Background Paper

"Energy Security, Market Integration and Sustainability in SE Europe"

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ENERGY SECURITY, MARKET INTEGRATION AND SUSTAINABILITY IN SE EUROPE

BACKGROUND PAPER

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Introduction

On February 21, 2022, after weeks of extreme tensions, Russia's President Vladimir Putin decided to recognise the non-government controlled areas of the Donetsk and Luhansk oblasts (administrative regions) in Ukraine as independent entities and to send Russian troops into these areas. This followed a positive vote by the Russian State Duma (the lower house of the Russian parliament) on February 15. On February 24, 2022, Russia launched an invasion in Ukraine.

The Russian invasion in Ukraine has risked disrupting global markets. Since the conflict began, there has already been a sharp increase in global prices for key commodities, although prices were elevated even before the invasion. This is further affecting markets, which have recently experienced historically high energy prices.

EU energy ministers held an extraordinary meeting on February 28 to exchange views on the impact of the conflict on Ukraine's energy capacities and on the European energy market. Ministers discussed (a) assistance for Ukraine and synchronisation of Ukraine's electricity network with that of the EU, (b) the status of member states' energy supplies, stocks and flows, (c) contingency market measures to secure supply and (d) options for limiting the impact of high prices. **(1)**

Over the following months, the EU went ahead and introduced a series of measures aimed at preventing the export of Russian energy and services to member states. Now, in its sixth round, EU sanctions oblige member states to stop the import of Russian coal and seaborne crude oil and products. At the same time, Europe's insurance companies have been advised to bar Russian companies from insurance cover, a number of European ports have refused to handle Russian energy supplies, while some countries (Poland, Bulgaria, Finland) and companies (e.g. Shell in Germany, etc.) have stopped importing Russian gas.

The gradual marginalisation of Russian energy exports to the EU, although far from effecting a substantial drop in exported oil and gas quantities as yet, has managed to create a totally negative climate in global markets which is impacting prices. Hence, we have seen an almost steady rise in international oil prices from about $90 per barrel on February 24, 2022 (the day of Russian invasion of Ukraine) to about $130 per barrel on March 8, before falling at about $125 per barrel now, while gas prices although trading below €100/MWh they are 5 times higher than they were 12 months ago. The same applies for coal which reached an all-time high of more than $400 a tonne in March 2022. A number of analysts even suggest that despite the present fall in the volume of Russian energy product exports to Europe, because of the rise in prices, the Russian government may actually realise higher earnings this year.

From whatever angle one sees the current situation in global and regional energy markets, the single most important factor which right now is influencing energy policy is the continuing war in Ukraine. As we argue in this Background Paper, SE Europe is particularly affected by the war in Ukraine and the counter actions instituted by the US and the EU. For the first time in many years, the security of electricity and gas supply is being questioned in several countries and consumers are getting ready to face electricity

and gas cuts. Hence, this year's SEEED conference is inevitably focusing on energy security, while also discussing energy market integration, both for electricity and gas, and the need to maintain efforts and interest in the development of clean energy sustainable solutions.

1. Europe's Great Reliance on Russian Oil and Gas

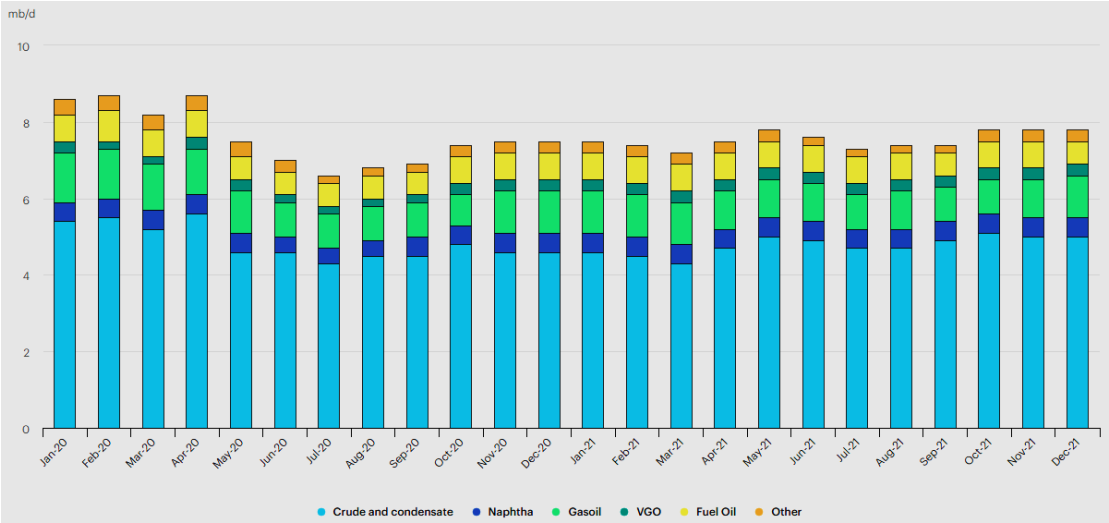
Crude Oil

Russia is the world's third largest oil producer behind the United States and Saudi Arabia. In January 2022, Russia's total oil production was 11.3 mb/d, of which 10 mb/d was crude oil, 960 kb/d condensates and 340 kb/d NGLs, based on IEA's data **(2)**. By comparison, US total oil production was 17.6 mb/d, while Saudi Arabia produced 12 mb/d.

In addition, Russia is the world's largest exporter of oil to global markets and the second largest crude oil exporter behind Saudi Arabia. In December 2021, it exported 7.8 mb/d, of which crude and condensate accounted for 5 mb/d, or 64%. Oil product exports totalled 2.85 mb/d, of which 1.1 mb/d of gasoil, 650 kb/d of fuel oil and 500 kb/d of naphtha and 280 kb/d of vacuum gas oil (VGO). Gasoline, LPG, jet fuel and petroleum coke made up the remaining 350 kb/d.

About 60% of Russia's oil exports go to Europe, which imports about one third of its oil, or around 4.5 mb/d, from Russia, according to latest available IEA data from November 2021. Roughly 750 thousand barrels a day is delivered via the Druzhba pipeline system, with about 250 kb/d transiting Ukraine via its southern branch to supply Hungary, Slovakia and the Czech Republic. Germany was the largest European buyer of Russian oil in November 2021, followed by the Netherlands and Poland.

Figure 1: Russian crude and oil product exports, January 2020-December 2021



Source: IENE

China is the single largest buyer of Russian oil, taking 1.6 mb/d of crude on average in 2021, or about 20% of Russia's exports, equally divided between pipeline and seaborne routes.

Japan and Korea combined imported a total of 440 thousand barrels a day from Russia in November 2021, about 5% of their total imports, split between crude and products. The US imported 625 kb/d, corresponding to 17% of its total imports. Russia is the 3rd largest source of US oil imports. In 2021, about 1.3 mb/d of seaborne Russian crude (and 1.5 mb/d of Kazakh crude) transited the Black Sea.

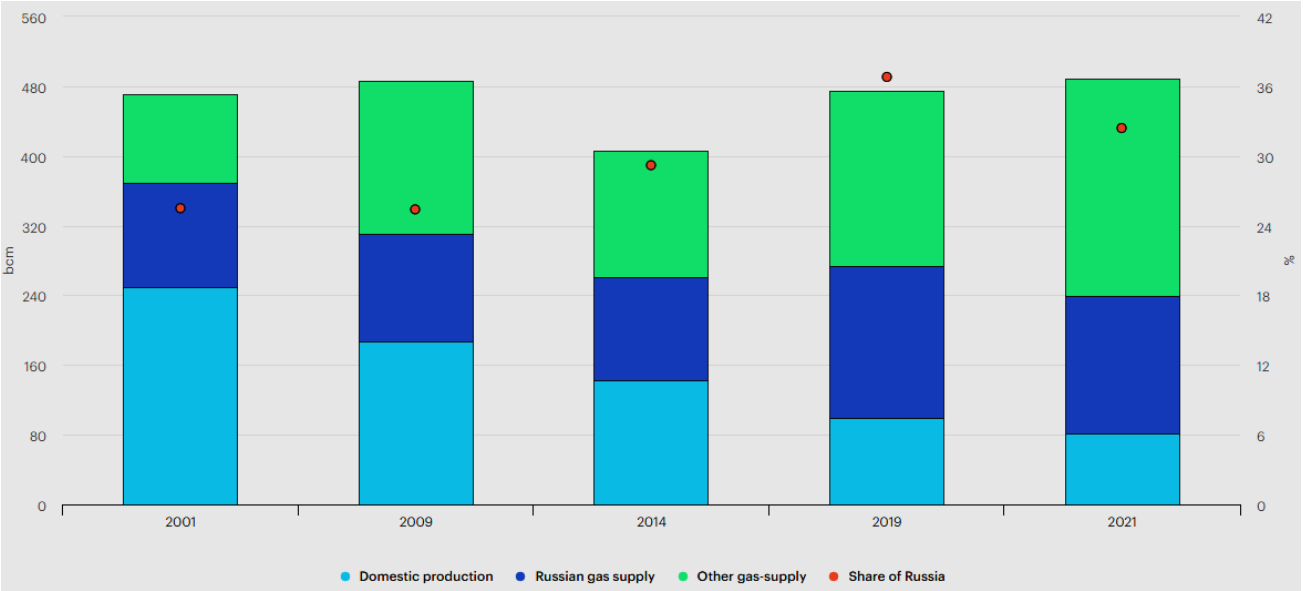
Natural Gas

Russia is the world's second largest gas producer, after the United States, producing 761 billion cubic meters (bcm) in 2021, or 18% of the global gas output, but it is the world's largest gas exporter, with exports amounting to around 250 bcm in 2021, with 210 bcm transiting through pipelines and 40 bcm transported as LNG.

In 2021, Russia supplied 32% of the total gas demand in the European Union and United Kingdom, up from 25% in 2009. However, Russian gas exports to Europe were already declining in the months before the invasion of Ukraine. Russia reduced its exports to Europe by 25% in the fourth quarter of 2021 compared with the same period in 2020, despite the exceptionally high market prices for natural gas. This artificial tightness was one of the reasons for rising spot gas prices in Europe.

The percentage of Russian pipeline deliveries to Europe passing through Ukraine fell to 25% in 2021 from more than 60% in 2009 because of the development of alternative routes, such as Nord Stream 1 and TurkStream. Overall, about 9% of the EU and UK's combined natural gas demand passes through Ukraine.

Figure 2: Share of Russia in European Union and United Kingdom gas demand, 2001-2021



Source: IEA

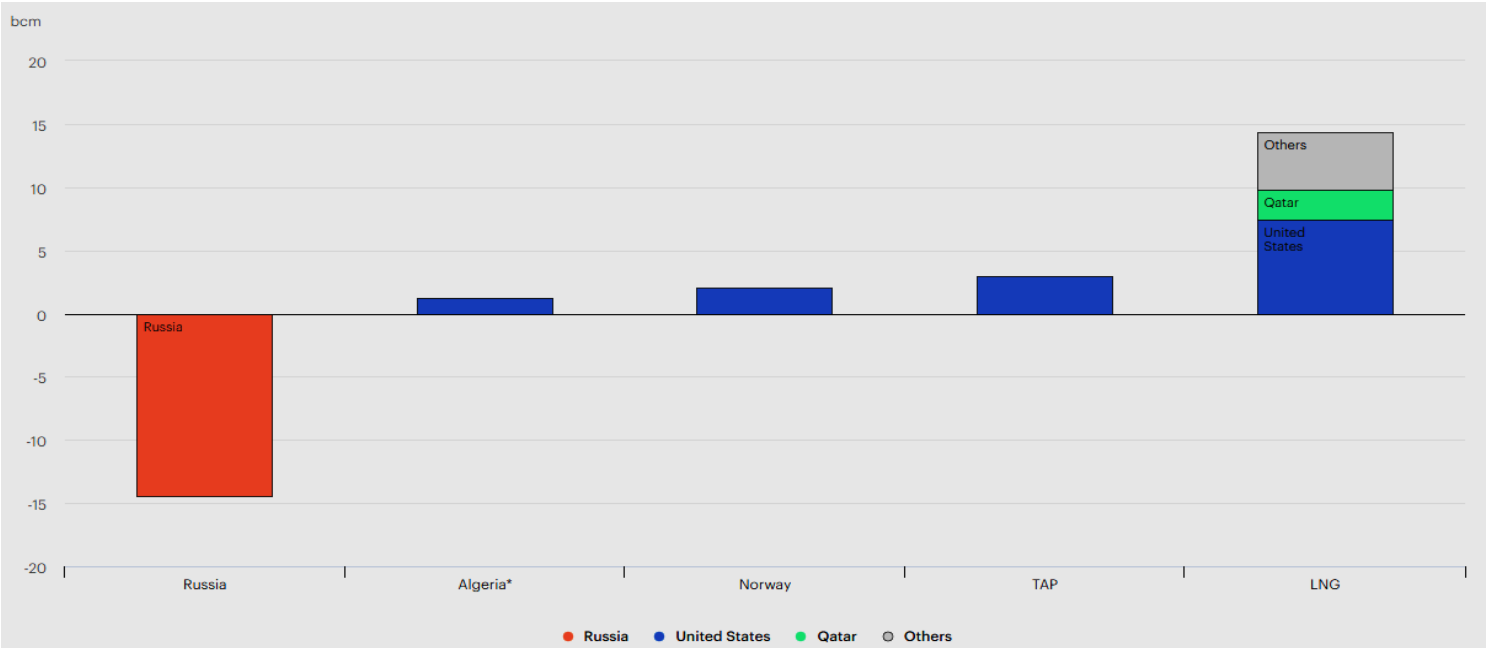
As highlighted by the IEA in September 2021 **(3)**, Russia has been reducing its piped gas supplies to the EU market, while it did not fill its own storage facilities in the EU to adequate

levels. Pipeline deliveries from Russia declined by 25% year-on-year in Q4 2021. This decrease in Russian pipeline supply to the EU became more pronounced in the first seven weeks of 2022, falling by 37% year-on-year. The last pipeline deliveries to Germany via the YAMAL pipeline (which goes through Belarus) were on 20 December 2021. Gas flows via Ukraine to Slovakia have fallen from an average of over 80 mcm/d in December to just 36 mcm/d in the first seven weeks of 2022. Altogether, Russian gas flows via Ukraine averaged 55 mcm/d during this period, well below the contractually available capacity of around 109 mcm/d, based on IEA's data.

Other pipeline suppliers, including Algeria, Azerbaijan and Norway, increased their deliveries during the heating season to the European market compared with last year, using commercially available supply routes. Lower Russian pipeline flows have been compensated in part by higher LNG inflows, which increased by 63% year-on-year through October until year-to-date. LNG inflows to the EU and the UK reached an all-time high of 13 bcm in January 2022 – almost three times their last year's levels and about 70% higher compared to Russian pipeline flows that month. Strong supply and milder-than-expected temperatures in Northeast Asia helped to facilitate the redirection of cargoes towards Europe and limit the implications of strong European demand for LNG markets.

The United States supplied over half of the additional LNG imported by the EU and UK since the beginning of the heating season, accounting for 37% of total LNG supplies. This highlights the importance of the US LNG export industry and of strong transatlantic ties to European energy security.

Figure 3: Year-on-year change in the European Union and United Kingdom natural gas imports by source, October 2021-January 2022



Source: IEA

2. How Europe Can Reduce its Reliance on Russian Oil and Gas

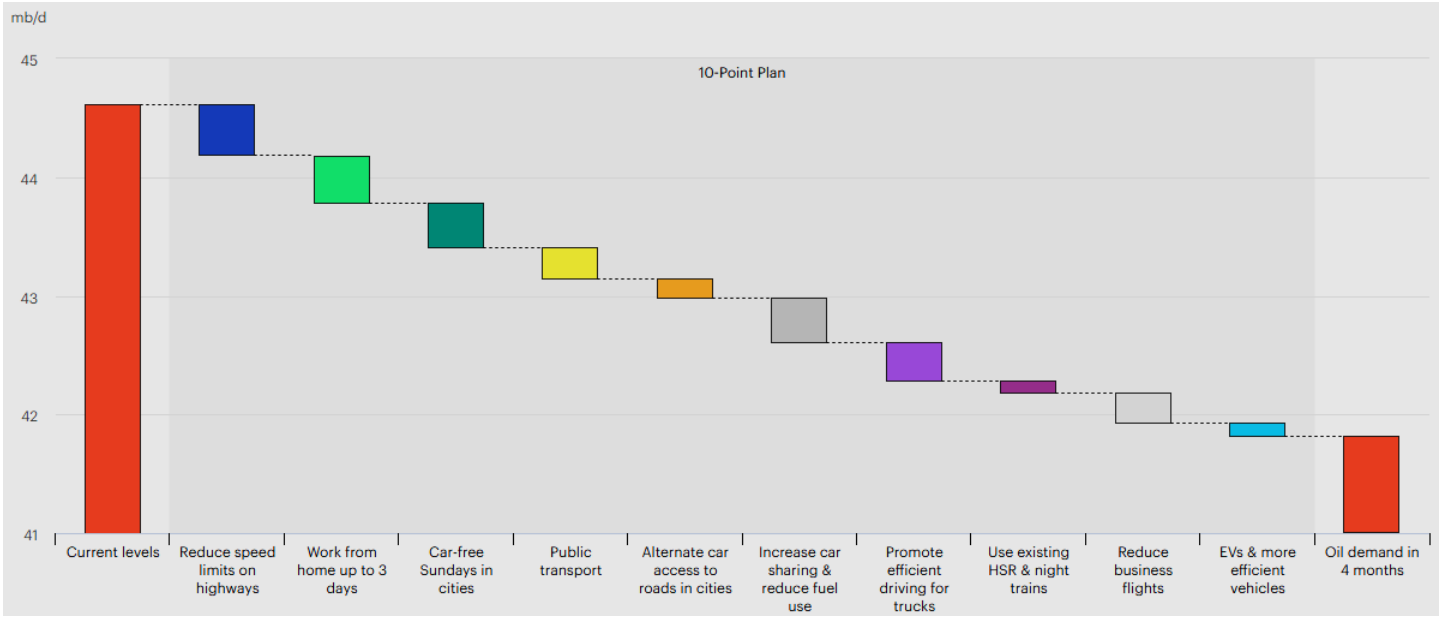
Crude Oil

Russia's invasion in Ukraine comes against a backdrop of already tight global oil markets, with heightened price volatility, commercial inventories that are at their lowest level since 2014, and a limited ability of producers to provide additional supply in the short term. For this reason, the IEA's 31 members agreed to release emergency oil stocks on March 1, 2022, to head off any potential shortfalls in energy supply. The total amount committed by IEA member countries stood at 61.7 million barrels, making it the largest stock release in IEA history. While the process and time lines for the release of these additional volumes of oil will vary across countries, this is the equivalent of about 2 million a day over 30 days. **(4)**

On April 1, 2022, the IEA member countries agreed to tap their emergency reserves for the second time in the space of a month, this time to the tune of 120 million barrels. The record volumes will provide welcome relief to an already tight oil market that is facing heightened uncertainty amid the multitude of repercussions stemming from sanctions and embargoes targeted at Russia by the international community and consumer boycotts. **(5)**

In addition, the IEA released on March 18, 2022 a 10-Point Plan **(6)** to cut oil use, proposing actions that can be taken to reduce oil demand with immediate impact – and provides recommendations for how those actions can help pave the way to putting oil demand onto a more sustainable path in the longer term.

Figure 4: Oil demand reductions in advanced economies within four months in IEA's 10-Point Plan



Source: IEA

Moreover, as announced on March 8, 2022, President Joe Biden banned imports of Russian oil and gas into the US as Washington steps up economic sanctions on Moscow over the

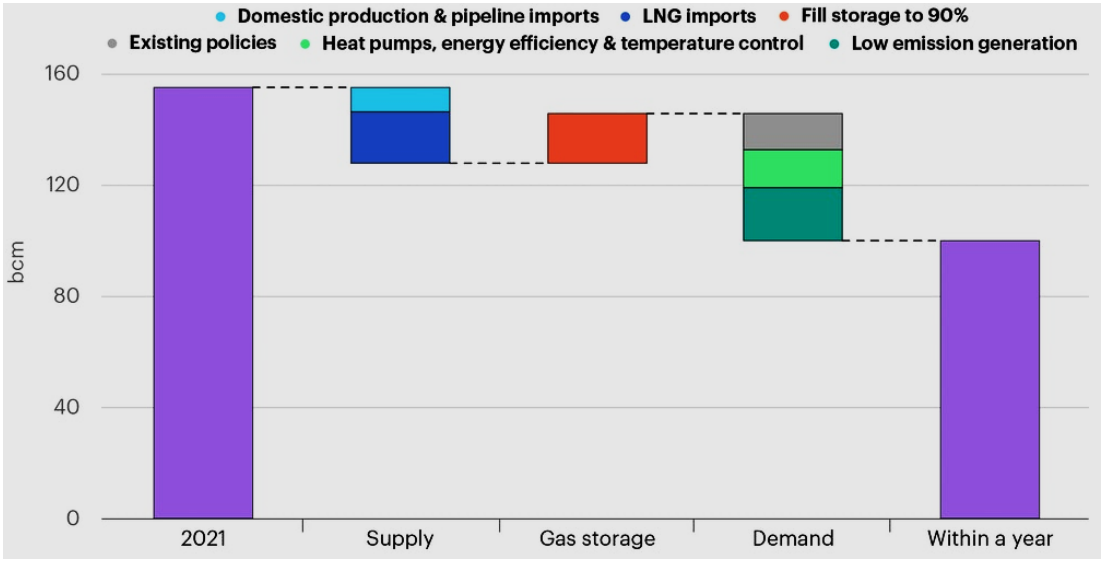
invasion of Ukraine in an attempt to deprive it of revenue. The US decision opens a new front in efforts to isolate Moscow from the global economy, following moves to impose sanctions on key Russian banks, top government officials and oligarchs, as well as its central bank. Similarly, UK prime minister Boris Johnson's government said it would phase out the import of Russian oil by the end of the year. **(7)**

Furthermore, US President Joe Biden on March 31, 2022 launched the largest release ever of up to 180 million barrels of oil from the Strategic Petroleum Reserve and challenged oil companies to drill more in an attempt to bring down gasoline prices that have soared during Russia's war with Ukraine. **(8)**

Natural Gas

According to the IEA, the European Union could reduce its imports of Russian natural gas by more than one-third within a year through a combination of measures that would be consistent with the European Green Deal and support energy security and affordability. More specifically, the IEA released on March 3, 2022 a 10-Point Plan for how European countries can reduce their reliance on Russian gas supplies **(9)** that includes a range of complementary actions that can be taken in the coming months, such as turning more to other suppliers, drawing on other energy sources and accelerating efforts to provide consumers, businesses and industry with the means to use clean and efficient alternatives to natural gas.

Figure 5: The implications of IEA's 10-Point Plan to reduce EU gas imports from Russia



Source: IEA

On March 8, 2022, the European Commission presented proposals to reduce the EU's dependence on Russian gas by two thirds before the end of 2022 as part of a plan to become independent from all Russian fossil fuels "well before 2030" **(10)**. The plan, called "REPowerEU", aims to "eliminate" Europe's dependence on Russian gas before 2030 and

outlines measures to ensure gas storage is filled up to at least 90% for next winter in order to cope with potential supply disruptions. The plan "will seek to diversify gas supplies, speed up the roll-out of renewable gases and replace gas in heating and power generation", according to the European Commission, which says this can reduce Europe's dependence on Russian gas by two thirds before the end of the year. The "REPowerEU" plan has two main focuses: (a) ensure gas supply security and (b) increasing the speed of deploying renewables (RES) and energy efficiency measures. On May 18, 2022, the European Commission presented the expanded "REPowerEU" plan, its response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. **(11)**

3. Developing Further Hydrocarbon Resources in SE Europe

It is worth noting that the "REPowerEU" plan does not make any mention of the need to increase indigenous natural gas production in the EU-27 to offset the reduction in imports from Russia. Although this is an implicit recognition of the ongoing decline in EU gas production, it is also indicative of EU's weakness in terms of foresight while it lays bare its current malaise in strategic thinking. Moreover, it is revealing of the utter confusion on its energy planners' minds between desirable solutions, vis-a-vis climate change goals, and the present reality where we are faced with causal shortages of currently and widely used hydrocarbons.

Based on data provided by the Oxford Institute of Energy Studies **(12)**, Dutch gas production in 2021 was 18.75 bcm, comprising 6.8 bcm from Groningen and 12.0 bcm from the "small fields" in the country. It should be noted that until recently gas production from the Groningen field was a main contributor of European gas supply. The Dutch government is currently reluctant to use its powers to increase production at Groningen, or to extend its life, but in more severe market circumstances it might be persuaded to do so. Without such intervention, total Dutch production is unlikely to exceed 16 bcm in 2022, and could actually be lower. On 14 March 2022, the Dutch economy ministry announced that production at Groningen in the period October 2021-September 2022 would be 4.6 bcm. Given that production at Groningen between September 2021 and January 2022 was 1.4 bcm, this suggests that production between February and September 2022 will be 3.2 bcm, giving a total for January-September 2022 of 3.66 bcm. Given that production in the "small fields" is likely to stabilise (at best) or decline further (at worst) from the 2021 level, total Dutch production for 2022 (assuming no Groningen production beyond September 2022) is actually likely to be less than 16 bcm, a year-on-year decline of around 3 bcm, the Oxford Institute of Energy Studies adds.

In the rest of the EU, outside the Netherlands, the ongoing gradual decline in gas production continues, with production falling from 39.2 bcm in 2017 to 27.6 bcm in 2020, and a further decline to 25.7 bcm in 2021. A substantial proportion of this decline is accounted for by Germany, Italy, Ireland, alongside smaller declines elsewhere, which are all unlikely to be reversed in the foreseeable future. In Denmark, the Tyra gas processing and export centre (which processes 90% of Danish gas production) was shut down in September 2019 for extended maintenance and is now not expected to restart until June 2023. Moreover, Danish gas production is forecast to rebound only to 2.7 bcm per year by 2025. If another 2

bcm year-on-year decline occurs in 2022, the total decline in EU-27 gas production could be 5 bcm, based on data provided by the Oxford Institute of Energy Studies.

Outside the EU-27, there is no technical or commercial flex in UK gas production, but there is expected to be a modest recovery in 2022. Gross production fell sharply from 39.3 bcm in 2020 to 32.5 bcm in 2021 due to temporary shutdowns related to project-related offshore investment, and is expected to recover to about 35-36 bcm in 2022. From an EU perspective, this additional UK production could help to increase the re-export from the UK to the EU of both pipeline imports from Norway and LNG from elsewhere.

Overall, gas production in the EU-27 is likely to decline modestly even if production at Groningen is preserved at its present level, and production is not halted in mid-2022 as planned. Otherwise, the decline may be steeper. In the event that the planned cessation of production at Groningen takes place, even the rebound in UK production will not be sufficient to prevent a modest overall decline in European (EU + UK) production.

Despite the aforementioned ominous environment, several European countries should be able to increase their gas production in order to meet their gas demand and decrease their dependence on Russian gas imports. For instance, Norwegian energy operator Equinor recently announced that, alongside its partners and Norwegian authorities, it will bump up gas output to Europe in the coming months, providing greater quantities of the energy source to try and offset booming prices and supply shortages. **(13)**

More specifically, increased production permits issued by the Ministry of Petroleum and Energy will allow Equinor to maintain high production levels at its Troll, Oseberg, and Heidrun gas fields. Following these permits, the Oseberg and Troll fields will increase exports by around 1 bcm, while the Heidrun field will increase gas exports by 0.4 bcm for the 2022 calendar year. The group's Hammerfest LNG unit is also scheduled to come online from mid-May this year, providing more than 6 bcm of gas per year from the Barents Sea. With these increases in gas production, it is hoped that Norway will be able to fill the gaps left by the loss of Russian imports as sanctions against Moscow come into effect. According to Equinor, Norway currently contributes 25% of gas demand in the EU and Britain, and is the seventh largest gas producer in the world.

Apart from certain European countries that are already gas producers and they can increase their gas production, there are also some other countries that can reduce their reliance on Russian gas imports through the development of indigenous gas production. Greece is such a case and it has already announced that it will speed up gas exploration, aiming at new exploratory drilling, in more than two decades, by the end of 2023. More specifically, Energean, the sole oil producer in Greece, is committed to carry out an exploratory drilling at an onshore block in the west of the country. Greece also wants to conclude by March 2023 a first round of detailed seismic surveys offshore in Crete and western Greece in order to identify any potential gas fields it could tap, according to a presentation by the Hellenic Hydrocarbon Resources Management. **(14)**

In 2021, the total natural gas production in the EU amounted to 50.6 bcm (-7% or -4 bcm compared to 2020), while its consumption reached 412 bcm. Romania's gas production (8.9

bcm) remained practically stable (-1%) in 2021, compared to 2020, but plans are in place for much higher production which will help the country become self-sufficient and allow it to plan some exports. In addition, the 2.6 bcm/year capacity floating LNG import terminal in Croatia received its first ever cargo from Egypt on November 10, 2021, while its gas production stood at 0.83 bcm in 2021, which covered almost 25% of the country's needs. Given the right research and tax incentives, Croatia's substantial gas potential could be further explored with a considerable increase of its gas production for the benefit of both the country and the EU.

As natural gas, together with nuclear, are fast emerging as the only viable options in terms of reduced GHGs capable of serving the continent's base load needs in the energy transition phase which could easily last until 2050 and beyond, the EU has every incentive to want to develop gas deposits not only in its own territory but also in the various peripheral countries. Looking at the broader picture, one can easily see that within and around the EU space we have substantial oil and gas deposits which have been identified following both seismic research and exploratory drilling. If we were to combine hydrocarbon potential resource findings so far in the Black Sea, the Adriatic, the East Mediterranean, including Greece and Cyprus and the North Sea, one could add up some 9.0-10.0 trillion cubic metres which are more than enough to cover EU needs for the next 30 years or more. By which time gas use will be diminishing as new forms of energy will be taking over. EU's myopic view to prefer to ignore the reality of such substantial indigenous reserves and opt exclusively for alternative gas import options is not helping with security of supply fundamentals and certainly antagonises economic development in the various European countries concerned.

4. Energy Security Implications

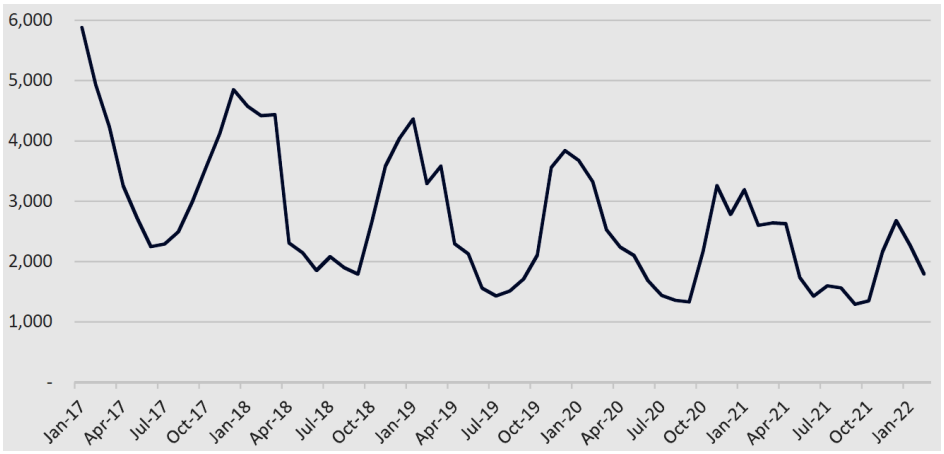
European domestic gas production is in long-term decline. The Netherlands accounts for roughly half of EU-27 gas production and gas production in both the Netherlands and the rest of the EU declined at approximately the same rate between 2017 and 2021. As a result, EU-27 gas production declined from 83 bcm in 2017 to 51 bcm in 2021, based on data provided by the Oxford Institute of Energy Studies **(15)**. Outside the EU-27, UK net gas production declined slowly from 39 bcm in 2017 to 36 bcm in 2020, followed by a dip to an estimated 29 bcm in 2021 due to maintenance held over from 2020. Although UK production is set to rebound in 2022, the overall picture is of an ongoing decline in both annual production volumes and seasonal "swing"[1]. This leads to the conclusion that, in the event of a curtailment of Russian pipeline supplies to Europe, production cannot ramp up to any meaningful extent to offset the loss of the Russian supplies.

The topic of gas storage has been prominent in discussions of European gas-related energy security. In Europe as a whole, there is the capacity to hold around 100 bcm of storage stocks, which is equivalent to one-fifth of annual demand. At the start of winter 2021/2022, European storage stocks were around 10% lower than would have been expected in a "normal" year. However, a mild winter and related slower storage withdrawals have meant

[1] The ability to raise production in winter to meet higher demand and lower production in summer, also in line with lower seasonal demand.

that European storage stocks on February 28 were similar in volume to those held on February 28 in 2017 and 2018, although still significantly lower than stocks held on February 28 in 2019-2021. As a result, the ability to withstand any curtailment of Russian flows through drawing down on storage is limited.

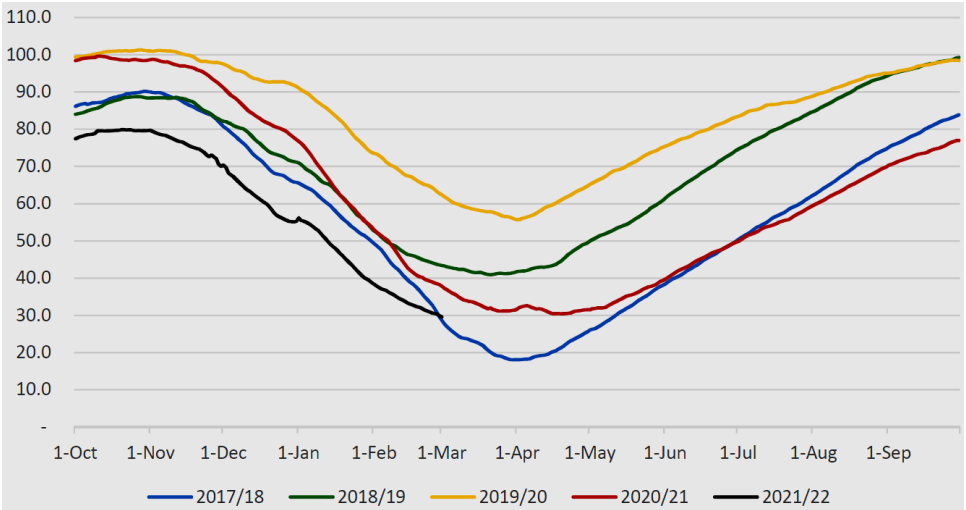
Figure 6: European gas production, mcm per month, January 2017-January 2022



Sources: OIES, ENTSOG

As several energy analysts point out, Europe's independence from Russian oil and gas will be the necessary historical correction of a geopolitical paradox. Europe's economic growth and development has been heavily based thus far on funding Russia through energy, which turned out to be the greatest threat for the EU acquis. According to the Central Bank, Russia's total exports reached $489.8 billion in 2021. Of that, crude oil accounted for $110.2 billion, oil products for $68.7 billion, pipeline natural gas for $54.2 billion and LNG $7.6 billion **(16)**. Even now, after Russia's unilateral declaration of war against Ukraine, Moscow is still funded through payments for energy imports from consuming European countries.

Figure 7: European gas storage stocks, bcm



Sources: OIES, GIE

Europe does not appear to have a "plan B" to face the current crisis, while the European Commission is desperately trying to formulate a workable response as its "REpowerEU" plan shows. Meanwhile, energy prices have nearly doubled since last year. Most likely, they have not yet peaked. So, turning to alternative countries for energy procurement is one solution that would not incur the greatest cost. In view of the substantial policy and infrastructure obstacles involved, which a decoupling from Russian energy entails, it is very important to work out a pragmatic approach in both oil and gas supplies. It is becoming clearer by the day that Europe will need to change course and aim towards a more self-sustaining energy supply mode. In that context, it is necessary to stress the importance of indigenous hydrocarbon production.

To this end, there are many things to be done, starting with exploitation of Europe's own resources in all directions. The penetration of renewables in the energy and storage markets is of crucial importance not only because of their minimum energy footprint, which would align with the EU's "Fit for 55" and net-zero emissions goals, but also because they both require high-end technologies that Europe has already made great strides on. The current energy prices, however, have forced many countries to step back to coal/lignite for electricity generation, but the fact remains that progress still needs to be made towards renewables.

Another resource to exploit is the large untapped potential of hydrocarbons in (SE) Europe. For instance, based on data provided by IENE's latest Special Report on Greece's Hydrocarbons, the country's potential gas reserves are estimated to be at about 2.0-2.5 tcm **(17)**. It is obvious that prolonged underinvestment in hydrocarbons raises the spectre of continued price shocks and volatility. Today, EU hydrocarbon reserves are estimated in the region of 7-10 tcm, of which 4.0 tcm in the East Mediterranean region.

As mentioned earlier, the storage capacities of the (SE) European countries should also be examined. For those in the EU, new financial tools and toolkits can be introduced to energy exchange markets in support of households and enterprises. Solutions must be scalable and customisable, taking into account the degree of dependency on Russian gas that these entities face. Additionally, the technological progress towards low carbon liquid fuels and reusable carbon fuels is coming closer to commercial use. At the same time, the discussion around the energy production capabilities of nuclear power is back on the table. The construction of new gas pipeline routes, which cross neutral countries, should also be examined.

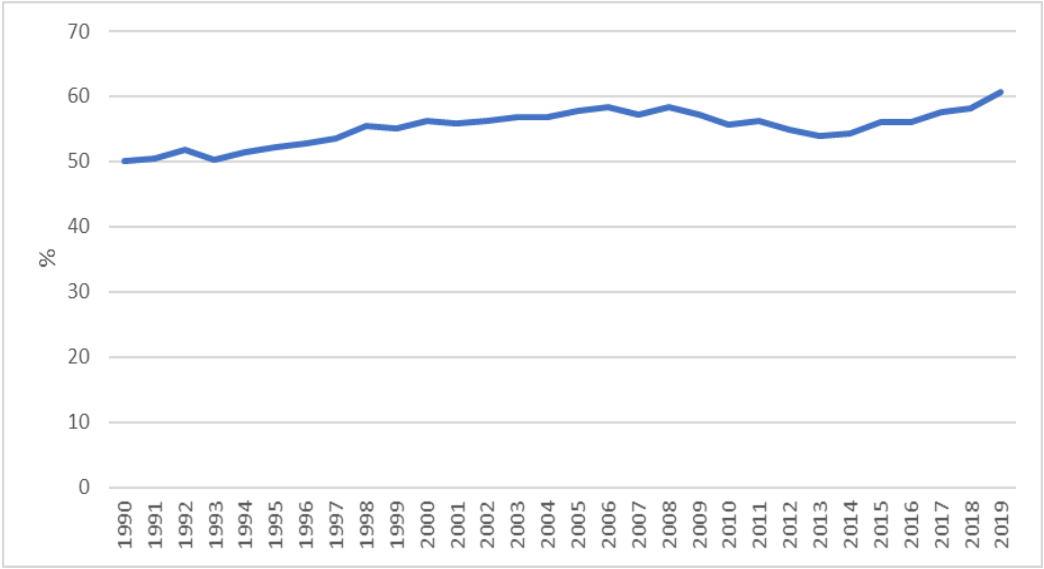
The world is once again learning an essential geopolitical lesson. If you want to be in a position to introduce punitive policies (e.g. imposition of sanctions), you have to be relatively self-sufficient in terms of energy. As the present crisis clearly shows, Europe is in no position to dictate terms without incurring substantial cost to its economy. This time, the West and particularly Europe, which is suffering most of the geopolitical and cost-related consequences out of any region, have to undertake all necessary and bold actions to direct efforts to break out of the Russian energy dependency headlock, so as to create opportunities towards a sustainable economic growth model and a vigorous geopolitical presence. If not, then (SE) Europe will suffer its own fate.

5. The Impact on SE Europe

According to IENE's "SE Europe Energy Outlook 2021/2022" reference study **(18)**, the high oil and gas import dependence for most SE European countries stood at 87.0% on average for total oil and petroleum products and at 89.3% on average for gas, based on 2019 figures, with some countries even reaching 100% dependence in both categories. Such high energy dependence is way above that of the EU-27, which on average stood at 60.7% in 2019. This means the state finances of several SE European countries are servient to the vagaries of international oil prices, as we have clearly seen in the period of 2010-2014, when the oil and gas import bill of most SE European countries ballooned to unprecedented levels, thus siphoning off much needed funds in order to meet basic transportation, heating and industry requirements and the same development may also appear now as the war in Ukraine is still in progress and the majority of oil and gas imports in SE Europe is relied on Russia.

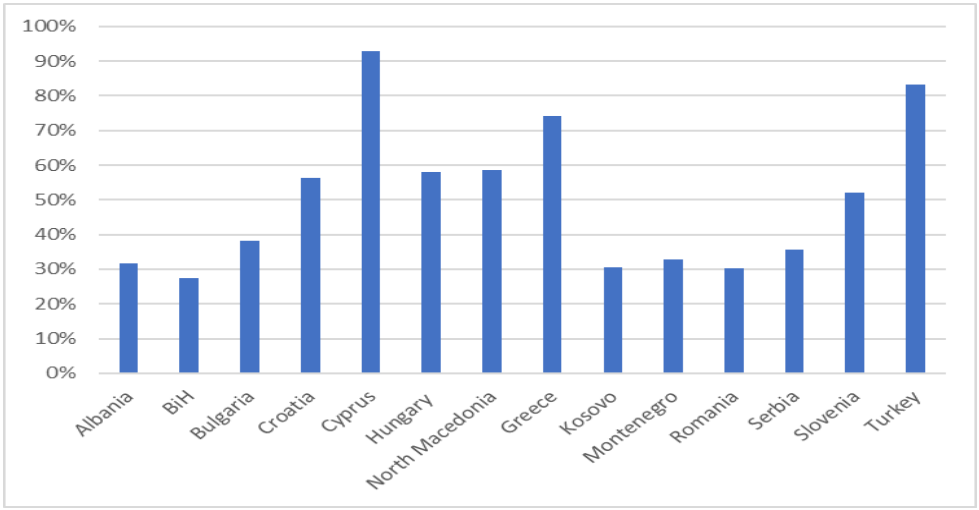
In 2019, the energy dependence of the EU-27 stood at 60.7%, the highest over the last decade. As illustrated in Figure 8, the evolution of EU-27 energy dependence has not been constant over 1990-2019; however, it has continuously stood above 50% since 1990. Regarding SEE countries, the overall energy dependence also varies significantly and averaged at 50.1% in 2019, taking into account the countries shown in Figure 9. These figures are issued by Eurostat, along with the publication of the detailed 2019 annual results on energy supply, transformation and consumption in the EU.

Figure 8: Evolution of the EU energy dependence (%) over 1990-2019



Sources: Eurostat, IENE

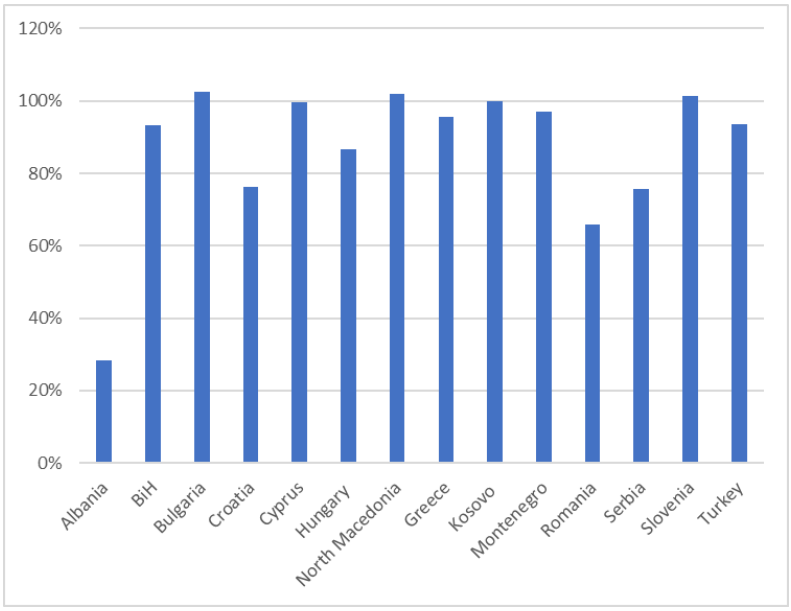
Figure 9: Energy dependence (%) in SE Europe (2019)



Sources: Eurostat, IENE

Eurostat also presents data for total oil and petroleum products as well as natural gas separately for the SEE region in 2019. More specifically, total oil and petroleum products dependence in SE Europe reached 87.0% in 2019, with Albania and Romania having the lowest dependence of 28.3% and 65.8% respectively (see Figure 10).

Figure 10: Total oil and petroleum products dependence (%) in SE Europe (2019)

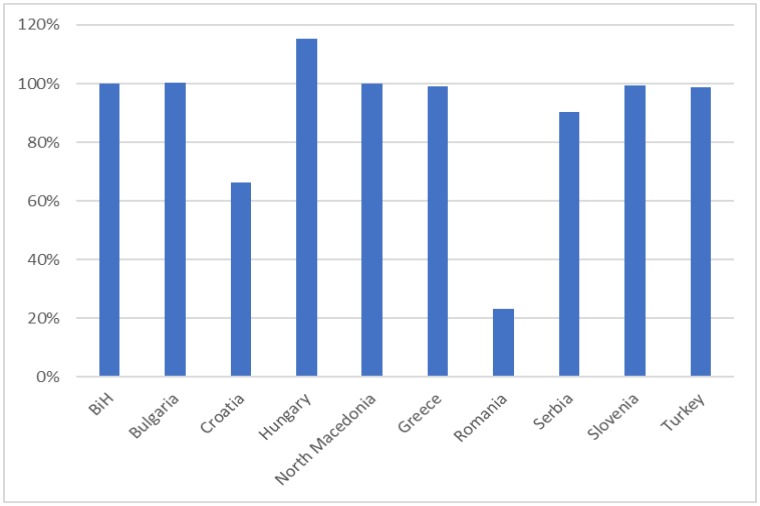


Note: A dependency rate in excess of 100% relates to the build-up of stocks.

Sources: Eurostat, IENE

The gas dependence in SE Europe reached 89.3% in 2019, with Croatia and Romania having the lowest gas dependence of 66.4% and 23.3% respectively (see Figure 11).

Figure 11: Gas dependence (%) in SE Europe (2019)



Note: Albania, Kosovo, Cyprus and Montenegro do not import natural gas.

Sources: Eurostat, IENE

Despite the fact that most of the SEE countries are highly dependent on oil and gas, which both are imported mainly from Russia and are widely used in the transport and household sectors, regional energy dependence is low, as the remaining energy used derives from hydropower and biomass, which are indigenous.

However, high import dependency becomes more problematic when it is associated with low levels of diversification, by country of origin and/or by energy source. Lack of access to affordable energy sources, disruptions in energy flows, high import dependency and wild fluctuations in prices are all seen as potential weaknesses, creating economic, geopolitical and social problems of the countries affected.

LNG

According to the "REPowerEU" plan, 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 rend 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 Ereglisi	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%), Ms. Elmina Kopelouzou (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.

6. Energy Market Integration in SE Europe

6.1. Electricity Markets

The region of SE Europe is of particular geopolitical and energy policy interest due to the European integration aspirations of Western Balkans countries and the region's position on the fringes of the EU internal market. It consists of member states of the EU, as well as non-EU countries that are contracting parties to the Energy Community (EnC) and participants in the Western Balkans 6 Initiative (WB6). As part of a developing region, these countries are in different stages of structural reforms of their energy sectors but with the common aim of integrating into the EU internal electricity market. In this context, SEE countries could serve as an example of extension of frameworks, rules, and practices that bring EU closer to its immediate neighbouring regions. **(19)**

Although the power systems in SEE are strongly interconnected and interdependent for ensuring security of supply, the power sectors of these countries are highly fragmented in terms of governing regulations and market designs. In general, national electricity markets in SEE have been characterized by price regulation and low liquidity, often due to a strong presence of incumbent generation companies. Therefore, most of the electricity sector advances in SEE are still driven by efforts to fully open electricity markets to greater competition by implementing EU legislation, primarily the Third Energy Package for Electricity and Gas Markets (TPEGM), the predecessor to the CEP. Simultaneously, the urgency of decarbonization translates into growing pressure on governments to decommission carbon-intensive power plants and to promote RES investment, consequently accelerating the need for market reforms.

In addition, there is a lack of incentives for active participation of customers in the retail markets, which is mainly due to dominance of incumbent suppliers and low competition. Wholesale markets are progressing with the establishment of power exchanges, although liquidity has been identified as a major issue in most cases. Advances in DAM and IDM coupling or signed MoUs, along with specific measures targeting liquidity, are expected to improve competition in future. All countries have established market-based procurement of balancing energy and reserves, while TSOs are also participating in regional and European projects for exchange of balancing services.

Wholesale electricity markets in SE Europe are generally less mature than EU electricity markets. The progress made by the WB6 countries regarding their electricity market reforms is analysed in ACER's Market Monitoring Report 2020 **(20)**:

6.2. Gas Markets

Over the last few years, the international gas market has evolved moving away from long-term take-or-pay contracts that are linked to oil prices (known as oil-indexed contracts) and include trade restrictions from destination clauses. Instead the market now features shorter-term contracts without destination clauses and pricing based on the supply-demand dynamics of natural gas instead of oil-linked prices. In line with these developments, the volume of spot gas trade has also significantly increased.

There is a definite trend in European gas markets for gas volumes to be traded through gas hubs, several of which have been established and are operating successfully in many EU countries. Already more than 14 such hubs are in operation and more are planned over the next few years.

Gas trading hubs come under two broad categories: (a) physical gas trading hubs, with import and export pipelines, connections with other physical hubs mainly via interconnectors, access to storage and gas title transfer among actors trading, and (b) commercial hubs with bilateral and broker-based trading, a balancing mechanism that takes market-based price formation as a basis as well as exchange trading, futures and financial derivative transactions. It should be noted that gas trading hubs are not necessarily limited to strict geographical boundaries as participants tend to trade gas volumes over extended boundaries. Therefore, the concept of gas trading hubs capable of serving the need of a wider region is fast gaining ground. Historical records from the operation of European gas trading hubs over the last ten years show that spot prices for gas volumes traded through the hubs are markedly lower than corresponding prices for long-term oil-indexed contracts.

In view of pressing European gas market needs to meet demand from a diversified supply base and planned new transit routes and interconnectors in the SE European region, coupled with increased storage capacity and new LNG terminals, available gas volumes in the region are set to increase substantially in the medium term (2022-2025). On the basis of the current contracted gas volumes to be transited through SE Europe by 2022-2025, it appears that market liquidity will substantially increase over the next few years with a parallel rise of gas trading opportunities.

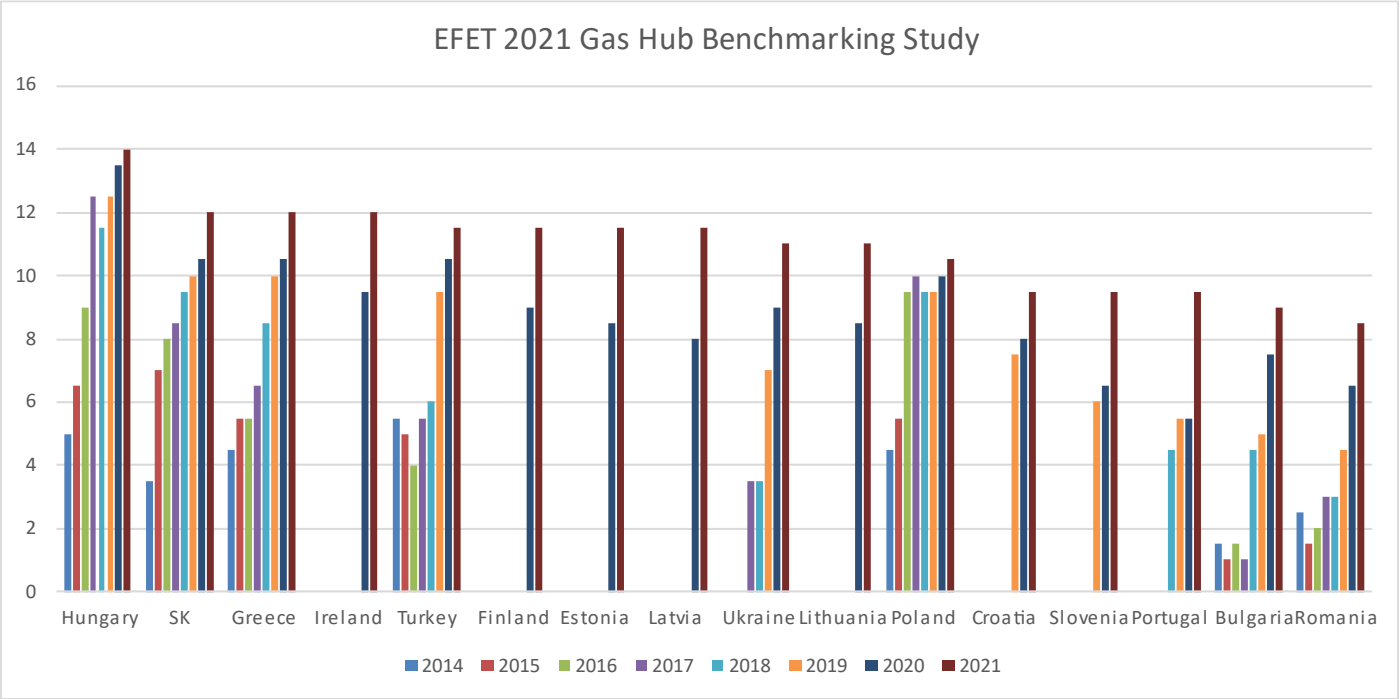
The satisfaction of future gas demand in SE Europe involves various routes, including the Southern Corridor, Turkish Stream, the East Mediterranean region and LNG terminals (land-based and FSRUs). However, future gas demand increases appear to be small, meaning that gas will need to move further westwards to find market and/or competitively force itself into Turkey. But transporting gas further north to larger markets in Europe looks hard, because greater distance means greater transportation costs and therefore lower netbacks. SE Europe would be significantly exposed in the case of a transit disruption through Ukraine under high demand scenarios.

Today, there is not one gas trading hub (or hubs) serving the needs of the SE European region. The Vienna-based CEGH is the nearest such hub which at present serves the needs of Central European countries. Vienna's CEGH in view of its geographical position and trade volume and origin can play pivotal role in enhancing gas trading in SE Europe and also act as a benchmark (to the regional gas hub(s) to be developed).

The background is already set for the planning and establishment of more than one gas trading hubs which will serve the needs of the broader SE European region enabling market participants in Greece, Bulgaria, Romania and Turkey to actively participate in gas trading activities. Already the TSOs of the countries in the region, energy exchanges, key market players and other stakeholders are actively exploring the possibilities and prospects of establishing such gas trading hubs. Setting up gas trading hubs in SE Europe should be a commercial rather than a political exercise, although governments should be fully informed of the process. In order for one or more regional gas trading hubs to be established in the mid-term, market liquidity must increase considerably. For this to happen, a series of key gas infrastructure projects (e.g. TAP-TANAP system, IGB, South Kavala UGS, FSRUs) must be fully implemented, with construction and operation likely to converge in 2023.

Already, there is a number of nascent gas trading hubs in SE Europe, which include those in Greece, Turkey, Bulgaria and Romania. According to the EFET's Annual Scorecard 2021 **(21)**, Greece is the frontrunner in SE Europe in its attempt to establish a regional gas trading hub, which is known as Hellenic Trading Point (HTP), as shown in Figure 12.

Figure 12: EFET's 2021 Gas Hub Benchmarking Study



Source: EFET

The experience of numerous European gas trading hubs demonstrates that there are certain essential factors for gas hub development. Unbundling of vertically integration gas

companies creates the necessary conditions for the emergence of market players. Market liberalization and pricing transition create the need of trade and liquidity. Hubs and the transition of gas pricing formation are interconnected. In addition, the liberalization and pricing transition requires political determination, and changes of cultures, regulations and governance practices.

The liberalisation and integration of the SE European gas markets has been an arduous process with many stops and starts along the way. Several regional countries have committed to aligning their gas sectors with the EU's free market principles to which they subscribed either as EU members or as Contracting Parties of the Energy Community.

The region remains fragmented and attempts to further integrate it are still short of reaching ambitious objectives. Barriers have come in many forms. Government cross-subsidies have been distorting the formation of prices and created internal market imbalances. The lack of access to physical cross-border interconnections or domestic infrastructure brought additional obstacles. This became evident in the summer of 2019, when Bulgaria, Romania and Turkey where gas prices had been regulated, became Europe's most expensive markets in sheer contrast to other EU hubs. The issue was further compounded by limited access to imports caused by restricted access to cross-border infrastructure. Other barriers have been linked to unwieldy bureaucratic arrangements or institutional weaknesses which led to unpredictable legal environments, over-regulation or lack of transparency.

7. The Growing Importance of Renewables in SE Europe

The European Green Deal[2], introduced in January 2020, adopted a set of policy initiatives by the European Commission for even higher emissions cuts. As part of the European Green Deal, the European Climate Law[3] has set a binding target of achieving carbon neutrality by 2050. This requires current greenhouse gas emission levels to drop substantially in the next decades. As an intermediate step, the EU has raised its 2030 climate ambition, committing to cutting emissions by at least 55% by 2030, known as "Fit for 55" package.

On May 18, 2022, the European Commission released its expanded "REPowerEU" plan, which is 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: 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 tackling the climate crisis.

Based on the "REPowerEU" plan, a massive scaling-up and speeding-up of renewable energy sources in power generation, industry, buildings and transport will accelerate Europe's independence, give a boost to the green transition, and reduce prices over time. The Commission proposes to increase the headline 2030 target for renewables from 40% to 45%

[2] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[3] https://ec.europa.eu/clima/eu-action/european-green-deal/european-climate-law_en

under the "Fit for 55" package. Setting this overall increased ambition will create the framework for other initiatives, including:

- A dedicated EU Solar Strategy[4] to double solar photovoltaic capacity by 2025 and install 600 GW by 2030.
- A Solar Rooftop Initiative with a phased-in legal obligation to install solar panels on new public and commercial buildings and new residential buildings.
- Doubling of the rate of deployment of heat pumps, and measures to integrate geothermal and solar thermal energy in modernised district and communal heating systems.
- A Commission Recommendation[5] to tackle slow and complex permitting for major renewable projects, and a targeted amendment to the Renewable Energy Directive[6] to recognise renewable energy as an overriding public interest. Dedicated 'go-to' areas for renewables should be put in place by Member States with shortened and simplified permitting processes in areas with lower environmental risks. To help quickly identify such 'go-to' areas, the Commission is making available datasets on environmentally sensitive areas as part of its digital mapping tool[7] for geographic data related to energy, industry and infrastructure.
- Setting a target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports by 2030, to replace natural gas, coal and oil in hard-to-decarbonise industries and transport sectors. To accelerate the hydrogen market increased sub-targets for specific sectors would need to be agreed by the co-legislators. The Commission is also publishing two Delegated Acts on the definition and production of renewable hydrogen to ensure that production leads to net decarbonisation. To accelerate hydrogen projects, additional funding of €200 million is set aside for research, and the Commission commits to complete the assessment of the first Important Projects of Common European Interest by the summer.
- A Biomethane Action Plan[8] sets out tools including a new biomethane industrial partnership and financial incentives to increase production to 35bcm by 2030, including through the Common Agricultural Policy.

SE European countries are at a disadvantage in the transition process to a green economy compared to northern Europe, and face systemic challenges to their energy markets. They also face serious challenges, especially the West Balkan Six (WB6) in implementing EU's energy acquis. These issues need to be addressed through a regionally focused approach.

There are six main obstacles to more integrated and efficient markets in the region: (i) high dependence on fossil fuels, often supported by policy, (ii) market concentration and state

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A221%3AFIN&qid=1653034500503
[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=PI_COM%3AC%282022%293219&qid=1653033569832
[6] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A222%3AFIN&qid=1653033811900
[7] https://joint-research-centre.ec.europa.eu/energy-and-industry-geography-lab_en
[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD%3A2022%3A230%3AFIN&qid=1653033922121

intervention, (iii) illiquid energy markets, (iv) occasionally poor interconnectivity and cross-border energy trade, (v) poor regulatory framework and institutional design, and (vi) lack of strategies for managing the energy transition.

The combination of carbon-intensive energy sectors, relatively low energy efficiency, and below EU average GDP per capita, makes the transformation – of the coal regions, for example – both technically challenging and politically sensitive. The European Green Deal and the "just transition" facility offer new opportunities for the region (including Covid-19 recovery funds) to develop lower carbon energy systems. But cash injections alone will not be sufficient. Some policy makers argue that the region will require tailor-made mechanisms that reflect its specific needs during the transition.

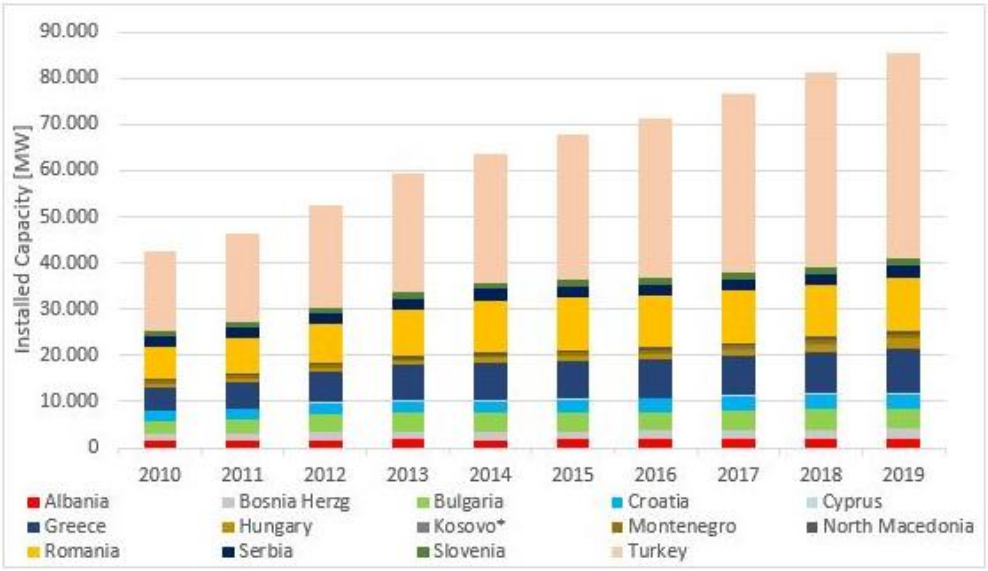
There is widespread feeling that the countries of the SEE region, together with the EU, have the opportunity to make a bold decision about moving forward alongside the bloc towards a sustainable, decarbonised future and reap the region's potential for a healthier environment.

The EU also understands that to maximise the impact of the European Green Deal for the whole continent, it should make SE Europe part of this deal and ensure the countries are given equal opportunities and weight. In this way, the EU can guide the region towards implementing the 2030 and 2050 targets, while benefiting from the added value the countries of the region could contribute. Bulgaria, Romania, and Greece are currently responsible for more than 9% of coal- and lignite-fired electricity generation in the EU, but their approaches are very different.

The installed RES capacity in SE Europe has more than doubled during the past decade, with local systems exceeding 85.56 GW of installed capacity in 2019, according to an IENE survey **(22)** conducted as part of the Institute's "SEE Energy Outlook 2021/2022" study. This represents an increase of 100.5% since 2010, when the region counted 42.68 GW of installed RES units. In addition, the power generation from RES including hydro has almost reached 200 TWh and stood at 199.2 TWh in 2018. This corresponds to a 40% increase over the last decade.

Electricity generation from RES in the SEE is heavily affected by the hydrologic cycle, which has shown signs of heavy volatility throughout the decade. Most notably the region was affected by drought especially during 2011, 2014 and 2017, when it halted the increase of y-y generation from RES, despite the increased deployment of other RES systems, mainly wind and solar. The most affected countries by the hydrologic cycle were Turkey, Croatia, Albania and Bosnia and Herzegovina.

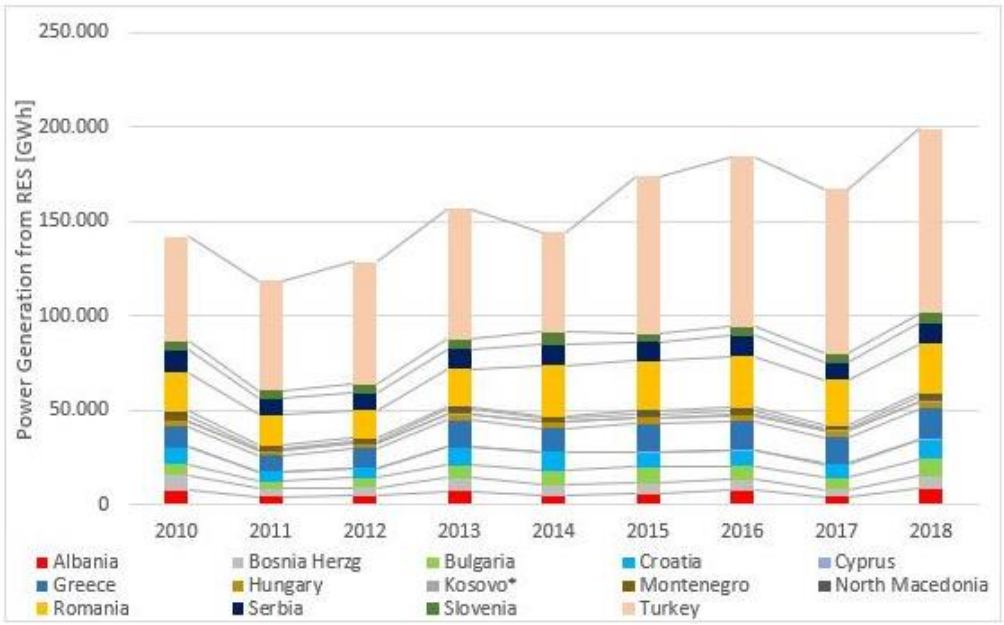
Figure 13: Total Installed RES Capacity (MW) in SEE, 2010-2019



Source: IRENA

The most widely deployed renewables are by far in Turkey, which has an RES fleet which consists mostly of hydro and wind, with a considerable capacity of geothermal energy, which in total exceeds 44.5 GW of installed capacity. Turkey is followed by Romania and Greece, with RES installed capacity of 11.2 GW and 9.8 GW respectively.

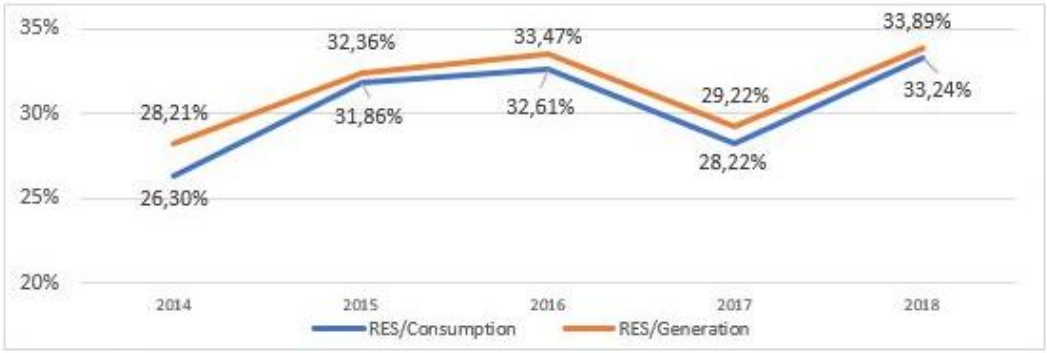
Figure 14: Power Generation (GWh) from RES (Including Hydro) in SEE, 2010-2019



Source: IRENA

Moreover, RES units have increased their regional share in power generation to 33.89% in 2019, i.e. by more than 5.5% compared to 2014, when they contributed 28.2%. In addition, in 2019 the share of RES in total regional electricity consumption rose to 33.2% from 26.3% in 2014.

Figure 15: Share of RES (%) in Total Regional Consumption and Power Generation in SEE, 2014-2019



Sources: IRENA, ENTSOe, ERE, IENE

However, energy storage is emerging as a key parameter in the overall drive to enable deeper RES penetration in the electricity grid on a daily basis. In this context, we should note that energy storage is not addressed adequately in regulatory frameworks across the SEE region, which leads to incoherent interpretation or a complete lack of rules on ownership, procurement of services by TSOs or DNOs, and support measures. In Bulgaria, the TSO and DNOs are not allowed to own any storage assets. In terms of connection, only Bosnia and Herzegovina, Bulgaria and Serbia have specific connection rules related to pumped hydro storage plants, or the existing connection rules for generators are sufficient to allow for their connection. Connection rules for storage units are expected to be changed in near future in Bulgaria and Romania. Pumped hydro storage plants in Croatia are able to participate in the market to provide tertiary reserve in both directions, and it is expected regulation on energy storage to be adopted in Romania, along with the development of support measures.

In Greece, the long-awaited regulatory framework for RES licensing, energy storage and pilot floating photovoltaics (with a capacity of 0.5 MW to 1 MW) was submitted by the Greek Ministry of Environment and Energy on April 26, 2022 for public consultation. Greece has doubled its 2030 target for energy storage deployment to 3 GW as it aims for a renewable electricity generation proportion of 70%. The target for energy storage is double the 1.5 GW outlined in the existing Greece's National Energy and Climate Plan of December 2019 and will accompany a renewable energy capacity of over 20 GW by the 2030 deadline. It is worth noting that Greece is procuring storage of 1.4 GW in the form of batteries and pumped hydropower.

SE Europe has abundant renewable energy resources, with their use already part of many inhabitants' daily lives. Historically, the region's power generation profile has been significantly shaped by large hydropower plants, while heating needs have mainly been covered by the large biomass endowment. The overall estimated unexploited potential for renewable energy is still substantial, however.

Despite having an installed hydropower capacity of more than 22 GW, the region still has the largest remaining unexploited hydropower potential in Europe, as its river catchments have remained largely undeveloped. In addition, the whole region is endowed with good wind resources, with wind blowing at average speeds of between 5.5 metres per second (m/s)

and 7 m/s, at 100 metre height. The mountainous and coastal landscape increases the variation in wind resource across the region, with higher average wind speeds in coastal areas and at high altitudes.

In the years ahead, SEE holds great potential for the deployment of renewable energy technologies, while already regional authorities have been taking the first important steps in the decarbonisation of their energy sectors. FiT and FiP schemes were or are available across the region and have been met with a varying degree of success. Moves towards the adoption of auction systems are also being taken across the region, with some well-designed and successful examples of these now in place – such as in Albania and Slovenia. Regional authorities can also draw on the lessons learnt by neighbouring countries in adopting best practices.

Meanwhile, however, the heating and cooling and transport sectors enjoy few supporting policies for the adoption of renewable energy solutions. More concerted action in these sectors may bring substantial benefits, decreasing energy dependency and improving the quality of life of the region's people.

8. Energy Efficiency is Key to Improving SE Europe's Energy Security

On July 14, 2021, the European Commission took a major step towards accomplishing its ambitious goal of making Europe the first climate neutral continent by 2050, as enshrined in the EU Climate Law, by adopting a package of proposals amending the EU's climate, energy, land use, transport and taxation policies with a view to reducing net greenhouse gas (GHG) emissions by at least 55% by 2030, known as the "Fit for 55" package. **(23)**

One of the key principles of the EU energy policy intended to ensure secure, sustainable, competitive and affordable energy supply in the EU is the "energy efficiency first principle". It practically means taking utmost account of cost-efficient energy efficiency measures in shaping energy policy and making relevant investment decisions. It is a far-reaching guiding principle that can complement other EU objectives, in particular in the sustainability, climate neutrality and green growth areas.

Energy efficiency is one of the key pillars not only to meet EU's climate objectives but also to reduce dependence on fossil fuels from abroad and increase security of supply and the use of renewable energy. However, it is often underestimated in existing planning and investment programmes in the EU and beyond. To tackle this issue, the Commission responded by proposing a clearer priority for the "energy efficiency first principle" in the recast Energy Efficiency Directive, adopted in July 2021, accompanied by a formal recommendation to EU countries on the issue and detailed guidelines on its application, adopted in September 2021. **(24)**

While taking full account of security of supply and market integration, this principle should also ensure that (a) only the energy really needed is produced, (b) investments in stranded assets are avoided and (c) demand for energy is reduced and managed in a cost-effective way.

The principle aims to treat energy efficiency as a source of energy in its own right in which the public and the private sector can invest ahead of other more complex or costly energy sources. This includes giving priority to demand-side solutions whenever they are more cost-effective than investments in energy infrastructure to meet policy objectives. Beyond contributing to reducing fossil fuels consumption and increasing independence and security of supply, this principle also emphasises the importance of reducing energy production. Reduced energy demand can help control the level of investment needed for the transition towards renewables. Moreover, it supports a more sustainable approach to the use of limited resources and increases the resilience of the EU's energy system.

However, energy efficiency is not so popular in SE Europe. A recent study **(25)** analysed both EU and non-EU funding streams available in the region that could be used to improve the energy efficiency of the building stock. The analysis found that both funding supply into the region and demand coming from the region should be stepped up. Only 3% of the public funds that could be used to support energy-efficiency investments in SE Europe are dedicated to upgrading buildings. Though the region is burdened with energy poverty and energy security concerns, the current allocation of EU and international funds shows that buildings are not considered to be critical energy infrastructure, despite the potential of deep renovation to reduce energy dependency, increase savings on energy bills and improve health and air quality. Within EU funding streams, only 4.35% of the region's Cohesion Policy Funds is allocated to demand-side infrastructure, amounting to €3.96 billion.

It is worth noting that energy efficiency in building sector (especially public buildings) is acting as a "locomotive train" pushing forward other sectors such as transportation and SMEs/Industry. Summing up the situation of energy efficiency in SE Europe, it is evident that there is an ongoing plethora of national efforts and programmes in support of the European long-term target to become the first "climate-neutral" continent by 2050.

9. Nuclear Power in SE Europe

In SE Europe, there are five countries (Bulgaria, Hungary, Romania, Slovenia and Croatia) that currently operate nuclear power plants (NPPs), while Turkey is expected to build at least two NPPs over the next decade. Turkey's first NPP (Akkuyu) will have four units, each with a capacity of 1,200 MW, and is expected to come on stream in 2023. Nuclear power, although it covered only 4.0% of the gross inland consumption in SE Europe in 2018, remains a viable option for growth because it offers important baseload capacity and supports the EU's decarbonization policies.

The zero emissions from operating NPPs contribute to the region's efforts to curtail GHG emissions. This means that nuclear energy has an important role to play in the SE European decarbonization efforts and the change of its electricity mix over the next decades. Following the tragic accident at Fukushima's NPP in March 2011 and operational security reviews, which have since been conducted by the SEE countries that host NPPs, the use of nuclear power in the region is unlikely to diminish over the next decade. Neither Bulgaria nor Romania nor Hungary are likely to shut down the Cernavoda, Kozloduy 5-6 and Paks 1, 2, 3, and 4 power plants respectively on account of safety concerns.

The same applies for Croatia and Slovenia, which, between them, share the Krško NPP. Both governments are very well aware of the fact that a decrease in the participation of nuclear power in their electricity generated portfolio cannot be easily replaced by renewables or be compensated by an increase of coal generated electricity due to the equally burdensome environmental costs. If they are to reduce the participation of nuclear power in their total electricity mix, both countries have as an alternative the increase of imported gas, magnifying their already high dependency.

Theoretically, the participation of nuclear generation in the regional electricity mix is set to diminish significantly as the rising demand of Bulgaria and Romania will be covered by increased volumes of natural gas and, to a lesser extent, renewables. However, this might change as both Romania and Turkey are definitely going ahead with plans to increase their nuclear installed capacity, which will result in two major nuclear power generation complexes with 6 GW of new installed capacity to be operated by 2030.

In the cases of Bulgaria (Units 5 and 6 and the planned Unit 7 of Kozloduy NPP) and Turkey (the Akkuyu site), Russia might have a role to play. However, it should be recalled that strategic investments have two substantial characteristics in the energy sector. They need many years to be implemented but they last for decades. In this context, such long-term planning should not be subverted by short-term political priorities against regional, economic and safety considerations.

In this sense, the Fukushima anti-nuclear rationale does not appear to hold much in the case of SE Europe. For countries already involved in nuclear power development (i.e. Bulgaria, Romania, Hungary, Croatia/Slovenia, Turkey), the road ahead is unlikely to be obstructed by revised risk assessments. Developing further nuclear power generation in the region will be a real challenge as not all countries favour this option. In this direction, detailed studies may have to be undertaken in order to identify the real potential pitfalls of nuclear energy and to assess the compatibility of nuclear and RES power in the context of decarbonization.

It is worth noting that the complementary Taxonomy Delegated Act, which was put forward by the European Commission on March 9, 2022, proposes to include, under certain conditions, specific nuclear and gas energy activities in the list of economic activities covered by the EU taxonomy.

10. Discussion

The transition to fully decarbonized power generation is not an easy regional issue, as 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 plexus. Although all countries in the region to a larger or to a smaller extent are committed to RES and energy efficiency programmes and specific targets, at the same time, they are pursuing a parallel coal-centered agenda as we have a number of coal-fired power plants under construction or at an advanced planning stage. In short, carbon-based power generation is also moving ahead, adding, in parallel, substantial capacity from now until 2025 (1.5 GW per year for SEE and 2.5 GW for Turkey, i.e. total 4 GW per year over the next 7-8 years). As a

result, there is a substantial gap between new coal-fired power plants and anticipated RES installations. The path towards decarbonization now seems more difficult in SE Europe due to Russia's invasion of Ukraine and the decisions that have already been taken from various countries in the region to maintain the use of coal/lignite in their power generation mix for energy security reasons.

To ensure sustained RES investment, it is essential to create an enabling environment by introducing appropriate and dedicated policies. The region has indeed proved that it can attract investment when supporting policies and measures are in place. These measures should go beyond mere direct RES and energy efficiency support and include, in addition, system regulation and in step integration with the everyday life of energy consumers. In this context, the role of energy storage is emerging as key in enabling greater penetration of RES into the electricity grid.

However, the SEE countries are still a long way from producing most of their targeted electricity from renewables, as these sources, especially wind and solar, are intermittent and energy storage technologies have not been adequately developed in the region. The use of indigenous sources of energy, such as renewables, will contribute towards increasing the flexibility of the national energy system and ensuring the security of energy supply. The promotion of renewables and objectives regarding demand response and energy storage can play an important role in that direction.

The transformation of the existing polluting SEE energy system into a sustainable one should be based on localized policies and differentiated energy sources of higher energy efficiency and with the view of tapping in the long term the potential for hydrogen generation. Energy cooperation between the various countries in the region is of paramount importance and necessary in order to introduce lasting changes aiming towards sustainability. Hydrogen produced from renewables, among others, could play a decisive role in achieving such sustainability and should be examined in detail for each different country of the region.

IRENA estimates that the adoption of an energy mix in SE Europe based on RES and energy efficiency technologies would provide a cumulative GDP gain amounting to $485 billion over the business-as-usual scenario between 2019 and 2050. With the creation of new jobs in the renewable energy sector, the energy transition would also help tackle long-standing unemployment and brain drain issues. The inclusion of social welfare benefits, such as improvements in health and air quality, ensures that potential gains further outweigh additional costs. **(26)**

At this point, one should mention the apparent inconsistency which exists between stated EC energy and climate policy (as already implemented by EIB and EBRD), which aims towards lessening the use of gas, and the plan of all SEE countries and locally pursued policies, which aim towards greater use of gas as the fastest road towards decarbonization.

Energy market integration and transition in SE Europe is moving on, but at slower pace than initially anticipated. There is a plethora of gas and electricity infrastructure projects that are expected to be implemented in the region over the next five years, such as gas and

electricity interconnections, LNG terminals and FSRUs, gas storage facilities, etc., making SE Europe an interesting and important part of Europe. The emergence of gas trading hubs will increase liquidity, transparency and competition and will facilitate market integration and transition in SE Europe.

Although the new energy targets under the "REPowerEU" plan sound really ambitious, the current status of most EU Member States indicates that a lot more work needs to be done. Hence, it is highly debatable if these new sky-high targets can actually be achieved under present policies. A situation which is further accentuated in the case of SE Europe.

References

1. European Council (2022), "EU response to Russia's invasion of Ukraine", https://www.consilium.europa.eu/en/policies/eu-response-ukraine-invasion/
2. IEA (2022a), "Oil Market and Russian Supply", https://www.iea.org/reports/ukrainerussia-conflict-and-consequences-for-energy-security/oil-market-and-russian-supply-2
3. IEA (2022b), "Statement on recent developments in natural gas and electricity markets", https://www.iea.org/news/statement-on-recent-developments-in-natural-gas-and-electricity-markets
4. IEA (2022c), "IEA confirms individual contributions to collective action to release oil stocks in response to Russia's invasion of Ukraine", https://www.iea.org/news/iea-confirms-individual-contributions-to-collective-action-to-release-oil-stocks-in-response-to-russia-s-invasion-of-ukraine
5. IEA (2022d), "IEA Member Countries agree to new emergency oil stock release in response to market turmoil", https://www.iea.org/news/iea-member-countries-agree-to-new-emergency-oil-stock-release-in-response-to-market-turmoil
6. IEA (2022e), "A 10-Point Plan to Cut Oil Use", https://www.iea.org/reports/a-10-point-plan-to-cut-oil-use
7. Politi, J., McCormick, M., Pickard, J. and Bounds, A. (2022), "US and UK ban Russian oil and gas imports in drive to punish Putin", https://www.ft.com/content/2e0b1d84-e595-4c5a-be4e-928417b9c7cc
8. Alper, A. and Gardner, T. (2022), "Biden spurs record emergency oil release in 'moment of peril' for world", https://www.reuters.com/business/energy/biden-release-1-mln-barrels-oil-day-ease-pump-prices-2022-03-31/
9. IEA (2022f), "How Europe can cut natural gas imports from Russia significantly within a year", https://www.iea.org/news/how-europe-can-cut-natural-gas-imports-from-russia-significantly-within-a-year
10. Taylor, K. (2022), "EU rolls out plan to slash Russian gas imports by two thirds before year end", https://www.euractiv.com/section/energy/news/eu-rolls-out-plan-to-slash-russian-gas-imports-by-two-thirds-before-year-end/
11. European Commission (2022), "REPowerEU Plan", https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF

12. Fulwood, M., Honoré, A., Sharples, J. and Marshall, H. (2022), "The EU plan to reduce Russian gas imports by two-thirds by the end of 2022: Practical realities and implications", https://a9w7k6q9.stackpathcdn.com/wpcms/wp-content/uploads/2022/03/Insight-110-The-EU-plan-to-reduce-Russian-gas-imports-by-two-thirds-by-the-end-of-2022.pdf
13. Evans, S. (2022), "Norway will increase gas supply to meet European demands", https://www.offshore-technology.com/news/norway-will-increase-gas-supply-to-meet-european-demands/
14. Koutantou, A. and Maltezou, R. (2022), "Greece speeds up gas exploration to help reduce Russia reliance", https://www.reuters.com/business/energy/greece-speed-up-gas-exploration-help-replace-russian-gas-pm-says-2022-04-12/
15. Fulwood, M., Sharples, J. and Henderson, J. (2022), "Ukraine Invasion: What This Means for the European Gas Market", https://a9w7k6q9.stackpathcdn.com/wpcms/wp-content/uploads/2022/03/Ukraine-Invasion-What-This-Means-for-the-European-Gas-Market.pdf
16. Central Bank of Russia (2022), "Russia's Balance of Payments", *No. 4 (10) 2021 Q4*, http://www.cbr.ru/collection/collection/file/39725/balance_of_payments_2021-04_10_e.pdf
17. IENE (2022a), "Economic and Geopolitical Benefits from Hydrocarbons' Exploitation in Greece", *IENE Special Report (No. 9)*, https://www.iene.gr/articlefiles/ekthesi%20ydogonantrakes.pdf
18. IENE (2022b), "SE Europe Energy Outlook 2021/2022", *An IENE (M48) Study*, https://www.iene.eu/south-east-europe-energy-outlook-2021-2022-p6560.html
19. Borozan, S. et al. (2021), "Progress of the electricity sectors in South East Europe: Challenges and opportunities in achieving compliance with EU energy policy", *Energy Reports 7 (2021) pp. 8730-8741*, https://www.sciencedirect.com/science/article/pii/S2352484721013512
20. ACER (2022), "ACER Market Monitoring Report 2020 – Electricity Wholesale Market Volume", https://extranet.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Market%20Monitoring%20Report%202020%20%E2%80%93%20Electricity%20Wholesale%20Market%20Volume.pdf
21. EFET (2022), "2021 Gas Hub Benchmarking Study", https://www.efet.org/home/documents?id=19
22. IENE (2021), "Renewable Energy Sources up their share in SE Europe's electricity mix", https://www.iene.eu/renewable-energy-sources-up-their-share-in-se-europe-s-electricity-mix-p5845.html
23. European Commission (2021a), "'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality", https://ec.europa.eu/info/sites/default/files/chapeau_communication.pdf
24. European Commission (2021b), "Proposal for a Directive of the European Parliament and of the Council on energy efficiency (recast)", https://eur-lex.europa.eu/resource.html?uri=cellar:a214c850-e574-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF

25. BPIE (2017), "Financing the future of buildings in Central, Eastern and South-East Europe", https://www.bpie.eu/publication/financing-the-future-of-buildings-in-central-eastern-and-south-east-europe/#
26. IRENA (2019), "Renewable Energy Market Analysis: Southeast Europe", https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Dec/IRENA_Market_Analysis_SEE_2019.pdf