THE METHOD OF CALCULATION OF SOLAR RADIATION

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A vector of energy policy of peace is aimed at increasing the share of renewable energy sources (RES) in the global energy balance [1-3]. Accelerated transition to carbon-free energy dictated by the situation on the global energy commodities market occurs.

It should be noted that in many regions there have entered short-term and long-term programmes for the development of renewable energy sources. The European Union programme "Europe 2020" aims that by 2020 the share of RES in total generation would be less than 20 %.

Incoming to the surface, solar radiation is unstable and depends on many unchanging and variable parameters. Unchanging from year to year, the parameters include: geographic coordinates and time zone location and the number of days in the calculation period, time of sunrise, Zenith and sunset, duration of day, etc. Variable parameters first need to include the following indicators: the presence of clouds, the composition of the clouds, the air mass based on the changing pressure and temperature, the change in the thickness of the vertical column of ozone layer.

After defined time intervals, the calculation of direct, diffuse and total solar radiation in the study area takes place. This work uses the main ideas presented in the mathematical model Iqbal.

In terms of time intervals (between sunrise and sunset), the basic meteorological and astronomical parameters are defined which calculate the direct, diffuse, and total solar radiation received on a horizontal surface in the study area. The calculation is performed with a discrete step of one hour.

Table 1 Summary solar radiation arriving on horizontal surface in the settlements by years of weather observations.

Summary solar radiation, kW·h/m²								
Number of the year	Алдан Aldan	Якутск Yakutsk	Оймякон Oymyakon	Черский Chersky	Тикси Tiksi	Саскылах Saskylakh	Верхоянск Verkhoyansk	Усть-Мома Ust-Moma
1	252,7	1064,6	1040,1	862,79	719,99	720,61	892,60	958,48
2	203,8	1031,6	1006,4	850,30	725,02	742,02	884,39	933,72
3	204,0	1031,8	1017,4	853,53	733,48	740,93	890,10	939,70
4	242,6	1040,9	1022,5	854,79	724,28	725,68	886,47	927,83
5	195,7	1027,6	996,5	850,40	731,60	733,61	881,80	927,36
6	225,2	1042,1	1019,6	871,97	737,84	729,64	895,09	943,07
7	246,8	1061,0	1025,8	879,88	751,26	760,70	909,44	954,67
8	210,5	1023,2	994,9	873,76	777,66	790,39	905,29	938,33
9	199,7	1006,2	995,3	870,14	767,12	780,44	886,85	929,54
10	225,0	1035,7	1021,3	877,65	770,23	777,73	903,94	954,27
11	216,8	1033,1	1006,7	888,36	790,12	778,57	895,83	934,85
12	212,3	1024,8	1003,5	885,97	784,74	777,42	899,21	942,33
Mean value	219,58	1035,21	1012,51	868,30	751,10	754,81	894,25	940,35

The obtained results are located quite relatively close to each other. This suggests that climatic processes in the middle and lower layers of the atmosphere are cyclical. Recurrence is dictated coming from the year of baric depressions, responsible for long-term (seasonal) climate change in the study area [4].

Table 2 maps the results obtained with the well-known open sources such as database NASA SSE [5].

Table 2.

Comparison of the mean annual values of total solar radiation with the data in [5].

Settlement	Алдан Aldan	Якутск Yakutsk	Оймякон Oymyakon	Черский Chersky	Тикси Tiksi	Саскылах Saskylakh	Верхоянск Verkhoyansk	Усть-Мома Ust-Moma
Mean value, kW·h/m²	1219,58	1035,21	1012,51	868,30	751,10	754,81	894,25	940,35
[57], кВт·ч/м² (kW·h/m²)	1091,32	1084,15	1051,24	905,23	781,12	795,35	949,11	952,65

The methodology of determining direct and diffuse solar radiation is of crucial importance. It is produced by solar radiation calculations for different localities of the Republic of Yakutia, and also compared with the results of NASA SSE.

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FEATURES OF THE CREATION OF UNDERGROUND NUCLEAR POWER PLANTS AND SOME ISSUES OF RADIATION COLD-FASTNESS AND WORKING CAPACITY OF STRUCTURAL MATERIALS OF THE REACTOR VESSEL

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At present, in the energy balance of most economically developed countries, nuclear power takes a solid place and continues to develop successfully. In 31 countries, 440 nuclear power units are operated with a total installed capacity of 359.9 GW, which accounts for about 17% of all electricity produced in the world, and in some countries (Lithuania, France, Sweden, Japan, Belgium) more than half of the energy produced is generated by nuclear power plants. For example, in France, nuclear power accounts for about 80% of the generated energy. Under construction are 30 power units with a total capacity of 31 GW, including in countries that previously did not have nuclear power plants (Iran). Only in 2002, 7 power units with a total capacity of 5.9 GW were commissioned in the world (China, Korea, Czech Republic).

The cardinal way to improve the safety of nuclear power plants is their underground location. The shelter of the roof from the natural rock of the nuclear and radiation-hazardous blocks of the station localizes the consequences of any nuclear (even beyond design) and radiation accident in a sealed underground space. The thickness of the Earth's layer is a reliable protection against any external impact - the fall of heavy aircraft, large meteorites, the use of concrete concrete shells, bombs, air and space attack, as well as sabotage and terrorist acts.

The second important advantage of underground nuclear power plants is the possibility of processing and storing radioactive waste in the underground space. This eliminates the need for their transportation and the creation of special storage facilities, which is fraught with a radiation accident.

An integral part of safety is the reliability and strength of the elements of equipment, pipelines, structures, etc. The specifics of the operating conditions of structural materials of the main units and equipment of nuclear power plants required