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Background Paper

Europe's Critical Energy Choices



INSTITUTE OF ENERGY FOR SE EUROPE
3 Alex. Soutsou, 106 71 Athens, Greece
Tel. +30 210 36 28 457, 36 40 278, Fax +30 210 36 46 144
e-mail: admin@iene.gr - www.iene.eu

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BACKGROUND PAPER

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Prepared by the IENE Research Team

Institute of Energy for South East Europe (IENE)

3, Alexandrou Soutsou, 106 71 Athens, Greece

tel: 0030 210 36 28 457, 3640 278 fax: 0030 210 3646 144

website: www.iene.eu, e-mail: admin@iene.gr

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Introduction

Global energy markets are in turmoil as major realignments are taking place focusing on gas and renewables with nuclear power making a strong comeback in an effort to address rising demand following this slump during the pandemic years. Market instability is further aggravated following the war in Ukraine and the West's decision to decouple from Russian energy exports. The energy equation becomes more complex given Paris agreement commitments for achieving 1.5 degrees rise in global temperature and EU's even more ambitious goals for NetZero emissions by 2050.

Hence, the need to feed and provide for the energy needs of an ever-growing population (it just surpassed the 8 billion mark), while checking the rise of emissions becomes a huge, if not impossible, challenge. In this context, the striking of a realistic balance between growing energy needs and climate emerges as an overwhelming priority and is bound to govern energy policy for the years to come.

The current energy situation in Europe provides a glimpse of the problems ahead of us. Today, almost all European countries are buying gas at sky-high prices and scrambling to curb energy use to avoid fuel shortages this winter, but early weather forecasts point to the risk of a cold snap that could temporarily hike demand. Surging European gas and power prices as the result of reduced Russian supplies are stoking inflation, hampering industrial activity and inflicting record-high bills on consumers ahead of the northern hemisphere winter.

Despite high gas storage levels and steady flow of liquefied natural gas (LNG), the continent still faces risks of power shortages, blackouts and energy rationing which could worsen the economic pain. Early winter forecasts released recently by the European Centre for Medium-Range Weather Forecasts (ECMWF) said Europe could face a cold snap in December - indicating a potential extra energy squeeze, as countries attempt to cope with scarce Russian gas supplies and sky-high energy prices.

In this context, the important role of energy and energy security in particular in today's geopolitically unstable world, as well as the strategic importance of reducing Europe's energy dependence on Russia, in the wake of the war in Ukraine, will be highlighted by the Institute of Energy of Southeast Europe (IENE) in its 26th Annual National Conference "Energy & Development" which will take place in Athens on November 22-23, 2022. The issue of energy security has emerged as IENE's special topic since last June 16-17, when it successfully organized its annual regional conference, the "SE Europe Energy Dialogue" in Thessaloniki (see [here](#)).

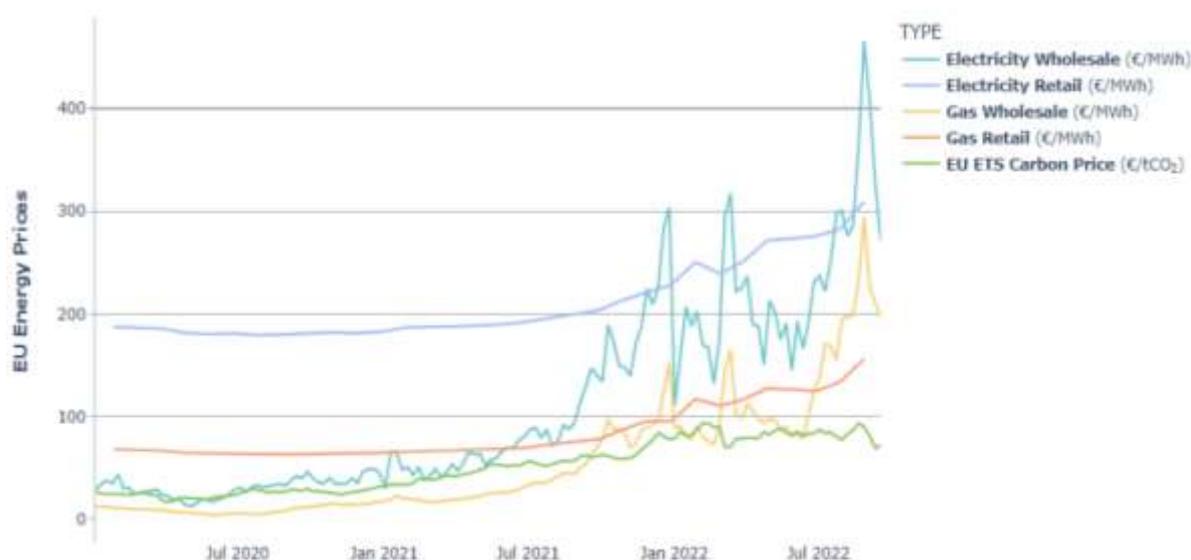
1. Current Energy Situation in Europe

Gas and electricity prices have hit all-time highs in 2022. Over the past year, electricity prices in Europe have rapidly risen to a level much higher than in recent decades. This dynamic is intrinsically related to the high price of gas, which increases the price of electricity produced from gas fired power plants. Prices started rising rapidly during the second half of 2021

when the world economy picked up after COVID-19 restrictions were eased. Subsequently, Russia's invasion of Ukraine has exacerbated this situation.

At the same time, electricity generation in the EU has been below usual levels. Record-breaking temperatures this summer have driven energy demand for cooling and have added pressure on electricity generation due to droughts (challenging hydro production) and high water temperatures (challenging nuclear production). The extreme weather conditions and its consequences on water have thus contributed to energy scarcity and high energy prices, constituting a burden for consumers, businesses and industry and dampening the economic recovery. Additional supply pressures on energy and food commodity prices are feeding global inflationary pressures, eroding the purchasing power of households and the economy.

Figure 1: Wholesale and Retail Gas and Electricity Prices and Carbon Prices in the EU



Sources: Platts, VaasaETT

Energy Supply

Since the start of Russia's invasion in Ukraine, Russia has been manipulating gas supply with the aim of undermining EU solidarity and energy security. Overall, 13 Member States are directly affected by partial or total supply reductions with five Member States (Bulgaria, Poland, Lithuania, Latvia and Finland) no longer receiving any gas supply from Russia.

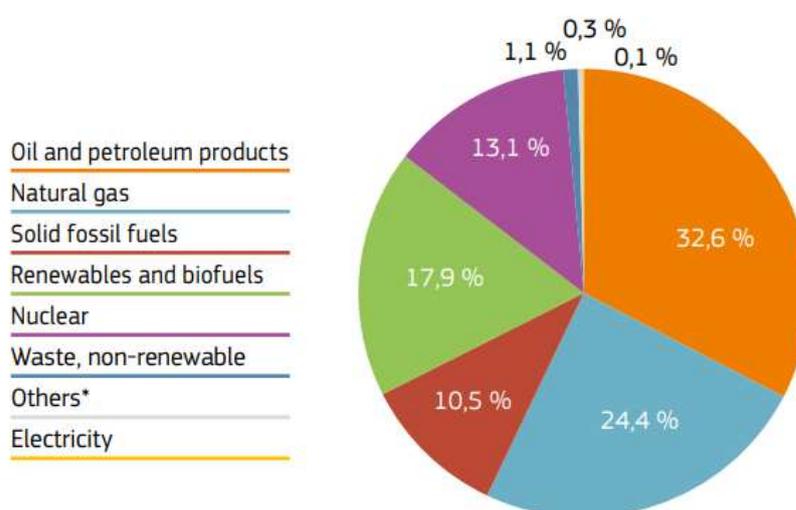
Gazprom has gradually reduced gas flows by Nord Stream 1 to zero by the beginning of September, and the recent incidents regarding Nord Stream 1 and 2 have been another wake-up call for the EU to strengthen security of supply and to increase preparedness to tackle serious disruption scenarios. The EU energy system is robust, including with respect to hybrid threats. However, beyond energy security of supply, Europe needs to continue the work on protection of critical infrastructure and cybersecurity. The continuous manipulations of gas supply to the EU has led to a considerable reduction in the Russian share in EU's pipeline imports. While the Russian Federation supplied 41% of EU's natural

gas imports in 2021, Russian pipeline gas imports have decreased to 9% by September 2022, based on latest European Commission's data. **(1)**

With the implementation of the "REPowerEU" plan¹ and the EU External Energy Strategy, the steady drop in Russian supply since the start of the war has been compensated by an increase of alternative gas supplies thanks to successful efforts to reach out to Europe's international partners. Between January and July, non-Russian deliveries via LNG increased by 19 bcm and 14 bcm via pipelines. LNG now is a key source of supply and accounting for 32% of total net gas imports. Norway and the USA are the EU's main suppliers.

Figure 2: Gross Inland Consumption By Fuel in EU-27, 2020

Total = 1340.1 Mtoe



Source: European Commission

The Commission also decided to act on a major element of preparedness for winter: gas storage. The Storage Regulation set a target of at least 80% of gas in storage by November 2022. Today, the EU gas storage filling level was above 91% by mid-October and 14 Member States had already exceeded 80% by 5 October 2022. The Member States are all in line with their storage trajectories and the Commission is continuing its work on implementing the Regulation to ensure that none will have difficulty in achieving these targets.

The EU's electricity supply has also been affected by some other disruptions. While the EU generated a record 12% of its electricity from solar from May to August 2022 and 13% from wind, the share of hydropower fell from 14% to 11% compared to previous years, due to low water levels in several rivers and reservoirs related to the summer droughts.

¹ In May 2022, the European Commission presented the "REPowerEU" plan, its response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. There is a double urgency to transform Europe's energy system: (a) ending the EU's dependence on Russian fossil fuels, which are used as an economic and political weapon and cost European taxpayers nearly €100 billion per year, and (b) tackling the climate crisis.

In 2020, nuclear power plants generated around 24.6% of the total electricity produced in the EU. However, the EU's nuclear fleet is ageing, and until new investments are coming online, its total output is set to temporarily decline until the end of the decade. Droughts and high temperatures have led to a lack of cooling water for nuclear power plants and to low water levels which have hampered production and the transportation of nuclear fuels. This has resulted in lower production in 2022.

Since March 2022, tightness and even shortages of some key petroleum products (mainly diesel, jet fuel and fuel oil) have been observed, mainly due to increasing demand and self-sanctioning by EU operators in anticipation of EU wide measures. This was aggravated during the summer by incidents in some EU refineries as well as by some logistic difficulties, driven by the low water levels on the Rhine and Danube, which are key waterways for transporting fuel. This prompted some Member States to release emergency oil stocks to compensate for the shortages in petroleum products. Developments are continuously monitored by the Commission in close cooperation with the Member States and the European Oil Coordination Group.

Diversification of EU Energy Supply

The EU, as the biggest importer of natural gas in the world has a long strategy to diversify sources and importing routes of natural gas. This includes connecting EU with new sources of supply, for instance via the Southern Gas Corridor and new sources of LNG in the Mediterranean area. Diversification efforts have accelerated recently, for instance with the Baltic Pipe, supported by the Trans-European Networks for Energy, inaugurated on 28 September 2022.

The Baltic Pipe enhances the diversification of gas supply in Central Eastern Europe and the Baltic States by opening a new import route from the North Sea to the EU. It will make it possible to import up to 10 bcm of gas annually from Norway to Poland and to transport 3 bcm of gas from Poland to Denmark. Also recently, the Greece-Bulgaria interconnector, a game changer in the diversification and resilience strategy, was inaugurated on 1 October.

Faced with today's energy supply pressure, the Commission and Member States set up the EU Energy Platform as voluntary coordination mechanism supporting the purchase of gas, LNG and hydrogen, and aimed at helping to diversify gas supplies. The EU Energy platform builds on three pillars: aggregating gas demand for joint purchase, optimising infrastructure usage in the EU to support change in flow patterns and coordinating outreach to international partners.

The Platform fast-tracked agreements with reliable and trusted energy partners to diversify and secure the EU energy supply over the short and medium term. On 15 June 2022, a trilateral agreement between the EU, Egypt and Israel was concluded in Cairo to support the export of gas supplies from Israel to the EU via Egypt's LNG terminals. On 18 July 2022, the EU and Azerbaijan signed a Memorandum of Understanding (MoU) on a Strategic Partnership in the Field of Energy. The new MoU will support doubling the capacity of the

Southern Gas Corridor up to at least 20 bcm annually as of 2027 in line with the “REPowerEU” plan while continuing to ensure attractive and stable conditions for natural gas supplies to the EU, reflecting the long-term nature of the energy partnership between the EU and Azerbaijan. In addition, the EU has intensified dialogue on increasing gas supplies with its trusted partners including the US, Norway and Algeria. It has also intensified discussions with Canada for possible supplies in the medium-term.

In its direct neighbourhood, the EU has taken the bold and unprecedented step to support the emergency synchronisation of the Ukrainian and Moldovan with the continental European electricity network thereby preserving grid stability and creating the conditions for mutually beneficial electricity trade.

As the inputs from companies in the gas market is key for this mechanism to be successful, the Commission is also establishing an Industry Advisory Group. This group will advise the Commission on the practical implementation of the joint purchasing and on the technical specifications for joint purchase in line with industry needs. It will look at arrangements such as joint tendering and the creation of joint ventures for gas purchase.

Cooperation with industry is already leading to results. For instance, the implementation of the “REPowerEU” plan on bio-methane has attained an important milestone with the official launch of the Bio-methane Industrial Partnership (BIP). The action plan will facilitate achieving the 35 bcm annual EU production of sustainable bio-methane by 2030. The Bio-methane Industrial Partnership will support the implementation of the action plan through several task forces, made up of experts from industry, the primary sector public authorities, academia, and civil society. Furthermore, five Regional Groups have been established under the Energy Platform involving the Commission, the Member States and the Energy Community countries identified. They will create a better understanding of potential gas demand, which will feed into the joint purchase scheme, once established.

The diversification of routes needs to be accompanied by a diversification of energy sources, for example by boosting renewable energy, accelerating renewable hydrogen uptake, scaling up sustainable biomethane, reducing fossil consumption in industrial and transport sectors where GHG are hard to abate and speeding up permitting and innovation.

As regards the use of domestic sources, 2021 saw a record of 36 GW newly installed renewable power generation capacity. With the increase of renewable energy, the EU substituted around 164.6 Mtoe and 155.6 Mtoe of fossil fuels in 2020 and 2019 respectively, compared to the level of use of renewable energy in 2005. This corresponds to a saving of €43.5 billion for the EU collectively from avoiding fossil fuel use in 2019, and €34.6 billion in 2020. Fossil fuel savings from deploying renewables, which would strongly increase when meeting the proposed 2030 target of 45% renewables, would allow the EU to steadily reduce to zero dependence on fossil fuel from Russia by 2027.

The EU's well-advanced policies to deploy renewable energy sources have been given a significant boost since the adoption of the “REPowerEU” plan, helping renewables to grow massively also in all end-use sectors. Early indications suggest that 2022 will be a record year

for the European solar photovoltaic market with annual deployment growth in the largest EU Member State markets between 17% and 26%. All in all, the share of renewables in the electricity generation is expected to grow from 37% in 2021 to 69% in 2030.

With the Hydrogen Accelerator proposed in the “REPowerEU” plan, the Commission has provided an estimate of the investment needs and additional costs with specific focus on replacing natural gas use. In her State of Union address before the European Parliament in September, the President of the Commission announced the setting up of the European Hydrogen Bank. The Hydrogen Bank aims to move the hydrogen market from niche to scale by accelerating the production and the use of renewable hydrogen and connecting these by developing the necessary infrastructures in a coordinated manner.

As regards nuclear energy contribution to the security of electricity supply in the coming years, Member States need to take timely decisions regarding investments in the long-term operation of existing nuclear power plants, and appropriate safety and efficiency improvements, including in climate adaptation measures. Moreover, to help mitigate the risks in some Member States related to security of supply of Russian nuclear fuel and nuclear fuel cycle services, as well as equipment and technology, the Commission and the Euratom Supply Agency (ESA) are stepping up efforts in collaboration with Member States and their authorities to ensure the availability of alternative fuel supplies from the EU and reliable international partners.

Energy Demand

Improving energy efficiency and reducing energy demand is key to shield against potential supply disruptions and minimise their impacts and costs. This can often be the cheapest, safest, and cleanest way to reduce our reliance on fossil fuel imports from Russia, while contributing to reducing GHG and air pollutant emissions, contributing to fight climate change.

In May 2022, the Commission proposed a set of initiatives starting with the EU “Save Energy” plan to guide Member States to design the best tailored measures to cut energy consumption. The Commission also proposed a new legislative tool and a “European Gas Demand Reduction Plan” in July 2022 in order to reduce gas use in Europe by 15% by next spring and Council adopted the Regulation on reducing gas demand on 5 August 2022. Member States are now implementing demand reduction measures, which will be factored into the update of National Emergency Plans due at the end of October 2022.

In line with the objectives of the “REPowerEU” plan and the “Save Gas for a Safe Winter” package, most Member States have adopted measures to encourage energy savings in buildings, industry and transport in the short-term. Many introduced communication campaigns. Several Member States implemented measures to set maximum heating and minimum cooling temperatures in specific categories of buildings and recommendations to lower the highway speed limit. Some Member States have also adopted more comprehensive and structural measures, which will already have an effect in the upcoming

winter season, either by strengthening existing regulations or topping up the existing support schemes for buildings, industry, and transport.

Additionally, the Commission proposed an increased EU 2030 energy efficiency target of 13% to raise private financing for energy efficiency. In 2023, it will also launch a high-level European Energy Efficiency Financing Coalition with the financial sector.

With the “REPowerEU” plan, the Commission also proposed to ensure that all new buildings are designed to optimise their solar energy generation potential as part of the ongoing revision of the Energy Performance of Buildings Directive (EPBD). This revision aims at fully decarbonising the European building stock by 2050, minimum energy performance standards to trigger energy efficient renovation of buildings, increasing the rate of renovations by 2030, phase-out fossil fuel based heating, and maximising the potential for solar energy in buildings. Such measures will be important for vulnerable households, especially in the current context of high energy prices.

Reviewing and updating existing regulations for energy-related products constitutes the main body of work of the ecodesign and energy labelling working plan, with heating and cooling appliances being the priority. At the same time, an ambitious revision of the Ecodesign Directive is ongoing.

2. The Role of Oil and Gas

Energy security is not just about having uninterrupted access to energy, but also about securing energy supplies at an affordable price. It is a topic of perennial importance, and is once again high on the policy agenda as a result of the global energy crisis sparked by Russia's invasion of Ukraine. The surge in energy prices has been on a large enough scale to worsen considerably the global economic outlook, causing difficulties for households and industrial operations alike, and leading many governments to recalibrate their policy priorities. (2)

The immediate policy focus is understandably on dealing with the impacts of high energy prices on consumers and coping with the disruption of energy supplies. Many countries are taking action to make the most of existing power plants (e.g. Japan's restart of nuclear reactors), diversify sources of supply (e.g. European LNG imports), accelerate the deployment of clean energy technologies (e.g. through the “REPowerEU” plan and the US Inflation Reduction Act) or enact programmes to protect consumers from high prices (e.g. by setting price caps, expanding targeted support or cutting fuel taxes). In some cases, actions have involved trade-offs between short-term security benefits and emissions reduction goals, for example when relying more on coal-fired power plants for electricity generation.

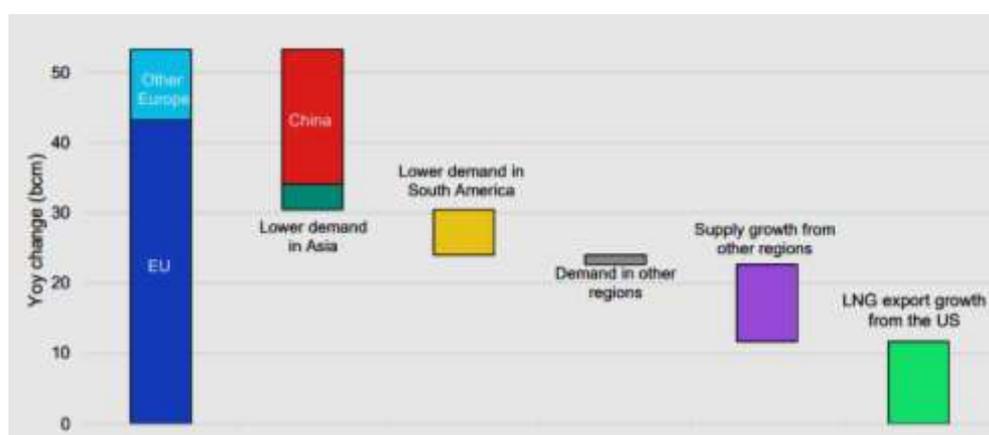
Natural Gas

As winter approaches, a combination of favourable LNG market dynamics, robust pipeline deliveries from non-Russian suppliers, lower demand, and policy actions has given Europe a

chance to sidestep some of the worst immediate impacts of Russia's steep cuts to natural gas deliveries:

- Russia's pipeline gas deliveries to the European Union halved in the first ten months of 2022 compared with last year's levels. The decline in absolute terms was 60 bcm, the equivalent of over 10% of the global LNG trade. The steep decline in Russian gas supplies coincided with multi-year lows in European hydro and nuclear power output (down by 20% and 16% year-on-year, respectively), putting huge pressure on European gas markets.
- Gas prices on the Dutch Title Transfer Facility (TTF) – a leading European gas hub – averaged over €130/MWh year-to-date, almost eight times the 5-year average between 2016 and 2020. The all-time high prices attracted record LNG inflows to the European Union and the United Kingdom, rising by 65% or over 50 bcm year-on-year in the first ten months of 2022.
- Gas demand in the European Union and the United Kingdom in the first 10 months of 2022 was down by an estimated 10%, or over 40 bcm, compared with the same period a year earlier. This was mainly the result of lower consumption across the residential, commercial and industrial sectors, but it also includes some efficiency gains and behavioural responses to higher prices. It also reflects demand destruction, particularly in gas-intensive industries.
- Non-Russian pipeline supplies to Europe increased substantially. Pipeline deliveries from Norway rose by 5% (5 bcm) and flows from Azerbaijan via the Trans Adriatic Pipeline (TAP) surged by close to 50% (3 bcm) year-on-year in the first ten months of 2022. In both cases, export infrastructure is running close to nameplate capacity. Algeria increased its pipeline supplies to Europe by over 10% (or 3 bcm) on available export routes in the first ten months of the year, and has some limited upside.

Figure 3: Year-on-year Changes in Global LNG Exports and Imports by Key Regions, January-October 2022



Source: IEA

- Strong European demand for LNG led to a reconfiguration of global LNG flows as increases in LNG supply (23 bcm) were not sufficient to meet Europe's rapidly rising LNG imports. Higher LNG flows towards Europe were enabled in part by China's LNG

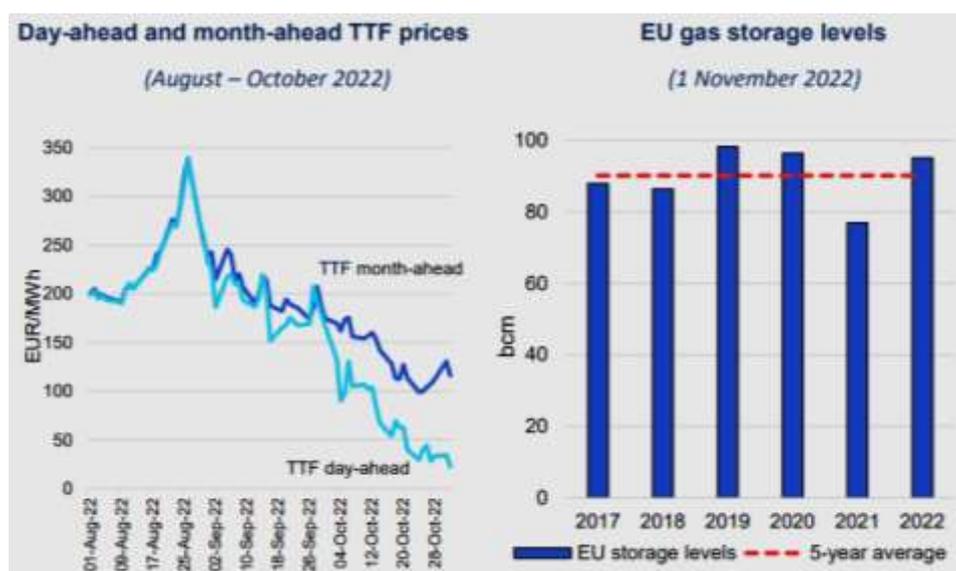
imports falling by 20% (or 19 bcm) year-to-date as it drastically reduced spot procurements. Europe's thirst for LNG also disrupted gas and electricity supply in more price-sensitive markets, including in South Asia.

Mild weather, healthy storage levels and strong LNG supply have led to a significant fall in some natural gas price markers. The combination of higher non-Russian gas imports and lower demand was instrumental for Europe to offset Russia's gas supply cuts and enable a near record build-up of storage levels. Storage injections were 22%, or 13 bcm, above their 5-year average in 2022. At the beginning of November, EU storage sites were close to 95% full - well above the EU's 80% target and well-aligned with the IEA's "10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas" (3).

Unseasonably mild weather in October reduced gas demand from distribution networks (concentrated in the commercial and residential sectors) by over 30% year-on-year and effectively delayed the start of the heating season in most European markets. This steep decline in demand coincided with a persistently strong influx of LNG cargoes, which have limited immediate flexibility to change destination, as deliveries are typically scheduled several weeks in advance.

Lower-than-expected demand, together with high LNG inflow and healthy storage levels, pushed down European gas prices. Month-ahead prices on TTF fell to just below €100/MWh (\$30/MMBtu) by the end of October. This was less than one-third of the all-time high at the end of August but still more than five times the 5-year average during the 2016-2020 period. Day-ahead prices - which are more reflective of short-term supply-demand factors - fell below \$10/MMBtu at the end of October, while next-hour prices dropped into negative territory for a short period on October 24, amid infrastructure constraints in the TTF market zone.

Figure 4: Day-ahead and Month-ahead TTF Prices (LHS) and EU Gas Storage Levels (RHS)



Source: IEA

Oil

Russian oil exports have so far proved resilient to sanctions, import embargoes and buyer boycotts. In October 2022, total oil exports were 7.7 mb/d, only 400 kb/d lower than pre-war levels, based on IEA's latest data (4).

Russian crude oil exports in October were largely unchanged compared with pre-war levels, at 4.97 mb/d. Crude oil exports to the EU member states have been reduced by 1 mb/d to 1.5 mb/d. The decline in shipments to the EU has been offset by increases to India, China and Turkey. By October, crude oil exports to India had increased by 965 kb/d, to 1.1 mb/d; China by 225 kb/d to 1.9 mb/d; and Turkey by 320 kb/d to 540 kb/d, according to the IEA. Shipments to unknown or yet to be identified destination have also risen, due to increased use of "dark" tankers and higher volumes of oil on water.

While Russia has been able to redirect all its crude oil exports so far, it has not found new buyers for its product exports. Total product exports in October were 2.8 mb/d, down 360 kb/d since the start of the year.

Russia plays an outsized role in world oil markets. It is the third largest producer of oil behind the United States and Saudi Arabia, the world's second largest exporter of crude oil behind Saudi Arabia, and the largest overall exporter once products are included. In October it exported about 5 mb/d of crude, and around 2.8 mb/d of products.

It is worth noting that revenues from oil and gas-related taxes and export tariffs accounted for 45% of Russia's federal budget in January 2022. Considering current market prices, the export value of Russian piped gas to the EU alone amounts to \$400 million per day. Total export revenues for crude oil and refined products currently amount to around \$560 million per day, down from about \$690 million a day in the first two months of the year, based on IEA's data.

3. Uncharted Territory

A cold spell-induced uptick in gas demand could collide with reduced renewable power generation, as high pressure systems tend to mean less wind and rain - although a trend for such systems to have less cloud cover could boost solar output. Gas storage buffers should help, but not for all weather scenarios. EU countries have filled their gas tanks to an average of about 95% of capacity, by snapping up non-Russian gas at record prices in recent months to build a supply buffer, as Moscow progressively cut deliveries after Western sanctions in response to the Ukraine war that began in February. (5)

But some analysts warn this alone will not compensate for the loss of Europe's main gas supplier - and a cold winter would make this worse. Russian gas now comprises less than 8% of Europe's supply, down from around 40% before Moscow invaded Ukraine - and Brussels has warned a full shut-off is possible. But it's not only Europe's weather that matters. As Russian supply cuts have deepened, Europe has relied on LNG to help fill the gap - snapping up cargoes in global markets where they compete with Asian buyers.

A cold winter in Europe could add 8 bcm to Europe's gas demand, said Energy Aspects analyst Leon Izbicki. If Asia also faced a cold winter, and needed more gas for its own heating, Europe could face a gas supply gap of 19 bcm - and end winter with its storage just 18% full, a level Izbicki said could cause regional fuel shortages. If cold weather depletes gas storage levels this winter, Europe will need to replenish for next winter - with far less Russian gas. Russian gas supplies to Europe have dropped to around 85 mcm per day from 360 mcm per day in September 2021, according to Bernstein analysts, as Moscow progressively curbed flows through the Nord Stream network to Germany and through other routes.

EU countries have agreed a 15% voluntary gas demand cut for winter (6) - which Brussels has said would ensure enough fuel for an average winter, but not a cold one. A document published by the European Commission last month showed EU countries' gas demand was 13% lower in May than the five-year average for the month, 7.6% lower in June and 10.7% lower in July.

The temporary comfort provided by today's market conditions should not lead to overly optimistic conclusions about the future: a cold spell could quickly change sentiment and Europe's gas balance faces even tougher tests in 2023. While EU gas inventories are standing 5%, or 5 bcm, above their 5-year average, this additional storage cushion could be quickly erased: 5 bcm is just two days of EU gas demand during a cold spell. (7)

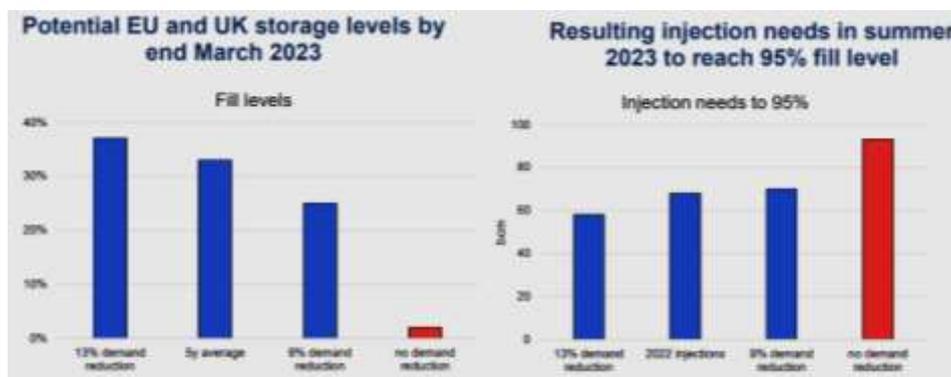
There is a wide range of possible outcomes for EU gas storage at the end of this winter heating season. Assuming no or very low Russian gas deliveries to the European Union this winter, and average levels of LNG imports (around 13 bcm per month), then gas storage levels could be anywhere between 5% and 35% by the end of the heating season, depending on demand trajectories over the coming months.

Variable demand trajectories, which can be influenced by policies as well as prices and weather, translate into a variety of future scenarios for gas injection needs during the summer of 2023. These vary between 60 bcm and 90 bcm in order to reach 95% storage levels by the beginning of the 2023-2024 heating season.

Considering current market trends, our assessment today is that the storage injection needs of the European Union and the United Kingdom will be 68 bcm (including 1.68 bcm of injections to the Rough storage in the United Kingdom). This is based on the assumption that European gas demand during this November-March period is 11% below its 5-year average. A colder-than-average winter could deplete European storage levels faster, resulting in injection needs in the range of 80-90 bcm.

Measures to limit short-term demand and storage depletion, alongside more structural measures to bring down gas demand, are absolutely essential to position Europe for next year. The drive to refill Europe's gas storages for the 2023-2024 winter heating season has to begin now.

Figure 5: Potential EU and UK Storage Levels by end-March 2023 (LHS) and Resulting Injection Needs in Summer 2023 to Reach 95% Fill Level (RHS)

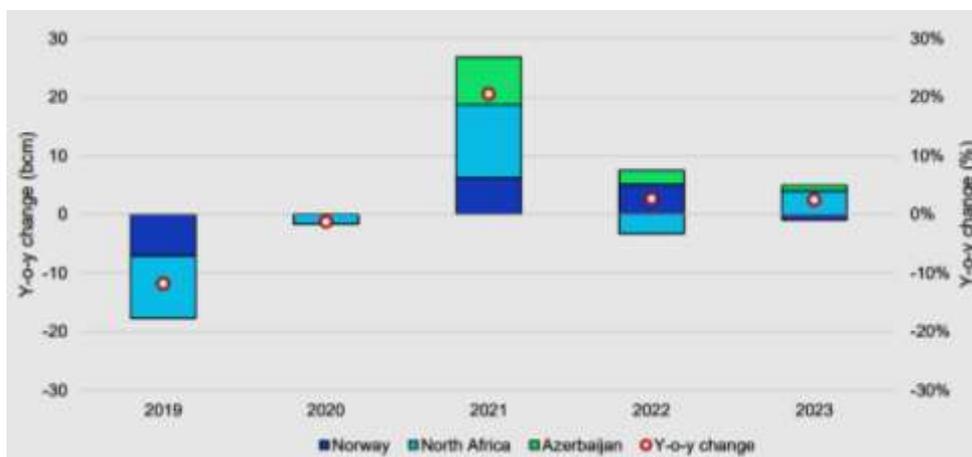


Source: IEA

Some of the factors that helped Europe in 2022 are unlikely to be as favourable in 2023. In particular, Russian deliveries are likely to be considerably lower and competition from China for available LNG cargoes considerably higher. Although Russian gas deliveries to Europe were cut sharply during 2022, they were close to “normal” levels for much of the first half of the year.

Total pipeline supply from Russia in 2022 is likely to amount to around 60 bcm. It is highly unlikely that Russia will deliver another 60 bcm of piped gas in 2023. If supply remains at current levels, then Russian pipeline supply would be around 25 bcm in 2023. It is also entirely possible that Russian deliveries could fall further - or cease entirely. Non-Russian pipeline suppliers have limited upside potential, with both Azerbaijan and Norway supplying close to their nameplate capacity in 2022. In the case of Algeria, some limited upside is expected with the development of gas fields in the Berkine South basin.

Figure 6: Change in Non-Russian Pipeline Gas Deliveries to Europe



Source: IEA

Global LNG supply is expected to increase by 20 bcm in 2023, supported mainly by the ramp-up of the Calcasieu Pass LNG facility in the United States and the Coral South LNG facility in Mozambique, as well as the return of the Freeport LNG facility in the United States. However, this increased LNG supply will not be sufficient to offset the likely decline in Russia's pipeline deliveries to the European Union.

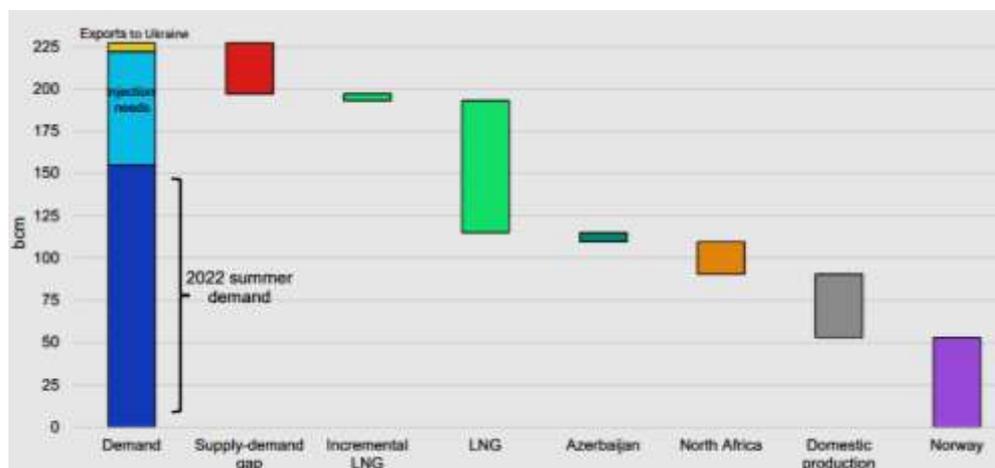
Domestic gas production in the European Union is set to decline in 2023. In the Netherlands, production at the Groningen field was capped at 2.8 bcm for the 2022-2023 Gas Year, down from 4.5 bcm in the 2021-2022 Gas Year. Production from small fields in the Netherlands also continues to decline. In Denmark, the restart of the Tyra field was postponed to the 2023-2024 winter –meaning that it will not contribute to the refilling of gas storages during summer 2023. In the United Kingdom, gas production recovered strongly in 2022 and the potential for further short-term growth is limited.

Even more significantly, China's LNG imports could rebound next year. China's lower LNG imports in the first ten months of 2022 were a key enabler of higher LNG availability to Europe. A return to stronger Chinese economic growth and some easing of lockdowns could bring 2023 LNG imports back to their 2021 levels (108 bcm), which would capture over 85% of next year's expected increase in global LNG supply and limit the amount of LNG available to the European market. China has pursued a strong LNG contracting strategy in recent years. As a result, China's reliance on destination-fixed LNG contracts is set to increase from 88 bcm per year in 2022 to 100 bcm per year in 2023. This effectively means that China will have the right-of-first-refusal on an additional 12 bcm of LNG - well over half of the expected increase in global LNG supply in 2023.

EU gas exports to Ukraine are set to rise. Ukraine started the 2022-2023 heating season with storage levels at just 14 bcm - well below their historic average. Even assuming a 25% reduction in the country's winter gas consumption, storage sites are expected to be severely depleted by the end of March 2023. IEA's analysis indicates that Ukraine would require at least 5 bcm of gas imports from the European Union during the summer of 2023 to replenish its storage levels to 14 bcm by the start of the 2023-2024 heating season.

Europe could face a 30 bcm shortfall in the gas it needs to fuel its economy and sufficiently refill storage sites during the summer of 2023, jeopardising its preparations for the winter of 2023-2024. A full cessation of Russian pipeline gas supplies to the European Union combined with a return of Chinese LNG imports to their 2021 levels would lead to a shortfall of 30 bcm of gas in Europe during the summer of 2023, the period when gas storage sites need to be refilled. This equates to almost half of the injections required to fill storage sites to 95% of capacity by the start of the 2023-2024 heating season. This is based on the assumption that natural gas demand in the European Union and the United Kingdom will decline by 11% compared to its 5-year average during the November 2022-March 2023 period and that Europe's gas storage sites will be around 30% full at the end of this winter.

Figure 7: Breakdown of the Summer 2023 Natural Gas Balance of the European Union and the United Kingdom in Case of Full Cessation of Russian Flows and Limited LNG Availability, April-September 2023



Source: IEA

4. Energy Security Takes Precedence

Energy policy in the EU has been an unstructured process in which member states participated voluntarily in the recent past, while they have been acting independently without a common energy strategy. There are several political parameters and beliefs affecting the stance of member states since they have been unwilling to act and contribute to any common policy in EU. Until the end of the last century, there was no vision within the EU to create a common energy policy, even though its existence was critical for member states and other involved parties including the European Commission. From the beginning of the 2000s, it became clear that EU had to deal with contemporary challenges that affected its economy and industries.

Finally, in 2005, the EU decided to establish a new energy policy, and after two years, the European Commission issued “An energy policy for Europe”, which was then adopted by the European Council and the European Parliament. “This policy will firmly commit the European Union to a low consumption economy based on more secure, more competitive and more sustainable energy. Priority energy objectives involve ensuring the smooth functioning of the internal market in energy, security of strategic supply, concrete reductions in greenhouse gas emissions caused by the production or consumption of energy and the EU’s ability to speak with a single voice on the international stage”. (8)

Taking into account each country’s specific conditions, energy security should be dealt with in parallel with developing domestic energy sources and their best possible use with increased energy efficiency, shifting to a more balanced energy mix. This should be done especially in countries that are mostly dependent on fossil fuels and thus the EU should take actions such as:

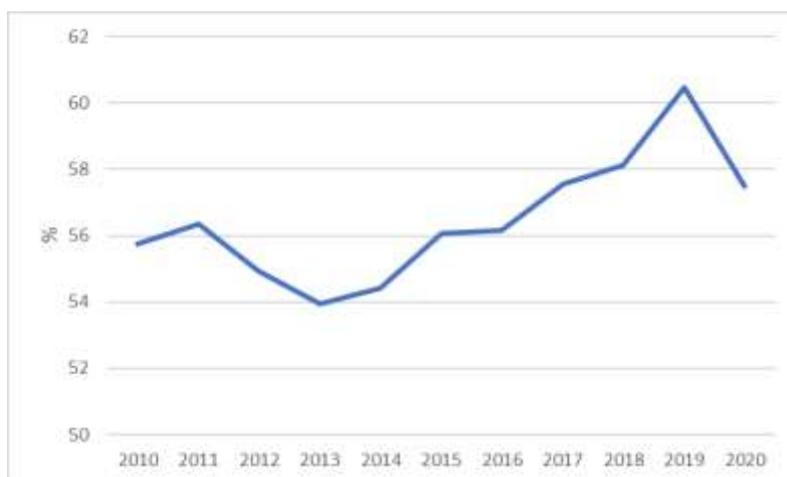
- Increasing the geographical diversification of oil and gas imports.

- Avoiding single sourcing policies from sole suppliers.
- Improving the level of integration within the EU gas and electricity markets.
- Developing cross-border interconnections (electricity and gas) between neighbouring countries.
- Increasing storage capacity for oil and gas.

With regard to the energy security of European countries, some countries are more vulnerable to the risk and one of them is considered to be Cyprus. Cyprus is considered to be an energy island with a policy already in place to establish electricity and gas connections with other countries. EU member states, and particularly the vulnerable ones, should improve their energy security and rank it as a priority of their policies and actions. EU legislation forces member states to maintain minimum stocks of oil in order to secure the oil supply to the EU. Any supply crisis related to the supply of petroleum from third countries being unexpectedly interrupted would most probably have a significant effect on the European economic activity.

In 2020, the energy dependence of the EU-27 stood at 57.5%, very close to 2017 levels, as IENE mentioned in its Monthly Analysis of July-August 2022 (9). As illustrated in Figure 8, the evolution of EU-27 energy dependence has not been constant over 2010-2020; however, it has continuously stood above 54% since 2010. The policy of the EU is aimed at minimizing its dependency on irregularities in energy supplies due to the growing dependence on energy imports of or via politically unstable regions. However, this is not actually happening as the EU continues to be highly dependent on imports from unstable regions or even from countries where foreign affairs relations have not been kept at a healthy level. The best example is the relations between the EU and Russia, where the EU's energy imports are the biggest from Russia, while at the same time the economic sanctions raised against the country do not match with such a fact at all.

Figure 8: Evolution of the EU Energy Dependence (%) over 2010-2020



Sources: Eurostat, IENE

A key energy security issue includes the lack of more and better electricity interconnections, which are preventing regional market development. This is especially visible in island regions, such as Greece and Cyprus. Advancing international electricity interconnections especially between Italy and Western Balkans and between mainland Greece and the Israel-Cyprus-Crete axis is becoming a priority in view of the fast-advancing electricity market integration in the region.

5. SE Europe and the Energy Crisis

As Europe is being tested with high energy prices taking hold, an energy crisis also looms high in SE Europe, while largely affecting the Western Balkans. As EU leaders scramble to maintain their energy supplies for the coming winter, at least two Western Balkans states - North Macedonia and Kosovo - declared an energy emergency in August, in anticipation of shortages during colder months. (10) (11)

Last year, the Covid-19 pandemic caused a significant economic shock in the Western Balkans. According to the World Bank, the GDP of countries in the region contracted by 3.2% in 2020, before rebounding to 7.4% growth in 2021. However, the global surge in energy prices is threatening the region with a new range of economic challenges. This means that policymakers working on the European Commission's Green Agenda for the Western Balkans will need to reconcile rising prices and energy security with the goal of environmental protection. This will require strong and coordinated action from governments in the region, along with a great deal of support from the European Union. (12)

Russia's war on Ukraine has weakened the Western Balkans' already fragile energy security. The region has long experienced periodic blackouts in winter. With the exception of Albania, which relies mainly on hydropower, Western Balkans states source much of their energy from fossil fuels - especially coal. Serbia, Bosnia and Herzegovina, and North Macedonia are largely dependent on Russia for natural gas, but this only accounts for a small proportion of their energy mix. So, even though all Western Balkans countries except Bosnia and Serbia have joined EU sanctions on Russia, their limited use of natural gas prevents the Kremlin from retaliating against them by cutting off their energy supplies - especially given that only Serbia has recently renewed its gas contract with Russia (at a relatively low cost). This also helps protect them from the direct impact of surging natural gas prices. Nonetheless, high prices for imported electricity mean that the Western Balkans will not emerge from the crisis unscathed. Several states in the region are vulnerable to these rising costs - particularly as winter approaches and demand for energy rises.

Most states in the Western Balkans rely mainly on coal-fired power plants to meet their energy needs. The use of these plants jeopardises their ability to fulfil the commitments outlined in the European Green Deal - one of which is a 55% reduction in carbon emissions (compared to 1990 levels) by 2030. Nonetheless, given the immediate pressure of the energy crisis, these countries will need to continue burning coal in the short term. Indeed, North Macedonia and Kosovo have already announced that they will delay plans to phase out their coal-fired power plants over the next few years. It is worth mentioning that Bulgaria, although it is in the Eastern Balkans, has decided to retain coal as a main energy

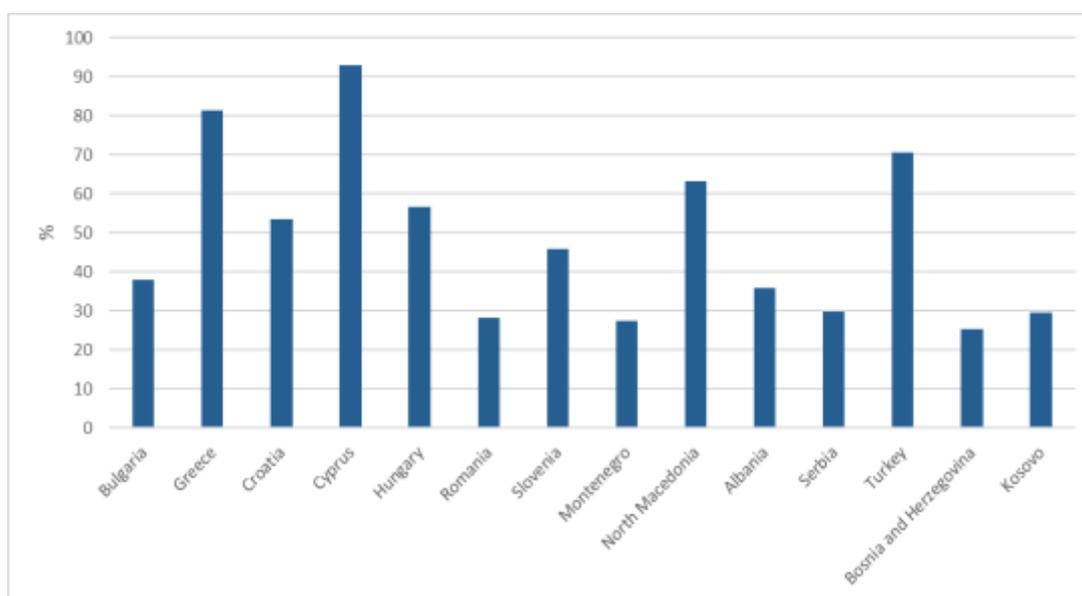
source until 2035. To survive the energy crisis, Western Balkans states will also need to improve their cooperation with one another within the framework of the Berlin process. They could do so by preparing joint investment proposals in renewable energy and the integration of the electricity and gas markets.

The European Commission's "REPowerEU" document outlines a €300 billion plan to cut the EU's dependence on Russian fossil fuels by two-thirds by the end of 2022, and to import no Russian energy at all by the end of 2030. This strategy marks a historic shift in the Union's approach to energy issues. It will also have a significant impact on the Balkans energy sector. The plan focuses on accelerating the green transition and diversifying supply through investment in liquefied natural gas terminals and other gas infrastructure.

The Balkans could become an important transportation corridor for Europe's energy supplies - particularly natural gas - in the medium term. This is especially true of various gas pipelines that could connect EU member states to countries on the Caspian Sea, such as Azerbaijan, and to the Greece-Bulgaria interconnector that is from October 1, 2022 in operation. There are also planned FSRUs in Alexandroupolis and Corinth, which will connect to the TAP and should become operational in 2023.

At SEE level, the overall energy dependence also varies significantly between countries and averaged at 49.1% in 2020, taking into account the countries shown in Figure 9. These figures are issued by Eurostat, along with the publication of the detailed 2020 annual results on energy supply, transformation and consumption in the EU.

Figure 9: Energy Dependence (%) in SE Europe (2020)



Sources: Eurostat, IENE

It is worth noting that IENE highlighted the issue of energy security in Greece and made recommendations of how to enhance it, in a special study for the country's Ministry of Environment and Energy prepared in November 2018. Although the reduction of energy dependence should have been a constant and non-negotiable target of energy policy, there

is no mention at all of this dire situation in most policy papers nor is this reflected in official government policy. IENE had suggested as a prime target of Greece's energy policy the gradual reduction of the country's current energy dependence from the present high number to the average EU dependency (58%-60%) (13). In order to achieve to lessen energy dependence, new policy priorities should be put in place, which should aim at:

- the reduction of the imported energy flows in parallel with
- an increase of the indigenous energy sources, with emphasis on renewables, hydrocarbons (and gas in particular) and an improvement in energy efficiency, mainly in transport and residential sectors and
- the stabilization, if not the increase, of the current share of lignite in the country's energy mix
- the diversification of gas supply routes

6. The Role of LNG

According to the "REPowerEU" plan (14), the EU could import 50 bcm more of LNG (e.g. from Qatar, USA, Egypt, West Africa) on a yearly basis, equivalent to 37 million tonnes of the superchilled fuel. Diversification of pipe sources (e.g. Azerbaijan, Algeria, Norway) could deliver another 10 bcm of yearly savings on Russian gas imports. Such an objective seems very challenging, given current European import capacity and the cost at which this would be done. It is worth noting that the EU and the UK together imported 67.55 million tonnes last year and 73.5 million tonnes in 2020.

Another key factor which EU planners tend to disregard is the instant availability of almost 10% of global LNG production. In other words, where are these extra quantities of LNG going to come from? Which countries are going to supply 50 bcma at short notice and at what cost? And where is this additional LNG going to be stored? These are serious questions which are begging for answers, especially if we are talking about the SE European region, where the LNG market is not so developed compared to the rest of Europe.

Regardless of developments in Ukraine, LNG demand in SE Europe is expected to grow over the next few years, as the regional market keeps expanding. The rapid penetration of LNG in the region will be similar to the recent past such as Spain, Portugal, Italy, Greece and Turkey. It appears that LNG prospects in SE Europe and the East Mediterranean in particular are far better placed than they were five years ago, with the aforementioned new projects getting ready to progress and LNG clearly emerging as a priority fuel for several industrial consumer groups helped by lower prices and increased availability.

Greece, Croatia and Turkey are the only countries in the broader Black Sea-SE European region which at present possess LNG gasification terminals which are well linked and integrated into their national gas systems. It is thus anticipated that the SE European region, from Croatia to Turkey, will play a significant role in expanding LNG trade in Europe through the construction and operation of several new LNG regasification projects, with the prospect of feeding gas quantities into the Greek, Bulgarian, Serbian and Turkish gas systems, among others.

Table: Existing and Under Construction LNG Terminals in SE Europe

	Country	Terminal or Phase Name	Start Year	Nameplate Receiving Capacity (MTPA)	Owners	Concept
Existing	Turkey	Marmara Ereğlisi	1994	5.9	Botas (100%)	Onshore
		Aliaga Izmir LNG	2006	4.4	EgeGaz (100%)	Onshore
		Dortyol - MOL FSRU Challenger	2018	4.1	Botas (100%)	FSRU
		Etki LNG terminal - Turquoise	2019	5.7	Terminal: Etki Liman (100%), FSRU: Kolin Construction (100%)	FSRU
	Greece	Revithoussa	2000	4.6	DEPA (100%)	Onshore
	Croatia	Krk - Golar FSRU	2021	1.9	Terminal: HEP (85%), Plinacro (15%), FSRU: Golar (100%)	FSRU
Under Construction	Turkey	Gulf of Saros terminal – Ertugrul Gazi	2022	7.5	Botas (100%)	FSRU
	Greece	Alexandroupolis FSRU	2022	4.0	DESFA (20%), Kopelouzos Group (20%), DEPA Commerce (20%), GasLog Cyprus Investments Ltd. (20%), Bulgartransgaz EAD (20%)	FSRU
	Cyprus	Vassilikos FSRU	2022	0.6	DEFA (100%)	FSRU

Sources: IGU, IENE

As shown in Table, the total nameplate receiving capacity of existing LNG terminals in SE Europe currently stands at 26.6 MTPA. If we add both Gulf of Saros (7.5 MTPA) and Vassilikos (0.6 MTPA) FSRUs, combined with the planned Dioryga Gas and Alexandroupolis FSRUs (4 MTPA), which undoubtedly will increase Greece's capacity, we are talking about a total nameplate receiving capacity by 2030, which will reach more than 40 MTPA. Therefore, we can easily appreciate the important role LNG can play over the next years in SE Europe's gas supply and its impact on European gas supply at large, but it can make only a small contribution to Europe's effort to reduce dramatically its reliance on Russian gas in the context of the "REPowerEU" plan. (15)

7. Discussion

Russian gas is still being delivered to European destinations through the Ukrainian network, through the Belarus transit and through Turk Stream, which in addition to Turkey, it channels gas to Greece, North Macedonia and Serbia with Bulgaria having stopped receiving Russia gas since last April.

In addition, Europe's great dependence on Russian oil imports is making it difficult to disengage. The EU imported around 11 million barrels of crude oil products per day in 2021,

from which Russia accounted for almost 30%, corresponding to about 3.4 million barrels per day. With a goal to end seaborne Russian oil deliveries by January 2023, Europe is now trying to tap more oil from the Gulf countries, from Norway and from the Caspian region.

However, a complete separation of Europe from Russian oil imports will not be possible for some years to come since several EU countries, including Germany, Poland, Hungary, Slovakia, Czech Republic and Austria, are dependent on the Soviet era Druzhba pipeline network, which delivers some 800,000 barrels of oil daily to European refineries. In addition, Russian refineries continue to supply almost half of Europe's diesel needs. It will be really difficult, if not impossible, over a short period of time to replace such fixed assets, as the Druzhba pipeline system, by building alternative pipeline systems.

Winston Churchill's well known dictum on energy security, first spelled out on the eve of World War 1, is still most relevant today given that human greed and land control instincts have not changed much over a century. In a sense, we still remain very much dependent on geography and this is why Winston Churchill was right when, in a famous speech in Parliament in defence of oil for Great Britain's fleet, he pointed out that "safety and certainty in oil lie in variety, and variety alone".

Hence, the diversification of energy supplies still remains an undisputed pillar of energy policy and the basis of energy security. Ignoring energy security can easily lead to complacency and overdependence from a particular source or country and so when the time comes of establishing new political priorities decoupling from a particular supplier becomes a nightmare. In the case of Europe, and with gas being such a strategic fuel, corresponding to more than 20% of all energy consumption, enhancing indigenous gas production is another priority. Europe has every reason to want to exploit its not significant gas resources, which according to estimates amount to 10.0 to 12.0 trillion cubic metres and can be found in the North Sea, the Black Sea, the Adriatic, the Ionian and the East Mediterranean. Today, Europe covers only 11% of its gas needs from indigenous production with ever greater reliance on gas imports. If Europe is to survive and prosper with low carbon gas being fully integrated in its energy system, it must scale up its local production.

Today's energy crisis, which started more than a year ago as energy supplies started becoming scarce, and is now fully blown following the war in Ukraine and Europe's embargo against its major energy supplier, is morphing into an economic crisis with recession looming in the horizon. Yet, this crisis is an opportunity for a radical change in EU energy policy and thinking where energy security will once again regain its key role together with an approach, which favours maximisation of indigenous energy production.

Furthermore, the economic knock-on effects of the Russian invasion of Ukraine are already being felt throughout Europe. While the overall economic fallout is still difficult to predict, the impact will be different for different member states. It shows that the EU's member states' economic vulnerability to the Russian invasion of Ukraine is very unevenly distributed. To cushion the economic blow and ensure political unity, the EU will need to share some of the economic burden of this crisis. (16)

Direct costs from sanctions and trade disruptions, rising inflation due to higher energy and commodity prices and mounting uncertainty will become a drag on Europe's economy. After the pandemic, the Russian invasion of Ukraine is yet another external economic shock with asymmetric consequences across Europe.

This unequal distribution of the economic hardship across EU member states is not only an economic problem: it matters politically. Making sure that Europe sticks together in the coming months and possibly years in the face of Russia's aggression will require burdensharing to avoid some member states being affected much more than others.

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