

ПЕРЕДУМОВИ ТА ПЕРСПЕКТИВИ РОЗВИТКУ ГАЗОВОГО ЕНЕРГЕТИЧНОГО ХАБУ В УКРАЇНІ НА ШЛЯХУ ДО ЄВРОІНТЕГРАЦІЇ

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Розглянуто передумови розвитку газового енергетичного хабу в Україні. Запропоновано класифікацію газових хабів відповідно до їхнього функціонального призначення та варіанти моделей газових ринків країн відповідно до розвитку ринкових відносин. Досліджено особливості системи українських підземних газових сховищ та споживання природного газу у країнах Європейського Союзу, ратифікації Третього енергетичного пакета в Україні. Визначено основні ознаки балансуєчого газового хабу.

Ключові слова: хаб, енергетичний хаб, газовий хаб, газовий ринок, види газових хабів.

PRECONDITIONS AND PROSPECTS OF GAS ENERGY HUB DEVELOPMENT IN UKRAINE TOWARDS EUROPEAN INTEGRATION

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The article considers the preconditions of gas energy hub in Ukraine. The classification of gas hubs according to their functional purpose and variants of gas markets models in accordance with the market relations development have been suggested. The peculiarities of Ukrainian underground gas storage system and natural gas consumption in the EU countries as well as the ratification of the Third Energy Package in Ukraine have been researched. The basic features of balancing gas hub have been determined.

Key words: hub, energy hub, gas hub, gas markets, types of gas hubs.

Problem formulation. The possibility of the energy gas hub creation in Ukraine has been actively discussed in political and academic circles during the previous year. Ukrainian government firmly believes that the creation of the hub will provide the country not only with "energetic independence" (lower prices for natural gas, development of shale gas production and trade), it can also be really helpful for the European Union (EU). This will prove the importance of Ukraine for the European Union to Europeans, since the issue of energy security is considered to be a top issue on the EU agenda. It should be noted that the current idea of gas and energy hub creation in Ukraine is not new, as far as the fact that Ukraine will be able to offer its underground gas storage (UGS) after the gas transit system (GTS) modernization as the basis for the new gas stock market has already been repeatedly declared. Deutsche Bank and German energy companies are willing to invest colossal funds (around 5-7 bln USD) in the modernization of Ukrainian GTS, but they are insufficient as compared to the funds needed for the bypass gas pipelines being built, constructed or just planned to be built. In addition, in September 2013, Ukraine is waiting for a credit line from the European Bank for Reconstruction and Development (EBRD) amounted to 326 million euros for the modernization of the GTS. The idea of the gas hub creation on the basis of Ukrainian GTS has been carried away in Ukraine and EU so that it was even included in the Association Agreement draft between Ukraine and the EU, which can be signed at the Eastern Partnership Summit in November 2013 in Vilnius. In order to offer European companies to keep gas in Ukrainian UGS, Ukrainian government intends to abolish export duty on gas and at the same time National Commission for the State Regulation of Energy (NCSRE) has increased tariffs for gas storage in the underground storage "Ukrtransgas" in 2,57 times, more than 4 times increase for gas injection and extraction from UGS and the

Cabinet of Ministers of Ukraine has decided to require gas injection into UGS from private Ukrainian gas producing companies that equals 50% of their volume of energy production in the preparation for the heating season (July – October 2013).

However, the way of what this hub is going to be as well as its main features and preconditions of formation in power engineering, that is one of the most specific and monopolized areas, still remain unclear.

Analysis of current research outputs and publications. The development of fuel and energy system of Ukraine and the European Union have been investigated and dealt upon by many authors throughout the world. Particularly, one can find the information about the processes of priorities formation of Ukrainian and EU energy strategies in [1,2]. Peculiarities of the development of gas markets have been developed in [3]. The usage of underground gas storage facilities and the establishments of Ukrainian gas hub have been thoroughly analyzed in [4].

It should be stressed that the level of energy markets liberalization usage reflects the actual concept of economics development and energy security of the countries. Accordingly, there is an increasing necessity for the implementation of technological innovations into traditional monopolized areas.

Article objectives. The objectives of the article are as follows:

- to analyze the condition and prospects of gas energy hubs;
- to examine the specificity of gas market organization.

Presentation of main materials. The term "hub" is rather frequently used in many areas and it means a node of any network. In transport it is a transport node with appropriate geographic location; in logistics – main node with a set of services, proper transport communication; in electric power engineering – a specialized place for power outlet [5]. The main function of a hub in gas industry is not just natural gas (as other energy sources) trade, as far as opposed to electricity, it can be stored and transported over long distances. Gas energy hubs are mainly based on the presence of considerably extensive gas pipelines and underground gas storage facilities.

Highly developed UGS are observed in the USA, while they are built in the U.S., Canada, UK, France, Germany, Netherlands, Italy and Japan. The capacities of Ukrainian underground gas storage system take the second place (after Russia) in Europe. The system provides injection and selection of more than 30 billion m³ of gas per season and consists of 13 underground gas storages, created in porous layers (two of them are based on water-bearing structures and 11 – on exhausted gas fields). Its total active equipped capaciousness amounts to 34.5 billion m³ and after the re-equipment of two UGS it will reach 38-39 billion m³. Seven UGS, more than half of efficient storages, possess active volume around 2 or more billion m³ each.

UGS system is divided into four territorial units: Western (Carpathian), Northern (Kyiv – area of Kyiv main gas pipeline system), Southern (Black Sea) – for the Southern Black Sea regions, the Crimea and part of the Dnieper regions; Donetsk – for Donetsk gas pipeline system.

Western system consisting of Bilche-Volytsk-Uhersko, Uhersko, Dashava, Oparsk and Bogorodchany UGS has been created along the main gas pipelines "Soyuz"(The Union), Urengoi-Pomary-Uzhgorod "Progress" Ivantsevychi-Dolyna, Kyiv-West of Ukraine, Dolyna-Uzhgorod, Ylets-Kremenchuk–Ananyiv-Bogorodchany. It guarantees the reliability of Russian or Central Asian gas transits to the European countries, gas supply to the Western regions of Ukraine and adjacent Moldova and Belarus, as well as the transit of Russian gas to the Balkans area.

Kyiv system consisting of Olyshivsk, Chervonopartyzansk, Solokhiv and Kehychivsk storages has one fundamental purpose – to provide a reliable gas supply to Kyiv and the metropolitan area. They are arranged in pairs within the gas supply system: Kehychivsk and Solokhivsk storages are connected to gas pipelines Shebelynka – Poltava – Kyiv and Yefremivka – Dykanka – Kyiv that are continued in the western direction through the gas pipeline system Kyiv – West of Ukraine; and Olyshivsk and Chervonopartyzansk storages are connected to the gas pipeline Kyiv – Bryansk, that is connected to the gas pipeline Tula – Shostka – Kyiv.

South Ukrainian system of underground gas storage is now under development and meanwhile its main purpose is to provide reliability for gas supply to the Black Sea and Dnieper regions as well as gas transits to Balkan countries is now insufficiently performed.

Donetsk system consisting of Krasnopopivsk and Verhunsks UGS fulfills the local task concerning reliability of gas supply to Donetsk gas pipeline system, particularly Krasnopopivsk UGS provides gas supply to the Lysychansk industrial hub consumers and Verhunsks UGS – to Luhansk consumers [4].

However, there is great need for Ukrainian gas market, with an annual consumption of 51 billion m³ of natural gas (2012), 40.2% (20.5 billion m³) of which is Domestic Production and respectively 59.8% (33 billion m³) is imported, to be reformed [6]. Competition procedures at energy markets are different in different countries. Simultaneously, there is a tendency to provide measures for enhancing competition among energy companies. In our opinion there are 4 main gas market models according to degree of relations liberalization.

Table 1

Gas market models of countries

Model	Essence
Single Customer Model	A specially created company buys all produced and imported into the country natural gas and simultaneously is the only wholesale natural gas trader to distribution companies and large consumers. Weakly developed gas infrastructure, a small scope of gas market, a limited number of participants and regulatory and legal framework
Single Customer Liberalized Model	A significant decrease in market share of Single Buyer due to the permission provided mostly to the large industrial consumers or to suppliers to conclude direct contracts in natural gas supply with independent producers at freely negotiated prices. Gas infrastructure is being developed; the number of participants and competition are rising.
Full-Scale Market Model	Mandatory pool is being formed through which all major producers and importers have to sell, and all suppliers – to buy natural gas. Effective regulation of natural monopolies; developed gas infrastructure, inefficient market structure
Balancing Market Model	The market participants have the freedom of choice between a combination of long-, medium- and short-term contracts and purchase of natural gas at balancing market, particularly by means of gas hubs development. Competitive pricing, active competition, effective market structures and regulatory and legal framework

Source: Personal elaboration

Today the EU demand for natural gas comprises about 500 billion cubic meters per year and it is predicted that it will increase by 20% in the upcoming years. As a result, Ukraine was to accede to the Protocol of the Treaty establishing the Energy Community as a strategic EU partner in connection with the transit of Russian gas in form of implementation of Directive 2003/55/EC concerning common rules for internal natural gas market functioning till January 1, 2012, as based on the principles of market liberalization:

1. Regardless market participants and regulator's authorities.
2. Equal access of the third parties to the transport and gas distribution system as well as to LNG-terminals on transparent commercial terms and under the regulator supervision.
3. The independence of system operators (companies/operators of transmission, storage and distribution of gas and LNG-terminals systems) that are responsible for managing, maintaining and developing of these systems, ensure safety, reliability, efficiency and interconnection of capacities as well as non-discriminatory access for all users.
4. The subdivision of vertically integrated companies into the companies of transmission and distribution, production and supply of natural gas.
5. Consumer protection: right to change supplier, transparent contract conditions, general information, dispute resolution mechanisms, etc.; determines appropriate level of protection of particularly vulnerable categories of users (e.g. to avoid cutoffs).

6. Exchange of information: system operators are obliged to provide other operators with the information necessary for the safe and efficient operation of related systems of natural gas transportation / distribution.

Basic gas market legislation should have been developed in Ukraine for the past 2 years for its full compliance with European standards. The government and NCSRE have made some progress in developing and implementing secondary legislation. However, market segmentation of suppliers and consumers along with regulated price maintenance lead to restriction of competition and access to new players which is not favourable for the reformation. Despite the announced plans, restructuring of NJSC “Naftogaz of Ukraine” is being held unsystematically and lacks transparency making it difficult to establish EU rules for the gas market liberalization. This proves that implementation of the Ukraine's commitments to Energy Community in this part has been partly implemented.

March 3, 2011, the so-called Third Energy Package has officially come into force in the EU that aims to create conditions for greater transparency at energy market as well as fair to all users, more secure, competitive and sustainable energy supply to the EU. Directive 2003/55/EC and Regulation 1775/2005 have been replaced by Directive 2009/73/EC and Regulation 715/2009 that set more ambitious goals for the EU countries concerning gas market liberalization. The new part of the package was Regulation 713/2009 on establishing the Agency for Cooperation of Energy Regulators (ACER).

In October 2011, it was decided to introduce most of the provisions of the Third Energy Package into legislation till January 1, 2015. Directive 2009/73/EC aims to create a fully functioning internal EU gas market and provides:

1. Complete separation of vertically integrated companies by ownership structure. EU gas market transition to the full independence of the transportation system operators was to take place on July 3, 2012.

2. An alternative model of liberalization. The Government of the EU member state may create gas transport system operator regardless the interests of production companies and suppliers along with the expansion of regulatory control mechanisms, such as gas hubs.

3. The independent status of gas transport systems operators.

4. The independence of gas storage systems operators.

5. Solidarity through bilateral and regional cooperation between the EU member states during crises in gas supply on market principles.

Regulation 715/2009 details the Regulation 1775/2005 on setting non-discriminatory rules for access conditions to gas transport systems, LNG-terminals and storages, taking into account special characteristics of national and regional markets:

- Harmonization, establishment of common mechanisms of network access, including transborder gas exchange.

- Further institutionalization through the network association of system operators ENTSOG.

- Operation expansion presupposes relevant requirements for operators of LNG-terminals and gas storages, in particular regarding third party access services, capacity allocation mechanisms and overload management.

- Transparency by means of regular and full disclosure of services provided along with technical data, prices, its methodology and structure [2].

The adaptation of Ukrainian legislation to the norms of the Third energy package is envisaged by the project of the updated Energy Strategy of Ukraine till 2030 and at the same time it gives Ukraine new prospects of entering the EU single gas market and provides the GTS development and is indefinitely postponed. For the previous 2 years the position of the Ukrainian government has been dramatically changed – from the restrain support to the actual refusal. Implementation of Ukraine's commitments to Energy Community in this part remains questionable.

Having taken into account the unique capacities of natural gas storage directly on the Western border, Ukraine is able to offer storage services and further gas transit to the European Union through the gas hub creation. In addition to existing gas storage facilities, Ukraine intends to double the UGS capacities that are managed by "Ukrtransgas" – from the current 32 billion m³ to 75 billion m³ and this means 38 billion cubic meters of increase. There is a possibility to increase storage capacities of the

operating UGS in Western Ukraine to 55 billion cubic meters and Kharkiv and Poltava regions are characterized with a "geological opportunity" to organize the storages of at least 10-20 billion m³ of gas, this may become a significant source of natural gas supply for Europe [7,8].

Pan-European gas market began to take shape at the regional level in 1998. Its potential gave way before the North American gas market and it appeared due to the necessity of establishing production, transportation, transit and import of natural gas from multiple sources in case of insufficient domestic production of energy resources (fig.1, fig.2).

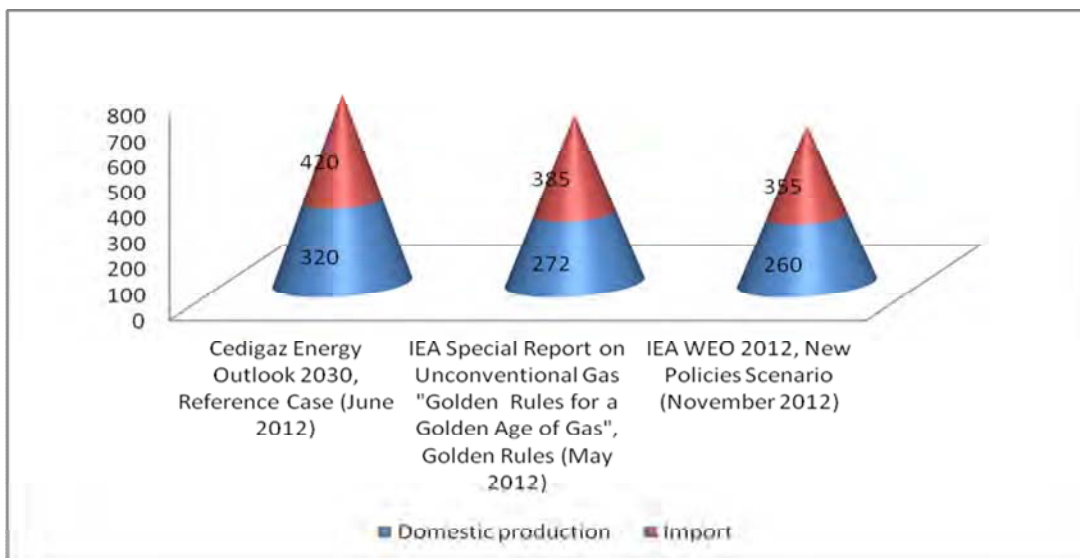


Fig.1. Prognosis of natural gas consumption in the EU in 2020 bln m³
Source: Personal elaboration on the basis of [1]

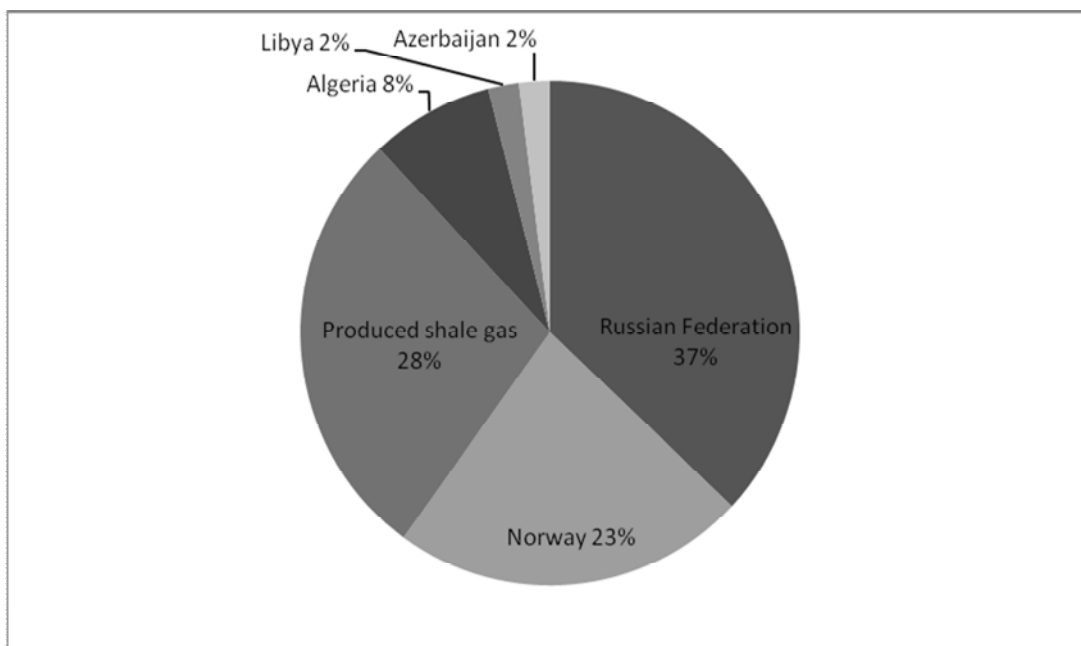


Fig.2. Predicted structure of natural gas supplies to the EU in 2020
Source: Personal elaboration on the basis of [1]

In 2010, gas trade in Europe was led by the UK's market (single EU balancing gas market) but today there is an active development of regional gas markets in continental Europe. Two groups of instruments are used at these markets – physical (direct transit, storage or sale of natural gas) and financial (futures, swaps).

Over the past 10 years Northwest regional European (NWE) gas markets have been rapidly evolving as a result of modern energy hubs being emerged (operational gas transit/storage centers/hubs) in the UK – NBP (National Balancing Point, 1996), Belgium – ZEE (Zeebrugge Platform, 2000), Holland – TTF (Title Transfer Facility) and Italy – PSV (Virtual Exchange Point, 2003), France – PEGs (Gas Exchange Point, 2004), Austria – CEGH (Central European Gas Hub, 2005); Germany – GPL and NCG (Gaspool, Net Connect Germany, 2009). The peak development of these energy facilities occurred during the last two winter periods: 2011-2012 and 2012-2013 years (Fig. 3).

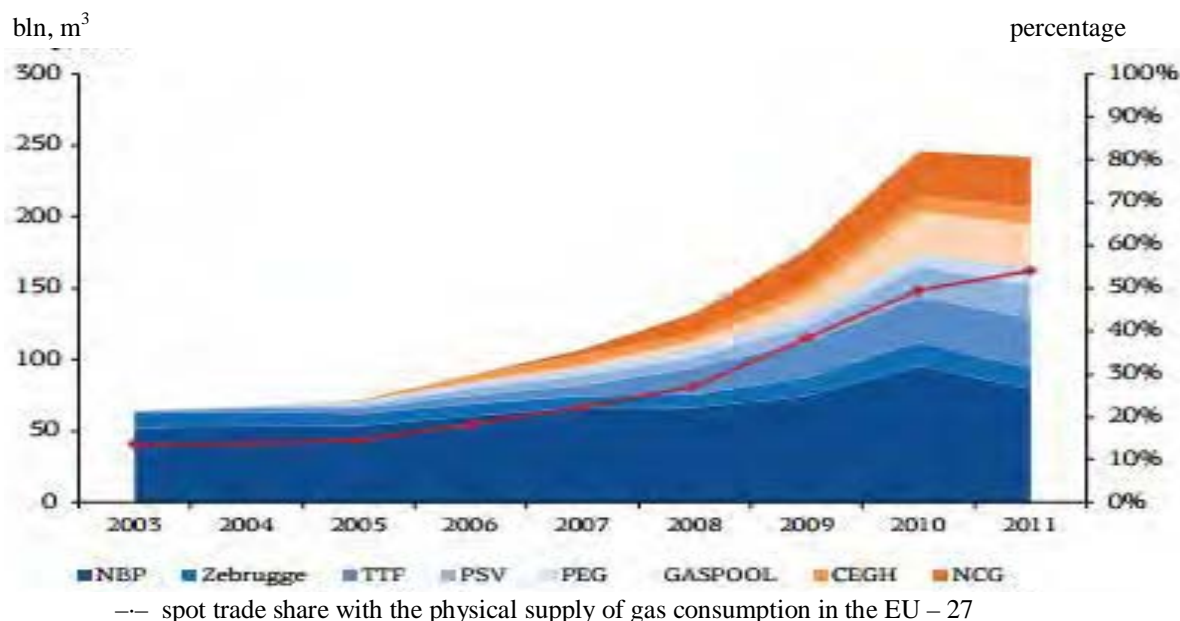


Fig.3. Rate of natural gas trade increase in the European gas hubs from 2005 to 2011 [6]

We believe that all gas energy hubs in Europe can be divided into three groups:

1. Trade – developed Centres/Hubs in form of virtual platforms where financial instrument trading takes place; they are connected with gas contracts (NBP, TTF).
2. Transit – Centres/Hubs in form of direct transit facilities – gas pipelines, gas storage facilities or individual spots where market participants may be able to sell gas, however, their primary task is to facilitate the transit of large amounts of gas (ZEE, CEGH).
3. Balancing – developing Centres/Hubs in form of virtual platforms where market prices for natural gas are being set for the corresponding national markets, practically they are balancing wholesale markets for suppliers and buyers of natural gas (GPL, NCG, PEGs, PSV).

The main European gas trading hubs are the UK's NBP and the Dutch TTF, conducting spot and derivatives trading on the Anglo-Dutch energy exchange (APX-Endex) and Intercontinental Exchange (ICE). Henry Hub (HH) has been effectively operating in Louisiana (USA). It brings together nine interstate and four intrastate gas pipelines as well as implements futures contracts trading on the New York Stock Exchange (NYMEX) and swaps on the Intercontinental Exchange (ICE). Prices, set in the hub, are considered to be basic for the North American natural gas market.

Conclusions and perspectives for further research. In our opinion key features of a successful long-term balancing gas hub should be as follows:

- market access (where biddings occur);
- a significant number of market participants;
- Financial Risk Management;
- balancing of gas supply regime and appropriate regional gas market;

- designed gas infrastructure;
- unified quality of gas;
- proper storage access;
- Electronic Data Interchange.

Electronic Data Interchange (EDI) at the European gas hubs meets the standard for the buying, selling, transporting and storage of gas Edigas, derived from the standard UN EDIFACT. North American companies are using EDI as based on the U.S. standard ANSI X.12. These standards should be unified in the future.

The formation of gas transit hub which is potentially able to cover 5-7% of the European Union needs in 2020 and at the same time to develop the country's energy security as well as to promote the shale gas development is the most promising and realistic for Ukraine. Thus, possibilities and prospects of shale gas production in Ukraine, LNG-terminals, and balanced energy supply of Ukrainian regions may become further directions of the research.

1. Захманн Г. *Енергетична стратегія ЄС та її наслідки для України*/ Захманн Г. [Електронний ресурс] // *Policy Briefing Series [PB/04/2011]*. – Режим доступу: // http://www.ier.com.ua/files/publications/Policy.../PB_04_2011_ukr.pdf. 2. *Україна і енергетичне співтовариство: два роки в очікуванні* [Електронний ресурс]. – Режим доступу: // <http://euinfocentre.rada.gov.ua/euinfocentre/doccatalog/document?id=48382>. 3. *Patrick Heather Continental European Gas Hubs: Are they fit for purpose?*. – *Oxford Institute for Energy Studies (Registered Charity, No. 286084)*. – 2012. 4. *Підземні сховища газу та їх роль в надійності транзитних поставок газу до Європи та газопостачання споживачів України* [Електронний ресурс] / НАК Нафтогаз України. – Режим доступу: <http://www.naftogaz.com/>. 5. *Вікіпедія* [Електронний ресурс]. – Режим доступу: <http://www.uk.wikipedia.org/>. 6. *Уніговський Л. Вхідження України в Європейський газовий ринок* [Електронний ресурс] / Програма розвитку Експертна рада з питань розвитку газової промисловості та ринку природного газу ТОВ “Нафтогазбудінформатика” / Уніговський Л.. – Режим доступу: <http://www.qclub.org.ua/wp-content/uploads/2013/06/>. 7. *Мацевич О. Энергетический хаб Европы. Зачем это нужно Украине?*/ *Мацевич О.* [Електронний ресурс]. – Режим доступу: <http://www.liga.net>. 8. *Логвинец В. Украинский энергетический хаб* / *Логвинец В.* [Електронний ресурс]. – Режим доступу: <http://odnarodyna.com.ua/content/ukrainskiy-energeticheskiy-hab>.