

## DEVELOPMENT OF ALTERNATIVE POWER IN UKRAINE AS THE MECHANISM OF THE SUSTAINABLE DEVELOPMENT OF ECONOMY

**Problem statement.** The economy of Ukraine has reached critical level of power consumption, the prices for energy carriers are unstable, there are problems with gas transit to the east Europe which, in its turn, is reflected in competitiveness of production. Besides, the out-of-date equipment of the atomic power station, a state district power station, thermal plant does not correspond to the international requirements of ecological safety. So, in 2007 power consumption of gross national product in Ukraine has made 0,89 kg of conditional fuel for 1 dollar which is the highest rate among the countries of Europe (fig. 1). Energy consumption for a gross national product unit in Ukraine is in 8 times more than in the USA. At the same time energy production per capita in Ukraine is 30-35% lower, than in the Russian Federation, and in 65-70% less, than in the USA and Canada. It testifies that, on the one hand, there is an enormous power inefficiency, on the other hand- energy underproduction.

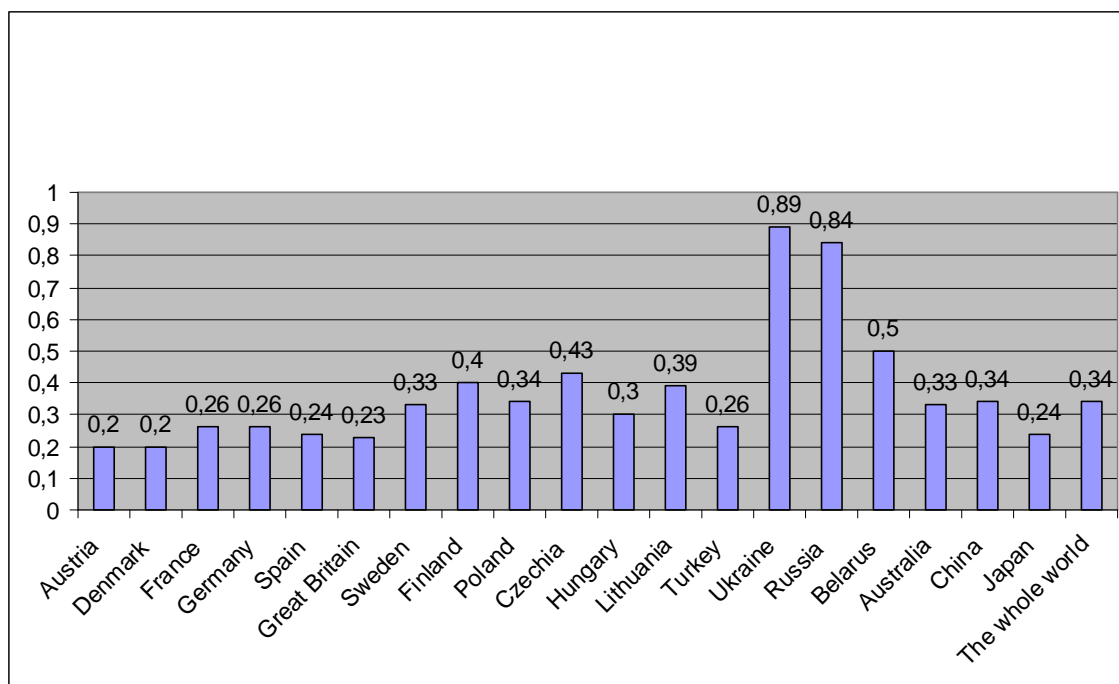
The general technological way of the Ukrainian economy predetermine considerable final consumption of primary power resources. So, in 2006 Ukraine used 207 million t. coal fuel. That three times exceeds an average index for the countries forming a kernel of the

European Union (EU-10) [1]. And power consumption of gross national product made 0,5 kg coal fuel. On production on 1 US dollar, while in the world — only 0,2 kg/1 of US dollar of gross national product [2, p. 20].

In Ukraine in 2009 renewed sources were used for reception only 1% of the general energy of the country. According to the Intergovernmental commission of experts on climate change (IPCC) renewed energy sources can provide up to 77% of world requirements for power by the middle of current century [4].

The aspects set forth above testify that the alternative power in Ukraine is not a priority at present. Against a budgeted deficit and the other actual economic problems, the alternative power should become the major object of the state policy. Thereupon there is a necessity for research and a substantiation of alternative technologies in power sector.

**The analysis of scientific researches and publications.** Various aspects of native and foreign power savings in Ukraine are considered in works of domestic scientists. The considerable contribution to working out of problems connected with the power savings mechanism in Ukraine has made V. Mamalyga [2], M. Krasnyansky



**Fig. 1. The comparative data of power consumption of gross national product of the global by 2030, kg. at. T./US dollar**

Source: [3]

has considered perspective directions in the sphere of power savings of the leading countries of the world [5]. S. Yermilova has studied power problems of Ukraine [6], etc. However, for today, there is no complex research of power saving technologies use in Ukraine.

The **purpose of the given work** is the substantiating of necessity of use of alternative kinds of energy in Ukraine, defining of ways of their financing and influence of the state on power development of the country.

**General content.** In 1994 the Law of Ukraine "About power savings" has adopted. According to the law in 1995 the State committee was formed, and in 1997 the Government program was accepted. The Cabinet was involved in work, decisions were accepted, legislation work was conducted. However, essential motions in power consumption decrease has not occurred, and internal power resources could not replace import [7]. Since 1990 till 2005 the expense of personal consumption of gas increased from 8,2 billion cubic metre to 17,5 billion whereas in the industry there was a decrease.

On this background the alternative power in Ukraine developed extremely slowly. By the beginning of 2010 following indicators of capacity on alternative sources were planned: wind power — 2000 MW, micro-hydroelectric power station — 590 MW, solar energy — 96,5 MW, small thermal power stations working on a biomass — to 410 MBr, biogas reception — to 5 billion cubic metre a year. However, there was a backlog on all planned indicators, for example, the capacity indicator of wind-driven electric power station reached 9% of the forecasted rate.

At present about half of investments into electric power industry goes to renewed energy sources, i.e. sun energy, wind, oceanic currents, rivers, biomass, and also geothermal energy. Investments into these kinds of energy, according to the experts IPCC, will make \$1,36 — 5,1 trillion 2010 — 2020 and \$1,5 — 7,2 trillion in 2012 — 2030.

According to the majority of the offered scenarios development of renewed power by 2050 can increase in 3-20 time thanks to a combination from gradual depreciation of the majority of technologies in this sphere, a purposeful state policy, scientific researches and considerable investments. Despite global financial shocks of 2009 all kinds of renewed power have expanded. Most actively developed a site of solar power (its development has increased more than twice, in 53%) and wind (30%). The technologies using various kinds of biofuel have the most long-term potential of growth, then there is an energy of the sun and wind. Experts are assumed that active transition to kinds of renewed energy will allow to lower emissions of hotbed gases by 2050 (at the most optimistic variant — almost in a third, or in an equivalent to 560 gigaton), and in more remote prospect it is enough to provide energy needs of the world [8].

According to the State target program of power efficiency increase for 2010 — 2015, consumption of natural gas by 2014 should be lowered in 6%, to 29% from the general consumption of fuel and energy resources. At the same time, consumption of coal which was traditionally

big, will grow by 2014 only on 1%, to 24%, and new alternative energy sources will still occupy an insignificant share in the general structure of consumption of power resources — 6%. Principal causes of low efficiency of power sector are cut prices, presence of subsidising and insufficient investment, and also absolutely formalistic approach of the state to development of power branch.

There are various estimations concerning what volume of investments is necessary for putting annually in power. By estimations of World Bank, the minimum investments into power should make 3% of gross national product of the country annually. For Ukraine is about 28 — 30 billion hrn. In particular, on 8 — 9 billion hrn. It is necessary to put in gas-transport system, in modernisation of existing actives and power efficiency, about 3 — 4 billion hrn. — in power supply system reconstruction.

Experts predict that in 2011 to Ukraine will come only direct foreign investments for the sum about \$7 billion. Besides, during the current year structural changes in direct foreign investments of Ukraine are expected. If in 2010 60% of investments out of \$6.5 billion FDI were left in bank and financial sector of economy, in 2011 the financial sector will receive about 30% of investments, other volume will be redistributed between other sectors of economy. In particular, direct foreign investments into power are assumed at level \$0.5 — 0.6 billion [9].

The state policy in sphere of development of alternative power includes working out of "green" tariffs and system of the preferential taxation [10]. The share of manufacture of energy by means of alternative renewed sources all over the world is equal to 3%. At present all developed countries began to finance actively working out and introduction of progressive technologies in alternative power. Still 20 years ago, cost of kw of the developed electricity and alternative differed in the traditional way in 10 times [11] whereas now this indicator has decreased to 2. It has occurred thanks to scientific and technical progress and support of the governments of the developed countries. It is planned that in 5 years cost of watt of the electric power which is received in the traditional way, will be equal at the price of alternative energy. More often investment projects in following areas of alternative power are realised: wind power, geothermal factories, water-power engineering, tidal energy,

Cost of kw/year for each separate kind of the electric power made from alternative sources, monthly is established by the National commission of regulation of electric power industry of Ukraine (NCEU). The size of the "green" tariff pays off under the formula: the retail tariff established for consumers of the second class (i.e. legal bodies), increased by "green" factor. And in its turn it is established "individually": depending on volume of investments which are necessary for power station building. The highest — 4,4 — 4,6 (505,09 copeck for kw/year, according to February, 2011) established for objects of solar power which are the most capital-intensive. In wind power — 1,2 — 2,1 (122,77 copeck for kw/year). The electric power made by stations which

work on a biomass, pays off on factor 2,3 (134,46 copeck for kw/year). The lowest factor — 0,8 — at small hydroelectric power stations (84,18 copeck For kw/year). Energy of biogas [12]. For comparison, in August, 2011 the price for the electric power for consumers of 1 class makes 63,31 copecks for kw/month, and for consumers of 2 classes — 83,56 copecks for kw/month which will make 759,72 copecks for kw/year and 1002,72 copeck for kw/year [13]. Thus, it is visible that replacement of traditional fuel resources with “pure” and cheap energy sources is economically expedient. And, nevertheless, for successful realisation of such projects, more active participation of the state in maintenance of conditions necessary for it is required.

In the countries of the western Europe where development of alternative power is given a close attention, in the state budget the item of expenses in projects financing on manufacture of non-polluting energy and various kinds of biofuel is put. It is connected with features of “green” projects. There are no certain investment templates and schemes. Each project is individual and possesses set of specific differences from each other, since the size and type of object and finishing regional and economic conditions of that environment where the project will be realised.

Not every each project of alternative power is capable to involve investments into the quantity necessary for its realisation. Investors prefer to finance projects with the help of which it is possible to get in a consequence stable profit in a foreign market, thus to enclose the minimum quantity of means that can be provided by only state privileges and special tariffs. The projects of the alternative power directed on economy of internal power resources of separately taken enterprise, are less claimed at external investors. Such projects should be financed from own means, and without the aid of the state in this case it is difficult to manage. Besides, the profit from such projects is stretched in time that pushes away potential investors. In each country there are features of realisation of such projects. It should be noticed that the policy of the state in this question is defining, and in the countries where traditional power resources are available, process of transition to alternative energy sources goes slowly.

The tightening of realisation of power saving up actions causes a considerable economic damage to the enterprises and is reflected in the general social and economic and ecological situation in the country. As the further growth of costs in the industry and other branches of a national economy is accompanied by growing deficiency of financial resources that detains updating of industrial base of the enterprise according to achievements of scientifically — technical progress. To prevent financial losses information of power saving actions it is necessary to work out and improve programs efficiency estimation methods of the power savings considering multi-variant approach of use of investments sources, intended for their realisation is required. Reduction of a power component

in production costs will allow to receive additional means for maintenance of comprehensible level of moral and physical deterioration of the technical equipment [4, p. 128].

At present a set of methods directed on power savings. Such methods can be: improvement of plants and heating mains, introduction of new technologies, thermal energy recycling, use of renewed energy sources. From all energy consumed in a life the big share — 79% goes on heating of premises, 15% of energy are spent for thermal processes (water heating, cooking etc.), 5% of energy consume electric home appliances and 1% of energy are spent for illumination, radio and the television devices. Experts assert that change of our own habits and use of modern appliances will allow saving to 40% of the electric power.

There are some ways of power saving up technologies in the industry: use of the equipment working on a cheap, alternative energy source; increase of efficiency of power installations;

Minimisation of losses of energy in the course of transportation from the unit developing such energy to object of consumption (to heat exchangers etc.), however, the most essential is now household power savings (power savings in a life), and also power savings in housing and communal services sphere. We will consider the basic methods of power savings in housing and communal services.

The sector of multiroom habitation is considered one of the most problem areas, as for economy of energy. 2/3 to 3/4 general consumptions of energy in housing sector is supplied by hot water and heating. Major factors which influence requirement for heating, is climate, sizes of the heated areas, quality of an external skeleton of a building, heating system etc. The majority of apartment houses do not meet modern requirements power- and resource saving as they are constructed taking into account old building norms.

The power savings in an apartment house are first of all reduction of losses of heat at the expense of warming of floors, walls, ceilings. Also here it is possible to carry change of system of heating which inefficiently spends energy, in such which will optimum spend energy, without violating thus comfortable conditions of residing.

In an arsenal of alternative power there are many tools and sources ( wind power, solar batteries, a biomass, thermal accumulators, water-power engineering, use of thermal sources, seismic activity of the earth and energy of waters), but, besides traditional methods of extraction of energy, there are also other perspective directions united in concept of alternative power. First of all, it concerns those methods of reception of energy which have the minimum risk of negative influence on ecology.

As a solution of a problem of stage-by-stage introduction of alternative power in housing and communal services sphere it is possible to offer the following: to book power audit which will give an overall picture of losses of heat in the house and will reveal the weak places needing the decision, and already after that

it will be possible to start the decision of these problems, to choose a variant most suitable to this or that house; to develop formation in area power- and cost-effective use of resources; to reduce energy consumption while in service houses; to form power- and resource-saving behaviour of tenants of the house; to develop perspective directions of building of the house and habitation operation; everywhere to measure consumption of municipal resources; to equip with water supply systems (cold and hot), water drains, gas supply, the device of water pumpings, boiler rooms, to warm apartment houses (works on improvement of heat-shielding properties of protecting designs, the device of external platforms, window fillings with a threefold glass cover), but unfortunately, in apartment houses warming possibility of outside separately taken wall is absent, therefore occurs warming from within; to establish the all house devices of the account of the expense of cold and hot water, thermal energy on hot water supply and heating) and room devices of the account of cold and hot water; persistently to introduce ресурсосберегающие the technologies, new materials, devices of the account of cold and hot water, thermal energy etc.

Obstacle to introduction of power saving up technologies is restraint of growth of tariffs for the population on separate kinds of resources (the electric power, gas), absence of means at the housing and communal services enterprises on realisation of power saving up programs, and also absence of mass household culture of power savings.

In Ukraine distribution was received by practice of reconstruction of existing buildings, installation of system of power savings, for example industrial cases and existing administrative or premises, under modern office or shopping centres, allowing to use the existing areas more effectively. Often similar premises do not correspond to operating sanitary specifications, both regarding maintenance of a necessary temperature mode, and regarding air exchange. Owing to these it is necessary to equip them with systems of a compulsory forced-air and exhaust ventilation, and sometimes air-conditionings. Unfortunately, installation listed above the equipment is interfaced to certain increase in power consumption. Generally, reconstruction can be and is not connected with a reshaping of premises, and urged to solve a problem of escalating of functionality of already existing office premise, shop or hotel that, in turn, is interfaced also to power consumption increase at the possibilities of the bringing electric system limited, as a rule.

**Conclusions.** Without serious decision of problems of power, it will be difficult for Ukraine to leave on a way of steady economic growth, as the majority of the industrial enterprises of the country are power-intensive, and the electric power production technology are ecologically not safe. Therefore, it is necessary to spend an estimation of economic efficiency of use of alternative energy sources in various branches for the purpose of attraction of investments.

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### **Okaryachenko A. P. Development of Alternative Power in Ukraine as the Mechanism of the Sustainable Development of Economy**

In article necessity of use of alternative kinds of energy has been proved, the current situation in power of Ukraine is resulted, legislation projects in this area are considered, terms of financing and uses of alternative power in housing and communal services sphere are defined.

*Key words:* alternative energy sources, power, financing, the legislation.

### **Окаряченко Г. П. Розвиток альтернативної енергетики в Україні як механізму сталого розвитку економіки**

У статті обґрунтовано необхідність використання альтернативних видів енергії, наведено сучасний стан в енергетиці України, розглянуто проекти законодавства в цій галузі, визначено умови фінансування та використання альтернативної енергетики в сфері ЖКГ.

*Ключові слова:* альтернативні джерела енергії, енергетика, фінансування, законодавство.

### **Окаряченко А. П. Развитие альтернативной энергетики в Украине как механизм устойчивого развития экономики**

В статье обоснована необходимость использования альтернативных видов энергии, приведена текущая ситуация в энергетике Украины, рассмотрены проекты законодательства в этой области, определены условия финансирования и использования альтернативной энергетики в сфере ЖКХ.

*Ключевые слова:* альтернативные источники энергии, энергетика, финансирование, законодательство.

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