THERMAL RESOURCES OF CLIMATE OF BELARUS AND THEIR APPLICATION IN "GREEN" ENERGY INDUSTRY

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This abstract presents some research aimed at studying thermal resources of Belarus climate. The researcher analyzes the factors that influence solar radiation on the land surface such as the duration of sunshine, the number of clear and cloudy days with total and lower cloud cover, and total solar radiation.

Keywords: "green" energy industry, solar power, sunshine duration, total solar radiation.

Nowadays Belarus has to solve an important problem of providing its energy security. However, the priority in the development of the power system of the republic is its environmental sustainability. Belarus is trying to switch from hydrocarbon fuels to alternative environmentally friendly sources of energy. A lot has already been done in this respect. For instance, we are finishing constructing our first nuclear power plant which is to generate "green" electricity. Thanks to the EU's financial support there has been built the largest in Belarus windmill farm near Novogrudok. We are also erecting small-scale hydropower plants and introducing biogas units at our enterprises. Nevertheless, it's not all that we can do. One of the possible approaches in developing power industry in Belarus can become solar power. The experience of such European countries as Germany (their solar industries generated 8.4% of all electricity in 2018 [1]) whose geographic position is similar to our country's proves that solar plants can contribute significantly to the power system of Belarus.

The purpose of this research is to study heat power resources of the current climate to apply them in the country's economy. The source data for this research are the results of the 70-year climate monitoring in Belarus. It should be noticed that only a few met stations around Belarus provide actinometrical data. That is why we developed methods of calculating heat-power resources of climate at different time intervals [2].

We analyzed the factors that influence solar radiation on the land surface of Belarus. They include duration of sunshine, the number of clear and cloudy days with total and lower cloud cover, and total solar radiation [3].

Due to the influence of various atmospheric factors, the total value of solar energy reaching the land surface is 40-80% less than the daily-average amount of insolation at the uppermost layer of atmosphere.

Yearly-average sunshine duration increases by approximately 7% from the north, north-west to the south, south-east: from 1740 (Grodno, Oshmyany) to 1860 hours (Gomel, Bragin). The number of clear days with total cloud cover has the same trend, i.e. it increases from the north, north-west to the south, south-east ranging from 20 (Grodno, Polotsk) to 30-35 days (Mozyr, Bragin). The number of clear days with lower cloud cover range from 60 (Brest, Grodno) to 100 days (Mozyr). Thus, there is a correlation between the growth of yearly-average sunshine duration, the number of clear days with total and lower cloud cover and the decrease in the number of cloudy days with total and lower cloud cover from the north, north-west to the south, south-east. Cloudiness reduces yearly sums of total solar radiation by a factor of 2.5-3. For example, in Minsk yearly sums with no cloudiness can reach 4485Mj/m^2. Yearly sums of total radiation decrease by approximately 40% compared to the ones without cloudiness. At the same time the sums of defuse radiation with mean cloudiness are 40% higher than with clear sky.

The calculations performed in the research accompanied by the zoning of the characteristics that reflect the influence of solar energy on the land surface make it possible to assess the prospects of developing solar power in the Republic of Belarus.

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RATIONING AND CONTROL OF SKIN, HANDS AND FEET IRRADIATION

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The article describes the ways of rationing and control of radioactive contamination of the skin, hands and feet.

Keywords: individual dose equivalent, ambient dose equivalent, directional dose equivalent.

Due to the construction of the nuclear power plant on the territory of the Republic of Belarus, the issue of ensuring radiation safety of both personnel and the public is relevant. Radioactive contamination and exposure of skin, hands and feet are an essential factor determining the external and internal exposure of a person. Since skin is the outer cover of the human body, its function is to protect humans against various external influences. The function of limbs is the implementation of various labor operations, manipulation of objects and movements. That is why these organs are the most vulnerable and in order to ensure radiation safety, dosimetric control of these organs is necessary.

In assessing compliance of exposure conditions with regulatory requirements, operational values are used, the values of which under certain exposure conditions are close to the values of the corresponding normalized values. The most important quality of operational quantities is that they can be directly measured during radiation monitoring.

Nowadays, the following operating values are used in the measurement practice of dosimetric monitoring of external exposure: ambient dose equivalent H*(10) and individual dose equivalent Hp(10) and, in some rare cases, individual dose equivalent in skin Hp(0,07).

Using a couple of operational quantities (ambient and individual dose equivalents), it is possible to solve the problems of dosimetric control. However, today in the Republic of Belarus there is no ambient operational value similar to H*(10) to control skin, hands and feet.

The current situation excludes the possibility of predicting the equivalent dose in the skin and limbs for the year and making decisions on the introduction of individual dosimetric control with measurement of individual dose equivalents Hp (0,07) at a given workplace.

In international practice, when controlling workplaces and as a criterion for introducing individual control of doses in the skin and limbs, the operational value “directional dose equivalent - H’ (d, Ω)” is used.

Thus, the directional dose equivalent - H’(d, Ω) and individual dose equivalent in the skin and limbs Hp(0,07) are capable to provide a conservative dose estimate of the dose from low-penetrating radiation. And these dose are mandatory for the purposes of radiation safety of external exposure.

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