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FACTORS AFFECTING THE CAPACITY OF PRODUCING RENEWABLE ENERGY SOURCES AND THEIR EFFECTS

Qodirov Baxodir Tursunovich

Independent Researcher of Andijan Institute of Economics and Construction

E-mail:qodirovbohodir0175@gmail.com

The main factor influencing the production potential of renewable energy sources is renewable energy technologies. Therefore, according to the technological and financial capabilities of most countries, renewable energy shows that it will take a long time to completely replace fossil fuels. For example, better manufacturing methods for solar photovoltaic panels reduce panel manufacturing costs, but manufacturing costs for these devices are still high.

Alternatively, the most important factors affecting the development of decentralized renewable energy systems can be classified as follows¹.

1. Natural and climatic factors:

- the energy potential of the energy source that is planned to be used to supply remote consumers with electricity;
- climate zone where consumers are located;
- the power of destructive effects of natural factors.

2. Technical factors:

- growing need for electricity and thermal energy;
- the distance from the alternative energy source to consumers;
- efficiency of alternative energy source.

3. Legislative and organizational factors:

- opportunities to receive state subsidies;
- availability of tax benefits established by law;
- availability of grant funds for projects in the field of renewable energy and their distribution.

4. Institutional factors:

- the government's move to introduce modern developments in the energy sector;
- emergence of renewable energy lobbyists.

5. Financial factors:

- the volume of investments directed to renewable energy sources;
- availability of credit funds for the sector;
- the amount of investment benefits for all participants of the cycle of use of renewable energy supply facilities (from development to use).

6. Qualifying factors:

- availability of labor resources;

¹ Nazarova Yu.A., Goryunov O.A., Zhiltsov S.A. Analysis of factors influencing the development of renewable energy sources for energy supply to remote consumers // Economics and business. Bulletin of the Research Center for Corporate Law, Management and Venture Capital, Syktyvkar State University. 2018. No. 3. p. 28-40

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- the number of scientific works on the topic of innovative energy supply for remote consumers;
- the number of patents for inventions or utility models used to provide remote consumers with alternative energy;
- the number of graduates of higher educational institutions on the specialties necessary for the activity of enterprises in the field of supplying remote consumers with alternative energy.

7. Competitive factors:

- the number of participants of the alternative energy supply market;
- the share of a large company in the market of innovative power supply for remote consumers.

8. Environmental factors:

- the cost of releasing 1 ton of carbon dioxide (SO₂);
- amount of harmful waste from industrial (conventional) power plants;
- the number of measures taken by environmental organizations against the development of industrial (conventional) power plants.

9. Reliability factors:

- the number of consumers who are not provided with the required category of power supply reliability from industrial (conventional) power plants;
- the amount of unsupplied energy from industrial (conventional) power plants for the required category of power supply reliability.

10. Cost of energy resources:

- the ratio of the cost of energy in the production of 1 kW/h of alternative energy and traditional energy sources;
- the volume of energy consumption;
- the amount of capital and operating costs of renewable energy sources;
- the stability of the cash flow generated by the renewable energy facility.

In our opinion, the following factors influence the use and further development of renewable energy sources:

Trust is the extent to which community members trust the developer of a renewable energy project.

The factor of distributive justice is the level of distributive justice. Distributive justice means that the costs and benefits of the project are distributed equally among the members of society. For example, if a proposed renewable energy project has the potential to generate income, and community members can also generate income, they may have a positive attitude toward the project. If one of the benefits is the provision of new jobs and previously unemployed team members can find employment, the chances of acceptance are also higher.

The location factor is the location of the infrastructure. The location includes a site selected for renewable energy generation technology. Sometimes community members do not like a proposed location, for example if it is culturally significant or

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technologically unsafe. If local residents have such concerns, they are less likely to accept the proposed project.

Socio-demographic factors - such factors include the age, gender, education and economic status of team members.

In the international experiments, the development and popularization of renewable energy sources, first of all, the adoption of it by the society, which has learned to use traditional energy resources, has been shown as the main direction of the issue.

Of course, many measures to overcome such problems have been tried in practice. The most effective of these are energy subsidies.

Energy subsidies are government measures that artificially lower the price of energy paid by consumers, increase the price charged by producers, or reduce the cost of production. Subsidies for renewable energy technologies are important because they can bring long-term economic and environmental benefits not only for the consumer, but also for the state or society (the world). However, when they focus on fossil fuels, the costs usually outweigh the benefits. Fossil fuel subsidies encourage waste, exacerbate energy price volatility by obfuscating market signals, encourage fuel counterfeiting and smuggling, and undermine the competitiveness of renewables and other low-emission energy technologies.

On the other hand, renewable energy is widely accepted by society when fossil fuels, which are more expensive than renewable fuels, become sufficiently scarce, that is, when fossil fuels are economically exhausted (Figure 1). In this case, the increase in the cost of fossil fuel extraction is indicated by the increase in the price of fossil fuel (MC_{fossil}). The economic demise of fossil fuels may take a very long time, of course. Because there are still large reserves of liquid oil on earth, and new technologies are making it cheaper to extract oil from shale formations. We also have close substitutes for oil from oil wells, such as tar sands and synthetic oil derived from coal. There is also a greater supply of natural gas using hydraulic fracturing ("fracking") technologies, and large reserves of coal remain to be developed. However, many of these new technologies involve high costs, so fossil fuel prices will tend to increase over time.

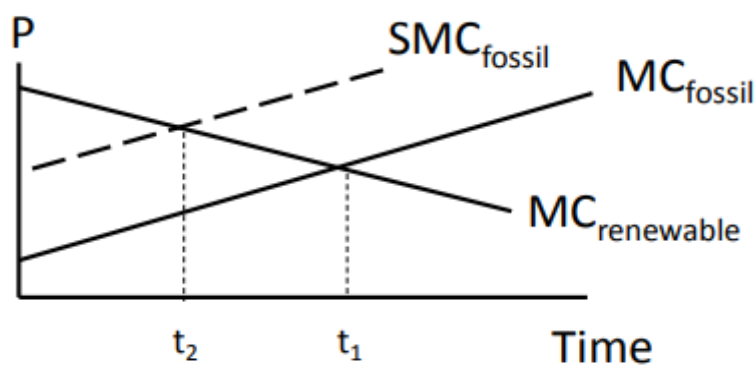


Figure 1. Dynamics of transition to renewable energy sources²

² Compiled by the author.

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At the same time, fossil fuel prices rise, new technology lowers the cost of renewable energy, as shown in the figure on the downward path for the cost of renewable energy (MC_{renewable}). In this case, interaction and costs are equal. After time t_1 , renewable energy becomes cheaper than fossil fuels, and market forces indirectly drive the shift to renewable energy.

In countries where this process has already taken place, renewable sources are widespread. For example, in Iceland, geothermal hot water is cheaper than coal or oil to heat buildings, and most buildings are heated with geothermal water. Likewise, hydropower is already widely used in countries where it is cheaper than the alternatives, such as in the US Pacific Northwest.

In this respect, one of the important areas of energy efficiency improvement in the world's leading countries today is the development of renewable energy sources.

An assessment of the current state of renewable energy development shows that the average rate of growth of power plants based on renewable energy is significantly higher than similar indicators in conventional energy. Currently, renewable energy sources are developing rapidly all over the world, which can be expressed by the depletion of traditional energy resources and the increasing attention of the population to the problems of climate change.

