CEPCONSULT s.r.o. Together We Can

ENERGY PARTNER

CORPORATE MAGAZINE CEPCONSULT S.R.O. | # 2 DECEMBER 2019 - FEBRUARY 2020 |

THE DIGITAL ERA OF ENERGY

AS AN OPPORTUNITY AND A CHALLENGE

THE MAIN TOPIC

THE NEXT FIVE YEARS CAN BECOME EXTREMELY DYNAMIC FOR THE EUROPEAN ENERGY MARKET.

LOOKING DEEPER,

SEEING FURTHER AND OFFERING MORE

New views of the market of traditional energy resources (oil, natural gas, coal) in Europe, business analysis of EU energy policy in the scope of the "Clean Energy Package", business opportunities in Europe under the challenges of global climate policy, depreciation of the loan portfolio at the expense of "green" borrowings, forecast of business development in the conditions of geopolitical changes – are the services offered by Slovakian consulting company Cepconsult s.r.o.

Founded in April 2019 in Slovakia, Cepconsult s.r.o. put together a team of experts in the field of economics, energy, sustainable development issues and non-financial risks in a short period of time which allows the company to provide services on marketing, consulting, information and lobbying to companies interested in business in the European energy markets. In the long term, it is planned to develop a new direction - "business training and short-term business education". More information and the portfolio of consulting services can be found on the website: https://cepconsult.com.

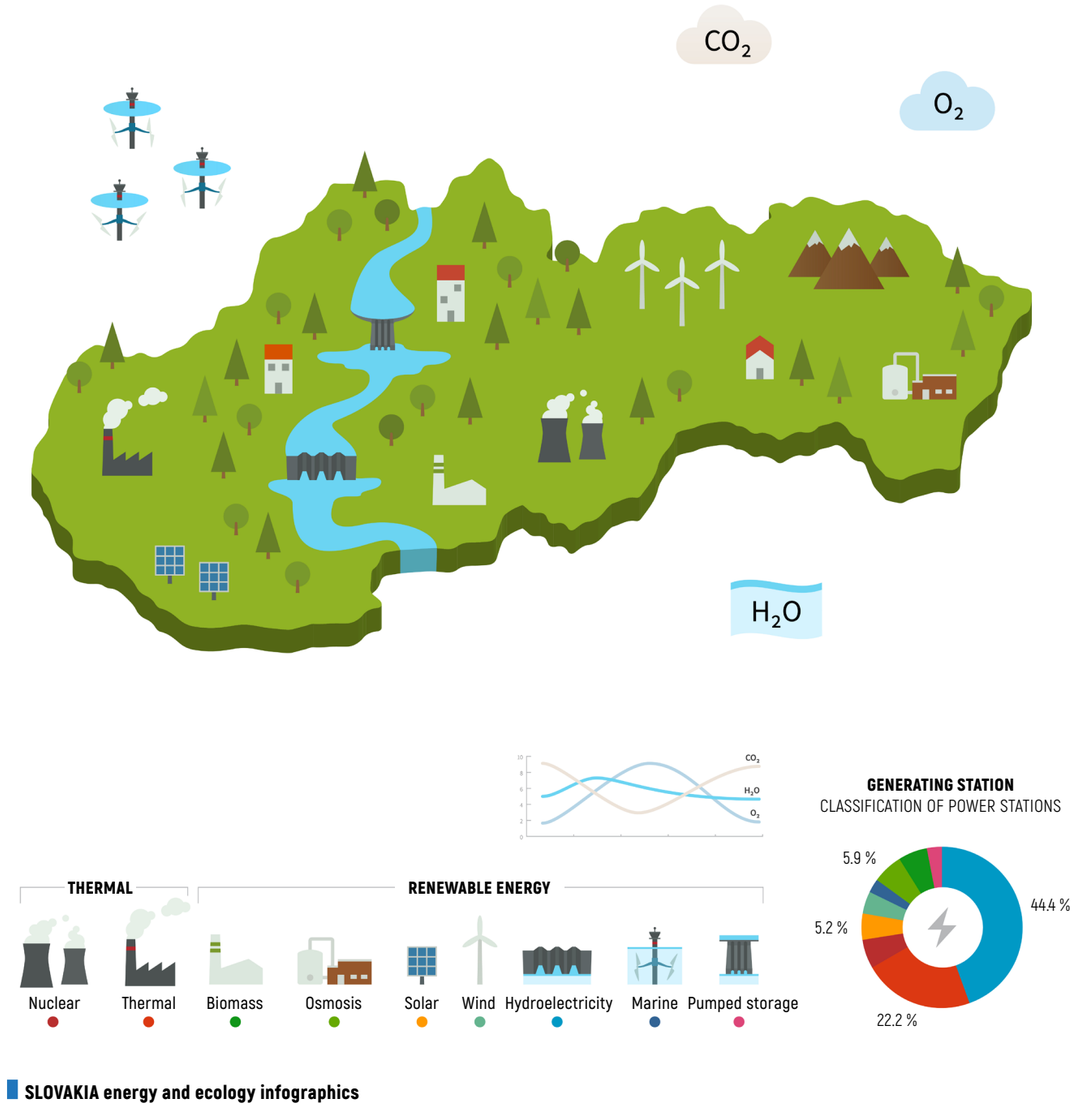
We are pleased to share our knowledge not only within professional community, but also on the pages of the corporate magazine "Energy Partner", the first issue of which examined the real level of US financial participation in the global "green economy", analyzed the issues of concerns of the gas distribution industry in Ukraine, reviewed markets promising for investment in renewable energy, considered the role of natural gas in relations between Russia and the European Union, etc. The magazine is available to our clients and partners in printed publications and online.

Cepconsult s.r.o. strives to become an attractive partner for companies operating in the European energy market by offering professional services regarding issues of energy and climate policy of the EU, relationships between key public and corporate actors, analysis and forecast of geopolitical, security and corporate risks and opportunities. We anticipate opening a representative office in Bratislava in the nearest time, where strategic interests of consumers, transistors and energy producers from traditional and alternative sources are crossed.

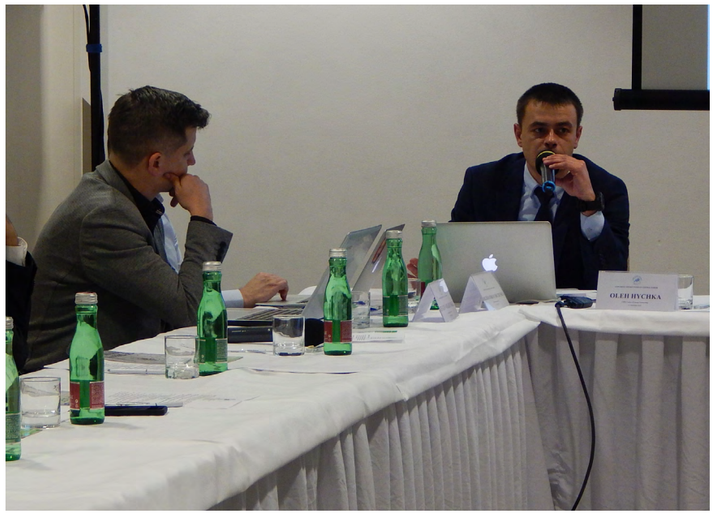
On November 15th, 2018 at the Morava conference hall of Austria Trend Hotel,Bratislava, our commercial project presented its portfolio of consulting services for the business community of Slovakia and other European countries in cooperation with Lithuanian consulting company UAB Centre of Energy Partnership (CEP). The purpose of the official presentation was to indicate the entry of the consulting agency into the Slovak consulting services market, to present the groundwork on the main directions of the company's competitive services, as well as to establish business contacts in the informal atmosphere of the reception.

The moment of entering the local and regional consulting services markets for Cepconsult is assessed as successful. In a welcoming address for the guests, Marian Me ko, the Honorary Consul of Lithuania in the Slovak Republic, noted the prospects of increasing interest of the business and government of Slovakia in consulting services in project management in energy, energy efficiency and non-financial risksin view of termination of the financial assistance period from the EU structural funds and financial institutions for Slovakia.

At the turn of 2019-2020, factors of



SLOVAKIA energy and ecology infographics

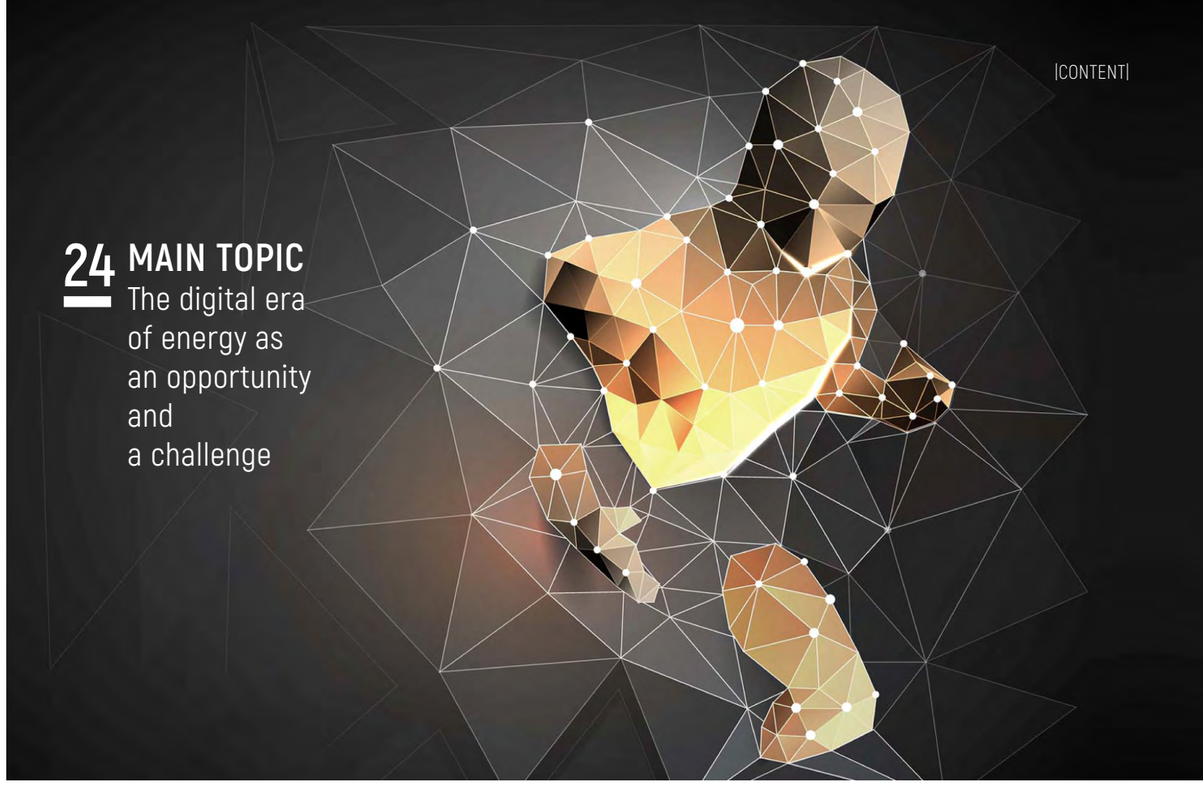


medium-sized business striving to work successfully in a changing environment in the European market. Cepconsult is willing to offer timely assessment of financial and professional capabilities, strengths of the company, attractive niche areas for development of company activities. Our company will undertake further support and provide timely information on possible new challenges for business resulting from changes in geopolitical realities or business conditions in a particular country. We research and adapt information about new opportunities for attracting financial resources at acceptable ratesto the needs of our customers; we offer unique cases for specific needs and always work according to an individual program.

instability in the global economy may intensify. At the European level, it is expected to reformat the transit routes for fossil fuels, to further promote increase of the role of renewable energy sources in the energy balance of the leading EU countries and strengthen responsibility of states for the impact on the environment. Adapting power market actors to the new operating conditions will require fresh ideas and creative approaches to solving professional problems in which Cepconsult team is ready to offer its services.

Due to a combination of knowledge and experience in the energy, finance, education and consulting sectors, Cepconsult has unique capabilities for a comprehensive analysis of the situation of both large companies, small and

We value each of our clients highly and strictly adhere to the corporate ethics of relationships, confidentiality and protection of rights in accordance with the requirements of European legislation. By combining our own knowledge and experience with the business ideas of our clients, we strive to achieve mutual benefit in accordance with the "win-win" principle and adhere to the approach embedded in our corporate slogan "Together we can".



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HEAD OF UKRAINIAN NGO

«SERGIY DRONOV HUMAN RIGHTS CENTER»

Sergiy Dronov, Doctor of Law

The applicants argued that Ukrainian Law No. 1540, which defines the legal status of the National Energy and Utilities Regulatory Commission (hereinafter referred to as NEURC), its objectives, functions, powers and the procedure of their implementation, violates the constitutional principles of separation of powers.

The Court concluded that the formation of a permanent independent state collegial body, which by its functionality, sphere of activity and powers has the characteristics of a central body of executive power (in particular, it forms and implements pricing and tariff policies in the field of energy and public utilities; participates in formation and implementation of state policy in the field of heat supply, centralized water supply and central sewerage; approves a typical agreement on the supply and distribution of natural gas) but is not subordinate to the Cabinet of Ministers of Ukraine and is not a part of the system of bodies of executive power, which does not comply with the Constitution of Ukraine.

In addition, by adopting Law No. 1540, according to which the Commission is a permanent independent state collegial body, the members of which are appointed and dismissed by the President of Ukraine, which is not provided for by the Constitution of Ukraine, Verkhovna Rada of Ukraine has gone beyond its constitutional powers and thus violated a number of provisions, in particular article 6, 19, 85, 92, 106 of the Constitution of Ukraine, since the system of state bodies, the name of state bodies, the order of their formation and functioning can be changed only by amending the Constitution of Ukraine and in order prescribed by the Constitution.

Thus, the Court declared unconstitutional the provisions of Law No. 1540 concerning the composition of the tender commission, its status as a regulator, its autonomy and independence, the guarantee of independence of its members and the formation of the tender commission for the selection of candidates for the posts of members of the NEURC.

These norms will cease to be effective from December 31, 2019, since the recognition of these norms being unconstitutional will cause substantial legal gaps in the legislation regarding the organization of the activity of the Commission, which may undermine its functioning and implementation of its tasks of state regulation in the energy and public utilities sector.

Therefore, the Constitutional Court of Ukraine found it necessary to delay the expiry of these provisions in order to bring the legislation into conformity with the requirements of the Constitution of Ukraine.

The new methodology stipulates that the payment for gas supply will be made in equal monthly installments. This will make the payment simple and predictable, as well as reduce the financial burden on the consumer in winter, as the consumer will make equal payments throughout the year. It should be noted that the formation of tariffs on the basis of capacity is provided by the Law of Ukraine "On the Natural Gas Market". Similar approaches to the payment of gas transportation are already applied at the market, for instance, by the state operator of gas transportation system "Ukrtransgaz".

The new tariff model will complete the process of separating the distribution service from the sale of gas itself as a commodity. The relevant steps are envisaged by the Law of Ukraine "On the Natural Gas Market" and are a part of the Third Energy Package of the European Commission, which Ukraine has committed to comply with in the framework of the implementation of the EU-Ukraine Association Agreement. The consumer will see how much he pays for the gas itself and for its delivery and will affect his expenses.

Equal payments throughout the year will allow gas distribution network operators to obtain the resource they need to maintain and modernize their networks. In turn, this will increase the safety and uninterrupted distribution of natural gas.

With the adoption of the new methodology, there will be an opportunity to direct funds for raising salaries for employees of gas companies. Once the tariffs have been approved, the employees of gas distribution network operators will be able to receive a salary of about UAH 13,500 per month, which amounts to the average salary in the industry.

At the same time, NEURC did not provide for up-to-date compensation for losses of gas distribution companies in the proposed tariffs. Last year alone, they suffered losses of more than UAH 4,5 billion. With the proposed rates of funding, losses will be compensated within more than 20 years.

> At the same time, four years in a row gas distribution network operators have required the NEURC to revise the tariff for natural gas distribution and to bring it to a cost-effective basis. On October 8, 2019, this issue started to be resolved. NEURC approved a new methodology for calculating gas supply tariffs for gas distribution network operators and approved the draft tariffsat its meeting. The transparent approach of formation of the cost is based on the capacity ordered by the consumer and will not depend on volumes of consumption.

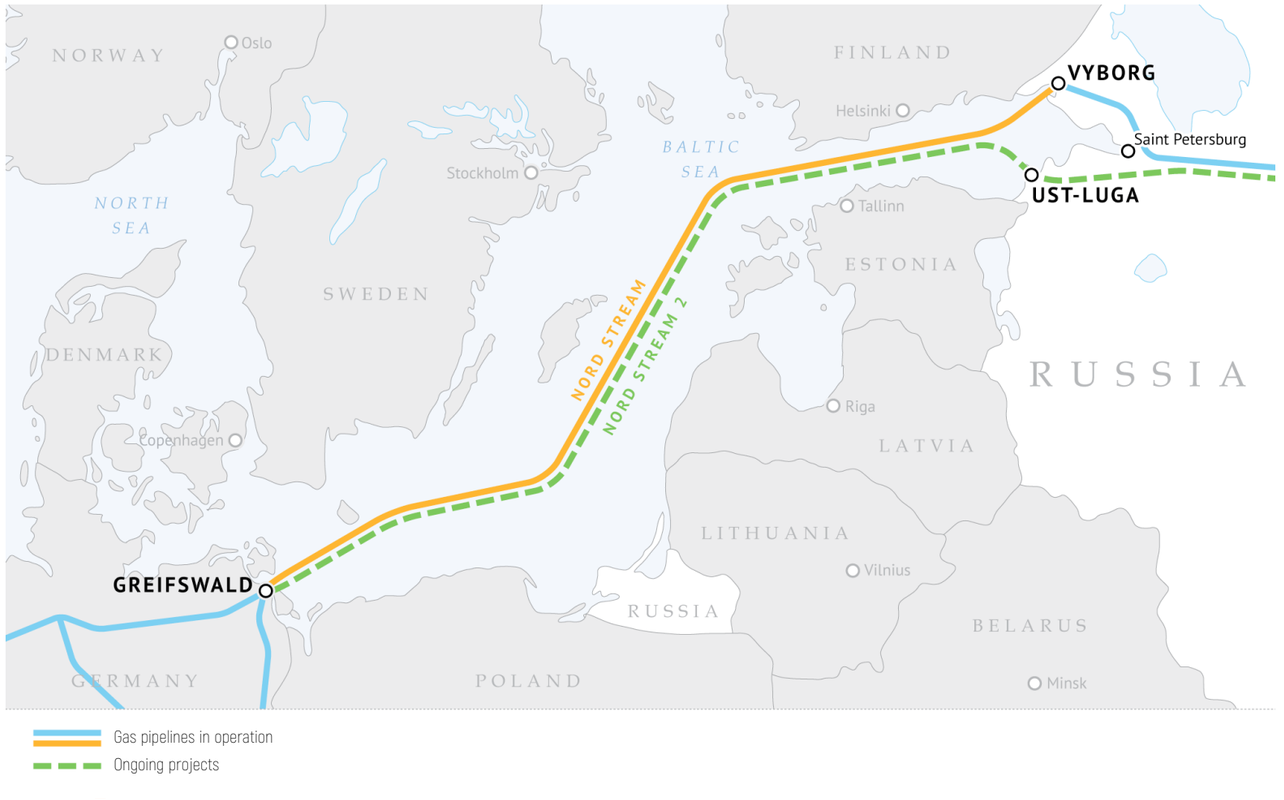
It is a car of the emergency dispatching service of JSC «Kyivoblgaz» with all the special equipment, driver Sergey, master Alexander and two locksmiths Yuri and Sergey. It is these teams that work around the clock on the calls, they are the ones that localize accidents and eliminate gas leaks.

> And here is the question. Does the aforementioned decision of the Constitutional Court of Ukraine not interfere with the approval of the long-awaited tariff for gas distribution network operators, since in early 2020 a new law on the NEURC should be adopted and a new composition of the Commission should be formed accordingly. One thing is for sure, the employees of gas distribution industry need more than ever a fair tariff, otherwise next year we won't be able to reach 104, as there won't be anyone to reply.

|GAS MARKETS|

GAS MARKETS IN CENTRAL AND SOUTH-EASTERN EUROPE

ARE ON THE PATH OF TRANSFORMATION



Nord Stream and Nord Stream 2 gas pipelines. | Source: gazprom.com.

DMYTRO MARUNYCH,
Co-chairman Energy Strategies Fund, Kiev

The countries of Central and South-Eastern Europe are important for both regional and international gas markets. The region is a major consumer and importer of natural gas – with gas consumption amounting to 72 billion cubic meters in 2017, which is 14% more than in 2010, and import of gas amounting to 60 billion cubic meters in 2017, which is 30% higher than in 2010. Taking into account Turkey, these figures reach 125 and 113 billion cubic meters respectively. The development of gas industry in the countries of Central and South-Eastern Europe until recently was associated with the supply of exclusively Russian gas. The Russian Federation (and earlier the USSR) provided the necessary level of gas consumption. However, later, due to economic and political reasons, as well as infrastructural restrictions, Eastern European countries began to actively develop new supply routes. At the same time, Russian "Gazprom" remains the main gas supplier in the region. Its share on average in recent years is about 70%.

The countries of Central and South-Eastern Europe play an important transit function, since they are located between the largest centers of gas production (Russia, Middle East) and gas consumption (Western Europe). The transit role of the region for Russian gas is likely to decrease due to the organization of direct supply by sea ("Nord Stream", "Nord Stream 2", "Turkish Stream"). At the same time, the transit role of the region for gas supplies from countries in Transcaucasia, Central Asia and the Middle East, on the contrary, tends to increase.

Assessment of the needs for natural gas of countries in the region

Gas demand in Central and South-Eastern Europe depends on the policies of individual countries, the European Union and the development of transport infrastructure enabling its imports. Experts of the "International Energy Agency", IEA and regional analysts in the long term expect an increase in gas consumption and imports to the countries of the region due to the implementation of EU legislation aimed at reducing CO2 emissions and environmental pollution. First of all it concerns the Czech Republic and Poland, the share of coal consumption in the energy balance of which remains quite significant. The increase in gas consumption is also explained by meeting the growing needs of the economies of the countries of Central and South-Eastern Europe (+ 2-3% per year by 2023, according to IMF forecasts).

According to the energy strategies of the countries of Central and South-Eastern Europe, the consumption of natural gas in the future until 2030 will be largely determined by the demand for gas from the thermal and electric power sectors. Under the influence of this factor, gas consumption is expected to increase in the Czech Republic (+ 7% for 2017–2030), Hungary (+ 10%). Last but not least, this determines the position of these countries in relation to Russia's "offshore" pipeline projects. At the same time, Poland does not expect consumption growth; consumption will constitute 20.2 billion cubic meters in 2030 in comparison with 20.1 billion cubic meters in 2017. Replacing electricity with gas for heating and domestic needs will determine the demand for gas in Bulgaria (+ 9% by 2030) and Serbia (+ 25% by 2030). Replacing coal with gas, especially in thermal power, will contribute to an increase in its consumption by 2030 by 15% in Slovakia.

The demand from the industrial sector will have a significant impact on the dynamics of gas consumption in a number of countries in Central and South-Eastern Europe. This factor will determine the volume of natural gas consumption in Romania, Turkey, Greece (an increase from 4.9 billion cubic meters in 2017 to more than 7 billion cubic meters by 2030) and Croatia, where an increase from 3 billion to 6 billion cubic meters is predicted .

Perspective gas production areas in the region

The development of natural gas production is among the priorities of the energy policy of a number of countries in Central and South-Eastern Europe. These include Bulgaria (development of offshore fields and shale gas), Poland (traditional deposits, coal gasification), and Romania (gas extraction at sea, intensification of onshore production).

At the same time, a significant increase in production should be expected only at offshore fields in Romania, where a number of transnational mining companies are implementing

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mining projects. Traditional gas extraction projects in Poland which were launched in the beginning of 2010's did not prove beneficial and, as of now, lost the support of all the major foreign players.

Competition among gas suppliers and the position of "Gazprom" in the region

The states of Central and South-Eastern Europe can be divided into 3 groups, depending on the declared and implemented policies in relation to "Gazprom" and gas imports from Russia.

At the same time, it is necessary to take into account the level of gas consumption in Central and South-Eastern Europe and the share of "Gazprom" in its provision (Table 1).

The first group includes countries such as Poland and Romania. The governments of these countries implement a fairly consistent policy on reduction of gas supplies from the Russian Federation and dependence on "Gazprom".

Thus, on November 8th, 2018, the authorities of Poland and the United States signed a declaration on expanding cooperation in the field of energy security. According to the Minister of Energy of Poland: "cooperation with the United States in the field of energy is of strategic importance for Poland."

At the same time, the Polish "PGNiG" concluded a long-term agreement with the "American Cheniere Marketing International". The document provides for deliveries to the LNG terminal in Poland in 2019-2022 about 0.73 billion cubic meters of gas after regasification, and about 3.9 billion cubic meters of gas in 2023-2024 after regasification. The total volume of supplies is 29.5 million tons of liquefied natural gas. LNG is also supplied as a part of a long-term contract with a volume of over 1 billion cubic meters per year from Qatar.

At the same time, "PGNiG" does not disclose the price of imported LNG, referring to sales within the company's portfolio. According to information from Polish sources, this price exceeds the price of pipeline gas, which Poland receives from the Russian Federation and other countries.

In November 2018, the Polish operator "Gaz-System" and the Danish "Energinet" made the final decision on building the "Baltic Pipe". The gas pipeline project will connect Poland and Denmark, and will subsequently provide connection to the Norwegian gas transmission network. This will allow transporting gas from Norway to Poland through Denmark. The projected gas pipeline capacity is 10 billion cubic meters of gas per year. As it is known, on January 23rd, 2019, Poland received confirmation of EUR 215 million financing for the construction of the "Baltic Pipe" from the EU budget.

Poland plans to replace gas imports from Russia with Norwegian gas after 2022, when the so-called "Yamalskyi" contract expires. "PGNiG" conducted a lengthy trial, accusing "Gazprom" of the unfair gas pricing formula.

Prospective directions for the development of the gas sector in Poland include: an increase in gas consumption in the electricity sector to cover peak loads and as a power reserve for wind power plants (WPP); import diversification; development of Poland's own gas extraction and production of gas by means of coal gasification; modernization of gas transmission system; expansion of the LNG receiving terminal; gas storage development. At the same time, at present, the characteristics of the Polish energy sector are complicated by the fact that the adoption of the new energy strategy of Poland until 2040 is being delayed.

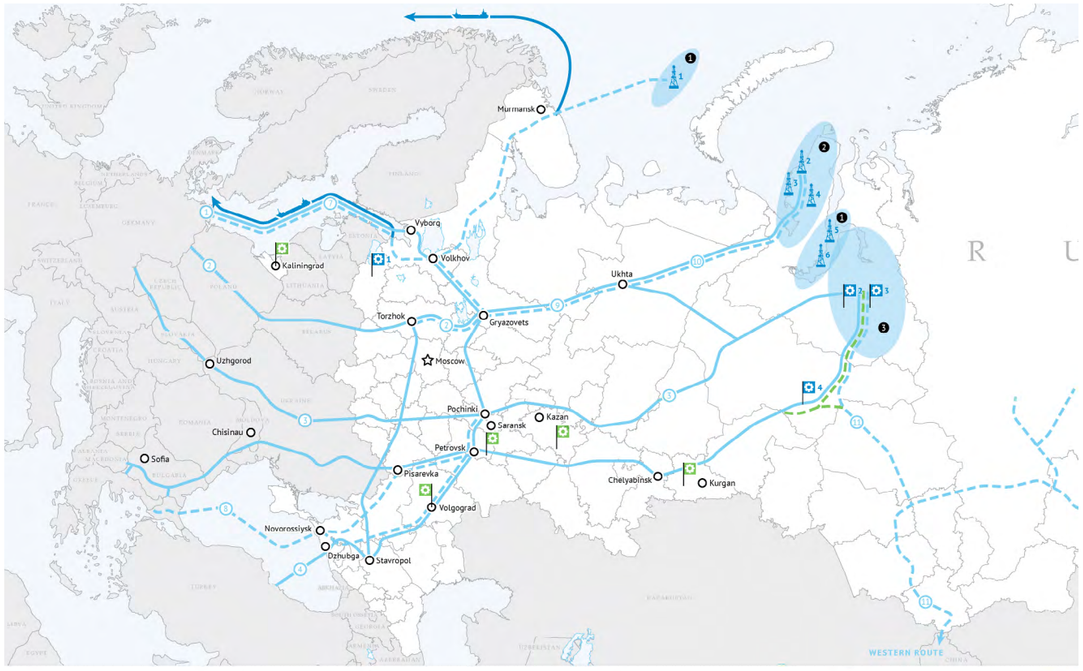
Romania managed to reduce gas imports from Russia due to the intensification of projects for the extraction of its own resource. Another factor was the decrease in industrial consumption after the closure of a large number of energy-intensive industries in the country. If in 2012 "Gazprom" supplied Romanian consumers with 2.9 billion cubic meters of gas, then in 2015 this volume was reduced to 0.3 billion cubic meters. Subsequently, the volume of imports from Russia increased again, since importers (WIEE — owned by "Gazprom" Schweiz AG, and Conef) offered consumers a resource at a price lower than the distributors of their own gas. As a result, in 2016, imports of "Gazprom's" resources amounted to 1.7 billion, and in 2017 — 1.4 billion cubic meters. However, in 2018 it again fell to about 1 billion cubic meters.

In the near future, Bucharest expects not only to reject from imports, but also to increase gas exports by launching a number of offshore production projects. At the same time, according to Romanian legislation, investors in energy projects will be able to export with ongoing plans just over 3 billion cubic meters per year, which does not prevent officials from announcing superior export plans. Thus, on February 6th, 2018, the Romanian Foreign Ministry announced that Romania had reached a preliminary agreement with Hungary on annual supplies of 1.75 billion cubic meters of gas starting from 2020, which should increase to 4.4 billion cubic meters since 2022.

In conclusion, it should be noted that it was Bucharest that submitted for consideration of the EU governing bodies amendments to the "gas directive" in the wording, which proposed issuing exemptions for projects from third countries exclusively by the European Commission. However, in the text of the amendments that was finally agreed upon under the pressure of Germany, this right was granted to the EU state,

STATE	GAS CONSUMPTION IN 2016, BILLION CUBIC METERS	IMPORT OF GAS FROM THE RUSSIAN FEDERATION IN 2016, BILLION CUBIC METERS	THE SHARE OF IMPORTS FROM THE RUSSIAN FEDERATION IN CONSUMPTION,%
BULGARIA	3,2	3,2	100
BOSNIA AND HERZEGOVINA	0,2	0,2	100
HUNGARY	10,1	5,7	56,4
GREECE	4,1	2,7	65,9
POLAND	19,0	11,1	57,9
ROMANIA	11,3	1,7	15
SERBIA	2,4	1,9	79,2
SLOVAKIA	4,7	3,7	78,7
SLOVENIA	0,9	0,5	55,5
TURKEY	46,4	24,8	53,4
CROATIA	2,6	0,8	30,8
CZECH	8,5	3,1	36,5

Table 1. Gas consumption in Central and South-Eastern Europe and the share of "Gazprom" in ensuring consumption



Gazprom Group's gas business development. Source: gazprom.com. | Source: gazprom.com.

|GAS MARKETS|

Construction of "Turkish Stream" gas pipeline. | Source: gazprom.com.

on the territory of which the first point of connection of the gas pipeline from a third country to the gas transmission system of the EU member state is located. In fact, this can be regarded as success of the lobbyists of the "Nord Stream 2" gas pipeline project.

One of the most important goals of the state policy of all countries of Central and South-Eastern Europe in the gas sector is to ensure their energy security, including by means of diversification of sources and routes of supply of natural gas, which is caused by high dependence of these countries on gas imports. Thus, diversification of gas supplies to Turkey and Bulgaria can be reached by purchasing gas from Algeria, Egypt, Iraq, Qatar, the United Arab Emirates, Oman, Turkmenistan, the countries of the Eastern Mediterranean, the Caspian region and Africa. This will also be facilitated by the construction of new and increased throughput capacity of existing interconnectors with neighboring countries, which is one of the priorities of the energy policy of Bulgaria, Bosnia and Herzegovina, Hungary, Slovakia and the Czech Republic. Hungary and the Czech Republic are also considering the possibility of gas supplies from LNG terminals in Poland, Croatia, Slovenia and northern Italy, while Bulgaria and Hungary are participating in the "Southern Gas Corridor" project.

Thus, in July 2017, Hungary, Bulgaria, Romania and Greece signed a memorandum of understanding within the framework of the "Vertical Gas Corridor" project, which is aimed to connect the gas transmission networks of these countries. The possibility of connecting to both the "Turkish Stream" gas pipeline and the alternative "TANAP" gas pipeline is being considered. At the same time, Bucharest is promoting the "BRUA" gas pipeline project (Bulgaria-Romania-Hungary-Austria), which should ensure supplies from gas fields on the shelf and in the deep-water part of the Black Sea to Austria via Romania, Bulgaria and Hungary by 2020.

There are factors that can cause tangible changes in the structure of gas supplies to the region, and lead to a decrease in "Gazprom's" presence.

Development of alternative pipeline gas supply routes

Azerbaijan, and later on — countries of Central Asia (Turkmenistan), as well as Iran can become new sources of gas imports. In 2018, the "TANAP" gas pipeline with a capacity of 16 billion cubic meters was commissioned, which connected the west coast of Turkey with Azerbaijan through Georgia. Currently, its continuation — the "TAP gas pipeline" (10 billion cubic meters per year) is being implemented in Europe and will connect Turkey with Italy through Greece and Albania. Supplies are scheduled for 2020, and increase of the capacity of "TANAP" to 23 billion cubic meters per year is expected by 2023.

Growth of LNG imports and gas transportation to continental countries

One of the priorities of the gas industry development in almost all maritime countries of Central and South-Eastern Europe is the construction of LNG terminals to supply gas to the domestic market and to neighboring countries (for example, projects in Croatia, Greece, Albania). The implementation of most of these projects is hampered due to the lack of investors. An example of the successful development of LNG infrastructure is Turkey, which in 2016 and 2018 put into operation two LNG terminals with a total capacity of 12 billion cubic meters per year, and another one is scheduled to launch in 2019.

The development of LNG infrastructure, the emergence of new suppliers of pipeline gas leads to increased competition with Russian gas in the countries of Central and Southeastern Europe. However, in the period up to 2030, gas consumption in the region as a whole is expected to grow by 15-20 billion cubic meters per year (in accordance with the forecasts of countries), which should be provided almost entirely by increasing imports. There is no doubt that the construction of LNG terminals can provide the required amount of resources, however, the sources of funding for these projects are not identified. As for the possibilities of a significant increase in the supply of pipeline gas within the "Southern Gas Corridor", in the next few years the volumes will be limited to 10 billion cubic meters per year ("TAP" gas pipeline), some of which will be sent to Italy, and the prospects for expanding this route depend on the availability of natural gas production capacity in Azerbaijan and the attraction of new countries to the project.

THUS, THE EXPECTED GROWTH IN GAS CONSUMPTION IN THE COUNTRIES OF EASTERN EUROPE OPENS UP PROSPECTS FOR "GAZPROM" TO MAINTAIN THE CURRENT SUPPLY VOLUME, OR EVEN INCREASE IN THEIR VOLUME IN CERTAIN CASES.

Bulgaria, Serbia and Hungary can be attributed to **the second conditional group** of countries of Central and South-Eastern Europe in relation to Russian gas supplies. As mentioned above, Russia is the largest gas supplier to the region. In a number of countries (Serbia, Bosnia and Herzegovina), Russian gas provides up to 100% of its consumption. In general, these countries are loyal to the expansion of "Gazprom's" presence in the region and intend to take an active part in the implementation of projects to expand the national gas pipeline networks.

First of all, we are referring in particular to the extension of the "Turkish Stream" gas pipeline route. Reports from Bulgarian official sources indicate a high likelihood that Russian gas from the "Turkish Stream" will flow through the EU's territory exactly by means of the so-called "Eastern route". State gas transmission operator "Bulgartransgaz" on January 31st, 2019 announced the final investment decision to expand the national network of gas pipelines from the border with Turkey to the border with Serbia. The project cost is EUR 1.4 billion. Proposals for the purchase of 100% of the gas from this pipeline have already been submitted by two bidders.

Preliminary distribution of gas from the second (European) branch of the "Turkish Stream" involves the supply of 3.5 billion cubic meters to Bulgaria, 2.5 billion cubic meters — to Serbia, 6 billion cubic meters — to Hungary. The remaining 3.75 billion cubic meters can be transported to Slovakia and Austria to the CEGH gas hub in Baumgarten.

The policy of expanding cooperation with "Gazprom" is also implemented by the leadership of Hungary. Thus, in the course of negotiations on September 18, 2018, Hungarian Prime Minister Viktor Orban suggested to Vladimir Putin to consider the extension of the "Turkish Stream" gas pipeline to Hungary. This is an obvious step towards Russian plans to increase the volume of gas supplies to Europe.

The third conditional group can be attributed to states with access to the sea, such as Croatia and Greece. In addition to expanding the supply of pipeline gas from available sources, including from the resources of "Gazprom", they are trying to implement projects for the construction of LNG terminals.

It should be noted that not all such projects are progressing successfully. In May 2018, Croatia once again lowered the estimated capacity of the LNG terminal on the island of Krk from 4-6 million tons per year to 2.6 million tons of LNG at the first stage. Project company LNG Hrvatska d.o.o. cancelled a previously announced tender for the supply of a floating regasification vessel and announced a new one for the supply of a vessel "with smaller capacity". According to Croatian media, the reason was that the LNG Hrvatska operator has no guarantee of loading the terminal in the form of binding bids for capacity. Only in January 2019, the operator announced the final investment decision on the project. At the same time, the confirmed reservation volumes of the future LNG terminal capacities amounted to only 520 million cubic meters per year.

Greece seeks to become a regional maritime link and distribution hub for LNG supplies in the Eastern Mediterranean by implementing a joint project with the EU, the "Poseidon Med II", worth EUR 53.3 million. The project started in June 2015 and should be completed in late 2020. The project involves terminals in six ports: Venice in Italy, Piraeus, Patra, Heraklion and Igoumenitsa in Greece and Limassol in Cyprus. The project also includes LNG terminal on Revitus Island, near Athens.

"Gazprom" repeatedly stated that the model of work on the European market, which is focused on supplies to the final consumer, is outdated. Apparently, Moscow learned a lesson from the negative experience, when in 2014 the construction of the "South Stream", which had already begun, was sustained. "Gazprom" adjusted the gas supply scheme in such a way that only local operators will be responsible for

Gas transmission across Serbia. | Source: gazprom.com.

Construction of offshore section of "Nord Stream 2" gas pipeline. | Source: gazprom.com.

the construction and transit of gas in the future and the Russian side will provide necessary support.

An antitrust investigation against "Gazprom", which was conducted by the European Commission from 2012 to 2018, also played its role. The reason was the accusation put forward to the Russian company in manipulating the European gas market by Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Hungary and Bulgaria. The plaintiffs argued that by controlling gas flows and barring its re-export, "Gazprom" artificially divided the markets and used this to establish unfairly high gas prices. "Gazprom" was threatened with a substantial fine — up to 10% of the total turnover. As a result, "Gazprom" made concessions, and the European Commission responded by closing the investigation in May2018. "Gazprom" excluded provisions on resale of gas restriction from contracts with the listed countries. The agreement also enabled consumers in Central and Eastern Europe to revise contract prices if they are too much different from quotations on gas hubs. Another condition was the provision of operations between the isolated gas markets of Bulgaria, Estonia, Latvia and Lithuania with the neighboring markets of the EU, including by means of virtual reverse.

However, in the EU there were those dissatisfied with the result of the proceedings. On October 15th, 2018, the Polish state-owned company "PGNiG" appealed to the European Court against the decision of the European Commission. Poland believes that "Gazprom" did not bear the deserved punishment for abuse of a dominant position and continues to artificially inflate gas prices.

SUMMARY

Currently, the largest gas projects in the countries of Eastern Europe are being implemented with the aim of diversifying the sources of gas imports – through the development of new pipeline gas supply routes and LNG infrastructure in maritime countries. At the same time, the growth in gas demand in Eastern Europe will be limited in the future until 2030, which indicates the development of gas transportation infrastructure, primarily with the aim of increasing the reliability of supplies and ensuring gas transit to Western European countries. "Gazprom's" positions on the markets of Eastern European countries will remain high owing to the traditional partners of a Russian company. Under certain scenarios, "Gazprom" may increase its presence in these markets.

FUTURE OF GAS INFRASTRUCTURE

IN CENTRAL EASTERN AND SOUTH EASTERN EUROPE

Following the releasing of the System Development Map 2017/2018 which presents existing infrastructure & capacity and planned infrastructure from the perspective of the year 2018 by ENTSOG www.entsog.eu and GIE www.gie.eu, CEP-team proposes editorial comment on it:

Expansion of gas infrastructure in the EU is coordinated through ENTSO-E and realized in most cases through co-financing. Therefore, respective gas TSOs prepare and submit proposals for the list of Projects of Common Interest (PCI) to the Connecting Europe Facility (CEF) – a special program of the EU for supporting single gas market connectivity.

There are four infrastructure corridors identified as priority by the Trans-European Networks for Energy (TEN-E), which require urgent infrastructure development in gas in order to limit energy isolation within European gas markets, improve security of supply and provide for alternative supply and transit routes and sources of gas.

Work on PCIs is coordinated by Regional Groups, established to propose and assess candidate projects of common interest, which contribute to achieving EU's energy and climate policy objectives a lot. Gas infrastructure in Central and Eastern Europe is subject to regulation by several Regional Groups, namely North-South gas interconnections in Central Eastern and South Eastern Europe (NSI East Gas), Southern Gas Corridor (SGC) and Baltic Energy Market Interconnection Plan in gas (BEMIP Gas).

CEF is one of the most important instruments for implementation of gas interconnection projects within the EU, as it provides up to 75% of financial sources. Most of EU Member States are reluctant to spend own money on interconnections and usually wait until the respective decision on support comes from CEF. From the very recent decisions of the European Commission, the following gas infrastructure projects were supported:

- CyprusGas2EU project will receive EUR 101 million that should cease isolation of Cyprus from European gas market;
- Malta-Italy Gas Interconnection will be supported by EUR 3,7 million to conduct a study on interconnection between Italy and Malta in order to establish gas infrastructure towards this island;
- STEP project will co-finance a study on the permit-granting process with EUR 1, 7 million for the purpose of creating a new gas interconnection point between France and Spain to increase the bidirectional gas flows and unlock LNG terminals for more gas imports.

During 2018, new rules, methodologies and approaches

|GAS MARKETS|

|GAS MARKETS|

UNITED KINGDOM

FRANCE

BELGIUM

THE NETHERLANDS

GERMANY

LUX.

DENMARK

POLAND

BELARUS

LATVIA

LITHUANIA

RUSSIA

CZECH REPUBLIC

SLOVAKIA

UKRAINE

MOLDOVA

ROMANIA

HUNGARY

AUSTRIA

SWITZERLAND

ITALY

SLOVENIA

CROATIA

BOSNIA HERZEGOVINA

SERBIA

MONTENEGRO

KOSOVO

BULGARIA

GREECE

ALBANIA

TURKEY

CORSICA

SARDINIA

MALLORCA

MENORCA

IBIZA

Baltic Sea

Ligurian Sea

Gulf of Lion

Adriatic Sea

Tyrrhenian Sea

Balearic Sea

Aegean

English Channel

Irish Sea

CORPORATE MAGAZINE Cepconsult s.r.o.

EP #2, Decemder 2019-February 2020

were developed by respective gas Regional Groups and in March 2019 they should be adopted. Simultaneously, consultations on the new PCI list of gas projects have taken place along with preliminary agreed list of projects, published in February 2019. Regional Groups should then work on the list according to approved methodologies and select respective priority projects. Respective proposals should be then transferred to the European Commission and proceed until the final decision in a form of a regulation, supported also by European Parliament and the EU Council is made. Under the best scenario, the so-called forth PCI list is expected to be approved by the end of May 2019.

In March 2019, the European Commission supported the decision on providing another EUR 750 million for CEF financing of PCI under the competitive call of proposals, which will end in middle June and final decision is expected by September. So far it is hard to predict which gas interconnections might gain financial support. However, some activities, undertaken by Member States, will at least facilitate decision making process to their favor. For instance, Poland and Baltic states, which also have the most vulnerable situation with regard to ensuring gas security, are very active. Preliminary list of PCIs for gas infrastructure also indicates several options with urgent deadlines in 2020 for some projects in Balkan region, in particular, Croatia, thus increasing options for financial support.

Poland is pushing for realization of the Baltic pipe to gain access to Norwegian gas via Denmark. Together with the later they are ready to co-finance the construction and recently submitted an application to the Swedish Government for a permit for the pipeline's routing through Sweden's exclusive economic zone.

Given the above, prospects of realization of new gas interconnections in the CEE region is rather moderate, as most of Member States would prefer to wait on co-financing from third parties. This creates unique opportunities for Russia to be engaged at least in SGC Regional Group activities. This could offer financial support to construct interconnections, which would allow Russian gas from Turkish stream to flow up to Austria through the territories of Bulgaria, Serbia and Hungary.

KEYS

Countries
- ENTSOG Member Countries
- ENTSOG Associated Partner
- ENTSOG Observers
- Other Countries

Transport by pipeline
- uder 24»
- 24» to 36»
- 36» and over
- project

Gas Reserve areas
- gas field
- drilling platform

Gas storage facilities
- Acquifer
- Salt cavity - cavern
- Depleted (Gas field) on shore/offshore
- Other type
- Unknown
- Gas storage *projects*
- Etzel* multiple storage facilities operated by different SSOs

Map points
- Trading Points/Market Areas
- Intra-country or intra balancing zone points
- Cross-border interconnection point within Europe or export point to non-EU country
- Cross-border interconnection point with third country (import)
- LNG Terminals' entry point intro transmission system
- LNG Export Terminal
- Small scale LNG liquefaction facilities
- Third country cross-border interconnection point
- Cross-Border Europe *Under construction or Planned*
- Cross-Border third country import/ export *Under construction or Planned*
- LNG Import terminal *Under construction or Planned*
- LNG Export terminal *Under construction or Planned*
- Small scale LNG liquefaction facilities *Under construction or Planned*

Data keys
- NATIONAL PRODUCTION
- RUSSIA
- NORWAY
- ALGERIA
- LIBYA
- UGS
- LNG

BELARUS NUCLEAR POWER PLANT "BELNPP", ITS PROSPECTS AND CHALLENGES FOR THE COUNTRY

KOST BONDARENKO, one of the leading political scientists in Eastern Europe, historian and publicist, prepared a paper on interconnection of energy and politics based on the «BelNPP» project exclusively for EP # 2, 2019

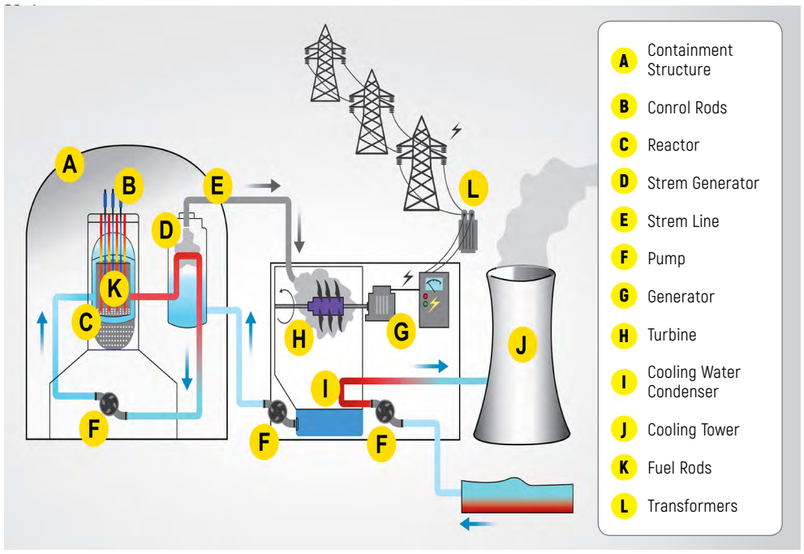
Debates around the efficiency, and most importantly - the safety of the project on a new nuclear power plant construction in Belarus, better known as "BelNPP", started in the late 70s, when the idea of a new nuclear power plant construction was submitted for public discussion.

In the early 80s, there was a significant increase in electricity demand in the Baltic region, which actualized the concerns of construction of a new nuclear power plant. Despite the high productivity outputs two power units of Ignalina Nuclear Power Plant, located on the territory of Lithuania, near the Belarusian border, (at the time of operation of two reactors, Ignalina NPP produced approximately 70% of electricity consumed in Lithuania) and a large margin of operational life (according to technical specifications – until 2032), could not cope with the rapidly growing consumer demand. At the same time, construction of

|ELECTRICITY MARKETS|

Minsk thermal power plant was started near Minsk, the prospects and effectiveness of which became the main arguments in refusing to construct a new nuclear power plant in favor of developing these capacities.

The construction of a new nuclear power plant was discussed in earnest only at the beginning of the early years of 2000, namely after 2001, the Lithuanian authorities, at the request of the EU, approved a program for sustention and further decommissioning of the first unit of Ignalina Nuclear Power Plant. This was one of the prerequisites for the accession of the Republic of Lithuania to the European Four possible sites were identified for the start of construction, a search of investments and signing of partnership agreements for the construction of the object was launched. In 2008, the decision of construction of Belarus NPP on the site of Ostrovets, located 18 kilometers from the border with Lithuania and 50 kilometers from Vilnius (the capital of Lithuania) was made. A similar decision was driven by the world public opinion as a political move on behalf of Belarus and Russia. The initial cost of implementing this project was estimated at USD 9 billion, USD 6 billion of which was planned to be spent on the construction of the NPP itself and another USD 3 billion - on the construction of related infrastructure, including a residential campus for NPP workers, connection of rail sidings, power lines and other. The estimated payback period is 15-20 years.



Nuclear Power Plant

The Belarusian side began negotiations with China and the United States regarding provision of additional investments. Apparently, such a step was taken to raise the bid in the auction with the Russian side, which still doubted the effectiveness and payback of the transaction.

However, Moscow's reaction to the actions of the Belarusian government turned out to be quite principled. Russia's ambassador to Belarus, Alexander Surikov (2007-2018), announced the following position: "I exclude the participation of the US in construction of the nuclear power plant for political reasons. If China takes part in financing of construction of a nuclear power plant, I have doubts that Russia will participate in the project implementation". It became clear that Russia does not intend to involve other participants in the project.

The negotiation process between Minsk and Moscow dragged on for several years and took place directly at the level of the first persons of the states. In 2011, during his visit to Minsk, Vladimir Putin met with the President of Belarus Alexander Lukashenko, where agreements on cooperation in the construction of nuclear power plants were signed and guarantees of lending from the Russian side were given.

Many experts noted that such a project is not cost-effective for the Russian side. Such conclusions were made not only on the basis of the high risk of non-return of credit funds by Belarus, but also because of possible competition in the export of electricity in the region. At the time of signing of the agreement between Moscow and Minsk in 2011, Russia continued construction of a nuclear power plant in Kaliningrad region. Likewise, a joint project of Lithuania and Poland for the construction of the Visaginas Nuclear Power Plant (at present, both projects are frozen) was negotiated forcefully. However, in October 2011, the "BelNPP" construction process was launched.

Along with the start of construction, protests among many public organizations and leaders of some European states intensified. The Lithuanian side alleged the increased risks both to the local population and the entire Baltic region. Protests against the construction of the nuclear power plant became regular. Similar protests were common inside Belarus.

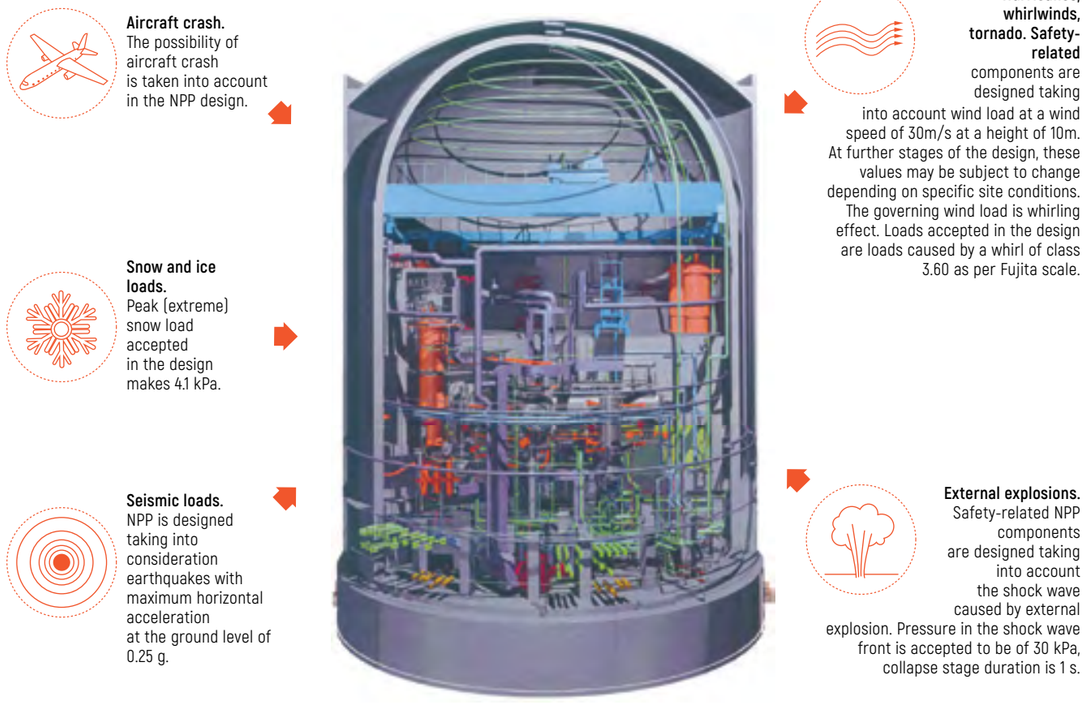
At the beginning of 2019, a Lithuanian non-governmental organization "Eastern Europe Studies Center" (EESC) conducted a survey, commissioned by the Lithuanian Ministry of Defense, according to which most Lithuanians consider Belarus to be a friendly country and do not see a threat in its foreign policy. Although 53% consider "BelaNPP" to be a source of danger for Lithuania.

At the end of 2018, Russia enhanced its political dialogue with Alexander Lukashenko in order to achieve full integration of the country into the Union State. For this purpose, dependence on the supply of Russian oil for Belarusian refineries at Russian domestic prices without export duty is actively used, following which Belarus receives a significant part of state budget revenues.

According to some forecasts, in 2019-2024 Russia will continue the introduction of the so-called second stage of "customs maneuver", under which the oil export duty is reduced from 30% to 0% with a proportional increase of the oil extraction tax. In this case, it is planned to introduce compensation payments to Russian oil refineries to support their competitive positions. As a result, Belarus in 2019 faces the threat of a significant reduction in state budget revenues, which were formed by refining Russian oil and exporting tax-imposed oil products. According to preliminary data, the loss constitutes approximately USD 400 million in 2019 (0.7% of annual GDP), and given the fall in profitability of oil refining at refineries over the next five years, Belarus will be USD 10-11 billion underfunded, which equals to 4% of annual GDP as of 2024.

In early January 2019, it was reported about Belarusian oil refineries purchasing Russian oil without providing compensation for the Russian "customs maneuver" to the Belarusian state budget. Their payments are not regulated by the provisions of the intergovernmental agreement of 2017 and in fact depend on the political decision of Russian leadership. Thus, only in October 2018, Belarus received compensation for re-exported oil in the amount of USD 263 million. The payment was delayed for various reasons since July 2018. As of today, Russia has not applied leverage against Belarus. According to preliminary data, the price of Russian gas for Belarus in 2019 remains at USD 127 per 1000 cubic meters, but for the population the regulated price increased from January 1, 2019 to USD 213 (2018 - USD 198 per 1000 cubic meters).

In order to minimize financial losses from a possible increase in prices for natural gas and



NPP Reactor building protection against external impacts | Source: atomenergoprom.ru

|ELECTRICITY MARKETS|

petroleum products, the President of Belarus ordered to intensify work on the electrification of industries and the residential sector. This is related to the expected commissioning (2019-2020) of "BelNPP" and the appearance of an additional 1200 MW of electricity production capacity.

For this year, Belarus does not plan to import electricity in advance, relying on its own capacities and allows only minor cross-border flows with Russia and Ukraine within the framework of technical needs for balancing. At the same time, Belarus is also relying on electricity exports to the Baltic States at a level of approximately 1 billion kWh during 2019, which are sold through the Nord Pool exchange trading platform.

In general, the NPP project provides for the construction of 2 power units with a total capacity of up to 2,400 MW (2 power units of 1,200 MW each). The project "AES-2006" atomenergoprom.ru/u/file/npp_2006_eng.pdf with pressurized water reactors (PWRs) of the third generation was chosen for the Belarus NPP. This generation of reactors is characterized by increased safety and reliability, namely the system of passive heat removal; the system of water disposal and cleaning from the shell; double protective hermetic shell and fuel melt trap in case of accidents beyond the design base.

The Baltic NPP, Novovoronezh NPP-2 and Leningrad NPP-2 were built according to the same project in the Russian Federation. A similar station is already in operation in China – the first stage of the Tianwan Nuclear Power Plant, which is recognized by the IAEA experts as one of the best in the world in safety parameters. The service life of the power unit used at nuclear power plants is about 50 years. Undoubtedly, in the construction of nuclear generating facilities, one of the main issues is the problem of waste disposal. Belarus is considering three options for solving this problem. The first option is the shipment of spent nuclear fuel of "BelNPP" for reprocessing to Russia, taking into account long-term storage in the territory of the Russian Federation and the subsequent return of high-level waste and its disposal in Belarus. The second is shipment for processing, taking into account long-term "dry" storage and further disposal in Belarus. The third is long-term storage followed by disposal on Belarusian soil.

It should also be noted that according to Viktor Karankevich, the Minister of Energy of Belarus, the commissioning of the nuclear power plant will allow replacing up to 5 billion cubic meters of natural gas and, accordingly, will reduce the share of its use in energy production from 95% to 60%. In addition, the ministry announced its intention to continue work on the diversification of types of fuel and suppliers of fuel and energy resources, including by means of constructing of renewable energy sources.

With the commissioning of a nuclear power plant, the energy sector of Belarus will face the problem of an electric power surplus. The government and policymakers have repeatedly stated their desire to increase energy exports. At the same time, the process of integration of the Baltic States and Ukraine into the system of European energy operators significantly complicates such plans, forcing Belarus to look for other ways to solve this problem. In this regard, at the moment, negotiations between the national energy companies "Belenergo" and "Ukrenergo" are being conducted on the submission of a joint application to the European Energy Community (Vienna, Austria) for the construction of a direct current supply. It is anticipated that such additional infrastructure will include two lines with the capacity of 500 MW each, which will allow the export of surplus electricity to Ukraine and other European countries.

Characteristics, units of measurement	Value of parameter (characteristic)
General parameters of power unit	
Rated thermal power of reactor, MW	**3200**
Rated electric power, MW	**1198,8**
Effective hours of rated power use, hour/year	**8065**
NPP lifetime, years	**50**
Seismic stability:	
Safe shutdown earthquake (SSE), g	**0,25**
Operation basis earthquake (OBE), g	**0,12**
Number of fuel assemblies in core, pcs.	**163**
Time during which fuel is in core, years	**4–5**
Basic parameters of the primary circuit	
Number of loops of the primary circuit, pcs.	**4**
Coolant flow through the reactor, m3/h	**85600±2900**
Coolant temperature at reactor inlet/outlet,	**298,6/329,7**
Nominal steady-state pressure at core outlet (abs.), MPa	**16,2**
Basic parameters of the secondary circuit	
Turbine:	
Rotation frequency, 1/s	**50**
Design scheme	**2LPC+HPC±2LPC**
Nominal steam pressure at turbine inlet, MPa	**6,8**
Feedwater temperature under nominal conditions, °C	**225±5**
Generator:	
Rated voltage, kV	**24**

Table 1. Basic technical characteristics and parameters of the power unit | Source: atomenergoprom.ru

Source: belaes.by.

> The Baltic countries and Poland are conducting an information campaign against Belarus, trying to prevent Belarusian electricity from entering the EU markets. In this connection, relations with Belarus are becoming a politically sensitive issue not only for the EU countries, but also for Ukraine and Moldova.

|THE MAIN TOPIC|

The next five years can become extremely dynamic for the European energy market. The current composition of the European Commission seeks to implement the "Clean Energy for All Europeans" program, which will launch powerful mechanisms of decarbonization, push the unprecedented changes in the principles of functioning of the energy market from centralized to distributed generation, and cause the emergence of a new active and mass player – the prosumer.

THE DIGITAL ERA OF ENERGY

AS AN OPPORTUNITY AND A CHALLENGE

Alongside with this, technologies allowing the creation of "smart cities" that can form autonomous systems due to low energy consumption, the integration of Renewable Energy Sources (RES) a flexible demand management system; and even local self-organization of prosumers and consumers using the blockchain technology are being actively developed.

Germany, having announced rejection from coal generation by 2038 in late January 2019, remains the most active driver of change. This reveals the willingness to completely shut down coal-fired power plants and coal production while ensuring balancing of demand for electricity and sufficient quantities of generation or supply of energy. According to preliminary estimates, over the next 20 years, the cost of "coal transformation" in Germany will amount to EUR 40 billion. Representatives of environmental organizations are talking about significantly larger costs, although even these are impressive. At the same time, Germany thoroughly approached the assessment of the timing of the coal mining termination along with the simultaneous economic reconstruction of the regions and the social-professional adaptation of the coal industry workers.

In place of fossil fuels, a combination of RES and energy efficiency measures should come; Germany intends to significantly renovate the residential sector and has imposed strict requirements for the standards of energy consumption of new homes to zero consumption and even sets the prevalence of generation over consumption. At the same time, Germany is lobbying for the expansion of imports of natural gas, hoping to use it as a reserve source for volatile RES.

Research institutions, small and medium-sized businesses in Germany are actively testing new energy management systems at the level of individual territorial communities. The combination of different forms of RES together with energy efficient measures and flexible demand management create unprecedented opportunities for interaction between small producers of electricity and consumers. A complex market of relationships is being formed, where smart modern systems of accounting allow you to do dozens of operations in 24 hours and flexibly respond to price signals by reducing or increasing consumption.

The role of electricity distribution system operators is growing sharply as the appearance and growth of the number of prosumers puts them in front of the need to ensure a two-way process of electricity distribution — from the network to the consumer and from the prosumer to the general network. Individual companies began to introduce special projects for the establishment of demand management centers. At the same time, major electricity suppliers with traditional generation facilities are changing their business model of operation and expand the range of services provided in the energy management sector, in particular at the municipal level.

The EU faces a complex choice between conservative energy, which is supported by the majority of new members of the community and the third energy revolution, the key element of which is digital technology. This choice has already divided the EU into two camps, between which the conflict intensifies, since a single energy market between states that support different forms of generation is not possible, not to mention the impact on the environment and climate.

Arguments about the high costs of full-scale energy transformation, the introduction of a new market model based on volatile RES, a shift in priority from large energy objects to distributed generation, an increase in the value of low-voltage distribution networks, an increase in the importance of cross-border interactions, the expansion of competition and the reduction of administrative influence on energy are rather reasonable.

The moment of truth for the EU was a debate about a new directive on the electricity market, which, despite the considerable efforts of the European Commission and the European Parliament, was not finalized, in particular, due to the resistance of Poland. Hungary opposed further measures aimed at strengthening the role of pan-European institutions in regulating national energy development plans. Collectively this position of individual EU member states threatens the so-called "Clean Energy for All Europeans" legislative package, which was one of the main points of the program of the current European Commission and the vice president Maros Sefcovic, who is of Slovak nationality and the avid admirer of the Energy Union, which was considered as a format for the integration of energy policies of all member states. There are less than two months remaining before the European Parliament elections, which reduces the chances of implementing the legislative package fully or otherwise causes excessive compromises for such states as Poland, in particular, the possible exclusions from the rules of support for coal generation by the state.

Meanwhile, plans for new ambitious goals of the EU for the next election period have already been announced: a package of "clean mobility" and the achievement of carbon neutrality are among them. While the latter is the first stage of a long-term project up to 2050, changes in the approaches to the transport sector are medium-term goals and will be further elaborated through relevant directives and regulations in the near future after the parliamentary elections and the formation of a new European Commission.

At present, the United States and China are in the process of developing the global trend, with the rapid growth of electric transport and charging infrastructure. By market volumes they have significantly outstripped the EU and offer two different auspicious ways — **centralized government policy with financing in accordance with clear plans and taking into account related industries (Chinese way) or business initiatives driven by the market and consumer preferences (American way).** For many states in Europe, some combination of these approaches will be optimal, where the state undertakes facilitation of the conditions for the formation of the electric transport market, and business invests in the projects and services necessary for its effective functioning.

At the same time, in Germany it was calculated that distributed generation (domestic solar power plants) in conjunction with energy saving systems and energy storage systems can become a cost-effective basis for expanding the fleet of electric vehicles while saving enormous public and private funds for the reconstruction of transmission lines, especially in the segment of low-voltage switchgear networks and transformer substations. Siemens in Germany is testing the use of cheaper and more affordable energy saving systems and energy storage systems on the basis of sodium and sulfur on an industrial scale, and is actively experimenting with other accumulative technologies, in particular, hydrogen.

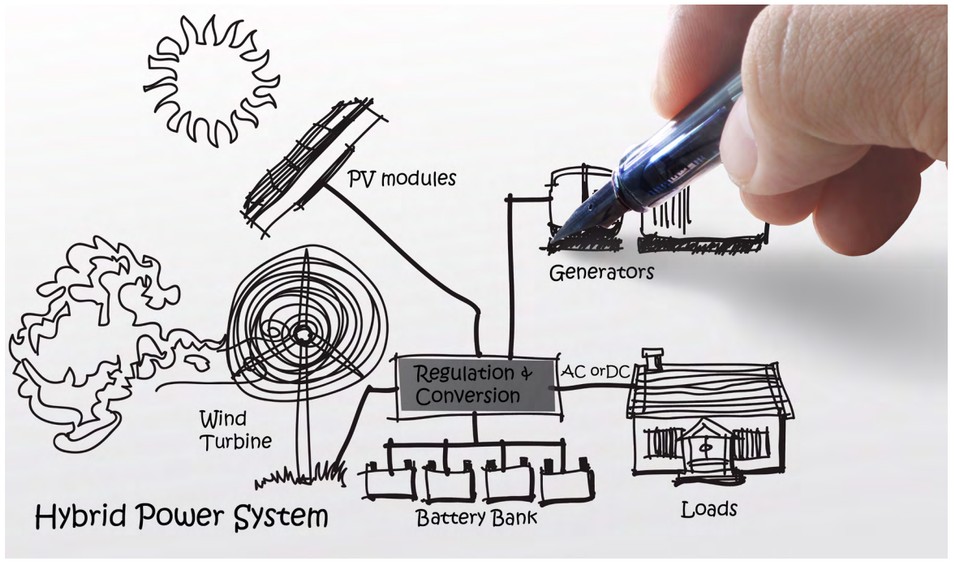
All this means that there is a new era of energy that will certainly require time and money to implement at the national level, but can positively affect the environment and climate, provide a balanced development of the energy sector and create the preconditions for employment. Active cooperation between states can make this process faster and cheaper, while conservatism and protectionism can slow it down, rather than stop it.

|NEW DEVELOPMENTS|

THE NEW HYBRID ENERGY SYSTEM

OF THE EUROPEAN UNION

According to the results of one of the most important European gas conferences – "Flame 2019", held on May 13, 2019 in Amsterdam, the Netherlands, the new paradigm of the future EU energy system could be the use of excess electricity generated from the sun and wind to produce hydrogen gas with its further transportation via gas transportation system and accumulation in the European system of underground gas storage facilities.



About 650 representatives of European gas and power generating companies, traders and regulators of the energy market, representatives of the European Commission, and others took part in the event. The main topics of the conference weredecarbonization of the European energy system, integration of the European gas infrastructure, electricity generation and gas storage infrastructure.

Jonathan Stern, a London-based Oxford Institute for Energy Studies expert, believes that the EU's gas storage infrastructure will play a central role in the latest European hybrid energy system model that will combine regenerative generation, EU gas transport networks and underground gas storage infrastructure (UGS) in the EU. According to G. Stern, at present, the main traditional value of gas storage infrastructure in the EU remains the aspect of energy security of consumer markets, namely providing users with sufficient quantities of gas in cases where gas supply contracts are breached or technological accidents occur that result in stopping the flow of gas to the EU. J. Stern emphasized that due to technological changes in recent years, a new function to the gas storage infrastructure of the EU has been added — integration of gas and electricity networks in the EU. Namely, to serve as a bridge between generation of solar and wind energy, existing gas transmission networks and the EU underground gas storage infrastructure.

According to Ilaria Conti, the head of gas programs at the EU Energy Research Center of the Florence School of Regulation, the EU gas storage capacity is about 1200 TWh (terawatt per hour). The tendency of recent years to reduce gas prices has led to a loss-making effect of the conservation of this energy in European underground gas storage infrastructure. At the same time, significant progress in the development of gas transmission networks in the EU provided an opportunity for the rapid pumping and supply of gas to those regions of the EU where there is a shortage of blue fuel. According to I. Conti, the liberalization of the EU gas market and the development of the gas transmission system have led to a significant reduction in gas prices in Europe. According to her, the irony is that, despite considerable efforts and reformation of the European gas market, diversification of gas sources supplies to the EU has not taken place. On the contrary, the EU dependence on Russian gas has risen.

I. Conti draws attention to the fact that in the past decade, the difference in the price of gas in the winter and summer was about EUR 10 — 12. At present, the seasonal difference in gas prices, at the "TTF" gas hub in the Netherlands, does not exceed EUR 2. At the same time, the gas storage tariff for the whole period remained unchanged at the level of EUR 5 — 6 per MWh (megawatt hour).

The equipment of gas storage in the EU is becoming obsolete, and the modernization of existing gas storage facilities does not seem attractive to invest in. Consequently, according to I.Konti, in the period from 2016 to 2018, the total capacity of the UGS in the EU decreased by 4% and this process is continuing.

According to the expert, the negative dynamics of the capacity of the UGS in the EU has a direct negative impact on the state of energy security of the EU. In such a way, with an additional 10% reduction in the EU UGS infrastructure, it will not be able to guarantee the security of gas supplies in the winter.

According to I. Conti, the European Commission does not have an effective policy on the development of the UGS infrastructure in the EU, its adaptation to the challenges and needs of the modern European energy market.

> During 2017 in the UK, a significant part of the UGS infrastructure was decommissioned due to the economic infeasibility of further use. A significant cooling in February 2018 led to a shortage of gas in the country, the demand for gas in the EU also reached its historic peak. In Great Britain, all available coal reserves were used. An emergency was prevented by urgent supplies of liquefied gas from Qatar and the United States. According to the expert, the experience of Great Britain clearly demonstrates the security aspect of the UGS infrastructure for Europe.

As Jan Ingwersen, the chairman of the "European Network of Transmission System Operators for Gas", noted in November 2018, within the framework of the Paris Climate Agreements, the European Commission has adopted a long-term strategy for the development of the EU energy and environmental policies. The strategy foresees that after 2050 the role of gas as fossil fuel in the EU energy balance will be significantly reduced. For the gas transport networks and UGS infrastructure in the EU, this means a complete change of the current traditional gas business model.

According to Klaus-Dieter Borchardt, Deputy Director General, Directorate General for Energy (DG ENER), European Commission, the new paradigm of the future EU energy system is to use excessive electricity from the sun and wind to generate hydrogen gas, followed by its transportation through the gas transmission system and accumulation in the EU UGS infrastructure. K. Borchardt noted that at present, this technology shows only the first success, but already there is a significant potential for the integration of all systems (transportation, storage of gas, generation of renewable energy) into a single integrated system. In the framework of the creation of such a hybrid system, according to K. Borchardt, further development of the architecture of the EU energy systems and its energy security will be determined.

A significant advantage of the development of the hybrid power system in the EU is that this approach does not involve the construction of new power lines, and may be based solely on existing European infrastructure.

Mr. Klaus-Dieter Borchardt noted that in the short term, in order to accelerate the implementation of the new (hybrid) model in the energy system in the EU, pilot projects with a capacity of 5 — 10 MW will be developed.

According to K. Borchardt, the current model of operation of the EU UGS system will exist until 2030-2035, in the future it will be transformed into a hybrid system, where the infrastructure of the UGS will not only maintain its main function — ensuring uninterrupted gas supply in winter, but will also provide the EU with flexibility in the operation of regenerative generation systems and gas transmission systems in Europe.

Consequently, due to increased competition in the gas market, liberalization and reformation of the EU energy market, gas prices in the EU have significantly decreased in recent years, seasonal fluctuations in gas prices have become minimal. This situation has become a serious challenge for the further existence of the infrastructure of underground storage facilities in the EU, which, in the absence of investment and market attractiveness, has already decreased by 4%. Such a trend (the further reduction of the UGS system by 10% and more) jeopardizes the EU energy security in the future, especially in the peak season of gas demand in the EU.

The new paradigm of the future EU energy system can be the use of excess electricity generated from the sun and wind for the generation of hydrogen gas with its subsequent transportation through the gas transmission system and accumulation in the European system of underground gas storage.

Based on the requirements of the "Paris Climate Agreements", the European Commission plans to significantly reduce the use of fossil (traditional) gas in Europe by 2050. To this end, a new strategy for the integration of the existing European GTS network, the UGS infrastructure with the renewable energy generation infrastructure is being developed, which can radically change the principles and mechanisms of the functioning of the energy security system in Europe.

MEDIUM-TERM PRIORITIES

FOR THE TRANSFORMATION OF THE EU ENERGY SYSTEM

Analyzing the results of a study on "Energy transit of the European Union: the key priorities for the next five years", conducted by the European think tank "Bruegel", which specializes in the formulation of EU development strategies and economic policy, it is clear that the EU has been pursuing an active climate policy for the last 10 years that has resulted in the mass integration of renewable generation technologies into the EU energy system. Obviously, the European Commission (EC) willfurther continue to contribute to increase in the generation of green energy and improvement of energy efficiency in all sectors of the EU economy.

However, at present, the EU has come close to the need to deepen the transformation of the energy system, in particular:

- the widespread introduction of technologies for decarbonization of the EU economy in accordance with the requirements of the Paris Climate Agreement;
- greater use of economic and industrial opportunities arising from the massive transformation of EU energy systems;
- development of new EC approaches to enhancing energy competitiveness and enhancing EU energy security (given the fact that the EU does not have unconventional oil and gas industry, contrary to the US, and investment opportunities common to China).

Thestudyleader, Simone Tagliapietra, Senior Expert at "Bruegel", believes that EU energy transformation is currently economically and technologically feasible, given the availability of all the necessary technologies and a significant reduction in the cost of their implementation. The costs of transforming the EU energy system are commensurate with its annual operating costs. Therefore, the new EU energy policy, which will be introduced by 2024, will determine, first and foremost, the architecture of the future EU energy system in 2050.

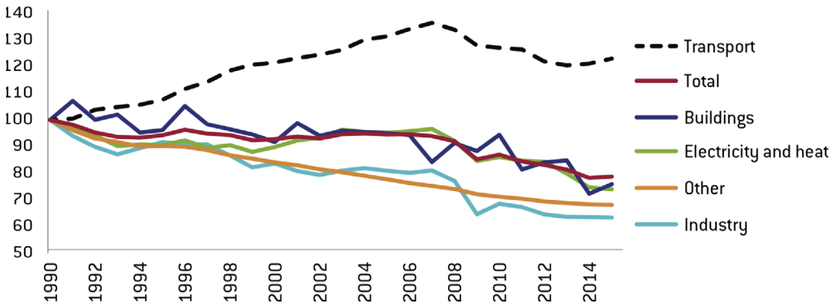
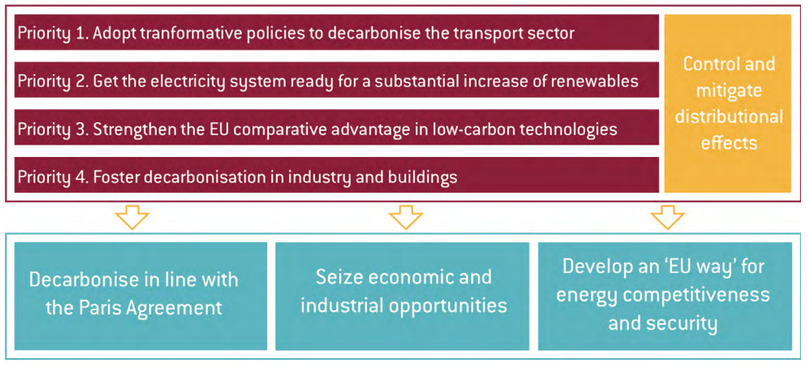


Figure 1: EU greenhouse gas emissions by sector, 1990-2016 | Source: Bruegel based on European Environment Agency (2018). Note: 1990 = 100.

From 1990 till 2016, EC efforts led to a reduction of CO2 emissions in all sectors of economy and in the EUin general, and this indicator increased only in transport sector, by 20% (Figure 1).



FOUR PRIORITIES UP TO 2024 TO FOSTER THE EU ENERGY TRANSITION | Source: bruegel.org

Therefore, transport is now a significant impediment to the EU decarbonization of the economy, with road transport accounting for 70% of all transport emissions. Therefore, the current EU policy, without being updated, could lead to an additional 15% increase in CO2 emissions from transport by 2050. The main priority in this context should be the increase of use of electric vehicles in the EU, both in the public and private sectors.

Georg Zachmann, expert atGerman Institute for Economic Research in Berlin, "Bruegel" research participant, believes that the updated European Parliament and the European Commission should provide a basis for the transformation of the EU energy system. According to him, the priorities of such transformation should be:

- introduction of a European decarbonisation policy in the transport sector;
- preparation of EU electricity grids for a significant increase in renewable energy generation, without weakening EU energy security indicators;
- widespread introduction of low carbon technologies in the EU;
- accelerating decarbonisation in industrial and construction sectors.

According to international experts, EU electrical systems are now undergoing a deep structural transformation. They are becoming more flexible, decentralized and include elements of digital automatic control. The EU backbone and distribution grids have been completely reorganized and subdivided into "smart grid" areas. This has allowed distribution companies to reduce the cost of delivering electricity to end users and to clearly set their energy consumption figures and clearly identify the potential and possible volumes of renewable generation in each industrial, administrative or residential area. Today, a new model of decentralized electricity grids is being built on the "smart grid" database, where on each "distribution platform" there is a local balancing of consumer demand, generation and capacity for electricity storage and formation of "energy-consuming communities" on this basis.

The expansion of innovative low carbon technologies in the EU can become widespread and cover all areas of life, including the introduction of energy efficient technologies and CO2 capture technologies in the generation of electricity, heating, refrigeration, transport, production of iron and steel, cement and other construction materials, production of paper, chemical industry and construction, etc.

As of now, the EU industry generates 25% of all CO2 emissions and is considered the most energy efficient sector of the EU economy due to the introduction of a CO2 emission trading system and modernization.

Source: https://bruegel.org/wp-content/uploads/2019/07/Bruegel_Policy_Brief-2019_01.pdf

In order to fulfill the requirements of the Paris Climate Agreement, in the medium term (by 2024), the European Commission and the European Parliament should formulate and start implementing a new policy of transformation of EU energy systems, the main instruments of which may be:

- decentralization of energy systems (creation of "distribution platforms" and "energy consumer communities", which will balance the generation of heat, electricity, its storage and distribution);
- large-scale introduction of digitalization (digital automatic control of energy systems, development of smart energy systems);
- large-scale transition of all spheres of EU life to low carbon technologies, the wider introduction of CO2 capture and storage systems;
- introduction of an efficient transport CO2 reduction policy, large-scale use of electric vehicles in both the public and private sectors.

NEW PROJECT

FOR INDUSTRIAL USE OF HYDROGEN IN THE EU

The European Commission has provided EUR 12 million for the implementation of the H2FUTURE project, which envisages the experimental and industrial introduction of hydrogen technologies by a consortium of European companies within the Voestalpine metallurgical group and Siemens companies, VERBUND and the transmission system operator Austrian Power Grid (APG). The project is supposed to be implemented within the framework of a decarbonization support strategy through the transition to alternative energy sources.

H2FUTURE
Green Hydrogen

The consortium will also work with research and organization partners K1-MET (R&D cutting-edge metallurgical technology center Metallurgische Kompetenzzentrum) and ECN (Energy Research Center of the Netherlands). The agreement between the European Commission and the consortium envisages the construction of one of the world's largest electrolysis plants for the production of hydrogen using electric power from renewable energy sources. In the course of the project, the partners plan to work at the site of a new Voestalpine company located in the village of Linz, Austria. The hydrogen complex will be used as a new part of the large Voestalpine metallurgical plant. The produced green hydrogen will be supplied directly to the internal gas network of the enterprise, which will allow the use of hydrogen at various stages of steel production.

> The EU's new climate and energy targets are set to reduce carbon dioxide emissions by 40% by 2030, posing significant challenges for energy-intensive and energy producing enterprises. At the same time, renewable energy can be not only the basis of the new structure of the European electricity sector, but also a source of energy for green hydrogen production as a universal source for industrial needs and balancing of energy systems.

Funding for the H2FUTURE project is planned through the EU strategic initiative — Fuel Cells and Hydrogen Joint Undertaking — FCH JU under the "Horizon 2020" budget. The total cost of the project is about EUR 18 million and the implementation period is 4.5 years. One of the largest and most advanced electrolysis plants, Proton-Exchange Membrane (PEM), manufactured by Siemens, will be the technical basis of production.

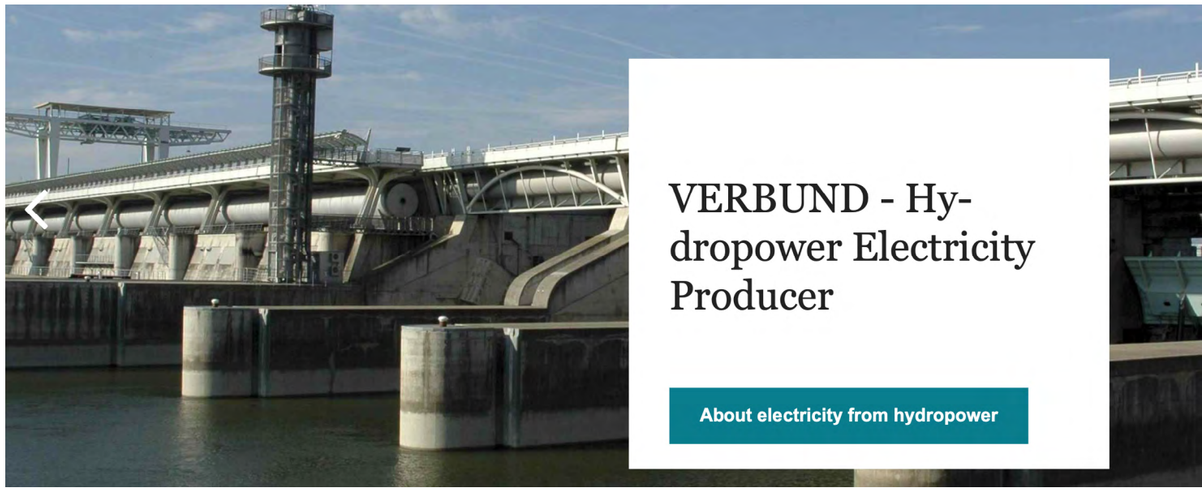
The key partners of the project (Voestalpine, Siemens and VERBUND) have experience of successful cooperation for many decades. It is envisaged that VERBUND, as project coordinator, will supply electricity from RES and provide network services. The R&D Center, ECN, will also be the partner of the project in charge of the scientific analysis of the demonstration industrial hydrogen operations and will ensure the application of experience learned from other industries. The Austrian transmission system operator APG will support the integration of the plant's capacity into the market of operational power system reserves. K1-MET will support the operation of an innovative plant and the expansion of experience in the application of hydrogen technologies in the European and global metallurgical sectors.

The potential and the possibility of using green hydrogen at different stages of steel production is expected to be assessed during the implementation of the H2FUTURE project. The possibility of applying this technology to other industries that use hydrogen in their production processes will be explored as well. Another objective of the project is to integrate the PEM electrolysis plant into the markets of operational reserves of electricity capacity and to develop demand management solutions. This will offset short-term generation fluctuations of electricity network with a rapidly increasing share of volatile RES by management of load for large consumers.

> Voestalpine has traditionally positioned itself internationally as environmentally friendly and energy efficient model in energy industry. Over the past 10 years, this industry group has spent more than EUR 2.2 billion on environmental activities at its plants in Austria. The company is seeking the complete replacement of coal through the use of alternative energy sources for steel production over the next two decades by using "transitional" natural gas technologies. This approach is already being implemented at a new electrolysis facility in Texas in the US.

Due to the creation of a new pilot plant for the production of zero-carbon steel in Linz, the consortium is taking a step towards the implementation of a long-term technological transformation. The company notes that the provision of sufficient energy from RES, as well as the political framework conditions that allow for long-term planning are the necessary prerequisites for the success and upscaling of these technologies.

Siemens, for its part, has developed an electrolysis system based on the use of PEM technology, which provides efficient conversion of electricity to hydrogen, is being successfully used in several projects and continues to be improved. The PEM electrolyzer at the Linz Metallurgical Plant will have a capacity of 6 MWt and will embody the next generation of Siemens technology.



Štrba Lake
High Tatras
Slovakia