

WAYS OF INNOVATIVE DEVELOPMENT OF ENTERPRISES OF THE ENERGETIC INDUSTRY OF UKRAINE INFLUENCING ENERGY REFORM

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Abstract. The article deals with the search of ways of innovative development of enterprises in the energy market of Ukraine under the influence of its reformation. The easiest way is to change the tariff setting system. But this way is now too politicized. Also, we should not forget about the alternative energy market. Therefore, in the work the specifics of the domestic solar and bioenergy market are analyzed on the example of Kherson and Poltava regions. Proven ability of this market in the next 3-5 years. A step-by-step algorithm for the output of this energy market is presented.

Key words: innovation, energy company, alternative energy, tariff formation, bioenergy, market.

Formulation of the problem. Innovative development of power enterprises of Ukraine is the key to its sustainable development. Consumers of electric energy are primarily interested in its uninterrupted reception. And energy companies need to meet this need. It is worth remembering that the profits of companies are in the pockets of consumers of its products or services. Therefore, the problems of finding ways to innovate the development of enterprises in the energy sector of Ukraine are relevant.

Analysis of recent research and publications. As is known, the term "innovation" was introduced into the scientific circulation by Austrian scientist J. Schumpeter at the beginning of the twentieth century.¹⁷ In the future, scientists such as B. Santo¹⁸, B. Twiss¹⁹, L. L. Antonyuk²⁰, S. M. Ilyashenko²¹. Innovative development is a prerequisite for achieving high economic indicators of the national economy of the information age. Therefore, enterprises should pay attention to the

¹⁷ Schumpeter J. (1982) *Teoriya ekonomicheskogo razvitiya: issledovaniya predprinimatelskoy pribyili, kapitala, kredita i tsikla kon'yunkturyi* [The theory of economic development: research of entrepreneurial profit, capital, credit and the cycle of conjuncture; trans. with English. L. I. Kravchenko]. Moscow: Progress, p. 455.

¹⁸ Santo B. (1990) *Innovatsiya kak sredstvo ekonomicheskogo razvitiya* [Innovation as a means of economic development; trans. with Hungarian. N. A. Rusak]. M.: Progress, p. 296.

¹⁹ Twiss B. (1989) *Upravlenie nauchno-tehnicheskimi novovvedeniyami* [Management of scientific and technological innovations; trans. with English. I. I. Eliseeva]. M.: Economics, p. 217.

²⁰ Antonyuk L. L. (2003) *Innovatsiyi: teoriya, mehanizm rozrobki ta komertsializatsiyi: [monografiya]* [Innovations: theory, mechanics of the retail distribution: [monograph]]. A. M. Poruchnik, V. S. Savchuk. – K.: KHEY, p. 394.

²¹ *Marketing I menedzhment Innovatsiyynogo rozvytku: Monografiya* [Marketing and management of innovative development: Monograph] / For zag. Ed. Prof. S. M. Ilyashenko (2006). – Sumy.: "The University Book", p. 728.

innovative component of economic activity. Only in this way can one hope for a victory in a fierce competition.

Selection of previously unsettled parts of the general problem. The main problem of the activity of energy companies lies in the search engines for the innovation development of the latter. Therefore, this article deals with this part of the general problem of innovation development.

The purpose of the article. The main purpose of this work is to analyze and elaborate proposals for the transition of energy enterprises of Ukraine to the rails of innovation development. For this purpose, methods of analysis and synthesis will be used.

Presenting main material. The easiest way to improve the economic situation of power companies in Ukraine is to increase tariffs for providing electricity generation and distribution services. So, let's dwell on the features of stimulating tariff formation at the present stage of development of the market of electric energy in Ukraine.

Incentive regulation or RAB-regulation (RAB – regulatory asset base) – a system of tariff regulation based on long-term rates (3.5 or 8 years) to attract investments for the construction and modernization of electricity infrastructure and stimulating the cost efficiency of electricity distributing companies. It provides for the establishment of the amount of necessary income, depending on the achievement of established indicators of reliability of electricity supply and the quality of customer service, as well as the motivation of regulated companies to reduce costs.

The main elements of stimulating regulation are:

- Reassessment of assets for the purpose of establishing the regulatory base of assets for the calculation of regulatory depreciation and profit;
- establishment of the profit rate at a level sufficient to attract the required amount of investment;
- Coverage of substantiated operating expenses;
- Establishing long-term regulatory parameters (targets for quality and reliability).

If the traditional model of "cost +" is represented by the formula: $\text{Cost} + \text{Profit (percentage of cost)} = \text{cost of a service}$, the new method suggests another interpretation: $\text{Price} - \text{Profit (requirements to return on capital)} = \text{cost (production target for cost)}$.

If the current method of "cost +" allows businesses to consider licensees in the rate of operating costs, depreciation and profitability installed, the RAB-method converts the last component of this formula in income on equity (R). This revenue is determined by two components: the company's regulatory framework and the profitability rule (r).

Regulatory asset base is defined as the fair value of assets used in regulated activities, and can be measured in several ways: as the market value of the company's renewable assets, discounted cash flow, book value or replacement cost of assets. That is, in fact, it is necessary, on the basis of an independent examination, to assess the capital assets of enterprises.

It is more difficult to calculate the rate of return (r) or the rate of the invested profit. According to European RAB-methods, it is calculated on the basis of the weighted average cost of capital (WACC). The formula for determining this indicator suggests that it takes into account the value of equity and the cost of debt capital (loans, bonds, direct investments). In addition, both of these elements (as own funds of the company, so borrowed) have their price expressed by a certain interest rate. At the same time, for the determination of the WACC, the taxes of the enterprise are taken into account.

The task of the regulator will also be to determine the level of operating costs that will be taken into account in tariffs that include both controlled costs (for example, energy) and uncontrolled (inflation indexation, deductions to payroll taxes, taxes, fees). By reducing controllable costs, the licensee will be able to save money that will be profitable for the company. In the transition to the 2nd regulatory period, the Regulator will also set requirements for efficiency and quality of services.

The main benefits of introducing incentive regulation for energy transmission and power supply companies is to reduce the Regulator's interference in operating activities, to maintain the benefits (achieved savings) as a result of improving the efficiency of the company's operations and, most importantly, to ensure the necessary amount of financing of investment programs by attracting equity and debt capital.

For consumers of electricity and the economy of Ukraine in general, the introduction of stimulating regulation will ensure the creation of an attractive investment climate to engage private investment, improving the quality and reliability of electricity supply and increasing the efficiency of operating activities of oblenegos by reducing inefficient operating costs and returning part of the gain (saving) appropriate reduction of tariffs. However, it should be noted that under this method it is impossible to release resources at economically unreasonable rates.

According to energy expert Andriy Gerus, the introduction of new tariffs will enable oblenego owners to receive about UAH 30 billion annually, as "such RAB-tariff will increase the tariff for oblenegos by 3 times".²² He also stresses that the "stock base" of oblenegos' assets was estimated using the new methodology and, as a result, their cost has doubled.

In addition, he believes that the 12.5% rate on the new base will not oblige oblenegos to invest in the development of networks, as banks offer higher interest rates on deposits.²³

In the case of introduction of RAB-tariffs, the price of electricity in Ukraine will actually grow, but will still remain the lowest in Europe.

Recall that the first time the RAB-rate methodology was applied in the UK in the late 1980s. For 15 years there has been a reduction in the costs of distribution companies and electricity tariffs twice. In the mid-1990s, many countries in Europe, including the Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, as well as Canada, the USA, Australia, took over RAB-regulation. In 2002, the

²² Plus 30 billion for oligarchs: the decision on RAB tariffs came into force.

²³ Plus 30 billion for oligarchs: the decision on RAB tariffs came into force.

European Union obliged Eastern European countries to apply RABs when setting tariffs for monopolies.²⁴

Industrial consumers do not perceive optimistic changes regarding the rules of work in the energy market. In particular, the Ukrainian industrial company Interpipe estimates its losses in 2018 from the introduction of RAB-tariffs and the formula "Rotterdam +" of \$ 10 million.²⁵ This amount is comparable to the capital investments of the company in the production of wheeled pairs.

Summarizing the above, it should be noted that only an increase in tariffs can not radically solve the problems of modern energy economy in Ukraine. Therefore, it is necessary to follow the path of innovation development. One of the solutions to the problem is alternative energy and the prospects of its use in our country.

It is known that in two weeks our planet receives so much energy from the daylight as humanity would suffice for a year. The problem is only to collect this energy. But technologies are not in place and the efficiency of solar panels increases every year, which means a simple thing: solar energy is becoming cheaper and more efficient.²⁶

Let's dwell below on the situation with the development of alternative energy in the world.

The use of renewable energy sources (RES) has become one of the important criteria for the development of the world community today. The main reasons for such attention are the expected exhaustion of stocks of organic fuels, a sharp increase in their prices, imperfections and low efficiency of technologies of use, harmful effects on the environment. That is why, abroad, alternative energy is attractive to investors.

According to the information of the international organization REN21 (division of the International Agency for Renewable Energy Sources), for the 2016 year only \$ 287.5 billion was invested in RES. The most active alternative energy is developing in China, the UK, the USA, Japan and Germany. Every year many of the power plants operating at RES are put into operation. The share of alternative sources in installed annual capacity in the world over the past year has already exceeded 50%. According to the experts of Global Energy, by 2100, the share of oil and coal in the global fuel and energy balance will be 2.1% and 0.9% respectively, and more than a quarter of the world's electricity will be produced through the sun. According to the long-term forecasts of Bloomberg New Energy Finance (2017), it is expected that the share of wind and solar power in the global energy basket will increase by six times and exceed all other types of energy by 2040.²⁷

Last year, Ukraine adopted the National Energy Strategy (approved by the order of the Cabinet of Ministers of Ukraine dated August 18, 2017 No. 605-p). So the state wants to solve the problem of energy security, increase energy efficiency and develop alternative sources of energy – solar, wind, biomass, etc.

²⁴ Julia Gorban RAB regulation in energetics: what is it and how will it affect our receipts?

²⁵ Interpipe Pinchuk estimates loss from RAB-based tariffs and "Rotterdam+" \$ 10 million.

²⁶ Timur Chmeruk Kherson Region – The Future "Solar Valley", or How to Save on Electricity.

²⁷ Timur Chmeruk Kherson Region – The Future "Solar Valley", or How to Save on Electricity.

According to the Strategy, Ukraine is, and in the long term, aspires to remain one of the largest hydrocarbon producers in continental Europe and a reliable transit of energy resources (primarily natural gas and oil), ensuring safe and reliable supply of energy resources to its own consumers and consumers of adjacent markets to be extracted and delivered with a high level of environmental and social responsibility, with efforts to comply with commitments to reduce greenhouse gas emissions.

In 2015, according to the State Statistics Service of Ukraine, the total primary energy supply (ZPPE), calculated as the sum of production (extraction, import, export, international bunkering of ships and changes in energy reserves in the country), was characterized by a high share of natural gas 28, 9%, (26.1 million tons of oilseed). The share of nuclear power was 25.5% (23.0 million tons of nuclear energy); coal – 30.4% (27.3 million tons of oilseed); crude oil and petroleum products – 11.6% (10.5 million tons of oilseed); biomass (biomass, fuel and waste) – 2.3% (2.1 million tons of oilseed); Hydroelectric power station – 0,5% (0,5 mln tons of oil equivalent); thermal energy (thermal energy of the environment and waste resources of technogenic origin) – 0.5% (0.5 million tons of oil equivalent) and WEU and SES together – 0.1% (0.1 million tons of oil equivalent). The total share of all RES was 3.6 million tons, or only 4%.²⁸

Now let's take a look at the prospects for the development of alternative energy in the regional aspect.

The main economic factor for the development of solar energy is the "green tariff". Behind him, oblenergos buy electricity from private traders. 1 kilowatt of solar power is purchased for 18 euro cents – almost 6 UAH. The wind is paid for 11.6 euro cents – almost 4 UAH per kilowatt.²⁹

By the end of 2017, more than 3,000 solar power stations in private households have been registered in Ukraine. The largest number is in Kyiv, Dnipropetrovsk and Ternopil regions. The last places on the list are Zaporozhye, Donetsk region and Luhansk region.

According to the plan of the State Energy Efficiency and Energy Conservation Agency of Ukraine, by 2020, half of the renewable energy will be produced by large hydroelectric plants, more than 22% by wind power plants, 16% by bioenergy plants, and more than 9% by solar power stations.

The geography of Ukraine makes it possible to develop this industry effectively. Although our country is located in an area of average solar intensity, we have more sunshine than in half of Europe. This is a definite plus in terms of investment attractiveness of solar energy.

However, it should be remembered that the level of solar radiation correlates with the coordinates of the terrain, the state of the atmosphere, topography, season, etc. Therefore, the annual amount of solar energy that can be obtained from a square meter varies from area to region (Fig. 1³⁰). One of the undoubted leaders in the level of solar activity in Ukraine is Kherson oblast, Mykolaiv oblast and Odesa oblast.

²⁸ Energy strategy of Ukraine for the period up to 2035.

²⁹ Irina Babenko "In Russia the envy us" – how solar power plants in Poltava region develop.

³⁰ Map of Ukraine's solar activity.

installed capacity. Only wind turbines and solar panels, which are located in private houses, located no more than 300 m from the connection point, were cut off in price, since their permitted power is limited to 30 kW. The rise in connection costs will undoubtedly slow down the development of alternative energy projects. Instead of introducing new types of NPDs without investing in new technologies without developing production on the basis of these technologies, the country preserves technological backwardness and may lose its chance to enter the global community as an important player.

Alternative energy provides a better economic result if it focuses on maximizing the use of the local resource base.

An example of Kherson region is very eloquent. This southern region of Ukraine has a significant potential for sunny days and is not densely populated. Therefore, on its territory it is worth developing solar power plants.

Poltava Region has a slightly different local resource base. This is an agrarian region of central Ukraine, which has significant potential for the development of bioenergy power plants.

That is why in 2016, with the support of the United Nations Development Program (UNDP) and the Global Environment Facility (GEF), a Regional Program for the use of bioenergy technologies in heat and hot water supply in the Poltava region was developed.³¹

Bioenergy is one of the most promising sectors of renewable energy in Ukraine, but its productive use by this time is very limited. The production of heat from bioenergy sources is about 0.5% of the total primary energy supply. Mostly firewood for household purposes and as fuel in forestry and wood processing enterprises.

In contrast, thermal generation provides 67%, nuclear power is 24%, and hydropower almost 9% of Ukraine's demand for 54.6 GW of production capacity. On the other hand, studies have shown that biomass energy can provide at least six times more, and potentially ten times more energy, to bring the share of biomass up to 7% of the total energy supply.

In Ukraine, bioenergy did not develop, as there was no clear state policy, and only now, in the context of politically complicated gas negotiations, new renewable energy projects can be expected.

According to expert estimates, the theoretical potential of biomass in Ukraine is 50 million tons of conventional fuel, technically feasible – 36 million tons of conventional fuel, with the annual consumption of primary energy resources in the country reaches 300 million tons of conventional fuel.

Among agricultural wastes the greatest economic potential has straw of grain crops – 5 million tons of conventional fuel, corn grain waste – 4 million tons of conventional fuel, sunflower oil waste – 3 million tons of conventional fuel.

³¹ Regional program of using bioenergy technologies in heat and hot water supply in the Poltava region / Pisarenko Vyacheslav Petrovich – Poltava, 2016, p. 15.

Calorific value of straw of cereal crops with optimum humidity is twice less than coal. Three tons of straw, in their calorific value, replace a thousand cubic meters of natural gas.

Ukraine annually produces 50 million tons of grain, straw as a by-product is produced in the same volumes. The agricultural producers do not have money for wages, the purchase of equipment, and local budgets spend community funds on the purchase of coal or gas.

According to statistics, fuel consumption in all boiler houses located in rural areas is 2.9 million tons of conventional fuel per year. The given data testify that straw is enough for maintenance of it all rural boiler-houses.

Perspective for Poltava region is the use in the form of fuel wood waste, sawdust, wood pellets and pellets. Burning pellets and wood briquettes can be carried out on different equipment. However, maximum efficiency is achieved when using boilers and burners specially designed to burn this type of biofuel. Due to the low humidity of wood pellets ($\approx 10\%$), they have a high heat of combustion – 4,8-4,9 MW.

Continuing the theme of woody biomass, it should be noted the feasibility of using fast-growing energy plants.

There are about 20 species of fast growing plants that can be grown for biomass and used for thermal energy generation.

For Poltava region, the most expedient is the cultivation of energy plants such as energy willow, elephant grass, poplar, miscanthus. The most widespread crop for producing solid fuels is energy willow. The most experienced in its development are EU countries such as Sweden, England, Poland and Denmark.

So, in Sweden there is a unique system of use of energy plantations of willow in the ecosystem of cities. Its main point is that plantations of energy willow serve not only as biofuel for local boiler plants, but also they are used for utilization and purification of sewage, which allows to save on mineral fertilizers for growth of plantations.

Energy plantations of biomass prevent soil erosion, contribute to the improvement of the environment. When combustion of such biomass at power plants or boilers, the amount of CO₂ emitted by the plant is emitted during the period of its growth, the energy value is 8 GJ / ton at 50% humidity.

Recall that in September 2010 the Protocol on the Accession of Ukraine to the Energy Community was signed. In 2011, Ukraine became a full member of the Energy Community. This means that the country should participate in the integration of Ukraine's energy sector into the EU's energy space. The provisions of the Renewable Energy Directives establish binding national targets, guarantee investment and encourage the development of up-to-date technologies and innovations. Ukraine has committed itself to reach 11% of renewable energy consumption by 2020. Therefore, the development of the alternative energy sector is so important for the future European prospects of Ukraine.

However, there are barriers that can slow down the increase in the use of renewable energy sources.

The lack of transport infrastructure is the main obstacle to exploiting the resources of the forestry sector of the Poltava region in heat power engineering. In order to ensure a cost-effective supply of biomass, the existing infrastructure of auto and railways needs to be improved.

The widespread use of straw is hampered by the high cost of harvesting it, and most agricultural enterprises do not have the ability to collect and store straw under appropriate conditions.

In the current conditions, energy willow is favorably cultivated not far from the place of processing and used for the needs of its own production: for the heating of industrial premises, greenhouses, drying products. Transportation of energy raw materials for long distances significantly reduces the financial attractiveness of this business; in this case, it is advisable to use peeling or pressing wood chips.

Potential investors in the production of solid biofuels from energy willow can be agricultural, which have land for laying plantations (especially those with a lot of unproductive land for agriculture). Investors in this business may also be energy supply companies that supply utility or industrial enterprises. And the third potential investor may be companies that have pellets or briquettes, which are important to constantly have stable in terms of volume and value of biomass reserves for the loading of production.

In order to implement the strategy of entering the segment of the energy market of alternative energy and consolidating it, within the framework of the economic activity of the energy company it is worth taking a number of steps.

First of all, it is necessary to create a project group from the number of experts of the company in the amount of up to ten people, the main task of which will be to analyze the state of the market of alternative energy in the region to date. This group should within a month provide the management of the energy company with an analytical note with the information processed.

The next step is to be interested in discussing the information and decision-making at the senior management level in relation to the strategy of further action. Monitoring the implementation of these or other steps should be performed at intervals of at least twice a month using reports in the format of A3.³²

Given the interest of the project team participants in the positive final outcome of the work performed, one can expect an economic effect in the form of a reduction in costs when providing energy services with reliable energy supply to consumers.

Conclusions and suggestions. The information analyzed and processed in this article allows us to draw the following conclusions.

Firstly, changing the policy of tariff regulation from the existing "cost +" to RAB tariffs can only lead to a temporary improvement in the financial state of energy companies and is not innovative.

Secondly, the question of raising the payment for electricity, which will inevitably occur when changing the methodology for calculating the tariff, is

³² Myronenko M. A. (2015) Menedzhment oschadlivogo virobnitstva: Navchalnyi posibnik [Management of lean Production: Textbook 3-rd type, corrected]. Dnipropetrovs'k: Porogy, p. 512.

Myronenko N. (2016) Upravlenie predpriyatiem na osnove kontseptsii berezhlivogo proizvodstvan [Enterprise management based on the concept of lean manufacturing]. Dnipropetrovs'k: Zhurfond, p. 146.

currently too politicized and there is no clear timeline for implementation. Therefore, it is not necessary to talk about any economic calculations under such conditions.

Thirdly, perhaps the only innovation step under such economic conditions is to consider the ways in which energy companies can enter the alternative energy market. After all, innovation is something fundamentally new, which allows you to see new horizons, prospects for development for years to come.

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