

THE DEPENDENCE OF ELECTRICITY PRODUCTION ON REGIONAL CONDITIONS AND THE ROLE OF HYDROENERGY AT THE GLOBAL SCALE

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Abstract. *The article discusses what factors the process of choosing the most suitable energy sources in the electricity production system of the countries of the world depends on, what the main energy resources are now and the urgency of switching to ecologically clean renewable energy sources.*

Key words: *Energy source, fossil resources, renewable energy sources, power plants, HPP, PSH.*

ЗАВИСИМОСТЬ ПРОИЗВОДСТВА ЭЛЕКТРОЭНЕРГИИ ОТ РЕГИОНАЛЬНЫХ УСЛОВИЙ И РОЛЬ ГИДРОЭНЕРГЕТИКИ В ГЛОБАЛЬНОМ МАСШТАБЕ

Аннотация. *В статье рассматривается, от каких факторов зависит процесс выбора наиболее подходящих источников энергии в системе производства электроэнергии стран мира, каковы основные энергоресурсы в настоящее время и актуальность перехода на экологически чистые возобновляемые источники энергии.*

Ключевые слова: *Источник энергии, ископаемые ресурсы, возобновляемые источники энергии, электростанции, ГЭС, ГАЭС.*

It is known that the main part of the electricity produced around the world comes from fossil resources (oil, natural gas and coal). That is, the level of reliance on natural fossil resources in the production of electricity in some countries is quite high. For example, about 100% of Saudi Arabia's electricity is from oil and natural gas, about 100% of Qatar's electricity is from natural gas, 100% of Kuwait's electricity is from natural gas and oil, and about 85-90% of Kazakhstan's electricity by coal and 85-90% of Indonesia's electricity is generated by coal and natural gas.

Also, the share of nuclear energy in the energy system of some other countries is high, and these indicators are as follows: France (70-75%), Slovakia (53%), Ukraine (50-55%), Belarus (40%), Hungary(48-50%), Belgium(50%), Sweden(30-40%) and South Korea(25-30%).

Fossil resources and nuclear energy make up the main part of the electricity produced in most countries because the production technologies using fossil fuels have been available and well developed in these countries for a long time. These technologies are capable of high-power and stable operation, providing constant and reliable energy supply to electric networks. Nuclear power

plants enable stable and long-term production of large amounts of electricity and also play an important role in reducing carbon emissions.

On the other hand, for countries with relatively large reserves of fossil fuels, their use is economically efficient. Although the initial investment for the construction of nuclear power plants is high, they pay off in the long term as a cheap and sustainable source of energy. In addition, energy production from fossil fuels and nuclear energy is more sustainable than other energy sources. For example, wind and solar energy are more difficult to ensure a constant supply of energy because they depend on weather conditions. However, many countries are trying to accelerate the transition to renewable energy sources to prevent global warming and environmental problems.

For example, as mentioned above, fossil resources and nuclear energy are used as the main energy sources in the electric power system of the Republic of South Korea. Although this country does not have natural gas, oil and coal reserves, it meets its main energy consumption by importing these resources. For example, 40-45% of the electricity produced comes from coal, 20-25% from natural gas, and about 3-5% from oil. Also, renewable energy sources (solar, wind, biomass and hydropower) account for approximately 6-8% of total electricity, and the share of hydropower alone is only 1-2%. Why has the hydropower sector not been popularized as a renewable energy source in the Republic of South Korea and its share in the total electricity generation has not increased compared to other energy sources? It should be noted that there are several reasons for this:

1. Geographically, the territory of South Korea is relatively small and mountainous, suitable areas for the construction of hydroelectric power plants are limited, and there are not enough large rivers or large water bodies, which makes it difficult to create suitable infrastructure for hydropower.

2. Due to the high population density in the areas where hydropower facilities and water reservoirs can be built, the construction of new hydroelectric power plants causes both environmental and social problems.

3. In recent years, changes in the amount of precipitation as a result of climate change reduce confidence in hydropower. The efficiency of hydroelectric power stations is directly dependent on the flow of water, which makes it difficult to produce sustainable energy.

4. The development of other alternative energy sources, mainly nuclear energy and other renewable energy sources (solar and wind energy) are being given great attention. These energy sources are better suited than hydropower to meet high energy demands.

Despite this, great importance is attached to re-modernization of existing hydroelectric power plants and increase in production capacity. According to the latest data, there are 36 hydropower plants in South Korea, 7 of which are large-capacity Pumped Storage Hydropower(PSH) and the rest are run-of-river hydropower plants: Yangyang PSH(1 GW), Yecheon PSH(800 MW), Sancheong PSH(700 MW), Muju PSH, Cheongsong PSH and Samnangjin PSH(600MW), Cheongpyeong PSH(400MW), Chungju HPP(400MW), Soyanggang HPP(200MW), Paldang HPP(120MW), Hwacheon HPP(108MW), Hapchon HPP(100MW)).

Several types of energy sources are used by the countries of the Central Asian region to meet their energy needs. In particular, about 85-90% of Kazakhstan's energy production is from coal and natural gas, about 85% of Uzbekistan's energy production is from natural gas and coal, about 95% of Turkmenistan's electricity is from natural gas, Kyrgyzstan over 90% of Uzbekistan's electricity comes from hydropower, and about 98% of Tajikistan's energy production comes from hydropower.

These numbers show that each country is using the resources available in its territory, using the available opportunities. However, even in Kazakhstan, Uzbekistan and Turkmenistan, which are mainly dependent on fossil resources in their energy system, great attention is paid to increasing the share of electricity production using renewable energy sources. Especially in the countries of Uzbekistan and Kazakhstan, it is planned to increase the share of electricity production using renewable energy sources by 20-25% by 2030, and significant work is being carried out in this regard.

According to the data, there are 62 existing and under construction hydroelectric power stations in Uzbekistan, and their share in total energy production is 12-13%. In particular, the largest hydroelectric power stations include: Charvak HPP(666MW), Pskem HPP(400MW), Topalang HPP(175MW), Khojakent HPP(165MW), Tuyamuyun HPP(150MW), Andijan HPP(140MW), Farkhad HPP (128.24MW), Gazalkent HPP (120MW) and Lower Chatkal HPP (90MW).

Thus, on a global scale, each country chooses the main sources of energy based on its own capabilities and internal conditions. Some countries rely on thermal energy due to their wealth of fossil resources, while others rely mainly on thermal energy by importing natural gas, oil, and coal due to the lack of fossil resources in their territory. However, almost all countries are realizing that they may run out of fossil fuels in the future, and that thermal power plants have adverse effects on the environment, and therefore need to build power plants that use renewable energy sources as much as possible new and modern projects are being developed.

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