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The French Experience of Alternative Energy Development

Nishonov Abdulloh ubaydulloh o'g'li
Tashkent State University of Law, Teacher of the "Environmental Law" department

Abstract: The world community is concerned about a number of environmental changes. Climate change, desertification, destruction of tropical rainforests, erosion of coastal ecosystems, loss of soil resources, overfishing, species extinction and loss of biodiversity are the factors that caused the loss. Many commentators argue that these problems constitute a cumulative, sustained human impact on the environment that has fundamentally changed the Earth's surface. For this reason, great attention is being paid to renewable energy sources around the world. In this article, we will provide information about the situation and growth of this current topic in France.

Keywords: Renewable energy sources (RE), "Open window" system, solar energy, wind power, geothermal energy, biomass energy.

In the 1970s and 80s, the French government decided to build thirty-four 900 MW nuclear reactors while the rest of the world was recovering from two oil crises. The success of these nuclear programs and subsequent additions to them has removed France from permanent dependence on fossil fuels. As a result, as of 2000, France's nuclear energy accounted for 75% of the electricity that meets national and export needs. [1].

With the emergence and continued availability of renewable energy sources, the dominance of nuclear power is slowly on the way to decline. Renewables are the fastest growing source of electricity generation in France, growing at 2.9% per year France's electricity generation mix includes five major sources: coal, natural gas, oil and other liquids fuels, nuclear energy and renewables.

For many years, nuclear energy has been the leader in the production of energy, but recently interest in alternative energy sources is growing. The country is promoting a transition to renewable energy following concerns about nuclear power safety, climate change and energy security. Alternative energy sources in France include:

Solar energy: Solar energy is becoming an increasingly popular source of renewable energy in France. There are many solar farms across the country that generates electricity by converting sunlight into energy. In addition, many households have installed solar panels on their roofs to harness solar energy. Solar panels cover the entire 55 million square meters of France and bring a significant amount of electricity to the country. Solar arrays are installed on the roofs of parks, commercial and residential buildings, as well as on open ground.

Wind Power: Wind power is another popular alternative energy source in France. There are many wind farms in the country, especially along the coasts where the wind is strong. France is also a leader in offshore wind energy, with several major projects underway. Wind turbines are also very important for France and the number of installations is increasing every year. They supply more than 12% of energy to the power grid. Energy companies are planning to build more wind turbines on land and offshore.

Hydropower: France also has a long history of using hydropower, which uses water power to generate electricity. There are many hydroelectric power plants in the country, especially in mountainous areas with many rivers and waterfalls. Hydroelectric power plants are also of great

importance to France, operating on many rivers such as the Rhone, Loire, Garonne, Adour, Ghent and Charente. Hydropower has long dominated the French RE market. Still, it's the only RE source that hasn't grown much over the past decade. In 2011, France generated 8.06% of its electricity from hydropower. However, it recorded only 2.78% growth in hydropower generation over the decade.

Each of the other renewable energy sources has seen significant growth over the same period. As of 2021, wind is second only to hydro in terms of renewable electricity generation, up from 2.18% in 2011 to 6.68%. Next to wind power is solar power, growing from 0.41% in 2011 to 2.67% in 2021. When other renewable energy sources such as biomass and waste incineration are included, they recorded a growth of 0.78% during the same study period.[2]

Geothermal Energy: France is home to several geothermal power plants that use the natural heat of the earth to generate electricity. This technology involves drilling into the ground to access hot water and steam, which can then be used to power turbines.

Biomass Energy: Biomass energy is generated by burning organic matter such as wood chips and agricultural waste to generate electricity. There are few biomass power plants in France, especially in rural areas where there is a lot of agricultural waste. France has made significant progress in the field of alternative energy sources and continues to actively develop these technologies. The coming years could be decisive in this process, which could lead to the creation of more environmentally friendly and future-oriented energy supply systems.

Also, in 2019, primary energy production in France decreased by 2.7% compared to 2018, due to the reduction of nuclear energy production. According to the French Ministry of Ecological Transition, which describes the evolution of various renewable energies, 0.4 GW of wind power was connected in France in the first half of 2020, which is 45% less than in the same period of 2019. This source of energy accounted for 9.5% of France's electricity at that time. In terms of photovoltaics, an additional 379 MW were connected compared to 405 MW in the first half of 2019. As for biomethane projects, a maximum production capacity of 453 GW/h was installed during these six months. This represents an increase compared to the first half of 2019 (221 GWh per year).[3]

According to some reports, France currently cooperates with several advanced countries in their energy relations. France is building its own complex electric power system, using widespread energy resources. However, the growth of renewable energy (RE) in France has not been smooth. In 2020, only 19% of energy was generated from renewable energy sources. It is the only EU country not to meet the EU's 20% renewable energy directive by 2020.[4]

In France, these alternative energy sources help reduce the country's dependence on nuclear power and fossil fuels. With continued investment and development, these alternative energy sources have the potential to provide a sustainable and secure energy source for the future. It should also be mentioned that France ranks second in the world in terms of the use of renewable energy sources. According to the French Agency for the Protection of the Environment and Energy Conservation, in France, the control of energy consumption and the development of renewable energy sources led to the creation of a sector of the economy with a turnover of 33 billion euros and 220 thousand jobs in 2007.[5]

At the same time, France has implemented large projects in this field in its legislation. In France, the support scheme for renewable energy sources is based on the law of August 17, 2015, 2015-992 "On the transition to energy for green growth". In accordance with the new Directive on State aid in the field of environmental protection and energy, the new rules are based on the sale of electricity from renewable sources on the market, the Electricity Purchase Obligation scheme is regulated by article L.314-1 of the French Energy Code is where statutory purchasing agents (EDF

or in some cases local distribution companies) are mandated to enter into a regulated power purchase agreement (PPA) to purchase the entire output of each renewable producer within the country. Every renewable producer agreed to this arrangement because the payment tariff remained above the market price. These price increases also include onshore wind turbines, geothermal installations, solar, photovoltaic and thermal installations.[6]

The characteristics of these objects and the conditions of use of support schemes were determined by decree, and these promoted norms were collectively called the "Open Window" system. In conclusion, France is taking important steps to promote alternative energy sources as part of its commitment to reduce carbon emissions and promote sustainable development. Focused on renewable energy sources such as solar, wind and geothermal energy. France is leading other countries in the transition to a clean and sustainable future. Renewable energy policy in France Since its heavy dependence on nuclear power, France, the second largest economy in the European Union, has focused on a certain form of self-reliance and development. As a result, the government has now decided to reduce the use of nuclear reactors and fill these gaps with renewable energy sources, which will ensure a sustainable energy exchange for all.

The development of renewable energy has been supported by the state until recently. However, with greater government involvement, production costs are expected to fall further, which will help lower costs for renewable energy generation.

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