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Biofuels Markets and Policies in Belarus[#]

Karel Janda* – Elena Stankus**

Abstract. This paper provides an overview of biofuel's markets and policies in Belarus. Belarus remains the country with a critical level of energy dependence on Russia. Availability of cheap Russian sources and lack of diversification within energy sector hinder Belarus from expanding the potential of local energy resources. While energy independence and security, which is defined as share of local energy sources in the total energy balance, is declared as Belarusian priority, there is essentially no biofuels industry in Belarus. An interesting option of development of biofuels is a possibility of utilization of large areas unsuitable for human food or animal feed production because of Chernobyl nuclear disaster.

Key words: Eastern Europe; Biofuels; Ethanol; Biodiesel

JEL classification: R11; Q16; Q42

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Introduction

The Republic of Belarus does not stay away from the global modern trends and directions of development of economy on the “green” principles. Nowadays local energy sources manage to cover only 15% from the total final consumption of energy. Despite the fact that Belarus does not have enough own energy resources, it is suitable for the creation of renewable energy sector because of huge industrial forests, well developed infrastructure of energy and heat distribution, modern engineering enterprises as well as technically educated population.

Table 1: Belarus key indicators 2015

Population (millions)	9.5
GDP (billion 2015 USD)	54.61
Energy production (Mtoe)	3.67
CO2 emissions from fossil-fuel use only (Mt of CO2)	57.43

Same as Ukraine, Belarus remains the country with a critical level of energy dependence. Moreover 90% of imported energy resources come from a single supplier – Russia. Availability of cheap Russian sources and lack of diversification within energy sector hinder Belarus from expanding the potential of local energy resources. However nowadays energy independence and security, which is defined as share of local energy sources in the total energy balance, stay Belarusian priority. Since 1990, countries has a tendency towards decreasing the share of oil and increasing the share of biofuels and wood waste in TPES, see Table 13 below. Specifically exacerbation of energy relations with Russia and concomitant rise in the cost of imported energy sources had led Belarus to expand its reliability on local, mainly renewable energy in the past. The reason of growth in the biofuels and waste was given by establishment of strong supportive policies for developing this sector from year 2007.

Table 2: Biofuels in the balance of TPES in Belarus, 2014

Supply (ktoe)	2007	2008	2009	2010	2011	2012	2013	2014
Liquid biofuels	0.0	6.7	19.9	33.6	27.3	28.4	23.0	24.2
Primary solid biofuels	1281.2	1289.5	1319.8	1433.0	1513.9	1550.1	1505.1	1399.3
Biogas	0.0	0.4	1.5	2.1	3.1	4.3	9.1	8.9
Biofuels and waste*	1303.0	1329.0	1370.0	1497.0	1575.0	1610.0	1562.0	1460.0

Biofuels and waste, % of TPES	4.7%	4.8%	5.2%	5.4%	5.4%	5.3%	5.7%	5.3%
TPES	27898	27937	26525	27523	29345	30499	27276	27746

*Total primary supply of biofuels taking into account stock changes and net export

Source: IEA, 2016

Based on the National Agency of Investment and Privatisation website, technical potential of RES is estimated at 60 Mtoe, which is higher than the current energy demand level of 23 Mtoe (National Agency of Investment and Privatisation, 2016). In 2014 share of renewables had reached 5.3% in the balance of TPES with the main contribution from biofuels and waste and insignificant part of hydro, wind and solar energy. During last decade share of biofuels and waste has risen by 39.5% that accelerated total growth in TPES accounting for 3.6% (OECD/IEA, 2016). Production of liquid biofuels is represented by biodiesel, since Belarus does not utilize bioethanol as a fuel yet.

Development of biodiesel market for Belarus seems more rational from the point of view that it does not cause the deficit in food production, because rapeseed oil is not used for food purposes in the country. Besides land based issues could be potentially solved by utilization of contaminated area for rapeseed oil production.

Belarus had signed the Kyoto Protocol only in year 2005 and ranked as emitter below Top 50. It committed to cut fossil fuel CO₂ emission in transport by 5 up to 10% from 1990 year level by 2020 and by 12% in total emissions. Nonetheless Belarus does not have general adaptation plan of committed targets, despite adaptation measures having been introduced in the several legal documents and strategy is currently under development (LSE, 2016). For Belarus along with Russia and Ukraine decrease in carbon dioxide emissions is difficult choice, since as transition economies, they continue to grow at the expense of reduction of emissions (Parnell, 2012).

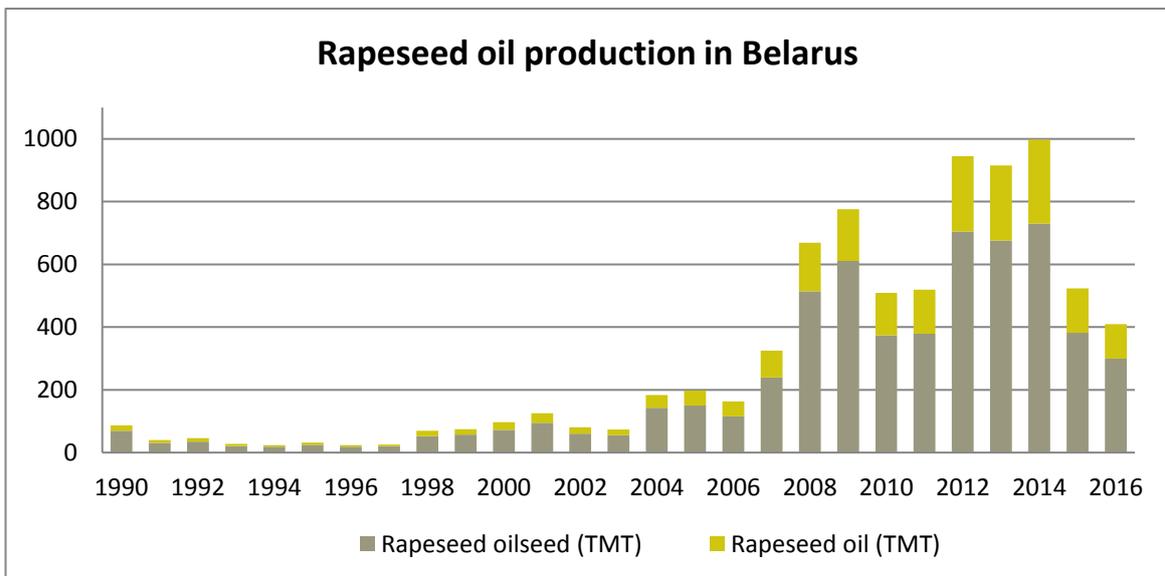
Feedstock potential

Biomass, biogas and liquid biofuels are most considerable sources of renewable energy in Belarus. Potential for conventional bioethanol and biodiesel are evaluated to be extensive taking into an account amount of arable land and opportunities from sugar production, starch and the cellulose industry for advanced biofuels. Production of bioethanol in the country is still

in quite early stage; however biodiesel industry is well developed. Total potential for conventional bioethanol and biodiesel production is estimated to 1 million tons annually (The Energy Charter, 2013). As a feedstock for biodiesel extraction rapeseed is primarily used and its cultivation takes one of the leading places in Belarus, accounting for 5% of total sowed land. Soybean and sunflower are being imported to the country.

According to the Graph 1 below the general harvest of rapeseed in 2016 has decreased to the minimum levels for the last 9 years and reached 300 kt (41% down compared to 2014). However as reported by the Ministry of Agriculture of Belarus, the sowing areas for winter rapeseed increased to 360 thousand ha and will contribute to the rapeseed yield growth in 2017 (APK-Inform Agency, 2016).

Belarus does not export rapeseed; all harvested volumes of oilseed are further produced within the country. The capacities of oilseed processing factories exceed harvesting volumes, what leads to downtime and imports of rapeseed from the Russia and Ukraine. Meantime Belarus exports extracted rapeseed oil primarily to the EU countries and up to 5% to the Commonwealth of Independent States (CIS). Based on the 2015 data from the National Statistics Committee of Belarus (BELSTAT), the following countries were the main buyers of rapeseed oil: Lithuania - 80.1 kt (86.9 kt in 2014), Norway - 24.1 kt (45 kt in 2014) and Poland – 9.1 kt (7.1 kt in 2014).



Graph 1: Rapeseed oil production in the Republic of Belarus

Source: United States Department of Agriculture, 2016

Belarus has huge potential not only for production of first generation of biofuels but also for advanced biofuels such as lignocellulosic bioethanol. As estimated in the National Programme on Local and Renewable Energy Development for 2011-15, potential of crop waste accounted for 1.0 Mtoe annually and potential from straw is 0.7 Mtoe annually. Wood resources and related residues are generous as well considering large forest areas covering 40% of Belorussian territory. Energy potential from wood and wood processing waste is appraised approximately to 2.2 Mtoe per year. Crop waste potential is estimated on level of 1.0 Mtoe annually and straw potential - 0.7 Mtoe.

An unusual benefit of Belarus is vast land areas available for growing feedstock without negative impact on food security. This circumstance was caused by nuclear disaster in 1986 which happened in Chernobyl in neighbouring Ukraine. As a consequence approximately 23% of the land area of Belarus was polluted by radioactivity and became inappropriate for agricultural use. Nonetheless contaminated land is suitable for sowing biofuel crops and brings advantage in the form of disposal of radioactive elements from the soil (Rahu M., 2003; Atomic Energy Agency, 2006).

Belorussian incentives in the biofuel industry

Belorussian consideration to develop biofuel industry was encouraged by President Directive №3 "Economy and frugality - the main factors of economic security of the state", signed in June 2007. The Directive considers the implementation of indicators for energy saving, increase the use of local, alternative and renewable energy sources, an important criteria for evaluating the work of state organizations. The provisions of Directive № 3 were expanded in the Strategy of Energy Potential Development, National Program for Energy Saving for 2011–2015 and further for 2016-2020. Examination of these documents let us to identify the priorities of the republican energy policy related to the biofuels. In general current policy and strategy of the Republic of Belarus in the field of energy and energy efficiency are aimed to make structural changes in the national economy and its modernization, based on energy-efficient technologies.

Government program for the production of biodiesel for the period 2007-2010

Due to the necessity of creating sources to ensure the economy of Belarus with automobile fuel at stable prices, stable market for raw materials and reduction of energy

imports, government has developed the program to ensure production of biodiesel in the country for 2007 – 2010 years. The strategy was focused on the provision of transport sector with competitive biodiesel by its production on the domestic raw material base. The state contractor of the program is Belarusian State Concern for Oil and Chemistry (Belneftekhim), which brings together the main organizations of chemical and petrochemical enterprises in Belarus.

Table 3: Performance targets of the Program for production of biodiesel in Belarus

Indicator (kt)	2007	2008	2009	2010
Rapeseed oil production	66.7	78.5	151.3	228.3
Biodiesel production	1	4	20	39-50
Biodiesel blends (minimum 5% of biodiesel)	20	80	450	780-1000

Source: State program for the production of biodiesel for the period 2007-2010, 2009

According to the program production of the rapeseed oil in 2009 was supposed to reach 151.3 kt and further 228.3 kt in 2010. Based on Table 14, showing actual annual yield of rapeseed oil, targets of program has been unfulfilled neither in year 2009 nor in 2010. In fact, “Belneftekhim” had managed to produce only 45% from the objective of 2010 - 450 kt of biodiesel blends (Charter’97, 2009). Thus Belarus did not achieve goal for biodiesel output of 1000 kt, established in the program.

National Energy Saving Program

In December 2010 National Energy Saving Program (NESP) for the period from 2010 till 2015 was adopted by Council of Ministers. As the main objectives, the program determines the deployment of alternative and renewable energy sources in conjunction with minimising GHG emissions, increase of energy efficiency, support of R&D in energy technologies and others. By accomplishment of sectional targets, the program assumes to lead to reduction of energy intensity of national GDP by approximately 30% within following period.

In the framework of NESP 2011-2015 on 10 May 2011 secondary bill was adopted - National Program of Local and Renewable Energy Sources Development for the period from 2011 until 2015. The focal point of the program is replacement of imported energy by local sources and substitute up to 2.4 billion cubic meters of imported natural gas along with compliance with the emissions level set by Kyoto protocol. Thus renewable energy sources

have been paid attention in the programme, however without specific goals for its share. Target for utilization of local sources of energy including RES was forecasted to achieve no less than 28-30% in 2015 in the balance of heat and electricity energy production. In 2010, the use of local ES and RES in the Republic of Belarus accounted to more than 3 mtoe (14.7%). Based on the resource potential and economic feasibility the extent of their use was predicted to increase till 2015 almost twofold to 5.7 mtoe (28%). Considering biofuels national program introduces resources potential and their economically feasible utilization volumes only for crop residues and wood waste, not taking into account other available feedstocks. Meantime it includes targets for biogas, hydro, wind and solar energy, strategy does not contain specific goals for liquid biofuels.

The strategy's target was projected to be reached by installing heat and power generation facilities using renewables in conjunction with ensuring development in specialist's qualification and introduction of normative legal acts. According to the results of 2015, NESP has proved to be successful and share of local energy sources achieved 29.5% in comparison with forecast of 28-20%. In this regard target of 11.2% decrease in energy intensity was fulfilled as well and has fallen by 12.6% to the 190 kg of oil equivalent per 1000 USD.

Recently in March 2016 new NESP for 2016-2020 was adopted, which includes an updated version of Local and Renewable Energy Sources Development Program and Program for Increasing of Energy Efficiency (IEE). The revised NESP emphasizes the increase of wood fuel use, rather than advanced biofuels. The reason is that wood fuel requires the least capital investments and provides shorter payback period compared with other types of renewable energy.

Table 4: Targets of National Energy Saving Program till 2020

Local/Renewable Energy Sources	2015 _R	2016 _F	2017 _F	2018 _F	2019 _F	2020 _F
Share of LES in TFC, %	13.6	14.2	14.5	14.7	15.6	16
Share of RES in TFC, %	5	5.7	5.9	6	6	6

*R- Reality, F-Forecast.

Source: The Department for Energy Efficiency of the State Standardization Committee of Belarus, 2016

The projected target for RES in 2020 is set up on the level of 6% in the gross total consumption of fuel and energy sources (TFC). Based on the results of 2015, share of RES has

reached 5% in the balance of TFC. Table 15 above provides reader with the annual objectives of the program for the period until 2020. Besides, IEE program foresees growth in the consumption of biodiesel as one of the steps to achieve savings of energy resources, but does not contain specific target for it.

Strategy for energy potential development in Belarus

In 2010 came into force the strategy, which aims to ensure the efficiency in the energy sector development and increase of energy security of republic till 2020. The strategy defines major changes to be done in the settlement of tariffs that have direct impact on RES growth. It became the first document in Belarus, which introduces definite objectives for the biofuels. The strategy introduces target for biodiesel and bioethanol use on the level not less than 2 million tons in 2020 together with the implementation of technologies for adaptation of internal combustion engines to run on gasoline with an ethanol content of more than 10 per cent.

The strategy also mentions the necessity in the reconstruction of distilleries, what would minimize required investments into the production of fuel ethanol. And as first step in the development of bioethanol potential requires to work out the cost-effective technology, which Belarus is missing so far.

Legislation in the Belorussian biofuel's industry

Standardization of biofuels

In early 2007 the government of Belarus approved a broad-ranging programme in order to develop technical regulations and standardisation in the sector of energy together with RES. In the interest to encourage use of alternative energy sources, standardisation supposes to improve the quality and efficiency of renewables. Before the programme came into force, in 2006 two approved STB 1657 standard on biodiesel (fatty acid methyl esters from rapeseed oil) and STB 1658 on mixed fuels based on petroleum diesel fuel with biodiesel content up to 5% were approved. Since Standardization program has been incorporated, numerous standards for ethanol as a blending component for petrol have been passed. Most recent standard GOST EN 15376 for petrol blends with bioethanol, which is identical to European standard, was accepted in 2014 and defines technical requirements for the fuel blends with maximum 5% of ethanol.

Value added tax (VAT) and tax reliefs

In 2009 the Belarus government had introduced Tax relief for renewable energy investors. The decree implies the right to deduct full amount of VAT paid by investors for the purchase of property right or goods. In addition it exempts RES investors from land tax, from rent for land payments provided that land belongs to the state and VAT and income tax in connection with a property transfer. The decree does not target directly RES projects but it is valid for them as well.

Import custom duties

Amendment of the Law № 2151-XII “About Custom Tariff” came into force in 2008. This law establishes the procedure of formation and use of the Customs Tariff and from 2008 exempts from customs duties imported equipment, used in the production, use, transformation, accumulation and transfer of energy produced from alternative and renewable energy sources.

Law on Renewable Energy Sources

Essential legislation in the sphere of RES was signed in December 2010 - Law on Renewable Energy Sources regulates sector of renewable energies in Belarus. The Law characterize essential legislative definitions in the RES sector, determines rights and responsibilities of producers, introduces competent authorities responsible for control over the sector and defines legislative basis for economic support for renewables. The Law implies obligatory promotion of RES and following facilitation of their development to the government bodies on both national and local level. Besides it includes governmental support to research in the sphere of renewable technologies including educational programmes.

The Law imposes mandatory registration for all RES producers maintained by governmental authorities and certification, which proves renewable origin of generated energy. It establishes a base for creation of financial support legislation for producers as well as investors in the form of tax reliefs, feed-in tariffs and other incentives. It also settles the procedure for establishing prices of renewable energy and tariffs for energy, generated from such sources. Meantime the Law consists of all necessary legislative support for the development of RES, it covers only solar, wind, geothermal, hydro, fuel wood, biomass and in

particular focuses on sector of renewables generating electric energy, however does not consider liquid biofuels.

International collaboration

In order to bring foreign direct investments into biofuel sector, Belarus has considered creating joint ventures with foreign companies in the country as well as outside (Akulova, 2010; Raskavičius, 2012). From 1990s World Bank has cooperated with Belarus in rising energy efficiency and use of renewables through different encouragements as investments, assistance regarding policies establishment and technical advisory. In 2014 World Bank had approved loan in the amount of US\$90 million that aims to increase the efficient utilization of biomass in heat and electricity generation (World Bank, 2014). Department of Energy Efficiency in different years signed memorandums on cooperation with Austrian (2009), German (2010) and Russian (2011) Energy Agencies in the sphere of RES. Nonetheless, according to available information, no biofuel projects have been registered in cooperation with listed agencies so far.

In 2007 government of Belarus and Greenfield Project Management Ltd, an investment and project development company incorporated under the laws of the Republic of Ireland, had signed a framework agreement to establish ethanol plant with 550 million litres production annually. Belarus was selected for this project establishment due to several competitive advantages such as low feedstock prices and labour costs, state support, well developed infrastructure and logistics. According to the Greenfield official page the agreement defines that arable lands in the region contaminated by the Chernobyl nuclear disaster are to be used for the purpose of the project. This supposed to ensure a stable supply of feedstock to the plant, meantime providing farmers a market for crops that cannot be offered to the food production. The project was aimed to produce wide range of ethanol blends from E5 till E85 which further to be exported to EU market and support achieving targets in transportation by 2020. Unfortunately the project proved to be fraud that was attracting funds from the Netherlands. It has collapsed in 2009 after government of Belarus refused to increase financing and withdrew financial support (The Greenfield Creditors Group, 2016).

Conclusions

Bioethanol industry in the Republic of Belarus doesn't exist; biodiesel production had already started in 2007. Overall there are 6 major organizations for the production of rapeseed oil, which is the main raw material for the production of biodiesel. The main producer in the country is "Belneftekhim". Total capacity of all 6 producers is approximately 100 thousand tons per year, which makes it possible to produce about 95 kt of biofuel (State program for the production of biodiesel for the period 2007-2010, 2007). Current level of biodiesel production accounted only for about 30% from the capacity (28 kt in 2014), see Table 16. However, the potential of these organizations is still not sufficient for the widespread production of an alternative type of motor fuel. Moreover available capacities won't allow Belarus to accomplish projected targets until 2020 stated in the Strategy for the energy potential development, taking into the account that country does not promote fuel ethanol as yet.

Table 5: Liquid biofuels production and consumption per sector in Belarus, 2014

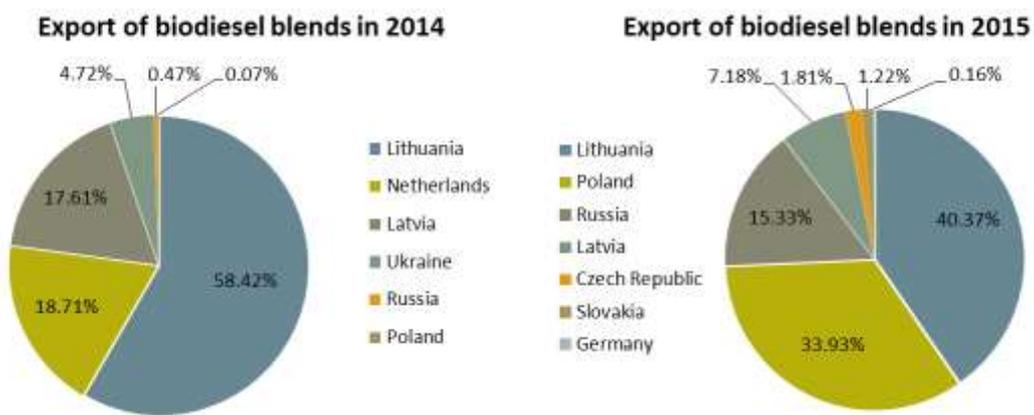
Liquid biofuels (kt)	2008	2009	2010	2011	2012	2013	2014
Production	8	23	38	31	33	26	28
Consumption	8	23	38	31	33	26	28
Agriculture	0	13	25	22	27	23	25
Transport	8	10	23	9	6	3	3

Source: IEA, Energy Balances of Non-OECD countries, 2014

Regardless unsuccessful state program from the period 2007-2010, the country hasn't succeeded in the expanding of biodiesel production to the industrial volumes. Despite the low price of B5 blend and supportive government policies, sales of biodiesel in Belarus since March 2011 has been stopped (Joffe, 2011). This was reflected in the usage of biofuels in the sector of transport, shown in the Table 16. Concern "Belneftekhim" refers to low rapeseed yield in 2010 (see Graph 6), resulting in a deficit in oil for biodiesel extraction, but this is unlikely the only reason, constrained biofuel production. According to several sources, the reason behind discontinuation of B5 from the market had been dual opinion about vehicles, operating on this type of biofuel. Many customers believe that biodiesel blends negatively affect the fuel system of vehicles. Meanwhile B5 fuel does not require any modifications of engines; depending on the quality of biodiesel and its additives, it could clog engine and gel during cold weather. Thus we assume that dual opinion on the market together with the lack of technical support and advisory services related to seasonal usage of biodiesel had also impacted the decrease in the

domestic demand. After 2011 biodiesel has not returned to the domestic market, despite the growth of rapeseed yield in the following years.

With established production of biodiesel, availability of feedstock but weak domestic demand on the other side, Belarus has recently started to export biodiesel blends. Taking traditional diesel fuel from Russia and rapeseed oil extracted domestically or imported from Russia and Ukraine, Belarus supplies foreign markets with biofuel. According to the BELSTAT in 2015 the country has supplied 15 kt to the foreign markets, what is significantly less than in 2014 – 35.6 kt. Lithuania remains the main consumer of Belarusian biodiesel throughout last three years. Graph 7 shows all buyers of biodiesel blends from Belarus in years 2014-2015. Average price of exported alternative fuel had decreased from 973 USD/tonne in 2014 to 766 USD/tonne in 2015 and currently attains level of 872 USD/tonne. Based on the operational data from January till October of 2016, export has reached only 5 kt.



Graph 2: Export of biodiesel blends from Belarus in 2014-2015 per country

Source: National Statistics Committee of Belarus, 2016

After analysis of current Belarusian policies in the sphere of biofuels, main constraints and incentives to be introduced for the growth of biodiesel production are considered:

- Outdated legislation framework with lack of definitive targets for liquid biofuels in the state programs. Most of Belarusian incentives are non-mandatory and do not contain any following sanctions that will motivate their further accomplishment;
- Low capacity of manufactures in case of biodiesel production. For bioethanol extraction there is a need for modifications made in the distilleries, which are not prepared for the production of fuel ethanol;

- Lack of promotion of liquid biofuels in the consumers market.

After discontinuation of biodiesel in 2011, liquid biofuels sector hasn't experienced any development in Belarus, despite all mentioned established state programs in force (NESP for the period 2016-2020 and Potential Development Program until 2020). In addition Belarus doesn't have institutional authority in the form of biofuel association that promotes biofuels in the country's energy market and contributes to the increase of energy security.

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