also affected Belarus. Unfortunately, our country does not have natural energy resources, so the issue of energy security exists. The Republic of Belarus is one of the twenty most energy-dependent countries in the world. The ratio of imports to gross energy consumption is approximately 85%. All this points to a serious problem of our country's energy security. However, this problem is gradually being solved. In 2014, the construction of the BelNPP began in Ostrovets. The first power unit was launched in 2020, and the second one is scheduled for 2021. Today, the entire country consumes 38-39 billion kilowatt-hours (kWh) of electricity per year. Belarus almost completely provides itself with this electricity, generating more than 80% of it from Russian fuel. The launch of two nuclear power plant reactors will add to this another 18 billion kWh that is, plus almost 50% of what Belarus consumes [3].

Renewable energy can also become one of the ways to achieve energy independence of the Republic of Belarus. Solar energy of all types of renewable energy sources seems to be the most attractive, especially its way of converting into electricity thanks to photovoltaic energy converters-solar cells. Solar cells have a number of obvious advantages, for example, they do not require fuel, do not have moving parts, they are silent, their work is not associated with the emission of harmful substances, and their service life reaches 25-30 years. In Belarus, there are not so many sunny days a year, only 30. However, contrary to popular opinion, there is enough sun in Belarus for industrial use. In the Republic of Belarus, the measured average annual energy illumination is: for horizontal surfaces – 0,12 kW/m²; for the inclined platform turned to the south – 0,15 kW/m². Taking this data into account, the solar energy falling on average per 1 m² per year is $E=0,15*365*24=1314$ kWh. In addition, according to studies of ten American satellites, the potential of solar energy (in kWh per year per 1 kW of installed capacity) in most of the territory of Belarus is about 10% higher than in European countries located with Belarus at the same latitude or to the south. Thus, we can conclude that solar energy should be taken into account the investment attractiveness [4].

The study analyzed the investment attractiveness of an industrial land-based solar power plant with a capacity of 10 MW. To determine the investment attractiveness of the project, the following indicators were evaluated: net present value (NPV), profitability index (PI), Payback Period (PP), internal rate of return (IRR) [5].

As a result of the calculations, NPV= –1819664,03 \$. This value of the net present value indicates that the income from the investment project cannot cover the risk of this project, which means that the investment is inefficient. The profitability index PI=0,68. Since the index value is less than 1, this means that the investment project will not be able to fully recover the capital costs invested in it. The payback period of the investment project was 11 years. But, since the service life of the solar battery is 20-25 years on average, this indicator is quite satisfactory. The internal rate of return for the considered solar power plant was equal to 6,5%. This suggests that such a project will generate negative discounted cash flow in the future.

After making all the necessary calculations, it was found that the production of solar energy in the framework of an industrial power plant in our country is currently not profitable. This is due to the fact that the tariffs for the sale of electricity to GPO “Belenergo” were reduced not so long ago. These measures were taken in connection with the commissioning of the BelNPP and, as a result, with the appearance of excess electricity in the network. It can be assumed that these measures are not focused on the long-term perspective. The tariff is likely to return to its previous value in the coming years, if not make it even more profitable. This will be due to the fact that the state will either increase energy consumption in the country, and at the moment an intersectoral set of measures to increase electricity consumption until 2025 has already been approved. Or the state will gradually reduce the capacity of thermal power plants that run on oil or gas. Both of these solutions lead to a decrease in the energy dependence of our country.

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