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IDENTIFICATION OF RISKS, SUSTAINABILITY AND PROBLEMS OF FUEL SECURITY OF UKRAINE AND THE COUNTRIES OF THE EUROPEAN AREA (MATRIX APPROACH)

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Identification of Risks, Sustainability and Problems of Fuel Security of Ukraine and the Countries of the European Area (Matrix Approach)

Today, Ukraine has a critically low level of fuel security, which is associated with a drop in oil production, a decline in oil refining and limited opportunities to import oil and motor fuel. The aim of the study is to develop a methodical approach to assessing the fuel security of Ukraine and the countries of the European space, which involves the calculation of local indicators of fuel security by components and levels. It is proposed to assess the fuel security of Ukraine and European countries according to four security components: accessibility, availability, acceptability, affordability. A methodical approach to identifying problems in ensuring fuel security is proposed, which, unlike the existing ones, is based on a system of matrices for positioning Ukraine and the countries of the European space in the plane of coordinates: «Accessibility of crude hydrocarbons for indigenous production, in particular year – Accessibility of crude hydrocarbons for oil refining»; «Availability of crude hydrocarbons for oil refining – Availability of motor fuel for final consumption»; «Acceptability of crude oil as a feedstock for refining – Acceptability of motor fuel in oil refining feedstock»; «Affordability of crude hydrocarbons imports – Affordability of motor fuel imports». The analysis of the components and levels of fuel security of Ukraine and the countries of the European space made it possible to determine that the highest level of fuel security in 2021 had the following countries: Norway, Great Britain, Lithuania, Spain; the lowest level of fuel security had Montenegro, Slovenia, Latvia, Estonia. In 2021, Ukraine ranked 24th among 29 European countries in terms of fuel security that was 35%. The decrease in the level of fuel security of Ukraine was influenced by: the destruction of production facilities as result of russian military aggression, a reduction in production, and limited opportunities to import crude hydrocarbons. The key problems in ensuring Ukraine's fuel security include: low level of accessibility of crude hydrocarbons for indigenous production and crude hydrocarbons for oil refining; low availability of crude hydrocarbons for oil refining and low availability of motor fuel for final consumption. To ensure fuel security, Ukraine needs to increase the production of crude hydrocarbons, increase the volume of oil refining for final consumption, and develop the production of synthetic motor fuel from coal.

Keywords: *fuel security, oil refining, initial hydrocarbons, matrix approach, assessment of fuel security.*

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Хаустова В. Є., Губарєва І. О., Салашенко Т. І., Костенко Д. М. Визначення ризиків, стійкості і проблем паливної безпеки України та країн Європейського простору (матричний підхід)

Україна на сьогодні має критично низький рівень паливної безпеки, що пов'язано з падінням нафтовидобутку, занепадом нафтопереробки й обмеженням можливостей щодо імпорту нафти та моторного палива. Метою дослідження є розробка методичного підходу до оцінки паливної безпеки України та країн Європейського простору, що передбачає розрахунок локальних індикаторів паливної безпеки за компонентами та рівнями. Оцінку паливної безпеки України та країн Європи запропоновано здійснювати за чотирма безпековими компонентами: достатність, наявність, прийнятність, доступність. Запропоновано методичний підхід до виявлення проблем у забезпеченні паливної безпеки, який, на відміну від наявних, базується на системі матриць позиціонування України та країн Європейського простору в площині координат: «Достатність сирих вуглеводнів для внутрішнього видобутку, років – Достатність сирих вуглеводнів для нафтопереробки»; «Наявність сирих вуглеводнів для нафтопереробки – Наявність моторного палива для кінцевого споживання»; «Прийнятність сирої нафти у сировині для нафтопереробки – Прийнятність моторного палива у вихідній продукції нафтопереробки; «Доступність імпорту сирих вуглеводнів – Доступність імпорту моторного палива». Аналіз компонент і рівнів паливної безпеки України та країн Європейського простору дозволив визначити, що найвищий рівень паливної безпеки у 2021 р. мали: Норвегія, Велика Британія, Литва, Іспанія, а найнижчий – Чорногорія, Словенія, Латвія, Естонія. Україна у 2021 р. за рівнем паливної безпеки 35 % займала 24-те місце серед 29 європейських країн. На зниження рівня паливної безпеки України вплинули: руйнація виробничих потужностей через російську агресію, скорочення видобутку, обмежені можливості імпорту сирих вуглеводнів. До ключових проблем у забезпечені паливної безпеки України необхідно віднести: низький рівень достатності сирих вуглеводнів для внутрішнього видобутку та сирих вуглеводнів для нафтопереробки; низький рівень наявності сирих вуглеводнів для нафтопереробки та наявності моторного палива для кінцевого споживання. Україні для забезпечення паливної безпеки необхідно збільшувати видобуток сирих вуглеводнів, нарощувати обсяги нафтопереробки для кінцевого споживання, розбудовувати виробництво синтетичного моторного палива із вугілля.

Ключові слова: *паливна безпека, нафтопереробка, первинні вуглеводні, матричний підхід, оцінка паливної безпеки.*

Рис.: *6.* ***Табл.:*** *1.* ***Бібл.:*** *11.*

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Introduction. Russian aggression against Ukraine has caused an energy crisis in Europe, therefore the issues of ensuring energy and fuel security are becoming increasingly acute. The reduction in the level of fuel security of Ukraine is influenced by: destruction of production facilities as result of russian aggression, decrease in oil production, limited opportunities to import crude hydrocarbons.

The carried out analysis of scientific literature shows that leading foreign scientists pay considerable attention to the problems of assessing both the energy and fuel security. The fundamental approach to assessing energy security was presented in the publication [1], that proposed the conception of 4A, based on such security components as: accessibility (geological component), availability (economic component),

acceptability (geopolitical component), affordability (environmental and social component).

The subject of research of such scientists as Kruyt B. et al. [1], Cherp A. [2], Jewell J., Hughes L. [3] Sovacool B. K. [4] Ren J. [6], Fang D. [6] is the development of methodological approaches to the energy and fuel security assessment. The carried out analysis showed the lack of a unified approach to assessing the energy and fuel security, the composition of security components, and absence of local indicators in their content.

The aim of the study is to develop a methodical approach to assessing the fuel security of Ukraine and the countries of the European space, which involves the calculation of local indicators of fuel security by components and levels.

The Eurostat data [7] served as an information base for assessing the fuel security of Ukraine and European countries. With the help of large-scale modeling of large data sets with the use of Microsoft Power BI software, matrices for positioning Ukraine and the countries of the European space by levels and components of fuel security are formed [8].

Presentation of the main material. Today, Ukraine has a critically low level of fuel security, which is associated with a drop in oil production, a decline in oil refining and limited opportunities to import oil and motor fuel.

Based on the authors' significant preceding developments in the field of fuel security [9–11, etc.], it is proposed to assess the fuel security of Ukraine and the countries of the world according to four security components: accessibility, availability, acceptability, affordability, which allows to determine by the levels of primary, ultimate and general fuel security.

The following were chosen as local fuel security indicators: Accessibility of crude hydrocarbons for indigenous production, in particular year (AC_{IP}); Accessibility of crude hydrocarbons for oil refining, in particular year (AC_{R}); Availability of crude hydrocarbons for oil refining, % (AV_{R}); Availability of motor fuel for final consumption, % (AV_{FC}); Acceptability of crude oil as a feedstock for refining, % (ACC_{O}); Acceptability of motor fuel in the output products of oil refining, % (ACC_{MF}); Affordability of crude hydrocarbons imports, % (AF_{CH}); Affordability of motor fuel imports, % (AF_{MF}).

The first chain of the fuel cycle is natural reserves, that is, deposits of oil and gas condensate. The assessment of the security component for this chain is reduced to the assessment of the accessibility of natural reserves of crude hydrocarbons for indigenous production and transformation (refinery inputs). This makes it possible to determine the natural potential of each country and arrange countries according to their contribution in the regional space.

Fig. 1 shows the matrix of positioning of Ukraine and European countries in the coordinate plane «Accessibility of crude hydrocarbons for indigenous production – Accessibility of crude hydrocarbons for oil refining» in the year 2021.

As shown in Figure 1, Spain is the only country in the quadrant of the matrix with a high level of the accessibility of crude hydrocarbons reserves, but at the same time the country has low volumes of hydrocarbons to meet the needs of oil refining.

Most of the countries under study have a low level of both accessibility of crude hydrocarbons reserves and accessibility of crude hydrocarbons for indigenous production, so they can be considered oil-deficient.

Ukraine had a fairly strong position in the European space in terms of accessibility of reserves for both production and oil refining needs. However, this level was reached due to a drop in their production and a reduction in oil refining volumes. Ukraine, Romania and Croatia belong to the quadrant of the matrix, characterized by a high level of accessibility of crude hydrocarbons for indigenous production and a low level of accessibility of crude hydrocarbons for oil refining.

Thus, according to the 1st security component (accessibility of natural reserves), it can be said that Ukraine, having moderate deposits of oil and gas condensate, did not develop its own oil refining.

The second security component is related to oil refining – the transformation of natural resources into end products. It is proposed to evaluate it by the availability of production for oil refining and oil refining for final consumption.

As can be seen from Fig. 2, in European countries, the availability of oil and gas condensate production for oil refining was at a low level. Of the countries under study, only Norway had the available production of crude hydrocarbons to cover the needs of oil refining.

According to the 2nd security component (availability of oil refining), Ukraine enters the quadrant of the matrix, which is characterized by a low level of availability of crude hydrocarbons for oil refining and a low level of availability of motor fuel for final consumption. Having a significant availability in the production of oil and gas condensate, Ukraine had a critically low availability of oil refining for final consumption.

The third security component determines the quality of transformation of initial resources into end products and can be characterized as the acceptability of oil refining. It is assessed by the acceptability of crude oil and the acceptability of refinery outputs. At that, in most countries there is a tendency to replace crude oil with other raw materials (natural gas liquids, refinery feedstocks and other hydrocarbons), which leads to an increase in the yield of motor fuel.

As can be seen from Fig. 3, in most European countries, the acceptability of crude oil and the acceptability of petroleum products exceeded 60% in the year 2021. Most of the countries under study fell into the quadrants of the matrix with a high and medium level of acceptability of crude oil as a feedstock for oil refining and a high level of acceptability of motor fuel in the output products of oil refining. Ukraine is also included in this group of countries, but it has one of the lowest values of acceptability rates in the European space.

The fourth security component is the affordability of imports of crude hydrocarbons and motor fuels, which helps to develop domestic oil refining based on high-quality and cheap raw materials and supply cheap and high-quality petroleum products to the internal market.

The countries of the European area had moderate values for the affordability of crude hydrocarbons imports, as they had an extensive geography of their supplies. Norway has the highest level of affordability of crude hydrocarbons imports and affordability of motor fuel imports (Fig. 4). The countries focused on importing russian oil had the least affordability of crude hy-

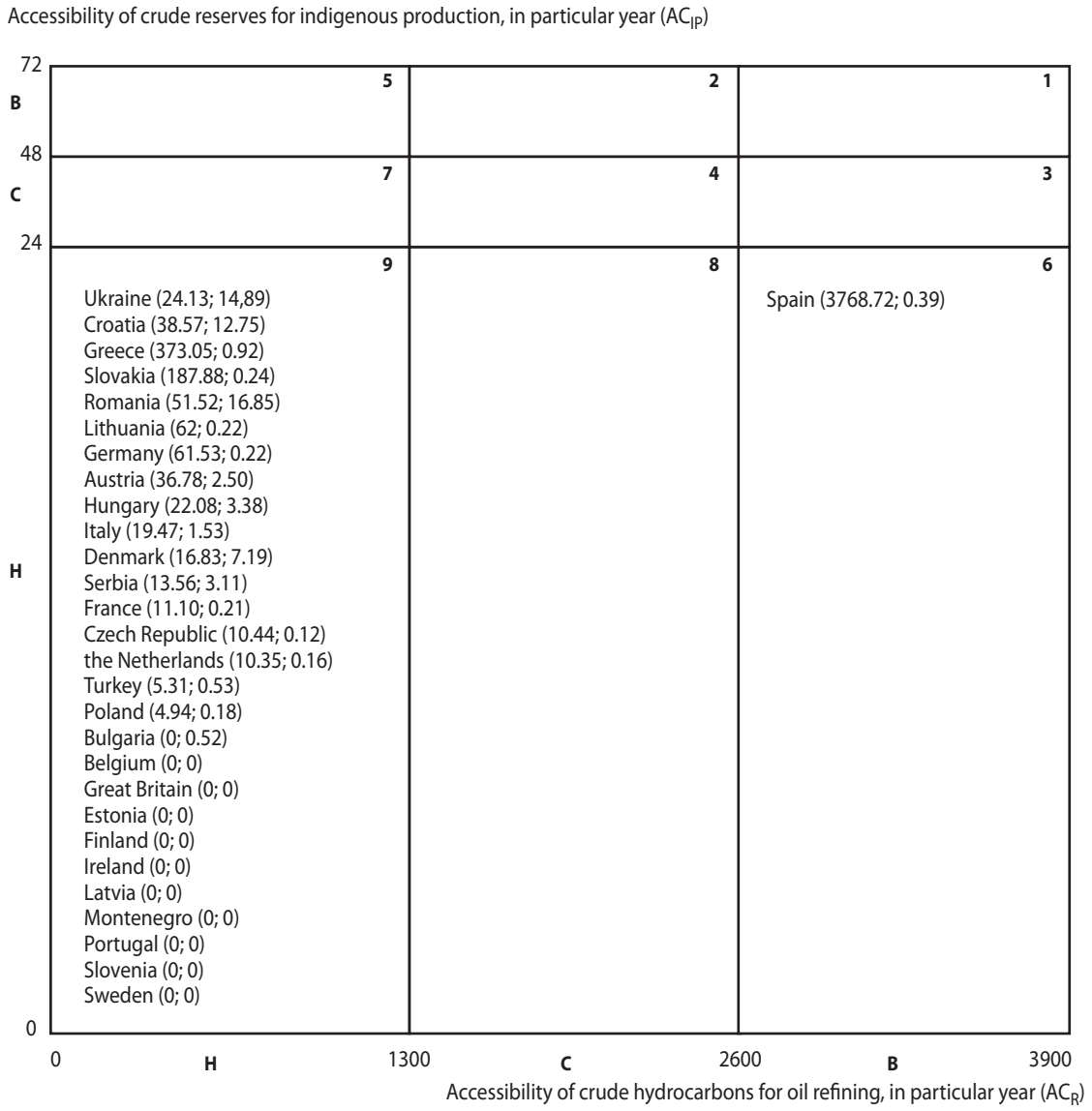

Fig. 1. The matrix of positioning of Ukraine and European countries in the coordinate plane «Accessibility of crude hydrocarbons for indigenous production – Accessibility of crude hydrocarbons for oil refining» in the year 2021

Source: formed by the authors

drocarbons: the Czech Republic, Slovakia, Bulgaria, Lithuania, and Finland. Countries with developed sea routes are characterized by high affordability of crude hydrocarbons imports: Spain, Italy, France, the Netherlands, Belgium, and Portugal.

Ukraine is included in the quadrant of the matrix, which is characterized by an average level of affordability of crude hydrocarbons imports and a low level of a affordability of motor fuel imports.

Fig. 5 presents an assessment of the fuel security of the countries of the European area and Ukraine by levels: primary fuel security, which applies exclusively to crude hydrocarbons, and ultimate fuel security, which applies exclusively to motor fuel.

Based on Fig. 5, the leaders in primary fuel security were Norway and Spain, i. e., the countries with sufficient deposits of crude hydrocarbons. The outsiders were countries that did not have proven deposits and had a zero resource cycle of motor fuel, such as Estonia, Latvia, Montenegro, Slovenia, as well as countries that were highly dependent on hydrocarbons imports, such as Finland and Bulgaria.

The leaders in ultimate fuel security are the countries that had excess capacities of the oil refining complex: Norway, Lithuania, Greece.

20 European countries, such as Hungary, the Czech Republic, Turkey, Poland, were included in the quadrant of the matrix with an average level of ultimate and a low level of primary security, they had insufficient capacity of the oil refining complex, focused on the import supply of russian oil.

Ukraine is included in the quadrant of the matrix, characterized by low levels of ultimate and primary security, because Ukraine would combine the moderate proven reserves with the for the most part declined oil refining.

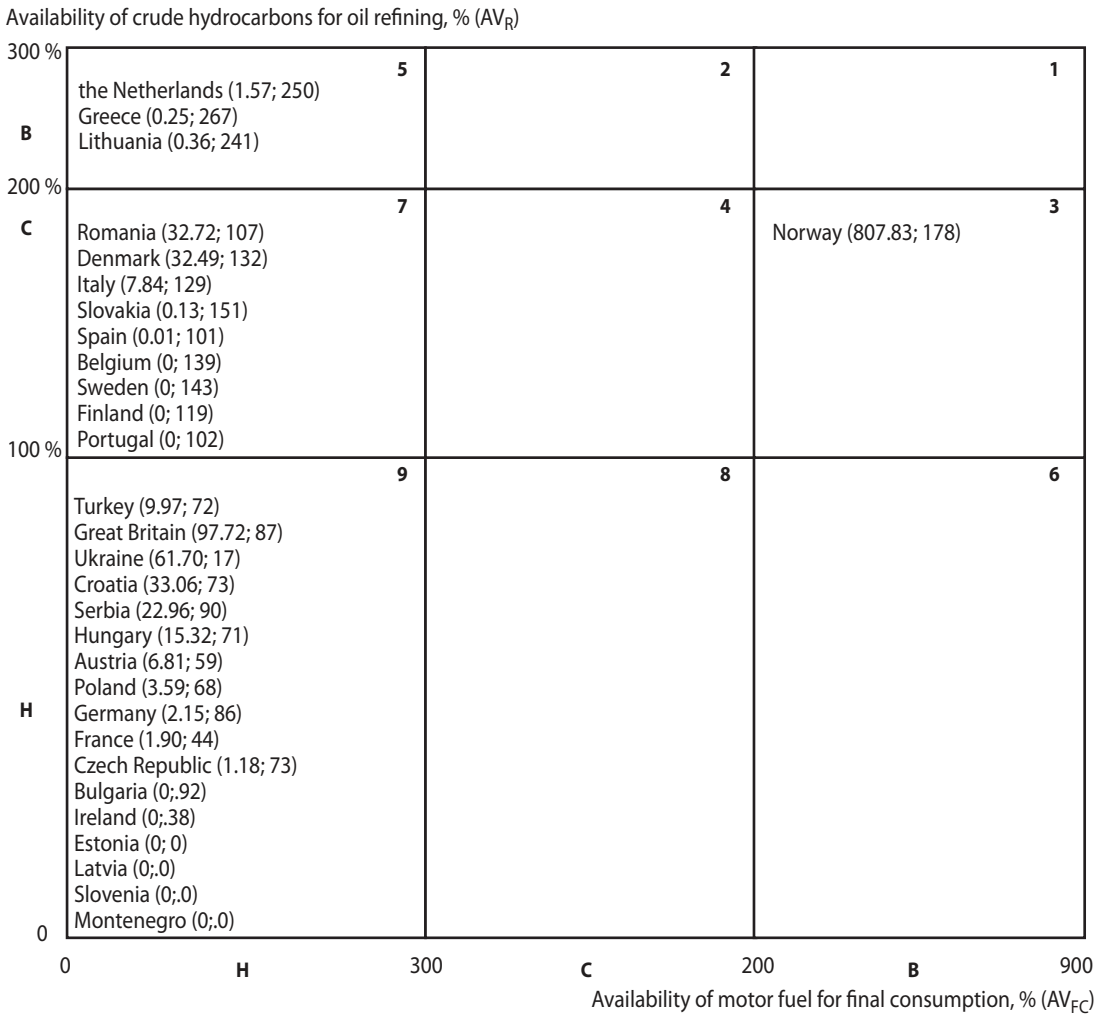

Fig. 2. The matrix of positioning of Ukraine and European countries in the plane of coordinates «Availability of crude hydrocarbons for oil refining – Availability of motor fuel for final consumption» in the year 2021

*Source: f*ormed by the authors

Fig. 6 shows a diagram of the distribution of Ukraine together with European countries by the level of fuel security in the year 2021.

European countries with a high level of fuel security include: Norway – 84%, Great Britain – 59%, Lithuania – 57%, Spain – 55%, and Greece – 54%. A low level of fuel security was noted in such countries as: Ireland – 34%, Montenegro – 17%, Slovenia – 15%, Latvia – 13%, Estonia – 12%. In 2021, Ukraine ranked 24th among 29 European countries in terms of fuel security that was 35%.

Tab. 1 presents a generalized description of the results of the fuel security assessment and its components in Ukraine and in European countries.

The carried out analysis of the components and levels of fuel security of Ukraine and the countries of the European space made it possible to determine that the following countries had the highest level of fuel security in 2021: Norway, Greece, Lithuania, Spain. It should be kept in mind that only Norway has significant oil deposits. Along with this, despite the absence of these deposits in other countries, the latter achieved a high level of fuel security due to the development of a highly efficient oil refining complex based on low-concentration imports of crude hydrocarbons.

Countries with zero resource cycles of motor fuel had the lowest level of fuel security: Montenegro, Slovenia, Latvia, and Estonia.

Based on the results of the analysis, it is determined that the key problem in ensuring the fuel security of most European countries are related to the components of accessibility, availability and affordability, namely: accessibility of crude hydrocarbons for indigenous production; accessibility of crude hydrocarbons for oil refining; availability of motor fuel for final consumption; affordability of motor fuel imports.

In Ukraine, problems in ensuring fuel security are related to the first and second security components, i. e. accessibility and availability. Thus, Ukraine has a low level of accessibility of crude hydrocarbons for indigenous production and of accessibility of crude hydrocarbons for oil refining, also a low level of availability of crude hydrocarbons for oil refining and of availability of motor fuel for final consumption.

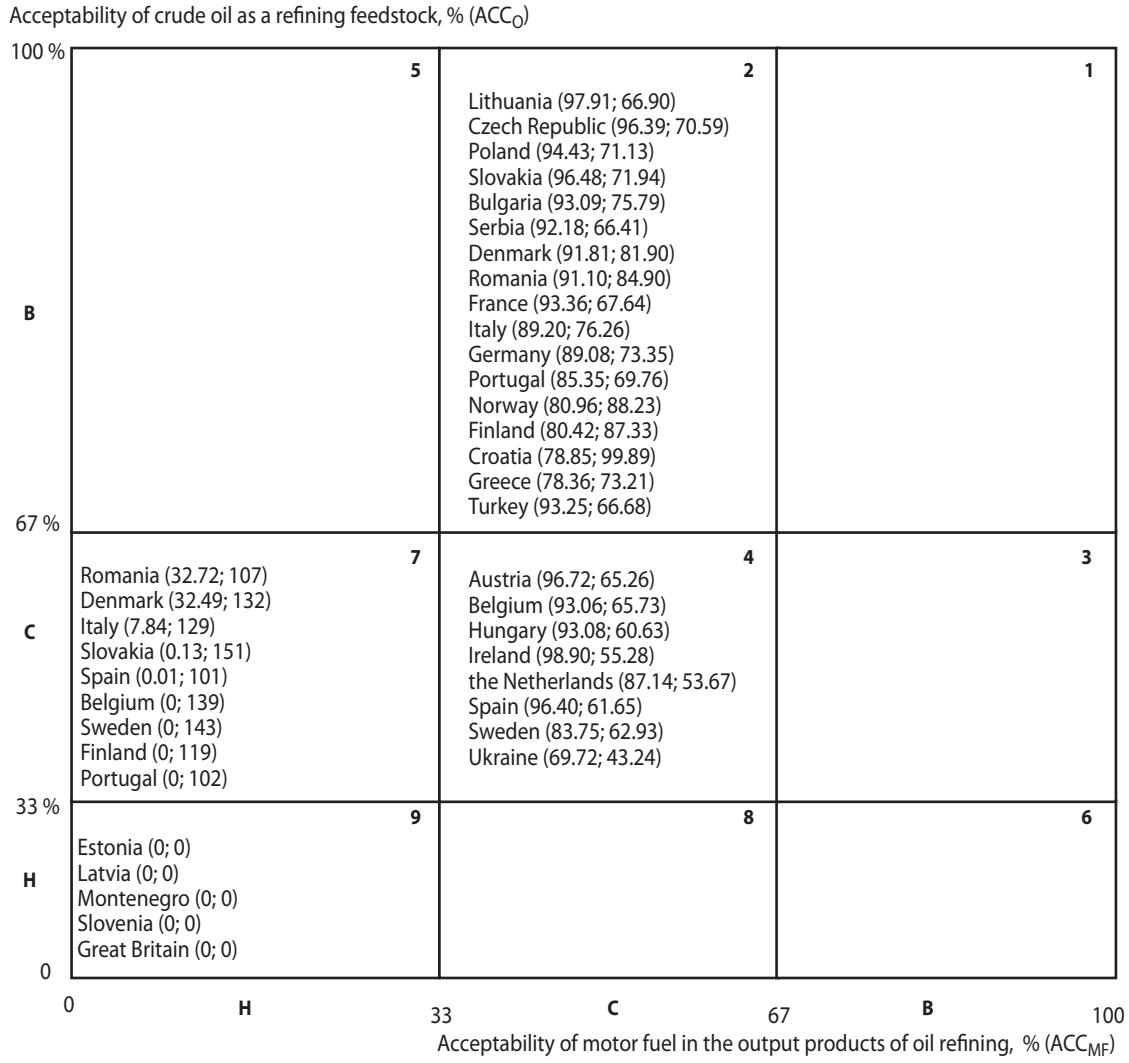

Fig. 3. The matrix of positioning of Ukraine and European countries in the coordinate plane «Acceptability of crude oil as a feedstock for refining – Acceptability of motor fuel in the output products of oil refining», in the year 2021

Source: formed by the authors

Conclusions. It is proposed to assess the fuel security of Ukraine and European countries according to four security components: accessibility, availability, acceptability, affordability, which allows it to be determined by the levels of primary, final and general fuel security.

A methodical approach to identifying problems in ensuring fuel security is proposed, which, unlike the existing ones, is based on a system of matrices for positioning Ukraine and the countries of the European space in the plane of coordinates: «Accessibility of crude hydrocarbons for indigenous production, in particular year – Accessibility of crude hydrocarbons for oil refining»; «Availability of crude hydrocarbons for oil refining – Availability of motor fuel for final consumption»; «Acceptability of crude oil as a feedstock for refining – Acceptability of motor fuel in oil refining feedstock»; «Affordability of crude hydrocarbons imports – Affordability of motor fuel imports».

The carried out analysis of the components and levels of fuel security of Ukraine and the countries of the European space made it possible to determine that the following countries had the highest level of fuel security in 2021: Norway, Greece, Lithuania, Spain; while the lowest level countries were: Montenegro, Slovenia, Latvia, Estonia. In 2021, Ukraine ranked 24th among 29 European countries in terms of fuel security that was 35%.

The key problems in ensuring Ukraine's fuel security include the following: low level of accessibility of crude hydrocarbons for indigenous production and of crude hydrocarbons for oil refining; low level of availability of crude hydrocarbons for oil refining and of availability of motor fuel for final consumption.

The carried out study allowed to determine that Ukraine, in comparison with European countries, has moderate deposits of crude oil and gas condensate, and in order to ensure fuel security, it is necessary to increase the production of crude hydrocarbons, increase the volume of crude oil refining for final consumption, and develop the production of synthetic motor fuel from coal.

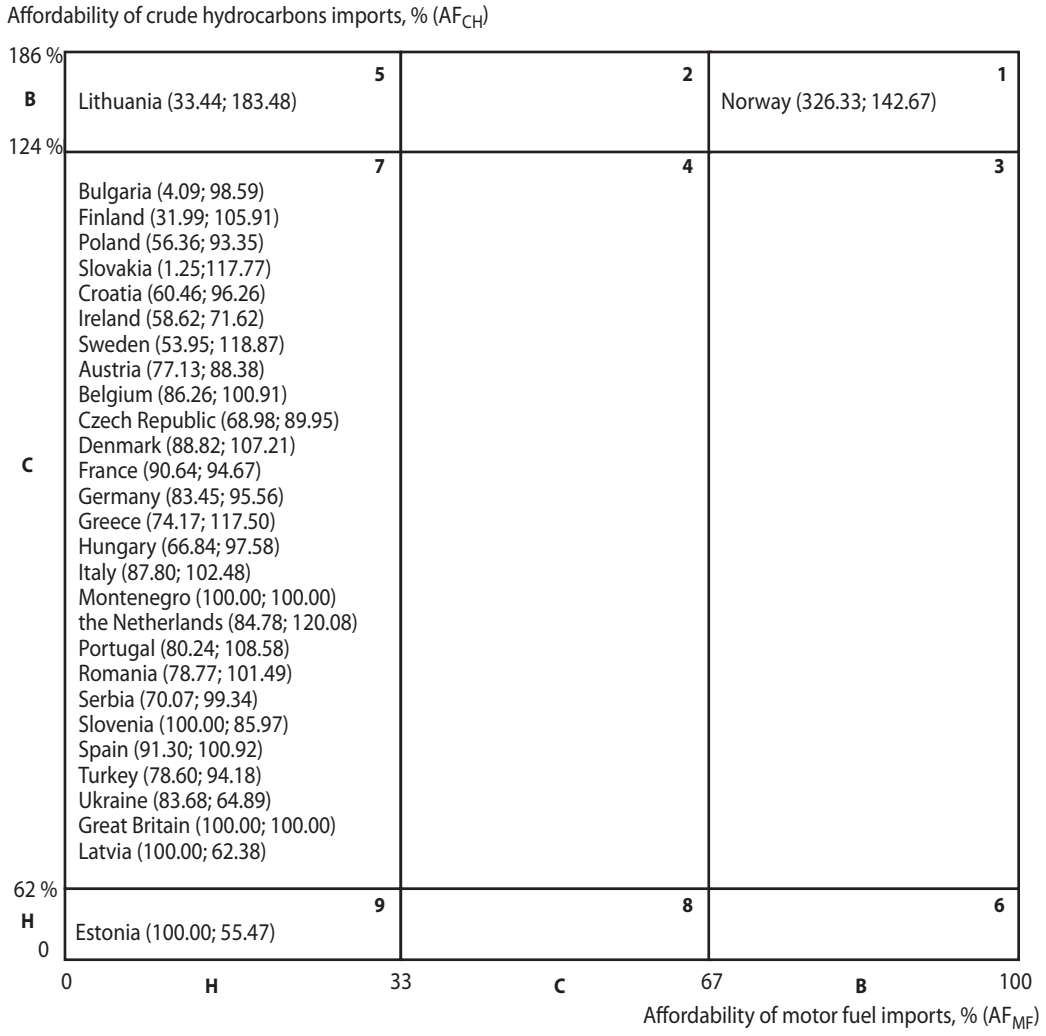

Fig. 4. The matrix of positioning of Ukraine and European countries in the plane of coordinates «Affordability of crude hydrocarbons imports – Affordability of motor fuel imports», in the year 2021

Source: *formed by the authors*

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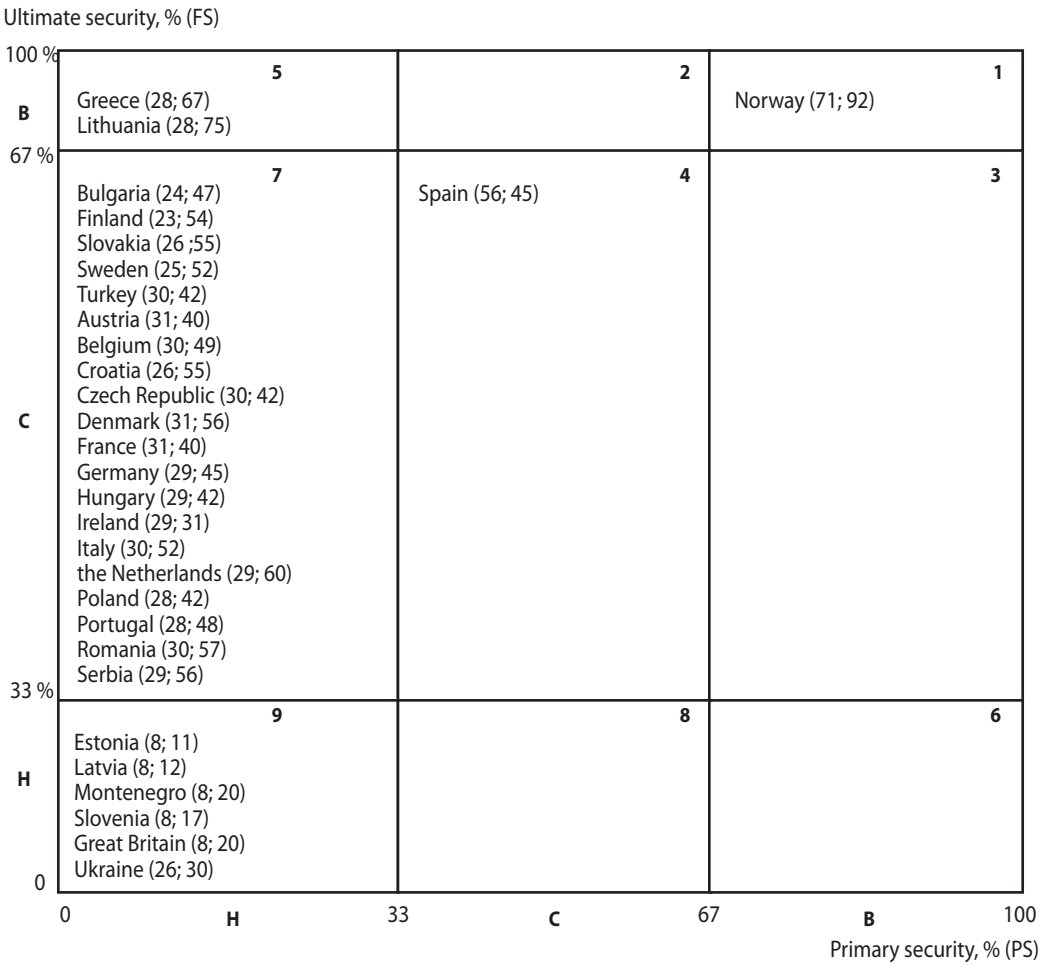

Fig. 5. The matrix of positioning of Ukraine and countries of the world in the plane of coordinates «Ultimate security – Primary security», in the year 2021

Source: formed by the authors

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Стаття надійшла до редакції 19.06.2024 р.

Статтю прийнято до публікації 10.07.2024 р.

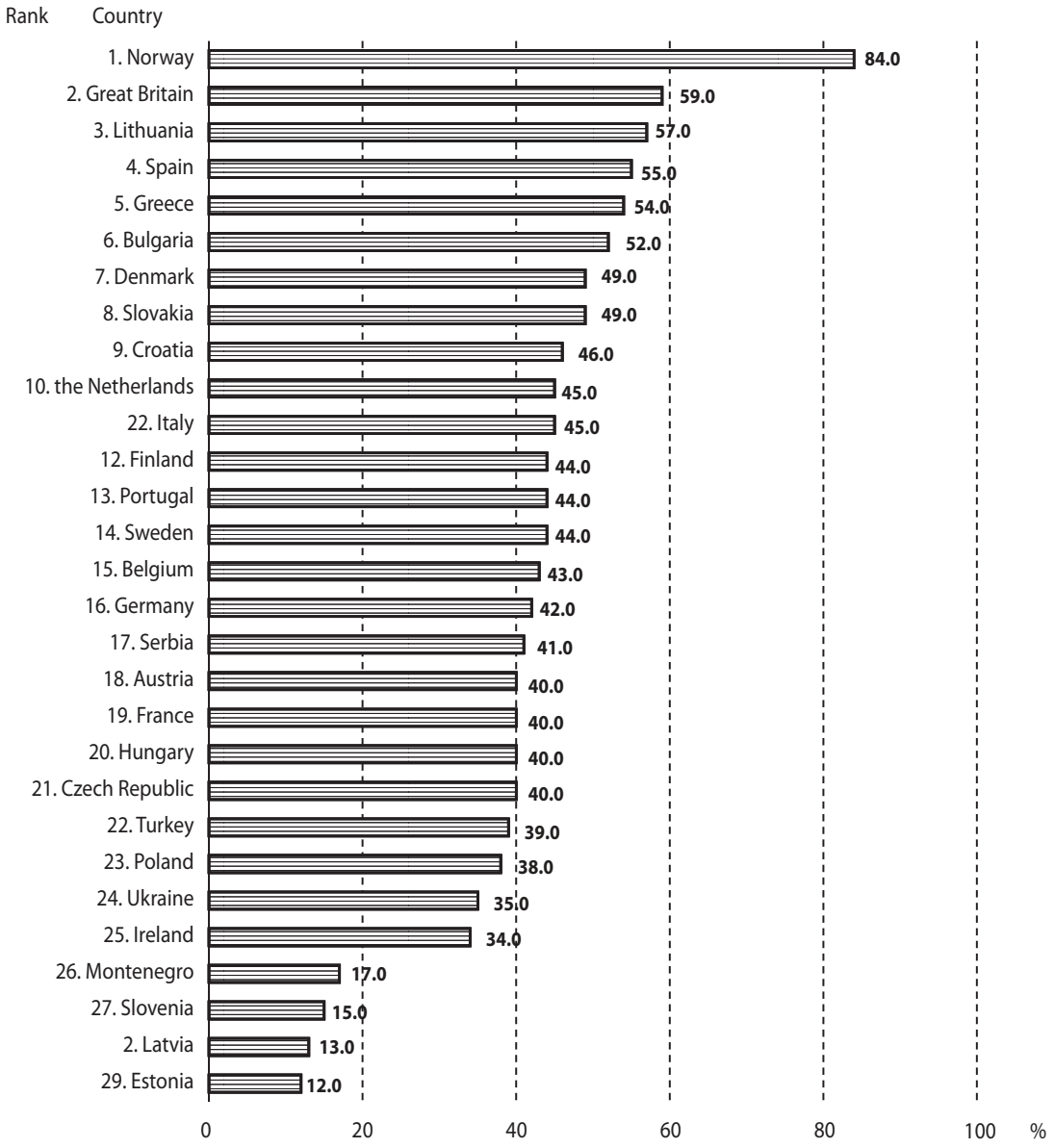

Fig. 6. The diagram of the distribution of Ukraine together with some other countries of the world by the level of fuel security in the year 2021

Source: formed by the authors

Table 1

The generalized characteristics of the results of the assessment of fuel security of Ukraine and European countries in the year 2021

Country	Components				Fuel security
	Accessibility	Availability	Acceptability	Affordability	
1	2	3	4	5	6
Austria	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Belgium	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Bulgaria	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Great Britain	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$H_{ACC_O} - H_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$H_{FS} - H_{PS}$
Greece	$H_{AC_{IP}} - H_{AC_R}$	$B_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$B_{FS} - H_{PS}$

End tbl. 1

1	2	3	4	5	6
Denmark	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Estonia	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$H_{ACC_O} - H_{ACC_{MF}}$	$H_{AF_{CH}} - H_{AF_{MF}}$	$H_{FS} - H_{PS}$
Ireland	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Spain	$H_{AC_{IP}} - B_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - C_{PS}$
Italy	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Latvia	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$H_{ACC_O} - H_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$H_{FS} - H_{PS}$
Lithuania	$H_{AC_{IP}} - H_{AC_R}$	$B_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$B_{AF_{CH}} - H_{AF_{MF}}$	$B_{FS} - H_{PS}$
the Netherlands	$H_{AC_{IP}} - H_{AC_R}$	$B_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Germany	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Norway	$B_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - B_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$B_{AF_{CH}} - B_{AF_{MF}}$	$B_{FS} - B_{PS}$
Poland	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Portugal	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Romania	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Serbia	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Slovakia	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Slovenia	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$H_{ACC_O} - H_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$H_{FS} - H_{PS}$
Turkey	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Hungary	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Ukraine	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$H_{FS} - H_{PS}$
Finland	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
France	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Croatia	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Czech Republic	$H A_{C_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$B_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$
Montenegro	$H_{AC_{IP}} - H_{AC_R}$	$H_{AV_R} - H_{AV_{FC}}$	$H_{ACC_O} - H_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$H_{FS} - H_{PS}$
Sweden	$H_{AC_{IP}} - H_{AC_R}$	$C_{AV_R} - H_{AV_{FC}}$	$C_{ACC_O} - B_{ACC_{MF}}$	$C_{AF_{CH}} - H_{AF_{MF}}$	$C_{FS} - H_{PS}$

Formed by the authors

where H – low level, C – medium level, B – high level