



## **POSITION OF BIOENERGY IN THE DRAFT UPDATED ENERGY STRATEGY OF UKRAINE TILL 2030**

Position paper

Georgiy Geletukha, Tetiana Zheliezna

---

18th of October 2012

Discussion within BAU: from 18.10.2012 to 26.10.2012  
Approval by the Board of BAU and publication at [www.uabio.org](http://www.uabio.org): 01.11.2012  
Responses and comments: [geletukha@biomass.kiev.ua](mailto:geletukha@biomass.kiev.ua)

The generalized data of 2010 on primary energy consumption in Ukraine, the EU, the U.S. and the world as a whole as well as forecast of these indexes for 2030 are shown in Table 1. Analysis of these data leads to several important conclusions. The share of natural gas in Ukraine is unreasonably high – about 43%, which is almost 2 times as higher than, for example, in the EU. At that the contribution of renewable energy sources in Ukraine is unduly low – 1.6%, which is 6 times as less than in the EU.

**Table 1.** Structure of primary energy consumption, % [1-5]

Energy carriers	2010				2030	
	World	Ukraine*	EU	USA	Ukraine**	EU
Natural gas	20.9	42.6	25.1	25.2	28	24
Oil	32.9	10.0	35.1	36.1	14.5	33
Coal	27.1	27.9	15.9	23.0	30	7
Uranium	5.8	17.9	13.5	9.8	22.5	11
RES	13.1	1.6	9.8	5.6	5.7	25

\* According to Ukraine's energy balance of 2010 prepared by the State Statistics Service of Ukraine [5].

\*\* In contrast to the world practice, the energy balance of Ukraine in 2030 besides the five listed energy carriers includes also rather big share of "other" sources of unknown origin (25.8 Mtce in the basic scenario, or 10.8% of the total energy consumption). The energy balance also includes "heat energy of the environment" (8 Mtce) but its calculation is non-transparent. Therefore, the shares of individual energy sources have been calculated as the ratio of their contribution to the total energy consumption (238.1 Mtce in the basic scenario) after deduction of 25.8 Mtce of "other" energy sources and 8 Mtce of "heat energy of the environment", so that their sum is 100%. The share of large hydro is included in the renewables.

Moreover, the lines of development of Ukraine's energy sectors proposed by the draft Updated Energy Strategy till 2030 also do not coincide with the trends in the EU's energy. Thus, Europe plans to cut down the consumption of coal (from 15.9% to 7%) and reduce the use of nuclear energy (from 13.5% to 11%) while the situation in Ukraine is reversed. The new version of the Strategy till 2030 plans the growth of coal use from 27.9% to 30%, and nuclear power from 17.9% to 22.5%. In addition, the EU intends to increase the contribution of RES by 2.5 times by 2030 (from 9.8% to 25%) while Ukraine plans much slower development of the sector (from 1.6% to 5.7%). According to data of 2010, the share of renewable energy in Ukraine's total energy balance is 6 times as less than in the EU. By 2030 the situation will be only a bit better, and Ukraine will have this index 4.4 times as less than in the EU.

Despite the fact that the current level of renewable energy development in the country is low, Ukraine has good preconditions for the future development of this sphere, especially bioenergy sector. Ukraine has a big potential of biomass available for energy production. The main components of this potential are agricultural waste, wood waste, and in prospect – energy crops, growing of which has been actively developing lately [6, 7].

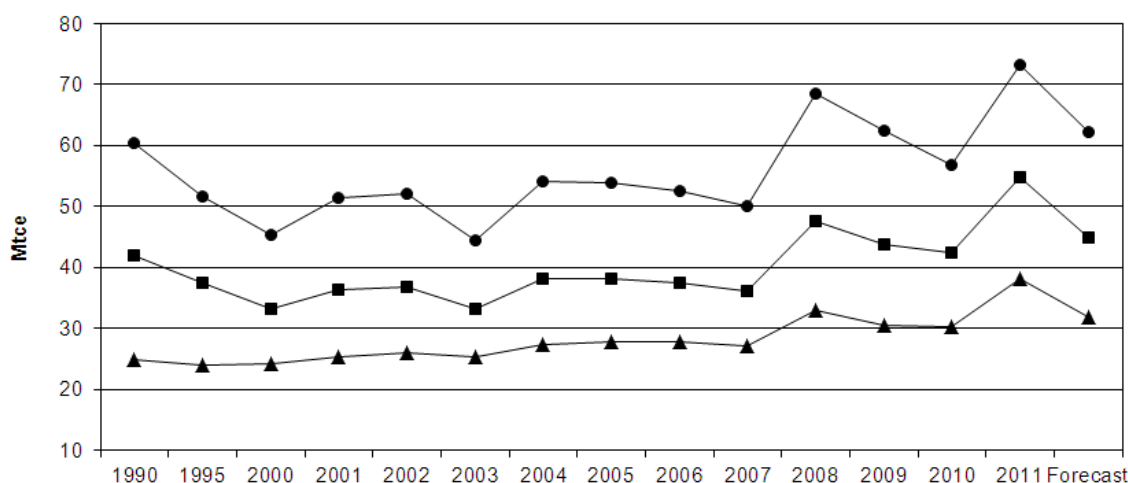
According to data of 2011, the economically expedient energy potential of the existing biomass waste is about 25 Mtce, and the energy potential of biomass, which can be produced on currently unused agricultural lands (of over 4 mill ha) is about 13 Mtce (Table 2). At the expense of this potential it is possible to cover up to 18% of the total primary energy consumption in Ukraine.

**Table 2.** Energy potential of biomass in Ukraine (2011)

Biomass type	Total generation, mill t	% of the total amount	Economic potential, Mtce
Straw of cereal crops	32	20	3.17
Straw of rapeseed	2.9	70	0.96
Residues from the production of corn for grain	34	52	8.59
Residues from the production of sunflower	17	67	5.55
Secondary agricultural residues (husks, bagasse)	9.7	77*	0.99
Wood biomass	3.9	89*	1.87
Biodiesel	-	-	0.35
Bioethanol	-	-	2.36
Biogas from manure	-	-	0.35
Landfill gas	-	-	0.26
Sewage gas	-	-	0.09
Energy crops:			
- poplar, Miscanthus, willow and other crops	20	85	10.30
- rapeseed (straw)	3.2	70	1.13
- rapeseed (biodiesel)	-	-	0.77
- corn (biogas)	-	-	1.10
Peat	-	-	0.4
Total	-	-	38.24

\* on average

The value of the energy potential of biomass varies from year to year and depends mainly on the yield of major crops (wheat, corn, sunflower, etc.). Over the last 10 years, the economic potential ranged from 25 to 38 Mtce/yr (Fig. 1).



**Figure 1. Variation of energy potential of biomass in Ukraine**

● theoretical potential      ■ technical potential      ▲ economic potential

According to the energy balance of Ukraine of 2010 [5], only about 1.3 Mtce/yr of biomass are used for energy production that makes up 0.7% of the total primary energy supply in Ukraine. It is mainly sunflower husks, wood waste and firewood for population. The authors' estimation of biomass volume, which is used for energy production in Ukraine, is presented in Table 3.

**Table 3.** Consumption of biomass for energy production in Ukraine (2010)

Biomass type	Consumption*		% of the total
	natural units	ktce	
Straw	50 th.t	24	1.9
Wood waste	957 th.t	261	20.2
Firewood (population)	1972 th. solid m <sup>3</sup>	377	29.2
Sunflower husks	884 th.t	452	35.0
Peat	339 th.t	156	12.1
Biogas (manure)	4516 th.m <sup>3</sup>	3	0.2
Landfill gas	26192 th.m <sup>3</sup>	18	1.4
<b>Total</b>		<b>1291</b>	<b>100</b>

\* Authors' own estimation: 1.29 Mtce make up about 0.7% of the total energy consumption in Ukraine. For comparison: according to the State Statistics Service of Ukraine [5], biofuels and waste (1.31 Mtce) make up 0,7% of the total energy supply in Ukraine in 2010.

Let us consider in more detail the position of biomass in the draft Updated Energy Strategy of Ukraine till 2030. One can state that the potential of bioenergy was almost neglected in the course of elaboration of the document. Key words search in the full text of the document gives us the following result:

“Biomass”                    – 0  
 “Biogas”                    – 0  
 “Biofuel” (solid)        – 2 (in descriptive context, without any figures)  
 “Biofuel” (liquid)      – > 10

Analysis of the planned targets on bioenergy contribution to the consumption of power, heat and motor fuels is presented below.

It should be noted that the goals for power production from biomass set in the new version of the Strategy are significantly understated. Thus, it is planned that in 2030 the share of biomass in power generation will be only 2.4% of the total power production from RES or 0.1% of the total electricity generation in Ukraine. For comparison, in the EU in 2030, the production of electricity from renewable energy sources is expected to be 66%, including biomass – 8% (Tables 4 and 5).

**Table 4.** Power production from renewable energy sources in Ukraine, TWh [4]

RES	2010	2015	2020	2025	2030
Wind	0.1	0.6	1.9	3.8	7.4
Solar	<0.1	0.3	0.8	1.4	2.6
Small hydro	0.2	0.4	0.7	1.3	2.1
Biomass	<0.1	<0.1	0.2	0.2	0.3
Other RES	<0.1	<0.1	<0.1	0.1	0.2
Total power production from RES	<0.4	<1.4	3.6	6.8	12.6
Total power production*	187.9	215	236	259	282

\* 2010 – actual production, 2015-2030 – basic scenario.

**Table 5.** Share of power production from RES in Ukraine and the EU, %

Indexes	2010	2015	2020	2025	2030
Power from RES in Ukraine, % of the total power production	<0.2	<0.7	1.5	2.6	4.5
Power from RES in the EU, % of the total power production	21	27	34	50	66
Power from BM in Ukraine, % of the total power production	<0.05	<0.04	0.08	0.07	0.1
Power from BM in the EU, % of the total power production	3.7	5.5	7.3	7.6	8.0

According to data of 2010, Ukraine is behind the EU as for the share of biomass in the total power generation by  $3.7/0.05 = 74$  times, and in 2030 the lag will reach  $8.0/0.1 = 80$  times! It means that reduction of the lag in this sector is not envisaged.

In addition, the draft updated Strategy does not reflect the planned share of biomass in heat production at all. It is mentioned only that "according to various estimates, the installed bioenergy capacity may potentially be 10...15  $\text{GW}_{\text{th}}$  and 1...1.5  $\text{GW}_{\text{el}}$ ". But these figures have not been included in any balance or target. In fact one takes them as some secondary information, which has no connection with the Strategy. As a matter of fact, the Energy Strategy does not plan production of heat from biomass at all.

Table 6 presents targets for biomass contribution to the total energy consumption in Ukraine and the European Union. On the basis of the above considerations, authors of the article have left the share of biomass in the total energy consumption of Ukraine at the level of 0.7%, which was already

achieved in 2010. Comparison with the EU's plans (19% in 2030) shows that the targets for biomass set in the updated Strategy are maleficently low. Moreover, they are even lower than the targets set by Energy Strategy of 2006.

**Table 6.** Targets on biomass contribution to the total energy consumption in Ukraine and the EU

Indexes	2011	2015	2020	2025	2030
BM share in the total energy consumption of Ukraine (Energy Strategy of Ukraine, 2006 [8])	1.3%	-	2.6%	-	3.0%
BM share in the total energy consumption of Ukraine (draft updated Energy Strategy of Ukraine, 2012) [4]	0.7%	0.7%	0.7%	0.7%	0.7%
BM share in the total energy consumption of Ukraine (the view of the authors of the article)	0.7%	1.5%	4%	7.5%	10%
BM share in the total energy consumption of the EU [1, 2]	6.7%	10%	14%	16%	19%

According to data of 2010, Ukraine is behind the EU as for the share of biomass in the total energy consumption by  $6.7/0.7 = 9.5$  times, and in 2030 the lag may increase to  $19/0.7 = 27$  times! It means that the lag in this sector will only be growing.

In fact, liquid biofuels are the only bioenergy sector, development of which is envisaged by the updated Energy Strategy (Table 7). The basic scenario plans the transition to the use of gasoline with 10% of ethanol by 2020 and 15% by 2030. According to this scenario, the spread of biodiesel as a motor fuel will happen after 2020, and the transition to the use of diesel with 7% of biodiesel will take place by 2030.

**Table 7.** Dynamics of consumption of liquid biofuels in 2010-2030 [4]

Indexes	2010	2015	2020	2025	2030
Consumption of bioethanol in Ukraine, Mt	<0.1	0.3	0.6	0.8	1.1
Consumption of biodiesel in Ukraine, Mt	~0	~0	<0.1	0.3	0.8
Total consumption of liquid biofuels in Ukraine, Mt	<0.1	0.3	0.6	1.1	1.9
Share of biofuels in the total consumption of motor fuels in Ukraine, %	<1	2.5	4.5	7.2	10.9
Share of biofuels in the total consumption of motor fuels in the EU, % [1, 2]	4.4	7.0	10.0	20.0	31.0

It was noted earlier that Ukraine has unreasonably high share of natural gas in the energy balance (about 43%). The draft updated Energy Strategy plans a very small reduction in gas consumption in Ukraine as a whole, and for the production of heat in particular. Thus, the total reduction in natural gas consumption in 2030 will be about 8 billion m<sup>3</sup> (14%) of the level of 2010 (Figure 2). In the sectors of "population" + "heat and power" the reduction will be only 3 billion m<sup>3</sup> (10%). For a country with such a high share of natural gas in the energy balance, the proposed reduction rates of

its consumption are unacceptably low. Such plans lead to the fact that gas will remain the dominant fuel in the heat production sector, and for biomass, in fact, no place is left here.

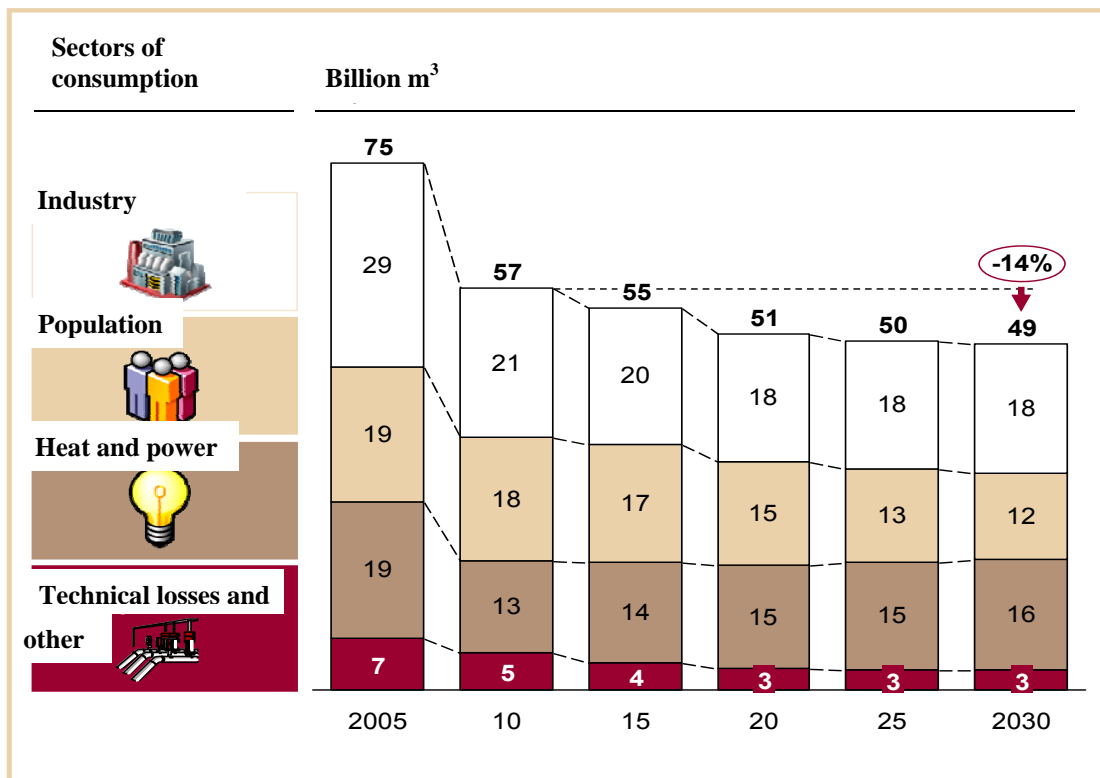


Figure 2. Dynamics of natural gas consumption in the main sectors [4]

The strategic view of the authors of the paper regarding the targets for natural gas reduction in heat production in Ukraine is shown in Table 8. We consider that of 27 billion m<sup>3</sup> of gas, which is used for heat supply (data of 2010), by 2030 it is possible and necessary:

- to replace 1/3 by biofuels (9 billion m<sup>3</sup>/yr);
- to save 1/3 at the expense of heat insulation of buildings, energy conservation during production, transportation and consumption of heat (9 billion m<sup>3</sup>/yr);
- to retain 1/3 for heat supply especially in big cities (9 billion m<sup>3</sup>/yr).

Table 8. Opportunities for the reduction of natural gas consumption in heat production in Ukraine

Sectors of consumption	Consumption of natural gas for heat supply, bill m <sup>3</sup> /yr			
	2010	2030		
	Consumption of NG	Consumption of NG	Conservation of NG	Replacement of NG by biomass
Housing and communal services sector	8	4.0	2.0	2.0
Population	17	4.0	6.5	6.5
State-financed sector	1	0.4	0.3	0.3
CHP plants	1	0.6	0.2	0.2
<b>Total</b>	<b>27</b>	<b>9</b>	<b>9</b>	<b>9</b>

The main provisions of this article regarding the development of bioenergy in Ukraine are confirmed by conclusions of the review of energy policy of Ukraine carried out by the International Energy Agency. The review was performed on the basis of the draft Updated Energy Strategy of Ukraine till 2030 [9]. Below are some quotes from the review:

*«On the supply side, this review estimates that Ukraine can eliminate its natural gas import dependency in the foreseeable future by substantially increasing domestic gas production, both conventional and unconventional, developing the country's **biomass** potential and maximising the energy efficiency gains».*

*«Ukraine should also focus on realising its potential for **biomass**, particularly **biogas** and waste-to-energy resources».*

*«Within five to eight years domestic production of unconventional gas and **biomass** resources can increase substantially, reducing import dependence and enhancing energy security».*

*«The government of Ukraine should ... make full use of the country's potential for renewable energy development, particularly **biogas** and municipal waste for heat and power generation. ... Introduce a balanced framework for promoting renewable energy sources (particularly **biomass** and **biogas**) ... ».*

*«In the power sector, investment is needed to refurbish, replace and develop generation units and networks, and to foster renewable energy generation, especially from **biomass** and waste».*

*«Ukraine should focus in particular on shale gas and coalbed methane, but also on the country's large **biomass** potential which is largely untapped and could prove competitive when compared with market prices for gas in applications such as heat generation, provided that these areas are attractive for investments and that technologies are available».*

*(Recommendations) "Focus on technologies that have a competitive advantage such as **biomass** and **biogas**, in order to promote economic growth and job creation. ... Develop an incentive framework for using renewable energy and waste in the heating sector and combined heat and power production, including provisions for cofiring of **biomass** and coal».*

### **Conclusions**

The lines of development of Ukraine's energy sectors proposed by the Updated Energy Strategy till 2030 are opposite to the trends in the EU's energy. Thus, Europe plans to cut down the consumption of coal and reduce the use of nuclear energy while Ukraine is going to enlarge these sectors. In addition, the EU intends to increase the contribution of RES by 2.5 times by 2030 while Ukraine actually plans stagnation of the sector (from 1.6% to 5.7%). According to data of 2010, the share of renewable energy in Ukraine's total energy balance is 6 times as less than in the EU. By



2030 the situation will be only a bit better, and Ukraine will have this index 4.4 times as less than in the EU.

The goals for power production from biomass set in the updated Strategy are significantly understated. Thus, in 2030, the share of biomass in the total power generation from RES will be only 2.4% (or 0.1% of the total electricity generation in Ukraine). For comparison, in the EU in 2030, the production of electricity from renewable energy sources is expected to be 66%, including biomass – 8%. At present Ukraine is behind the EU as for the share of biomass in the total power production by 74 times, and in 2030 the lag may reach 80 times! It means that reduction of the lag in this sector is not envisaged.

Actually, the draft updated Energy Strategy does not plan the production of heat from biomass. According to data of 2010, Ukraine is behind the EU as for the share of biomass in the total energy consumption by 9.5 times, and in 2030 the lag may increase to 27 times! It means that the lag in this sector will only be growing.

In fact, liquid biofuels are the only bioenergy sector, development of which is envisaged by the new version of the Energy Strategy

We are of opinion that the targets regarding bioenergy sector set in the Updated Energy Strategy of Ukraine till 2030 must be cardinally revised and increased. We recommend to include in it the figures on biomass contribution to the total energy consumption, which are presented in Table 6, with biomass share of 10% in 2030.

The main provisions of this article regarding the development of bioenergy in Ukraine are confirmed by conclusions of the review of energy policy of Ukraine carried out by the International Energy Agency. The review was performed on the basis of the draft Updated Energy Strategy of Ukraine till 2030.

#### REFERENCES

1. EU Energy in Figures. Statistical Pocketbook. European Commission, 2012
2. RE-Thinking 2050. A 100% Renewable Energy Vision for the European Union. European Renewable Energy Council, 2010.
3. Renewables Information. International Energy Agency, 2011.
4. Draft Updated Energy Strategy of Ukraine till 2030 [in Ukrainian)].  
[http://mpe.kmu.gov.ua/fuel/control/uk/publish/article?art\\_id=222035&cat\\_id=200576](http://mpe.kmu.gov.ua/fuel/control/uk/publish/article?art_id=222035&cat_id=200576)
5. State Statistics Service of Ukraine <http://www.ukrstat.gov.ua/>
6. Geletukha G.G., Zheliezna T.A., Zhovmir M.M., Matveev Yu.B., Drozdova O.I. Assessment of energy potential of biomass in Ukraine. Part 2. Energy crops, liquid biofuels, biogas [in Ukrainian] // Industrial Heat Engineering. – 2011, v. 33, N 1, p.57-64.

7. Geletukha G.G., Zheliezna T.A., Zhovmir M.M., Matveev Yu.B., Drozdova O.I. Assessment of energy potential of biomass in Ukraine. Part 1. Agricultural residues and wood biomass [in Ukrainian] // Industrial Heat Engineering. – 2010, v. 32, N 6, p.58-65.
8. Energy Strategy of Ukraine till 2030 [in Ukrainian]. Approved by Resolution of the Cabinet of Ministers of Ukraine N 145-p from 15.03.2006.
9. Ukraine 2012. Main provisions and recommendations. General energy policy. Review by International Energy Agency [in Ukrainian]  
[http://ua-energy.org/upload/files/IEA\\_Ukraine%20report%202012\\_summary%20plus%20ukr.pdf](http://ua-energy.org/upload/files/IEA_Ukraine%20report%202012_summary%20plus%20ukr.pdf)

### **Abbreviation**

BM – biomass;  
RES – renewable energy sources;  
NG – natural gas;  
CHP – combined heat and power  
Mt – million tons;  
Mtce – million tons of coal equivalent;  
ktce – thousand tons of coal equivalent

---

Civic union "Bioenergy Association of Ukraine" (UABio) was established to create a common platform for cooperation on bioenergy market in Ukraine, as well as to provide the most favorable business environment, accelerated and sustainable development of bioenergy. General constituent assembly of UABio was held on September, 25, 2012 in Kyiv. Currently, the Association is in the process of state registration. Among UABio members are over 10 leading companies and over 20 recognized experts working in the field of bioenergy.

<http://uabio.org>

