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German Bundestag



Issue # 07/2014

At the Institute for Economic Research and Policy Consulting

AGRI-FOOD POLICY REVIEW

What is the role of bioenergy in strengthening of energy security in Ukraine?

Authors

Yuliya Ogarenko
ogarenko@apd-ukraine.de

German-Ukrainian Agricultural Policy Dialogue (APD)
Reytarska 8/5 A, 01030 Kyiv
Tel. +38044/ 2356327
info@apd-ukraine.de
www.apd-ukraine.de

Pressing need for strengthening energy security improvement in the light of gas supplies cut off from Russia on the one hand and huge unexploited biomass potential on the other hand could significantly boost the growth of bioenergy sector of Ukraine in the next few years. In fact, Ukraine could use this opportunity and make a breakthrough in reducing its dependence from gas imports through increase of energy efficiency and development of alternative energy sources. Bioenergy in terms of the use of biogenic waste and production of energy crops could play an import role here.

Certain important steps in this direction are already made, however, further legislative changes are needed to eliminate barriers and implement incentives for bioenergy development in Ukraine.

Energy security challenge

Political tensions between Russia and Ukraine increasingly affect economic cooperation between two countries. This resulted in trade disruptions in a number of economic sectors and resumed dispute over the terms of contract on gas supplies from Russia and transit over the territory of Ukraine. On the 16th of June, Russia cut off gas supplies to Ukraine, while gas supplies to the EU countries via Ukrainian territory were preserved.

Although gas disputes between Russia and Ukraine occurred not for the first time (e. g., 2005/06, 2007/08, 2008/09, 2010), previously Ukrainian politicians did not undertake any serious steps¹ to strengthen energy security in the short-term. According to the Institute for 21st Century Energy² Ukraine has the worst energy security index score³ among large energy user group of countries.

This time Russia-Ukraine gas dispute seems to be more serious as both parties have mutual claims and filed lawsuits to the Stockholm court of arbitration, which is supposed to make an interim decision by the late 2014. Hence, Ukrainian

¹ Despite developing plans for exploration of shale and offshore natural gas resources, which could considerably increase domestic gas production in the next 5-7 years.

² <http://www.energyxxi.org/energy-security-risk-index>

³ In 2012, Ukraine had Energy Security Risk Score at 2,250 (114% higher than the OECD average) and ranked 25th among large energy user group of countries.

politicians are now concerned about energy security of the country as never before.

On 4th of July, 2014, Verkhovna Rada approved the draft law #4117a on a special period (de facto emergency state) in fuel and energy complex of Ukraine⁴ in the first reading. On the 16th of August, the draft law #4116a on reforming of the gas pipeline system of Ukraine⁵ was approved in the second reading and signed by the President on 8th of September. Timely implementation of legislative changes initiated with these draft laws is required to ensure functioning of the economy and district heating systems under condition of limited gas supplies.

Cabinet of Ministers has already introduced a requirement for industry and utilities companies to reduce gas consumption by 30 % and by 10 % for state-funded institutions, which should be fulfilled during the period from August, 2014 to March, 2015. In addition, a number of important legislative amendments were approved and incentives developed to stimulate development of renewable energy sources, particularly bioenergy.

Bioenergy potential

According to Bioenergy Association of Ukraine (BAU)⁶, the share of biomass in the gross final energy consumption of Ukraine is only 1.78 %. For comparison, average figure⁷ for the EU-27 is 8.39 %.

⁴ http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=51387

⁵ http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=51386

⁶ Estimated based on 2012 data. Source: <http://www.uabio.org/img/files/docs/position-paper-uabio-9-en.pdf>

⁷ In Latvia and Finland the share of biomass in gross final energy consumption constitutes 28.1% and 27.6%, respectively), in Sweden and Estonia it is close to 26%

Table 1. The use of biomass and biofuels for energy production in Ukraine (2012)

	Annual consumption*	ktce ⁸	Share, %
Straw	84 kt ⁹	43	2.0
Firewood	1.7 million m ³	413	19.0
Wood biomass (industrial use)	3.8 Mt	1296	59.6
Sunflower husk	627 kt	343	15.8
Bioethanol	52 kt	48	2.2
Biodiesel	~ 0	~ 0	~ 0
Biogas from agricultural waste	20 million m ³	12	0.6
Landfill gas	26 million m ³	18	0.8
Total		2173	100 %

Source: Bioenergy Association of Ukraine

* Consumption for energy production in Ukraine. Export of biomass granules/briquettes is not taken into account.

Overall, about 2 Mtce of energy is produced from biomass, lion's share of which is constituted by wood biomass (see Table 1.). At the same time, huge potential of energy production from agricultural wastes and residues, and energy crops are considerably unexploited.

According to IFC study¹⁰ about 109 m t of wastes and residues (cereal straw, corn cobs and stalks, sunflower baskets, cattle manure, swine manure, poultry manure, food industry waste and other wastes) are generated in the agricultural complex annually and only 55 % of these residues are processed. The rest is either inefficiently utilised or disposed, which often has negative environmental consequences. Currently, only about 1 % of agricultural residues is used for energy purposes. It is estimated by the IFC experts that almost 20 m t more of agricultural residues and wastes could be used for economically viable energy projects (payback period up to 5 years), which could cumulatively provide up to 9 Mtce (73 TWh)¹¹ of energy and save up to 8 bln m³ of gas annually (equals to 25 % of gas imported from

⁸ ktce – thousand tons of coal equivalent.

⁹ kt - thousand tons.

¹⁰ www.uabio.org/img/files/news/pdf/waste-agro-complex-2013.pdf

¹¹ This is equivalent to 25% of energy use by industry.

Russia in 2012). However, more than EUR 2 bln of investments will be required to utilise this potential.

Table 2. Energy potential of biomass in Ukraine, 2013

	Mtce
Straw of grain crops	4.54
Straw of rape	0.84
Corn stalks and cobs	4.39
Sunflower stalks and heads	1.72
Secondary agricultural residues	1.13
Wood	1.77
Biodiesel	0.47
Bioethanol	0.99
Biogas	0.97
Landfill gas	0.26
Sewage gas	0.27
Energy crops:	9.96
Peat	0.40
Total	27.71

Source: Bioenergy Association of Ukraine

It should be noted that biomass potential varies from year to year depending on the harvest. Considering that there is tendency of crop productivity growth, amount of crop residues also increases. According to the BAU, energy potential of agricultural residues estimated based on 2013 data (record grain harvest at 63 m t) is at 11 Mtce. Moreover, potential of energy crops, which could be grown at degraded agricultural lands, is calculated at 10 Mtce. Table 2 illustrates economic potential of different types of biomass in Ukraine. Overall, total biomass potential is estimated at about 28 Mtce, while only 8-10 % of it is currently used.

BAU experts estimated that the share of biomass in gross final energy consumption could increase from 1.78 % in 2011 to 4.3 % by 2020 and to 10 % by 2030. Moreover, 3.5 bln m³ of natural gas¹² (7 % from total gas consumption) for heat

¹² For comparison, agricultural sector currently needs about 2.5 bln m³ of natural gas annually.

production could be substituted with biomass annually by 2020 and 7.5 bln m³ (15% from total gas consumption) – by 2030.

Legislative incentives

The complex plan of measures for gradual replacement of natural gas with other fuels in the industry, state and commercial institutions, and housing sector was developed by the Ministry of Energy and Coal of Ukraine based on proposals of the Bioenergy Association of Ukraine. The plan was approved at the conciliation meeting of all relevant executive bodies (e.g., Ministry of Finance, Ministry of Regional Development, National Electricity Regulatory Commission, etc.) and submitted for consideration to the Cabinet of Ministers of Ukraine.

The complex plan contains 15 measures including correction of legislative limitations discussed in detail in AFPR#8/2013¹³ (approval of more precise definition of "biomass", elimination of local component requirement, increase of green tariffs for biogas projects, etc.) and new incentives to facilitate substitution of natural gas with other types of energy.

The draft plan is not yet approved by the Cabinet of Ministers'; however, two measures are already implemented at the legislative level. One of this is amendments to the state standard (DBN) B.1.2-16:2013¹⁴ on the definition of the class of consequences (liability) and complexity category of construction objects, which came into effect on 1st of July, 2014. The requirement on automatic assignment of the 5th category of complexity to highly environmentally dangerous projects (including bioenergy projects) is cancelled. The category of object will be now determined based on possible consequences of a theoretical equipment failure at the object. This means that biofuel boilers will be assigned a third category of complexity in most cases, which greatly simplifies

¹³ apd-ukraine.de/wp-content/uploads/2013/11/APD_AFPR_8_2013_eng.pdf

¹⁴ <http://www.minregion.gov.ua/building/tehnichne-regulyuvannya-ta-naukovo-tehnichny-rozvitok/standartizacija/nakazi-pro-priynyattya-ta-skasuvannya-nacionalnih-standativ-u-sferi-budivnictva--vidomosti-dp-ukrarhbudinform-schodo-vidannya-n-11099/nakaz-minregionu-ukrayini-vid-12-05-2014-n-135-pro-priynyattya-zmini-n-1-dstu-n-b-v-1-2-16-2013-viznachennya-klasu-naslidkiv-vid-64872/>

requirements at project development stage, obtaining permits and commissioning of the object.

A promising incentive is introduced with the Cabinet of Ministers' Resolution#293¹⁵, which envisions compensation of the difference between heat tariffs for households and heat production costs (including marginal profitability of up to 21 %) for private companies, which use other than gas types of fuel and energy (including biomass, electricity, coal) for heat production. At the moment, heat tariffs for households are about three times lower than the market heat price (based on the price of imported gas) and the difference is compensated to district heating companies from the budget. Cabinet of Ministers' incentive effectively reallocates state subsidy for gas to other types of energy used for heat production.

The resolution will come into effect on 1st of October, 2014. Considering that reconstruction of existing power plants or construction of new ones will take certain time, it is unlikely that this incentive will help to substitute considerable amount of gas by the nearest heating season. However, next year investments in gas-substitution projects could boost if investors will see that the scheme is working effectively and compensation from the budget for heat producers is allocated transparently and smoothly.

One of the prominent disadvantages of this initiative is that it equally supports substitution of gas with any other types of energy regardless of their efficiency and environmental impacts. In particular, coal production is heavily subsidised by the government and its extraction and combustion causes environmental pollution. Substitution of gas with electricity for heating purposes is an inefficient solution since a lot of energy is lost during generation process and transmission. Although the urgency of gas substitution measures is clear, it would be more rational to limit this incentive to renewable energy projects.

In addition to a number of stimulating legislative initiatives described above, Verkhovan Rada also

¹⁵ <http://zakon4.rada.gov.ua/laws/show/293-2014-%D0%BF>

approved amendments to the Tax Code¹⁶ on the 31st of July, which *inter alia* abolish income tax for producers of electricity from renewable energy sources and introduce excise tax for alternative motor fuels at EUR 99 per t¹⁷. In light of current situation in Ukraine, it is clear that the government had to increase taxes in order to shorten budget deficit. However, it is important to maintain and further improve favourable conditions for the development of renewable energy sources to achieve substantial progress in strengthening energy security of Ukraine. Hence, elimination of preferential taxation for renewable energy producers should be reconsidered when economic situation will improve.

In conclusion, suspensions of gas imports from Russia poses serious risks for energy security of Ukraine. Cabinet of Ministers should facilitate approval and implementation of the complex plan of measures for stimulating gas-substitution projects. In order to ensure sustainable development of Ukraine special attention should be given to energy efficiency technologies and use of renewable energy sources. That is why unlocking bioenergy potential could make considerable contribution towards reducing dependence on gas imports.

¹⁶ http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=51735

¹⁷ In the first version of the law it was at EUR 139 per t.