

Інноваційний розвиток та конкурентоспроможність підприємств

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INCENTIVES AND BUDGET CONSTRAINTS OF ENERGY RESOURCES SAVING FOR SUSTAINABLE DEVELOPMENT OF AGRICULTURE

Onegina V.M. Incentives and budget constraints of energy resources saving for sustainable development of agriculture.

The main tendencies in the energy resources use in agriculture in Ukraine due to the purposes of suitable development were considered. The changes of the prices and costs of energy resources use in agricultural production as the incentives and consequences of transformation of technologies of agricultural production were evaluated. Special attention was devoted to the changes of carbon resources use in greenhouses in Ukraine. Budget possibilities of macro- and micro levels to respond to modern challenges of sustainable development were defined. The programs of state policy for possibilities of innovation low carbon technologies implementation in agriculture were offered.

Key words: energy resources saving, sustainable development, agriculture, agricultural enterprises, prices, costs, innovation.

Problem statement. Today's challenges inspire society to intensify searches of ways of sustainable development. The development that gives possibilities to satisfy needs of present generation without threats for future generation requires the finding of modes of resources and energy use due to principles of sustainability. The list of defined goals to transform our world for aim of sustainable development includes affordable and clean energy use. Development and implementation of low-carbon technologies, growth of use of alternative renewable energy sources have become the signs of the current stage of technological progress. These technological changes give possibilities to reduce energy dependence, the costs of appropriate resources, pollutions, to decrease using of non-renewable energy sources.

Agriculture is a special area of economic activity, which combines the business, social, and ecological systems. Agriculture is a big consumer of energy, but also it is a producer of energy. The importance of sustainability of resources and energy use in agriculture for global scale sustainable development was reflected in the main goals and objectives of Food and Agricultural Organization (FAO) of the United Nations. Among its main goals there is sustainable management and utilization of natural resources including land, water, air, climate and genetic resources for the benefit of present and future generation. One of its main

objectives is to make agriculture more productive and sustainable. The saving of natural tradition energy resources is a clue factor to achieve these goals [7].

Agriculture is very important for Ukrainian economy. It generated 11.8 % of gross added value of country, the export of agricultural and food products equals 31 % of value of Ukrainian export in 2014 [4]. The reasons of special concentration on energy resources use in agriculture are a national security, food safety, economic efficiency, healthy environment, costs and quality of living, the development of rural communities.

Since the middle of 2000-th the agricultural producers have been actively implementing technologies of energy self-sufficiency, using biofuels, solar and wind energy, developed agricultural machines with low fuel consumption, low carbon agrarian technologies.

Analysis of last research and publications. The economic problems of innovation technologies and energy resources saving in Ukrainian agriculture have been considered in the scientific works of Ukrainian scientist N. Gerasymchuk, G. Maznev, L. Melnyk, V. Shcherbak [1, 2, 6, 8] and some others, but a wide range of topics requires future investigations for definition of last changes of energy resources use due to modern challenges of development.

The main goal of this article is to evaluate

the changes in the costs of energy resources use in agricultural production as the incentives and consequences of transformation of technologies of agricultural production and budget possibilities of agricultural producers to respond to these challenges.

Main results of the research. The prices are clue signals for changes in market economy. They contain and pass information on scarcity of resources and products, needs of consumers,

costs of production. During 2008–2014 the prices of gas, oil products, fuel and electric power have been increasing a lot (by 2-3 times) in Ukraine (table 1). The index of prices on oil product was 286.6%, on fuel – 243.0% for agricultural producers in Ukraine in 2014 (to 2008). These tendencies created strong incentives for agriculture producers to change technologies to save costs on resources of energy for being profitable.

Table 1

Indices of price on energy resources for agricultural producers in Ukraine, %

Type of resources	2009	2010	2011	2012	2013	2014	2014 to 2008, %
1	2	3	4	5	6	7	8
Oil products	147.3	11.7	124.0	99.7	100.0	140.9	286.6
Electric power	100.7	113.1	120.6	109.9	105.5	127.2	200.6
Fuel	110.6	139.2	116.3	104.2	100.8	129.2	243.0

Source: information of State Statistical Service of Ukraine [4]

To evaluate of changes of energy resources use we calculated, compared and defined trends of the volume of costs of oil products, electric power, fuel (costs of energy resources or total energy costs), the ratio of energy costs to market value of sold agricultural products of agricultural enterprises in Ukraine in 2008–2014 (table 2). These calculations showed the absolute growth of total energy costs (almost by 3 times). It was caused mainly by price growth and growth of production. But they also showed the reduction of the energy costs capacity of value of agricultural product sold. Every Ukrainian hryvna of sold

agricultural product contained 15 kop. of total energy costs in 2008, and 12 kop. in 2014, among them – 2 kop. of costs on electric power in 2008 and 1 kop. in 2014. The share of energy costs in total costs of agricultural production had changed slightly (even increased by less 1%) due to the results of calculations on the basis of statistical observation of big and middle size agricultural enterprises [3]. But the reduction of the share of energy costs in total costs of agricultural production was more significant – from 14.2% to 13.3% for enterprises included in Statistical Yearbook «Agriculture of Ukraine» [4].

Table 2

The income from agricultural products sales, total costs and energy costs of agricultural enterprises in Ukraine in 2008 - 2014

Indicators	2008	2009	2010	2011	2012	2013	2014	2014 to 2008, %
1	2	3	4	5	6	7	8	9
Income from agricultural product sale, mln. hrn.	46167	58806	73134	93680	118892	117444	162514	352.0
Total costs, mln. hrn	55346	61209	75010	99266	123739	127190	154313	278.8
Material costs, mln. hrn.	38981	42406	52528	70732	84856	88542	108701	278.9
Costs of oil products, fuel, electric power, mln. hrn.	6913	6712	8254	11979	13479	13590	20474	296.2
Costs of electric power, mln. hrn.	923	1052	1233	1529	1732	1969	2018	218.6
Ratio of material costs to income from sales	0.84	0.72	0.72	0.75	0.71	0.75	0.67	79.8
Ratio of costs of oil products, fuel, electric power to income from sales	0.15	0.11	0.11	0.13	0.11	0.12	0.12	80.0
Ratio of costs of electric power to income from sales	0.02	0.02	0.02	0.02	0.01	0.02	0.01	50.0

Source: Authors' calculations on the data of State Statistical Services of Ukraine [3]

These evaluations testify the slow progress in rationalization of energy resources use in agricultural enterprises in Ukraine. Some technological changes have been implemented in agricultural enterprises (mainly in large enterprises). Agricultural producers started to use low carbon technologies such as «no till», «mini till», and technologies of smart farming. The list of 20 high innovative companies of Ukrainian economy (2016) includes 6 agricultural companies (Forbes, Ukraine) [5]. All their innovations (geoinformation system and management of land bank; new logistics decision, smart farming, coordinated farming) deal with the energy use corresponded to the principles of sustainable development.

The special concentration of our research was on the tendencies of energy use in

vegetable production in greenhouses. The production of the vegetables in greenhouses is very sensitive to temperature regime and microclimate. A lot of greenhouses were built near sources of heater (for example, electric power stations) in Soviet Ukraine. They had received cheap hot water from these stations. After market reform situation has changed dramatically for greenhouses. They have not gotten cheap energy, more over electric stations got monopoly and set up their rules for energy provision of technologically depended greenhouses. But production of vegetables requires reliable energy provision. Greenhouses started to use new sources of energy (mainly – gas). In 2008–2012 the energy costs reached up to 45% of costs of production of vegetables in greenhouses (tables 3).

Table 3

Structure of production costs in «Allians Co» (Kharkiv region), 2010 – 2014

<i>Type of costs</i>	2010	2011	2012	2013	2014
	%				
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Wages and salaries	19.6	17.0	15.3	23.7	32.0
Social insurance	7.1	5.9	6.1	9.4	12.6
Material costs	54.9	27.4	71.5	54.3	40.8
including:					
seeds	0.2	0.2	0.0	0.1	0.4
mineral fertilizers	3.5	5.6	5.6	4.9	9.4
oil products	1.0	1.1	0.2	0.2	2.0
electric power	8.4	7.7	5.8	8.8	14.0
fuel and energy	16.7	17.4	45.0	30.0	6.7
repairing and construction materials	0.3	0.5	0.7	0.0	0.6
another material costs	22.5	7.5	13.8	16.1	3.7
Depreciation	10.9	8.0	7.1	6.2	14.7
Others costs	7.5	0	0	0	0
Total costs	100	100	100	100	100

Source: authors' calculations

Huge growth of expenses for energy resources (especially in 2012–2013) led to losses of greenhouses. The profitability of vegetable production was negative in 2009–2013 in Kharkiv region. The management of greenhouse was looking for the new diversified efficient sources of energy. In 2014 the share of energy costs in total costs of production in greenhouses reduced by 20 per cent points. In 2014 the profitability of vegetables production reached 1.1 % in greenhouses in Kharkiv region and 12.4 % in Ukraine [3].

We consider the absolute (by 2-3 times)

and relative reductions of energy costs in greenhouses in 2014 as an evidence that enterprises opened up the new ways of energy provision to optimize total energy costs. Further implementation of innovation energy technologies requires investments. Political and economic instability leads to the growth of credit resources, reduction of profit of enterprises. These factors and growth of energy resources prices causes the reduction of budget possibilities of enterprises to implement innovation. The combination of private, social, national and international endeavors is very

important for the development and implementation of energy innovation.

Tax Code of Ukraine provides some incentives for biofuel producers (up to January 1, 2020): exemption from taxation the profit of producers of biofuels derived from its sale; profit from the simultaneous production of electricity and thermal energy and / or thermal energy getting by using biofuels; profit of equipment manufacturers, defined art. 7 of the Law of Ukraine «On alternative fuel» for production and reconstruction of machines, including farm machinery and power equipment, consuming biological fuels, derived from the sale of that machinery and equipment, which were manufactured in Ukraine. VAT exemptions for suppliers of technology, equipment, facilities identified by art. 7 of the Law of Ukraine «On alternative fuels» are set up.

Tax privileges are very important, but they are not sufficient to stimulate energy innovation implementation in agricultural enterprises in the conditions of budget limitations.

Conclusions. So, the price tendencies formed strong incentives for implementation of technology of sustainable energy development in Ukrainian agriculture. Agricultural producers were looking for and implementing the new sources of energy, the new energy resources saving technologies (for example, «mini till», «no till»), new efficient agricultural machinery and equipments, that consume less energy. Producers made just first steps on this way. The size of the relative reduction of energy costs testifies this.

But the price tendencies caused the reduction of profit of agricultural producers, strong budgets limitations. Macroeconomic and

political crises turned the situation for the worse. The value of credit increased catastrophically (up to 40%) in Ukraine. Such conditions influence negatively on the possibilities of agricultural producers to finance technological changes. To enforce the technological changes due to the principles of sustainable development there is a necessity of the searches of the models of financing of the development and implementation of new technologies. These models should include as endeavors of business, as well a state. The important steps of agricultural producers to implement new technologies are the strategic planning of innovative development, including working out the investment strategies of innovation activities, the collaboration with universities and scientific-research institutes, effective forms of financing of access to new technologies (mutual funding of agricultural enterprises, leasing, foreign investments). The role of the government is very important also in the process of passing over the budget limitation of agricultural producers for the sustainable energy development. The main steps of government may include in this case the tax reduction for the profit is being invested in the new technologies, state budget support of the scientific research concern sustainable energy development, and state support of programs of implementation sustainable energy technologies (including tax, credit and budget support programs). International experience and programs of International financial organizations are is very worthy too for the implementation of innovation low carbon technologies and sustainable development of agricultural enterprises and agriculture in Ukraine.

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Анотація.

Онегіна В.М. Стимули та бюджетні обмеження збереження енергоресурсів у забезпеченні сталого розвитку сільського господарства.

Основні тенденції у використанні енергетичних ресурсів в сільському господарстві в Україні були розглянуті. Зміни цін та витрат на енергетичні ресурси у сільськогосподарському виробництві як стимули та наслідки технологічних трансформацій в сільському господарстві були оцінені. Особлива увага була приділена змінам у використанні вуглеводних ресурсів в тепличному господарстві в Україні. Бюджетні можливості макро - та макрорівнів для відповіді на сучасні виклики сталому розвитку були визначені. Заходи державної політики для формування можливостей впровадження низько вуглеводних технологій в сільському господарстві були запропоновані.

Ключові слова: збереження енергетичних ресурсів, сталий розвиток, сільське господарство, сільськогосподарські підприємства, ціни, витрати, інновації.

Аннотация.

Онегина В.М. Стимулы и бюджетные ограничения сохранения энергоресурсов в обеспечении устойчивого развития сельского хозяйства.

Основные тенденции в использовании энергетических ресурсов в сельском хозяйстве в Украине были рассмотрены. Изменения цен и затрат на энергетические ресурсы в сельском хозяйстве как стимулы и последствия технологических трансформаций в сельском хозяйстве были оценены. Отдельное внимание было уделено изменениям в использовании углеводородных ресурсов в тепличном хозяйстве в Украине. Бюджетные возможности микро - и макроуровней для реакции на современные вызовы устойчивому развитию были определены. Меры государственной политики для формирования возможностей внедрения низко углеводородных были предложены.

Ключевые слова: сохранение энергетических ресурсов, устойчивое развитие, сельское хозяйство, сельскохозяйственные предприятия, цены, затраты, инновации.

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