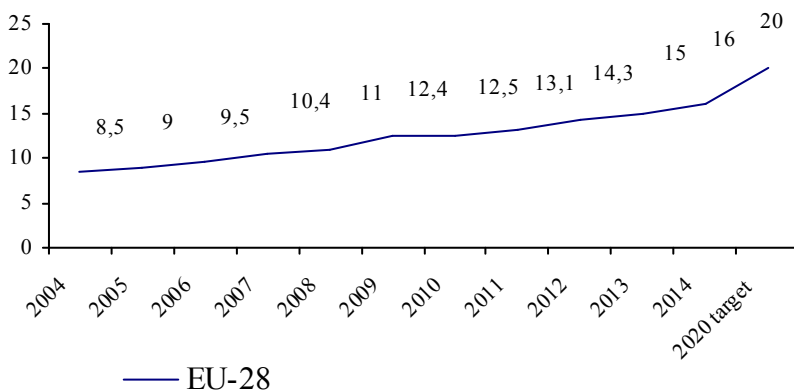


## PROSPECTS FOR THE USE OF ALTERNATIVE FUELS FOR TRANSPORT IN THE EU COUNTRIES

*SKUDLARSKI JACEK, DR INŻ.,  
WARSAW UNIVERSITY OF LIFE SCIENCES – SGGW, POLAND  
ZAIKA S.O., C.E.S., ASSOCIATE PROFESSOR,  
KHARKOV PETRO VASILENKO STATE TECHNICAL  
UNIVERSITY OF AGRICULTURE*

At the moment, in Europe today, as well as throughout the world, the trend towards the development of alternative energy continues that trend in the near future will need to replace traditional sources of energy, though not completely. This is due to expensive raw material in the usual hydrocarbon depletion of natural sources, as well as the unfavorable situation in the aftermath of their production and use.

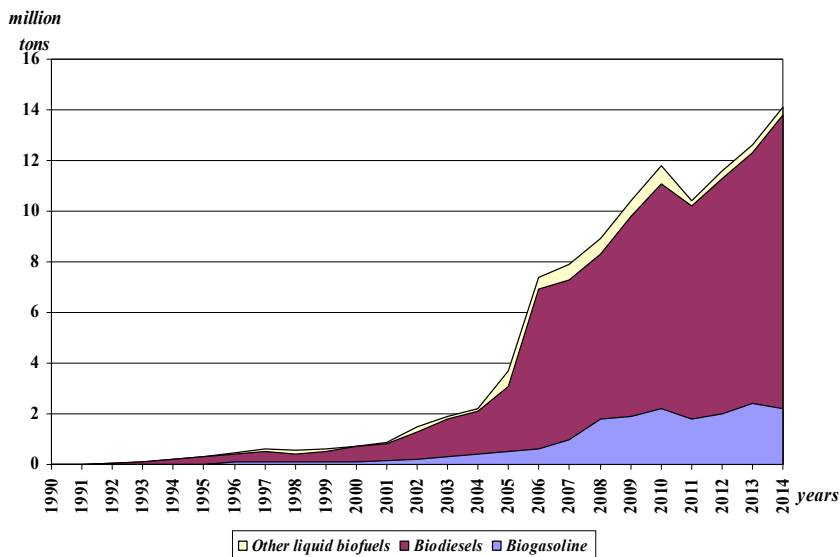
Renewable energy has many potential benefits, including the reduction of greenhouse gas emissions, diversify energy supplies and reduce dependence on the market of fossil fuels (in particular oil and gas). The share of renewable energy in total consumption of energy in Europe is constantly growing and has reached 16% in 2014 (Fig. 1) [7].



**Figure 1. Share of energy from renewable sources in gross final consumption of energy, EU-28, 2004-2014**

*Source: Eurostat*

Production of liquid biofuels increased significantly from almost nothing in 1990. There were rapid increases — especially after 2002 — producing an average annual growth rate between 2000 and 2010 of 32 % [1-3]. However, production decreased in 2011 by 10 % compared with 2010. Since then it is increasing at around 10% each year. Production of liquid biofuels is shown in Figure 2.



**Figure 2. Primary production of liquid biofuels, EU-28, 1990-2014**

*Source: Eurostat*

For all countries, there is a common 2020 target of 10 % for the share of renewable energy in the transport sector. The Renewable Energy Directive 2009/28/EC stipulates that only biofuels and bioliquids that fulfil sustainability criteria should be included. In some countries consumption of biofuels and bioliquids in the period 2011-2014 were not certified as compliant (sustainable) due to late implementation of Directive 2009/28/EC [5]. While the share of renewable energy as a whole is increasing since 2004, between 2010 and 2011 its share in transport decreased. This can be attributed in part to the total absence of compliant biofuels reported by several EU countries (countries did report some biofuel use, but none or very little of it compliant in 2011) [4, 6]. Respecting accounting rules of Directive 2009/28/EC, the share of energy from renewable sources in transport increased from 1% in 2004 to 6% in 2014.

The share of energy from renewable sources in transport is presented in Table 1.

Table 1

**Share of renewable energy sources in transport, %**

EU-28	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2020 target
EU-28	1.0	1.4	2.1	2.8	3.6	4.3	4.8	3.4	5.0	5.4	5.9	10
Belgium	0.2	0.2	0.2	1.3	1.3	3.4	4.2	4.0	4.4	4.3	4.9	10
Bulgaria	0.4	0.3	0.6	0.4	0.5	0.5	1.0	0.4	0.3	5.6	5.3	10
Czech Republic	1.1	0.5	0.8	1.0	2.3	3.7	4.5	0.5	5.5	5.6	6.1	10
Denmark	0.2	0.2	0.3	0.3	0.3	0.4	0.9	3.3	5.5	5.7	5.8	10
Germany	1.9	3.7	6.5	7.6	6.1	5.6	6.0	5.9	6.9	6.4	6.6	10
Estonia	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	10
Ireland	0	0	0.1	0.5	1.3	1.9	2.4	3.8	4.0	4.9	5.2	10
Greece	0	0	0.7	1.2	1.0	1.1	1.9	0.7	1.0	1.0	1.4	10
Spain	0.8	1.0	0.7	1.2	1.9	3.5	4.7	0.4	0.4	0.5	0.5	10
France	1.1	1.7	2.0	3.6	5.8	6.2	6.1	0.5	7.0	7.2	7.8	10
Croatia	0.4	0.4	0.4	0.6	0.6	0.8	0.6	0.4	0.4	2.2	2.1	10
Italy	1.0	0.8	0.9	0.8	2.3	3.7	4.6	4.7	5.7	4.9	4.5	10
Cyprus	0	0	0	0	1.9	2.0	2.0	0	0	1.1	2.7	10
Latvia	1.1	1.3	1.2	0.9	0.9	1.1	3.3	3.2	3.1	3.1	3.2	10
Lithuania	0.3	0.5	1.7	3.7	4.2	4.3	3.6	3.7	4.8	4.6	4.2	10
Luxembourg	0.1	0.1	0.1	2.1	2.1	2.1	2.0	2.1	2.2	3.8	5.2	10
Hungary	0.4	0.4	0.6	1.0	4.6	5.2	5.4	5.4	5.2	5.6	6.9	10
Malta	0	0	0	0	0	0	0	2.1	3.2	3.5	4.7	10
Netherlands	0.2	0.2	0.5	2.9	2.7	4.2	3.0	4.5	4.5	4.6	5.7	10
Austria	2.4	2.8	5.5	6.3	7.5	9.0	8.7	7.7	7.8	7.8	8.9	10
Poland	0.7	1.0	1.2	1.2	3.6	4.9	6.2	6.4	6.0	6.0	5.7	10
Portugal	0.2	0.2	1.3	2.2	2.3	3.6	5.3	0.4	0.4	0.7	3.4	10
Romania	0.9	1.0	0.8	1.8	2.8	3.9	3.2	2.1	4.0	4.6	3.8	10
Slovenia	0.4	0.3	0.6	1.1	1.4	2.0	2.8	2.1	2.9	3.5	2.6	10
Slovak Republic	0.7	1.1	2.9	3.5	3.9	4.9	4.8	5.0	4.8	5.3	6.9	10
Finland	0.5	0.4	0.4	0.4	2.4	4.0	3.8	0.4	0.4	9.6	21.6	10
Sweden	3.8	3.8	4.7	5.7	6.3	6.9	7.2	10.0	12.6	17.0	19.2	10
United Kingdom	0.2	0.3	0.6	1.0	2.1	2.6	3.1	2.9	3.6	4.4	4.9	10

\* Source: Eurostat

Directive 2009/28/EC on the promotion of the use of energy from renewable sources established a European framework for the promotion of renewable energy, setting mandatory national renewable energy targets for achieving a 20 % share of renewable energy in final energy consumption - and a 10 % share of energy from renewable sources in transport - by 2020. These goals are headline targets of the European 2020 strategy for growth. They contribute to Europe's industrial innovation and technological leadership, reduce greenhouse gas emissions, improve the security of energy supply and reduce energy import dependency.

### Literature.

1. Bezpieczeństwo energetyczne na wspólnym rynku energii Unii Europejskiej / [Redakcja naukowa Stanisław Gędek, Mariusz Ruszel]. – Warszawa: Wydawnictwo Rambler, 2015. – 325 s.

2. Izdebski W. Opportunities and barriers to development of bio-fuels for transport in Poland - experience for Ukraine / [W. Izdebski, J. Skudlarski, S. Zaika] // Технологический аудит и резервы производства. - № 3/3 (17). – 2014. – С. 23-27.

3. Izdebski W. Stan i perspektywy rozwoju energetyki odnawialnej w Polsce i na Ukrainie / [W. Izdebski, J. Skudlarski, S. Zaika] // Stowarzyszeni eekonom is towrol nictwa iagrobiznes u roczniki naukowe. – Tom XVII. - zeszyt 1. – 2015. – С. 72-76.

4. Krasnorutsky O.O. Bio-fuel usage promotion in the European Union: experience for Ukraine / J. Skudlarski, O.O. Krasnorutsky, S.O. Zaika // Вісник Харківського національного технічного університету сільського господарства: Економічні науки. Вип. 161. - Харків: ХНТУСГ. – 2015. - С. 21-30.

5. Skudlarski J. Alternative energy development in the context bio-fuel production / J. Skudlarski, O.O. Krasnorutsky, S.O. Zaika // Вісник Харківського національного технічного університету сільського господарства: Економічні науки. Вип. 162. - Харків: ХНТУСГ. – 2015. - С. 3-11.

6. Szczerbowski R. Bezpieczeństwo energetyczne Polski – mix energetyczny i efektywność energetyczna, «Polityka Energetyczna» - 16/4. – 2013. - S. 35-47.

7. Возобновляемые источники энергии. [Электронный ресурс] / Режим доступа: [http://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Renewable\\_energy\\_sources](http://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Renewable_energy_sources).