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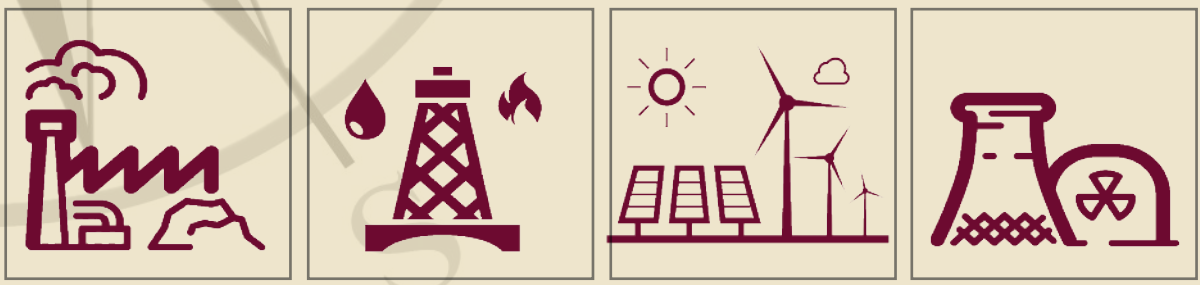
Energy and Climate Diplomacy



FOREIGN AFFAIRS RESEARCH PAPERS June 2023 17

REPUBLIC OF BULGARIA

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ENERGY AND CLIMATE DIPLOMACY

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CONTENTS

2022-2023 – UNPRECEDENTED ENERGY CHANGES WELL BEYOND THE EXPECTATIONS

Slavtcho Neykov, Editor-in-Chief

Member of the National Consultative Council of the Bulgarian Diplomatic Institute

DEAR READERS,

Welcome to the 2023 edition of the ENERGY AND CLIMATE DIPLOMACY JOURNAL, issued by the Bulgarian Diplomatic Institute (BDI), and thank you for your interest in it!

As in previous years, the authors represent different social groups – you have the chance to read the views and comments of diplomats, representatives of European and national business associations, heads of companies, researchers, etc. Despite their different backgrounds, they are certainly united by their interest in the energy and climate developments at international, European, regional and national level, regardless of whether they are professionally engaged with these topics or not. And I am grateful to all of them for sharing their views also in the current issue.

The journal has been prepared while the world in general, and concretely Europe, underwent immense political and economic changes within months – and the energy sector played one of the key roles in this transformation.

Thus, from the energy perspective, at political level, the war between Russia and Ukraine boosted a whole set of new elements in the political order. New allies appeared, old friendships were broken. Furthermore, the political changes caused substantial economic reorientation processes – this concerns, inter alia, the location (including redirection) and the type of investments, as well as reassessment of the role of different energy sources like gas, coal, oil, etc.

On this ground – and mostly from the European perspective – the authors of the articles included in this year's edition duly reflect in their own way the facts and changes, which one of them calls a "new balance of power".

Without any doubt, the EU energy policy continued with its pivotal role throughout Europe, but it was also changing with the time. In fact, these step-by-step changes were reflecting in a way also the political developments. After it became clear that the war will not stop as quickly as expected, and that the EU sanctions towards Russia need ongoing updates, new EU policy concepts were brought to the table. One of them is the REPower EU Plan[1], whose realisation is in practical terms ongoing. Being backed up by the principled decision for increasing the European energy security by reducing the dependency on unreliable suppliers (concretely Russia), the plan is also aiming to boost the energy saving and to accelerate the clean energy transition.

[1] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

However, the changes in the EU energy related framework in the recent year are not due only to the war between the two countries. Certainly, this war accelerated the process of new developments, but in real terms the active move towards more energy security, diversification and the green transition has been planned well before.

And so far, the results of the new policies' approach are beyond belief! The technological boom makes renewables cheaper and more reliable literally within just days – and their increasing share in the energy mix is already a fact all around. In parallel, countries which were close to being 100% dependent on Russian gas have completely cut off their relations with Russia as a supplier. Concrete steps towards diversification of nuclear fuel are also to be seen. Energy savings prosper. The average citizens become actively involved not only in the consumption but also in the production of electricity.

In this aspect, it should be also recalled that the overall frame of positive steps was confronted by big energy-related turbulences. The latter were clearly seen particularly in the second half of 2022, when the European countries faced an unprecedented price increase, mostly for electricity and gas, combined sometimes with supply problems. Conceptually, the crises were met collectively throughout Europe, both in the EU and the Energy Community, but the key responsibilities were and still are for the national authorities. On this ground, people sometimes even witnessed contradictory messages from the European institutions – e.g., about the role of coal and nuclear, about the format of state aids, etc.

However, at the end of the day, these price-related crises were also gradually overcome together with the issue of security of supply for the countries which were confronted with them. In this context, aside from the European level solidarity, key role was played by the bilateral and/or regional relations. Thus, along the developments in the European energy policy frame, the steps towards promotion of these relations should be strongly further encouraged.

The overall energy policy developments walk hand in hand with the climate-related concerns. In fact, aside from the theoretical elaborations, one can easily find already practical examples for substantial changes in many countries. In these, the energy and climate considerations have brought forward new economic developments in the context of the green transition.

The process is actively supported conceptually and financially by the EU. Despite this active EU support, again the role of the national authorities is crucial when it comes to practical implementation both in the energy and the climate directions. Based on their experience in the recent year, they should be encouraged to propose amendments in the EU framework. However, until these amendments are legal reality, the implementation obligations remain – the rule of law should not be underestimated at any moment. In fact, the overall look at the articles in this edition shows that they touch upon all the aspects mentioned above. Certainly, this is done by the authors in their own way, according to their understanding of the facts – and their opinion should be duly respected.

The current publication has become an indispensable part of BDI's research activities on topics related to energy and climate diplomacy and security. The Institute has been actively fostering dialogue and exchange of ideas between all the stakeholders – public domain, business communities, academia and the NGO sector, involved in the process of energy transformation. However, such profound change is not linear and is not limited to purely replacing fossil fuels with renewables. It entails deep and overarching changes in the functioning of the world economy and therefore politics and geopolitics. It is more than obvious that the diplomatic and energy/climate domains are closely intertwined, as issues such as the climate emergency or the energy security crisis require global concerted efforts, even though their effects have their own specific regional manifestations. In this regard, the BDI is striving to attract international expertise in order to shed light into the ongoing processes and issues pertaining to energy and climate diplomacy. Some of the articles would also be a focus of discussion within the Annual Seminar on Energy and Climate Diplomacy, which the BDI has been conducting for more than a decade, and which is another important forum for networking and expert exchange.

Once again, thank you for your interest – I hope you will enjoy reading the articles the way I did, regardless of whether you share completely or partially the views they express.

Mr. Slavtcho Neykov *has 30 years non-interrupted experience in the energy sector, including as Secretary General of the Bulgarian Ministry of Energy, Commissioner in the State Energy Regulatory Commission, expert at the Energy Charter Secretariat in Brussels and a Director of the Energy Community Secretariat in Vienna. Throughout the years, his area of activities has been linked to international and EU energy law, energy diplomacy and energy policy matters at national, regional and EU level. He was the leader of the Bulgarian negotiation team on Chapter 14 "Energy" during the Bulgarian accession to the EU. Prior to his involvement in the energy sector, he has worked as a state prosecutor and a legal advisor.*

His university level education in Bulgaria includes a law degree and two years postgraduate studies on International Economic Relations and Foreign Economic Activities. He also holds Master of Arts in European Integration from the University of Limerick in Ireland.

Since the end of 2014, Mr. Neykov acts as a Chairman of the Board of Managers of the Energy Management Institute (www.emi-bg.com).

Mr. Neykov is a member of the Board of Directors of EURELECTRIC. He is also a member of the National Consultative Committee of the Bulgarian Diplomatic Institute.

THE REPOWER EU PLAN AND ENERGY SECURITY IN SOUTHEAST EUROPE

Alexios-Marios Lyberopoulos, Ambassador of the Hellenic Republic to Bulgaria

Introduction

Since Russia's unprovoked and unjustified invasion of Ukraine and the subsequent "weaponization" of energy supplies, the EU has been in the "eye of the energy storm". The war in Ukraine has turned out to be a major shock for Europe and the world, as it has pushed energy prices to record high levels and, at the same time, has raised serious concerns about energy security on our continent. As the International Energy Agency put it in its World Energy Outlook 2022 report "*We are in the midst of the first truly global energy crisis in history*"[2].

As a result of the looming energy security crisis at a time when the European economy was still trying to recover from the adverse effects of the "COVID-19" pandemic, Europe was faced with critical energy choices for the short as well as for the longer term[3]. After all, the climate crisis also appeared, at that time, more severe and threatening than ever before. The question which was being posed in Europe, immediately after the outbreak of the war in Ukraine, was: "*Which path should now Europe follow? More fossil fuels from other sources to replace Russian supplies (energy security and diversification of energy supplies) or more investment in cleaner energy sources (green energy transition)?*"[4]. Fortunately, the EU institutions and governments have quickly come to realize that this is not a "*black and white issue*"[5]. They acknowledged that all Member States do need to rely on already available energy sources (even fossil fuels), in order to deal with the immediate energy security threat and the urgent need to power their households and economy in the short-to-medium term. However, they also acknowledged that for the longer term this is not a sustainable and acceptable option. The European Commission in particular, in its attempt to articulate a new and comprehensive response to the emerging crisis, was urgently mobilized and quickly developed a new strategy which, in essence, "merges" the twin goals of "energy security" and "green energy transition" into a single framework. The idea under the new circumstances was that the European Green Deal goals remain central to the European Agenda, even in the new geopolitical reality. The green and just energy transition is a prerequisite in

[2] World Energy Outlook 2022, p. 19. Available at: [https://www.iea.org/reports/world-energy-outlook-2022]

[3] "*Introductory Session*", 26th National Conference "Energy & Development 2022" with the title: "***Europe's Critical Energy Choices***", Institute of Energy for SE Europe (IENE), Athens, November 22-23, 2022.

[4] Mr. Dimitrios Tsitouridis, Country Coordinator for Greece, DG Energy, Brussels. Remarks at the "Introductory Session" of IENE's 26th National Conference "Energy & Development 2022", Athens, November 22-23, 2022.

[5] Ibid.

the EU's efforts to achieve its climate targets for 2030 and 2050, but now it is also the key to the Union's energy and political independence, depriving any external actor (Russia) of the possibility to influence or undermine its strategic choices.

The EU's response to Russia's brutal war in Ukraine, and the subsequent challenges it created for the energy sector, was the launching of the ambitious *REPowerEU Plan*. The Plan is the culmination of the EU's strategy to move away from dependence on Russian fossil fuels, to become more self-sufficient on energy resources and to speed up the clean energy transition. It is based on three central pillars: **i.** diversification of gas supplies, **ii.** boosting energy efficiency and energy savings and **iii.** acceleration of renewables deployment with a higher EU renewable energy target of 45% in the EU's energy mix by 2030. On this ground, the main (yet not exclusive) focus of this article will be on aspects related to the first mentioned pillar on "diversification of gas supplies", since the latter is related to major recent developments, initiatives and infrastructure projects that are of particular importance for energy security in the region of Southeast Europe (SEE). This pillar is linked to the establishment of the very important "*EU Energy Purchase Platform*" which has set the tone for subsequent efforts in Europe and in SEE to strengthen energy cooperation, to make full use of existing energy infrastructure and to promote new relevant infrastructure, in a spirit of "solidarity and unity"[6] to overcome the energy crisis and achieve the goals of energy diversification and green transition.

This pillar is also very important, according to our view, as a "booster" to major strategic diplomatic partnerships between the countries in the region, such as the one developed lately between Greece and Bulgaria. The diplomatically-driven partnership between the two countries in developing joint energy connectivity infrastructure projects is very important for addressing both regional and EU energy security considerations. Concrete examples to be mentioned in this context are the existing infrastructure projects (IGB Interconnector, UGS Chiren, Revithoussa LNG Terminal), the projects under implementation (FSRU Alexandroupolis, IBS Interconnector, electricity interconnection "Maritsa-Nea Santa", 840 MW Alexandroupolis CCGT Power Plant) and planned projects (expansion of UGS Chiren, 4 new LNG Terminals in Greece). Further, it should be noted that relevant developments are related not only to geopolitical factors but also to recent market trends. In this context, one might quote one of last year's contributors to the "Energy and Climate Diplomacy Journal", that those joint energy connectivity projects constitute "*comprehensive infrastructure which, in synergy, can provide energy security for the region, especially in the context of today's international situation*"[7].

The "EU Energy Purchase Platform" initiative

The cornerstone of the EU-sponsored initiatives to deal with the issue of "diversification

[6] See Statement by EU Commission President Ursula von der Leyen on Energy, September 7, 2022: [https://ec.europa.eu/commission/presscorner/detail/en/speech_22_5389]

[7] Excerpt from article by former Bulgarian Minister of Energy Alexander Nikolov, "*Bulgarian energy policy in the context of energy security in the region*", Energy and Climate Diplomacy, June 2022, p. 12.

of gas supplies" in the context of the *REPowerEU Plan,* is the establishment of the "*EU Energy Purchase Platform*" for the common purchases of gas, LNG and hydrogen. This platform will aggregate demand for gas across the EU ahead of next winter and enable companies to jointly negotiate gas purchases with non-Russian suppliers. Already at the Brussels European Council on 24-25 March 2022, the European Council mandated EU Member States to "*work together on voluntary common purchase of gas, LNG and hydrogen, making optimal use of the collective political and market weight of the EU and its Member States to dampen prices in negotiations*". The same European Council also announced that "*the common purchases Platform will also be open for Western Balkan countries and the three associated Eastern Partners*"[8]. In short, the goal of this scheme would be to leverage EU gas demand to attract reliable suppliers from global markets and ensure price stability. Since then, the European Commission has intensively worked on the means to operationalize demand aggregation and joint gas purchases by companies. Currently, various models are under discussion and options range from joint tendering by companies to the creation of joint ventures[9]. To that end, an Industry Advisory Group has also been created, aiming at providing the Commission with the necessary know-how and information on demand aggregation, the joint purchase and the timely diversification of sources. Demand aggregation is mandatory for Member States to ensure that companies under their jurisdiction account for at least 15% of the volumes needed to fill gas storages[10]. With regard to optimization of the infrastructure and supply at the regional level, the EU Commission together with the Member States have decided to establish Regional Groups to work on defining and implementing measures in the immediate and short term to support diversification and security of supply.

On May 5, 2022, during the Regional Ministerial Meeting hosted by Bulgaria in Sofia with the title: "*Southeast Energy Transition – Regional Cooperation for Energy Security, Diversification and Transition*", the European Commission and Bulgaria set up a "**Southeast Europe Regional Taskforce**" – *the first of its kind established as part of the EU's Energy Purchase Platform* – that would concentrate on implementing the *REPowerEU Plan* in the region. The aim of this Taskforce, in coordination with neighbors in the greater region[11], would be "*to jointly diversify energy supplies, most of all gas deliveries, strengthen energy security and identify the needs and opportunities for common use of infrastructure and potential new suppliers*". Also, "*it is tasked to support and coordinate joint preparedness plans, including international purchase, storage and interconnections*". The "*Southeast Europe Regional Taskforce*" has been the first Group to adopt (and is already

[8] Ukraine, Moldova (because of the Trans-Balkan pipeline) and Georgia. See: [https://euneighbourseast.eu/news/latest-news/eu-agrees-to-buy-gas-jointly-and-opens-common-purchase-platform-to-georgia-moldova-and-ukraine/]

[9] See Press Remarks by EU Commissioner Maroš Šefčovič after the conclusion of the 2nd formal meeting of the Steering Board of the EU Energy Platform: [https://ec.europa.eu/commission/presscorner/api/files/document/print/en/speech_23_1347/SPEECH_23_1347_EN.pdf]

[10] Council Regulation (EU) 2022/2576 of 19 December, 2022, "*enhancing solidarity through better coordination of gas purchases, reliable price benchmarks and exchanges of gas across borders*".

[11] Bulgaria, Greece, Romania, Serbia, North Macedonia, Moldova and Ukraine.

implementing) an Action Plan which sets out the steps (investment and reforms) that will improve the diversification of supply in our region[12].

The reason why the outcome of the Regional Ministerial Meeting of May 5, 2022, in Sofia was so important for subsequent energy security developments in SEE, is that it has helped to forge a common stance among all affected partners at regional level towards the Russian policy of "weaponization of energy supplies", focusing *inter alia* on the need to further strengthen regional energy cooperation and energy diversification through intensifying the development of energy connectivity infrastructure. Subsequent developments, only a few months later, such as the grand opening of the IGB Interconnector in October 2022, the launching of construction works of the IBS Interconnector in February 2023 and significant progress in the implementation of other supportive connectivity projects (e.g. Alexandroupolis FSRU) are putting the region on the right track in terms of the necessary infrastructure to secure and diversify gas sources.

The main reasons why energy security in the SEE region matters for the future success of the overall EU energy security strategy launched under the *REPowerEU Plan* are the following:

1) SEE is the region in the EU most vulnerable to Russia's policy of "weaponization" of energy supplies, due to its hitherto high degree of dependence on Russian fossil fuels and the high degree of carbon-intensity (coal, gas, oil) in its energy and/or electricity mix,

2) SEE is the region of Europe most closely located, in geographic terms, to the "theater of the war" (strategic location) and

3) SEE is a region that possesses significant energy resources and is crossed by critical energy infrastructure for Europe's current strategy to move away from dependence on Russian fossil fuels in the future (e.g., Trans Adriatic Pipeline / part of the Southern Gas Corridor, IGB Interconnector, gas storage facilities, LNG terminals and electricity interconnections under development).

The important role of gas connectivity infrastructure between Greece and Bulgaria in promoting the goals of the REPowerEU Plan

Through the establishment of a wide network of international energy relations and partnerships in the Balkans and Southeast Mediterranean region, Greece's energy diplomacy pursues the goals of maximization of energy security, competitiveness of prices and diversification of sources. The country wishes to act as a gateway and an (regional) energy transit hub from east to west and from south to north. As a result, geopolitical challenges, diplomatic initiatives and energy infrastructure developments along the so-called "Southern" or "Vertical Energy Corridor" are of crucial importance for its diplomacy. In particular, Greece actively promotes the implementation of the

[12] See the following links: [https://commission.europa.eu/news/action-plan-regional-energy-platform-south-east-europe-2022-06-02_en] and [https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3299]

"Southern Gas Corridor" (crossing Greece, Bulgaria, Romania, Hungary, Ukraine and Moldova), which will actually be a network of existing and future natural gas infrastructure projects greatly enhancing the terms of energy security in SEE and in Europe as a whole. Its purpose will be to carry natural gas and LNG from a variety of sources, such as the Revithoussa LNG Terminal, the soon-to-be-completed Alexandroupolis FSRU and other planned LNG terminals in Greece and the TAP, through Bulgaria to Central and Eastern European countries. A key project for the realization of the Vertical Gas Corridor, which operates as its first part, is the recently completed and inaugurated natural gas Interconnector Greece-Bulgaria (IGB)[13].

IGB reshapes the region's energy map and opens an entirely new route for diversified and secure natural gas deliveries. Its timely completion – only a few months after the Ukrainian war erupted and gas supplies to Europe on behalf of the Russian Federation were drastically decreased or even cut off (case of Bulgaria) – marks a crucial milestone towards the goal of diversification of energy sources and routes in the SEE region. The IGB project not only supplies Bulgaria with natural gas of non-Russian origin but also allows transportation of significant quantities to other countries. Its planned capacity increase to 5 bcm annually from the year 2025 in conjunction with the prospect of doubling the capacity of the TAP pipeline to 22 bcm annually from 2028 onwards, outlines a framework for further deepening energy cooperation between Greece and Bulgaria and enhancing the European energy security.

Besides, this infrastructure can be also used for the transport of hydrogen in the future. Thus, the gas transmission infrastructure provides an opportunity for the successful and accelerated introduction of hydrogen into the energy mix, and the Greek and Bulgarian gas transmission operators are already cooperating in the context of submitting important H2 projects as IPCEI project candidates[14]. Therefore, energy infrastructure development between the two countries contributes to the promotion of the energy security and energy transition goals of the *REPowerEU Plan* not only in the short run, but also in the context of a long-term perspective along multiple options.

Bulgaria is Greece's strategic partner for the diversification of energy sources in SEE and beyond. In fact, the cooperation between the two countries provided concrete positive effect not only for them but also for other countries in need, including Moldova and Ukraine. Thus, shortly after its commissioning in October 2022 and due to the deteriorating conditions of energy insecurity and instability in the region, the IGB Interconnector has acquired a weighty geopolitical importance. On the one hand, it has greatly assisted Bulgaria in dealing with its severe issue of shortage of gas supplies and skyrocketing gas prices, by transporting up to a total of 7.9 million megawatt hours since its launching[15] and providing much needed diversification of gas supplies. On the other

[13] "Hellenic Ministry of Foreign Affairs: Energy Diplomacy": [https://www.mfa.gr/en/energy-diplomacy/]

[14] See recent statements by Bulgartransgaz's CEO, Vladimir Malinov: [https://3e-news.net/en/a/view/41114/vladimir-malinov-cooperation-with-reliable-suppliers-of-liquefied-natural-gas-ensured-uninterrupted-supply-to-the-country]

[15] ICGB news section: [https://www.icgb.eu/news/over-3-million-megawatt-hours-were-transported-through-igb-since-the-beginning-of-the-year/]

hand, it contributed to the lifting of Moldova's energy isolation, by supplying the latter with Azeri natural gas from the TAP pipeline through the route "Greece-Bulgaria-Romania". On December 1, 2022, a Memorandum of Understanding for the development of the "Southern Gas Corridor" was signed in Athens between gas system operators DESFA (Greece), Bulgartransgaz (Bulgaria), Transgaz (Romania), FGSZ (Hungary), ICGB (Bulgaria) and Gastrade (Greece), "*confirming the commitment of all parties to work together with the aim of exploring the possibility of building the necessary infrastructure for the transport of natural gas to the transit countries and to the EU market from Greece through Bulgaria, Romania to Hungary and vice versa*"[16]. The Natural Gas System Operator of Ukraine expressed its intention to participate and benefit from this initiative. As a result, the IGB Interconnector is developing into a "game-changer" for the region of Central and Southeast Europe in the light of recent geopolitical events, strengthening energy connectivity and providing a real diversification of gas supplies not only to Bulgaria but also to Hungary, Romania, Moldova and Ukraine, and in the near future to the countries of the Western Balkans[17].

Based on recent DESFA data[18], Greece is gradually establishing its position as regional energy hub, almost quadrupling (+288.68%) its natural gas exports in the previous year. In 2022, the Revithoussa LNG Terminal was the country's main natural gas entry gate and almost 35% of the LNG offloaded at Revithoussa – 30 terrawatt hours or 2.5 bcm – was exported to Bulgaria. Securing the Revithoussa LNG terminal for the provision of stable supply of LNG, as a replacement of pipeline gas coming from Russia in 2022, was very important for the energy diversification and energy security of Bulgaria. In addition, the caretaker government of Bulgaria also took another huge step forward towards energy independence by doubling its capacity commitments at the future Alexandroupolis LNG terminal (FSRU). Accordingly for Greece, securing gas storage in the Bulgaria's underground gas storage facility in Chiren up to a certain level is very important for preventing possible future supply disruptions, pursuant to *Regulation (EU) 2022/1032 of 29th June 2022* with regard to gas storage. The recent MoU signed in Athens (February 2023) between the Ministries of Energy of Greece and Bulgaria, allows energy companies from Greece to book injection and withdrawal capacities at Bulgaria's Chiren depot, while at the same time allowing Bulgarian companies to reserve slots, storage capacity and regasification capacity at the Revithoussa LNG terminal and other Greek LNG terminals to be developed in the future. The signing of that MoU, is a remarkable example of how our strategic bilateral approach to energy cooperation can serve the regional goals of security of gas supply and gas storage which are set by EU Regulations and the *REPowerEU Plan*. Looking forward, the planned upgrade of the Revithoussa LNG terminal's capacity to 375,000

[16] DESFA press releases: [https://www.desfa.gr/en/press-center/press-releases/memorandum-of-understanding-between-gas-systems-operators-from-bulgaria-greece-romania-and-hungary-for-the-development-of-the-vertical-corridor]

[17] See recent interview of ICGB Executive Director Ms. Teodora Georgieva: [https://3e-news.net/en/a/view/42245/teodora-georgieva-the-igb-is-changing-the-rules-of-the-game-for-the-balkans-in-terms-of-natural-gas-supplies]

[18] DESFA press releases: [https://www.desfa.gr/en/press-center/press-releases/stoixeia-desfa-gia-thn-katanalwsh-fysikoy-aerioy-to-2022]

cubic meters of LNG (almost doubled capacity), the expected completion of the FSRU in Alexandroupolis by the beginning of next year and the planned expansion of the underground gas storage in Chiren envisaging the doubling of its storage capacity are projects of key importance for increasing the diversification and security of gas supplies, since they are expected to increase the share of LNG in the energy mix of both countries in accordance with the *REPowerEU Plan*.

Complementarity of LNG Terminals and Gas Pipelines as a "game-changer" for energy security in SEE

Under the specific conditions created in the European energy landscape due to the war in Ukraine and its aftermath, including the launching of the *REPowerEU Plan*, the focus of the debate about the energy future of Europe has changed. The goals of energy survival, energy security and the implementation of the *REPowerEU Plan* for phasing-out Russian fossil fuels have become a priority for Europe in the short-to-medium term, without however compromising the steady, long-term goal of transition to a net-zero economy. Within this changing landscape, natural gas infrastructure is called upon to play a unique role. Thus, the implementation of the *REPowerEU* strategy is ultimately a prerequisite not only for ensuring Europe's energy survival and security but also for the smooth transition to the green economy.

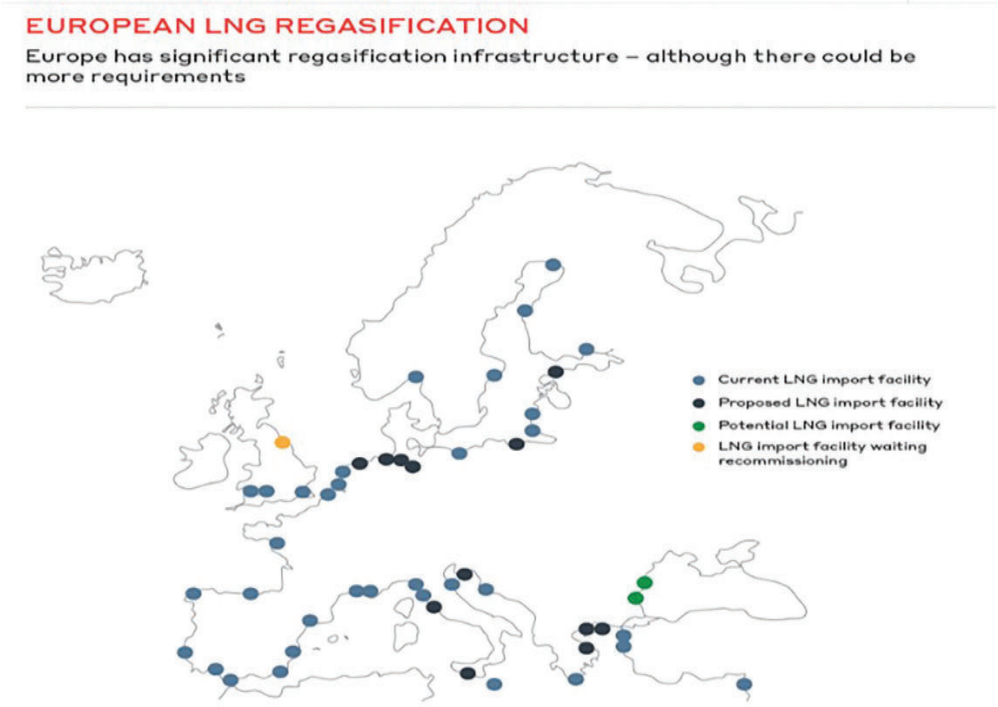
Objectively, the greater region of Southeast and Central Europe has traditionally been largely dependent on gas supply contracts with Russia. The war in Ukraine has emphatically stressed the need for a **regional complementarity of infrastructure**, for the benefit of all parties affected. Towards the fulfillment of this need, apart from natural gas pipelines, the development of LNG terminals will play a key role in the future. LNG supplies enjoy several advantages over pipeline gas supplies, the most important being that they can be shipped and imported from anywhere in the world. In fact, the pivoting away from Russian gas supplies under the present European "gas supply mix" – particularly while the Russian offensive on Ukrainian territory continues but also in the long term – leaves LNG as the only meaningful supply alternative to Russian gas. The EU turned to LNG and emerged in 2022 as the leading market for this type of gas, taking the reins from Asia[19]. Moreover, its growing appetite for LNG already has a profound impact on market pricing and flow dynamics. Importing LNG as a way of diversifying suppliers and routes has become particularly important in the context of the Russian invasion of Ukraine and has taken center stage in the EU's plan to reduce dependence on Russian gas imports. As a result, governments are looking for LNG import infrastructure solutions. This finding has special weight for Southeast Europe.

Starting with Greece and moving further north to countries like Bulgaria, Romania, North Macedonia, Serbia, Moldova and Hungary (excluding Ukraine from the equation), the dependence of the entire area of Southeast and Central Europe from Russian natural gas supplies was calculated in 2021 at 60%, i.e., volumes approaching 22 to

[19] EU Commission Quarterly Report on European Gas Markets (3d Quarter 2022): [https://energy.ec.europa.eu/news/new-reports-highlight-3rd-quarter-impact-gas-supply-cuts-2023-01-13_en]

23 bcm. At the same time, this region is one of the few in Europe that has a significant prospect for strengthening demand for natural gas in the medium term, of around 10% until the year 2030[20]. In fact, the only facilities that can realistically offer alternative supplies of natural gas to this region in the coming years are the TAP pipeline and the already functioning or planned LNG terminals. The latter represent the only truly independent infrastructure in the sense of routing, since they do not pass through transit countries that are "unpredictable" in their international behavior. The only such LNG terminals currently operating in the Southeast and Central Europe region are the one of Revithoussa in Greece and the relatively smaller capacity terminal on the island of Krk in Croatia, which serves mainly the Croatian, Hungarian and Slovenian markets.

It is quite evident that those LNG terminals are not sufficient to meet the increased needs of the entire region. Therefore, LNG terminals such as those currently being developed in Alexandroupolis or planned to be developed in the near future in other regions of Greece are coming to fill a large gap of the needs and demand for liquefied natural gas generated in the region[21].



(Source: WSP Global Inc. [https://www.wsp.com/en-gl/insights/time-for-lng-in-europe])

[20] Institute of Energy for SE Europe (IENE), Athens, November 22-23, 2022: [https://www.iene.eu/articlefiles/inline/sifnaios%2023%2011%202022.pdf]

[21] Private entities in Greece are advancing investments in five new floating liquefied natural gas storage and gasification units (FSRUs) in order to cover increasing fuel demand. See: [https://www.ot.gr/2023/01/09/english-edition/electricity-and-gas-from-greece-will-power-the-balkans/]. With the creation of the new FSRUs that will be connected to the network during the period 2023-2025, deliveries will substantially increase, and Greece is expected to achieve an annual LNG handling capacity of 25 bcm (approximately four times the current demand).

However, in order to have those new terminals operating effectively, it is crucial to complete a network of new projects in the region which are in various stages of development (already operating, in the final phase of construction or planned for the future). Once completed, these infrastructure projects will complement each other by creating the conditions for the smooth transit of gas throughout the whole region. In addition, they will enhance energy liquidity, support the creation of a natural gas hub on a greater scale and, ultimately, accelerate the balancing of prices at the regional and European level, in relation to other major European gas hubs (e.g., Italian Punto di Scambio Virtuale / PSV).

In this context, the natural gas infrastructure projects that are being developed on the territory of Greece's strategic partner in the Balkans, Bulgaria, are of key importance for the achievement of the above objectives, which are also objectives of the *REPowerEU Plan*. In addition to the recently commissioned IGB Interconnector, the launching of construction works for the Bulgaria-Serbia natural gas Interconnector project (IBS) was inaugurated jointly by Presidents Radev and *Vučić* on February 1, 2023. The IBS Interconnector, according to the Bulgarian Ministry of Energy, will be ready around autumn 2023. It will be supplied via the IGB Interconnector with gas from the TAP pipeline and very soon from the FSRU in Alexandroupolis. The Bulgarian Minister of Energy acknowledged that Bulgaria, as an important transit country, enjoys a strategic advantage but also bears responsibility as a guarantor of security in the energy sector, not only for itself but for the entire region[22]. In addition, the IGB Interconnector, as a "game-changer" for the EU's energy security, will also enable supplies to Romania through the IBR Interconnector project, which foresees the possibility for reverse gas flows. Last but not least, very important facilities for the functioning of the overall natural gas transmission system, are gas storage facilities. Bulgaria's UGS Chiren facility, with current storage capacity of 550 mcm, is planned to almost double its capacity to 1 bcm in the near future, which means more flexibility to the system and more benefits for the countries of the region and their energy security.

The FSRU Alexandroupolis terminal project, in which Bulgartransgaz EAD already owns 20% of its share composition, is perhaps the most important and essential link in the complementary operation of the above mentioned "chain of infrastructure". By accepting LNG supplies from any source worldwide (when completed), this terminal will be able to support the viability of the above-mentioned trans-Balkan gas infrastructure under development, as well as energy security in the greater region[23]. Along with FSRU Alexandroupolis, the construction of another terminal in the same area (Thrace LNG terminal) is planned in the coming years, as well as the construction of three more LNG terminals throughout Greece that will change the entire energy map in our region[24]. In the medium-to-long term, those projects may effectively support, through the reverse

[22] Bulgarian News Agency – BTA: [https://www.bta.bg/en/news/balkans/399891-wrap-up-presidents-of-bulgaria-serbia-attend-start-of-construction-on-bulgaria]

[23] See: [https://3e-news.net/en/a/view/42413/from-2024-the-alexandroupolis-terminal-will-provide-access-to-significant-quantities-of-gas-from-alternative-suppliers]

[24] See: [https://www.reuters.com/business/energy/greek-lng-terminals-pipeline-2022-11-30/]

flow of the Trans-Balkan pipeline, the supply of natural gas to the Southeast European region and also to Ukraine, which will be in dire need for more energy resources for its reconstruction after the war ends. The contribution of those projects, in synergy and complementarity with the corresponding projects implemented in neighboring Bulgaria, is of critical importance for the energy security of the SEE region and, ultimately, for Europe. They open new corridors of regional cooperation, in the diplomatic sense, and demonstrate that the energy sector can be a tool of solidarity in countries affected by Russia's policy of "weaponization" of energy supplies. Finally, they put our countries, Greece, Bulgaria and, recently, Romania[25] at the center of strategic developments in a sensitive region, making them points of reference and reliable partners of Europe and the international community.

The way ahead: Positive "Spillover effects" of Greek-Bulgarian bilateral gas cooperation on other energy sector projects and initiatives advancing regional energy security goals

In order to secure affordable and competitive delivery of gas through cross-border infrastructure developed between Greece and Bulgaria, the two countries are already very active participants in the SEE Group of the "*EU Energy Purchase Platform*". Following the second formal meeting of the Steering Board of the EU Energy Purchase Platform on March 2, 2023, in Brussels, the European Commission is currently working on a tight schedule to prepare for next winter and the storage refilling season. 22 EU Member States have expressed their preliminary interest in aggregating gas demand of more than 17 bcm of gas for the next 3 years, topped up by close to 4 bcm of gas demand signaled by Moldova, Ukraine and Serbia. The dedicated platform, which will enable EU Member States to pool natural gas and LNG demand and make joint purchases (*AggregateEU mechanism*), was launched on March 22, 2023, by service provider "PRISMA". A call for expressions of interest for companies (which cannot be linked to Russia in any way) to act as a "*Central buyer*" or "*Agent-on-behalf*" was launched on that date. The procedure is open to all companies which offer services in those 2 models of cooperation[26]. Last but not least, on April 25, 2023, the EU Energy Platform for the joint purchasing of gas – via its *AggregateEU* service – was expected to launch the first call for placing a demand to buy gas, which would be open until May 2, 2023. The logic advocated by the EU Commission services is that "*The more participants we have [in the Platform], the higher the chances of finding attractive gas deals*"[27].

[25] Trilateral scheme of diplomatic cooperation between Greece, Bulgaria and Romania having already convened two meetings (Athens, May 12, 2022, and Sofia, October 13-14, 2022). See: [https://www.bta.bg/en/news/bulgaria/343882-trilateral-meeting-of-bulgaria-greece-and-romania-held-in-sofia]

[26] For updated information on the "*EU Energy Purchase Platform*" and the functioning of "*PRISMA European Capacity Platform GmbH*" , see: [https://energy.ec.europa.eu/topics/energy-security/eu-energy-platform_en] and [https://help.prisma-capacity.eu/support/solutions/articles/36000428919-requests-for-expression-of-interest-in-offering-agent-on-behalf-and-central-buyers-services]

[27] See: [https://energy.ec.europa.eu/news/eu-energy-platform-first-call-placing-demand-buy-gas-open-25-april-2023-04-18_en]

At the beginning of March 2023, the Bulgarian Ministry of Energy has launched an important regional initiative to analyze the gas market in Southeast and Central Europe, which is expected to provide answers to the questions regarding the demand (identification of the necessary quantities for each country) and the possibilities for implementing alternative gas supplies. The goal is to use this information to assess where to increase transit capacity and where to invest in additional infrastructure. According to the Bulgarian Energy Minister, Mr. Rosen Hristov, Energy Ministers of Greece, North Macedonia, Serbia, Hungary, Romania, Moldova and Ukraine have all embraced the initiative and are planning to sign an international Memorandum so that the gas transmission operators can start work on this large-scale study[28]. Once all parameters are received, the parties to the Memorandum can start planning of supplies and diversification of gas sources for the region of Central and Southeast Europe. In this regard, Mr. Hristov also announced at the recent "4th P-TECC Forum" in Zagreb[29] that in the coming period tenders will be held for securing long-term contracts for delivery of LNG from multiple sources to further diversify gas supplies, based on the already secured infrastructure. He mentioned in his speech that "*in order to have security in energy supplies, it is necessary to work at the regional level, not only at the national level*". A gas market test has already been launched, while taking into consideration the demand of all neighboring countries for a period of 3 to 4 years; further steps in this context were linked to the assessment of the current condition of the natural gas transmission system and to plans for upgrades. Completion of the Alexandroupolis FSRU and "complementary infrastructure", such as the IBS Interconnector by the end of this year as well as the Greece-North Macedonia gas Interconnector by 2024, will be very important in this respect – it will provide access to new quantities of gas from various sources (USA, Qatar, Algeria) at competitive prices for the markets in the region. In that way, it will ensure that much of our northern neighbors' demand is met through those systems. Therefore, in the coming period, working together on further developing relevant cross-border gas infrastructure and communicating much more on the best practices in the relevant countries will be crucial for meeting common goals.

Stepping on their already intensive gas cooperation, this winter Greece and Bulgaria have also undertaken new joint diplomatic initiatives to build a strong gateway for additional energy supplies to the Balkan countries and Eastern Europe. The signing on February 16, in Athens, of two bilateral MoUs in the gas and oil sectors marks another crucial move forward, not only in deepening bilateral energy cooperation but also in communicating to the greater region a shared vision on the role of energy as a catalyst for synergies and an enabler of peace. The first MoU on "*Cooperation in the Security of Gas Supply and Gas Storage*", which is similar to the one Greece has already signed with Italy, aims at increasing the resilience

[28] See: [https://business.dir.bg/energien-pazar/do-dni-podpisvame-memorandum-sas-sasednite-darzhavi-za-analiz-na-tarseneto-na-priroden-gaz] (in Bulgarian language)

[29] March 1-2, 2023. See: [https://3e-news.net/en/a/view/41731/rosen-hristov-in-order-to-have-security-in-energy-supplies-it-is-necessary-to-work-at-the-regional-level]

of the energy security systems of the two countries, practically consolidating the energy solidarity between them in a period of intense uncertainty.

The second MoU on "*Cooperation for Exploring the Possibility to Construct the Alexandroupolis-Burgas Oil Pipeline*", proposed by Bulgaria, serves two main geopolitical priorities: a) the need for the rapid and complete independence of European economies from Russian hydrocarbon exports and b) the creation of a new oil route which bypasses the Bosphorus Straits' commercial, transport (railway network) and energy infrastructure network. At the same time, this pipeline reduces the risk of a catastrophic environmental accident that could occur in the Bosphorus Straits due to the oversaturation of their use by dozens of tankers and hundreds of commercial and passenger ships which run through the narrow sea passage between the European and Asian coasts of Istanbul.

However, in order to move forward with that initiative, the direct support of the states involved is needed. Further, the support by the European Commission itself is also a must, as the project serves a fundamental objective of the *REPowerEU* strategy: ending European dependence on Russian hydrocarbons by 2027. Aside from its role at European level, the new oil pipeline project is very important for Bulgaria, Greece and the SEE region as a whole, in its effort to diversify the supply with non-Russian oil. For Bulgaria, it is important because the country hosts on its territory the largest oil refinery in the Balkans ("*Lukoil Neftochim Burgas AD*"), producing oil products for the entire region, and it operates predominantly with Russian crude oil which now must be phased-out. Therefore, new routes for the supply of non-Russian oil must be sought in order for this strategic refinery for Bulgaria and for the whole region to continue operating. For Greece, it is equally important because Alexandroupolis is becoming a regional energy, transport-logistics and defense hub and will be able to receive oil from various sources in the future.

By the end of the current year, Greece and Bulgaria are also expecting finalization of construction of the second electricity interconnection line between Nea Santa and Maritsa East, a long-awaited IPCEI project that is anticipated to further increase the power transmission capacity at the border of the two countries. With this project, the transportability of electricity exports to Bulgaria will increase to 1,400 MW and of imports to Greece to 1,700 MW. The completion of this project will also be of strategic importance for the two countries and for the SEE region, since Greece is currently developing a number of parallel connectivity projects at a strategic point of intersection of international electricity grid interconnections, through which green electricity can be exported to Bulgaria and the whole region. On January 14, 2023, in the presence of the Greek Prime Minister and the Bulgarian Minister of Energy, construction works on the 840 MW new "Alexandroupolis Power Generation Unit" (CCGT) with natural gas as fuel were inaugurated. This new unit, with the participation of both public and private investors from Greece[30], will be connected to the "Nea Santa-Maritsa East electricity interconnection line" and is

[30] See: [https://depa.gr/a-joint-venture-of-dei-depa-commercial-and-damco-energy-alexandroupolis-power-plant-enters-the-implementation-stage/?lang=en]

expected to play an important role in improving the security of electricity supply of Greece and the SEE region. The cost of the investment is estimated at around 400 million euros, and the new unit that will also receive gas from the Alexandroupolis FSRU will be ready in 2025.

Last but not least, on December 14, 2022, the Council of Ministers of Bulgaria sent a "Letter of Support" to the EU concerning the inclusion of the "*project for the construction of an electrical interconnection between Egypt and Greece*" (GREGY) on the IPCEI list of projects. This project aims to ensure the transfer of 3,000 MW of green energy produced in Egypt from renewables and is fully in line with the EU's green energy targets. Its implementation is expected to help increase the cross-border transmission capacity of the electricity network on the border between Greece and Bulgaria, which will promote Bulgaria's energy security and regional trade in electricity and, most importantly, contribute significantly to promoting climate targets and achieving the goals of the European Green Deal. For Greece, the "*GREGY Project*"[31] is key to increasing security of power supply in the region and, at the same time, transitioning to a cleaner energy mix and a zero-carbon economy. The latest news related to this project is that Greece has submitted a proposal for an expanded European grid that would facilitate the transfer of electricity generated by RES between the continent's south and north.

With that proposal, supported by 14 EU Member States (including Bulgaria) at the EU Council of Ministers Meeting on March 28, 2023, the Greek government is seeking, *inter alia*, an approved EU decision to increase investments in electricity interconnections in order to be able to transport quantities of green energy by undersea cables from North Africa (Egypt) to Greece and from there to Europe, via the Western Balkans[32]. The Greek initiative, placing emphasis on the development of electricity corridors linking the continent's north and south, would enable more consistent green energy supply all over Europe throughout the year. In the long term, the significant potential of the Eastern Mediterranean and Southeast Europe regions for both renewable electricity generation and green hydrogen production and its import from trusted and reliable partners will undoubtedly encourage future investments in hydrogen infrastructure. To this end, *Bulgartransgaz EAD* and the Greek transmission operator *DESFA* are already working to interconnect hydrogen networks[33]. This will allow both countries to maintain a key role in the sustainable and secure energy supply for the region, contributing to its green transition and achieving net zero emissions by 2050, in accordance with the *EU Hydrogen Strategy* and the *REPowerEU Plan*.

[31] Project's short presentation is available at the following link (by ELICA Group): [https://www.iene.eu/articlefiles/inline/karydas%2022%2011%202022.pdf]

[32] The Greek proposal is based on data provided by "ENTSO-E", according to which an additional overall capacity of 64 GW can be added at 50 cross-border electricity interconnections in Europe between 2025 and 2030, a development that would boost the European grid's efficiency by 55%.

[33] See: [https://energypress.eu/desfa-bulgartransgaz-seeking-ipcei-support-for-hydrogen-related-projects/]

Conclusion

Under the current geopolitical situation, the implementation and further planning of significant energy connectivity projects in our region is a “game-changer” in providing SEE countries with increased supply options and access to alternative suppliers of energy.

In the longer term, implementation of interconnection projects facilitating e.g. the flow of LNG in the region would further integrate the energy markets, help in building resilience of energy systems in the region and eliminate Russia’s ability to “weaponize” energy supplies in the future, in line with the goals of the *REPowerEU Plan*.

To this end, the diplomatically-driven partnership between Greece and Bulgaria in energy infrastructure development is vital for the goal of “diversification of gas supplies”, which constitutes one of the three central pillars of the Plan. Recently, the Greek-Bulgarian diplomatic partnership is actively expanding its reach, to also include other projects advancing security of energy supplies to our region, while at the same time contributing to its further electrification and green energy transition. In this difficult period for the European continent, Greece and Bulgaria are leading by example in our region, on a bilateral basis with a regional look, within the context of the European energy policy.

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A NEW BALANCE OF POWER – EUROPE'S ENERGY TRANSITION AMID GEOPOLITICAL UPHEAVAL[34]

Kristian Ruby – Secretary General at Eurelectric

My niece was once asked to point out Europe on a globe in connection with a primary school assignment. After a moment of consideration, her face lit up and she started turning the globe. "It's where all the small countries are, right?"

Although the geography remains largely the same, the world around us is changing. War returning to the European continent is just one in a string of developments over recent years that has called into question the balance of power established since the Second World War. The tectonic plates of geopolitics are in motion. Russia, once seemingly on a path towards democracy and becoming a reliable destination for foreign investment, has deteriorated into an authoritarian state with suppression of the political opposition, control over the media, and consolidation of power by a ruling elite. Increasingly, it is wielding its global influence by means of military aggression. And recently Vladimir Putin has asserted his ambition to – at least partly – re-establish the territorial borders of the Soviet Union.

China, once considered an emerging economy, has now truly emerged as an industrial powerhouse with dominant positions in several critical industries. And, breaking with a century-long tradition, it is adopting a far more proactive and assertive role in foreign policy. The United States – previously a leading advocate of global free trade – has ramped up efforts to reshore its industries in recent years and finds itself in an increasingly tense stand-off with China. Internally, deep cultural, economic, and political rifts are polarising the country, which in turn cast doubts over its long-term direction, including its foreign policy. The rule-based world order rooted in universal values, in which Europe has long imagined itself, is in flux and increasingly giving way to geopolitical tension, ideological rivalry, and protectionist industrial policy. Security is no longer a given, putting the EU in a pinch.

Europe is at serious risk of becoming 'the small countries' in more than just the literal sense. To navigate the new balance of power, The European Union (EU) must act swiftly, by doubling down on its green ambitions and reinforcing its resilience – in defence, industry, and energy.

The end of history – and its subsequent renaissance; two decades of Pax Americana

What has happened? Rather than the new situation, many pundits regard the preceding decades as the historical anomaly. In the words of former Prime Minister of Finland Alexander Stubb, we have been on a 30-year vacation from world history.

Following the dissolution of the bi-polar world order of the Cold War, a period

[34] The author would like to thank Nic Steinwand for valuable input and contributions.

of unchallenged US leadership followed in the 1990s and early 2000s, famously touted as the “end of history” by Francis Fukuyama. The United States became *the* key player shaping global politics due to its military might and economic dominance. The period was characterised by concerted efforts to establish a rule-based world order. The world experienced a period of accelerated globalisation and an increase in global trade and investment spurred by the establishment of an international rule set under the World Trade Organisation (WTO).

Another significant characteristic of this era was the emerging effort to take global action to protect the environment. With the growing concerns about climate change and the decline of biodiversity, countries around the world came together to address these challenges. Following the success of the Montreal Protocol to reign in the use of ozone-depleting substances, the signing of the United Nations Framework Convention on Climate Change as well as the Convention on Biological Diversity in 1992 were landmark achievements in the establishment of a global governance structure for protection of the environment.

Overall, the security situation in the 1990s was marked by relative peace and stability. Having emerged as the sole superpower on the global stage, the United States mainly undertook humanitarian interventions in places such as Somalia, Haiti or the Balkans, where it played a leading role in ending the conflicts in Bosnia and Kosovo. The US also led a coalition of countries to drive Iraq out of Kuwait. Although contested at the time, both for their efficiency and legitimacy, these interventions were generally seen to be carried out in response to clear violations of international law and humanitarian norms.

However, the situation changed in the early 2000s, as the US and its allies initiated the War on Terror in response to the attacks of September 11, 2001. The US interventions in Iraq and Afghanistan in the 2000s were widely perceived as less legitimate than those of the 1990s, as they were based on doubtful intelligence and lacked clear justifications under international law. In addition, poor treatment of war prisoners as well as scandals involving torture and harsh interrogation techniques further eroded the moral authority of the US and its allies in the eyes of the broader international community.

In the first decade of the new millennium, China was primarily focusing on reforms and economic development. Joining the World Trade Organisation (WTO) in 2000, the country sought to build industrial strength through a combination of opening up to foreign investment and targeted industrial policies. In return for market access, foreign companies had to accept local content requirements. Domestic companies of strategic importance received a combination of preferential treatment, such as guaranteed demand pipeline, coupled with disciplining measures to ensure continuous technological upgrading.

Russia, on its side, was busy bringing order to its society after the shock therapy and chaos capitalism of the 1990s. The country’s foreign policy mainly focused on conflicts in the fragmented post-Soviet space, notably with Chechnya and Georgia. Vladimir

Putin's world view was already clear at the time, however. In his 2005 annual state of the nation address, he deemed the collapse of the Soviet empire as the "greatest geopolitical catastrophe" of the 20th century, serving as an omen of things to come.

Showing teeth – changing the geopolitical game in the 2010s

In the 2010s, Russian foreign policy saw a significant shift towards a more aggressive stance on the world stage. In addition to covert operations carried out in EU countries, Russia refined its methods of hybrid warfare and increasingly began to systematically deploy cyber attacks and propaganda seeking to meddle in the political affairs of other countries. The shift in policy was also marked by several high-profile actions, including Russia's involvement in the Maidan protests in Ukraine, its intervention in the Syrian Civil War, and the annexation of Crimea.

China, previously focused on establishing itself as the workshop of the world, also began to shift its focus in the 2010s. With Xi Jinping assuming power in 2013, China gradually left the "Peaceful Rise" adage of the Hu Jintao era and developed a more assertive and outward oriented mentality, perhaps best exemplified in their extensive Belt and Road Initiative with investments to the tune of $575 billion in 70 Asian, African, and European countries.

The United States, too, was part and parcel of the shifting balance of power in this period. With the inauguration of President Donald Trump in 2016, populism won out in America. With his 'America First' election campaign Trump struck a note of national self-centeredness and isolationism. Now, upon election, he eyed nearly all the institutions making up the global power structure America had been at the center of hereto.

In addition to aggravating China, he alienated allies in the North Atlantic Treaty Organization (NATO), decried free trade deals like the North American Free Trade Agreement (NAFTA), and pulled out of the Paris Climate Accord which had been negotiated just one year earlier. This demonstrated that the US, which many counted on as a stable ally, was prone to the whims of the administration in power. It also called into question liberal cooperation on a global scale. Data from the Global Trade Alert database show that by 2017 more than 50% of exports from G20 countries were subject to harmful trade measures, up from 20% in 2009. And even today with President Joe Biden, cooperation seen before the Trump Administration has not been restored, and tensions among allies are high. The 2022 Inflation Reduction Act (IRA) that offers subsidies for green technology is exemplary of this, as it puts priority on American made technologies through local content requirements which flies in the face of WTO rules and skirts European industry.

2020s - decade of disruption

The 2020s kicked off with two severe systemic shocks that tipped the scales further. The coronavirus pandemic that gripped the world for more than two years

precipitated major disruptions in the global economy and shifted world views. Then, just as emergency restrictions were beginning to ease across the world, Russia's President Vladimir Putin ordered a 'special military operation' in the sovereign nation of Ukraine – what in the fullest extent of the definition classifies as 'war'. These events triggered two things. First, they created massive uncertainty in supply chains. During the pandemic, many economies were shuttered and the fragility of such a hyperconnected world – where essential supplies are sourced from places all over the globe – became apparent. With the Russian invasion, this materialised in energy supply. Nearly 40% of Europe's gas supply was sourced via pipeline from Russia before the invasion, and a significant portion of that flowed through Ukraine. With the two at war, gas flows fell, and with President Putin dismayed at the West's support for Ukraine, Russia also deliberately tapered off gas deliveries, creating a supply crunch that resonated across the world.

This reinforced a second realisation; that strategic resilience is now a must. Although this seemed to be a long time in the making, it was this moment especially that tipped the EU over the edge. Green ambitions outlined in the European Green Deal could not be met by relying on others to do the heavy lifting. Defense of the continent could not be left up to allies. Producing the technologies needed for both could not be done halfway across the world. The debate in Europe, and indeed the world, on what the new balance of power looks like is now being revisited. Events are still unfolding, and the scale has not found its balance. It is certain that ongoing geopolitical churn will have far-reaching consequences for international security, economic stability, and the distribution of resources in the near future.

Cleaner and greener – the EU GPS to the New World Order

The EU has evolved significantly over the past three decades – culturally, economically, and in terms of political priorities. Although still ironing out the creeses of the Iron Curtain, the European Union is no longer a simple amalgamation of cooperative states – it is a functioning supranational framework for economic, political, legal, social, and cultural integration. Through recent political overhauls, it has been trying to make good on the ambition to lead on climate action and to develop a future-friendly, sustainable economic model. The European Green Deal, envisioned by Commission President Ursula von der Leyen, effectively functions as a strategic, political objective for the continent. With the goal of becoming the first net zero continent by 2050, the EU aims not only to be a leader in the fight against climate change, but also to become a green powerhouse economy.

The key elements of the Green Deal included a European Climate Law, a Biodiversity Strategy for 2030, an Industrial Strategy and Circular Economy Action Plan, and a plan to transform and modernise the continent's agricultural sector – the so-called Farm to Fork Strategy. Alongside this, the Commission set to work on strengthening the 2030 emission reduction targets to bring net zero by 2050

more clearly into range. With a target of 55% below 1990 levels by 2030, the Commission launched a slew of legislation in July 2021. The package, dubbed Fit for 55, wielded over a dozen of legislative proposals aimed at making these emission reductions a reality. This included among other things a regulation to phase out internal combustion engine (ICE) passenger cars and vans by 2035, an increased target for renewables in the energy mix, a carbon border adjustment mechanism for imports of carbon-intensive goods and services.

Policymakers were working through the legislative proposals when in 2022, after weeks of tense buildup, the Russian army rolled over Ukrainian borders. The invasion of Ukraine served as a catalyst for Europe's green ambitions. As the days turned to weeks and months, Russia became ever more aggressive towards the EU in the face of its resolve to support Ukraine. As European countries came together to levy sanctions over the blatant act of aggression, President Putin began to levy his own sanctions. He delivered an ultimatum to EU countries via the state gas company, Gazprom, to either pay for gas deliveries in the Russian denominated Rubel, or face shutoffs. Determined, many countries declined, as long-term contracts dictated that payment could be made in Euros. Nonetheless, Putin illegally went forth culling deliveries.

With nearly a quarter of European energy derived from natural gas and facing a serious supply crunch, Europe needed solutions. As a direct response to the supply crunch from Russia's invasion, the Commission REPowerEU plan sought to end the EU's dependence on Russian fossil fuels through energy savings, diversification of energy supplies, and accelerated roll-out of renewable energy. The EU upped the ante on its green transformation, and this time it was about security, not just the climate crisis. Most recently, the EU also made good on its Green Deal promise for an industrial strategy, although rather in a reactionary manner than a trailblazing one. In August of 2022, US President Biden announced his goliath IRA earmarking some €345 billion in public spending for green energy and climate change solutions. While the spending alone amounted to tax cuts and direct subsidies for things like renewable energy and hydrogen production, electric vehicle (EV) manufacturing, and so on, a red flag for Europe was the preferential treatment of US produced green solutions via local content requirements. Spurred on by the uproar this ignited in Europe over what many saw as blatant protectionism, the EU needed to act.

In February this year, at the annual conference in Davos, Switzerland, President von der Leyen announced the Green Deal Industrial Plan (GDIP) to go toe to toe with the IRA. The four pillars of this plan include a predictable regulatory environment, faster access to funding, skills, and open trade for resilient supply chains. These pillars highlight where the EU thinks it needs to improve, and the plan signals that the EU is also worried of losing its competitive advantage in green developments.

Although a first mover in the manufacturing of many green technologies, Europe today is challenged in terms of competitiveness. Asia, and specifically China, has

come out of the shadows over the recent decades to become a major contender in green technology. When looking at the most important technologies for a green economy – electrolysers to produce green hydrogen, batteries for variable renewable electricity storage and EVs, and EVs and solar panels themselves – many of them are predominantly made in Asia. Not to mention the raw materials needed to produce them. 63% of rare earth minerals, vital to produce EVs and other clean technologies, are mined in China, while 85% of their processing is done there as well. 90% of wafers and other solar PV components are produced in China. Europe lacks access to the first link in the supply chain – the raw materials. In a world of free trade and friendly cooperation there is limited need to shore up the following links, like processing and manufacturing. But the world is changing fast. Rather than the 'just in time' rationale of a hyperconnected world, "just in case" now seems to be the tune of the time.

In fact, permitting, which has also been a major roadblock in clean energy, not only makes mining for the few raw materials on the continent quite difficult, but also makes major facilities for manufacturing difficult to build as well. Europe is one of the most regulated places in the world, and while it is a positive for quality of life, it complicates industry. Now, as it becomes more attractive to locate in places like the US, and harder to compete against a near monopoly in China, Europe will need to take steps to entice its industry to stay on the continent.

Energy transition for climate and sovereignty

The initial reason for the energy transition is that the EU realises the need to act on climate change. Setting emissions reduction targets, aiming for massive additions of renewable energy and ensuring efficient use of energy, is the clearest cut way to decarbonise European society. While there is no doubt that climate change remains a key variable of Europe's decarbonisation mission, the shifting balance of power has introduced other arguments for carrying out the energy transition. Russia's weaponisation of energy quickly after its invasion was a claxon to the EU that it needed to shore up its security of supply for energy. This is exactly what REPowerEU was meant to do.

Along similar lines, the gas shock was not just felt in Europe, but all over the world. Taking so much gas offline for Europe meant, in the short-term, they had to find it elsewhere. The US is one of the biggest liquified natural gas (LNG) exporters in the world, and as a key ally, they could certainly come to Europe's aid. The problem is that Europe did not have the regassification infrastructure in place to handle such deliveries – gas coming from Russia normally came via pipeline. Thus, a conundrum: Europe invests in gas assets to shore up short-term supply, but those assets become stranded in view of the energy transition and phasing out of natural gas. What this crunch did, was force Europe's hand where no solution would be efficient, and it would remain reliant on external partners for its energy

needs. No longer. The energy transition here takes on a third argument, being that it is the way to European independence.

The onus is clear. Europe's pathway in the new world order is the energy transition and there are six elements to it that address the challenges facing Europe. First, electrify industry, transport, and buildings with clean, energy efficient solutions. Building on that, energy efficiency will have to be the name of the game in every technology. Energy imports that cannot be replaced will have to be diversified. Where it can be done, though, energy imports must be replaced with clean power that delivers synergies across different sectors of the economy. To do that, reinforced and digitalised distribution grids are the backbone to ensure this system stands on its own two feet. Finally, bringing it all together, industrial capacity must be built up, especially in clean power.

Electrification – energising the EU in the new balance of power

Electrification is Europe's speedway to decarbonisation and independence in the world. In a study by Eurelectric published in 2017, direct electrification of industry, transport, and buildings – that being, using electricity directly for energy needs – it was found that the EU could reduce CO_2 emissions by 80-95% thanks to a potential electrification of 63% of final energy consumption in transport and buildings, and 50% in industrial processes. In light of today's events, electrification would go a long way to end reliance on foreign imports of energy. Smart meters and thermostats, heat pumps, EVs, electrolysers, rooftop solar PV, and on-site battery storage are all technologies available now to decarbonise buildings, transport, and industry with clean energy. Not to mention the efficiency gains in energy conversion.

European policymakers have already put electrification at the heart of the energy transition, but the EU is still not electrifying fast enough to deliver on decarbonisation targets. More could still be done. Taxing electricity fairly as an energy carrier is a good start, as is prioritising the direct electrification of everything that can be more efficiently powered by electricity that is not already.

Energy efficiency – the first freedom fuel

Beyond efficiency gains from electrification on its own, energy efficiency should be baked into all developments from here on out. With years of scarcity in sight, energy is a precious resource, and we cannot afford to use it in an inefficient way. Recently, the European Parliament voted on the Energy Performance of Builds Directive (EPBD) to bring Europe's building stock into higher classes of energy efficiency, as buildings account for some 40% of Europe's final energy consumption and 36% of emissions. This will be vital to reducing the amount of energy demand in the EU and guaranteeing security of supply. Technical solutions as well need to have the energy efficiency principle in mind. For example, technologies like elec-

trolysis for green hydrogen production are superbly inefficient, losing 40% of the energy delivered by the electricity to produce it. There is a place for hydrogen to be sure, but only when it is the most efficient use of the energy we have. Funnelling energy resources into less-than-optimal efficient solutions will simply go against the objective of energy independence.

Here, we must ensure that the most energy efficient options are prioritised. This means making them the financially attractive option, but it also means ensuring that customers know that it is the most energy efficient and financially attractive option as well. Providing customers with this transparent information will be key to getting them engaged in the energy transition and rolling out more energy efficient solutions.

Diversify energy imports

It would be naïve to assume Europe will shut off imports of energy overnight. Nonetheless, it is important that residual imports are not concentrated in the hands of too few partners, and that those partners can be considered reliable. This is perhaps the starkest lesson for Europe vis-à-vis Russia's invasion and the weaponisation of energy. With 40% of gas supplies having originated in Russia before the war only to be turned off practically overnight, shocks rang out across energy markets. Lesson learned: one should not be lured into strategic dependencies with one – what is more, unpredictable – partner. In the short term, Europe would do good to seek closer ties with more reliable allies. Canada and the United States the closest among them. Another could be the more recently discovered Leviathan gas field in the Eastern Mediterranean, and North African suppliers like Algeria. Although not reliable beyond a doubt, the key is diversification so that any disturbance in supply can be buffered by supply from other partners.

North Africa also has a huge, vastly untapped source of potential solar electricity. As the energy transition marches on, gas will surely become less of a priority, but the intermittency of renewable generation will certainly remain a challenge. Interconnectors are thus also vital to ensure energy – especially variable renewable energy – can flow to where its needed, in and outside the bloc.

Clean power is political power

The simplest answer to the energy crisis, although with a lagging effect, is to build out as much renewable and carbon neutral power capacity as possible in the coming decades. This is the core of the energy transition, and it stands to make Europe self-sufficient in its energy needs. Nonetheless, many raise the question about baseload and the variability of renewables. However, there are solutions for that, too. By retrofitting many of Europe's longstanding hydroelectric dams, we can utilise their capacity flexibility potential more efficiently. Beyond this, existing

nuclear, which provides a steady 20-25% of Europe's electricity, also forms a cheap and efficient source of electricity that will be required in the next decades. Advanced nuclear technology, like small modular reactors, also deserve consideration.

What is critically needed to ensure the buildout is rapid approval. Permitting still takes too long. A wind turbine takes two years for buildout but up to eight years, or more, just to get the permit. To reach our targets and end our reliance on fossil fuels, this needs to speed up. We cannot wait another decade if we want to deliver the plus 700GW of clean capacity by 2030 as set out in REPowerEU.

Escaping the grid-lock: investment in infrastructure

While discussing the tremendous buildout of clean energy capacity needed for Europe's energy security, what often goes unmentioned is the need to build out the grid in turn. The rule of thumb should be that for every Euro spent on generation capacity, an additional 50e¢ - at least - should be earmarked for the distribution grids. In 2021, Eurelectric released a study estimating some €400 billion was needed in distribution grids alone by 2030. And that was before Fit for 55 and REPowerEU upped the ante. The need for reinforcement and digitalisation is clear. 30% of the low-voltage grids in the EU are more than 40 years old, and they were built for a different time where generation was highly centralised in big power plants. Most of the new capacity entering the grid today connects at the low and medium voltage level, causing congestion concerns for utilities. Modernisation of these grids, as well as their digitalisation to understand flows on a more granular level, will be vital to introducing hundreds of gigawatts of distribution level variable energy sources.

Modern tariff structures will be the key to unlock the necessary investments in infrastructure. But complementary financing through the various instruments under the EU Multi-annual Financial Framework is likely to accelerate investments in areas where customers are particularly sensitive to price increases. Moreover, a more modern and agile governance by national regulators is essential for the grid modernisation to keep pace.

Industry capacity for power capacity

Underlying all of this is the industrial capacity to produce the necessary equipment. What we face today is a near monopoly when looking to China for green technologies, but we have learned that we cannot be so strategically dependent. Developing the capacity at home to manufacture our EVs, electrolysers, solar panels, wind turbines, and so on, has become paramount for Europe's autonomy. With the Commission's recently tabled legislation as part of the Green Deal Industrial Plan, the Net Zero Industry Act and the Critical Raw Materials Act look to make that happen.

The Net Zero Industry Act tabled in March 2023 aims at ensuring that 40% of

key technologies are manufactured in the EU by 2030. It identifies eight strategic technologies with a high potential to deliver on this benchmark, including solar PV and solar thermal, onshore wind and offshore renewables, grid technologies, heat pumps and geothermal energy, batteries and storage, carbon capture and storage, and sustainable biogas and biomethane.

As for the raw materials needed, which are also heavily concentrated in the hands of China, diversification of the supply chain is vital. The Critical Raw Materials Act seeks to diversify these supply chains by repatriating at least 10% of the EU's annual consumption for extraction, at least 40% of annual consumption for processing, and at least 15% of annual consumption for recycling, by 2030. Beyond that, the Act dictates that not more than 65% of the Union's annual consumption of each strategic raw material at any stage of processing should come from a single third country. The aim of these complimentary Acts under the GDIP is clear. Getting there will be more difficult, however. Especially, questions remain over the Net Zero Industry Act. Strategic technology choices always entail questions over whether the chosen technologies are the "right" ones. Also, the jury will be out on whether the revised tendering rules for clean technology strike the right balance in terms of a) incentivising domestic production; b) championing resilience and sustainability; c) being manageable for both administrators and bidders; and d) ensuring competitiveness of domestic industry and avoiding unnecessary price increases. Certainly, the strategies will have to be backed by more robust measures, including a clearer link to funding instruments.

As Europe is approaching the election of a new Parliament and Commission in the coming year, all of the targets that have been set in the prior years will need deliverance. To make it happen, policymakers should make the next sitting about that, and enable it with a clear and coherent implementation strategy.

Managing Europe's new fate as 'the small countries'

Delivery hinges on six factors. Electrification needs to be prioritised. Although at the centre of nearly all green legislation in the EU, the rate of electrification still must speed up to reach decarbonisation targets. This goes in hand with energy efficiency. Ensuring customers know their options and their benefits in terms of energy usage and potential savings will be key to lowering overall electricity demand.

Then, where not possible to reduce energy imports, it will be vital to diversify so that Europe's security of supply can never again be disrupted by a rogue actor. The true security of supply though will lie in our ability to roll out mass amounts of clean energy and storage technologies. Permitting will be key to this. Supplementary will be digitalised and expanded grids to handle prosumer interactions and the mass volumes of clean energy that we add to the system. To enable it all, the starting point of the Green Deal Industrial Plan will need to be reinforced with

an all-encompassing strategy – something the next Commission should certainly prioritise for the deliverance of all the rest, and for the energy transition.

Getting all these elements right is the pathway to decarbonising Europe's economy. It is the roadmap to energy security. It is the speedway to energy independence and European autonomy. The energy transition has taken on new meaning amid today's geopolitical upheaval: it is the key tool for the EU to manage its role as 'the small countries' in a world with less certainty, more friction, and a new balance of power.

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THE WAY FROM THE ENERGY UNION FRAMEWORK STRATEGY TO THE REPOWER EU PLAN

Zinaida Zlatanova, Liberal Institute for Political Analyses

The green and climate policy of the EU has its many tools. However, neither energy nor environment and climate fall under the policies where the EU has an exclusive competence. These are the policies where the European Union has an ability to project its weight on the global stage or effectively protect its common economic interest – such as trade, customs union, competition or monetary policy (for the Euro area). These areas are designed by the EU treaties in a way to be able to withstand the powerful pressure of external economic forces. The EU's common foreign and security policy, on the other hand, is characterised by specific institutional features, such as the limited participation of the European Commission and the European Parliament in the decision-making procedure and the exclusion of any legislation activity. That policy is defined and implemented by the European Council and by the Council of the European Union – the Foreign Affairs Council.

Amid this complex legal framework, the EU is trying to speak with one voice and to engage in a constructive way with its partners, as well as play a central role on the global energy stage and be the true leader in climate policy.

On the 26 June 2014, the European Council set the creation of an Energy Union as one of the five main objectives of the European strategic agenda, which sets out EU's priorities for the years to come. On the international stage, the Energy Union[35] "aimed at allowing the EU to speak with one voice, instrumental for the negotiation and the implementation of the Paris Agreement. The EU was willing to continue to lead by example in global climate action."

However, in between, the political and policy framework, which affects the European energy scene, has changed drastically within several years. This caused substantial policy-oriented changes at EU level leading to a set of new initiatives and new legislation on board. In this relation, there is an objective need for a closer look at the Energy Union goals, particularly along the REPowerEU plan.

Energy Union: A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy

The strategy has five dimensions designed to bring greater energy security, sustainability and competitiveness, with emphasis on sustainability and competitiveness. The European Commission firmly believes that a successful green transformation can indeed reduce dependencies and minimise suppliers' potential to weaponise energy. For this reason, and despite the declarations of the opposite, the Energy union looks from a today's point of view more as an

[35] COM/2015/080finalhttps://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0080

inward-looking project. That approach is based on the assumption that a well-functioning and big enough market is a good tool, vis-à-vis external suppliers. The first dimension "Energy security, solidarity and trust" contains a part devoted to the external energy policy – "Stronger European role in global energy markets", but the rest of the strategy deals mainly with the internal EU issues.

The progress was measured annually using different dimensions and giving priority to different aspects of the strategy. That is why it is difficult to measure strictly the overall progress. The Commission considers the strengthening and completion of the internal energy market and coordination of energy policy main instruments for increasing EU's geopolitical capacity.

For that reason and the institutional reasons listed above, the geopolitical approach in the EU's energy policy is triggered by external (dramatic) events – such as the Ukraine crisis back in 2014, COVID-19 consequences to the global supply chains in 2021 and the war of Russia against Ukraine in 2022. In its ***Energy Security Strategy***[36] from 2014 the Commission warned and called for awareness among both policy makers and consumers about the steps that need to be taken in the near future for reducing dependencies on certain fuels, suppliers and routes.

In fact, the Energy Union builds on this ***Energy Security Strategy***. According to the latter, the key drivers of energy security are the completion of the internal energy market, better energy efficiency and more solidarity among the Member states. The understanding of the Commission was that the EU needs to transform Europe's energy system and the respective actions were set out and listed as fifteen points at the end of the document. The initiatives to be developed have a clear timetable for adoption and implementation as well as respective responsibilities. These internal reforms required actions on both EU and Member State levels at the same time and a lot of negotiations within and between the EU institutions.

The Five Energy Union Dimensions

The first dimension *"Energy security, solidarity and trust"* deals with diversification of supply (energy sources, suppliers and routes), working together on security of supply, stronger European role in global energy markets and more transparency on gas supply in particular. The Commission, however, believes the completion of the internal energy market, enhanced energy efficiency, and solidarity between the Member states will ensure energy security.

The second dimension is related to *"A fully-integrated internal energy market"*.

The Commission analyses the need to update the internal market's hardware – that means to complete and modernise the national and trans-European energy infrastructure and upgrade and modernise the internal energy market's "software", meaning laws and regulations to be put in place that provide for better governance of the Energy Union and the respective national systems. The internal market

[36] COM(2014) 0330 https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52014DC0330

integration should ensure better cooperation between the Member states within a common EU framework. Protection of the vulnerable and empowerment of consumers are also part of that pillar.

The third dimension focuses on *"Energy efficiency as a contribution to the moderation of energy demand".*

The Strategy pays special attention to the energy efficiency of the building and transport sectors. Transport represents more than 30% of final energy consumption in Europe, and its decarbonisation and energy saving reforms seam urgent already in 2015.

The fourth dimension emphasises on *"Decarbonisation of the economy".*

The Commission sees a well-functioning EU Emissions Trading System as a pillar of Europe's climate policy. It is seen as a tool that will deliver a fair price on greenhouse emissions and stimulate their reduction. The European Commission wants the EU Emissions Trading System to fully play its role as a technology-neutral, cost-effective and EU-wide driver for low-carbon investments. Other ideas whose development we will see in the subsequent strategies, such as land and forest sectors' inclusion in the EU 2030 framework, are presented in this chapter. The EU's long-standing ambition to become a leader in renewable energy is clearly outlined in this chapter as well.

The fifth dimension is about the *"Union for Research, Innovation and Competitiveness"*

Actions should be grouped around the following four priorities, to which Member states and the Commission would commit and contribute:

– being the world leader in developing the next generation of renewable energy technologies;

– facilitating the participation of consumers in the energy transition through smart technologies;

– efficient energy systems to make the building stock energy neutral;

– more sustainable transport systems that develop and deploy at large scale innovative technologies.

Additional research priorities which require a much greater level of collaboration between the Commission and those Member states that want to use these technologies:

– A forward-looking approach to carbon capture and storage (CCS) and carbon capture and use (CCU) for the power and industrial sectors, which will require an enabling policy framework, including a reform of the Emissions Trading System.

– Ensure the highest standards of safety, security, waste management and non-proliferation in the nuclear energy sector. The EU should also ensure that it maintains technological leadership in the nuclear domain so as not to increase energy and technology dependence.

Recalling these facts about the Energy Union certainly provides important frame for the analysis of the REPowerEU mechanism as such.

The REPowerEU Plan[37]

Since 2020, events unseen in generations occurred and forced an urgent reality check and change of the course of action. The interruption of the supply chains and physical stop of the world's transport, blockage of key transport routes, health and sanitary emergencies created a very different policy environment.

In the middle of the COVID-19 pandemic, on the 25 January 2021, The Council of the European Union adopted conclusions on *"Climate and Energy Diplomacy – Delivering on the external dimension of the European Green Deal".*[38] The document says that EU energy diplomacy will continue to play a key role in maintaining and strengthening the energy security and resilience of the EU and its partners and calls on the Commission for more decisive measures to ensure Europe's leadership.

A year later, amid the dramatically changed geopolitical reality and the aftermath of the COVID-19 pandemic, it became clearer than ever that the Union's energy security and energy independence are a key pillar of economic and political resilience and a matter of strategic autonomy. The central element of EU's policy response to these immediate challenges was the ***REPowerEU*** plan***.***

The ***State of the Energy Union 2022 Report***[39] shows what actions have been taken by the EU in response to the current energy crisis, how much progress has been achieved overall and – most importantly – it makes the transition to a new long-term approach for meeting the new challenges, notably through the ***REPowerEU*** plan. Its level of ambition matches the gravity of the situation when it was developed and requires the EU to act swiftly and decisively.

The **REPowerEU** is no less than a clear and sound road map intended to eliminate Europe's reliance on Russian energy sources by 2027.

The renewable energy sector is planned to play a key role in this effort together with a much more active international effort. The plan consists of three pillars:

– reduction of consumption and savings;

– diversification to find alternative energy supplies of gas, oil and coal as quickly as possible, and looking in the long term for renewable hydrogen suppliers while future-proofing the corresponding infrastructure;

– acceleration of the transition to renewable energy sources, perceived as the cheapest and cleanest energy available that can be produced domestically.

The Joint Communication on EU External Energy Engagement

The plan was published along with a new ***Joint Communication on EU external energy engagement***[40] sending a clear message that the green energy transition

[37] COM(2022) 230 final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022-%3A230%3AFIN

[38] https://data.consilium.europa.eu/doc/document/ST-5263-2021-INIT/en/pdf

[39] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0547&qid=166659-5113558

[40] JOIN(2022) 23 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=JOIN%3A2022%3A-23%3AFIN

is at the heart of the EU's drive for energy independence and moving away from Russian fossil fuels. Green and climate diplomacy is based on an assumption that green transformation can eliminate or reduce dependencies not only for the EU but globally.

The ambition, as declared in the *Joint Communication*, is to lay the foundations of the new global energy system that "will be fundamentally and structurally different from todays". There are several groups of key actions:

– leading by example to accelerate the global green and just energy transition remains a firm commitment of the EU;

– a central role is envisaged to the actions preparing the EU for renewable hydrogen trade, including negotiating a favourable international framework;

– repowering Ukraine's energy system and cooperating with the close neighbourhood is outlined as a priority action of the broader policy for future support for the partners impacted by Russia's invasion of Ukraine.

The *Joint Communication* recognises that many challenges still lay ahead. At the same time, there is a rare opportunity to build on the EU's leadership in the green transformation and make that change inclusive and fair for as many countries and regions as possible. The document tries to give a comprehensive and structured solution of how to meet emerging challenges and use new opportunities at the same time. The proposed solution can be summarised as follows:

Short term action to end dependency on Russian fossil fuels

Moving away from Russian gas and oil requires short- to medium-term substitution from other suppliers. The potential solutions include a supply of LNG from the **US** and **Canada**, and a trilateral agreement with **Egypt** and **Israel**. However, the *Joint Communication* suggests that "the EU will favour diversification strategies that encompass both gas and green hydrogen investments." To this end, the EU has launched the *EU Energy Platform*. **Norway** increased its deliveries to Europe and both **Algeria** and **Azerbaijan** have expressed their willingness to do so as well. Countries in **Africa**, such as **Nigeria** (already supplying 15% of EU 2021 imports), **Senegal** and **Angola** also offer untapped LNG potential.

Hydrogen

The Commission suggests to explore the potential of reliable hydrogen partnerships. It envisages three major hydrogen import corridors from **the North Sea region** (**Norway** and **UK**), the **Southern Mediterranean** and **Ukraine,** as soon as conditions allow. The Mediterranean is considered the region with particularly high potential. The future global hydrogen market must be based on common rules, namely for standards, certification and good regulatory practice, in terms of infrastructure and trade. The EU considers its regulatory framework for hydrogen to be the most advanced and will seek support for its worldwide acceptance.

Supporting and cooperating with the neighbourhood

Another priority is the support partners affected by recent crises, whose economies slowly started to recover from COVID-19 when food and energy prices

reached unprecedented highs. To that end, the EU will deploy its development and trade tools to help developing economies recover, notably in Africa and the EU's neighbourhood. Repowering Ukraine's energy system, ensuring nuclear safety and promoting regional cooperation with the near neighbourhood become part of the EU energy priorities. Future full integration of the energy markets of Ukraine, the Western Balkans, Moldova and Georgia has already started with the opening of the EU platform for common purchases of gas. For that purpose, a ***REPowerUkraine initiative***[41] is under preparation to restore and rebuild the damaged Ukrainian energy system. Finally, the EU plans to propose to the Western Balkans to fully integrate into the EU internal electricity market.

Leading the global green transition

The globalisation of the green transition is also supported by development aid and other financial instruments of the EU. For instance, in October 2019, the EU together with Argentina, Canada, Chile, China, India, Kenya and Morocco (further countries have now joined), launched the International Platform on Sustainable Finance, and 35% for the Neighbourhood, Development and International Cooperation Instrument 2021-2027 should be spent on climate. Being consistent in its efforts, already in 2014, an EU flagship initiative – Global Climate Change Alliance+ was launched. Its main channel for EU support in developing economies was the Global Climate Change Alliance Plus (GCCA+). This initiative ran from 2014 to 2020 and projects are currently being finalised. The full list of EU's global initiatives can be found on the European Commission's website devoted to the topic.[42] The EU is already the largest donor to the global commitment for climate finance and this trend will continue. The EU will explore possibilities for transition partnerships with more regions and countries around the globe, promoting and financially and technically supporting the green transition. The European Commission together with the EU High Representative have launched the Global Gateway[43], a new European strategy to boost smart, clean and secure links in the digital, energy and transport sectors, and to strengthen health, education and research systems worldwide.

Cooperation in research and technology and Access to critical raw materials

The substitution of fossil fuels beyond renewable energy and hydrogen is a priority in research and development activities in the EU and its partnerships. That is the case with critical raw materials, access to which is essential to develop the low carbon economy. The EU is aiming at preventing future dependencies in this sector. Sustainable Raw Material Value Chain Partnerships with **Canada** and **Ukraine** are already established, and the European Commission is looking

[41] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: Ukraine relief and reconstruction, COM/2022/233 and JOIN(2022) 23 final, p.11

[42] https://climate.ec.europa.eu/eu-action/international-action-climate-change_en

[43] JOIN(2021) 30 final Joint Communication to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank – The Global Gateway

towards **Australia**, **Latin Amerika** and part of **Africa** to apply the same approach of mutually beneficial partnerships.

The Joint Communication is indeed a document about engagement and partnership for the EU to promote the internationalisation of the European Green Deal to tackle the global challenge. It does this through an active European diplomacy that makes use of trade and development instruments, aimed at engaging with other major economies to convince them to join Europe's effort.[44]

However, in the recent years the restrictive measures that the EU imposes on persons and businesses should be commented briefly in light of the energy diplomacy, too. In case of the recent sanctions packages towards Russia, the EU restrictive measures involve many EU policies, including trade, investment, competition, and research and technology. Although they cannot be directly linked to the energy diplomacy, it is well known that restrictions and sanctions are a foreign policy tool and not an economic policy instrument. Restrictive measures, or sanctions, are one of the EU's tools to promote the objectives of the Common Foreign and Security Policy (CFSP), including for preserving peace, preventing conflicts and strengthening international security.

In March 2023, the Council of the European Union said: "EU energy diplomacy will actively support the implementation of relevant sanctions and the rollout of the price-cap mechanism on Russian oil and petroleum products."[45]

The State of the Energy Union 2022 Report gives also an interesting insight on the Bulgarian situation and starting position ahead of the ***REPowerEU*** implementation. The published snapshots per EU countries compare key national figures with the EU average in areas of energy security, markets, energy poverty and Recovery and Resilience Plan contribution to the Green Transition.

The place and potential of Bulgaria:

The internal situation

State of the Energy Union as of 2022: Bulgaria

According to the 2022 **Report on the Achievement of the 2020 Renewable Energy Targets**[46], "*the renewable energy shares in 2020 vary widely across Member states, reflecting the different starting positions and national targets set for each Member State in RED I. Considering both national deployment and currently notified statistical transfers, all Member states except from France achieved a share equal to, or higher than, their 2020 binding renewable energy target under RED I. Some Member states* ***exceeded their targets*** *by far;* ***Sweden*** *was 11.1 percent points above its target,* ***Bulgaria 7.3 percentage points****, and* ***Finland*** *5.8 percentage points."*

[44] https://www.eeas.europa.eu/eeas/climate-environment-energy_en

[45] Council conclusions on Climate and Energy Diplomacy as approved by the Council at its meeting held on 9 March 2023

[46] COM/2022/639 final, REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL 2022 Report on the Achievement of the 2020 Renewable Energy Target

The **Report** is accompanied by very detailed energy snapshots per country that are looking into energy security, energy markets, energy poverty and the respective Country Specific Recommendations in the energy sector. Bulgaria's indicators can be easily compared to the EU average and with other Member states indicators.

The overall energy import dependency of Bulgaria in 2022 compared to the EU average[47] is presented in Figure 1.

Figure 1.

	2000		2010		2019		2020	
	BG	EU	BG	EU	BG	EU	BG	EU
Fuel Import Dependency (%)	46.6%	57.8%	40.4%	57.4%	38.3%	62.3%	38.1%	59.2%
of Solid fossil fuels	35.2%	29.8%	24.5%	38.2%	7.2%	43.3%	9.2%	35.8%
of Hard coal	101.0%	43.2%	86.0%	57.7%	57.6%	67.9%	69.0%	57.4%
of Oil and petroleum products	97.5%	99.8%	104.3%	102.1%	104.2%	105%	99.4%	105.6%
of Crude and NGL	98.7%	92.5%	99.1%	94.4%	102.6%	96.6%	99.4%	96.2%
of Natural gas	93.5%	65.7%	92.6%	67.8%	100.4%	89.7%	96.4%	83.6%

Source: EU energy statistical pocketbook and country datasheets based on Eurostat, European Commission Bulgaria Energy Snapshot 2022

Dependency from Russian Fossil fuels[48] – Figure 2

Figure 2

EU27	44%	26%	54%
BG	75%	63%	85%

Source: Eurostat, European Commission Bulgaria, Energy Snapshot 2022

One particular aspect in the overall energy context, which needs specific attention, is the energy poverty, being an indicator that is easy to compare. It is also a part of the 2022 snapshots per country and has to be taken into account when taking decisions in the energy sector. Beyond certain levels, energy poverty might influence the pace, the substance and the financial cost of reforms, and force governments to divert from policies decided together with other Member states. The comparison of just some Member states gives a double-digit difference between the results and looks the following way[49]: Inability to keep home adequately warm (households %) is reported to be 23.7% for Bulgaria, 17.5% for Greece, 10.1% for Romania and 1.7% for Austria, at EU27 average of 6.9%. Arrears on utility bills

[47] Negative value indicates net exporter: country that exports more fuels than it consumes. Values higher than 100% mostly refer to the build of stocks (increase of fuel in stocks), however, they might be also a result of statistical discrepancies in raw data.

[48] Eurostat, 2020, share of Russian imports over total imports of natural gas, crude oil, including intra-EU trade. For the EU27 average, the total imports are based on extra-EU27 imports. For crude oil in BG, the Russian share can be underrepresented due to unclear ultimate country of origin. 2019 data has been used. 2020 import data is not informative, as large qualities of crude oil imports had been categorised as from 'not specified' trade partners.

[49] Source: Eurostat: Statistics | Eurostat (europa.eu) European Union Statistics on Income and Living Conditions (EU-SILC) 2021

(households %) – 19.2% for Bulgaria, 26.3% for Greece, 7.3% for Romania and 2.4% for Austria, at EU27 average of 6.4%.

Bulgaria and the REPowerEU plan

The most important part of the **REPowerEU** that relates to Bulgaria is the additional financing[50] provided and the **Joint Communication on the EU's External Energy Engagement**.

In order to encourage ambition to speedy decarbonisation, Member states can follow the European Commission's request of updating Recovery and Resilience Plans in order to access funding for their sustainable energy-supply infrastructure. According to the EU Climate Law adopted in June 2021, each country has to individually decide how to reach net zero by 2050. The REPowerEU Regulation of 27 February (EU) 2023/435 gives the opportunity to each Member state to present an additional REPowerEU chapter in its Recovery and Resilience Plan. For that purpose, the Regulation stipulates for an allocation of 20 bln Euro additional non-repayable financial support. The REPowerEU chapters should include new reforms and investments, starting from the 1 February 2022, contributing to the REPowerEU objectives and tackling the crisis caused by recent geopolitical events. The indicative allocation for Bulgaria is 480,047 mln Euro.[51] This Annex sets out the methodology for calculating the allocation share of the resources in the form of additional non-repayable financial support under the Facility referred to in Article 21a(1) available for each Member State.

Though EU Member states have to submit until the end of August 2023 their revised National Recovery and Resilience Plans, the European Commission is urging them to submit their revised plans even earlier. Bulgaria doesn't announce any plans yet, at least to the broader public. The situation is different in Greece. The country's revised RRF plan will be linked to Greece 2.0 programme revisions resulting in the addition of new actions for the allocation of an additional 769 mln Euro the country is entitled to from the REPowerEU programme.

Bulgaria and the region

The **Joint Communication on the EU's External Energy Engagement (EEE)** looks for broadening the **geography** of EU's partnerships in the short- to mid-term. If Bulgaria looks into the measures planned for the **Western Balkans** and other immediate or close neighbours – the **Western Balkans** are considered key strategic partner: "The resilience, energy security and green transition of **Ukraine**, **Moldova** and **Western Balkans** are linked to the EU's and therefore a central priority." Specific tool in the context is the ***EU Energy Purchase Platform,*** which is meant to enhance cooperation between EU Member states by also including the neighbours. Bulgaria was the first country to agree in April 2022 to set up in Sofia a first regional taskforce, as part of the ***EU's Energy Purchase Platform***.

[50] REGULATION (EU) 2023/435 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation (EU) 2021/241 as regards REPowerEU chapters in recovery and resilience plans and amending Regulations (EU) No 1303/2013, (EU) 2021/1060 and (EU) 2021/1755, and Directive 2003/87/EC provides additional non repayable financial support

[51] ANNEX IVa to REGULATION (EU) 2023/435

The taskforce was established at a ministerial meeting called "Southeast Energy Transition – Regional Cooperation for Energy Security, Diversification and Transition." Officials from **Bulgaria**, **Greece**, **Republic of North Macedonia**, **Romania**, **Serbia**, **Turkey**, **Ukraine**, **Azerbaijan** and the European Commission discussed decarbonisation and the green transition in early May 2022 in Sofia. The aim of the taskforce set up in Sofia was for the participating countries to jointly diversify their energy supplies, most of all gas deliveries, and strengthen energy security.

Without any doubt, the EU will also continue supporting the **Western Balkans'** Green Agenda in the framework of their EU accession perspective reform efforts. The Energy Community, with the support from the European Commission, is working to determine the energy and climate targets for 2030. The Clean Energy Package from November 2021 under the Energy Community Treaty is meant to send investment signals and to reinforce political will and action. The EU's intension to fully integrate the **Western Balkans** into the EU internal electricity market also provides interesting opportunities for the neighbouring EU countries in terms of investing in accelerated green transition.

Turkey is mentioned once in the Strategy with regard to the cooperation in meeting green standards: "Cooperation with Turkey should continue on decarbonisation, to ensure alignment of the Turkish legal framework with the EU acquis, including through the Turkish Investment Platform."

Ukraine and Moldova can be literally seen present in almost every part of the EEE Strategy.

Concerning the **thematic range** of actions that should be of interest for Bulgaria, **nuclear** safety and security are an important part of the Engagement. On the safety issue, the EU mobilises its European Instrument for International Nuclear Safety Cooperation to address the urgent needs of the current situation in Ukraine. Diversification of fuel supply for nuclear power plants is an important task to end dependencies. Nuclear energy is likely coming back to stay for a while – it turned out to be an important part of the green transition in at least half of the EU as well as in the neighbourhood. Amid this situation "…the EU will assist nuclear utilities in expediting the licensing process of alternative fuel for the Russian design VVER reactors and work with international nuclear organisations such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) under the Organisation for Economic Co-operation and Development (OECD) to build up cooperation in the area of security of supply. Work with partners such as Canada is already ongoing." The Energy Union provided a framework of the needed policies already in 2015. That framework takes into account the constrains and opportunities of the Treaties in the field of energy. It is an example of how forward looking the European Commission can be, anticipating future problems, including geopolitical ones, and giving potential solutions. While considering the best way and time for implementing these solutions, the situation was changed dramatically

by the events after 2020. The REPowerEU plan is an example of a swift reaction by EU institutions and Member states together facing events unseen for generations. Ultimately, it is in the hands of national governments how they will make use of the European framework and how prepared they will be to face the next crisis.

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EU's ENERGY AND CLIMATE POLICIES AT A TIME OF ADVERSE GEOPOLITICS

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Introduction

At the time of writing this article, positive references to the European Union's overall performance seem to prevail. From its COVID recovery initiatives to the EU's effective response to the Russian invasion of Ukraine, the EU has demonstrated it can not only weather crises but provide leadership in times of trouble, observe two Wilson Center researchers. [1]

However, things did not quite look this way only a few years ago. By the time of the May 2019 EU Parliamentary elections, the European project had already been put to the strain of an array of Euro-skeptic, anti-European and openly destructive political forces from both within the Union and, increasingly, from powerful external sources. In the period starting with the 2007-2008 global financial and economic crisis – the responsibility for which was never fully attributed to the culprit parties – at least three radical developments had occurred in Europe: Brexit; right-wing populism, which for the first time since WWII demonstrably found its way in parliamentary representation and political influence; and left-wing populism (which, amongst others, threatened the eurozone in 2015). [2] Important differences surfaced between France and Germany, hitherto regarded as integrated Europe's solid common foundation, on issues such as the rules and management of the eurozone, the European Central Bank's policy or European defense. Ideas suggesting a two- or even three-speed European Union were openly advanced in Brussels circles, exacerbating the parallel rise of ill-conceived Euro-skepticism in certain Central European countries.

The external environment and foreign actors bore the marks of equally dramatic developments. An unsubstantiated shift in the US posture towards the European Union, initiated by the Trump Administration, highlighted the cause of the nation state – a most sensitive issue in Europe, discouraged integration and undertook high-level interventions into European politics under the eyes of shocked European audiences. This came on top of a steady stream of cyberattacks, disinformation and hybrid operations by Russian sources in the governmental, parliamentary, party politics, critical infrastructure and other vital systems of most EU Member States. The Kremlin policy sought to divide and weaken the European Union, as pointed out by a number of European politicians. For its part, China almost succeeded in detaching the Central and Eastern European Member States from their Western EU partners through the 16 + 1 format and the Belt and Road Initiative investments.

Bitter divisions among Member States on fiscal discipline had contributed to this outcome. The Commission continued with policies in support of the European project, including energy and climate, but a unity of purpose seemed to be missing.

The outcome of the 2019 European parliamentary elections, however, demonstrated a higher level of positive political activism and a more mature European electorate than expected, both of which contributed to the preservation of the traditional consensus of support for further European integration, the eurozone, globalization and transatlantic unity.

Against this backdrop, and bringing a new spirit of ambition to Brussels politics, European Commission President Ursula von der Leyen launched the European Green Deal (EGD), a concept and a grand strategy of historic significance to the people of Europe and the world at large. On the home front, the EGD has been designed to play the role of a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net GHG emissions by 2050 and where economic growth is decoupled from resource use. Internationally, the EU commits to act as a global leader, continuing to promote and implement ambitious environment, climate and energy policies across the world. It will develop a stronger 'green deal diplomacy' focused on convincing and supporting others to take on their share of promoting more sustainable development. [3]

The EU believed it was setting a credible example, complimented with diplomacy, trade policy, development support and other external soft power policies. The EU advocacy proved effective: less than a year after the EGD's launch, dozens of countries across the world shared, or declared support for, the European transformational approach and climate targets, including nine of the ten most developed nations.

COP 26 in Glasgow, while of more modest outcome than initially planned, highlighted several noteworthy trends:

- multilateral accords on key issues such as reduction of methane or phasing-down of coal proved possible;
- China and the US, the two leading global emitters, indicated they were generally prepared to work together to tackle climate change; but above all,
- 450 banks, investors and insurers representing $130 trillion in assets, named *Glasgow Financial Alliance for Net Zero*, committed to decarbonize their businesses by mid-century, use science-based targets, and provide 2030 interim goals; their commitment, albeit voluntary, has indicated for the first time after the Paris Agreement that a large part of the global business and banking community accepts the net-zero concept as the overarching principle of their further activities. [4]

Taking the world on a transformation journey to 2050 and beyond, as the EU suggests, cannot be however only about cooperation. It has been evident from the start that the process will entail severe forms of industrial, technological and resource competition that will unavoidably lead to a re-ordering of the geopolitical

and geoeconomic standing of states and groups of states, as the global fossil-based economy gradually gives way to comprehensive net-zero solutions. There again, the EU is particularly well placed to act as a facilitator in multilateral fora and other formats dealing with trade and competition disputes.

Three months after the closure of COP 26, Russia invaded Ukraine. A deeper analysis will reveal that the emerging global consensus on the feasibility of climate neutrality, shaped in Glasgow, was not unrelated to the Kremlin's final decision to go to war…

The European Union is undoubtedly the most negatively affected party in the ensuing disruptive trends in international relations, in ways much more important than just the interruption of contracted Russian energy supplies. Today, the magnitude and the pace of the global energy transition, decarbonization and biodiversity are driven primarily by the European Green Deal, the US Reduction of Inflation Act and, with some trepidation, China's XIV National Plan. Consistent net-zero policies are also pursued by the UK, Japan, Canada, the Republic of Korea and Australia. India joined late but being the third biggest polluter, its contribution is appreciated. So is the importance of Brazil's Amazon basin thanks to a change of climate policy under the new president.

While the first and the second biggest economies experience roadblocks on their respective pathways to net-zero, albeit of different nature and market implications, it is the European Union that is facing really cumbersome challenges. Of the three, the EU is the most disadvantaged in terms of own fossil-based energy, which denies the EU even a limited leeway for a more relaxed pursuit of its ambitious green transition plans. The Union operates in a complex consensus-building environment by default and an even harder to achieve coordination of EGD-related national implementation measures. Notably, the Union has also offered the countries in the Western Balkans, its Eastern and Southern Neighborhoods as well as leading capitals in the Global South to work with the EU strategically in a common quest of climate neutrality and long-term economic cooperation: this requires strategic insight, resources and diplomatic clout that the Union has yet to develop in full.

The EU has embedded these policies and core interests in an approach that seeks to bring the technocratic and business imperatives in the Green Deal closer to the aspirations of the European citizens. The EU's contribution to the global green and digital transformation should be seen as intrinsically linked to the Union's principles, values and strategic goals. These involve, among others, commitments to society's security and social justice; the need to strengthen the European project; and the challenge of being a stalwart of democracy and human rights worldwide. The long-standing ambition of enhancing EU's role of a global geopolitical player remains half fulfilled.

The Multilingual Digital Platform for the Conference on the Future of Europe, where 48,530 contributions with 18,955 ideas were recorded, is indicative of the thinking and preferences of the European citizens and other stakeholders. The

Platform rated climate change and the environment as the leading topic. The contributors called for a stronger EU presence in the global political arena in line with the EU's core values. Related to recent hikes in energy prices and the EU's problematic dependency on Russian gas and oil supplies, contributors have called for an accelerated switch to renewable energy sources, promoting more conscious energy consumption, as well as advocating EU energy sovereignty. They suggested that the EU should be bolder in its exercise of both soft and hard power. [5]

The current adverse geopolitical environment and a bourgeoning global competition are leading the list of risks and threats impacting on EU's very vocation of a recognized and influential soft power and a leading trading block. To counter these setbacks to its long-term energy and climate policies, the Union has developed new strategies under the *Green Deal Industrial Plan*. The initiative will prevent fragmenting the single market by incentivizing relevant European companies to keep their production lines here and by making Europe a central location for cleantech innovation and industries. More than ever, the Union needs unity and solidarity among its Member States, and a propitious international setting, to be able to fully realize its open and constructive policies. This article addresses the EU's energy transition and climate policies in the current complex and challenging geopolitical context.

From energy crisis management to conceptualizing EU's net-zero industry

The intentionally created energy crisis exposed the EU's severe vulnerability to volatile fossil fuels and unreliable energy suppliers. Few of the existing EU safety nets related to security of supply and solidarity, e.g., those inscribed in the Energy Union, worked satisfactorily. The EU needed a full-blown crisis to realize that the existing resilience measures were essentially ineffective.

So acute were the implications that the Union did not hesitate to reconfigure and bend, albeit temporarily, such tenets as the energy trilemma and established market fundamentals. The countermeasures proposed by the European Commission were slightly chaotic and unconvincing at the beginning but they soon assumed a more systematic and comprehensive character, covering industrial sectors, small and medium-sized enterprises (SME) and households alike. Some observers kept their criticism regardless.

What really occurred was an unanticipated and enforced acceleration of the process of abandoning fossil fuels in the EU. It gathered strength from a trove of concepts, experiments, technologies and industrial applications which the Member States' energy and industrial sectors had already applied or adopted in the initial stages of implementing the European Green Deal (EGD). In other words, had the EU been faced with such massive interruptions of contracted energy supplies in the absence of the EGD strategies, the Union's response could not have been so rapid, largely effective and forward-looking.

The brunt of hardship and sacrifice fell on the European citizens and on European

business. The citizens in particular have reacted with laudable civic maturity and have imparted decisive political support for the Union's approach. The occasional outbursts of protest in European cities should rather be seen as a reiteration of the European citizens' right to a free public voice. Being supportive of EU and Western sanctions on Russia and Russian officials and oligarchs – and of EU assistance to Ukraine's war effort – on the one hand, and expressing anger with the rising cost of living, on the other hand, is a feature of European democracy and its values.

A Flash Eurobarometer survey was conducted in the 27 Member States between 13 and 20 April, 2022, with 26,066 EU citizens having been interviewed online. [6] The survey established large consensus among EU citizens in favor of the EU's harsh response to Russia's invasion of Ukraine. In particular, roughly 85% of Europeans believed that the EU should reduce its dependency on Russian gas and oil as soon as possible to support Ukraine. The vast majority of European citizens saw the abrupt and painful shift in EU energy policy through the prism of the European and the Euro-Atlantic interpretation of Russia's invasion of Ukraine. This should explain the consistency of EU's supportive attitude to Ukraine and the far-reaching measures intended to "drastically accelerate the EU clean energy transition". Renewable energy and clean hydrogen, among others, stand out as two key areas in which the EU has clearly proven its ability to mobilize resources fast and to agree on considerably more ambitious targets within much shortened time frames.

The REPowerEU May 2022 plan is about rapidly reducing the Union's dependence on Russian fossil fuels by fast forwarding the clean transition as well as joining forces to achieve a more resilient energy system and "a true Energy Union". In comparison to preceding strategic documents issued by the Commission, the REPowerEU is characterized by bolder targets and a more elaborate guidance as to how Member States can reach them. Very much like the European Green Deal, REPowerEU is a master strategic document, which is being upgraded by follow-up strategies, recommendations, plans and acts. It encourages Member States to: save energy; diversify supplies; quickly substitute fossil fuels by accelerating Europe's clean energy transition; and smartly combine investments and reforms. Taken together, these actions will structurally transform EU's energy system, explains the EU Commission, and points out that they require "effective coordination between European regulatory and infrastructure measures, as well as national investment and reforms and *joined-up energy diplomacy*". [7]

What started as a contingency response to an unprecedented energy crisis soon acquired the character of a reinvigoration and acceleration of the European Green Deal in its key dimensions. Challenged simultaneously by extraordinary disruptions of global energy and commodities markets caused by Russia's war of aggression, and by what Brussels finds to be an unfair competition in the realm of net-zero technologies, industries and subsidies, the Union has reacted with strategic foresight and vigor not seen in a long time. The EU institutions developed

not only immediate crisis response measures but proceeded to accelerate the implementation of renewables-based electrification, massive application of green hydrogen and shaping the EU cleantech industrial base. The emphasis is clearly on forward looking net-zero policies and innovative technologies as a reliable strategy to end the carbon dependency.

A certain return to the use of fossil fuels, both indigenous and imported, does not contradict the cleantech drive. It is rather a part of a flexible schedule to tackle energy market disruptions until – relatively sooner than previously planned ("a small window") – the bulk of European energy, industry, transportation, buildings and other economic sectors are firmly and irrevocably set on a net-zero pathway.

The current market picture for investments in oil and gas is highly uncertain and unpredictable. Reliable industry sources point out that capital investment in oil and gas projects looks "attractive, albeit tempered by the still very real threat of declining demand next decade and beyond". Any incremental investment in oil and gas will continue to be in low-cost, short-cycle, fast-payback projects with a below-average emissions footprint. [8]

As mentioned, the growing competition from both the US and China (although of vastly different implications for the EU) – and perhaps even from other major net-zero players – will complicate the Union's cleantech plans. This type of challenge can in principle be tackled by the EU's usual tactics and instruments, in which it excels: consultation, negotiation and various forms of energy-, climate- and traditional diplomacy. In this case, however, the EU's real negotiating power can only come from an across-the-board surge of cleantech innovation and industrial activities in all Member States and key companies, based on efficient coordination, sound regulation and adequate funding. By pursuing its strategic net-zero interests in this new global competition arena – where geoeconomics meet geopolitics – the EU should be prepared to change and improve many of its business-as-usual models and approaches. The Net-Zero Industrial Plan, and the proposed Act, is a promising start.

As to the related necessity of garnering higher levels of EU unity and solidarity, any new proposal of the Commission should be communicated and explained in much more elaborate terms to a range of stakeholders: governments, businesses, social partners and citizens alike. When the European Green Deal was launched, civil society activists across Europe were thrilled to note the Commission's willingness to involve the citizens. Unfortunately, little in the way of EU institutions – citizens cooperation on EGD issues has so far taken place.

Tackling the security of gas supply challenge

The European Union has been described as "gas-hungry", consuming roughly 400 bcm/y. Several EU Member States in Northwest Europe, at the time UK included, plus Italy consumed about 80% of all EU supplies. Russian gas imports grew in the past thirteen years from 30% to about 40% of consumption.

When REPowerEU was publicized in May 2022, building on the Fit for 55 benchmarks and setting what looked like overambitious targets, many experts, both within and outside the EU, expressed doubts, in particular in the feasibility of a break with Russian natural gas. In less than a year, Europe has actually managed to overcome this dangerous dependency (by 70 bcm by end of 2022, with 10 bcm above target) and intends to terminate buying Russian gas by 2027. Commission President Ursula von der Leyen stated that the EU has replaced 80% of Russian pipeline gas, has filled EU storage facilities and reduced EU demand by more than 20% in the period from August to November 2022. The Union "brought down gas prices quicker than anyone expected", stated von der Leyen at Davos – from their peak in August (€350 per MWh) European natural gas prices have dropped 80% by January 2023: this is below the levels from before the Ukraine war. [9]

A year ago, Russia took advantage of high international energy prices following the invasion. Russia's oil and gas export revenues are, however, suffering today: on a monthly basis, they dropped by $12 billion in January 2023 compared with a year earlier – a decline of about 40%. [10] The European energy diplomacy contributed substantially to this outcome, working with like-minded and friendly countries bilaterally and multilaterally, e.g., in the G-7 format.

The Trans-European energy networks (TEN-E) framework has helped establish a more resilient European gas infrastructure base that enables more diversified supplies. Once the ongoing Projects of common interest (PCI) and Projects of mutual interests (PMI) are implemented, wrote the Commission in May 2022, all Member States and Neighboring countries will have access to at least three gas sources or to the global liquefied natural gas (LNG) market. In 2022 alone, gas PCIs with a total additional gas transmission capacity of 20 bcm/y have been (or will be commissioned). A number of key projects co-financed by the EU were completed or launched, such as the Gas Interconnector Poland-Lithuania (GIPL), of key importance to the Baltic region, and a new liquefied natural gas terminal at Alexandroupolis in Northern Greece that will help Europe and the Balkans become less reliant on Russian supplies. [11]

In the meantime, the Commission's President has personally undertaken several tours of successful energy diplomacy, securing additional volumes of natural gas to the single European market from gas-rich countries – notably from the United States, but also Algeria, Azerbaijan, etc. The latest such development, on 17 March 2023, marked a high-level understanding between President von der Leyen and Norway's Prime Minister Jonas Gahr Stoere, in the presence of NATO Secretary-General Jens Stoltenberg and *Equinor* CEO Anders Opedal, on a commitment by *Equinor* to supply sufficient gas to the EU on a long-term basis through the EU Energy Platform for joint purchases of fuels. The Norwegian energy minister has previously said he does not fear Europe's joint gas platform would become a buyers' cartel that would disadvantage Norway as a supplier. The truth of the matter is that on several occasions in the past 11 years authorized Norwegian representatives have indicated Norway was ready to supply or to substitute any amount of Russian

gas removed from the single market, provided Norwegian companies struck long-term contracts. Norway has now received assurances that the EU would buy its gas over the long term so Oslo has an incentive to maintain production. [12]

With the exception of the Joint Statement on US-EU Cooperation on Energy Security of January 2022, and subsequent EU-US high-level strategic arrangements – the latest one of March 2023 on new investments to create clean energy industries and jobs on both sides of the Atlantic – no other Commission-brokered accord on gas has provided a larger measure of security of supply than the EU-Norway (*Equinor)* deal. Starting with filling EU gas storage this summer, the *Equinor* deal is of a truly key importance because it provides much needed liquidity and elasticity to the single gas market not only long-term but above all in the next two-three critical years until the US increases its LNG export capacity, backed by America's limitless shale technology resources.

Neither the EU Commission, nor heavily gas-dependent Member States have illusions that the issue with security of gas supply has been fully solved. The regional assessment of additional gas infrastructure needs shows that it will be possible to fully compensate the equivalent of Russian gas imports by a combination of demand reduction, a ramp up of domestic production of biogas/biomethane and hydrogen, and limited additions of gas infrastructure. The most important needs are linked to meeting demand in Central and Eastern Europe, and in the northern part of Germany, as well as the reinforcement of the Southern gas corridor. This limited additional infrastructure should solve the needs for the forthcoming decade, without leading to a lock-in of fossil fuels and stranded assets that inhibit the long-term transition to a climate-neutral economy.

For its part, the E3G Consultancy points out that EU Member States and the European Commission have agreed to extend last year's target for a 15% (60 bcm) gas savings target to repeat these savings a further year. While necessary, this emergency measure does not put the EU on track to reach the 52% structural reduction of gas demand foreseen by the REPowerEU plan. [13] Under the circumstances, the Commission continues with establishing new, stronger schemes of solidarity among Member States, pushing for and incentivizing also renewable gases, and, of course, opening a whole new industrial era of clean hydrogen.

The remarkable growth of EU's clean hydrogen economy

When the European Green Deal was launched, most EU Member States' national integrated climate and energy plans regarded hydrogen as just another energy carrier. Several Member States paid only token attention to green (renewable) hydrogen and did not envisage any particular hydrogen-based industrial applications before 2030, perhaps even 2032. At the time, automobile companies from Japan and the Republic of Korea had already established dealerships in the US market, selling hydrogen fuel cell vehicles.

The first signs of an increasing "institutional" pressure to introduce hydrogen-based technologies for the sake of EGD-set benchmarks were recorded in chemical, energy and industrial companies in the Ruhr area of Germany, where industry associations' leaders complained that the pressure came too soon after the same companies had been squeezed into substituting coal for natural gas.

Long before the Russian invasion – which only substantiated the Union's wise choice to prioritize hydrogen – both European academics and industrialists were actively propagating the technological and economic advantages of renewable hydrogen. Their project proposals and designs invariably featured cross-border, even trans-continental, dimensions.

Against this backdrop, the REPowerEU vision of a more than three-fold increase in the volume of clean hydrogen in the single market by 2030 came as little surprise. Renewable hydrogen will be key to replace natural gas, coal and oil in hard-to-decarbonize industries and transport. Hence, REPowerEU set a target of 10 million tons of domestic renewable hydrogen production and 10 million tons of renewable hydrogen imports by 2030. The sub-targets for renewable fuels of non-biological origin for industry and transport were also aligned with the REPowerEU ambition.

EU's robust action on renewable hydrogen represents both a powerful energy transition policy and a climate policy. Upscaling the use of renewable hydrogen, ammonia and other derivatives, asserts a Commission Staff document, would accelerate decarbonization and greatly reduce the EU's dependence on natural gas (by approximately 27 bcm), oil (by approximately 3.9 Mtoe) and coking coal imports (approximately 156 Kt) from Russia. [14]

Higher levels of consumption, up to the 20 Mt of hydrogen announced in the REPowerEU communication, is assumed to be delivered from third countries in the form of ammonia (for example from Angola to Germany) and potentially in the form of other hydrogen carriers and derivatives.

Taking into consideration the need for new production capacity and dedicated transport (transmission) infrastructure for renewable hydrogen, the latter can only start to contribute significantly to the EU ambitious decarbonization efforts after 2027, estimates the Commission. This assessment might prove inaccurate because the interest in renewable hydrogen in most EU Member States grows with every new facilitation scheme or regulation proposed by the Commission, and with new technology innovations stimulated by the Net-Zero Industry Act. The entrepreneurial spirit and business-to-business cooperation reigning over various activities and formats of the European Clean Hydrogen Alliance (ECHA) – a Brussels-based volunteer, EU-wide, industry association – have contributed to the start, in some cases the fruition of hydrogen projects *in more than half of the EU Member States*. ECHA works closely and productively with the relevant Commission Directorates. In a recent joint Commission-ECHA declaration, the European manufacturers of electrolyzer serial production made public their intention to reach a combined annual production capacity of 17.5 GW in 2025, a tenfold increase compared to 2022. [15]

The roadmap on hydrogen standardization, launched in March this year, was drafted by ECHA's Working Group on Standards. This is a most valuable contribution by the Alliance: it provides a comprehensive overview of standardization gaps, challenges and needs, all of which have important practical connotations in view of the planned huge volumes of imported renewable hydrogen from a number of third countries. Hydrogen quality issues are expected to emerge once hydrogen is injected into the hydrogen network from different production processes and transported through a meshed network, including cross-border. The roadmap highlights six key actions (too detailed to quote here) which should pave the way for new hydrogen standards to accelerate the roll out of large-scale hydrogen solutions.

A number of TSOs and infrastructure promoters harbor hopes of using existing gas transmission pipelines and equipment to transport hydrogen when the necessary demand arises. The EU Commission's experts have now warned that blending already low volumes of hydrogen into the natural gas network can cause significant problems and additional costs for end-users (pilot projects were commissioned in six EU cities 18 months ago). The costs to adapt to a certain level of hydrogen blend are in fact quite complex. These include the adaptation costs to change of end-use appliances, e. g., furnaces, turbines, engines, household boilers, or to change of compressor stations and measuring equipment/comptographs. At the time of writing, the debate on the applicability of blending is still going on among European stakeholders.

Hailed as a landmark agreement between the European Parliament and the Council, a recently agreed regulation for the deployment of alternative fuels infrastructure (AFIR) sets mandatory deployment targets for electric vehicle charging and hydrogen refueling infrastructure for the road sector, for both cars and heavy-duty vehicles. [16] Industry association Hydrogen Europe is reported to have said: Despite not [fully] meeting industry demands, the agreement is a satisfactory starting point that also lays the foundations for the use of hydrogen in maritime, aviation and rail transport. By all accounts, the European institutions have sent a strong signal that clean hydrogen mobility is a viable and realistic solution to fossil fuels in the transport sector.

Announced last year and launched simultaneously with the Net-Zero Industrial Plan, the recently opened European Hydrogen Bank represents an important new addition to the Union's growing ambition concerning renewable hydrogen, its carriers and derivatives. The Bank aims to attract private investments in hydrogen value chains in both the EU and in third countries, by connecting renewable hydrogen supply with the emerging demand by European off-takers, and thus to establish an initial market for renewable hydrogen. With a capital of €3 billion, the Bank will promote the production of renewable hydrogen domestically as well as imports from international producers to European consumers, plans the EU Commission. The international and cross-border schedules of projects to be

financed by the Bank suggest that the fast-emerging EU renewable hydrogen market will by definition depend on European energy diplomacy.

It is indicative that the global momentum behind the hydrogen industry shows no signs of slowing in 2023 – "export project announcements are coming thick and fast", said Aurora's head of hydrogen research, Anise Ganbold. This expert has done a fact check and found that importing hydrogen into Europe even over long distances makes economic sense, given the much lower cost of renewable energy in markets such as Morocco and Australia. [17]

An exceptional emphasis on renewable energy

In the EU approach to rapidly reduce dependence on Russian fossil fuels well before 2030 by accelerating the clean energy transition, the EU policy on renewable energy takes center-stage. The REPowerEU plan envisages scaling up of renewable energy in power generation, industry, buildings and transport to a level that would translate to a biding target of 42.5% (45% optional) in a revised Renewable Energy Directive. The measure is expected to contribute substantively to reducing net greenhouse gas (GHG) emissions by at least 55% by 2030. It is therefore viewed as "a key building block to reach the EU's energy and climate objectives".

The Renewable Energy Directive (whose amendment is presently under consideration by the European Parliament and the Council) will further develop common rules and targets for the development of renewable energy (including renewable hydrogen) across all sectors of the economy. Cooperation mechanisms will enable EU countries to work together to meet their renewable energy targets.

The array of policies and measures on renewable energy, which the Commission had developed in the preceding 6-8 months, is understood fully when seen in close connection with the March 2023 proposal of the Commission on a new EU electricity market design and, by the same token, if the new design is seen in connection with, or forming part of, the Green Deal Industrial Plan. Massive digitization in the energy sector and climate related spheres is part of the overall change. This interlinked and mutually reenforcing set of reform policies reflects the Union's political will to build *a renewables-based energy system.* At this stage, such a system is considered essential and indispensable to reaching the EU's energy and climate targets.

Part and parcel of this ambition is tripling the deployment of renewables in the EU by the end of this decade. This is a global trend. The first truly global energy crisis, triggered by Russia's invasion of Ukraine, has sparked unprecedented momentum for renewables, writes the International Energy Agency (IEA). Renewables are the only electricity generation source whose share is expected to grow, with declining shares for coal, natural gas, nuclear and oil generation. Electricity from wind and solar PV more than doubles in the next five years, providing almost 20% of global power generation in 2027. [18]

Cumulative renewable electricity capacity in Europe is expected to increase with nearly 60% (+425 GW) between 2022 and 2027, more than twice as much as in the previous five-year period (2016-2021). Solar PV leads growth, followed by onshore wind, offshore wind, bioenergy and hydropower. Three-quarters of European expansion, observes IEA, is concentrated in seven countries – Germany, Spain, the UK, Turkey, France, the Netherlands and Poland.

The proposed reform of the EU's electricity market design is both comprehensive and multifaced but, for the sake of this initial review, reference will be made to only a few examples. Above all, the reform allows the European industry to have access to a renewable, non-fossil and affordable power supply which is a key enabler of decarbonization and the green transition. To enhance the competitiveness of EU industry and to reduce its exposure to volatile prices, the Commission is proposing to facilitate the deployment of more stable long-term contracts such as Power Purchase Agreements (PPAs) – through which companies establish their own direct supplies of energy and thereby can profit from more stable prices of renewable and non-fossil power production. [19]

Equally, if not more important – in view of the hardships which the European citizens and small businesses were/are putting up with – is the part of the reform which concerns protecting and empowering consumers. The reform will give consumers a wide choice of contracts and clearer information before signing these, providing them with the option to lock in secure, long-term prices to avoid excessive risks and volatility. Price stability will be fostered by reducing the risk of supplier failure. Vulnerable consumers in arrears shall not be disconnected, and Member States will be allowed to extend regulated retail prices to households and SMEs in case of a crisis. Consumers will be able to invest in wind or solar parks and sell excess rooftop solar electricity to neighbors, not just to their supplier. This should be particularly good news to consumers in Central and Eastern Europe where centralized energy systems still prevail.

In terms of electricity generation, 2022 will go down in history as the year in which solar and wind overtook every other form in the EU – gas, nuclear, or coal. And 2023 is likely to see the trend continued.

The reform proposal by the Commission has evoked immense professional interest. Most comments are positive and encouraging. Some experts, on the other hand, point out the need for more robust regulation. For example, the Electricity Directive of the Clean Energy for all Europeans established the right for customers and eligible parties of their choice to access metering and energy consumption data, as well as data required for customer switching, demand response and other services. However, writes Sofia Nikolai of the Florence School of Regulation, there is currently no large-scale, uniform and easy access to consumers' energy data across Member States. This absence is even more relevant when considering data sharing between the EU members. The low degree of harmonization of data access procedures represents an obstacle to the flourishing of cross-border

energy services, with negative consequences for the quality and competitiveness of European energy retail markets. [20]

One can safely conclude, in broad terms, that the proposed reform of the EU electricity market design can boost renewables, better protect consumers and enhance industrial competitiveness. This assessment is supported in particular by the provisions of the Net-Zero Industry Act and the related Critical Raw Materials Act.

Strengthening Europe's net-zero technology manufacturing ecosystem

In an explanatory memorandum, the Commission points out that the global market for key mass-manufactured net-zero technologies is set to triple by 2030 with an annual worth of around €600 billion. EU's partners and competitors have grasped this opportunity and are deploying ambitious measures to secure significant parts of this new market (China alone accounts for 90% of manufacturing output). These developments are also driven by security of supply considerations. The resilience of future energy systems will be measured by a secure access to the technologies that will power those systems. A near exhaustive list includes: renewable energy technologies; electricity and heat storage technologies; heat pumps; grid technologies; renewable fuels of non-biological origin technologies; electrolyzers and fuel cells; fusion; small modular nuclear reactors and related best-in-class fuels; carbon capture, utilization, and storage technologies; as well as energy-system related energy efficiency technologies and their supply chains. If available in adequate numbers, these technologies will facilitate the decarbonization of EU's economic sectors, from energy supply to transport, buildings and industry. In turn, a secure supply of energy will be essential for ensuring sustainable economic growth, and ultimately public order and security. [21]

It should be noted that the *"public order and security"* consideration, which in an EU with substantive social dimensions is vital for the Union's smooth and successful functioning, turns to be crucial in an adverse geopolitical setting in particular. In this respect, the Commission's proposal will contribute to achieving the EU targets of the European Pillar of Social Rights Action Plan for 2030 of employment rate of at least 78% and participation in training of at least 60% of adults. To ensure the availability of skilled workforce supporting the production of net-zero technologies in the EU, the Act introduces an adequately funded *Net-Zero Industry Academy*.

The Net-Zero Industry Act (NZI Act) derives from the NZI Plan, the latter having been issued six weeks previously. The Act is built on "four pillars": (i) a predictable and simplified regulatory environment; (ii) faster access to funding; (iii) enhancing skills and (iv) open trade for resilient supply chains. The NZI Act and the cross-references contained therein represent a holistic and detailed "manual" on how the Member States, acting in unison with the European institutions and among themselves, can reach the targets set in the European Green Deal and subsequent upgrades. It would seem the Union now has a hitherto missing coupling between

long-agreed common energy and climate targets and an implementation roadmap, comprising regulatory, market and industrial measures based on an impressive ambition to quickly roll out the necessary net-zero technology products and close the procurement gap with partners and competitors.

The NZI Act singles out Net-Zero Strategic Projects and gives them priority ("fastest" permitting timelines and streamlined procedures) as they would be essential for reinforcing the resilience and competitiveness of the EU industry. Without prejudice to State aid rules, Member States may undertake activities to accelerate and crowd-in private investments in net-zero strategic projects to speed their implementation. The technology readiness level (TRL) is the first of three criteria to define a Net-Zero Strategic Project (the other two criteria being decarbonization and competitiveness, and security of supply). The overall objectives of the Regulation proposal are aimed at ensuring that by 2030, the manufacturing capacity in the Union of the strategic net-zero technologies approaches or reaches at least 40% of the Union's annual deployment needs. The Net-Zero Europe Platform, introduced in the Act, will support investment by identifying financial needs, bottlenecks and best practices for projects across the EU. It will also foster contacts across the Union's net-zero sectors, relying particularly on existing industrial alliances, and assist the Commission and Member States to coordinate action and exchange information. Innovation and technology adoption are key to the task of accelerating the cleantech industry. While aiming at promotion of innovation in net-zero technologies and regulatory learning, the Act makes it possible for Member States to *set up regulatory sandboxes* to test innovative net-zero technologies and stimulate innovation, under flexible regulatory conditions.

Given the complexity and the transnational character of net-zero technologies, the Commission warns that *uncoordinated national measures* to ensure access to those technologies would have a high potential of distorting competition and fragmenting the single market. To avoid this, the Act highlights the need to create a common EU legal framework to collectively address this central challenge by increasing the Union's resilience and security of supply in the field of net-zero technologies. Regarding external aspects, in particular regarding emerging markets and developing economies, the EU will seek win-win partnerships in the framework of its Global Gateway strategy, which could contribute to the diversification of its raw materials supply chain as well as to partner countries' efforts to pursue twin transition and develop local value addition. This is a really important area for energy and climate diplomacy. It necessitates further elaboration in what could be a standing consultation format between the Commission and the Member States.

The Act also stimulates the expansion of the Union's manufacturing capacity for energy efficient technologies, such as smart grid technologies. At transmission level, high voltage direct current (HVDC) systems are needed to connect offshore renewable energies; while at distribution level, connecting electricity providers and managing demand-side flexibility builds on investments in innovative grid

technologies, such as electric vehicles smart charging (EVSC), energy efficiency building and industry automation and smart controls, advanced meter infrastructure (AMI) and home energy management systems (HEMS). Grid modernization is a weak spot in many Member States: it would be a good idea to prioritize smart grid technologies projects across the Union, Central and Eastern Europe in particular.

EU's global responsibilities will only grow

When the strategists behind the European Green Deal recommended that the EU should develop a "stronger green deal diplomacy" to induce the rest of the world to take up their share in moving to net-zero by 2050 (2040 in UN Secretary-General's expediency call), even they could not have probably envisaged that the green transition could be affected by so severe geopolitical stand-offs. The severity comes of course from Russia's unprovoked aggression against Ukraine. But many other designs aimed at delaying or blocking the climate neutrality prospects take place regardless.

Presently, the proponents of an indefinite adherence to fossil fuels-based economic models seem to be content with a draw of sorts, represented and personified by Sultan al-Jaber, the CEO of Abu Dhabi National Oil Co., who will chair COP 28 in November this year. He's been behind billions in investments in renewable energy – and also leads an oil company that pumps some 4 million barrels of crude a day and hopes to expand to 5 million/d. [22] High-level Western representatives have voiced support for Mr. al-Jaber, trusting his negotiation acumen will prevent a collapse of the green transition drive. It is another matter how the Abu Dhabi Conference – climate conferences are difficult to predict – will assess a dualistic concept on fossil fuels and renewables, with its implied delaying effect on the global climate urgency.

So far as the EU is concerned, it is clear – in light of all EU's energy and climate policies from the adoption of REPowerEU onwards – that accelerating all processes conducive to reaching the EU 2030 targets and goals, fully and on schedule, is not only a matter of political necessity but of social and economic advancement of the EU as a whole. This would be a good basis for further strengthening of the European project – and this means agreements on issues such as foreign and security policy (the Union is in the process of developing an Economic Security Strategy); fiscal and monetary union; migration; and enlargement. To the extent that EU's energy and climate policies, including the emerging cleantech industry, are open to international trade and cooperation, the EU's "haste" in the energy transition should be well communicated and argued with the EU's numerous partners around the world. However, there is one, hopefully temporary, exception. EU's dialogue with China, although keeping to diplomatic civility, is at a somewhat strained junction: the 2020 EU-China Comprehensive Agreement on Investment (CAI) has been effectively stalled and most likely will be reassessed. Indicative of

the trend is the Commission President's view that the EU needs to "define its future relationship with China" in sensitive high-tech areas such as microelectronics, quantum computing, robotics, artificial intelligence and biotech. [23]

An authority on European affairs, Adam Tooze, director of the European Institute at Columbia University, has recently written in the Foreign Policy magazine that European governments, businesses and society are accelerating the energy transition. And they aren't doing so on ideological grounds – although US self-appointed realists are fond of accusing Europe's energy policy-makers of making strategic choices for the sake of green ideology – or because they are blind to the risks of new dependencies (notably China). They are doing so because – in a world of tough choices and uncertainty, including about US politics, mounting ecological crisis and geopolitical risk – the green energy transition simply looks like the smartest bet. [24] The author of this article couldn't agree more.

Sofia, 10 April 2023

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[18] IEA. Renewables 2022: Analysis and forecast to 2027, December, 2022.

[19] The European Commission: Reform of the EU electricity market design. Press release. Strasbourg, 14 March, 2023.

[20] Sofia Nicolai: A European distributed data-sharing infrastructure for enabling innovative energy services. Florence School of Regulation, 27 February, 2023.

[21] European Commission: Proposal for a Regulation…on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net-Zero Industry Act). COM (2023) 161 final 2023/0081(COD). Brussels, 16 March, 2023.

[22] OAE's COP28 Leader: Fight Climate Change, Not Each Other, Associated Press, February 14, 2023.

[23] Nicolas Camut and Stuart Lau authoring two separate reports in Politico.eu. 31 and 30 March, 2023.

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OIL MARKETS AFTER THE INVASION OF UKRAINE: MOVING TOWARDS STRATEGIC COMPETITION

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Introduction

Europe's decoupling from Russia as a result of the war in Ukraine has accelerated global strategic competition, bloc forming and protectionism in strategic sectors. The move away from multilateral cooperation and open trade relations into isolationist policies is mirrored by energy markets. This paper analyses the influence of central geopolitical and economic developments on global oil markets in the short (2-3 years) and long term (10-15 years).

In the short term, global oil markets will remain volatile as suppliers and consumers are settling into a post-sanctions world. As the European Union (EU) is trying to secure supplies from alternative producers, Russia is finding new energy markets. The EU is relying on the United States (US), Norway and the Organisation of the Oil Exporting Countries (OPEC+, excluding Russia) to fill the gap left by Russian oil.[52] Russian relations with China, India and Turkey are intensifying. At the same time, uncertainty regarding the global position and strategy of key market players remains. Is the US emerging as the main energy superpower? How are OPEC+ producers navigating the changing balance of power? Can Saudi Arabia maintain its role as a market balancer, or is it primarily self-interest that motivates cuts in oil production?

Strategic competition is also impacting the energy transition in the long term. Decisive and accelerated action is needed for an orderly energy transition, but current energy developments point to isolationism, nationalism and therefore a more chaotic exit of fossil fuels from the European energy system. The energy crisis that followed the invasion of Ukraine led to significant governmental involvement in oil and gas markets. Securing critical minerals and green technologies for the energy transition has become a priority as well, codified in plans like the US Inflation Reduction Act and the EU's Critical Raw Materials Act and Net Zero Industry Act.

This is an update of the paper previously released in August 2022, "*From the War in Ukraine to the Energy Transition: Searching for a New Balance in the Oil Market*" published by The Hague Centre for Strategic Studies.[53]

[52] Eurostat. 'EU Imports of Energy Products - Recent Developments', 2023. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_imports_of_energy_products_-_recent_developments; Eurostat. 'Crude Oil Imports by Field of Production - Monthly Data'. Accessed 13 April 2023. https://ec.europa.eu/eurostat/databrowser/view/NRG_TI_COIFPM__custom_5710917/default/table?lang=en.

[53] Irina Patrahau, Lucia Van Geuns, and Jilles Van den Beukel. 'From the War in Ukraine to the Energy Transition: Searching for a New Balance in the Oil Market'. The Hague Centre for Strategic Studies, 2022. https://hcss.nl/report/searching-for-new-balance-in-the-oil-market/.

Context: Navigating the energy crisis

The Russian invasion of Ukraine in February 2022 placed pressure on a global energy system that was already struggling to manage volatility ever since the Covid-19 pandemic. The Covid-19 pandemic resulted in one of the sharpest declines in global oil consumption in history, as oil demand declined from 99 million barrels a day (mb/d) in 2019 to 90 mb/d in 2020.54 This was caused by working from home mandates and the significant reduction in air transport, paired with the slow-down in industrial activity and manufacturing, and re-shoring of supply chains.55 The tumultuous period at the beginning of the Covid-19 lockdown led global prices to plummet and reach unprecedented levels in April 2020. Oil producers were struggling to find sufficient storage capacity for the surplus of oil that could not be sold due to the drop in demand, with oil stocks reaching all-time high levels in June 2020.56

In 2021, pandemic measures were gradually eased, resulting in the recovery of global oil demand. Demand averaged 96 mb/d in 2021.[57] By 2022, global oil demand had returned to 2019 levels. The rapid post-pandemic recovery, characterized by a sharp increase in road transport, aviation, and shipping, was not met by an equally fast increase in oil production. Production outages caused by weather events like Hurricane Ida in the US, combined with fires at facilities in Mexico and Russia, as well as operational issues in Nigeria, Libya and Kazakhstan, led to continued issues for suppliers to meet demand.[58] The largest oil producers in OPEC, particularly Saudi Arabia and the United Arab Emirates, could raise their production but made a choice not to do so.

The record levels of oil inventories in 2020 were followed by a sharp decline in stocks that lasted almost two years. High oil prices, tight supply and geopolitical instability led to a number of coordinated releases of strategic reserves from OECD countries.[59] When inventories and spare capacities are low, the ability of market players to stabilize oil prices becomes very weak. The oil price therefore becomes highly susceptible to external factors and volatility dominates the market. In the first weeks after the war erupted, governments started sanctioning Russian companies. The United States and Canada quickly imposed bans on imports of Russian oil.[60] As their dependency on Russian oil was minimal, these measures were politically

[54] IEA. 'Oil Market Report', December 2021. https://iea.blob.core.dows.net/assets/0921d7d0-7a36-4f15-b920-efcbbff2038b/-14DEC2021_OilMarketReport.pdf.

[55] Dan Klein and Mark Mozur. 'Moving Mountains: COVID-19 and Peak Oil Demand', 2020. https://www.spglobal.com/en/research-insights/featured/moving-mountains-covid-19-and-peak-oil-demand.

[56] IEA. 'Oil Market Report', August 2020. https://www.iea.org/reports/oil-market-report-august-2020.

[57] IEA. 'Oil Market Report', June 2022. https://www.iea.org/reports/oil-market-report-june-2022.

[58] IEA. 'Oil Market Report', September 2021. https://iea.blob.core.windows.net/assets/0921d7d0-7a36-4f15-b920-efcbbff2038b/-14DEC2021_OilMarketReport.pdf.

[59] IEA. 'Oil Market Report', June 2022, 50.

[60] Reuters. 'Tracking Sanctions against Russia', 31 May 2022. https://graphics.reuters.com/UKRAINE-CRISIS/SANCTIONS/byvrjenzmve/.

motivated and had limited direct economic impact. For the EU, the largest market for Russian oil and natural gas, imposing such a ban was a more problematic decision from an economic perspective.

Still, the EU's decoupling from Russian energy was virtually completed by the end of 2022, with a few exceptions such as oil flowing through the Druzhba pipeline, liquefied natural gas (LNG) imports and limited natural gas pipeline imports. The EU boycott on maritime imports of Russian oil was announced in June 2022 and entered into force in December 2022 for crude and February 2023 for products. The boycott was paired with a G7 agreed upon price cap for crude and products. It was met by retaliatory actions by the Kremlin, cutting pipeline exports of natural gas to Europe.

The most severe increases in EU oil price took place right after the sanctions on Russian oil were announced, in the summer of 2022 (Figure 1). The uncertainty in global oil markets led to significant price increases, compounded by sudden disruptions in Russian gas exports to Europe. EU efforts to bring in supplies from other sources led to price competition with other consumers, thus disrupting supply chains worldwide and causing sharp increases in inflation levels.

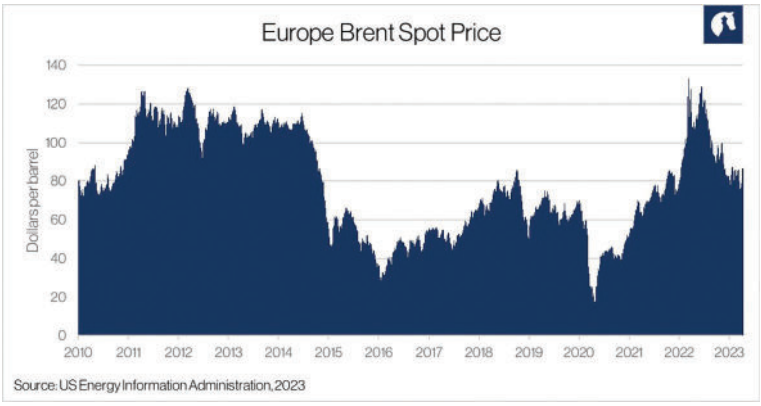

Figure 1 Brent oil price development

Even after the ban on crude oil came into place in December 2022, the EU remained Russia's main export market for oil products in December 2022, in preparation for the ban in February 2023.[61] More than 8 million barrels of Russian diesel were imported by European countries in the first two weeks of January 2023. [62] A large part of it was placed in storage. When sanctions came into force, the impacts were less severe than anticipated for EU consumers. The price of Brent remained under 90 USD/barrel since the end of November 2022 until the end of March 2023 (Figure 1).[63] Companies had already filled strategic reserves

[61] CREA. 'EU Oil Ban and Price Cap Are Costing Russia EUR 160 Mn/Day, but Further Steps Can Multiply the Impact', 11 January 2023. https://energyandcleanair.org/wp/wp-content/uploads/2023/01/CREA_Press-release_EU-oil-ban-and-price-cap-are-costing-Russia-EUR-160-mn_day-but-further-steps-can-multiply-the-impact.pdf.

[62] Anna Cooban. 'Europe's Ban on Russian Diesel Could Send Pump Prices Even Higher'. CNN, 17 January 2023. https://www.cnn.com/2023/01/17/energy/russia-diesel-ban-prices/index.html.

[63] U.S. Energy Information Administration. 'Europe Brent Spot Price FOB (Dollars per Barrel)', 13 April 2023. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RBRTE&f=M.

and commercial inventories with Russian oil. To make up for the gap, additional oil supplies were sourced from Saudi Arabia, Angola, Iraq and the US.[64]

Due to the high oil prices and European companies' rush to fill storage units with Russian oil before the boycott came into force, the immediate impact of sanctions on Russia's oil revenues was limited. In 2021, oil and natural gas revenues accounted for 45% of Russia's federal budget.[65] This is a higher proportion than the 35-36% reported in previous years.[66] Since the beginning of the war, Russia earned EUR 325 billion from exporting fossil fuels, the EU having accounted for EUR 149 billion of that sum.[67]

Short term: Volatile oil markets

Global oil prices remained relatively stable since the sanctions and price cap for Russian exports came into force. Yet the oil market is undergoing critical shifts with direct consequences for the geopolitical order. Russia is bolstering relations with China and India, two of the world's largest oil consumers. The US is becoming Europe's main oil supplier and competing for global market dominance with Saudi Arabia and OPEC+. Until a new energy system is established and a new balance is found, prices will remain susceptible to market shocks and geopolitical events.

Russia: Closer ties with China and India

After the oil boycott came into force in February 2023, Russian oil found its way to alternative consumers. China, Turkey and India are Russia's main new partners (Figure 2).

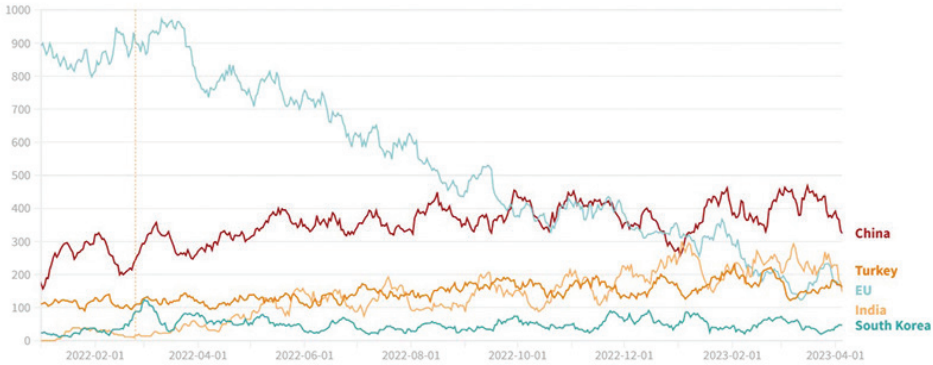

Figure 2 Russian daily exports of crude oil, in thousand tonnes. Source: CREA, 2023[68]

[64] Eurostat. 'EU Imports of Energy Products - Recent Developments'.

[65] IEA. 'Energy Fact Sheet: Why Does Russian Oil and Gas Matter?' March 2022. https://www.iea.org/articles/energy-fact-sheet-why-does-russian-oil-and-gas-matter.

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[67] CREA. 'Russia Fossil Tracker – Payments to Russia for Fossil Fuels since 24 February 2022'. Accessed 13 April 2023. https://www.russiafossiltracker.com/.

[68] CREA. 'Russia Fossil Tracker – Payments to Russia for Fossil Fuels since 24 February 2022'.

Indian imports of Russian oil have surged since the war in Ukraine, despite the country barely having purchased any Russian oil in the first two months of 2022.[69] Indian refiners have been taking advantage of discounted Russian crude oil. A large part of the refined oil products is believed to be sent on to Europe, making India the de facto refining hub for banned Russian oil.[70]

The energy relations between China and Russia have further tightened as well, given China's reluctance to publicly denounce and impose sanctions on Russia following the war. China has become the largest consumer of Russian crude and oil products since the EU boycott (Figure 2), making use of the Eastern Siberia-Pacific Ocean (ESPO) and the Kazakh Atasu-Alashankou crude oil pipelines, as well as maritime shipments.[71] As China has not imposed any sanctions on Russia, the price of Russian oil sold to China through the ESPO pipeline hovers above the EU/G7 price cap level, around 70 USD/barrel.[72]

Even though a large part of Russian oil has found new markets, the impact of sanctions is becoming increasingly visible. While oil production remained relatively stable compared to 2021, Russian oil exports decreased by 500 kb/d according to the International Energy Agency.[73] Russia's oil revenues decreased by 48% in February 2023 year-on-year due to the much lower price that it is sold for.[74] The Urals crude oil spot price has fluctuated between 50-60 USD/barrel but remained under the price cap levels of 60 USD/barrel.[75]

While Russian deliveries of oil to Europe were made over short distances and took between two and three weeks to reach destination, tankers have to travel much longer distances to China and India.[76] Russia's maritime oil exports are now reliant on an old maritime fleet and ship-to-ship transfers offshore European ports.

[69] Shruti Menon. 'Ukraine Crisis: Why Is India Buying Russian Oil?' BBC News, 10 June 2022. https://www.bbc.com/news/world-asia-india-60783874.

[70] William Watts. 'Why India Is the Big Winner as EU's Russia Oil Ban Redraws Energy Trade Map'. MarketWatch, 31 May 2022. https://www.marketwatch.com/story/why-india-is-set-to-win-big-as-eu-bans-russian-oil-imports-11654021874.

[71] Carol Zhu. 'Russian Crude Oil Pipeline Capabilities to Mainland China - The ESPO Crude Oil Pipeline'. S&P Global, 1 April 2022. https://www.spglobal.com/commodityinsights/en/ci/research-analysis/espo-crude-oil-pipeline.html; 'Russian Govt Approves 10-Year Extension of Agreement with Kazakhstan on Transit to China of up to 10 Mln Tonnes of Oil per Year'. Interfax, December 2022. https://interfax.com/newsroom/top-stories/86654/.

[72] Meri Pukarinen. 'Weekly Snapshot - Russian Fossil Fuels 13 to 19 March 2023'. Centre for Research on Energy and Clean Air, 23 March 2023. https://energyandcleanair.org/weekly-snapshot-russian-fossil-fuels-13-to-19-march-2023/; OilPrice.com. 'Oil Price Charts'. Accessed 11 April 2023. https://oilprice.com/oil-price-charts/.

[73] IEA. 'Oil Market Report - March 2023', March 2023. https://www.iea.rg/reports/oil-market-report-march-2023.

[74] Bloomberg News. 'Russia's Revenue From Oil and Gas Almost Halved in February - Bloomberg'. Bloomberg, 3 March 2023. https://www.bloomberg.com/news/articles/2023-03-03/russia-s-revenue-from-oil-and-gas-almost-halved-in-february#xj4y7vzkg.

[75] Trading Economics. 'Urals Oil - 2023 Data - 2012-2022 Historical - 2024 Forecast'. Accessed 11 April 2023. https://tradingeconomics.com/commodity/urals-oil.

[76] Tsvetana Paraskova. 'The Biggest Reshuffle Of Oil Flows Since The 1970s'. OilPrice.com, 7 June 2022. https://oilprice.com/Energy/Energy-General/The-Biggest-Reshuffle-Of-Oil-Flows-Since-The-1970s.html.

Still, over 60% of Russian oil tankers are insured by companies in the EU, G7 or Norway, a slight decline from 75-80% in 2021.[77]

OPEC+: Mounting tensions with the US

For decades, OPEC played a central role in stabilizing the oil market through concerted decisions to scale up production when demand is high and the other way around. In 2016, OPEC expanded into a broader alliance that includes (among others) Russia and Kazakhstan, usually referred to as OPEC+. Saudi Arabia has the largest spare production capacity out of the group, and over time it has used it strategically to maintain the status quo in the oil market. While this ability has been challenged by the US in the last decade, Saudi Arabia remains an important balancer in the market.

The OPEC+ response to the war in Ukraine has been controversial, mainly because Russia is one of the largest members of OPEC+. Since February 2022, OPEC+ and Western countries, primarily led by the US, have had several disagreements regarding the stability of global oil markets. Specifically, US-Saudi relations have been severed by mistrust and misalignment. The development of this relationship will have direct consequences for global energy markets.

Despite the spike in prices following the war, OPEC+ was not willing to increase production, blaming the price crisis on geopolitical tensions rather than fundamentals or issues with the physical supply of oil.[78] The fact that Russia is part of OPEC+ furthered complicated the bloc's response to the global energy crisis. In contrast, a lot of countries, led by the US, released strategic reserves in order to decrease global prices. US President Biden in particular has publicly requested Saudi Arabia and others to increase output and mitigate some of the market pressure.[79]

In April 2023, the conflict between the US and OPEC+ was reignited by the latter's decision to cut oil output. In an effort to increase oil prices, OPEC+ announced in April 2023 a decrease in output by 1.16 mb/d.[80] The largest drop in production will come from Saudi Arabia, which accounts for 500 kb/d, followed by Iraq, UAE and Kuwait.[81] This comes after the decision in October 2022 to decrease output by 2 mb/d.

As the relations between Saudi Arabia and the US are cooling down, China is stepping in. In March 2023, China brokered a meeting between Iranian and Saudi representatives, which ended in an agreement to normalize relations following years

[77] Conall Heussaff et al. 'Russian Crude Oil Tracker'. Bruegel, 13 March 2023. https://www.bruegel.org/dataset/russian-crude-oil-tracker.

[78] Sameer Hashmi. 'Oil-Producing Nations Stick to Their Plan despite Ukraine'. *BBC News*, 3 March 2022, sec. Business. https://www.bbc.com/news/business-60591107.

[79] Derek Brower and David Sheppard. 'Opec Agrees to Accelerate Oil Production Following US Pressure'. *Financial Times*, 2 June 2022.

[80] Michelle Toh, Mohammed Tawfeeq, and Anna Cooban. 'Oil Prices Surge after OPEC+ Producers Announce Surprise Cuts | CNN Business'. *CNN*, 2 April 2023. https://www.cnn.com/2023/04/02/business/opec-production-cuts/index.html.

[81] Toh, Tawfeeq, and Cooban.

of tensions.[82] China has been expanding its political and economic influence in the region through massive investments and bilateral Strategic Partnerships. The Middle East has been an integral part of its Belt and Road Initiative, given China's reliance on – among others – Saudi crude oil and Qatari LNG.[83] The escalation in tensions between Saudi Arabia and Iran on the one hand, and the US on the other, is giving China a window of opportunity to consolidate its position in the Middle East.

US: Becoming the energy superpower?

Over time, the booming shale industry has brought great benefits to the US government, both economic and geopolitical. The country has become virtually energy independent and also the largest gas exporter in the world. The energy crisis following the Covid-19 pandemic and invasion of Ukraine is allowing the US to lead the way into a newly emerging energy system, as Russia is no longer a trustworthy oil and gas producer for the western world, and OPEC+ countries, with a few exceptions like Saudi Arabia, are facing troubles to maintain their production levels. Even though the US is the largest oil producer in the world, the country is also the largest oil consumer. As such, a significant part of its oil has historically been used domestically.[84] Yet the US has been expanding its crude oil exporting capacity over the last decade. In January 2023, it became the EU's largest oil supplier, followed closely by Norway and Kazakhstan.[85]

Despite some issues discussed below, it seems like the US could leave this crisis in a much better geopolitical situation than a few years ago. The production of shale oil in the US has not yet reached pre-pandemic levels, partly because of insufficient financing and partly because of issues in global supply chains preventing producers from getting the right equipment. [86] The shale industry registered a negative cash flow of USD 300 billion since 2010 and saw almost 200 bankruptcies.[87] Most of the generated revenue was reinvested in new production. Despite the enormous boom, investors have for a long time been disillusioned with US shale oil and the Covid-19 pandemic enhanced the financial issues of the shale industry. This has only recently changed and over the last two years cash flow has become positive. Reinvestment rates plummeted during the pandemic and instead

[82] Maria Fantappie and Vali Nasr. 'A New Order in the Middle East?' *Foreign Affairs*, 22 March 2023. https://www.foreignaffairs.com/china/iran-saudi-arabia-middle-east-relations.

[83] Camille Lons et al. 'China's Great Game in the Middle East – European Council on Foreign Relations'. *ECFR* (blog), 21 October 2019. https://ecfr.eu/publication/china_great_game_middle_east/.

[84] Energy Information Administration. 'How Much of the Crude Oil Produced in the United States Is Consumed in the United States?' Accessed 13 April 2023. https://www.eia.gov/tools/faqs/faq.php.

[85] Eurostat. 'Crude Oil Imports by Field of Production - Monthly Data'.

[86] David Messler. 'The U.S. Shale Patch Is Facing A Plethora Of Problems'. *OilPrice.com*, 2 May 2022. https://oilprice.com/Energy/Energy-General/The-US-Shale-Patch-Is-Facing-A-Plethora-Of-Problems.html.

[87] Deloitte. 'The Great Compression: Implications of COVID-19 for the US Shale Industry', 2020. https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/covid-19-implications-for-us-shale-industry.html.

generated free cash flows for investors.[88] Some time is needed to fix the industry's long time looming problems.

Now, shale oil companies are trying to ramp up production after almost two years of underinvestment. The global market pressure is likely driving an increase in output. While it is uncertain whether and how long it would take for the shale industry to recover, conditions seem to be favourable for the US to consolidate its position as the world's energy superpower.

Outlook: A turbulent energy transition?

In the short term, the energy crisis and price volatility are taking away attention from climate goals. But in the next 10-20 years, the energy transition will bring about considerable changes. How will the transition unfold? Will it be orderly, characterized by international cooperation and a simultaneous decrease in fossil fuel consumption and production? Or will it be more turbulent as countries remain competitive, focus on protectionist policies and economic gains, and climate action is left behind?

By 2030, Europe is aiming at a decrease in greenhouse gas emissions of 55%.[89] The demand for diesel and gasoline is expected to decrease across all OECD countries, as road transport rapidly moves toward electrification.[90] However, chemical production, shipping and aviation will remain highly dependent on oil products – naphtha, fuel oil and jet/kerosene, respectively – given the lack of mature low carbon alternatives in these sectors.[91]

If 2030 goals are to be achieved, accelerated action will have to be taken in all economic sectors. This requires significant lifestyle changes from consumers all over the world – less air travel, less meat consumption, less plastics demanded. To what extent are Europeans ready to make such disruptive lifestyle changes? So far, the European consumption of fossil fuels has not decreased as fast as expected. Will real change be seen by 2030, or will business-as-usual continue?

The war in Ukraine was a wake-up call for American and European policymakers that energy security for both fossil fuels and green technologies is a matter of national interest. The energy sector witnessed a shift from a liberal market system to

[88] Rystad Energy. 'Shale Getting Stingy? Reinvestment Rates in the US Hit Historic Lows in Q3 Shaping Record Free Cash Flow', 22 November 2021. https://www.rystadenergy.com/newsevents/news/press-releases/shale-getting-stingy-reinvestment-rates-in-the-US-hit-historic-lows-in-Q3-shaping-record-free-cash-flow/.

[89] European Commission. '"Fit for 55": Delivering the EU's 2030 Climate Target on the Way to Climate Neutrality', 14 July 2021. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0550.

[90] IEA. 'Oil 2021' (Paris: IEA, 2021), 31. https://www.iea.org/reports/oil-2021.

[91] European Commission. 'Proposal for a Regulation on Ensuring a Level Playing Field for Sustainable Air Transport', 14 July 2021. https://ec.europa.eu/info/sites/default/files/refueleu_aviation_-_sustainable_aviation_fuels.pdf; European Commission. 'Proposal for a Regulation on the Use of Renewable and Low-Carbon Fuels in Maritime Transport and Amending Directive 2009/16/EC'. Brussels, 14 July 2021. https://ec.europa.eu/info/sites/default/files/fueleu_maritime_-_green_european_maritime_space.pdf.

significantly more governmental involvement. The US Inflation Reduction Act[92] was introduced as a way of encouraging domestic companies to expand their activity in the minerals and green technology sectors, ultimately reducing dependence on foreign supply chains. The EU responded with the Critical Raw Materials Act[93] (CRMA) and Net Zero Industry Act[94] (NZIA), to counter not just the dominance of Chinese companies in the energy transition, but also of the US.

The move toward re-shoring and protectionism in the energy sector is a symptom of the broader geopolitical trend of strategic competition. The US-China power struggle has accelerated over the last five years as shown by the trade disputes in 2018-2019.[95] Recognizing its own interest in maintaining relations with both the US and China, the EU sought strategic autonomy rather than joining one side of the conflict.[96] Faced with supply chain disruptions during the Covid-19 pandemic and war in Ukraine, the EU took a larger step toward increasing self-sufficiency in strategic sectors and pursuing competitive advantages for green technologies. Achieving an orderly energy transition requires incremental but decisive action to reduce energy demand, increase supply of renewables, and build infrastructure. It also requires cooperation between states, for knowledge and technological transfer, as well as for keeping the old, fossil fuels market stable. However, current developments seem to point to a more disorderly transition, characterized by protectionism, strategic competition and strong governmental involvement.

Conclusion

The international oil market is undergoing significant changes. The central theme for the oil market up to 2024-2025 will be volatility. As the world is struggling to find a new power balance, supply chains remain vulnerable to market shocks. The supply chains that the EU is now reliant on for crude and oil products have expanded given the longer geographical distances between the EU and its suppliers. Russian exports are now delivered to China, India and Turkey, both through pipelines and tankers. These supply chains are more vulnerable to geopolitical and economic shocks, weather events and cyber and logistical disruptions. The US and Saudi Arabia (together with its OPEC+ partners) are competing for global oil market dominance. The United States is well positioned to become the global energy leader, due to its promising shale oil industry, fall of Russia as an energy

[92] The White House. 'Inflation Reduction Act Guidebook | Clean Energy'Accessed 5 April 2023. https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/.

[93] European Commission. 'Critical Raw Materials Act', 2022. https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_5523.

[94] European Commission. 'Net Zero Industry Act', 16 March 2023. https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act_en.

[95] Council on Foreign Relations. 'Timeline: U.S.-China Relations'. Accessed 13 April 2023. https://www.cfr.org/timeline/us-china-relations.

[96] Mario Damen. 'EU Strategic Autonomy 2013-2023: From Concept to Capacity'. European Parliamentary Research Service, July 2022. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733589/EPRS_BRI(2022)733589_EN.pdf.

superpower and issues within OPEC+. Saudi Arabia's historical role as a market balancer is allowing it to impose production cuts and strongly influence global prices. Its increasingly stronger alliance with China is replacing US influence in the Middle East. In the mid- to long-term, the energy transition will be the driving force in the global oil market. The main question is whether the transition can take place in an orderly, cooperative way, or if it will be turbulent, characterized by isolationism and nationalist gains. Although Europe (and other OECD countries) are expected to change their energy system most dramatically by 2030, so far progress has been limited and signs are pointing toward a disorderly exit of fossil fuels.

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LOSS & DAMAGE FINANCE AND MITIGATION PLEDGES: PRIORITIES FOR CLIMATE DIPLOMACY IN 2023

Marian Feist and Oliver Geden

Climate diplomacy in 2022 was marked by multiple crises and the shaken confidence of developing countries in the multilateral process. Since an agreement was reached on the critical issue of loss and damage at the 27th Conference of the Parties (COP 27) to the United Nations Framework Convention on Climate Change (UNFCCC) in Sharm el-Sheikh, Egypt, the focus is now on working out the critical details. With regard to emission reductions, there is a credibility crisis that threatens to worsen, not only because political priorities have shifted following Russia's attack on Ukraine. In order to strengthen international climate cooperation in 2023 and beyond, it will be crucial to honour existing commitments, adhere to agreed processes, and show diplomatic tact in dealing with partner countries.

Energy-supply insecurity, high inflation rates, and geopolitical tensions – Russia's war against Ukraine has affected short-term priorities in many countries. This has had consequences for international climate politics, not only with regard to the availability of fiscal resources. The German government has delayed its coal phase-out and seen it necessary to court new gas suppliers to meet its energy needs. In the political context of the UNFCCC, countries in the Global South see such measures as lacking coherence and credibility.

In addition, there was a considerable degree of frustration that had accrued in the run-up to COP 27 among the developing countries that are particularly affected by climate change. Despite old and new commitments, multilateral negotiations had yielded hardly any progress on important issues. At the 2009 climate summit in Copenhagen (COP 15), developed countries had pledged to mobilise US$100 billion in annual funding for climate change mitigation and adaptation by 2020. Actual finance flows fell short[97] of this target by almost US$17 billion and are now expected to reach US$100 billion in 2023. Funding for climate change adaptation is especially insufficient when measured against estimated needs.[98] Discrepancies between pledges and actual support are hardly a new issue. But the situation has reached a critical point for many representatives of the Global South. As the Bahamian Prime Minister, Philip Davis, put it, "We are commitment-fatigued and we are pledge-fatigued."[99]

[97] OECD, "Aggregate Trends of Climate Finance Provided and Mobilised by Developed Countries in 2013-2020," 2022.

[98] UNEP, "Adaptation Gap Report 2022," 2022.

[99] Jasper Ward, "Caribbean nations should push for climate finance at COP27, Bahamas PM says," Reuters, 2022, https://www.reuters.com/business/environment/caribbean-nations-should-push-climate-finance-cop27-bahamas-pm-says-2022-08-16/.

Loss and damage: An important first step

Growing frustration was also prevalent with regard to loss and damage, which was expected to become a major issue at COP 27. Countries that have contributed little to climate change but are disproportionately impacted by its effects have, since the early 1990s, been calling for financial support in response to climate-related damages, for example due to rising sea levels or extreme weather events. A new dialogue on loss and damage was launched at COP 26 in Glasgow in 2021, and the new German government showed sensitivity to the importance of the issue for developing countries. In July 2022, the foreign minister travelled to Palau to signal solidarity with those small island developing states that are particularly affected by climate change. The governments of Scotland and Denmark made financial announcements in the run-up to COP 27 that were taken as a sign that the position of developed countries was beginning to change. On the other hand, the Glasgow Dialogue had not made any significant progress in the intersessional negotiations in Bonn in June 2022. Against this backdrop, it was essential for COP 27 to produce a tangible outcome on loss and damage and restore confidence in the multilateral process.

Loss and damage had already been on the agenda in previous negotiation rounds, for example in the context of the Warsaw Mechanism, which emerged from COP 19 (2013).[100] Financial support, however, was explicitly put on the agenda for the first time in Sharm el-Sheikh. This kind of support is not about adapting to environmental change, but about providing finance in response to the destruction brought on by climate change.

Developed countries have been opposed to this idea due to concerns about the legal implications that any formal recognition of responsibility could have. The United States, in particular, has historically been in strong opposition to loss and damage proposals. It accounts for a large share of the global greenhouse gases emitted since the beginning of the Industrial Revolution. Immense financial obligations could potentially be derived from such proposals. In line with the logic already asserted by the US government while negotiating the Paris Agreement, compensation and liability were therefore explicitly excluded from the negotiations at COP 27. Instead, the core demand of the developing countries was to create a dedicated fund for loss and damage from which eligible states could receive payments.

Germany played a prominent role in the negotiations. The German Special Envoy for International Climate Action, Jennifer Morgan, chaired the loss and damage finance negotiations together with Chilean Environment Minister Maisa Rojas. Germany had already launched the idea of a *Global Shield* as an insurance solution for loss and damage as part of a G7 cooperation with the Vulnerable 20 (V20), a group of countries particularly affected by climate change. This Global

[100] Jonathan Gewirtzman et al., "Financing loss and damage: Reviewing options under the Warsaw International Mechanism," *Climate Policy* 18, no. 8 (2018).

Shield was intended as a workable solution for the short to medium term. But the political effects of this proposal had been underestimated. From the perspective of many developing countries, the initiative seemed like an attempt to take the wind out of the sails of those demanding a dedicated UNFCCC fund.

As expected, the loss and damage negotiations at COP 27 proved difficult. A key point of contention, which the European Union (EU) raised in unusual clarity, was whether China could still be classified as a developing country or whether it should be obligated – as the largest current greenhouse gas emitter – to contribute to loss and damage finance. Despite tremendous dissimilarities in levels of economic strength and emissions among countries, they are still commonly divided into developed and developing countries, according to a principle established in the UNFCCC in 1992. While this equates countries such as Burkina Faso or Tuvalu with China, South Korea, or Saudi Arabia, the dichotomy is still very much a central principle of the UNFCCC's internal organisation (e.g., for the composition of committees), and it often reflects key political cleavages.

In Sharm el-Sheikh, China was only willing to make voluntary contributions, as it has been in other areas of international climate finance. The United States and the EU relented rather late, but ultimately they signalled their willingness to agree to a dedicated fund for loss and damage.[101] Initially intended as a bargaining move, this concession turned out to be an essential step towards restoring the trust of some of the developing countries in the multilateral process. Although many Western countries would have preferred a different solution, the decision to create a fund for particularly vulnerable developing countries was a crucial concession with great symbolic significance.

A Transitional Committee, consisting of 14 delegates from developing and 10 from developed countries has been formed to deliberate on the details of how this fund is going to operate. At these post-agreement negotiations, a number of fundamental issues still need to be resolved. The wording agreed in Sharm el-Sheikh[102] is vague on key points – a typical example of the use of constructive ambiguity in UN climate negotiations. Excluding contentious issues may serve to facilitate an initial agreement, but important details now remain to be negotiated. For example, the fund aims to support developing countries that are particularly affected by the negative impacts of climate change. Exactly which countries are eligible for support, however, was left undecided, as was who will contribute to the fund or which financial instruments will be used.[103]

[101] Svea Koch, Nils Keijzer, and Steffen Bauer, "The EU in Sharm-El-Sheikh: Good cop at a bad COP?," German Institute of Development and Sustainability, 2022, https://blogs.idos-research.de/2022/11/24/the-eu-in-sharm-el-sheikh-good-cop-at-a-bad-cop/.

[102] UNFCCC, "Funding arrangements for responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage," 2022, https://unfccc.int/documents/624440.

[103] Adeline Stuart-Watt, "Why COP27 will be remembered as the Loss and Damage COP and what to expect next," Grantham Research Institute on Climate Change and the Environment, 2022, https://www.lse.ac.uk/granthaminstitute/news/why-cop27-will-be-remembered-as-the-loss-and-damage-cop-and-what-to-expect-next/.

This is reminiscent of the *Green Climate Fund* (GCF). Operationalising the GCF after the initial decision to establish it proved a lengthy process.[104] The fund was conceived at COP 15 in Copenhagen in 2009 and agreed upon a year later in Cancún. But it took until 2015 before the first projects could be financed. The GCF's key guiding document had left many critical questions unanswered, such as how the required balance between funding for mitigation and adaptation would be interpreted. The much-anticipated upcoming 2015 Paris climate summit (COP 21) generated political pressure and likely sped things up. Important questions about the GCF's institutional design were nonetheless deferred until well after its launch. The new loss and damage fund now faces a similarly difficult and cumbersome process of operationalisation.

While there is a considerable deal of momentum to establish the fund, key issues, like what kinds of losses and damages are covered and whether the contributor base should be broadened to include countries like China, are still major political stumbling blocks that need to be overcome. At its first meeting in March 2023, the Transitional Committee gave itself an ambitious workplan and is expected to present initial results by this year's COP 28 in Dubai.[105]

Emission reductions: An increasing credibility gap

The so-called cover decision of COP 26, the Glasgow Climate Pact[106], was generally well received by observers. After all, it seemed to contain the promise that parties would submit updates of their *Nationally Determined Contributions* (NDCs) for 2030 ahead of COP 27, ramping up their mitigation pledges. By contrast, the *Sharm el-Sheikh Implementation Plan* was met with almost unanimous criticism, despite the fact that the wording in both cover decisions does not significantly differ. This change in perception can be attributed to two main factors: first, the developments in climate and energy policy since COP 26, and second, the extraordinarily cumbersome negotiations at the conference in Egypt.

Multiple crises, which became virulent with Russia's attack on Ukraine, have shifted the short-term priorities of many of Europe's climate policy pioneers. Germany is by far not the only country where the focus is now more on the security of energy supply and energy prices. Unsurprisingly, the importance of climate policy has diminished, at least temporarily, in view of the enormous energy security challenges. It is doubtful, however, as to whether the lack of progress since COP 26

[104] Marian Feist, "A crisis of confidence at the Green Climate Fund?," Grantham Research Institute on Climate Change and the Environment, 2018, https://www.lse.ac.uk/granthaminstitute/news/crisis-confidence-at-green-climate-fund/.

[105] Liane Schalatek, "The TC Needs a Bit of Luck and a Lot of Political Will to Deliver a Loss and Damage Fund That Can Soar," Heinrich Böll Foundation, 2023, https://us.boell.org/en/2023/04/11/transitional-committee-needs-bit-luck-and-lot-political-will, accessed April 2023.

[106] UNFCCC, "Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its third session, held in Glasgow from 31 October to 13 November 2021: Addendum, part two: Action taken by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its third session," 2022, https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf.

can be sufficiently explained by the intensification of crises. Numerous G20 members, including the EU, had already signalled shortly after the Glasgow climate summit that they would not add more stringent reduction targets to their NDCs in 2022.[107] The only significant increase in ambition that a G20 member has announced for 2030 was made by Australia – a direct consequence of a change of government in May 2022.

There was not much confidence either that the developed countries would actually achieve their national emission reduction targets, whatever their level. Global greenhouse gas emissions have now returned to 2019 levels, the last year before the outbreak of the Covid pandemic. But emissions would need to fall by 43 per cent between 2019 and 2030 to bring the world onto a 1.5 °C path, according to the latest report from the Intergovernmental Panel on Climate Change (IPCC).[108], [109]

With its *Inflation Reduction Act* of August 2022, the Biden administration unexpectedly succeeded in getting a comprehensive climate policy package through Congress. As this package is based on subsidies for climate-friendly technologies – as opposed to carbon pricing or even limiting emissions – its effect cannot yet be precisely quantified. However, it is particularly irritating for developing countries that, on the European side, there has been a shift from natural gas to coal in electricity production and that new infrastructures and supply relationships are being created for gas and oil. Even if the medium- to long-term lock-in effects within the EU should turn out to be limited – due to the emissions trading system and accompanying measures – Europe, which is highly dependent on fossil energy, is acting far more pragmatically here than it has so far conceded to developing countries. At COP 26, Germany and other EU Member States pledged to end state co-financing of coal, oil, and natural gas projects abroad by the end of 2022. The Elmau G7 summit in June 2022 indicated a change of course. State-backed investments in the gas sector should, according to the leaders' communiqué, be "implemented in a manner consistent with our climate objectives and without creating lock-in effects".[110] This would not be feasible in the much-discussed case of exploring new gas fields in developing countries such as Senegal.

As the political focus of COP 27 was undoubtedly on loss and damage, there was little progress in the negotiations on mitigation, with positions even hardening. This applies both to the implementation of international cooperation mechanisms

[107] Susanne Dröge and Oliver Geden, "Next COP ahead: Europe has work to do," SWP Comment 2022/C 02, 2022.

[108] IPCC, "Climate Change 2022 – Mitigation of Climate Change – Summary for Policymakers: Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change," 2022, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf.

[109] IPCC, "Climate Change 2023: Synthesis Report: A Report of the Intergovernmental Panel on Climate Change. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change," [Core Writing Team, H. Lee and J. Romero (eds.)], 2023, https://www.ipcc.ch/report/ar6/syr/.

[110] G7, "G7 Leaders' Communiqué," 2022, https://www.g7germany.de/resource/blob/974430/2062292/fbdb2c7e996205aee402386aae057c5e/2022-07-14-leaders-communique-data.pdf?download=1.

(under Article 6 of the Paris Agreement) and to the *Mitigation Work Programme* agreed in Glasgow. The latter was intended not least to support and revitalise the ongoing global stocktaking of progress under the Paris Agreement. The fact that the final cover decision of COP 27 essentially repeats the Glasgow resolutions on mitigation can be considered a success in view of the course of negotiations. In contrast to COP 26, Sharm el-Sheikh did not serve as a stage for launching new sector-specific initiatives beyond the UNFCCC process. At the G20 summit in Bali, held in parallel with COP 27, a *Just Energy Transition Partnership* (JETP) was announced by a number of developed countries with Indonesia, following a similar agreement with South Africa. In December there was another JETP concluded with Vietnam. In all three cases, groups of donor countries – each of which includes Germany – aim to support coal-dependent emerging economies with decarbonising their energy sectors.

Taking stock of Paris

The first Global Stocktake (GST) can be considered the litmus test for the UN climate regime's ability to trigger net emission reductions that are consistent with achieving the 1.5 °C target. The five-yearly process was launched at the 2022 intersessional negotiations in Bonn. Its purpose is to assess collective progress in the areas of mitigation, adaptation, and finance and to assess it against Paris-compatible benchmarks.

So far, however, the process has not progressed beyond technical expert dialogues. It is expected to conclude at COP 28 in Dubai and provide an impetus to significantly increase the ambition of NDCs by the next deadline in 2025. If the largest emitters fail to announce massively ramped-up reduction targets for 2030 and 2035 in the next round, the *pledge-and-review* process legally codified in the 2015 Paris Agreement will inevitably face a deep credibility crisis – and international climate diplomacy with it. A similar outcome, albeit delayed, can be expected if the developed countries fail to actually meet their 2030 pledges or if the recently announced JETPs do not fulfil the hopes placed in them.

Europe has work to do

The EU is comparatively well-placed in terms of target formulation and implementation. With a net reduction target of 55 per cent by 2030 (base year 1990), its NDC is surpassed by hardly any developed country. But the completion of the Fit-for-55 package, expected in the course of 2023, is even more important, as it will actually implement the overall EU target through more than a dozen directives and regulations. Tougher emissions trading could not only limit the impact of the crisis-induced shift from natural gas to coal. During the first week of COP 27, the Council of the EU and Parliament agreed to increase the amount of net CO_2

removal from land use, land-use change and forestry (LULUCF). This enabled Vice Commission President Frans Timmermans to announce in Sharm el-Sheikh that the EU's ambition level would be increased to 57 per cent by 2030 – a step not yet formally agreed upon by Member States in the Council of the European Union.

The approaching debate on the targets for 2035 and 2040 will be far more contentious within the EU. The European Climate Law provides that net zero greenhouse gas emissions be achieved by 2050. To set interim targets, the law requires the Commission to submit concrete proposals for the path to climate neutrality, at the latest within six months after the conclusion of each GST. A decision can be expected in 2024, the year of the European elections. With each five-year step, the question of internal EU burden-sharing will become more vexing – not only because ambition levels in Central and Southeast Europe are still relatively low, but also because the climate neutrality target for 2050 concerns the EU as a whole, that is, it does not necessarily have to be achieved by every single Member State, provided that other Member States exceed this target. The net emission reduction target of 110 per cent by 2050, announced by Denmark's new government a few weeks after COP 27, could be a significant step here.

National net-negative emission targets for 2050 not only expand the scope for negotiations within the EU, taking into account macroeconomic conditions in Member States with GDP per capita significantly below the EU average (e.g., Bulgaria and Romania) or the sectoral structure in Member States with very high levels of hard-to-abate agricultural emissions (e.g., Ireland). Such targets also signal that, in the long term, climate policy pioneers can be expected to remove more CO_2 from the atmosphere each year than they emit. Methods for this include afforestation or the capture of CO_2 from ambient air with subsequent geological storage (*Direct Air Carbon Capture and Storage,* DACCS).[111] The latest reports of the IPCC show that net-negative emission pathways are indispensable for reaching the 1.5 °C mark by the end of the 21st century after temporarily exceeding the threshold from the 2030s onwards (*overshoot*).

Cooperation with diplomatic tact

Because global emissions are still not falling, despite the Paris Agreement, dealing with the consequences of climate change is becoming an increasingly pressing political issue – even in the optimistic scenario that global warming can be halted by mid-century. If the 1.5 °C threshold is significantly exceeded, problems will become even more acute. The political dimension of the enormous physical impacts of climate change became very clear at COP 27. Owing to current priorities in the multilateral process, there was a strong focus on loss and damage. By contrast, adaptation to climate-related environmental change as well as international climate finance for adaptation have fallen short. The pledge to provide

[111] Oliver Geden and Felix Schenuit, "Unconventional mitigation: Carbon Dioxide Removal as a New Approach in EU Climate Policy," SWP Research Paper 2020/RP 08, 2020.

US$100 billion annually in international climate finance will only be fulfilled after a delay of several years. Moreover, the estimated funding needs for adaptation are not being met.

Meanwhile, delegates continue to struggle to agree on a single definition of international climate finance for the UNFCCC. A n*ew Collective Quantified Goal on Climate Finance* (NCQG) is being negotiated. Based on the previous US$100 billion target, it is to be adopted by 2024. Both the size of the new target – literally a question between billions or trillions – and the potential sources of funding are on the agenda. Whereas adaptation finance is often not viable without government support and therefore requires public sources of funding, developed countries insist on involving private investors to a considerable extent in view of the amounts required. In this context, there is also the abovementioned conflict over whether countries such as China should be obligated to make contributions, comparable to those from developed countries. These negotiations – as well as those for a *Global Goal on Adaptation* (GGA) – made little progress in Sharm el-Sheikh. Addressing climate impacts is therefore an issue that will continue to put increasing pressure on the international community, both materially and politically.

In view of this pressure, the loss of confidence on the part of developing countries, and the – at least in the short term – conflicting goals between energy security and climate change mitigation, diplomatic tact will be required to continue the multilateral process effectively in 2023 and beyond. The German government has repeatedly made assurances that its efforts to replace gas imports from Russia in no way represent a step backwards in Germany's ambition to reduce emissions. However, the very fact that countries of the Global South perceive a lack of coherence in view of the – albeit temporary – measures has emerged as a problem for Germany's climate diplomacy.

With the G7 climate club[112] and the *Global Shield*, Germany has proven to be quite resourceful and flexible when it comes to new initiatives and forms of cooperation. However, it will be important to also strategically anticipate the procedural challenges that need to be overcome in order to reach an agreement on such initiatives with specific partners. The loss and damage negotiations in Sharm el-Sheikh have shown this very clearly.

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[112] Susanne Dröge and Marian Feist, "The G7 Summit: Advancing international climate cooperation?," SWP Research Paper 022/C 34, 2022.

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THE IMPACT OF THE ENERGY TRANSITION AND THE GLOBAL ENERGY CRISIS ON EU TECHNOLOGY LEADERSHIP POLICY

Yanko Yanakiev, PhD

The world is witnessing fundamental shifts in the global energy landscape that have broad economic, social, technological, political and geopolitical implications as a result of the global energy transition[113] linked to the need to avert climate catastrophe and leading to a low carbon future.

The current energy transition represents a gradual and large-scale industrial transformation of the energy foundations of the global economy (amounting to USD 100 trillion), characterized by a change in energy use practices and an increase in the relative share of renewable energy sources (RES), innovation and deployment of a range of low-carbon technologies, all motivated by the objective of reducing greenhouse gas emissions. Structural changes are underway to shape global energy demand and the need for new, greener ways of producing energy, leading to fundamental changes in the structure of the energy complex of individual countries around the world.

The energy transition encompasses all levels and stages of the energy production chain, the balance between supply and demand in global and regional energy markets, actors and their behavior, financial models and business models, existing policies, regulatory framework, etc. It seriously alters existing economic and trade patterns and affects the interstate balance of power, inevitably leading to changes in the configuration of existing political, economic and trade alliances and the emergence of new ones. Besides, it forms non-linear and dynamic interrelationships between geopolitics, national security strategies, foreign policy, energy and climate diplomacy.

The issue of energy transition is widely debated, but the contradictions and conflicts both within and between countries have yet to deepen and concern the nature of the transition, its development and the timing of its implementation. Last but not least, and extremely important, are the answers to the questions: How much will it cost? Who will pay?

The first global energy crisis and the energy transition

Although there is some controversy, the first global energy crisis did not begin with Russia's military aggression in Ukraine in February 2022, but in the summer

[113] The energy transition is a natural, long-term, multidimensional transformation process, whereby one or more energy resources are displaced and new ones are more widely used under the influence of scientific and technological progress and the complex development of new technologies. As a result, profound and fundamental changes are taking place in the course of industrial transformation of the whole society and changes in the whole social system, in a wide range of different fields in industry, technology, economy and politics.

See also Yanakiev, Y., Energy Transition – Geopolitics and Energy diplomacy, S., University for National and World Economy, 2022., p. 56.

of 2021. The crisis is determined by the mutual influence of many factors, of which the following should be highlighted:

- A sharp increase in demand for energy resources in response to increased global energy consumption due to the faster economic recovery following the COVID-19 pandemic. In the middle of 2021, the oil, natural gas and coal markets gave the first signs of supply-demand balance problems, pushing up prices. In effect, demand has collided with an already evident supply shortage. Assumptions and attitudes about a global peak in energy demand between 2019 and 2020 have proved to be very wrong. In November 2021, the US announced large-scale oil sales from the country's strategic reserve[114];

- Insufficient investment to explore and develop new oil and gas fields and to produce in adequate quantities. This follows earlier decisions by oil and gas companies to reduce investment in new supply, given low energy prices in 2014-15 and through 2020 and low returns, uncertainty of future demand, and pressure from investors and financial intermediaries to return more value to shareholders. Many major oil and natural gas producers have failed to increase supply in 2021 to meet rising demand, even with the incentive of high prices. Underinvestment is also due to government policy and regulation; investor support for environmental, social and governance (ESG) factors; and the lack of sufficient alternatives to oil and natural gas that were expected to already be available;

- Europe's high level of dependence on Russian energy sources. The share of Russian natural gas in EU consumption has increased from an average of 30% in 2005-2010 to reach 40% in 2015-2020. This dependence has long been identified as a strategic weakness of the EU. Over the last ten years, infrastructure has been built to diversify import sources, but Russian volumes have remained high;

- The fragile balance between energy supply and demand has been disrupted by supply constraints. The most striking example of this was Russia's deliberate action in autumn 2021 to restrict its natural gas supplies to Europe, months before the invasion of Ukraine. There was also an uncharacteristic reduction in Russian natural gas supplies to Europe in January 2022, which raises the question of whether this was economically justified or whether Russia was aiming to bring tension to the European gas market before the aggression in Ukraine;

- Policies of self-restraint and a forced transition to a carbon-neutral economy based on the hasty abandonment of traditional energy sources and a transition to intermittent renewable sources. This shows unequivocally that no transformation of the energy sector can take place without sufficient reliable and cost-effective baseload generation capacity. The coexistence of fossil fuels with RES and alter-

[114] President Biden Announces Release from the Strategic Petroleum Reserve As Part of Ongoing Efforts to Lower Prices and Address Lack of Supply Around the World, https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/23/president-biden-announces-release-from-the-strategic-petroleum-reserve-as-part-of-ongoing-efforts-to-lower-prices-and-address-lack-of-supply-around-the-world/

native green fuels is inevitable not only in the short term but also in the long term[115].

The cumulative impact of these and other factors has led to significant price increases for coal, oil, natural gas, and electricity, respectively, in the summer and fall of 2021. The situation escalated into a full-scale global energy crisis following Russia's military aggression in Ukraine in February 2022. The war has accelerated the rise in energy prices, with the price of natural gas reaching record highs, directly affecting electricity prices in some markets. Oil prices have reached their highest level since 2008.

The global energy crisis in the period 2021-2022 is of unprecedented depth and complexity, and is highly multifaceted with major implications for markets, policies and economies worldwide. There are certain commonalities between the first global energy crisis and the oil shocks of the 1970s, but there are also important differences. The oil shocks were a consequence of the Arab oil embargo and were largely confined to oil and at a time when the world economy was much more dependent on oil and less on natural gas. Certain political acts and actions then led to geopolitical confrontation between particular blocks of countries (the West versus the Arab states), which primarily affected regional energy markets in the US and Western countries. The current energy crisis is all-encompassing because it has multiple dimensions: fossil carbon resources – oil, natural gas, coal – as well as electricity and climate. It has led to too much disruption in the global market and key regional energy markets, given the highly interconnected nature of the globalized world economy. Perhaps one of the most critical factors underlying the current energy crisis is the reinforcement, very close linkage and interaction with the global geopolitical crisis, as a result of the increased political contradictions, simmering and open confrontations and conflicts, including military ones. Many countries were also facing a food security crisis and increasingly visible impacts of climate change. In this sense, the world has witnessed the generation, mutual influence and accumulation of energy, market, economic and geopolitical crises.

The Russian military aggression in Ukraine, as well as the de facto 'second front' opened in Europe's gas markets, have triggered a reassessment of energy policies and priorities, as well as questioned the viability of infrastructure and investment solutions, profoundly reorienting international energy trade. It has also discredited one of the main pillars of the international energy, economic order and energy security of the last 70 years, namely the belief that the intensification of international trade can consolidate and guarantee security of supply.

The war in Ukraine has become that bifurcation point at which the energy crisis intersects with that of a global geopolitical crisis in which the uncertainty and unsustainability of the world's future energy, economic and political development is growing. It is complemented by the decisions of the EU and the US to impose a number of sanctions on Moscow, as well as to initially restrict and then completely refuse the import of all fossil fuels from Russia. These policy decisions have led to a significant reshuffling and

[115] Yanakiev, Y., Energy Transition – Geopolitics and Energy diplomacy, S., University for National and World Economy, 2022., p. 12.

restructuring of energy markets. Subsequently, the EU's actions to replace Russian natural gas with significant volumes of LNG have caused a diversion of supplies away from traditional LNG customers in Asia, leading to price increases for US, Australian and Qatari LNG and very high spot prices at gas hubs in Europe and the Far East, and even at Henry Hubs in the US. The energy crisis in Europe has become the impetus for major market and geopolitical reconfigurations on a global scale.

Although the first global energy crisis created economic and geopolitical uncertainty it did not undermine political and public support for the energy transition. At present, there is little likelihood that the global energy crisis will deter the West and other politically and economically leading countries from backing away from commitments already made on energy transition and climate.

The "Energy Trilemma"[116] and the Relationship between Energy Transition and Energy Security

Over the last decade, the "Energy Trilemma" has been a central element of energy policy philosophy. In developed economies, growing concerns about the impact of the energy economy on the natural environment mean that sustainability is increasingly a leading priority (especially since the Paris Agreement at COP21 in 2015) and, together with affordability, are becoming problematic for the global energy transition. Energy security has largely been left in the background thanks to the availability of diversified supplies. Conversely, the trend in many developing economies has been to place energy security and equity above sustainability.

Climate neutrality policies and actions have become a major macroeconomic challenge. Trends in energy markets and soaring energy prices, the ensuing economic difficulties, Russia's military aggression in Ukraine and geopolitical conflicts have put energy security at the top of countries' agendas. These events have also changed the perception of the relative importance and urgency of the three vectors of the 'energy trilemma', highlighting the urgent need for secure and affordable energy supplies. This has placed energy security as the overriding global priority, downplaying the relative importance of sustainability. The dramatic revision of this prioritization also highlights the difference in perceptions of the 'energy trilemma' in different regions of the world. The claim that only one goal of the trilemma matters and all others are subordinate or can be achieved as ancillary and side activities have rather ideological dimensions and is a recipe for deception.

[116] A concept developed by the World Energy Council (WEC) to implement sustainable energy projects. It focuses on three main vectors for energy development: energy security, energy affordability and environmental sustainability. Energy security: the efficient organization of primary energy supply from domestic and foreign sources, the reliability of energy infrastructure and the ability of energy suppliers to meet the demands of current and future demand. Energy affordability: availability and accessibility of energy for the population, economic development and inclusive economic growth. Environmental sustainability: determines the efficiency of energy supply and demand as well as the development of renewable and other low carbon sources.

See also Yanakiev, Y., Energy Transition – Geopolitics and Energy diplomacy, S., University for National and World Economy, 2022., p. 19.

The argument that the first global energy crisis and energy security had a deterrent effect on decarbonization and energy transition is also controversial. Rather, the challenges of energy security, at this stage, point to the wrong trajectory of the global energy transition in terms of uneven pace and regional disparities, and in terms of fossil fuels, which still supply about 80% of the world's primary energy. Reducing dependence on them requires an energy transition that ensures a continuous and secure energy supply. If the new reality created by the symbiosis of a global energy and geopolitical crisis allows the myriad scenarios of rapid and complete decarbonization to be forgotten, this will be a step forward, but it would be a mistake to conclude that the energy transition ceases to be a priority.

In 2022, a shift in energy policy priorities from environmental issues to energy security and affordability was clearly noted. The gap between short-term challenges, such as tackling inflation and unemployment and securing food and fuel, and the long-term goal of achieving a climate-neutral economy has never been greater. Energy security is now an issue for many governments, which have been forced to rethink their strategies and take short-term policy measures related to ensuring the functioning of energy systems, fuel substitution, market interventions and fiscal policy, including energy compensation measures for the population and businesses. On this ground, ongoing geopolitical turmoil, persistent inflation and macroeconomic problems, and the worsening physical impacts of climate change are expected to create new tensions and conflicts between managing short-term risks and making meaningful progress on longer-term decarbonization and energy transition goals.

There are currently two main issues related to the impact of the 'energy trilemma' rebalancing process and the uncertainty surrounding it. The first is that it increases the risk of stranded assets – a short-term focus on securing needed additional volumes of carbon-intensive fossil fuels (including to replace Russian imports) could lead to the development of new resources that have limited supply if the elements of the trilemma are rebalanced in the near term.

This leads to the second issue and a key commercial risk for companies – the practical question is how will they balance short-term energy security needs with longer-term requirements for a low or zero carbon environment?! The expectation is that they will seek to develop all kinds of energy resources, including fossil fuels, as low carbon as possible, but in the near term to 2025 this will be severely tested by the competing interests of energy consumers, environmental NGOs, demanding shareholders and especially politicians with multiple vested interests. Thus, there is a need for a public expert debate on how to balance new investment in fossil carbon generation with commitments to climate neutrality. The growing focus on zero- and low-carbon energy is creating a whole new dimension to energy geopolitics, linked to supply chains for critical minerals needed such as components for batteries, electric motors, wind turbines, electrolyzers and solar panels. Plans and priorities depend on geopolitics, investment decisions and economic development imperatives, suggesting that pragmatism, flexibility, ambition and synergies will be needed.

Policies to pursue the goals of the trilemma elements in the short term require trade-offs, which is a prerequisite for formulating credible and sensible energy policies. There is a need to strike a balance between security, affordability and sustainability as security and climate compete as priorities for governments, companies and society. These trends highlight the delicate balancing act that we see interested countries face and manage, weighing different and sometimes opposing forces. The short-term balancing act of the 'energy trilemma' towards energy security may even bring environmental benefits in the longer term, given the desire of many countries to reduce fossil fuel consumption.

In the medium and long term, achieving climate goals, ensuring economic growth and a just energy transition for all are paramount, as the world economy is expected to double by 2050 and the world's population is set to increase by 2 billion people. Long-term energy transition goals will be weighed alongside more immediate considerations such as energy affordability and security. Improving security of supply while reducing emissions is possible, but requires huge investment in all areas combined with a reduction in energy demand. The net result in aggregate economic terms is that investment needs to increase and energy consumption needs to be reduced. This is not easy to achieve in economies that are mainly driven by consumer demand. Sustainability should be pragmatic and practical, and balancing the 'energy trilemma' is possible, but will take time and will certainly require cooperation and shared innovation between every part of the energy industry. There is a need for a deeper analysis of the macroeconomic implications of such a large and radical energy transition. Policy and public discussions require methodical expert assessment of the potential costs and benefits of alternative action plans.

The global energy transition and the struggle for technological leadership

The world is currently entering a new phase of technological competition in the context of the global energy and geopolitical crisis. Renewable and low-carbon energy technologies are at the forefront of the industrial and investment strategies of the world's major economic powers and have an important role to play in a successful energy transition and in achieving a climate-neutral economy. These technologies underpin the development of a new industrial base and are at the heart of modern industrial policies and strategies. As a result of continued investment, improvements through learning curves and supportive government policies, low carbon technologies are becoming cheaper, more local, provide more jobs, emit much less carbon and provide more energy options for the future[117]. Investments in renewable and low-carbon energy technologies pay off not only through climate change mitigation,

[117] IEA Energy Technology Perspectives 2023 shows that employment in new energy technologies already accounts for 55% of global energy jobs and continues to grow. The IEA projects employment in new technologies to grow by about 1.5 million per year through 2030 as fossil fuel jobs decline by 0.5 million per year – a net increase of 1 million jobs per year in a more efficient system.

but also through jobs and technological leadership. The combination of more jobs and lower emissions is the starting point of a new generation of industrial base and policy in both developed and developing economies. There is already a fierce arms race in renewable and low-carbon energy technologies, with leading countries and blocks seeking to gain a competitive edge in this technological area.

Industrial policy is currently undergoing a new renaissance, upending global supply chains, reshaping industries from semiconductors to solar panels, and increasing the non-linearity and indeterminacy of global geopolitical and commercial perspectives. Large-scale industrial policy[118] is again high on the agenda of policy-makers in the world's three largest economies: the US, China and the EU. At the center of this current wave are renewable and low-carbon energy technologies and associated supply chains. The implications of this new era of industrial policy are expected to be profound and more significant, particularly in four interrelated areas: geopolitics, energy transition, trade and sustainability.

The current new wave of industrial policy has its origins in China in 2015, when Beijing initiated its Made in China 2025 plan (MIC2025中国制造2025)[119], and in 2018 launched its China Standards 2035 strategy (中国标准2035)[120]. The two programs include a broad set of policy measures that focus on new technology industries, clean energy and the digital economy. They are centered around large direct government investments and are highly motivated to develop strategic technological autonomy. Through them, Beijing aims not only to limit its dependence on the world's advanced economies and technology leaders, but also to have leading Chinese technology companies set global standards for emerging technologies such as 5G, the Internet of Things (IoT) and artificial intelligence (AI).

As China pursues the goals of these agendas, it has increased its influence through large state investment, protectionist policies, an increasingly integrated domestic market and low labor costs. Starting in 2020, Chinese investment in clean manufacturing is accelerating dramatically, as in 2022 Beijing invested over USD 500 billion in green industries (about 3% of its GDP). China has become the largest producer and exporter of low-carbon renewable energy technologies and also the largest investor in clean energy projects worldwide. The country has at least 60% of the world's manufacturing capacity for technologies such as solar, wind and batteries, 40% of the production of electrolyzers, and dominates the electric vehicle manufacturing sector[121]. Thanks to vertical integration, economies of scale

[118] Industrial policy is defined as government policy intervention in the private sector to strengthen domestic strategic industries through a combination of subsidies, trade promotion, protectionism and regulatory intervention.

[119] Made in China 2025, https://english.www.gov.cn/2016special/madeinchina2025/

[120] China Standards 2035, https://cset.georgetown.edu/wp-content/uploads/t0406_standardization_outline_EN.pdf

[121] IEA Energy Technology Perspectives 2023, https://iea.blob.core.windows.net/assets/a86b480e-2b03-4e25-bae1-da1395e0b620/EnergyTechnologyPerspectives2023.pdf. Chinese companies have a 73% share of global production (downstream) for lithium-ion batteries, 72% for solar modules, 66% for polysilicon, 78% for solar cells and 58% for wind turbines. In terms of raw materials and minerals, China has a concentration of deposits and solid resources of rare earths, but without a monopoly on any critical mineral.

and long learning curves, China's battery industry is now competitive even without national policy support.

Changes to industrial policy in the US began under President Joseph Biden (in office from January 2021). In the period 2021-2022, under the impact of the economic shock of the COVID-19 pandemic and the energy transition, the presidential administration took steps in terms of promoting a new US industrial policy. Three key laws have been passed: the Infrastructure Investment and Jobs Act (November 2021)[122], the Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022 (CHIPS Act) (August 2022)[123] and the Inflation Reduction Act of 2022 (IRA) (August 2022)[124].

Following the articulated domestic and international response to China's technological rise in 2018 under President Donald Trump, the competition for technological leadership between the US and China took a new turn, given the gathering momentum in the race to subsidies their industries. With the passage of the largest domestic climate package with the "triple whammy" of innovation, investment and industrial policy, it could unlock up to USD 3.5 trillion in investment over the next decade. The IRA consists of a combination of grants, tax incentives and loan guarantees, but also focuses on value added. IRAs can provide upfront investment tax credits of up to 70% of the investment cost of renewable energy technologies and cut the cost of onshore wind and solar generation in half. By basing its industrial policy on a share of total project costs, the US seeks to capture high-value segments rather than build an entire supply chain. Although protectionist, this still allows US trading partners to provide other components or subcomponents.

The IRA will dramatically change the economics of clean energy and electric vehicle technologies in the US and the rest of the world. It aims to usher US industrial policy into a new era, the philosophy of which is based on moving the US economy away from fossil fuels and towards the use of low-carbon energy technologies, a lower-emissions energy mix and a modernized electric power system. The IRA also aims to address decades of Chinese and, to a lesser extent, European dominance in five industries: electric vehicles (EVs), batteries, wind, solar, and emerging technologies such as green hydrogen production and carbon capture. On the other hand, this massive spending package will allow the US to increase its share of exports of green technologies and climate-neutral production, as well as change clean global value chains.

EU policy for technological leadership on renewable and low-carbon energy technologies

For more than ten years, the EU has established itself as a global leader in tak-

[122] H.R.3684 – Infrastructure Investment and Jobs Act, https://www.congress.gov/bill/117th-congress/house-bill/3684/text

[123] H.R.4346 – Chips and Science Act, The Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022 (CHIPS Act), signed into law on August 9, 2022, https://www.congress.gov/bill/117th-congress/house-bill/4346/text

[124] H.R.5376 – Inflation Reduction Act of 2022, https://www.congress.gov/bill/117th-congress/house-bill/5376/text

ing ambitious climate action and setting policies to reduce greenhouse gas emissions. Nevertheless, the EU's green industries are increasingly squeezed by the industrial might of the US and China, which is a consequence of a distortion of the level playing field in key technologies and critical raw materials related to the energy transition. In the global race for sustainable technologies, the EU has so far benefited from the most developed set of climate regulations and carbon pricing in the world, introducing carbon pricing in 2005 through the implementation of its Emissions Trading Scheme (ETS). The block has one of the highest carbon prices in the world and is ready to introduce the world's first border tax on carbon emissions[125]. As a result of this consistent policy, the EU is benefiting from accelerated deployment of renewable energy compared to other developed economies.

The COVID-19 pandemic and the global energy crisis have shown how the over-concentration of value chains has led to EU dependence on certain countries not only for critical raw materials and key technologies but even for common products. These dependencies can have serious consequences for the EU's economic prosperity when global markets are unable to meet all demands at all times.

In the 2019-2023 period, the industrial policy renaissance has also returned to the EU amid geopolitical rifts over the role of free trade and the security of supply chains. In response to these new challenges, major policy plans, programs and packages of laws have been consistently initiated in the EU.

The European Green Deal (December 2019)[126] is a vision for making Europe a climate-neutral continent by 2050 through the supply of clean, affordable and secure energy. In December 2020, the European Council reaffirmed its commitment to the EU's energy transition for a net domestic reduction in greenhouse gas emissions of at least 55% by 2030. **The Next Generation EU (December 2020)**[127] is a direct response to the economic damage caused by Covid-19 and included a "Recovery and Resilience Fund" (RRF) that allocated around EUR 250 billion to green investments.

Fit for 55: delivering the EU's 2030 Climate Target on the way to climate neutrality (July 2021)[128], the package is a set of proposals and initiatives aimed at revising and updating EU legislation to align it with 2030 and 2050 climate targets. On April 25, 2023, the Council of the EU adopted five laws that will enable the EU to cut greenhouse gas emissions within the main sectors of the economy, while making sure that the most vulnerable citizens and micro-enterprises, as well as the sectors exposed to carbon leakage, are effectively supported in the climate transition[129].

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[125] In December 2022, the EU reached a final agreement on the implementation of CBAM, a regulatory mechanism aimed at combating carbon leakage.

[126] COM/2022/230 final, The European Green Deal, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN&qid=1653033742483

[127] Next Generation EU, COUNCIL REGULATION (EU) 2020/2094 of 14 December 2020, https://eur-lex.europa.eu/eli/reg/2020/2094/oj

[128] COM(2021) 550 final, Fit for 55: delivering the EU's 2030 Climate Target on the way to climate neutrality, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52021AE5481

[129] Fit for 55': Council adopts key pieces of legislation delivering on 2030 climate targets https://www.consilium.europa.eu/en/press/press-releases/2023/04/25/fit-for-55-council-adopts-key-pieces-of-legislation-delivering-on-2030-climate-targets/

REPowerEU (March 2022)[130] is a response to Russia's aggression in Ukraine and the subsequent energy crisis. The aim is to accelerate Europe's green transition in the critical fight against climate change, but also to end the EU's over-dependence on Russia and on fossil fuels in general, whose imports are tied to ever-increasing costs.

Since early 2023, the EU clean-tech sectors have been supported by a major Green Deal Industrial Plan for the Net-Zero Age (GDIP) (February 2023)[131] and two proposed legislative acts – the Net Zero Industry Act (NZIA)[132] and the European Critical Raw Materials Act (CRMA)[133]. The GDIP and its complementary EU laws aim to change the fundamentals of the European economy and industrial model, protect the block from external geopolitical pressures and mitigate the effects of climate change. They fill the missing ingredient of subsidies and government support, whereby the Union lags significantly behind China and the US. The next logical step is for the EU to build a long-term investment plan that looks at the effects of large-scale investment, ensuring long-term predictability and using simple tools to complement the other parts of Europe's industrial climate neutrality puzzle.

GDIP should provide a more favorable environment to increase the EU's production capacity for net-zero technologies and products, enhance the competitiveness of European industry and support the rapid transition towards climate neutrality. It builds on previous initiatives and on the strengths of the EU single market, complementing ongoing efforts under the European Green Deal and REPowerEU.

NZIA should promote the use of clean technologies within the EU and accelerate the transition to clean energy. The regulation will provide better conditions for creating net-zero projects in Europe and attracting investment. Positive effects are expected from accelerating progress towards the EU's 2030 climate and energy targets, moving towards climate neutrality, boosting the competitiveness of EU industry, creating quality jobs and supporting the EU's efforts to be energy independent. The implementation of the NZIA aims to expand the EU clean technology industry and to meet at least 40% of the EU's annual deployment needs for strategic net-zero technologies by 2030. These strategic technologies include: solar, wind, battery and storage, heat pumps and geothermal, electrolyzers and fuel cells, biogas/biomethane, carbon capture and storage and grid technologies.

CRMA sets targets for the production, refining and recycling of critical raw materials (CRMs), which are often indispensable to strategic sectors including renewable energy, digital, space, defense and healthcare. These CRMs often involve a high level of supply risk and can also be associated with negative environmental

[130] COM/2022/230 final, REPowerEU Plan, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN&qid=1653033742483

[131] COM(2023) 62 final, A Green Deal Industrial Plan for the Net-Zero Age, https://commission.europa.eu/system/files/2023-02/COM_2023_62_2_EN_ACT_A%20Green%20Deal%20Industrial%20Plan%20for%20the%20Net-Zero%20Age.pdf

[132] COM (2023) 161, SWD(2023) 68, Net Zero Industry Act, https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act_en

[133] The European Critical Raw Materials Act, https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en

impacts depending on extraction methods and processes. The CRMA aims to provide the EU with security of supply of CRMs needed for green technologies. In particular, the CRMA should stimulate domestic production in the EU by directing supply chains away from third countries (including China).

Through these new initiatives, the EU is making a strong bid to play an important role in the global race for clean technologies, and to become a technology hub for clean energy. Brussels is demonstrating that it will not tolerate policies from countries that seek to give their own industries an unfair advantage. At a time when the EU is seeking to diversify its supplies, the fear of de-industrialization in Europe and the flight of investment capital and 'brains' has been further fueled by the IRA. The IRA has posed multiple challenges to the EU's green industrial policy and energy transition approach, forcing Brussels to respond in an effective way to maintain and strengthen its leadership in green technologies, to address the potential loss of competitiveness and the risk of relocation of energy-intensive industries, thereby promoting its future economic prosperity.

GDIP is a highly sophisticated political approach with the aim of developing green value chains in the EU, to strengthen the EU's industrial base for prosperity and increase Europe's resilience against global trade disruptions. This package shows a certain paradigm shift for the EU. The Union has a contribution to make in building a global economic system, open and rules-based trade, insisting on respecting and advancing social and environmental sustainability standards. While the EU remains fully committed to these values, the weakening of the WTO and the increasing 'weaponization' of trade forces the EU to have industrial policy instruments to restore a 'level playing field' and reduce excessive dependencies that can be used to exert pressure.

Undoubtedly, the legislative package has major implications for European foreign policy, energy and climate diplomacy. Given the EU's heavy reliance on imports for certain critical technologies and raw materials, these changes will affect its partners. European ambitions for an energy transition and net zero, and ambitions to reduce over-dependence, should not be seen as a form of 'green protectionism' or 'regulatory imperialism'. The GDIP does not target any particular country, on the contrary it offers new opportunities for European partners.

Globally, the net effect of these measures can be expected to be an acceleration of the overall energy transition and an increase in investment in clean technologies and renewables, which have already received a significant boost from the US's IRA. However, European acts also risk contributing to rising climate protectionism, potentially damaging green industries in developing countries and exacerbating trade tensions. India and China have already voiced strong objections to the EU's carbon cap adjustment mechanism.

Conclusion

The global energy crisis poses fundamentally new challenges and tasks for the world energy industry and for the political and business community that cannot be solved within the old paradigm, with old technologies, methods and means. Many traditional ideas, concepts and notions are in fact obsolete, having acquired completely new content. What is needed is an optimal long-term pragmatic plan that reconciles climate objectives and economic development without putting key social, energy and economic balances to the test. This becomes even more urgent today as climate change is turning to be the new global megatrend, a factor in global competition for resources, knowledge and technology, as well as for economic, technological and geopolitical leadership.

There are significant challenges for European industrial policy in the struggle for technological leadership in terms of market rationality, state aid regimes, geopolitical competition and the future partnership with the US in this area. Without transatlantic coordination, Washington and Brussels could become bogged down in a trade war, leaving them vulnerable on both climate policies and their energy and climate diplomacy under the global decarbonization consensus. A transatlantic approach to cooperative competition could facilitate a virtuous cycle in the climate-trade nexus, evolving into an economic block that can compete more effectively with China and strengthen transatlantic power during the global energy transition.

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ON THE FOSSIL GAS FUTURE OF THE EUROPEAN ENERGY MIX

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Introduction

For millennia, mankind has been searching for undiscovered "panaceas". In this context, the natural drive for survival forces people to act pragmatically, dreaming of the undiscovered but living with the known. This is the rational approach of the Leaders of modern human society, standing firmly on their own feet… Or at least it should be.

Few Europeans remember when the concept of the "Green Deal" came into circulation. It was intended to be both green and a deal. It was an agreement between the future and the present, a rational compromise between the conventional and the unconventional. However, the situation today looks quite different:

- 2021 was a record year for coal use globally; so where is the green element here?
- 2022 beat the 2021 record[134];
- All data indicate that 2023 will cement the "record after record" trend.

Thus, it seems people are moving away from the green colour of the deal, if there ever was one…

The above facts are proof that just a few years after its announcement, the outcome of the Green Deal is that what has been achieved is substantially at odds with the intentions expressed as arguments for its structuring and adoption. It seems that gas is about to be replaced by coal instead of the other way round. In essence, the anathema of all types of conventional and fossil energy as part of a common and equally "dirty" fossil family, while in parallel declaring renewable energy to be the only green panacea, is the reason for the disconnect between intentions and outcome. People know well what happens to eager youngsters who get behind the wheel of a powerful car without having a driving licence and without being prepared for the heavy traffic on the roads. Sooner or later, they crash – and unfortunately in most cases they cause fatal consequences for other road users, not just themselves. The same happens as a result of political impatience followed by unreasonable haste and the artificial imposition of new irrational norms in energy economies that are intolerable for modern human society. Therefore, if the society does not want the consequences for the European economy to be like the aftermath of an unwise "energy" drift by an inexperienced driver, the policy decision-makers should be brought to reason as soon as possible, using objective facts and a rational approach.

At least this is how things look like with regard to natural gas.

[134] IEA: The World's Coal Consumption Is Set to Reach a New High in 2022 as the Energy Crisis Shakes Markets.

THE FACTS ABOUT NATURAL GAS:

Historically, for our civilization gas is an energy teenager with untapped capacity.

Human civilization has been using coal for industrial purposes for more than 300 years. Petroleum products have been a mass reality in industrial production for over 200 years. Compared to this historical reality, natural gas is an energy "teenager": modern industry has been extensively using it for only 65 years. This fact alone suggests how great the untapped potential of the blue fuel is. In fact, a philosophical look at the "aggregate evolution" of the world's energy industry proves the logic of its development so far. There is nothing strange in the fact that humans have been able to master the solid, liquid and gaseous states of energy exactly in this sequence. Technologies and scientific discoveries for mastering the different aggregate states of matter have developed along a similar trend curve;

Natural gas is the cleanest fossil END energy, which – when replacing coal-generated electricity – completely eliminates the latter's carbon footprint.

According to data by the Ministry of Environment and Water, the CO2 emission factor of natural gas is nearly 2.5 times lower than that of electricity[135]. An objective cost-benefit analysis of the process of replacing electrical energy with natural gas as final energy clearly demonstrates that the benefits, in addition to being many times greater than the effort and resources required for this transition, are also sustainable. There is a lot of evidence that this process saves a significant amount of primary energy, greenhouse gases and other harmful emissions, and that jobs in the energy sector increase quantitatively, while the demand for highly-skilled and well-paid human resources increases sharply. It is clear that in such a process productivity rises sharply, guaranteeing an economic growth.

The aforementioned highlights have significant economic but also geopolitical significance – specifically at European level. The events of the last 10 years clearly confirm that the European Union is not a homogeneous union of countries with common values. The main reason is the different readiness with which each Member State has subscribed to the political idea of the EU. The different development status of the energy sectors in the individual Member States guarantees the different outcome of applying the same policies, treating them as already "brought under a common denominator". They simply are not and have never been (and perhaps will never be) at the same stage in their development. It is for this reason that the application of uniform policies in the field of energy cannot fail to give a different result – unfortunately different both in absolute value and in direction (positive or negative).

[135] Ministry of Environment and Water: Calculation and Forecast of the Emission Factor of Greenhouse Gases for the National Electricity Network of the Republic of Bulgaria for the Period 2017-2025, p. 79.

And this causes risks – the main reason for them is not due to the lack of analyses that might state the obvious situation. There are such analyses, but the problem lies in the lack of self-critical insight at the local level. In fact, the lack of an objective view from within guarantees missed opportunities and the existence of a huge untapped potential. Operationally, this is backed by the refusal to understand the energy sector's realities with its objective threats and weaknesses for each individual Member State, with a view to designing and implementing a specific energy policy, which is respectively appropriate. One can compare such situations with, e.g., a similar approach in clinical trials – there are cases where all patients are treated with the same medication, but for some of them the outcome is fatal. Certainly, the medical assessment of the success rate in the field of clinical research, called acceptable mortality, is not applicable in modern European energy policy – in reality, it affects entire national energy industries and, respectively, entire European nations. By 2020, natural gas occupies a share in the structure of primary and final energy consumption between zero and 70% in the energy systems of the various EU Member States. The share of natural gas in the final energy consumption in the EU is on average 32%, and in Bulgaria it is 4%[136]. This in itself suggests that, due to their energy policies, some Member States have allowed the blue fuel to make substantial inroads into their energy systems, thereby eliminating to the maximum extent the negative impact of "dirty" fossil solid and liquid fuels many years ago. In such conditions, thanks mostly to the cumulative effect of the above-mentioned substitution, the transition to carbon-neutral energy industry appears to be a foregone conclusion, including the role of natural gas. In many countries, the replacement of gas-based energy with energy produced by RES is a natural development and an upgrade on the status quo.

Thus, the blue fuel will reduce its relative share, but will remain an essential backbone of the energy industry for many decades to come. However, countries with a relatively small share of gas in their energy mix have exploited its potential as a clean and highly efficient fossil fuel to a very small extent.

The above facts warrant the conclusion that the blue fuel still has significant untapped potential in the European energy mix. Therefore, voluntarily refusing to exploit its further usage is certainly not a rational action that can be held up as a useful example or good practice. The application of a common aggressive European policy, treating all fossil fuels in the territory of countries that are not homogeneous in their degree of development (such as the 27 EU Member States) in one and the same way, can in reality be even harmful. Failure to take into account the objective differences between the individual impact of this type of fuels on the climate, as well as their specific role in the economies of individual Member States, degenerates into the reversal of natural progression. The most dangerous manifestation of such negative development is the replacement of the most ecologically clean and efficient fossil energy – natural gas – with energy produced from coal and other solid dirty fuels. Such a phenomenon is certainly a

[136] Eurostat: Final Energy Consumption in Households by Type of Fuel.

step back in the development of human civilization with substantial economic and environmental consequences.

An illustration in relation to the above might be the case of Bulgaria.

The use of the approach described above and the results achieved in the Bulgarian energy sector is a suitable example of such illogical development at national level. The ineffective outcome is based on applying a common policy on energy sectors of different status, without taking into account all local specificities and untapped potential. 40% of the electricity for heating, cooking and hot water used by the Bulgarian population is produced from low-calorific and seriously polluting coal[137].

Due to this local feature, every owner of an electric car in Bulgaria does not contribute to reducing the carbon footprint of transport, but on the contrary – contributes to increasing it. The overall efficiency of this old-fashioned electricity production chain is 20%. In other words, with nearly four-fifths of the primary energy used to generate electricity from coal, the Bulgarian coal-based electricity industry is warming the air and senselessly emitting carbon dioxide and other greenhouse gases and harmful emissions. Replacing every kWh of final electricity with natural gas directly at the end consumers eliminates a substantial portion of all greenhouse gases and all other harmful elements emitted when coal is burned for electricity production. This natural, efficient and beneficial process for society has been slowed down by the blind application of a single aggressive policy against natural gas and in the direction of supporting electrification without taking into account the negative effects of its production from coal (as described above).

The Prices

Prices should reflect the objective supply-demand relationships as this is the only way to make an objective choice based on a real comparison of the characteristics of the different types of final energy. A sustainable functional real energy market requires that the production costs for the different types of energy are objectively reflected. In this context, it should be underlined that modern human civilization does not know rich societies with unreasonably low prices; certainly, it is also true that rich societies are not rich just because their prices are relatively high. Market-based prices are a necessary (even obligatory) but insufficient condition, i.e., they are only a prerequisite for sustainable development.

Unfortunately, modern politicians often win over the electorate with populist approaches involving artificially low prices as a tool. In parallel, rich societies, however, are not rich because their prices are high, but because they are highly efficient. High prices are only a prerequisite for the efficient use of all resources, and when a sufficiently high level of efficiency is achieved, it is time to remember Einstein's maxim that everything is relative, including prices.

Beyond philosophical reasoning, both the prices of energy resources, that are

[137] EWRC: Annual Report for the European Commission, July 2022, pp. 27-28.

artificially kept low, and the policies that impose them have extremely negative consequences in the long run. Over the last 10 years, European countries have implemented rather left-wing policies in all areas of the economy, and energy is no exception in this respect. Seeking to win electoral support at any cost is the most direct route to populism. In recent years, this has found expression in different formats, e.g., the imposition of price caps, restrictive profit measures and the introduction of artificial terms with vague content, such as "excess profits", etc. These measures directly affect negatively rather than positively the development of the energy markets in all their aspects and might increase the confusion – thus, e.g., after the definition of the concept of excess profits, should one expect as a next step the introduction of the concept of "excess losses"? And if so, what will the politicians come up with to hedge such an event…

Investments

It is more than clear that without investment there is no sustainability and predictability. European policies at the beginning of the 21st century have tried to enforce the coercive model of energy saving by introducing direct and indirect additional components in the cost of energy – one of the key pretexts was that this penalises polluters and saves the planet.

In reality, such policy approach has diverted a substantial part of the cash flows from the producers of energy and energy resources to policy makers. The result was not long in coming. According to some International Energy Agency data, in its normal course of development, the global oil and gas industry invested nearly USD 900 billion[138] annually primarily in building gas infrastructure with a long economic and physical lifetime. The latter ensured the long-term level of gas production in all its forms so that the cost of the energy teenager was at familiar levels – significantly lower than even conventional electricity and fossil liquid fuels. The modern "green policy" described above, coupled with the political aggression toward the blue fuel, were perceived as substantial risk to new investments. Thus, investors who have traditionally invested money in natural gas extraction, processing and transportation reacted rightly by evaluating these risks and they reacted quite naturally – the effect was that the interest in investments in the above-mentioned activities and respectively in the use of natural gas has declined sharply. The result – global new investment levels in the gas and oil upstream business dropped to USD 420 billion per year[139], and this in turn foreshadowed a long-term and sustained decline in natural gas supply. In practical terms, the cause-effect relationship was more than clear – a decline in investment led to a decline in supply, and demand continued to grow despite aggressive policies against the place of gas in modern economies. Objectively, there is no solution to this equation other than a high price.

[138] Hacquard, Simoën, Hache: Is the Oil Industry Able to Support a World That Consumes 105 Million Barrels of Oil per Day in 2025?

[139] Ibid.

Gas has become a political weapon thanks to those who were too quick to declare renewable energy a panacea.

The war in Ukraine has only hastened the inevitable manifestation of the risks posed by the dependencies created by political short-sightedness.

The geographical location of the European continent, as well as the high density of its gross domestic product, measured in million euros per square kilometre, are ideal prerequisites for at least the following rational measures:

- Achieving the ideal infrastructure connectivity between the countries with minimal and highly efficient investments in energy infrastructure;
- Guaranteed diversification of sources of primary energy resources, including natural gas, which also involves with high effectiveness of investments in infrastructure;
- Optimal and balanced ratio between known technologies for extraction, processing and transport of natural gas;
- High level of flexibility in substitution of different primary energy sources, including natural gas;
- Preserving natural gas demand with the help of natural resources and new technologies in an optimal combination; this also requires adequate effectiveness of the investments;
- Implementation of a high-efficiency “green” gas revolution consisting of the replacement of dirty primary energies with natural gas, etc.

Certainly, all these steps should be reasonably combined with renewable energy in a sustainable and well analysed manner. On grounds of the above, it can be concluded that the European society has all the necessary prerequisites and opportunities that can help it to establish itself as the richest and most prosperous society on the planet and sustainably maintain this place in the 21st century – and natural gas can be a major contributor in this process

Instead, Europe seems to be permanently inferior to the economies of the other continents in all competitive directions. The emanation of the wrong policies applied since the end of the 20th century and continued in the first decades of the 21st century is the war that started in early 2022 on the territory of Ukraine. The result of all accumulated mistakes is manifested in the obstruction of the possibilities to exploit the great potential of the combination of natural gas and the objective characteristics of the European continent. Such mistakes have allowed gas to be turned from a civilizational opportunity for accelerated development into a dangerous good, considered at first as political and later on as military weapon. The politicians attempted to simultaneously open wide the Brandenburg Gate, the Triumphal Arch and all the other symbolic gates so that gas can quickly “get out”, with the idea that its place would be quickly occupied solely by renewables. In reality, this approach has caused an unprecedented commotion in the European Union.

However, there is also good news – natural gas is still a solution, not a problem, and that is in spite of policies and not because of them. This shows once again the resilience of the "teenage aggregate state of energy" in the face of irrationality in political decisions.

Gas in Europe does not have its "own" lobby… For now.

The main reason is that on the territory of the European continent, where the gas demand is heavily concentrated, local extraction has not been sufficiently essential. In other words, at this stage there are not enough cash flows generated from domestic natural gas production to justify such advocacy for it. Sooner or later, this lack of "advocacy" will be filled in as the demand-driven business interest will compensate for the lack of business interest from producers. The only way to stop such rational development for the place of natural gas in the European energy mix is an artificial reduction in natural gas demand in favour of RES energy.

Against this background, a key question occurs – what in fact is the driving factor behind the very strong and rapidly growing lobby in favour of RES energy?!

As mentioned above, substantial cash flows are a prerequisite for the development of any kind of advocacy to improve the environment for one type of activity or another. The special thing about RES is that cash flows in the form of financial support sourced from the EU budget presuppose strong lobbying in their favour. Certainly, RES energy deserves support because it has no alternative in terms of its potential to reduce the energy carbon footprint. On the other hand, however, its artificial imposition should not be rushed – the danger of halting progress by exhausting too much of the available potential is real. In reality, the facts show that coal and oil are those that profit the most from the conflict that exists today between gas and RES; while in fact they have huge potential for partnership and synergy.

SUMMARY

A sober rational view of the situation shows that mankind, or at least the part of it that inhabits Europe, can exceed its carbon neutrality targets by using gas – and the positive effects would be visible with little effort, in a short time and at a much lower cost.

Here are a few examples on a national and European level that illustrate the possibilities:

A) Replacing the electricity used for heating, cooking and hot water (e.g., in 1 million Bulgarian households) with natural gas will reduce by several times the carbon footprint of these households from the final energy they use today, including electricity, liquid and solid fuels;

B) According to data of Ready4H2 initiative, currently 1,151,000 km of pipelines

of members of the initiative are ready for conversion, which represents 96% of the total network. The readiness of components (connections, valves, metering equipment, compressors, etc.) is under evaluation. Two-thirds of Ready4H2 members expect to be fully ready for 100% hydrogen by 2040, with parts of their networks able to convert sooner[140]. In Bulgaria, nearly 98% of the gas distribution networks are made of non-metallic materials (mainly PE-HD and PE 100). According to Ready4H2 data, natural gas mixed with up to 20% hydrogen can be transported in such networks without any additional investment. This would solve the problem of the rest of greenhouse gases emitted into the environment. This is how natural gas can be part of the tools to achieve carbon neutrality goals.

For 150 years, human civilization has used petroleum products in combination with coal, believing that it was moving closer to an energy system less and less dependent on solid fuels. Today's reality only proves that this assumption was unrealistic. Is it reasonable and possible to try to replace gas together with other fossil fuels in a decade or two with as yet unknown technologies?! Do we know well enough all the risks of identifying carbon neutral with fossil free?! The answers to these questions are contained in the cited facts, and we should not forget that a mistake is forgivable only once. Philosophers call the repetition of an already known mistake stupidity, and to make it thrice is a matter of choice.

CONCLUSIONS

Natural gas and RES in a balanced combination with new technologies (e.g., for hydrogen production) equals rational, balanced, carbon-neutral and sustainable energy industry.

Europe's energy future is undoubtedly carbon-neutral, but it cannot be fossil-free. Transformation is possible, but not without natural gas. At least for now.

And here are some concrete proposals at European and national level, which should be quickly considered:

- Recognition of the status of natural gas not as a transitional fuel but as part of the tools to achieve carbon neutrality goals, where it is an effective tool to replace energy produced from coal and petroleum products;
- Equal treatment of natural gas with that of RES, especially in technological solutions where these two types of energy achieve synergy;
- For the territory of Bulgaria the solution is easy and therefore its non-application is even more puzzling. The National Programme for Accelerated Gasification of Bulgaria should be updated and implemented. This programme document contains, in addition to a cost-benefit analysis, all the steps necessary for the rapid development of local gas distribution infrastructure. This will enable the Bulgarian energy consumer to take advantage of the country's geopolitical position, so cleverly used only for the transit of natural gas to third countries.

[140] Ready4H2: Europe's Local Hydrogen Networks – Part 1: Local gas networks are getting ready to convert.

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- Initiator and one of the Developers of several editions of a National Program for Accelerated Gasification;

- Author of numerous publications and studies;

- Participant in dozens of public and closed discussions on energy in Bulgaria.

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THE ARDUOUS PATH OF DECARBONISATION IN SOUTHEAST EUROPE

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Introduction

Lately, decarbonisation as a concept and a coordinated set of actions has come to dominate Europe's current and long-term (i.e., 2030 and 2050) energy strategies. When considering the energy policy in SE Europe, decarbonisation will come to play an important role as it affects the whole spectrum of energy – from power generation to transport, building, industry, trade and services sectors **(1).** The ultimate objective is the reduction of Greenhouse Gas (GHG) emissions. The power sector is expected to play central role in the decarbonisation process, as it is in a position to deliver fast and visible benefits, given the high volume of gases it produces.

Decarbonisation in the case of power generation means reduction of the sector's carbon intensity, which in turn means decline of the emissions per unit of electricity generated. Decarbonisation is of particular importance for coal-intensive regions, such as SE Europe, in order to transit into a "cleaner" energy mix. A gradual decarbonisation of the power sector can be achieved by increasing the share of low-carbon energy sources, like renewables and nuclear, as well as by capping GHG emissions from fossil fuel power stations through Carbon Capture and Storage (CCS) technology and Carbon Capture and Utilisation (CCU). A shift from "dirtier" fossil fuels, like coal (which emits on average 900g CO_2/kWh), to lower emissions fuels, like gas (which emits about 400g CO_2/kWh) and renewables, can also help to reduce power plant emissions. **(2)**

Reaching climate neutrality by 2050, as envisioned by the European Commission's strategic long-term vision, requires timely decarbonisation of the European energy sector, including a complete phase-out of coal (see Map 1). This will particularly affect regions which are dependent on the coal sector and other high-carbon industries, as they will have to follow a transition phase to low-carbon economies in the coming decades. This briefing offers a deep dive into the positioning of key stakeholders as well as opportunities and challenges for a transition away from coal in the coal-dependent SE European region.

Most governments in SE Europe, in contrast to the rest of Europe, remain committed to continuing coal use. Greece is until now the only country in SE Europe that is expected to shut down all its lignite-fired power plants by 2028[141],

[141] In December 2019, Greece's Public Power Corporation (PPC) decided to cease operating all but one of its existing lignite-fired power plants by 2023. The only lignite-fired power plant remaining until 2028 is Ptolemaida V, which is currently under construction. PPC is now looking for a fuel conversion at the facility for lignite-free operation beyond 2028. Natural gas, biomass and waste-to-energy incineration, even a combination of all three generation methods, have been included as possible options in state-controlled PPC's new business plan.

while North Macedonia's coal phase-out plan is still under discussion[142]. Based on IENE's estimates, the share of solid fuels for power generation is anticipated to hold its present position if not increase in several countries of the region (most notably in Serbia, Kosovo*[143], Croatia, Bosnia and Herzegovina, Montenegro and Türkiye[144]) over the next 10-15 years, as these countries will struggle to meet increasing energy demand. Hence, the road towards decarbonisation and the transition to a "greener" future in SE Europe, with higher use of natural gas and renewables (RES), appears difficult, if not uncertain, in comparison to the rest of Europe.

Outlining the Frame

It seems that a far more realistic approach towards decarbonisation is required in the case of SE Europe. The necessity for such an approach is based on the fact that reforms are not easily being implemented, as there is a lack of social acceptance or of political will, or both.

The Paris agreement (2015) marks the latest step in the evolution of the UN climate change regime, which originated in 1992 with the adoption of the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC established a long-term objective, general principles, common and differentiated commitments, and a basic governance structure, including an annual Conference of the Parties (COP). The Paris agreement (COP21) is proving to be an important reference point and an accelerator for global energy transformation.

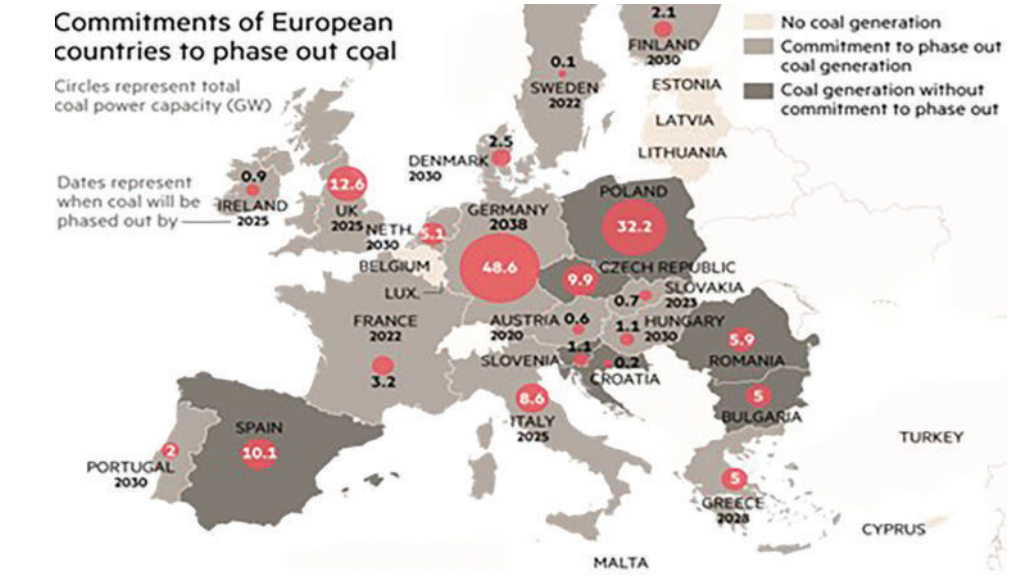
The main question arising for the countries in SE Europe, including the Western Balkan ones, is whether they are willing to substitute coal with other energy sources. SE Europe as a whole is a carbon-intensive region, with the exception of Albania whose energy sector is remarkably low-carbon, as its system relies almost fully on hydropower for electricity generation. Albania's goal will be to diversify its hydropower-dependent energy mix without increasing CO_2 emissions, while preserving biodiversity. For the rest of the countries in SE Europe, rich in solid fuels, the challenge will be how to diversify their energy mix progressively by minimising coal use.

[142] In February 2020, North Macedonia adopted a ground-breaking new energy strategy, making it the first country in the Western Balkans to name concrete date options for a coal phase-out. Two of the strategy's scenarios entail a coal exit by 2025, with the third delaying closure of the Bitola lignite-fired power plant until 2040. A final decision on which pathway to take will be made in 2021.

[143] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.

[144] Currently, all these SEE countries do not have any coal phase-out plan.

Map 1: Commitments of European Countries to Phase Out Coal



Sources: Europe Beyond Coal, Financial Times (3)

An appropriate energy mix appears to be the best vehicle towards achieving decarbonisation. And it can be achieved only through a combination of low-carbon energy sources (i.e., renewables and nuclear), as well as by using Carbon Capture Storage and Carbon Capture Utilisation technologies. However, in a carbon-intensive region such as SE Europe, detailed studies (currently lacking) must be conducted in order to identify the optimum energy mix, taking into consideration the persistent use of coal in the years ahead under a business-as-usual scenario.

In order to achieve an optimum energy mix, a detailed strategy for the entire SEE region needs to be worked out, with short-, medium- and long-term targets. It is only by following such studies that a clear roadmap for SE Europe's transition to a decarbonised state can be established.

Although CCUS applications in SE Europe have made little progress, a comprehensive overview of currently available techniques and technologies is needed in order to be able to assess the availability and applicability of the CCUS option in the region.

The Coal Problem

In almost all the SEE countries, local actors are driving the transition while national governments remain committed to coal as a basic energy source and maintain close ties to the coal industry. In Greece, local mayors are looking for alternative ways for the coal-rich region of Western Macedonia to develop, while in

Kosovo* protests have taken place in villages affected by the expansion of mining activities. While transition strategies benefit from being driven by local stakeholders, guidance and policy frameworks from the national level are key as they provide stability and enable long-term planning. Among civil society voices, labour unions tend to be vocal opponents of measures that could impact on the coal sector.

The EU has a central role in supporting transition processes. Kosovo*, North Macedonia and other countries in the Western Balkans share the aspiration of joining the EU and as part of the Energy Community they are already influenced by the Union's climate and energy policy. The EU sets targets for national climate and energy policies and through its budget has a powerful tool to support the transition away from coal.

Large amounts of indigenous coal and lignite deposits, which provide relatively cheap and easily accessible energy for most countries in the region, are preventing a determined move towards decarbonisation. As shown in the following Table, most countries in SE Europe have well-defined plans and ongoing projects for new coal/lignite-fired power plants. Over the next 8-10 years these plants will add some 10GW of new electricity capacity. Hence, the region's dependence on solid fuels is likely to increase, notwithstanding commitments for increased RES use.

Table: Under Construction and Planned Coal Plants in SEE Countries (MW), as of July 2020**

Country	Announced New Plants	Pre-permit	Permitted	Announced + Pre-permit + Permitted	Under Construction	Shelved	Operating	Cancelled (2010-2020)
Turkey	13,460	12,925	5,680	32,065	1,610	5,670	17,717	65,867
Bosnia & Herzegovina	1,830	600	1,100	3,530	0	550	2,073	1,020
Serbia	1,000	350	0	1,350	350	375	4,405	1,070
Romania	0	600	0	600	0	0	4,675	5,105
Kosovo	0	0	0	0	0	0	1,290	830
Hungary	0	0	0	0	0	0	944	3,520
Israel	0	0	0	0	0	0	4,900	1,260
Bulgaria	0	0	0	0	0	0	4,829	2,660
Greece	0	0	0	0	660	0	3,175	1,250
Slovenia	0	0	0	0	0	0	1,069	0
North Macedonia	0	0	0	0	0	0	800	730
Montenegro	0	0	0	0	0	0	225	1,664
Croatia	0	0	0	0	0	0	210	1,300
Albania	0	0	0	0	0	0	0	800

****Note:** Includes units 30 MW and larger

Sources: EndCoal (4), IENE

In Europe, there are initiatives towards a "greener" energy future such as the EU "Coal Regions in Transition Platform", launched in 2017 and included as a non-legislative element of the "Clean energy for all Europeans package". The platform works as an open forum, gathering all relevant parties, local, regional and national governments, businesses and trade unions, NGOs and academia. It promotes knowledge-sharing and exchanges of experiences between EU coal regions, and represents a unique bottom-up approach to a just transition, enabling

regions to identify and respond to their particular contexts and opportunities. Since 2019, a secretariat has been set up to manage platform activities, covering events, provision of support materials and technical assistance to coal regions, including the Czech Republic, Germany, Poland, Slovakia, Spain and the SE European countries of Greece, Romania and Slovenia. In October 2019, a group of 41 mayors from 10 coal regions in 9 European countries launched a statement supporting a just transition to the post-coal era. **(5)**

Map 2: Signatories Declaration of Mayors on Just Transition

Source: WWF

The Climate Dimension

On March 4, 2020, the European Commission adopted the European Climate Law proposal[145], which will enshrine in EU legislation the EU's commitment to achieve net zero GHG emissions by 2050. The 2050 objective reflects commitments under the Paris Agreement and is central to the European Green Deal[146], published in December 2019, which sets out the Commission's commitment to tackling climate change and environmental challenges.

To date, most SEE countries have relied heavily on conventional generation technologies. However, over the next decade, countries in this region will have to replace around 50% of their existing capacity for age-related reasons, according to a report by Agora Energiewende **(6)**. However, renewable energy development in SE Europe has been limited until now.

One impediment to scaling up renewables is their higher up-front capital intensity, compared to investment in coal or natural gas. These costs make renewable energy investment more sensitive to political and regulatory conditions than projects with lower up-front capital intensity. And since private investors

[145] https://ec.europa.eu/info/files/commission-proposal-regulation-european-climate-law_en
[146] https://ec.europa.eu/info/files/communication-european-green-deal_en

typically consider ventures in SE Europe riskier than investment in Germany or France, this kind of project in the region faces relatively higher financing and capital costs. The “risk premiums” demanded by investors have a significant effect on the price of renewable power. Past research has shown that higher financing costs could render a wind project in, for instance, Croatia, twice as expensive as the same project with similar resource conditions in Germany. Bloated financing costs thus have two effects: (a) they support the perception that renewables are costly to consumers and taxpayers; and (b) they can render renewables incapable of outcompeting fossil-fired generation, even given cheaper system costs. **(7)**

Policy Inconsistencies Concerning Gas Use in SE Europe

If one looks at the EC’s 2030 energy and climate policies at face value, it should be noted that there is a clear prejudice against any further investment in gas infrastructure in view of its full abandonment over the next 10-15 years and its substitution with hydrogen and RES. Meanwhile, all countries in SE Europe have firm plans encouraging further gas use for power generation, industrial and commercial use, and for domestic applications. Almost all governments in SE Europe consider gas as the fastest and most efficient way for decarbonisation, and its increased use is already evident in the region.

Hence, a strong inconsistency in SE Europe is being witnessed between pursued EU policy targets – with the EIB and EBRD already deciding against new gas infrastructure projects – and locally applied energy policies favouring gas use. Sooner or later, the EU will have to address this serious policy discrepancy and decide on strategy correction and associated medium- and long-term action plans. In other words, to what extent is Brussels willing to prohibit gas use and what alternative fuels is it ready to propose? In this context, one should mention that gas is now included in the EU Taxonomy and this will facilitate matters to pursue its use in SE Europe[147].

It is no coincidence that last May, a group of eight EU members from the Balkans and eastern Europe joined forces to defend the “role of natural gas in a climate-neutral Europe” **(8)**. In a joint paper, the group of eight calls for “combined electricity – gas solutions” in the transition to net-zero emissions by 2050. “A transition based solely on renewable energy sources does not consider the need for a diversified energy mix in the EU,” says the paper.

The paper – titled “The role of natural gas in a climate-neutral Europe” – is signed by a contiguous stack of countries, including south to north, Greece, Bulgaria, Romania, the Czech Republic, Slovakia, Hungary, Poland and Lithuania. It makes the case for gas in the transition away from coal power, which is a dominant form of electricity in many eastern EU member states. “When replacing solid fossil fuels, natural gas and other gaseous fuels such as bio-methane and decarbonised gases can reduce emissions significantly,” the paper argues.

[147] https://finance.ec.europa.eu/publications/eu-taxonomy-complementary-climate-delegated-act-accelerate-decarbonisation_en

In late January 2021, the European Commission asked advisors to rework the EU's green finance taxonomy rules after member states rejected draft implementing guidelines, unhappy about the exclusion of gas as a "transition" activity towards net-zero emissions. **(9)**

In early February 2021, EU officials announced that the grants and loans provided to EU countries under the bloc's €750 billion Recovery and Resilience Fund will not automatically exclude funding for gas infrastructure as long as these projects are part of a coherent national decarbonisation strategy with clear milestones. The European Commission is currently preparing a "guidance document" on how to apply the so-called *Do No Significant Harm* (DNSH) principle, which applies to the entire Fund. Under that rule, EU money will be prevented from going to polluting technologies. The guidance document will explain "which kinds of conditions can be attached to gas investments" and make them "compatible with that principle". **(10)**

Among the conditions are assurances that gas is part of a wider transition plan to renewables and guarantees that investments in gas facilities do not create a "lock-in" effect into fossil fuels – for instance, making sure that infrastructure is also suitable for the use of clean gases. All these must be part of a very clear and credible plan for decarbonisation, with clear milestones and deadlines, EU officials stressed.

The European Commission reckons that clean electricity will meet 53% of the bloc's energy demand by 2050 as the bloc moves towards reducing emissions to net-zero. That leaves at least 40% for other energy carriers such as gaseous fuels that Brussels says will have to be fully decarbonised in order to reach the EU's stated goal of becoming climate-neutral by 2050. Natural gas has been a major driver of Europe's rapid transition away from coal power and is also proving a baseload back-up for variable renewable electricity generation from wind and solar power.

However, along the EU guiding role, when it comes to practical implementation, the bilateral and the regional cooperation remains crucial. The following are some examples which illustrate the role of this cooperation.

Energy Cooperation between Greece and Bulgaria Towards Decarbonisation

Greece and Romania are the most active among EU member states in SE Europe on climate change issues, while Bulgaria is still trying to catch up with much of the EU, according to a report on the implementation of the European Green Deal published by the European Council on Foreign Relations (ECFR). **(11)**

In its recommendations on how countries can add value to the impact of the European Green Deal, the ECFR says that Greece, if it wants to establish itself as a green champion, should team up with the "less ambitious" Romania and Bulgaria, which share some of its climate-related challenges. This, the report says, could push Romania and Bulgaria to adopt best green transition practices and join Greece in climate initiatives.

Bulgaria, which is likely to sustain its coal sector for the next 20-30 years,

has pursued a rather conservative climate strategy, out of fear the green energy transition could adversely affect the economy, jobs and citizens. However, thanks to the opportunities offered by the EU's Resilience and Recovery Fund, the country's position has started to shift a little, and now it seeks to increase the use of nuclear energy and natural gas, while its integrated energy and climate plan envisages developing more than 2.5 GW of renewables capacity by 2030. **(12)**

In Bulgaria's National Energy and Climate Plan (NECP) **(13)**, the utilisation of natural gas by 2030 is predicted to remain at the current level of 3 bcm/year and the remaining volume should come from renewable gases. Bulgaria will import some 1 bcm of natural gas per year from the Shah Deniz II field in Azerbaijan for a period of 25 years under a contract with the Azeri company SOCAR and talks to increase the volume are underway. Furthermore, the country's NECP does not primarily mention the use and development of biomethane. According to the projections of the report, biogas and off-gases could reach up to 680 GWh in 2030. Projection of the development in renewable transport technology shows no use of biogas and consequently no biomethane.

Based on the NECP, Bulgaria intends to enable the integration of hydrogen in its energy and transport. The country expects an annual final hydrogen consumption of 32 GWh in the transport sector by 2030, which will be facilitated by the planned deployment of hydrogen refuelling stations. The hydrogen should be produced by electrolysis using renewable electricity. According to Bulgaria's NECP, a pilot project for hydrogen production with a total installed capacity of 20 MW is planned. There is currently a limited number of projects operating in the country and most Bulgarian hydrogen is fossil-fuel based. According to Bulgaria's Sustainable Energy Development Strategy **(14)**, the country intends to prepare key gas infrastructure for hydrogen transport by 2030.

Similarly, in Greece's NECP **(15)**, natural gas will continue to play a significant role in the country's demand by 2030, especially in district heating. The decarbonisation focus will remain on the more polluting lignite plants. Hydrogen production in Greece (mainly via electrolysis) is expected to reach 0.8 TWh in 2030 and 12.8 TWh in 2040. In addition, Greece is expected to be a net hydrogen exporter by 2045 (8.6 TWh or 2.4 bcm H2), while in 2050 the net exported volumes are anticipated to be even larger (20.2 TWh or 5.7 bcm H2).

Also, the country plans the gradual blending of biomethane into the gas network and its use in the heating, transport and energy sectors. To successfully fulfil this target, Greece plans to create a new regulatory framework that will enable the development of biomethane production and its use in gas transmission and transportation network. The NECP does not provide any specific predictions for biomethane production. However, it provides predictions for the use of biofuels in transport, the consumption of which should reach 4.3 GWh in 2030.

Greece declares in its NECP that it is necessary to consider the production of hydrogen in connection with the deployment of renewables. Further, it mentions the

potential of hydrogen blending into the gas system and sector coupling. According to government institutions, Greece must participate in relevant programmes that deal in more detail with the application of hydrogen in individual sectors.

Both Greece and Bulgaria already have an energy cooperation in various energy projects, including the completion and operation (since October 2022) of the Gas Interconnection Greece-Bulgaria (IGB), while additional gas quantities are expected to come from the Alexandroupolis FSRU, currently under construction, in which Bulgaria has a stake.

In addition, Bulgaria currently has two nuclear reactors in Kozloduy, producing about one-third of the country's electricity. Officials in Athens and Sofia are also discussing prospects for a bilateral agreement on deliveries of nuclear power from Bulgaria to Greece. Greece has no plans to build nuclear facilities because of the risk of earthquakes in the region. The Greek government aims to conclude long-term bilateral contracts with Bulgaria that would ensure a stable supply of energy at very low prices and contribute to the competitiveness of the country's economy. Greece already imports electricity from Bulgaria, part of which comes from the Kozloduy nuclear power plant. **(16)**

It is worth noting that Greece and Bulgaria intend to expand their existing electricity interconnection through the construction of a second line between Nea Santa and Maritsa East, with a capacity of 2 GW and a length of 151 kilometres. The new 400 kV line is a European project of common interest (PCI). It is envisaged to increase the total capacity to 1.4 GW in the direction towards Bulgaria and to 1.7 GW from Bulgaria towards Greece. Construction has been completed on the Bulgarian side, while on the Greek part of the border it is expected to be finished by the end of 2023. **(17)**

Moreover, the Greek and Bulgarian gas transmission and storage system operators presented in April 2023 two major hydrogen projects to the European Union. The EU has set strict rules for the future role of natural gas. The goal is to develop the infrastructure in such a way as to not lock in its use for decades to come. The obvious way to achieve it is to make any new infrastructure hydrogen ready and combine natural gas with green hydrogen. This is why countries like Greece and Bulgaria, which aim at becoming regional natural gas hubs, have turned their attention towards building pipelines that would transfer renewable gasses as well as fossil gas. Already, the aforementioned IGB is designed to transfer hydrogen in the future. Another such endeavour is the Greece-North Macedonia gas interconnector, the construction of which is expected to begin this year.

Discussion

The transition to decarbonised power generation is not an easy regional issue, since in most of the SEE countries electricity generation, which is mainly based on coal and lignite, supports thousands of jobs while it forms the basis of an extensive

industrial base. Although all countries in the region to a greater or smaller extent are committed to RES and energy efficiency programmes and specific targets, they are also pursuing a parallel carbonisation agenda as several coal-fired power plants are under construction or at an advanced planning stage. In short, coal-based power generation is also moving ahead, adding substantial capacity from now until 2025 (1.5 GW per year for SE Europe and 2.5 GW for Türkiye, i.e., total 4 GW per year over the next 7-8 years). New RES capacity over the last three-year period is less than 500 MW per year of installed capacity excluding Türkiye, and approximately 1.5 GW per year including Türkiye. As a result, there is a substantial gap between new coal-fired power plants and anticipated RES installations.

In addition to this RES supply gap, we must consider the likelihood of a power generation shortfall as early as 2027. If that happens, the region will be transformed from an exporter of electricity to a net importer. This will drive up electricity prices. Underinvestment today and higher electricity prices in the near future will act as a brake to economic growth, fulfilling lacklustre performance forecasts for the region.

The road to decarbonisation can be approached on two levels: (a) through policy addressing the energy mix and assessing the optimum rate of decarbonisation and investment in economic terms; and (b) through technology, whose penetration depends on the policies to be implemented and could contribute significantly towards decarbonisation. Good examples are the use of CCS/CCU or dual-fuel power plants, analysed by IENE in its “SE Europe Energy Outlook 2016-2017” study. **(18)**

The arduous and complex decarbonisation process in SE Europe is further burdened by a strong coal/lignite legacy and serious energy security issues. Rapidly increasing carbon prices and stricter EU regulations on air-polluters will bankrupt outdated lignite-fired power plants in the region over the next decade, making them politically untenable. Rising carbon prices will require ever bigger state subsidies for power plants, which is clearly not sustainable. Without these subsidies, fossil-based generation will make no economic sense.

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ELEMENTS OF COOPERATION IN THE COMMON POLICY TO GUARANTEE THE ENERGY SECURITY OF THE REGION OF SOUTHEAST EUROPE AND THE EXAMPLE OF BULGARIA AND ROMANIA

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The Balkans and the Black Sea region as an intersection of interests

Today, energy security is a state of complex interdependence and interconnectedness. The security of each country – donor, transit or user of energy resources – directly depends on the security of the functioning of the energy sector in all other countries along the energy route. In this sense, the energy infrastructure is increasingly becoming a multinational network, and the security of its operation is equal to the vulnerability of its weakest link. Thus, deepening of the conflicts provoked by the energy sector leads to a change in the configuration of international relations and to a significant modification of the previously known political, economic, and cultural relations between countries.

Many international interests are intertwined in the Balkan region today. As a means of maintaining security and stability to improve the state of the economy and infrastructure, the development of cooperation in the Balkans is a priority for every country here, including Bulgaria. In its capacity as an EU Member State, Bulgaria strives to participate in all forms of regional cooperation in Southeast Europe, in accordance with the economic and political impact on its national interests. Bulgaria carefully takes into account the dynamics and new realities of international relations, directing its regional policy in the Balkans to strengthening trust, stability, security, and establishing European standards in the relations between the countries of the region. The COVID-19 pandemic and the conflict in Ukraine have made the new realities of the security environment and their impact on countries in the region painfully clear. Of particular importance are the relations with Romania, which is a natural partner and an intersection of Euro-Atlantic political, social, and economic values.

In the studies devoted to the security and development of the Black Sea region, a conflict between two approaches can be definitely observed. The first has pronounced geopolitical or geostrategic nuances and views the region through the prism of the rivalry between the West and Russia. The second approach places the emphasis on cooperation, common benefit, constructive diplomacy, and overall regional economic development, with the embodiment of these ideas being the Organization for Black Sea Economic Cooperation.

In terms of the energy issues, there is definitely an interweaving of elements of confrontation and cooperation. In certain periods, efforts to create a climate of mutual concessions on energy issues come to the fore. At the same time, however, Russia is interested in maintaining its dominant position on the European energy market. For this reason, Russian energy diplomacy in the

region cannot avoid being aimed at blocking European attempts to diversify supplies and push new energy routes bypassing Russia. Plans to take full control of energy channels in Southeast Europe are systematically pursued and are not always concealed even at the official political level. The emphasis on elements of rivalry and competition between the West and Russia has even led a number of analysts to identify energy infrastructure as an attribute of the new undeclared Cold War.[148]

The study of the potential of the Black Sea region as one of the factors of the EU's energy security is based on considering it as a connecting link between Central Asia and the Caucasus-Caspian region on the one hand, and the Balkans and – in a broader sense – Europe on the other. This role defines the region's ever-increasing importance to the Old Continent as its energy artery. Undoubtedly, recent years have been marked by the intensification of efforts to build the region's new pipeline architecture. Numerous projects were developed, a small part of which were realized, and the rest remain at the conceptual level or have been discontinued. If it is assumed that, due to the number of launched alternatives, the period of generating new proposals has ended, then the complex task of selecting the most suitable routes and ensuring their supply with raw materials comes to the fore.

Predictions of how this process will proceed are extremely controversial. According to more extreme opinions, the competition between the projects will increase regional tensions and turn the Black Sea area into an arena of rivalry. Some say the many different options for new pipelines – supported by various coalitions of countries – create stability, while others say they will build an unsustainable energy architecture. In addition, it is currently clear that the developed plans for the supply of energy resources from the Caspian region and Central Asia are seriously ahead of the exporters' extraction possibilities, so that even the already built facilities are currently facing the problems of filling them.

Research devoted to the Black Sea region unanimously emphasizes its enormous importance as an energy hub, as a bridge between the East and the West, and as a natural waterway between Europe and Asia. This space is considered by analysts as an intersection of four geopolitical axes:

a) Caspian Sea-Black Sea-Mediterranean Sea;

b) East-West along the so-called "Silk Road", where relations with China and in general with the Shanghai Cooperation Organization are of key importance;

c) EU's West-East corridor Rhine-Main-Danube-Black Sea;

d) North-South and the connection between the Baltic and Black Seas.

It is clear from this scheme that the region should not be limited to only the six littoral countries (Bulgaria, Georgia, Romania, Russia, Turkey, Ukraine), but should be treated as an "extended Black Sea area". The adoption of this model allows the identification of this space as the second-largest producer of oil and natural gas after the Middle East.

[148] Yoneva, Elizabet. 2010. "The Black Sea region and the EU energy security." *Avangard*, p. 103-111.

Alternative gas routes to strengthen the energy security of the region

Natural gas will play an important role in Europe's energy diversification and transition efforts. As local production declines, diversification of import routes becomes increasingly important. While the EU has made significant progress in building natural gas pipelines, reverse flow infrastructure, and LNG terminals, there are still parts of Central and Eastern Europe that lack diverse natural gas supply options. Several regional projects listed below are examples of strategic infrastructure that will further develop energy independence in Europe. Access to diverse natural gas routes means a faster switch from coal to gas in electricity and heating for countries reliant on fossil fuels.

Projects in Southeast Europe are an opportunity to strengthen energy security and market competition. Southeast Europe, and especially the Western Balkans region, has not received as much attention as the Central European region in discussions of European energy security. This region is still heavily dependent on coal, Russian gas, and hydropower. There is a huge opportunity to build natural gas infrastructure in the Western Balkans to diversify the region's energy mix and provide alternatives to gas supplies from Russia and coal-fired power generation, which is fueled primarily by coal mined in the Balkans.

The Southern Gas Corridor is one of the most complex energy projects, 3,500 km long and involving 7 countries and 11 energy companies. It runs from Baku to southern Italy through Georgia, Turkey, Greece, and Albania. An integrated system of pipelines, which also includes the South Caucasian and Trans-Anatolian gas pipelines, its throughput is 16 billion cubic meters (bcm), and its main source is the Shah Deniz field with reserves of 1.2 trillion cubic meters of gas. On December 31, 2020, Azerbaijan began commercial gas supplies to Europe through the Trans-Adriatic Pipeline, which is part of the Southern Gas Corridor. It is planned that for 25 years the Asian country will annually export more than 10 bcm of gas to the European market. Azerbaijan delivered 7 bcm of gas through the Trans-Adriatic Pipeline to Italy in 2021 alone, with plans to increase volumes in 2023.[149]

Bulgaria is another country on the southern route with agreed quantities of 1 bcm per year. IGB is the only gas pipeline that will directly connect the Bulgarian gas market with the Southern Gas Corridor. The capacity of the link is 3 bcm, with the possibility of going up to 5 bcm. It is already known that Serbia is interested in importing Azeri gas, relying for this on the reversible connector with Bulgaria that is being built. In February 2022, Romania also expressed its desire to connect to the Southern Gas Corridor through an interconnector with Bulgaria and through the BRUA pipeline announced in 2017, which should provide Bulgaria, Romania, Hungary, and Austria with Black Sea gas.

[149] Karimli, Ilhan. 2022. "Azerbaijan Ranks Third-Largest Natural Gas Supplier to Italy." *Caspian News*, March 27, 2022. https://caspiannews.com/news-detail/azerbaijan-ranks-third-largest-natural-gas-supplier-to-italy-2022-4-14-0/.

In November 2021, BRUA was included in the European Commission's list of critical energy infrastructure for Europe.[150]

Given the new geopolitical realities, all landlocked Central Asian countries need alternative routes for market access as well as for import needs. A natural option would be Iran, which is nevertheless also under sanctions, and not all Central Asian actors will feel comfortable using this route. In addition, Iran still has limited transit infrastructure. China is an alternative market that will remain important for Central Asia, but it will not be useful for transit due to distances to the sea. There is a southern option through Pakistan ports via Afghanistan, but the lack of transit infrastructure, especially for energy resources, makes this option less viable until serious investment in infrastructure development is made.

Currently, stakeholders have a unique opportunity to focus seriously on the development of the Middle Corridor. The economic potential to connect resource-rich but landlocked Central Asia and the resource-hungry countries of Central and Eastern Europe remains largely untapped, which could bring together the economic interests of key countries such as Turkey, Bulgaria, Romania, Georgia, Azerbaijan, Kazakhstan, and Uzbekistan. If hard and soft infrastructure elements can support increased transit volume to reduce transport costs, then the Middle Corridor will play a greater role in trade between Asia and Europe. Expanding trans-Caspian connectivity and removing the transit bottleneck between the eastern and western shores of the Caspian Sea should be a top priority.

It is in the interest of Kazakhstan, Uzbekistan, and other Central Asian countries to build long-term strategic ties with Azerbaijan, Georgia, Turkey, and Black Sea countries with common interests such as Bulgaria and Romania, and it is also in the great interest of Europe to facilitate and support these ties. The region has significant potential to contribute to European and global energy and food security, and Europe can and should support this process through greater engagement and participation in transit projects, including by focusing on creative ways to expand the Three Seas initiative. Adding the Caspian Sea to the consideration of projects for economic, energy, digital, and wider infrastructure connectivity in Central and Eastern Europe will increase the focus of the bureaucracy in this direction and stimulate the engagement of the private sector.

A vector of cooperation can also be sought in the direction of expanding the interconnection for gas coming to Bulgaria from Greece, which can allow our country to play an important role in opening another alternative supply route to Romania, this time for Mediterranean energy. The Greek company Copelouzos Group took an important step towards the realization of the project for electrical connection between Greece and Egypt (GREGY – Green Energy Interconnector) by submitting a full application for its inclusion in the ten-year plan for the development of European energy networks (TYNDP 2022). Its inclusion in TYNDP

[150] Chirileasa, Andrei. 2021. "EC includes second stage of BRUA pipeline among critically important projects." *Romania Insider*, November 22, 2021. https://www.romania-insider.com/brua-second-stage-ec-imp-projects-nov-2021.

2022 will be the first necessary step that will start the process of including this ambitious project in the 6th list of projects of common interest of the European Union (PCI) in the context of the interconnection of European energy networks. Projects included in the PCI list are important cross-border projects that connect the energy systems of EU countries and third countries and help the European Union achieve its climate goals and implement its energy policy by providing safe, affordable, and sustainable energy. Copelouzos Group's electricity interconnection project will transfer 100% clean, green energy produced from renewable energy sources. It will be implemented in Egypt and will offer significant benefits not only to Greece but to the whole of Europe, contributing to its energy security and helping it achieve faster decarbonization and its zero carbon targets.

Energy cooperation between Bulgaria and Romania: the RES vector

Another vector of cooperation and diversification can be sought in the context of the project for the production, transport, and use of green hydrogen for industrial customers and the transport sector Green Hydrogen @ Blue Danube. The project is being developed by Verbund, Austria's largest producer of renewable electricity, and aims to create a green hydrogen value chain connecting renewable capacities in Southeast Europe with the growing interest in hydrogen in Western Europe.

Verbund is developing Green Hydrogen @ Blue Danube together with partners and buyers of green hydrogen within the framework of the European Commission's initiative for important projects of common European interest. The project is coordinated by Verbund and involves various stakeholders along the value chain, mainly Austrian and German companies such as Bayernoil, Bosch, Siemens Energy, and many others. The Romanian state-owned electricity company Hidroelectrica is also involved in the project as a co-investor in renewable energy and hydrogen production in Southeast Europe.[151] It is considering the construction of a 50 MW green hydrogen production plant and a photovoltaic park with energy storage batteries on the Danube River island of Ostrovu Mare, located near the Iron Gate II hydropower and navigation system. Hidroelectrica wants to start producing ultra-high-purity green hydrogen at Ostrovu Mare in 2026, aiming for a process efficiency of 75%, a minimum load of 10%, and production of at least 7,500 tons per year. The company expects to receive no more than €4 per kilogram of H2 and also wants to produce green hydrogen through a hydrolyzer of at least 100 MW on the Olt River in a project that also includes the construction of a photovoltaic park with an installed capacity of at least 300 MW.[152]

The aim is to create a trans-European green hydrogen value chain – from

[151] Szoke, Evelin. 2020. "Romania's Hidroelectrica takes part in multi-stakeholder European green hydrogen project." *CEE Energy News*, November 19, 2020. https://ceenergynews.com/hydrogen/romanias-hidroelectrica-takes-part-in-multi-stakeholder-european-green-hydrogen-project/.

[152] Hydrogen Central. 2021. "Romania – Hidroelectrica Plans Green Hydrogen Production on The Danube." December 28, 2021. https://hydrogen-central.com/romania-hidroelectrica-green-hydrogen-production-danube/.

production to transport and purchase by industrial and mobile customers. The first phase of the project focuses on the production and use of green hydrogen in Austria and Bavaria. The second phase will connect hydrogen produced from renewable sources in Southeast Europe. The hydrogen will be transported via the Danube, a long-established transport corridor (TEN-T), to buyers in Austria and Germany.

Future demand for green hydrogen can be met only partially by domestic production. Like most Western European countries, Austria will also be more dependent on green hydrogen imports to meet ambitious climate goals. The idea is to expand the green electricity value chain by creating a hydrogen project with a European dimension to use renewable resources produced in Europe that could not otherwise be realized due to a lack of energy transmission capacity. The European hydrogen economy is also gaining momentum as a result of the Commission's new hydrogen strategy announced in 2020, and there is a clear intention to increase hydrogen capacity and in particular to stimulate cross-border projects. At the beginning of 2022, Romania expressed a desire for the construction of the so-called 'green bridge' between the Black and Caspian Seas. Tentatively called the "Green Corridor", its aim is to connect wind farms along the coast of both seas with an undersea cable from Georgia to Romania. This will facilitate the export of green energy from Romania to the rest of Europe, including at a time of heightened concerns about the continent's energy security.[153]

In the spring of 2022, it became clear that Bulgaria will offer Romania a project to build a joint offshore wind farm in the waters of the Black Sea, as investors from Denmark and Germany, which have experience in the field, showed interest in a similar project. Bulgaria's marine RES potential is estimated at 116 GW, but projects for 26 GW could be realized in accessible areas and with available technologies. Four key areas of the Bulgarian Black Sea coast have been identified as suitable for offshore projects. The region of Shabla, close to the sea border with Romania, is considered the most promising for quick implementation, and it is likely to be proposed for a joint offshore wind farm with Romania. There is potential for 3-4 GW with a capacity of 45-48% and average costs of €60-80 per megawatt hour installed.[154] The waters near Varna, Obzor, and Rezovo near the sea border with Turkey, are the other areas that can turn the regions of Varna and Burgas into centers for decarbonization of the Bulgarian economy, according to the organization's calculations.

In February 2022, German renewable energy developer wpd offshore revealed plans to build two wind farms totaling 1.9 GW in Romanian Black Sea waters. A month later, wpd told media outlets in the Bulgarian capital of Sofia that it was

[153] Shaban, Ilham. 2022. "Southern Gas Corridor's importance for Europe's supply security is more than ever before." *Caspian Barrel*, June 28, 2022. http://caspianbarrel.org/en/2022/06/southern-gas-corridor-s-importance-for-europe-s-supply-security-is-more-than-ever-before/.

[154] Center for the Study of Democracy. 2022. "Tackling the energy and climate security conundrum in Southeast Europe." *Policy Brief*, no. 110, May, 2022. https://csd.bg/fileadmin/user_upload/publications_library/files/2022_05/BRIEF_110_ENG.pdf.

planning two wind farm projects totaling 75-100 MW near the city of Balchik on Bulgaria's northern Black Sea coast.[155]

The European Commission already in autumn 2020 announced the EU Strategy on Offshore Renewable Energy, according to which these capacities should increase from 12 GW to at least 60 GW by 2030 and 300 GW by 2050. In the document, the Black Sea has been identified as a place with huge potential for the deployment of offshore wind platforms – both fixed to the sea bed and floating, as well as for the use of energy from waves and tides. According to the EC strategy for offshore parks, the European Commission, the European Investment Bank, and other financial institutions will work together to support investment in such renewable sources. For this purpose, the Recovery and Sustainability Plan of the EC, the InvestEU and Connected Europe programmes, the RES financing mechanism, the Innovation Fund, and other funds will be used. Public-private partnerships such as the one with the Spanish company EDP Renewables, which is a world leader in the RES market and has already invested more than €750 million in Romania, can also enable the development of large green energy projects. If they want to use wind generators in the Black Sea – a very important sector for both Romania and Bulgaria as well as Turkey – Sofia and Bucharest must work together because they cannot develop independent capacities, as (although they have plans in this area) this is just not efficient.

The first step towards the launch of offshore wind energy is advance planning, especially marine spatial planning and bilateral cooperation between Bulgaria and Romania. Neither country currently envisages the deployment of offshore wind in their national energy and climate plans for 2030. This should change when the plans are updated in 2023. Giving clear visibility to desired expansion of offshore wind until 2030 is crucial for attracting investment. It would be even better if Bulgaria and Romania cooperated on a joint offshore wind project that would qualify as a flagship European initiative under the EU Strategy on Offshore Renewable Energy.

The second step would be to ensure that offshore wind can coexist with other economic sectors. national marine spatial plans are crucial to this end. The document covers internal marine waters, territorial sea, contiguous zone, continental shelf, exclusive economic zone, including coastal marine waters. It should outline the opportunities for the deployment of offshore wind energy for the next six years in each country. Neither Romania nor Bulgaria have listed offshore areas as a priority sector in their plans so far, and this needs to be changed as a matter of priority.

Both countries' national recovery and resilience plans should then direct investment to the right priorities for offshore wind expansion. These plans outline how EU Member States plan to invest €653 billion from the EU's Recovery and Resilience Facility.[156] Bulgaria is betting on the digitalization of electricity grids and

[155] Renewables Now. 2022. "Bulgaria, Romania to explore joint energy, infrastructure projects." April 29, 2022. https://renewablesnow.com/news/bulgaria-romania-to-explore-joint-energy-infrastructure-projects-govt-782855/.

[156] WindEurope. 2021. "Are the offshore winds of change coming to the Black Sea too?" March 1, 2021. https://windeurope.org/newsroom/news/are-the-offshore-winds-of-change-coming-to-the-black-sea-too/.

hydrogen infrastructure, while Romania wants to further strengthen planning to expand and strengthen its electricity grid. But both plans critically miss investments in port infrastructure, which will be key to the deployment of offshore wind and could prove to be central funding propositions for both countries' plans. The need for a robust regulatory framework for offshore wind systems is evident. Also evident is that contracts for difference (CfD) would be the preferred way to finance offshore wind power in the Black Sea. This model is cheap for governments: they pay and get back depending on market prices. It reduces financing costs, which means lower bills for energy consumers. Denmark, Poland, Ireland, France, Lithuania, United Kingdom already operate that way.

Last but not least, how Bulgaria and Romania deal with biodiversity when deploying offshore wind energy in the Black Sea is also important. The two neighbors could use the best practices put forward by the Offshore Coalition, which is a collaboration between leading European NGOs and transmission system operators, to deploy offshore wind energy in full respect of nature conservation and healthy marine ecosystems.

Southeast Europe and the special case of nuclear energy

According to the latest Eurostat data, the 13 EU countries that have nuclear power plants generated 683,512 GWh of nuclear power in 2020. This represents almost 25% of the total EU power generation.[157] Europe is currently reassessing its approach to nuclear power due to the approaching deadlines of climate agreements and the unstable political environment. When properly operated, nuclear power is able to address various challenges posed by the looming energy crisis and the need for diversification. First, subject to the highest safety standards, nuclear power can provide the necessary amounts of electricity for future electrification and is a key component in finding a solution to reduce dependence on fossil fuel imports from Russia. Next, considering the so-called system costs and the value of stability, nuclear power is a competitive energy source, especially when considering specific funding schemes for capital-intensive projects. Regarding the management of radioactive waste, including for medical or industrial applications, disposal technologies are available; for highly active waste, deep geological repositories are currently considered a suitable and safe solution, and the technology for their construction is already available.

Amid the increasing share of wind and solar power, several countries, including France and Britain, are looking to expand their nuclear power programmes. In mid-2022, Bulgaria joined the opinion of 20 trade unions from Belgium, the Czech Republic, Finland, France, Hungary, Lithuania, Romania, Slovakia, Slovenia, and Croatia in support of nuclear energy. In a joint article, the participants of the initiative call on the European Commission to include nuclear energy in the policies of the

[157] Center for the Study of Democracy. 2022. "Tackling the energy and climate security conundrum in Southeast Europe." *Policy Brief*, no. 110, May, 2022. https://csd.bg/fileadmin/user_upload/publications_library/files/2022_05/BRIEF_110_ENG.pdf.

Green Deal and the REPowerEU plan. According to them, the inclusion of nuclear power in the EU taxonomy is vital to tackle climate change and increase energy independence. This will provide an opportunity for sustainable financing of nuclear energy projects in the future. Participants in the initiative note that – alongside renewable energy sources – nuclear energy has the potential to form the basis of Europe's carbon-free energy system.

The argument is that wind and solar power alone will not be enough to help countries meet the targets set at the December 2021 UN climate summit in Glasgow. The nuclear industry's main trump card is technology involving compact plants, or small modular reactors, which proponents say are safe, cheap, and efficient. According to Rolls-Royce, one reactor would have roughly one-seventh the power of the largest modern nuclear plants and could power one million homes.[158] Critics argue that nuclear power is hardly the answer to accelerating the drive to net zero emissions.

NuScale reactors, which are to become operational first in Romania, are also planned for deployment by Poland, Bulgaria, and Ukraine. The latter has already received grants from the US for the preparation of permits and the search for sites for the construction of reactor units. At the end of October 2021, Bulgarian Energy Holding signed a memorandum of cooperation with the American Fluor Corporation. The corporation is a majority owner in NuScale Power, with which at the end of 2020 "Kozloduy NPP - New Powers" signed an agreement to analyze the possibility of installing its small modular reactors at the Kozloduy NPP site. The development of a specific schedule for preparation, fabrication, delivery of the modules and implementation of the project, economic and engineering analyzes, and giving a specific price for a specific project were also planned. The US is also expected to assist with licensing and other mutually agreed activities for the potential construction of a NuScale project at the Kozloduy NPP.[159]

Objectively speaking, however, there are several fundamental circumstances regarding the subject that should be explicitly emphasized. For one thing, new nuclear plants, even small ones, will take up to a decade or more to come online, in part because of regulatory requirements, which is nowhere near fast enough to address the climate emergency.For another, after the nuclear accidents, safety issues remain unresolved and at the center of public interest. The topic of radioactive waste storage is also painful. Croatia opposes a nuclear reactor project in Slovenia that would dump some of the nuclear waste near their border. Germany opposes a planned Polish reactor that Germany's Green Party says would most likely pollute Germany in the event of an accident.[160]

[158] Rolls-Royce Small Modular Reactors. https://www.rolls-royce.com/innovation/small-modular-reactors.aspx#/.

[159] Nikolov, Daniel. 2021. "Romania to build a modular NPP with twelve reactors with technology from the United States." *Bloomberg TV*, November 2, 2021. https://www.bloombergtv.bg/a/8-novini-ot-sveta/99729-rumaniya-shte-stroi-modulna-aets-s-dvanadeset-reaktora-s-tehnologiya-ot-sasht.

[160] Sieradzka, Monika. 2021. "Germany alarmed over Poland's nuclear plans." *Deutsche Welle*, February 17, 2021. https://www.dw.com/en/germany-concerned-about-polands-nuclear-energy-plans/a-56603782.

In any case, the situation surrounding the war in Ukraine may change trends and thinking on the subject. It is very likely that after the conflict calms down, the international institutions will be activated with new, even stricter arrangements for nuclear safety. Recently, the issue of the reassessment of the level of carbon emissions from NPPs from the point of view of the source materials has also been raised. If this approach is adopted, however, it will have to be imposed on solar and wind turbines as well, and it is more likely that it will not be raised for the time being.[161] Another important consequence may be that the balance on the nuclear technology market will change. It is possible that, despite significant progress in this area, Russia's Rosatom will fall into partial isolation – partial, since a number of plants are based on the Russian technology and will require support from their experts. Such processes take months and years. However, the European institutions do not have such a long period and have two options – either to admit nuclear energy into the taxonomy, or to extend the energy transition by at least another 10 years – until 2060.

Conclusion

Due to the current security situation in Europe, the need for energy security is more evident than ever. Urgent efforts are needed to effectively replace dependence on imported fossil fuels. Energy optimization and the transition to sustainable energy sources will help in attaining greater energy security. This can be achieved by increasing the use of sustainable energy sources, electric transport, sustainable industrial heat processes, bioenergy, biogas and hydrogen fuel instead of coal and oil, as well as by increasing energy efficiency.

Finding alternatives to Russian gas is the main problem for Europe today. Based on the view that Bulgaria has a special role in the energy sector of the Balkans, it should distinguish itself as an important intermediary in the relations between the US, Russia, China, and the EU, as well as in the relations with EU Member States Romania and Greece and the countries from the Western Balkans – Albania, North Macedonia, Bosnia and Herzegovina, Montenegro, Croatia, Serbia, and Kosovo. Despite the different political positions, provoked by the economic interests related to the trade of energy resources, there is a unifying link, and it is based on the conviction that stability and security must be achieved in order for the region to develop and energy projects to be protected.

The role of Bulgaria in the energy sector will progressively increase. This is due both to its geographical location and to its sustainable policy in the sector, where – while taking into account the interests of the main actors such as the US, Russia, China, and the EU – Bulgaria manages to also carry out its own policy in the sector: diversification of suppliers, increase of the security and competitiveness

[161] Marinova, Galina. 2021. "Nuclear energy – sentiments in Europe continue to be polarized." *Bloomberg TV*, December 2, 2021. https://www.bloombergtv.bg/a/8-novini-ot-sveta/100864-yadrena-energiya-razdelenieto-v-evropa-ostava-dostatachno-ostro.

of the economy, creation of new jobs, and ensuring acceptable prices for the users of energy resources. However, more efforts are needed at the internal level by all governmental and non-governmental bodies and organizations involved in decision-making, monitoring, and control processes in the sector, so that obstacles can be overcome in a timely manner. In view of the increased interest in Bulgaria's energy sector, the prioritization, and rapid and unimpeded execution of energy projects that are on the agenda – regardless of whether they are national or with foreign participation – will be of particular importance. This is necessary precisely because the world economy is expected to begin a process of gradual and permanent transformation of energy production and energy consumption in the near future, a process to which Bulgaria, as a country with positions and opportunities, must respond adequately.

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ENERGY MODELLING OF THE ELECTRICITY SYSTEM OF BULGARIA AND THE GREEN DEAL GOALS – AN UPDATE OF THE STORY

Lyubomira Gancheva, Energy expert

Introduction

Making Europe the world's first climate-neutral continent is a major goal set and already adopted by the EU. The European Green Deal proposals and steps aim at preparing all sectors of the EU economy to meet the 2050 climate targets in a fair, cost-effective and competitive way. Achieving these ambitious European climate goals goes through a transformation of the current energy system and inevitably leads to serious socio-economic consequences.

As an EU member, Bulgaria must also clearly state its goals in this strategic framework and define the main priorities and the way to achieve them. On this ground, the focus of the current analysis is to provide an up-to-date look at the challenges the Green Deal brings to the electricity system in Bulgaria in the frame of its national dimension but also concerning the regional electricity outlook.

European Policies and Targets for 2050 and Their Practical Influence in Bulgaria

In 2019, the European Commission presented the European Green Deal[162], an ambitious package of measures that envisages the European Union to be climate neutral in 2050. To meet the ambitious targets of the European Green Deal, the EU has developed a strategic plan – "Fit for 55" (adopted in February 2022), which sets (1) the Union's increased binding target of achieving a net greenhouse gas (GHG) reduction of at least 55% by 2030, relative to the base year 1990; (2) increasing the EU-level target of at least 40% share of energy from renewable energy sources (RES) in gross final energy consumption in 2030 and (3) mandatory reduction of energy consumption by 9% at EU level, compared to the 2020 reference scenario.

This general framework influenced substantially the policy steps in Bulgaria.

Thus, the Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030 (NECP, the Plan)[163], approved by the EC on 14.10.2020, has been developed in accordance with the European objectives and policies aimed in the long term at achieving ambitious community goals for transition to a low-carbon economy, considering the specifics, experience and traditions in the energy sector of the Republic of Bulgaria. It provides for the maximum use of the existing potential of local coal in the country in compliance with environmental requirements. By 2030,

[162] European Green Deal, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_bg

[163] The Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030, https://www.me.government.bg/files/useruploads/files/national_energy_and_climate_plan_bulgaria_clear_22.02.20.pdf

the total GHG emissions generated by **the energy sector** are expected to decrease by around 26% by 2030, compared to GHG emissions in the 2015 baseline.[164]

At the same time, the Recovery and Resilience Plan of the Republic of Bulgaria (RRP)[165], adopted by Council of Ministers No 203/07.04.2022 and approved by a Decision on the implementation of the Council of the EU approving the assessment of the RRP of Bulgaria No CM 2890/22 of 04.05.2022, provides for Reform 10: Decarbonization of the Energy Sector (the Reform). It includes a reduction in carbon emissions from electricity generation by 40%, based on 2019 baselines, to be achieved in 2025 (measured and confirmed with data in 2026). Additionally, there is need for updating the national legislation in the Climate Change Mitigation Act, including a timetable for the phasing out of coal-fired power plants and the implementation of a regulatory cap on their carbon dioxide (CO_2) emissions as of 01.01.2026.

The reduction of carbon dioxide emissions should be achieved by the following specific coal-burning plants: TPP Maritsa 3 EAD, TPP Maritsa East 2 EAD, TPP Bobov Dol EAD, AES Maritsa East 1 EOOD, TPP Contour Global Maritsa East 3 AD, TPP Brikel EAD, TPP Repubblica – Pernik, TPP Ruse Iztok and Toplofikatsia Sliven EAD (explicitly listed in the RRP of Bulgaria in the description of the Reform 10).

Key stages have been identified to ensure the implementation of the Reform. The first of them was for the first quarter of 2023 and provides for the entry into force of legislation laying down rules to produce electricity from coal, which should provide:

- A ban on the construction and operation of new coal-fired power generation and coal-fired power plants, which shall enter into force no later than 2038, including a mandatory phasing-out schedule;
- Introduction of a general limit on the total annual amount of CO_2 emissions, as recorded in the EU Emission Register (EU ETS) for existing coal-fired power plants ('emission cap'). The upper emission limit shall apply from 01.01.2026 and shall be implemented through the mechanism provided for in key stage 116 of the RRP. The upper limit of emissions ensures that the annual emissions from all coal-fired power plants should not exceed 10,983,000 tons of CO_2 until coal is fully phased out.

When discussing the RRP, the Commission has further proposed the following timetable for a gradual reduction of carbon dioxide emissions compared to 2019 levels from the above-mentioned coal-fired power plants:

- By the end of 2022, a decrease of 8%;
- By the end of 2023, a decrease of 18%;
- By the end of 2024, a decrease of 28% from 2019 levels;
- By the end of 2025, a decrease of 40%.

On the grounds of the above, some conclusions can be summarized. The key

[164] Base year for NECP modelling, (B)EST model, E3Modelling

[165] RRP for Bulgaria, https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/recovery-and-resilience-plan-bulgaria_en

one is that the greatest ambition for the decarbonization of the Bulgarian energy sector by 2026, as defined in Reform 10 of the RRP, is unrealistic to achieve. This conclusion is based on the current state and trends in the development of electricity price levels on the energy markets.

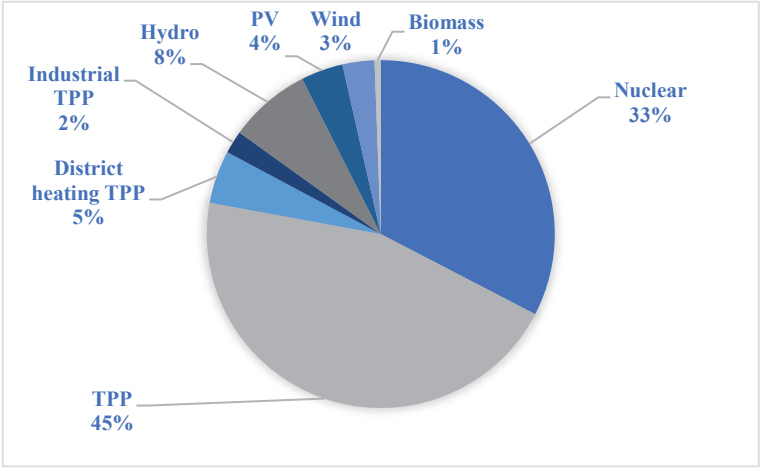
At the same time, the proposed timetable is a commitment only to the RRP. In fact, the document that should detail the implementation of the decarbonization target is the updated NECP, a draft of which should be submitted in June 2023. From today's perspective, it seems that there is enough time to prepare and defend before the European institutions a working plan for the real achievement of the European climate goals by Bulgaria. This, however, should not threaten the security of the electricity system and compromise the monetary proceeds from electricity exports.

In the context of the latter, it is important to have an updated look at the national electricity sector and then place it in the regional and the European perspective.

Current Status of the Bulgarian Electricity Sector

The Republic of Bulgaria has a complex energy infrastructure and a diverse electricity generation mix that ensures the security of electricity supply to the country and the region. The structure of electricity production is dominated by coal-fired thermal power plants, followed by the Kozloduy nuclear power plant, with the percentage distribution by type of plant shown in the following figure.

Figure 1: *Structure of electricity production by type of technology (2022), %*



In 2022, the amount of electricity produced increased by 5.7% compared to the previous year. This growth comes from the increase in electricity produced in condensing power plants (by 4 TWh), RES (0.3 TWh) and hydropower (0.26 TWh).

Electricity production facilities ensure consumption in the country and enable the export of electricity. At present, the installed capacity for electricity production in SAES is 13,247 MW and the available capacity is 10,771 MW.

Figure 2: *Installed electricity generation capacity by technology (2022), %*

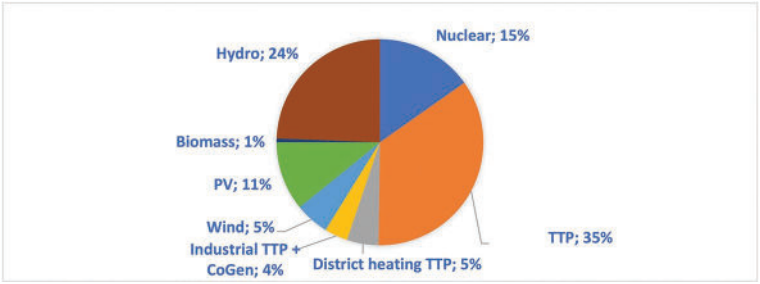
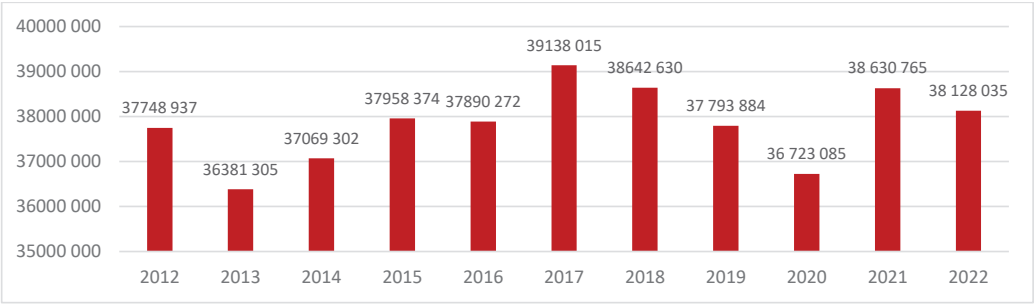


Figure 3: *Gross electricity consumption of Bulgaria (without pumps) (2012-2022), MWh*



NPP and TPP are basic energy capacities that ensure the secure operation of the SAES of the country, its management and balancing, as well as the security of electricity supply. These plants are the leading component for the reliability of the system, respectively for the vitality of the electricity market. Unlike the plants involved in the regulation of frequency and exchange capacities, Kozloduy NPP cannot provide additional services for technological reasons, which creates certain difficulties in balancing the secondary frequency regulation in the periods of minimum load and in the presence of forced production by hydropower plants and wind farms in the spring. With the accelerated penetration of renewable energy and the lack of significant industrial load in the country, the need to force the operating capacity of NPPs during certain periods of the year is yet to increase. The loss of maneuverability and balancing capabilities of SAES should be compensated by creating and introducing storage innovations, including the development of technologies and processes for the conversion of energy into hydrogen and other alternative gases to allow energy storage at times of surplus.

According to the Plan for the Development of the Transmission Electricity Network of the Republic of Bulgaria[166], if by 2031 the designed Wind Power Plant and PV are unregulated with a total installed capacity of over 6,500 MW, the balancing capacity of the SAES will be reduced.

There will be a residual availability for production of 7.8-9.7 TWh/year in Bulgaria.

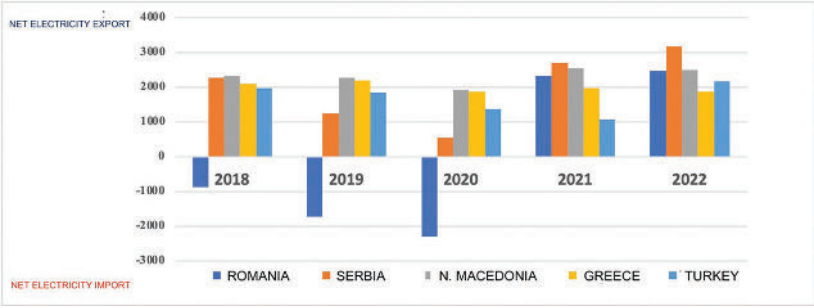
[166] ESO 10-Year Network Development Plan, https://www.dker.bg/uploads/_CGCalendar/2020/10_Year_Net_Dev_Plan_20-29.pdf

It should be borne in mind that this is mainly due to the phased commissioning of the planned growth of RES, especially in the case of PV. Power balances show a drastic disproportion in the possibilities of covering domestic consumption and possible electricity exports. The latter is not only impossible in winter conditions, but in some years even implies the use of all available sources of additional services and/or import of electricity. Even more aggravated is the situation in the combination of prolonged extreme winter conditions, depleted primary energy resources in hydropower plants and power plants, and increased emergency in electricity production facilities, as was the case in January 2017.

Bulgaria is traditionally one of the largest exporters of electricity in Europe, which contributes to increasing security and ensuring electricity supply in Southeast Europe, especially in the conditions of deficit and increased demand in the region. For the past year 2022, a record high net export of nearly 12.2 TWh was registered.

The following figure gives the export of electricity at borders for the last 5 years.

Figure 4: *Net balance of Bulgaria's physical electricity exchanges with neighboring countries (2018-2022), GWh*



The illustrated facts allow to underline the fact that Bulgaria has a balanced electricity generation mix and well-developed electricity infrastructure. This mix is based mostly on domestic energy resources and ensures reliability at national and regional level. In view of the tense geopolitical situation and the focus of the REPowerEU plan on energy independence, one of the main strategic goals towards 2053 is to preserve energy sovereignty by maximizing the use of local energy resources – available and new ones.

Bulgaria and the Electricity Market in SEE and in Europe

In the first half of 2022, Bulgaria was among the top 3 countries in terms of net electricity exports in Europe. The EnAppSys Research Center energy data[167] show that for the period under review, our country exported 33% of its domestic electricity consumption, thus overtaking Spain and France. Agency for the Cooperation of Energy Regulators (ACER) data on EU electricity exporters and importers also confirm that Bulgaria is among the leading net exporters of electricity in 2022.

[167] https://www.enappsys.com/sweden-overtakes-france-as-europes-biggest-net-power-exporter/

According to several researches and scenarios[168,169,170,171,172], despite planned improvements in terms of energy efficiency, electricity demand in Europe is expected to increase significantly in the next 2 decades, driven by the following driving factors:

1. Electrification of industry and transport
2. New specific uses for electricity
3. New types of capacity

The countries of the region of SEE are counting on Bulgaria's role as a significant net exporter to be maintained. Greece plans to phase out its coal plants and to accelerate the development of renewables, as well as expand interconnection, which also creates conditions to become a net exporter. Due to the nature of the energy mix with a predominance of RES capacities, Bulgaria can take advantage of this trend and work towards providing transit services, storage and arbitrage, and balancing energy.

Romania is also working on the decommissioning of coal plants and accelerated development of renewables but focuses on energy independence through the development of production based on local gas and the construction of small modular nuclear reactors.

Modernization and decommissioning of low-efficiency capacities are expected on the territory of the Western Balkans, which determines the need for development of electricity infrastructure and investments in the direction of improving low initial energy efficiency. There is potential for investment by Bulgaria in technologies and know-how in the field of modernization and energy connectivity and efficiency.

The rest of Southeast Europe is a traditional electricity importer.

The war in Ukraine creates a need to provide electricity and help restore infrastructure for the country. Moldova and the Republic of Kosovo have also expressed interest in importing electricity from Bulgaria.

Over the past few years, the country's electricity exports have amounted to 7-8 TWh per year. In 2022, because of maintaining electricity production at the level of 2021 (47.6 TWh), it was possible to export electricity in the amount of 12.24 TWh, generating approximately BGN 6.7 billion in revenue – and this, according to the national statistics, represents 4.8% of Bulgaria's GDP. Based on the windfall profits received by electricity producers, measures were implemented to support

[168] IEA – Electricity Market Report 2023, https://www.iea.org/reports/electricity-market-report-2023

[169] Shell – Shell Scenarios: Sky, Meeting the Goals of the Paris Agreement, https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/what-are-the-previous-shell-scenarios/shell-scenario-sky/_jcr_content/root/main/section_136373495/simple_791089401/promo_773130804/links/item0.stream/1652204963894/eca19f7fc0d20adbe830d3b0b27bcc9ef72198f5/shell-scenario-sky.pdf

[170] Energy Brainpool – EU Energy Outlook 2060, https://energypost.eu/eu-energy-outlook-to-2060-how-will-power-prices-and-revenues-develop-for-wind-solar-gas-hydrogen-more/

[171] European Commission – A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2018:773:FIN

[172] Eurelectric – Decarbonization Pathways, https://www.eurelectric.org/decarbonisation-pathways/

non-household end customers to deal with the consequences of the significant and unfavorable fluctuations of electricity prices in 2022, and the regulated prices for final household consumers in the country were maintained.

Neighboring countries might need increased imports of electricity on seasonal basis. These facts should be considered both from the perspective of the availability of enough electricity as well as from the perspective of the level of its price within Bulgaria. An example of this is the dropping of 1,000 MW from the production (Unit 6) of Kozloduy NPP in December 2022, which caused an additional shortage of electricity in the already scarce region of Southeast Europe and led to imports of about 1,500 MW per day from neighboring countries, as well as higher prices on the market.

To summarize – Bulgaria has traditionally been a net exporter of electricity to the entire region and among the main strategic goals towards 2053 is to maintain and upgrade this role. The plans and forecasts of neighboring countries show that it is difficult to rely on them for electricity at peak demand. Moreover, there are indications that these countries will continue to need both electricity and storage systems for such capacities produced by renewable energy.

National Energy Security and Sustainable Energy Development

The sustainable shift to low-carbon energy requires a long-term vision, predictability and staging so that the systemic adequacy of the country's electricity system (SAES) is not compromised.

Ensuring the adequacy and security of the SAES of the Republic of Bulgaria and balancing and regulating in the conditions of the Green Deal should be ensured with reliable low-emission technologies that have the availability to ensure consumption in the country and maneuverability to avoid balance problems. The expected penetration of electromobility and the development of hydrogen production technologies will create a need to increase the share of generating capacities that have high availability.

Bulgaria has traditionally been a net exporter of electricity to the entire region and in this sense is a balancer of the electricity systems of its neighbors. A rapid significant change in the energy mix means a change of this position and the need to provide a reserve for electricity imports. At the same time, EU green policies are implemented by neighboring Member States (Greece and Romania); the Energy Community countries (including Serbia and North Macedonia) will also be forced to implement them. In this sense, Bulgaria could not rely on basic electricity from the region but should seek a solution to its energy and national security only at national level.

Currently, the SAES of the country has an energy mix of generating sources, in which security and sustainability are ensured only by conventional power plants with synchronous generators of systemic importance. The units of TPP "Maritsa East 2", TPP AES Galabovo (ME1), TPP "Contour Global Maritsa East 3", TPP

“Varna” and TPP “Bobov dol”, described in Reform 10 of the RRP, have a total installed gross capacity of 4,874 MW. Out of these, 3,648 MW are base generating capacity and 2,686 MW are regulated in round-the-clock section and used as base or sub-peak generating capacity. Further, they are used for the implementation of the following essential and mandatory tasks performed by the generating capacity of a single integrated electricity system:

- for primary frequency control within the ENTSO-E Continental Europe synchronous area;
- for participation in the secondary regulation of the frequency and exchange capacities of the Bulgarian SAES;
- to maintain the stress levels at the main nodes of the SAES;
- to maintain the stock of sustainability of the SAES;
- to maintain the total inertia stock of the country’s SAES;
- To participate in the protection plan and the recovery plan of the SAES after severe accidents.

The Green Deal steps very much on RES. However, due to design and technological features, Wind Power Plants, PVs, Thermal Power Plants, Small Hydropower Plants, Biopower Plants and Plant TPPs can neither provide a reserve for primary regulation, an automatic reserve for automatic frequency control, nor participate in the 24-hour centralized voltage regulation at the main nodes of the ESAESES. Moreover, the currently used wind and power plants have a negative impact on the dynamic characteristics of the network and a negative effect on the stability of the system in interference and post-emergency modes. In normal modes, the variable nature of the primary resource in HPP and PV provokes continuous changes and fluctuations of the active power flows in the system.

It should be also noted that the Bulgarian electricity system operates synchronously with the rest of continental Europe, i.e., any disruption outside it affects real-time management. Furthermore, market coupling in Europe assumes that the electricity produced is distributed according to the supply and demand curve between different market areas, the only limitation being the transmission capacity of interconnections.

In 2022, in Bulgaria, about 45% (22.5 TWh) of gross electricity production is produced by plants using coal as a primary energy resource.

Thus, the sustainable shift to low-carbon energy requires a step-by-step and smooth replacement of coal plants by new low-emission technologies, so that systemic adequacy is not compromised. RES plants cannot be considered as an alternative and cannot replace the used basic coal capacity in the country.

On this ground, it should be noted that meeting the target set in Reform 10 of the RRP to reduce carbon emissions by 40% by the end of 2025, and the reduced operation of lignite plants, puts at risk the systemic adequacy of the country’s electricity system. The preservation of a 35% range for regulating the maneuverability of the system is violated. Additional SAES services will be provided

by limited energy resources, which will impose restrictions on active and reactive power (duration, subsequent activations, etc.).

Thanks to the production of electricity from lignite thermal power plants, exports are made to the neighboring countries of the Republic of Bulgaria. TPPs maintain the inertia reserve in the southeast region and participate in the regulation of the frequency of the common energy system in continental Europe and in the southeast region. Meeting the commitment to a 40% reduction in carbon emissions by 2026 compared to those emitted in 2019 creates a serious risk of closing conventional base generation capacity, which would jeopardies systemic adequacy.

In the continuing unstable situation on the energy markets in Europe and war in Ukraine, Bulgaria and the work of our SAES is a determining factor for the stable operation of the ESAESES in the region of southeast continental Europe.

Wrap Up on the Challenges

The first frame challenge is linked to the legal framework, which should be in line with the Green Deal objectives and should support the achievement of its goals.

The Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030, which has been prepared in implementation of Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, sets several long-term goals for the development of the sector in the country. The final version of the Plan was submitted to the Commission and published in March 2020, and in October of the same year the Commission announced its comments and assessment of the document. However, its update is upcoming in 2023.

As of 2020, there is no established energy development strategy in Bulgaria. The latest draft 'Strategy for sustainable energy development of the Republic of Bulgaria until 2030, with a horizon of 2050'[173] was published on the website of the National Assembly and presented for public discussion in February 2021, but it was not adopted by the legislature. Through the prism of the European requirements for transparency and predictability of national policies, for securing investments in the sector and ensuring security of energy supply for the next decade, the NECP is a fundamental document. Nevertheless, this does not reduce the need for a national energy strategy as the leading national document, which should outline the individual path for the energy development of the country for the period 2023-2053, considering the specifics of the national energy system. Bulgaria is in dire need of a national energy strategy that will provide more clarity and predictability for the future development of Bulgarian energy in the context of the transition to lower carbon emissions and protection of workers in the sector.

The European Green Deal presented a package of initiatives to achieve EU climate neutrality by 2050, presenting a new strategy for fair and prosperous

[173] ‚Strategy for sustainable energy development of the Republic of Bulgaria until 2030, with a horizon of 2050', https://www.me.government.bg/uploads/manager/source/video_upload/Strategia.pdf

societal development of the EU. This is based on a modern, resource-efficient and competitive economy in which there will be no net greenhouse gas emissions in 2050 and economic growth is not dependent on resource use.

The processes of uncontrollable change in electricity prices, observed in the second half of 2021 and the beginning of 2022, and the forthcoming deployment of more nuclear capacity in Europe (in Germany and France) raise sharply the issue of the availability of basic generation capacities in Europe in the medium term.

The military actions on the territory of Ukraine bring to the fore the need to preserve Bulgaria's energy security and expand the opportunities for electricity exports to the region.

Bulgaria has a balanced electricity production mix and a well-developed electricity infrastructure, which rely on domestic energy resources and ensure reliability at the national and regional level. In view of the tense geopolitical situation and the emphasis of the REPowerEU plan on energy independence, among the main strategic goals towards 2053 is the preservation of energy sovereignty through the maximum use of local energy resources – available and new ones. The country has traditionally been a net exporter of electricity for the entire region, and one of the main strategic goals for 2053 is to preserve and upgrade this role.

The plans and forecasts of neighboring countries show that we can hardly rely on them for electricity at peak times of consumption. Moreover, there are indications that they will continue to need both electricity and storage systems produced by renewable energy.

There is enough time to prepare and defend before the European institutions a working plan for the real achievement of the European climate goals by Bulgaria, which does not threaten the security of the electricity system and does not compromise the cash receipts from the export of electricity. However, this depends to a very big extent on the political stability in the country and on the availability of a clear strategic vision for the energy sector developments.

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GEOPOLITICAL PROJECTIONS ON THE EUROPEAN ELECTRICITY MARKET, AND THEIR BULGARIAN DIMENSIONS

Nedko Kosev, PhD Student

Electricity Sector's Role in Shaping Geopolitical Spaces

Fundamental postulates of geopolitics stipulate that world economy development results from matching natural and public factors at global as well as civilisational and regional levels. Emphasis is placed on the correlation between availability of resources and development of production regions across the world, sectoral development and division of labour, with diverse interstate economic relations ensuing therefrom (Roussev, 2004). Thus, geopolitics enables explaining economic and political processes through various geographic variables such as country location, territorial size, natural resource abundance, population and economical and technological development.

Historically, countries' connection into a common electricity network is also closely tied to the economic and natural specifics of a given geographic region. The main driver for such a connection is the attempt to mitigate electricity supply risks and to manage supply and demand more efficiently. Synchronised networks increase the likelihood of cheaper electricity import from neighbouring countries, which in turn does not necessitate substantial investment in new local generation capacity. This also assumes devising standards for the technological integration of electricity networks for individual countries, which in fact has been going on quite extensively at European level in the last fifteen years following the setup of the European Network of Transmission System Operators (ENTSO-E)[174].

For the last two decades, the dynamics of the electricity sector's development has attached a multi-vector geopolitical significance to electricity, turning it into the main tool for supranational macro-regions design. This is attributed to broadening the denotation of the term *connectivity* (which today is not confined solely to the technical aspect of the process) and to establishing new *standards* for electricity generation in the strive to meet the ever-growing need of expanding electricity networks towards geographical spaces considered until recently as border or peripheral areas of leading economic centres.

From the perspective of electricity, Westphal et al. (2022) define such *centres* as *infrastructurally and industrially dense spaces* which are politically and normatively homogeneous, and exert numerous economic and social transactions. It is believed that the degree of influence an external geopolitical power exerts on such spaces is low. On the other hand, *peripheries* tend to be less industrialised and with poor infrastructural and social settings, and experience quite a dynamic political environment due to weak political apparatus and high permeability to external geopolitical powers. According to Ho (2020), infrastructure development creates preconditions for change

[174] See www.entsoe.eu.

in space configuration within the boundaries of third countries, enabling an in-country transformation of economy and society. In establishing supranational electricity networks, it is not only the centre-periphery link that is important but also the setup of an *infrastructurised space* and *legal space* (Westphal et al., 2022).

Consideration of only HVDC[175] electricity transmission lines between two countries is associated to the analysis of *infrastructurised spaces* which connect different geographic regions and jurisdictions. The most important role is held by market players that are able to control and regulate electricity flows, thus influencing other players therein.

Legal space builds on the infrastructure by way of enforcing various standards and rules for electricity market participation but confines its influence only to the specific territory. An example of such a space is the integrated electricity network operating synchronously within the internal EU energy market. Such a multifaceted economic cohesion is a core element in energy geopolitics because it allows for sharp alterations in electricity prices. High prices pertain directly to long-term investment planning of international companies while diminished volatility of energy markets serves the interests of both importers and exporters in the long run (Pascual & Zambetakis, 2008). Processes of this type contribute to differences and borders between infrastructurised and legal spaces fading away, and to the gradual dying out of the term *territoriality*. *Network communities* are being formed based on common regulations and drivers for a mutual economic benefit while sharing risks associated with network security maintenance.

Scholten & Bosman (2016) note that in a synchronised electricity network, the balance of powers is distributed more evenly among states and the risk of a deliberate supply disruption to a certain country is minimised because this would impact negatively not only the entire network community but also the particular state undertaking such an action. Setting up energy network communities is a prerequisite for a higher country-to-country trade volume and for establishing a competitive trading environment, and consequently, for ensuring a constant electricity supply at affordable prices[176].

In their study of electricity sector and geopolitics correlation, Westphal et al. (2022) point out that building electricity interconnections may render several asymmetric dependencies which need to be taken into account when considering participation in the electricity market. Among these dependencies distinguishable are: the use of technical and economic influence of external geopolitical powers, sustainability of electricity generation mix, electricity capacity of other countries and creating new value chains based on digital and information technologies. This is why one of the main objectives of geopolitical centres focuses on a broader

[175] High-voltage direct current interconnection; at EU level, it is expected that by 2030, transmitted capacity through HVDC-underwater lines will reach 150 GW, which is 16% of the total electricity consumption in Europe.

[176] At micro level, there are different methodologies to determine electricity cost affordability for households. By and large, they use percentage rate of household income spent on energy. Different states employ different thresholds for price affordability.

infrastructurised and legal binding with newly connected regions some of which have frequently remained in the outer edge of the electricity sector.

Energy Transition as a Geopolitical Tool

Development and mass deployment of renewable energy sources (RES) in the electricity generation mix is gaining an increasingly important role in EU energy policy. They change entirely the perceptions existing currently about electricity market functioning involving enlargement of the electricity grid. On the one hand, establishing denser network communities encompassing broader geographic spaces supports prompt transfer of environmentally-friendly, economic and social effects, and on the other – deepens the abovementioned asymmetric dependencies.

The effect is augmented by some additional RES sector specifics. Investments at sectoral level are often driven by not only environmental considerations but also investment profits or desire to secure crucial economic points in product chains where energy supply to manufacturing processes is essential. This implies that countries capable of manufacturing goods at a lower energy cost may concentrate more capital to feed into development of technical innovations, while bearing in mind that RES industry still remains a capital-intensive sector. For this reason, some substantial disproportions in electricity generation are observed as regards renewable sources (RS) use at regional and international level, with intermittent overproduction or shortage being detected. The only remedy to such disproportions is to reorganise the electricity transmission system so that it can be capable of absorbing and distributing pick generation and responding to demand at time of shortage.

Binding generation to demand to serve increasingly longer distances contributes to exacerbation of geoeconomic competition in EU neighbouring regions where regional and global interests come to play, with economic powers pursuing enforcement of their views on connectivity development and technical and trade standards. From economic perspective, the common market and network connectivity allow actors to not only share some systemic risks but also strengthen their dependency on external economic and political shocks. Behaviour of consumers in remote geographic points may also cause unexpected electricity price fluctuations and create social tension and economic disproportions in a given country. As an example to this end may serve supply chain disruptions and reduced investment flows after the COVID-19 pandemic onset followed by economic recovery since the summer of 2021. This exogenous economic shock impacted directly consumer behaviour and caused unexpected fluctuations in energy prices. In turn, in-state social tension and economic disproportions materialised and further intensified after February 2022 with the break out of the war in Ukraine[177].

[177] Bruegel analysis of European countries' aid to households and businesses following the surge in energy expenditure (including electricity) since September 2022; amounts are nearly EUR 800 billion. The largest per capita expenditure is held by Luxemburg, Denmark and Germany, the latter's aid amounting to approximately EUR 270 billion.

The traditionally variable RES electricity generation adds to salient price volatility. Due to the strong network connectivity and generation intermittency in certain geographic regions, the price signals sent affect the entire common market[178]. They are capable of prompting electricity price rise even in countries with low production costs. The possibility to exert political influence on interconnections and commercial unions set up outside a specific geopolitical centre (due to environmental standards imposed on electricity generation) also becomes apparent. This is important from the standpoint of the leading economic union or block pursuing adoption of their preferred regulatory framework. However, this can also bring the RES sector closer to the petrol and natural gas markets where economic logic is frequently conceding to political considerations.

Scholten & Bosman (2016) indicate that countries with favourable RES generation conditions (semi-dry and coastal areas, mountainous regions with substantial hydropower resources, regions situated over tectonic faults) will hold a relative advantage in RES energy trade. Markets will be even more oriented towards supply than demand (which represents the current structure using basic and reserve capacities). In combination with environmental requirements imposed, this results in *generate or purchase* becoming the pre-eminent principle. Apart from producers, large consumers and countries capable of offering balancing services will have an influence on electricity markets and prices because electricity storage options have very distinct geographic traits. This is why the countries' strategic interest shifts towards electricity infrastructure and markets tied up to it – producers, consumers and transit countries will favour acquisition of physical assets in electricity transmission networks and use them to exercise influence on commercial flows.

Centre-Periphery Relations from the Perspective of Policy in the Electricity Sector

The EU strives to accelerate the overall economic and environmental integration and to facilitate and make the inclusion of regions to the common European market worthwhile via gradually expanding the electricity market and transmission networks, and modernising the transport and communications sectors. This is supplemented by the will to establish various environmental standards such as the so-called carbon tax on goods import. Such a policy affects the overall international market structure, as well as China (PRC) which is the largest exporter of goods to the EU. This is why in the last decade PRC foreign trade strategy has targeted geopolitically vulnerable regions with a potential to play an important role in the European energy transition; PRC investment expansion in the critical infrastructure

[178] An opinion of the European Economic and Social Committee on the geopolitical impact of energy transition (item 3.8) notes that energy transformation will be accompanied by a substantial electricity price volatility and will pose a geopolitical challenge; also noted is the need to undertake actions to avoid exacerbation of existing social inequalities.

of EU neighbouring countries such as Morocco and Israel is becoming increasingly tangible.

Yiwei (2021) remarks that the main purpose is to use accumulated capital resources to participate and develop markets where China may set the standard it requires. For this reason, PRC is focusing on a high-speed rail transport and electricity transmission networks which implement 'Chinese standards' and allow shifting from medium to high class in the industrial chain. Currently, China is a leading export country, but nonetheless, it cannot set the international trade rules and product quality standards and qualifications; that is why it is very active in building energy networks in developing countries within the realm of peripheral/ border geopolitical spaces. Added to the latter is the experience gained in constructing the country's domestic transmission network, which due to local geographic particularities and urban specifics has to transmit generated electricity to remote economic centres (as per the definition of Westphal et al., 2022).

China positions itself as a leader in standards for a new generation of transmission networks (UHVDC), with a voltage of over 500 kV and between 1% and 3% loss registered over 1,000 km; this is an area where several other countries cannot achieve satisfactory results and still remain at the experimental stage. China's electricity sector experience, in parallel with the country's perception of economy as a network system rather than a hierarchical structure, is in fact translated into various projects under the 'One Belt, One Road' initiative[179]. These projects aim at achieving a multi-vector connectivity of the basic infrastructure, port infrastructure, energy infrastructure, cross-border optic network and Internet backbone connections. In this context, renewable energy becomes a crucial component of this economic initiative. In 2020, more than half of the investments (57%) were purposed to this sector and amounted to USD 11 billion.

Tagotra (2022) emphasises that China's investment policy in Africa[180] aims to breed multi-vector collaboration with developing regions not only in the North-South line but also in the South-South geopolitical line, which would facilitate electricity network connectivity under the Chinese model. Rather serious appears to be the possibility of Chinese geopolitical pressure exerted by means of RES generation technologies since China controls the necessary manufacturing components. In this manner, the RES technology market may turn out to be a market of sellers with a near-monopoly control, even bigger than the control over the petrol market[181].

The multi-vector Chinese policy collides directly with EU interests in North Africa, in countries such as Morocco, Tunisia and Egypt. The EU is increasingly pursuing contracts for RES energy purchase and expansion of the European

[179] See https://www.ebrd.com/what-we-do/belt-and-road/overview.html.

[180] China implements over 40 projects to build regional energy networks in Africa alone.

[181] China controls close to 70% of the global lithium production, securing it via developing its own deposits and via its shares in companies operating in other countries rich in rare-earth metal deposits. Chinese companies hold about 80% of the global solar cell manufacturing capacity. The Critical Materials Strategy (U.S. Department of Energy) of 2010 stipulated that the key to low-carbon transition was held by China.

network. Leonard et al. (2021) point out that in the coming decades the main driver for energy transition success will be not only enhanced electrification but also increased import of electricity from PV and wind power stations located along Morocco's Atlantic coastline up to Egypt's Red Sea coastline. Implementation prospects of such an endeavour open room for EU geographically neighbouring regions that possess optimal conditions for RES electricity generation to make use of the global dynamics in the political arena and implement their concepts for electricity sector development, and hence, to build their own areas of influence.

This means that centre-periphery economic relations will be reformatted because control over critical infrastructure will become the rivalry ground for big global and several regional players. Egypt and Morocco have established very clear regional foreign policy plans. However, the abovementioned applies the most to Turkiye, which similarly to China is trying to exert a large-scale influence on European energy markets. Turkiye may serve as an example of the political dimension associated with a synchronised electricity network. Despite the formal completion of Turkiye's national grid synchronisation with the EU network in 2015, integration strengthening seems to be put to a halt. This may bear relevance to the de facto suspended Turkiye-EU pre-accession processes. It appears that in this case, trading in electricity remains to be post hoc.

Using its multi-vector economic and historic links with the neighbouring Caucus, Middle East and North Africa, Turkiye can synchronise its electricity networks and become an important transit country for electricity generated in these RES-favourable climate regions. Rather important are Turkiye's relations with Georgia, which falls into the EU enlargement concept with plans to become an independent electricity hub, exporting electricity to European countries via Turkiye's electricity network. The EU's failure to invest substantially in infrastructure and exploitation of fossil fuel and natural gas deposits incentivises Turkiye to take advantage of the vacuum created. It allows the country to position itself as the main natural gas distribution hub fed from various gas corridors, which in turn provides the country with a two-dimensional potential to influence European energy markets. Should a crisis in natural gas supply through Turkiye occur, European industrial and household demand will increase and will bring about a surge in prices similar to the one faced in the summer and fall of 2021[182].

The situation will be aggravated further with the construction of the Akkuyu[183] NPP (built with Russian involvement), which will expand the country's base-load power capacity. This will open the door for a principal geopolitical rival of the EU to gain influence. The scenario looks feasible not only because of the Russian Federation still holding considerable influence over the Caucus region but also

[182] To this end, infrastructural and economic recovery after the earthquake in Turkiye and Syria could also affect energy markets and be subject of future analyses.

[183] Turkiye plans to build three nuclear power plants. Akkuyu NPP is built by Rosatom, a Russian company. Intent to construct the second NPP, in the Sinop province, has been stated by South Korean, Japanese and Canadian companies. The third NPP is planned to be built at the Black Sea shore close to the Bulgarian-Turkiye border.

because of the complexity of political confrontation dwelling in the Mediterranean area with the involvement of Turkiye, Greece, Cyprus, Libya and Israel. The disputes over maritime borders affect both the economic dimensions and sovereignty of these states. On the other hand, long-term European policies on carbon-neutral economy facilitate the cohesion of Russia, China and Turkiye. Imposing trade and financial sanctions and limiting import of Russian energy resources following the war in Ukraine have catalysed these processes. Both China and Turkiye are taking full advantage of the situation and set even lower prices for Russian export of hydrocarbons, which disfavours European companies trading on international markets.

Bulgarian Electricity Sector – Geopolitical Opportunities and Risks

Bulgaria's important geographic location along with the multi-vector geopolitical interests of global and regional powers brings about numerous questions regarding the future of the electricity sector at national level. Among the major risks faced by the Bulgarian economy is its strong vulnerability to sharp fluctuations in electricity prices. In most cases, these are caused by external factors affecting seriously the local market.

An essential external factor is the electricity deficit in the majority of European countries, which triggers an average price rise internationally. From domestic perspective, the value of electricity generated at relatively low costs is also on the upturn, and the main commercial flows are directed towards more prospective trading areas. This process affects the overall economic development of the country because Bulgaria continues to hold a strong energy-intensive profile[184], and exports[185] raw materials and materials for further processing instead of innovative goods of high value added. The impact of international demand becomes even harder due to domestic market design specifics – electricity is traded in the most volatile exchange segment, namely, Day Ahead. There is no option for industrial producers to have long-term contracts at affordable prices.

This is an example of how electricity network connectivity proves to be of major importance for Bulgaria despite having excess of electricity, in contrast to other countries in the EU and the region. The export profile of the Bulgarian electricity sector came about because the largest industrial consumers of energy were restructured or closed down in the course of the transition to market economy. In combination with a diminishing population, this additionally incentivises electricity export to denser spaces as regards infrastructure, industry and demography, and which, by means of network communities, pursue trade expansion and competitive

[184] Energy intensity of a given economy is a parameter which measures the quantity of energy necessary to manufacture a unit of economic produce. It is calculated as the ratio between gross available energy (in tonnes of oil equivalent; toe) and GDP. In 2020, the value for Bulgaria was 405.17 toe per GDP of EUR 1,000, being one of the largest values in both the EU and the Balkan peninsula.

[185] See, Ministry of Economy of Republic of Bulgaria, Foreign Trade of Bulgaria. Export structure by Customs Statistics sections and chapters: https://www.sme.government.bg/?p=10168.

and liquidity environments enabling constant access to electricity at affordable prices.

Due to the continuing conflict in Ukraine, Bulgarian economy will feel more tangibly the effect of Central and Eastern Europe electricity market price levels. Days after the war broke, the Ukrainian electricity grid was synchronised with the EU network, thereby completing a prolonged process that started in 2005. In recent years, even RES energy and green hydrogen export to the common European market had been considered, owing to the country's significant investment potential in this area.

Following energy system destruction and Russian control being established over crucial electricity facilities, Ukraine faces power shortage. This means that in the future an item in the agenda will not be electricity export[186] but rather electricity import from the EU. The problem is further exacerbated by the Moldavskaya GRES, situated in the unrecognised separatist region of Transnistria, which until recently has not only covered Moldova's power needs[187] but has exported electricity to Romania because of its frequent deficiencies caused by RES mass penetration in the country's electricity mix. In Eastern Europe, the threat of Russian geopolitical influence via the electricity sector acquires an even more apparent shape due not only to the war but also to Hungary's Paks-2 NPP, built with Russian involvement and supply of nuclear fuel. This is an issue of topical importance for Bulgaria, which has not yet diversified its Russian supplies.

Against the backdrop of these dynamic geopolitical processes occurring in Eastern Europe, the Bulgarian domestic market model needs rethinking. Otherwise, these processes will assign an even more ambivalent role of Bulgarian export to EU countries, which are experiencing increasingly stronger electricity shortages. In the coming years, additional domestic and regional electricity imbalances may be caused by a rapid transition to low-carbon economy and closure of the Maritsa basin coal-fired power plants. This scenario carries an important economic dimension for the country since there is no clear view about building RES-based replacement capacities or other technologies tallying well with the concept of a successful energy transition.

Economic risks caused by the war in Ukraine may serve as a strong argument when timelines for closure of coal-fired power plants and building a second NPP based on western technologies are considered. Germany's move to reopen its coal-fired power plants closed in the past, and to rethink its views on nuclear power plants in order to meet domestic market electricity needs, comes in confirmation of the necessity to revisit such an option. Despite these negative trends, Bulgaria's high integration with the common European electricity market and the well-balanced generation facilities available currently, will allow the country to play a more active role at the regional level.

[186] Before the war, Ukraine exported electricity to neighbouring countries via the Burshtyn energy-island, with Burshtyn TPP, whose network was synchronised with the European energy system.

[187] In the past, Moldavskaya GRES exported electricity to Bulgaria as well.

Electricity export opportunities may be expanded when cross-border infrastructure projects of common interest are implemented. These will provide connectivity for the Western Balkans[188] and will offer options to build on and support further efforts towards regional energy transition set in motion under the Berlin Process, following the EC-Western Balkans Summit in Sofia in 2020. This will make Bulgaria an intermediary in enforcing EU technical and regulatory rules which shape the foundation of an overall economic convergence of the countries in the region striving for EU membership. Considering the South destination, there is an opportunity for Bulgaria arising from the aggravated diplomatic relations between Turkiye and Greece. Due to its important geographic location[189], the country may become a linking and balancing element between the common European market and the Caucus region, provided EU's and Turkiye's electricity networks achieve stronger synchronicity. This will require expanding existing physical infrastructure[190] because even without accounting for Turkiye's ambitious large-scale plans for new generation capacities (with 24/7 accessibility), the region will experience a significant impact. Increasing transit flows in the East-West direction may turn the Bulgarian-Turkiye border and the Bulgarian-Serbian border into bottlenecks, limiting electricity trading. The same outcome would be observed in case the Maritsa basin facilities are closed.

In this context, restoring Chaira PSHPP operations would also have an important geopolitical effect because, as mentioned above, in the near future options for RES energy balancing and storage would allow for a more tangible impact on an electricity market which would increasingly tend to apply the *generate or purchase* principle.

Conclusion

The electricity sector's importance in establishing network communities which apply common electricity standards and regulations makes electricity an essential geopolitical variable. In the coming years, its significance will only grow higher. In EU border regions, cues of an enhanced geopolitical confrontation regarding this particular sector have already been detected. An integral part of such a showdown is the will of global and regional powers to shape new economic unions and gravitational centres. In that respect, Chinese influence via investments in electricity transmission networks in several countries and the possibility for China to transform the RES technology market into a completely monopolised one proves to be of economic and political importance for the EU. This may become

[188] A new, second interconnector is expected to be built between Bulgarian and Serbia after 2030.

[189] Because of Bulgaria's important geographical location and the expected increased interest in transiting electricity via the national transmission network, the EC has recognised projects on building new power lines of 400 kV between Maritsa Iztok – Nea Santa (Greece) substations, Plovdiv – Maritsa Iztok substations and a Burgas – Varna substation as projects of common interest under the requirements of Regulation (EU) 347/2013 of the European Parliament and the Council on 17 April 2013.

[190] Also after 2030, a third interconnector between Bulgaria and Turkiye is expected to be build.

a destabilising factor in successfully realising European ambitions for an energy transition while bearing in mind that in the future Europe may become an RES-generated electricity importer from countries outside the EU.

Geopolitical processes outlined herein indicate that the EU has to be proactive in broadening its political and economic relations with countries known to be rich in rare-earth metal deposits and having the potential to become key players in the RES sector. The EU needs to apply a more coordinated and targeted foreign policy towards neighbouring geographic areas but also with Latin America, Africa or Australia, as some of these countries are particularly rich in rare-earth elements. The war in Ukraine reaffirms the notion that electricity network synchronisation is probably the first trait of convergence towards an economic and political union. That is why the EU should not tolerate any delay in electricity sector integration processes (as it happened with Ukraine) and be even more active in securing the connection of the Baltic countries to the common pan-European electricity network. Provided the EU fails to undertake such a proactive approach, Russia will not hesitate to impose its strong influence on the sector in Eastern Europe by means of both physical infrastructure and nuclear fuel supply. Enforcing European standards to RES electricity generation and trade, and to financialisation of the electricity sector, turns out to be a key factor for an adequate response to Chinese investment expansion. For this purpose, it is possible to use the European Investment Bank, to develop a green bonds market or to establish a new independent financial entity such as the European Climate and Sustainable Development Bank[191].

Bulgaria is not remaining on the side-lines of multi-vector geopolitical processes transpiring on the Old Continent. Being part of the European electricity and economic network connectivity, it shares all probable asymmetric risks at sectoral level. Turkiye's plans to set its own area of influence in the Eastern Mediterranean and the Caucus regions, along with the country's proximity to the military conflict in Ukraine, position it as a bordering but binding unit to several geopolitical centres.

Price fluctuations will continue to impact seriously the energy-intensive Bulgarian economy. This calls for revision of the domestic market model so that it can ensure long-term affordable electricity prices for the local industry and consumers rather than targeting only the high-liquidity though fluid and export-oriented Day Ahead segment. There are prerequisites for the war in Ukraine to induce a surge in electricity shortages in Eastern Europe. However, Turkiye's push towards building new base capacities may cause imbalance in Southeast Europe. These processes require pursuing preservation of the balanced Bulgarian electricity mix, extensive investments in new transmission infrastructure with EU support and proactive mediation in the pre-accession course of Western Balkan countries.

Regulation and standardisation at supranational level brings forward the need to perceive the electricity sector in the context of the overall EU economic and political paradigm. By putting in place institutions like ENTSO-E, ACER and

[191] See Leonard, M., Pisani-Ferry, J., Shapiro, J., Tagliapietra, S., Wolff, G. (2021), The geopolitics of the European Green Deal, Policy Contribution, Issue 04/21.

IRENA[192], state control over the sector gives way to the free market while security of supply rests no longer in the national but in the collective focus. Technical and regulatory convergence is vital for a deeper economic cohesion and membership in the EU. This provides a new way of binding economic centres and peripheries. In some cases, the latter may acquire higher importance depending on how well-endowed they are with regard to electricity generation.

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[192] ENTSO-E, ACER (Agency for Cooperation of Electricity Regulators) and IRENA (International Renewable Energy Agency) have been established between 2009-2011.

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FROM POLITICS TO PRACTICE: THE CRITICAL ROLE OF HUMAN CAPITAL IN ACHIEVING THE RENEWABLE ENERGY TRANSFORMATION

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Scope and Summary

The transition to a low-carbon, renewable energy future is one of the most pressing global challenges of our time. The success of this transition will depend on the availability of a skilled and competent workforce capable of driving the deployment and integration of renewable energy technologies. Despite the rapid growth of the renewable energy sector, the industry is facing a significant skills gap, which threatens to limit the pace and scale of the energy transformation.

The article presents the argument that the critical role of human capital in achieving a successful energy transition has been largely overlooked in policy and academic discussions. In order to overcome the skills gap and build a sustainable energy future, there is urgent need to prioritize workforce development in renewable energy.

On this ground, a realistic overview of the current state of the renewable energy sector and the challenges faced by the industry in terms of workforce development is more than necessary. Thus, a series of recommendations for addressing the skills gap is pointed out, including inter alia the need for:

• A concerted effort to prioritize workforce development along the energy policy;

• Investment in renewable energy education and training programs;

• The creation of industry-academia partnerships to drive innovation and the transfer of knowledge;

• Encouragement of diversity and inclusiveness in the renewable energy sector as to ensure that the benefits of the energy transition are shared by all, etc.

The energy transformation is a critical issue that requires the involvement of multiple stakeholders, including the political sector. However, the ultimate success of this transformation depends heavily on the human capital involved. Skilled workers, knowledgeable experts, and efficient managers play a vital role in the design, implementation, and maintenance of energy-efficient systems and technologies. Without an adequate pool of human capital, the energy transformation would likely be hindered by a lack of expertise and technical know-how. It is crucial for governments and organizations to invest in the development of human capital in the energy sector, through education, training, and capacity-building initiatives. This investment will not only help to achieve the energy transformation but also create economic opportunities and support sustainable development.

Introduction

The world is facing an existential threat due to climate change. The increasing global temperature, extreme weather conditions, and rising sea levels are some of the most significant consequences of this problem. To combat this issue, the world needs to reduce its carbon footprint and transition towards a low-carbon, renewable energy future. The transition to renewable energy sources is one of the most pressing global challenges of our time, as it is essential to ensure a sustainable future for the planet and all its inhabitants.

Renewable energy technologies such as solar, wind, and hydropower are rapidly growing and have the potential to replace traditional fossil fuel-based energy sources. However, this transition is not without its challenges. One of the most significant challenges is the availability of a skilled and competent workforce that can drive the deployment and integration of renewable energy technologies. Despite the rapid growth of the renewable energy sector, the industry is facing a significant skills gap, which threatens to limit the pace and scale of the energy transformation.

Based on an internationally established frame, which was also explicitly developed at EU level, governments and organizations worldwide have recognized the need to promote renewable energy and reduce greenhouse gas emissions. These have adopted various policies and proposals aimed at promoting renewable energy, such as renewable energy targets, feed-in tariffs, carbon pricing, and energy efficiency standards.

Nonetheless, the critical role of human capital in achieving a successful energy transition has been largely overlooked in policy and academic discussions. While these policies are essential, they may not be enough to achieve the desired outcomes without an adequate pool of skilled and competent professionals in the renewable energy sector.

A concerted effort to prioritize workforce development in the energy related context

A concerted effort to prioritize workforce development in the frame of the energy policy is essential to ensure that the renewable energy sector has the human capital needed to drive the energy transformation. Policies that promote workforce development can take many forms, from funding for education and training programs to tax incentives for businesses that invest in employee skills and knowledge.

The European Commission has recognized the importance of workforce development in achieving a sustainable energy future. The Commission launched the European Green Deal in December 2019 as a set of policy proposals based on the concept for making the EU’s economy sustainable and reducing its greenhouse gas emissions.

The Green Deal includes a specific focus on the human capital needed to achieve these goals, including proposals for:

- The European Skills Agenda for sustainable competitiveness, social fairness, and resilience

This policy initiative aims to ensure that people develop the right skills for the green and digital transition. The Agenda sets out a number of actions, such as upskilling and reskilling people, to improve the employability of workers and ensure a sustainable, fair, and resilient recovery from the COVID-19 pandemic;[193]

- The European Education Area

This initiative aims to ensure that everyone has access to high-quality education and training throughout their lives. It focuses on key competences, such as digital and green skills, and aims to increase the attractiveness of vocational education and training.[194]

- The European Climate Law

This legislation sets the framework for EU climate policy and sets a target of net-zero greenhouse gas emissions by 2050. It recognizes the need for a skilled workforce to achieve this target and calls for the development of a "just transition" for workers in sectors affected by the energy transformation.[195]

In addition to these policy proposals, the European Commission has also supported funding for education and training programs through its Horizon Europe research and innovation program. The program provides funding for research and innovation projects that aim to address societal challenges, including the energy transition.

Overall, a concerted effort to prioritize workforce development in the frame of coherent energy policy approach is crucial for achieving a sustainable energy future. The policies of the European Commission, such as the European Skills Agenda and the European Education Area, provide a strong framework for achieving this goal. By investing in human capital and ensuring that workers have the skills and knowledge needed to drive the energy transformation, we can create a more sustainable, fair, and resilient future for all.

In addition to prioritizing workforce development, it is important to consider the relationship between the approach of the European Union (EU) and the role of its member countries in training and the human factor in general. While the EU provides a strong framework for achieving workforce development goals, it is ultimately up to the member countries to take the lead in implementing these policies and programs. Each country has its own unique energy landscape and workforce, and therefore requires tailored solutions to address the skills gap in the renewable energy sector. The EU can play a role in facilitating collaboration and

[193] European Commission. "The European Green Deal." https://ec.europa.eu/social/main.jsp?catId=89&langId=en&pubId=8284.

[194] European Commission. 2020. "European Education Area." https://ec.europa.eu/education/education-in-the-eu/european-education-area_en.

[195] European Commission. 2020. "The European Green Deal." https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en.

knowledge-sharing among member countries to promote best practices and ensure a cohesive approach to workforce development. However, it is up to individual countries to take the lead in designing and implementing education and training programs that meet the specific needs of their workforce. By doing so, member countries can ensure that their workers have the skills and knowledge necessary to contribute to the energy transition.

Investment in renewable energy education and training programs

These investments are a critical component in building a skilled and competent workforce capable of driving the deployment and integration of renewable energy technologies. The development of a robust workforce is essential in ensuring the success of the transition to a low-carbon, renewable energy future.

One of the key ways to promote investment in renewable energy education and training programs is through adequate and systematic governmental policies and initiatives. In fact, these should be analyzed both individually and in the frame of the steps at the EU policy level in these directions.

The European Commission has been at the forefront of promoting renewable energy and reducing greenhouse gas emissions through various steps concretely in the sphere of education and training. One of the most significant initiatives is the European Green Deal, which aims to make Europe the world's first climate-neutral continent by 2050. As part of this initiative, the Commission has set a target of producing at least 32% of the EU's energy from renewable sources by 2030.[196] To achieve the Green Deal targets for the role of RES, the European Commission has put forward a number of policies and measures aimed at promoting investment in renewable energy education and training programs. One such policy format is the European Strategic Energy Technology Plan (SET Plan), which aims to accelerate the development and deployment of low-carbon technologies, including renewable energy technologies, through research, innovation, and education.[197]

Another concrete format is the European Union's Horizon 2020 program, which is the largest research and innovation program in the world, with a budget of €80 billion.[198] It provides funding for renewable energy research and development, including education and training programs, to support the transition to a low-carbon, renewable energy future. The Commission has also established the European Energy Union, which aims to provide secure, affordable, and sustainable energy for all Europeans. The Energy Union includes, inter alia, measures aimed at promoting investment in renewable energy education and training programs to

[196] European Commission. "Renewable energy directive." https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en.

[197] Magagna, D., Shtjefni, D., Peteves, E., Tzimas, E., De Felice, M., Tarvydas, D., and Ruehringer, M. 2020. "Implementing the SET Plan." Mendes Pinheiro Andre, S. ed. Publications Office of the European Union. Luxembourg. ISBN 978-92-76-25345-7, doi:10.2760/927963, JRC122587. https://publications.jrc.ec.europa.eu/repository/handle/JRC122587.

[198] European Commission. "What was Horizon 2020?" https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-2020_en.

develop a skilled and competent workforce capable of driving the deployment and integration of renewable energy technologies.[199]

In addition to government policies and initiatives, there are also good practices that can be suggested to promote investment in renewable energy education and training programs. One such practice is the creation of public-private partnerships to fund such programs. By partnering with the private sector, governments can leverage additional funding and expertise to develop education and training programs that are tailored to the needs of the renewable energy industry.

For example, the European Renewable Energy Research Centres Agency (EUREC) offers a postgraduate program in renewable energy that is designed in collaboration with leading research centers and industry partners across Europe. The program provides students with hands-on experience in renewable energy technologies, as well as a strong theoretical foundation in renewable energy policy and management. By collaborating with industry partners, EUREC is able to ensure that the program is aligned with industry needs and trends, providing graduates with the skills and knowledge needed to succeed in the renewable energy industry.[200]

Another good practice is the establishment of centers of excellence in renewable energy education and training. These centers can provide a range of education and training programs, from basic training for entry-level workers to advanced training for experts in the field. By creating a network of centers of excellence, governments can ensure that the renewable energy industry has access to a skilled and competent workforce.

One example of a center of excellence in renewable energy education and training in Europe is the Renewable Energy Research Institute (RERI)[201] at the University of Applied Sciences and Arts Western Switzerland. RERI offers a range of programs, including a Master's degree in Energy and Environmental Sciences with a specialization in renewable energy. The institute also provides continuing education programs and research opportunities in renewable energy technologies, policy, and management. RERI's programs are designed to provide students with a strong theoretical foundation as well as practical skills in renewable energy, ensuring that they are equipped to succeed in the industry.

The creation of industry-academia partnerships to drive innovation and the transfer of knowledge

Industry-academia partnerships are crucial in driving innovation and the transfer of knowledge in the renewable energy sector. These partnerships bring together academic institutions and private sector companies to collaborate on research and development projects, allowing for the exchange of expertise and resources. The benefits of such partnerships are numerous, including the development of

[199] European Commission. "Energy union." https://energy.ec.europa.eu/topics/energy-strategy/energy-union_en.

[200] EUREC. "European master in renewable energy." https://master.eurec.be/about/objectives/.

[201] Renewables and Environmental Regulatory Institute. https://www.reri.org.rs/en/home/.

new technologies, the identification of new markets, and the creation of new job opportunities.

One reason why industry-academia partnerships are important is that they help to bridge the gap between theoretical research and practical applications. Academic institutions have a wealth of knowledge and expertise in renewable energy, but may not have the resources or infrastructure to bring their research to market. Private sector companies, on the other hand, have the resources and infrastructure to commercialize new technologies, but may lack the necessary research expertise. By working together, academic institutions and private sector companies can leverage each other's strengths to develop new products and technologies that are more efficient, effective, and sustainable.

Moreover, industry-academia partnerships can accelerate the pace of innovation in the renewable energy sector. The rapid growth of renewable energy technologies requires constant innovation to keep pace with changing market demands and technological advancements. Collaborating with academic institutions allows private sector companies to access the latest research and technological advancements, and to incorporate these developments into their products and services. In this way, industry-academia partnerships can help to drive the development of new and more efficient renewable energy technologies.

There are several good practices that can be suggested to foster successful industry-academia partnerships in the renewable energy sector. One such practice is to establish clear and open lines of communication between academic institutions and private sector companies. This can help to ensure that research goals and timelines are aligned, and that both parties are able to benefit from the partnership.

Another good practice is to establish clear expectations and metrics for success. This can help to ensure that both parties are working towards the same goals, and can help to identify any issues that may arise early on in the partnership. It is also important to ensure that intellectual property rights are clearly defined and protected, to avoid any potential conflicts between academic institutions and private sector companies. The European Commission has recognized the importance of industry-academia partnerships in driving innovation and competitiveness in the renewable energy sector. The Horizon Europe program, for example, includes funding opportunities for research and innovation partnerships between academia, industry, and other stakeholders. The European Commission has also launched initiatives to promote industry-academia partnerships, such as the European Institute of Innovation and Technology's Knowledge and Innovation Communities.[202]

Encouragement of diversity and inclusiveness in the renewable energy sector

The renewable energy sector has the potential to create significant economic and environmental benefits, including the creation of new jobs and the reduction of

[202] European Institute of Innovation & Technology. "Activities." https://eit.europa.eu/our-activities.

greenhouse gas emissions. However, it is important to ensure that the benefits of the energy transition are shared by all members of society, regardless of gender, race, or socio-economic status. Therefore, encouraging diversity and inclusiveness in the renewable energy sector is critical to achieving this goal.

There are several reasons why diversity and inclusiveness are important in the renewable energy sector.

Firstly, it can help to promote innovation and creativity. Studies have shown that diverse teams are more likely to come up with innovative solutions and ideas. By promoting diversity and inclusiveness in the renewable energy sector, one can harness the full potential of the workforce and drive innovation in the sector. An example of this is the "Innovation Through Diversity" study[203] – a research effort that aims to investigate the relationship between workplace diversity and innovation. The study includes research from various organizations and consulting firms, such as Boston Consulting Group and McKinsey & Company, which have found compelling evidence that diversity unlocks innovation and drives market growth . The research suggests that companies with diverse teams are more likely to develop new ideas, improve collaboration, and be more successful.

Secondly, promoting diversity and inclusiveness can help to address social and economic inequalities. The renewable energy sector has the potential to create new jobs and economic opportunities. However, if these opportunities are not accessible to all members of society, then the benefits of the energy transition will not be fully realized. By promoting diversity and inclusiveness in the renewable energy sector, governments can help to ensure that all members of society have access to the economic opportunities created by the sector.

Finally, promoting diversity and inclusiveness is simply the right thing to do. Everyone should have the opportunity to participate in and benefit from the renewable energy sector, regardless of their background or identity.

There are several ways in which diversity and inclusiveness can be promoted in the renewable energy sector. One approach is to develop targeted recruitment and training programs to encourage the participation of underrepresented groups in the sector. For example, initiatives could be developed to encourage women, minorities, and low-income individuals to pursue careers in renewable energy. For example, the European Platform for Women in Energy (WONY) is an initiative aimed at promoting gender diversity and equal opportunities in the energy sector across Europe.[204] It was established to provide a networking and mentoring platform for women working or interested in working in the energy sector, and to organize events and training sessions to support their professional development. One of EPWE's main goals is to increase the participation of women in the energy sector, particularly in leadership positions. To achieve this goal, the platform provides a range of services and resources, including mentorship programs, networking

[203] Boston Consulting Group. "Innovation Through Diversity." https://www.bcg.com/publications/2017/people-organization-leadership-talent-innovation-through-diversity-mix-that-matters.

[204] Women in energy. https://www.womeninenergy.eu/events/.

events, and professional development opportunities. These resources help to equip women with the skills and knowledge they need to succeed in the energy sector, and to build strong networks of support and collaboration. In addition to providing support for individual women, EPWE also works to promote diversity and inclusiveness in the energy sector as a whole. The platform has partnerships with industry, government, and education providers to promote diversity and inclusiveness in the workforce. These partnerships help to create a more supportive and inclusive work environment, and to ensure that underrepresented groups have equal opportunities to participate in the energy sector. Overall, EPWE is an important initiative that is helping to promote gender diversity and equal opportunities in the energy sector across Europe. By providing support for women and promoting diversity and inclusiveness in the workforce, the platform is helping to create a more sustainable and equitable energy sector for everyone.

Another approach is to create a supportive and inclusive workplace culture. This can involve implementing policies and practices that promote diversity and inclusiveness, such as flexible working arrangements, mentoring programs, and bias training.

Furthermore, industry leaders and policymakers can work together to create a more diverse and inclusive renewable energy sector. This could involve setting diversity targets and tracking progress, as well as promoting the participation of underrepresented groups in decision-making processes.

Conclusion

Beyond any doubt, the success of the energy transition is dependent on the availability of a skilled and competent workforce capable of driving the deployment and integration of renewable energy technologies. The skills gap[205] currently faced by the renewable energy sector threatens to limit the pace and scale of the energy transformation. It is therefore critical that governments and organizations prioritize workforce development in energy policy to overcome this skills gap.

Investment in renewable energy education and training programs is a key component of workforce development. These programs can provide workers with the skills and knowledge necessary to design, implement, and maintain energy-efficient systems and technologies. The European Commission has recognized the importance of these programs and has invested significant resources in the development of renewable energy education and training initiatives. Good practices such as the Erasmus+ program[206] have enabled students and professionals to gain international experience and develop the skills necessary to contribute to the energy transition.

The European Commission has recognized the importance of diversity and

[205] International Energy Agency (IEA). 2020. “Energy Technology Perspectives 2020.” https://www.iea.org/reports/energy-technology-perspectives-2020.

[206] European Commission. 2021-2027. “Erasmus+” https://www.eacea.ec.europa.eu/grants/2021-2027/erasmus_en.

inclusiveness in the renewable energy sector and has adopted policies and initiatives to promote gender balance, social inclusion, and equal opportunities.

The energy transition is a critical issue that requires the involvement of multiple stakeholders, including the political sector. The success of the energy transition depends heavily on the human capital involved. Skilled workers, knowledgeable experts, and efficient managers play a vital role in the design, implementation, and maintenance of energy-efficient systems and technologies. Without an adequate pool of human capital, the energy transformation would likely be hindered by a lack of expertise and technical know-how. Thus, it is crucial for governments and organizations to invest in the development of human capital in the energy sector, through education, training, and capacity-building initiatives. This investment will not only help to achieve the energy transformation but also create economic opportunities and support sustainable development.

In conclusion, the success of the energy transition depends on the availability of a skilled and diverse workforce. The EU's policies and initiatives to promote workforce development and diversity in the renewable energy sector are crucial for achieving a sustainable energy future. The investment in renewable energy education and training programs is a key component of workforce development and should be prioritized by governments and organizations. It is crucial for the member countries to lead this effort by investing in human capital through education, training, and capacity-building initiatives. This investment will not only help to achieve the energy transformation but also create economic opportunities and support sustainable development.

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IDENTIFYING THE LINKS BETWEEN POLICY AND PROSUMERS; WHY IS TRANSFORMATION LATE AND WHAT LED TO THIS CRISIS?

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Introduction

The EU's energy policy toward prosumers is implemented through the Renewable Energy and Internal Energy Market Directives, most recently amended with the Clean Energy Package, which has been in effect since 2021[207]. These documents regulate the existence of prosumers and organizations that consumers can be involved with, taking advantage of opportunities to share renewable energy physically or virtually on a market basis or via tariffs[208]. The focus is on the right of consumers to cooperate in different legal and organizational forms, to build and operate energy facilities, and to have guaranteed access to existing infrastructure, all of which should be defined in the legislation of individual EU Member States. The directives also state that to bring prosumers into the system, market-based mechanisms should be developed. The Renewable Energy Directive is quoted verbatim, without specifying the rules (a bill for amending and supplementing[209] the Energy from Renewable Sources Act, available only in Bulgarian language) in the Bulgarian legislation, with the expectation of extending the relevant regulatory framework to include additional local markets and access to the grid. Please refer to the cited research for more information on the definitions of prosumers and different types of sharing organizations[210].

Prosumers are consumers strategically and operationally involved in the energy market, proactively securing their own consumption. These energy system actors can decide whether to invest and how best to use energy assets, considering the price of energy resources in the energy market, which is a function of supply and demand. The price depends on the current and future state of the energy system. This means that a shortage of energy resources due to supply channels interruptions or other factors that influence the limited supply (or increased demand) would result in increasing the price to match the need of meeting energy demands. Therefore, long-term and short-term price forecasting is necessary for assessing

[207] Article 21. https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en.

[208] Alshehri, Khaled, Subhonmesh Bose, and Tamer Başar. "Centralized Volatility Reduction for Electricity Markets." *International Journal of Electrical Power & Energy Systems* 133 (December 1, 2021): 107101. https://doi.org/10.1016/j.ijepes.2021.107101.

[209] Page 19, §22. https://parliament.bg/bg/bills/ID/164715.

[210] de Almeida, Lucila and Klausmann, Nikolas and van Soest, Henri and Cappelli, Viola. "Peer-to-Peer Trading and Energy Community in the Electricity Market – Analysing the Literature on Law and Regulation and Looking Ahead to Future Challenges." *Robert Schuman Centre for Advanced Studies* (March 2021) Research Paper No. RSCAS 2021/35. https://ssrn.com/abstract=3821689 or http://dx.doi.org/10.2139/ssrn.3821689.

investments in energy facilities by prosumers and is only possible in a functioning market, which is a key objective of energy policies.

Considering the existing legal framework and the experience so far, it can be inferred that the prosumer domain still calls for more questions rather than providing answers. It is proposed as necessary in view of the following aspects:

- Defining the role of energy policy for market formation;
- Description of the link between market signals and energy infrastructure;
- Determining the necessary market signals when making investment and operational decisions;
- Identifying missing information and guidelines for quantitative research.

On energy policy and prosumers

Energy policy aims to ensure the functioning of the market and the security of supply, and to promote the efficient use of resources. Failure of the measures to achieve the above-stated objectives means the energy policy has failed. The main factors contributing to such failures are lack of consistency, delay in implementation, unclear responsibilities, and the structure of the institutional organization[211].

The energy system transformation, where prosumers will play an increasingly important role, is in line with international environmental treaties and is to be implemented with the EU's decarbonization policies. A decentralized conversion of energy resources close to the point of consumption is part of the transformation; this is a new type of energy system management (instead of centralized management). In that context, the target energy market model anticipates trading (exchange) between multiple small-scale participants (prosumers) close to the real delivery time. Smart grids are the conduit, allowing a bidirectional flow of information (about system status) and energy, where prosumers can decide the amount of energy (commodity) emitted, stored, or consumed by them as the result of price signals. Part of the incentives that lead to consumers' conversion into prosumers is their commitment to society and the environment, as well as monetary incentives[212]. There have been various studies based on scenarios and system models that aim at assessing the effects of transformation at a macroeconomic level. The expectation is based on forecasts of technological and social innovation and policies that incentivize them[213]. The main technological innovations in the energy sector refer to the conversion of renewable energy into useful energy and its associated support systems, considering their unpredictability. Socially, consumer behavior is

[211] Maciej M. Sokołowski, and Raphael J. Heffron. "Defining and Conceptualising Energy Policy Failure: The When, Where, Why, and How." *Energy Policy* 161 (February 1, 2022): 112745. https://doi.org/10.1016/j.enpol.2021.112745.

[212] Eunice Espe, Vidyasagar Potdar, and Elizabeth Chang. "Prosumer Communities and Relationships in Smart Grids: A Literature Review, Evolution and Future Directions." *Energies* 11, no. 10 (2018). https://doi.org/10.3390/en11102528.

[213] Karlo Hainsch et al. "Energy Transition Scenarios: What Policies, Societal Attitudes, and Technology Developments Will Realize the EU Green Deal?" *Energy* 239 (January 15, 2022): 122067. https://doi.org/10.1016/j.energy.2021.122067.

expected to shift from passive to proactive, or the so-called prosumption.

In fact, proactive behavior comprises investments in energy facilities, active participation in the energy market, and some form of cooperation with other consumers. The economic incentives for prosumers, however, remain the key factors that are essential to achieve transformation by leveraging their flexibility[214] – this flexibility represents a degree of reaction to new information. Therefore, information systems are the basis of the transformation. In practice, all economic and business models that refer to prosumers include smart organizations, which are based on IT and hardware, including cooperatives and local markets, microgrids[215], and smart cities[216].

The Local Energy Market (LEM) plays an important role in the development of prosumers as a social and economic phenomenon. LEM is a means for coordination of the exchange in front of the electricity meter, which means prosumers use the public grid for sharing.

Three types of LEM are differentiated in the existing literature:

- peer-to-peer energy trading (P2P) for electricity trading without intermediaries and without geographical restrictions;
- collective self-consumption, where energy is shared between consumers in the same locale through a common agent; and
- a transactive energy market, for system balancing, using market signals.

The three types of energy exchange are distinguished by the goals, which will be achieved through an organization of sharing, such as resource optimization for the transactive LEM, sharing incentive for the P2P LEM, or cooperative welfare improvement for collective self-consumption[217]. In all three organizations of the market, the exchange is done on a certified electronic RES sharing platform, with automatic ordering and transaction settlement between participants. This enables prosumers to form a micro market for sharing energy in excess of their self-consumption. Depending on the type, it exists at a different grid level. It can function in parallel, subordinate to, or as a substitute for the existing market. In this case, prosumers should only use an information platform and grid infrastructure to share energy among themselves.

Unfortunately, the Clean Energy Package does not provide guidance on the

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[214] Alireza Nouri et al. “Identification of Gaps and Barriers in Regulations, Standards, and Network Codes to Energy Citizen Participation in the Energy Transition.” *Energies* 15, no. 3 (2022). https://doi.org/10.3390/en15030856.

[215] Marta Castellini et al. “Photovoltaic Smart Grids in the Prosumers Investment Decisions: A Real Option Model.” *Investment, Energy and Green Economy* 126 (May 1, 2021): 103988. https://doi.org/10.1016/j.jedc.2020.103988.

[216] Ana-Maria I. Şanta. “Prosumers – A New Mindset for Citizens in Smart Cities.” *Smart Cities* 5, no. 4 (2022): 1409-20. https://doi.org/10.3390/smartcities5040072.

[217] Capper, Timothy, Anna Gorbatcheva, Mustafa A. Mustafa, Mohamed Bahloul, Jan Marc Schwidtal, Ruzanna Chitchyan, Merlinda Andoni et al. “Peer-to-Peer, Community Self-Consumption, and Transactive Energy: A Systematic Literature Review of Local Energy Market Models.” *Renewable and Sustainable Energy Reviews* 162 (July 1, 2022): 112403. https://doi.org/10.1016/j.rser.2022.112403.

main aspects related to the common information platform. It remains unclear what the financial conditions regarding access to the electronic platform and the grid would be, other than the fact that the directives require cost-oriented and non-discriminatory access. The local energy market has the objective of providing multiple participants with the right to act as suppliers for other participants. If we review the national practice in Bulgaria, for example, this is evidently impeded by the existing retail model, where a select supplier is responsible for the supply and/or the balancing, for the aggregation, and for the pricing. In terms of pricing, the practice in Bulgaria is to index the price to the day-ahead wholesale market price. This is an hourly price, and it reflects the status of the high-voltage grid, connecting major consumers and producers, the distribution grids, and the adjacent market areas. This price does not reflect the condition of the medium voltage and low voltage grid, which is where prosumers are. Other than the fact that resource availability is different at this system level, pricing for grid constraints is also required, for example, using the rent collection model with transmission capacity constraint between two market areas. The price should also include system balancing, which is carried out by network operators or through additional supply contracts[218].

To summarize, energy policy at the European level sets the objectives and the measures for achieving them. Therefore, regarding transformation toward a prosumer-based energy system, efforts need to be focused primarily on the right of consumers to actively participate in the market. The national framework must clarify conditions for connecting to the grid, conditions for surplus sharing with the other participants in the system, and for guaranteeing energy supply, if needed.

Because the grid is a monopoly, regulating it should allow tariffs to act as a sharing incentive for prosumers, covering all operational and development costs of the system. Energy should be paid at a price that reflects energy supply and demand at the level of distribution grids, which is where prosumers are. Therefore, efforts to create additional markets are needed in the policies of the European Union and every EU Member State. The absence of these additional markets is a prerequisite for an inequitable distribution of resources. Synchronizing national legislations, delayed implementation, and unclear responsibilities for the governance of these markets have resulted in delayed transformation, because the necessary market signals for investments and operation of energy facilities for prosumers do not exist. The shift of power system management from a centralized to a decentralized management model also depends on these signals, both for balancing and infrastructure development.

[218] Koirala, Binod Prasad, Elta Koliou, Jonas Friege, Rudi A. Hakvoort, and Paulien M. Herder. "Energetic Communities for Community Energy: A Review of Key Issues and Trends Shaping Integrated Community Energy Systems." *Renewable and Sustainable Energy Reviews* 56 (April 1, 2016): 722-44. https://doi.org/10.1016/j.rser.2015.11.080.

On the predictability of the energy system, the market, and the activities of prosumers

The energy market links the supply and demand for energy resources; hence it also links the management of the system. Commodity prices are a function of the time, location, and product, and this can result in substantial differences in energy prices at a single moment in time in different parts of the same country. The change in one of the three commodity parameters is at the core of the real infrastructure payoff[219]. If prosumers' utility can be increased after energy transformation, prosumers should invest in energy assets. Utility could mean higher income, lower costs, or improved security of supply. Improved satisfaction is a consequence of the option for transformation at any time during the lifecycle of facilities.

Local energy markets are similar to existing wholesale markets, the only difference being the scale and grid level. Local energy markets allow prosumers to use information disclosure rules, wherein bilateral trade implies proprietary information that is only known to the regulatory authorities and the parties to the transaction. The product is not standardized for bilateral trading, which means it cannot be benchmarked against another contract, and the required statistical data cannot be obtained.

One of the main tasks in shaping the energy market is achieving security of supply in the short and long term. Security is the dynamic response of the system to unexpected disruptions, and resilience is the ability to regain balance after a disruption, which depends on the flexibility of the system. The market, therefore, must be structured to allow evaluation and trading with different types of flexibility options. For prosumers, this means that if the system experiences an energy shortage, prosumers must be able to rely on their own storage and generation systems, or they have to reduce their consumption. If the system experiences an energy surplus, prosumers should be able to take advantage of this – by storing some of the energy, for example. To paraphrase, their response to an interruption is possible if price signals exist and their response is limited by their technological capabilities. Any response should provide prosumers with a payoff, depending on their contribution and the magnitude of the disruption. As an example, if the system experiences a shortage at a particular location, the grid energy supply is useful and should be evaluated in accordance with the magnitude of the shortage. Conversely, when the system experiences a surplus, storage systems are useful, and should also generate revenue.

Against this backdrop, prosumers should set the price for power at a level higher than the expected spot price, and this should be reflected in a local futures market and/or options market. This is because of the active penetration of RES in the medium voltage grid and the intermittent and weather-dependent generation

[219] Secomandi, Nicola, and Seppi, Duane J. "Energy Real Options: Valuation and Operations." (February 26, 2016). "Managing Energy Price Risk." Chapter 13, 449-477. V. Kaminski, ed. *Risk Books*, 4-th Edition, 2016. https://ssrn.com/abstract=2856430.

by RES, along with other factors which influence the future state of the system. As an increasing number of storage systems is introduced and given the available technological conversion capabilities, prosumers should assess the risk by looking at the benefits of their available capacity.

Additionally, from the perspective of the local energy market previously referred to, investment in RES will depend on many other factors, such as current energy prices, which reflect the current supply and demand in the distribution grid; the future price, which reflects the information about the planned investments in RES and energy storage systems; expected consumption increase; and multiple other factors. All these aspects have direct relevance to the functioning of prosumers, because instead of being left to the spot market, where any disruption could result in a price increase, prosumers can guarantee a price cap for a portion of their own power.

Factors that have a pronounced adverse effect on the energy system overall and respectively on the operation of the prosumers may vary; however, geopolitical events, political stability, and predictability, especially at the national level, play a special role. This is important for price forecasting by prosumers and the options they have at their disposal to meet their own consumption demands and to realize the energy surplus and the benefit of investments in energy facilities.

Investment and operational solutions

The primary questions prosumers must answer are whether to invest in energy facilities and how to use them as best as possible considering the transformation conditions and the market situation. Their main business objective is to get the maximum benefit from the invested assets. In the energy market, prosumers are practically interested in market risk management, so they are looking for an alternative to insuring themselves against future adverse system states, i.e., predominantly the price of energy[220].

An option for consumers is to take action to build infrastructure, which will guarantee a maximum price cap in the long term, as well as security of supply. Infrastructure may consist of generation, storage, and consumption facilities, as well as network and IT infrastructure. Facilities can be considered either individually or as a portfolio. From the point of view of prosumers, investments in energy facilities can be valued as an operational compound option, which represents the value of the investments. The issue here is an evaluation of the options, which depend on the existing market instruments and the optimization approach for the optimal use of the assets. Market instruments provide information about the options for substitution of one of the parameters of the resource and, given the technical limitations, prosumers need to be able to optimize their behavior within the energy system.

[220] P. U. Shinde, and S. R. Deshmukh. “Risk Management in Electricity Market by Portfolio Optimization.” *2014 Annual IEEE India Conference (INDICON)*, 2014, 1-6. https://doi.org/10.1109/INDICON.2014.7030542.

Legal regulation of prosumers in Bulgaria

At the time of this submission, the Clean Energy Package Directives have not been fully transposed, therefore, formal definitions for prosumers and their rights for access to the grid do not exist, with the exception of self-consumption cases (Energy from Renewable Sources Act, amended and supplemented in SG, issue 11, dated 2 February 2023[221]). Furthermore, the legislation is yet to incorporate excess energy consumption rules. This means efforts by the academia are needed to study the opportunities and promotion of a prosumer-based local energy system, but also political measures directed at specific objectives for implementation of sharing platforms and guaranteeing non-discriminatory access conditions to prosumer grids, connected at the medium and low voltage level. On the other hand, through the Industrial Parks Act[222], Bulgarian legislation has anticipated the rights of industrial parks to develop and manage their own grids, which is a good opportunity for pilot projects related to the development of smart grids and local energy markets.

Summary

Recent geopolitical events have driven EC to propose a round of public discussions regarding measures for changing market models for energy trading[223]. The main objectives to be achieved through the new model would be: (i) creating investment incentives; and (ii) protecting consumers. This shows that the approach to creating markets to guarantee the objectives above is not yet clear at the EC level.

The above leads to the conclusion that the intent to include consumers in the energy market in their capacity as prosumers should be achieved through active development and introduction of specific additional policies both on a European and national level. Such policies should aim at the creation of synchronized market instruments for all stakeholders, which would respectively provide the requisite price signals, directed mostly toward price guarantees and consumer deliveries, but also at preventing grid disruptions, which would influence the security of supply. Other than an adequate regulatory framework at European and national levels, the successful development of prosumers also implies the need for detailed study of the relationship between the price on existing wholesale physical delivery markets and the price of financial instruments. The specific benefit of introducing local markets should be assessed on this basis, considering the technical and legislative constraints.

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[221] Article 25-27. Renewable energy law. https://lex.bg/laws/ldoc/2135728864%20%D0%92%D0%98%D0%96%20.

[222] Chapter 4 – Functioning and Development of an Industrial Park. https://dv.parliament.bg/DVWeb/showMaterialDV.jsp?idMat=156334.

[223] Glachant, Jean-Michel. "Reforming the EU internal electricity market in the middle of a huge energy crisis: an absolute short-term emergency or preparation for the future?" *Florence School of Regulation,* EUI RSC, 2023/03. https://hdl.handle.net/1814/75239.

The outstanding key question is how the legislative framework for EU energy markets will change to allow prosumers to appreciate the benefits of proactive participation through investment in their own facilities. Despite the EC guidelines[224], however, the national approach on this subject will still be the leading approach, because of the particulars of the energy systems of each Member State.

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[224] Article 19a, COM/2023/148 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0148&qid=1679410882233.

MORE ABOUT THE BULGARIAN DIPLOMATIC INSTITUTE

The Bulgarian Diplomatic Institute (BDI) was created on 23 September, 2003, pursuant to a Decree of the Council of Ministers. Its status and functions were regulated by the Diplomatic Service Act adopted by the National Assembly on 13 September, 2007. Its work meets the high demands and professional expectations pursuant to Bulgaria's membership in EU and NATO, and displays continuity that allows the Bulgarian diplomatic profession to have the place it deserves in the large Euro-Atlantic family.

Our mission is to:

- Guarantee the high-level expertise and skills of the diplomatic staff and the public administration by applying up-to-date professional standards of training;
- Enhance continuity in the Bulgarian Foreign Service by promoting exchange of experience and good practices among generations of diplomats;
- Promote the diplomatic profession and Bulgaria's foreign policy by reaching out to the general public;
- Provoke exchange of expertise on foreign policy issues by providing a platform for debate among government and non-government actors;
- Support the diplomatic profession and the foreign policy debate by research and publications;
- Develop national and international cooperation by implementing joint projects.

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Among our major training programmes are the courses for the MFA trainee attaches and consular staff, foreign language training, courses for diplomats, representatives of the public administration and of the NGO and private sector in the field of regional issues and security, energy diplomacy, economic diplomacy, environment, public diplomacy, diplomatic protocol, as well as tailor-made trainings for foreign diplomats and our traditional Winter School of Diplomacy.

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A strategic task of the BDI is to provide comprehensive analyses by internal and outside experts on international topics to meet the needs of the MFA and to enhance the expertise in foreign policy theory and practice. As of 2013 the Institute also holds national contests for applied research projects.

Among our publications, in Bulgarian and/or English, are the Foreign Policy Research Papers series, the Energy and Climate Diplomacy collection of journals, books and textbooks on EU matters, security and environment issues, diplomatic skills and practice, as well as the long-established Diplomacy Journal which has already grown into an online platform for foreign policy analysis and research. To assist its activities and programmes, the BDI manages a library of over 65 000 titles in over 20 languages, in the field of international relations, European Studies, security, international organizations, diplomacy, law, history, sociology, political sciences, economy, etc.

MORE ABOUT THE BULGARIAN CO-OPERATION AND HUMANITARIAN AID

Development co-operation and humanitarian aid are an integral part of the foreign policy of Republic of Bulgaria and contribute to the achievement of its goals. Through development cooperation, Bulgaria contributes to a more balanced and equitable global development, taking its share of responsibility in the efforts to eradicate poverty and achieve sustainable development. As a responsible and active member of the international community, together with its partners it strives to protect human dignity and ensure a sustainable, just, inclusive, safe and prosperous future for all. The purpose of the humanitarian aid is to save lives, to protect human dignity during and as a result of crises, to help prevent such situations and to increase preparedness for them.

Bulgaria has been a development co-operation actor since joining the European Union in 2007. With its accession to the EU, it has made important commitments to participate in the Union's Common Foreign Policy, including development policy as its importance for the security is growing. Bulgarian development assistance and humanitarian aid successfully complements our participation in the EU's common external action instruments to assist neighbouring countries and regions, developing countries, and to provide humanitarian assistance.

Bulgaria, just as the rest of the new Member States which joined after 2002, is expected to strive to reach a target of 0.33% of gross national income for Official Development Assistance (ODA/GNI) within the time frame set by the 2030 Agenda for Sustainable Development for the achievement of the SDGs. Bulgaria's ODA increased significantly in 2022 to USD 240 million (preliminary data), representing 0.27 **%** of GNI.

Bulgarian development policy is based on the principles of effectiveness, transparency, coherence, partnership, membership, concentration and non-discrimination. Two objectives shape its vision of development co-operation: 1) its multilateral commitments to assist developing countries and promote sustainable development globally; and 2) its regional commitment to contribute to the development of transition countries in its neighbourhood, including through sharing its own experience.

Bulgarian development aid also includes humanitarian assistance, through which Bulgaria expresses its solidarity with the affected countries and persons facing emergency situations as a result of large-scale natural and other disasters or armed conflicts. Bulgaria's humanitarian action is led by the universal humanitarian principles of humanity, neutrality, independence and impartiality. Around 20 % of the overall budget for development cooperation for 2022 is dedicated to humanitarian aid.

To guide the implementation of its policy framework, Bulgaria develops Mid-Term Programs for development assistance and humanitarian aid setting out geographical and thematic priorities. Bulgaria's efforts are mainly geared towards

sharing its experience from the process of transition to democracy and market-oriented economy with the countries from the Western Balkans and the Eastern Partnership. The current Mid-Term Program for the period 2020-2024 further develops and enriches the geographical and sectoral priorities and expands the circle of participants. It is a proof that from a primarily recipient of development aid, Bulgaria country is increasingly establishing itself as a donor actively preparing for the implementation of one of its most important foreign policy tasks - membership in the Organisation for Economic Co-operation and Development (OECD).

Since 2018 Bulgaria has a participant status in the OECD Development Assistance Committee (DAC).

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