

**Shvets Oleksandr**

Kyiv National University of Technologies and Design

(Kyiv)

**Language and scientific supervisor - Nataliia Gudkova**

## **THE INFLUENCE OF RENEWABLE ENERGY SOURCES ON THE PROSPECTS OF NUCLEAR ENERGY**

**Introduction.** Immediately after the accident at the Japanese nuclear power plant "Fukushima-1", the discussion of the development of nuclear energy became more acute around the world. In many countries anti-nuclear sentiment has intensified – both among citizens and among political and economic elites. Japan has already announced a full phase-out of nuclear energy in favor of renewable energy sources. The nuclear disaster at Fukushima-1 has sobered many supporters of the nuclear power industry and inflicted irreparable damage on its reputation. For some developed countries, especially Japan, Germany and Italy, this has become a point in the long-standing (after the Chernobyl nuclear power plant) debate about the future of their national nuclear power programs.

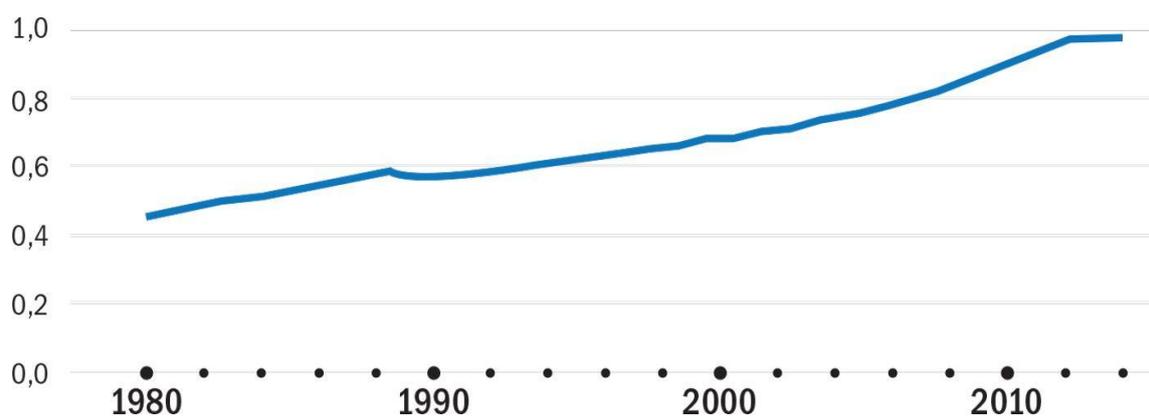
**The purpose** of this article is to analyze the energy market, compare different types of energy, study review renewable energy sources and identify the most promising sources.

**Basic material.** Fossil fuels continue to be most used in the production of electricity. Power stations with fossil fuels have always been described by very high and predictable capacity factor. For example, a typical gas-fired power plant in the United States produces about 70% of its potential (a decrease of 100% is due to seasonal fluctuations in consumption and maintenance costs). The reason is that after the commissioning of a new solar or wind station, it gives almost free electricity (fuel costs are zero), while at TPP, the production of each new watt requires another portion of fuel. Therefore, if the energy company has the opportunity to choose, it chooses a free option. So there is a "self-accelerating cyclic movement". The

capacity factor of coal and gas power plants is the smaller the more stations are built on renewable sources.

The main disadvantage of thermal power plants is pollution of the environment: thermal and smoke gases (from combustion of fuel, transportation of slag). Especially coal-fired power plants heavily pollute the environment. The largest source of carbon dioxide emissions is China. Approximately 80% of Chinese thermal power plants use coal. Smoke fog caused by the operation of coal-fired power plants and heavy industry enterprises in China is its long-standing and persistent problem.

The most common Renewable energy is hydropower (76%). When generating electricity, hydroelectric power plants do not produce greenhouse gases, toxic waste and particulate matter. Installed capacity in hydropower increased in the last 20 years by approximately two times. (See Fig. 1) This sector has a two-fold growth reserve, hidden in the capacity of water flows flowing around the world [4, p. 25].



**Fig.1. Installed capacity in hydropower (terawatt)**

The main problem of hydropower plants is the ecological imbalance created by them, especially in the lower reaches of rivers. Hydroelectric projects disrupt ecosystems. The water flowing out of the dam differs in temperature and transparency from the water upstream. This can cause coastal erosion and endanger the life of plants and animals, and also negatively affects the fish population.

Another important problem is the need to relocate people. For example, in China, the construction of a dam for the HPP "Sanxia" with a capacity of 22.5 GW led to the eviction of 1.2 million people. The question of how to level out the

environmental consequences during the decommissioning of hydropower plants, as none of the largest of them has not yet been taken out, has been studied insufficiently. One thing is clear: the withdrawal of hydropower plants from operation will require large budgetary costs.

Renewable energy has come first in the world in terms of the growth in installed capacity among all types of energy resources. The share of solar and wind energy in global electricity consumption has doubled over the past four years. International Energy Agency in late October 2016 increased by 13% its last year's five-year growth forecast for renewable energy sources [1, p. 50]. This is due to the political support of renewable energy sources in countries such as the US, China, India and Mexico, and with a sharp reduction in its cost. Even low prices for coal and gas are not able to prevent a global transformation of the energy market.

We used to think that the revolution of alternative energy sources is a distant future. However, in 2015, for the first time in history, the commissioning of new renewable energy capacity reached 153 GW, or 55% of all the worlds installed power capacities.

Turbines are installed everywhere: in forests, fields, on the coasts, in the coastal waters of the seas and oceans. Even in densely populated metropolises architects manage to introduce wind generators in the design of skyscrapers, transferring the latter to partial self-sufficiency.

To coordinate efforts and quickly respond to changes in the demands of the wind energy market, the international non-profit organization WWEA (World Wind Energy Association), headquartered in Germany, was established. The top five countries with the most developed wind power are: China, USA, Germany, India, and Spain. The development of wind power in such EU countries as the United Kingdom and France is associated primarily with the gradual abandonment of the use of atomic energy [2, p.168]. The listed countries not only actively build wind farms, but also are the leading developers and manufacturers of turbine equipment, along with Germany.

Atomic energy today is represented by 449 commercial nuclear power reactors operating in 30 countries, with a total installed capacity of more than 392 GW. Leading countries in terms of installed capacity in this area are the USA, France, Japan, Russia, and South Korea. Forecasts for WNA made in 2016 suggest an increase in installed capacity by 30% (to 510 GW) by 2030 (low and high forecasts: 376 and 643 GW).

Nuclear power supplies a reliable basic load on the network. Reactors of high power generate a large amount of electrical energy, taking up a relatively small area. Nuclear plants are distinguished by the highest power capacity.

The problem of radioactive waste is still not solved. Despite the fact that in countries with nuclear power they make up less than 1% of all industrial toxic waste, nuclear waste is extremely dangerous, and they need to be carefully taken care of for several thousand years (10,000 years according to standards of the US Environmental Protection Agency) [3, p. 18]. However, these problems can be solved by closing the nuclear fuel cycle.

Work in this direction is being conducted in a number of countries. Generation of nuclear energy produces relatively low volumes of carbon dioxide (CO<sub>2</sub>). Therefore, the contribution of nuclear power plants to global warming is negligible. This is the main advantage of nuclear power in front of the power industry on fossil fuels [5, p. 193].

**Conclusions.** The world enters a new era – the era of low-carbon energy, which is characterized by significant changes in the order for the supply of electricity and the reduction of direct and hidden subsidies to traditional energy.

The main source of uncertainty today is the speed of transition to a low-carbon energy system. The forecasted trends in the development of nuclear energy from year to year look increasingly less optimistic. The revision of the priorities towards lowering the share of nuclear energy followed the accident at the Fukushima-1 NPP.

In the conditions of decarbonization of the world energy, renewable resources (mainly solar and wind energy) and nuclear power will become the dominant sources of electric power generation. However, today nuclear energy is losing the fight for the

market. It is possible to reverse the situation only by introducing radically new technologies that will allow changing the long-term tendency to increase the specific capital cost and operating costs.

## REFERENCES

1. Ansar A., Flyvbjerg B., Budzier A., Lunn D. Should we build more large dams? The actual costs of hydropower megaproject development. *Energy Policy*. – Volume 69. – 2014. – P. 43–56.
2. Conti J., Holtberg P., Diefenderfer J., LaRose A., Turnure J. T., Westfall L. *International Energy Outlook*. – Washington. – 2016. – 290 p.
3. Gilbert A., Sovacool B., Johnstone P., Stirling A. Cost overruns and financial risk in the construction of nuclear power reactors: A critical appraisal // *Research Gate*. – 2016. – 18 p.
4. Jean J., Borrelli D. C., Wu T. Mapping the economics of U.S. coal power and the rise of renewables // *An MIT Energy Initiative Working Paper*. – Massachusetts, Cambridge. – 2016. – 40 p.
5. *The World Nuclear Industry Status Report 2015 // World Nuclear Industry Status Report*. – 2015. – 202 p.

**Шевченко Любов Василівна**

Київський національний університет технологій та дизайну

(м. Київ)

**Науковий керівник – Звонок О. А.**

## **THE VALUE OF LANGUAGE SKILLS IN MODERN BRANCHES OF ECONOMY**

Today, English in the IT field is not considered a line in your resume, but a skill that you must master by default. Starting from business analysts and ending with programmers and project managers, all employees of the modern company