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Background Paper

Key Energy Issues in SE Europe: Current Challenges and Prospects

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KEY ENERGY ISSUES IN SE EUROPE: CURRENT CHALLENGES AND PROSPECTS

BACKGROUND PAPER

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Introduction

Before looking at SE Europe's core 15 countries and peripheral ones, as defined by IENE **(1)**, it is important to consider the big picture and become acquainted with the key issues which confront the region's energy sector. These include the relatively high dependence of the majority of the countries on solid fuels, mostly used for power generation, high dependence on imported oil and gas, lack of adequate gas supply routes and interconnections (especially relevant for the main Balkan block), slower than anticipated penetration of renewables (RES) and slow progress on energy efficiency improvement.

Map 1: The SE European Region as Defined by IENE

Source: IENE

The slow differentiation of the regional energy mix, which in spite of the rise of RES and gas penetration remains bound to high solid fuel consumption and sizeable oil imports, is no doubt a prime point of reference. The large amounts of indigenous coal and lignite deposits provide relatively cheap and easily accessible energy supplies for most countries of the region and hence are seen as preventing a determined move, by the European Commission and certain governments, towards decarbonisation. Hence, we have here a major policy challenge, which governments and the EC will have to address. Simply put, there is a huge incompatibility between stated and adopted EU goals for decarbonisation and the region's silent commitment to continuing large-scale solid fuel use.

Although several countries in the region appear determined to exhaust its coal/lignite deposits, they are in parallel developing renewables and other carbon free resources such as nuclear power. Given the financial and legal constraints in most countries, the rise of RES, especially for electricity generation, over the last five years appears impressive. Yet because

of the intermittent nature of power generation from RES and undeveloped large-scale energy storage, their contribution into the electricity production of the different countries appears limited. However, given the strong market dynamics of the RES sector, the introduction of viable large-scale storage schemes in the mid-term and hydrogen in the long-term are distinct options in the years ahead.

High oil and gas import reliance means that 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. In other words, the then-prevailing high oil and gas prices prevented governments from channeling funds to development and social welfare projects, while condemning economic growth to zero or, in the best of cases, anemic rates.

Another important regional issue concerns oil and gas exploration efforts and plans for future production. Most countries in SE Europe, in view of their great dependence on oil and gas imports, have over the years harbored plans and initiated long-term programmes aiming at the exploitation of their indigenous hydrocarbon potential. In many cases, such plans have been seriously challenged following the coronavirus (COVID-19) pandemic and the charge of EU's green policies.

On the one hand, the gloomy atmosphere in the global oil market, following NGOs' persistent calls for an end to hydrocarbon exploration activities and the rising geopolitical tensions present in the East Mediterranean, have caused concern to international oil companies active in SE Europe. Questions arise about the viability of the companies that currently hold licensing blocks in the region, but also about the competitiveness of natural gas in an era of low prices (especially for LNG) and growing enmity against hydrocarbons in view of their implied negative environmental footprint.

In addition, natural gas, which is the fossil fuel with the lowest emissions, is facing another serious challenge by the narrow-confines of the EU Taxonomy. Hence, the decarbonization of the SE European region, without the use of natural gas, becomes an impossible equation thanks to EU's bureaucratic thinking, which appears to be completely cut-off from the harsh economic reality in the field in several SE European countries.

Other key challenges of the energy sector include the lack of adequate gas interconnections, which are preventing regional market development, since available gas quantities cannot be easily transported from one well supplied geographic area to another needy one. To a lesser extent, the region is in need of more and better electricity interconnections, something which 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.

1. The Glacial Change in the Region's Energy Mix

A key observation regarding the region's energy situation is related to its energy mix, taking into account all 14 countries (i.e. EU Member States, WB6 and Turkey). SE Europe's energy mix, with and without Turkey, is changing, albeit very slowly. In summary, between 2011 and 2021 (see Figures 1-4), there is lower use of coal (lignite) and nuclear as well as more gas, RES and oil, given the different total gross inland consumption. In a sense, this is disappointing given the huge emphasis placed over the past years on RES and the lowering of oil use.

Figure 1: Gross Inland Consumption (%) in SE Europe, including Turkey, 2011 (Total=265.7 Mtoe)

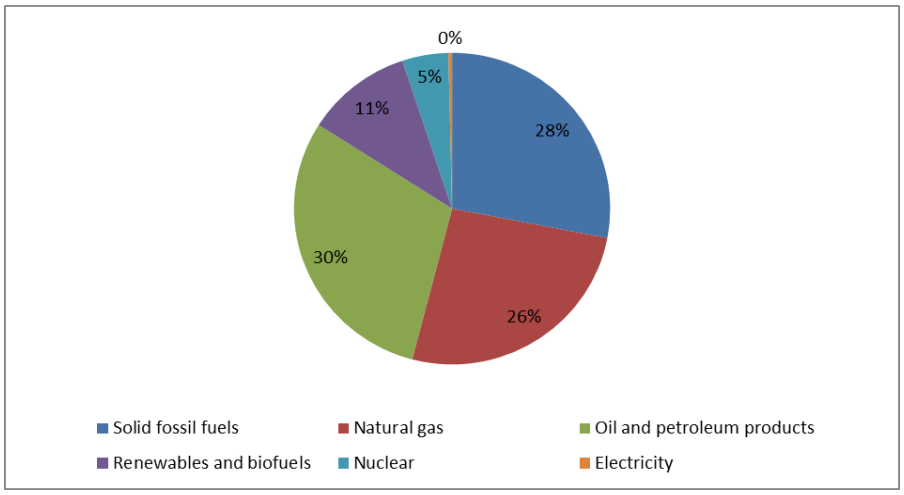


Figure 2: Gross Inland Consumption (%) in SE Europe, without Turkey, 2011 (Total=152.9 Mtoe)

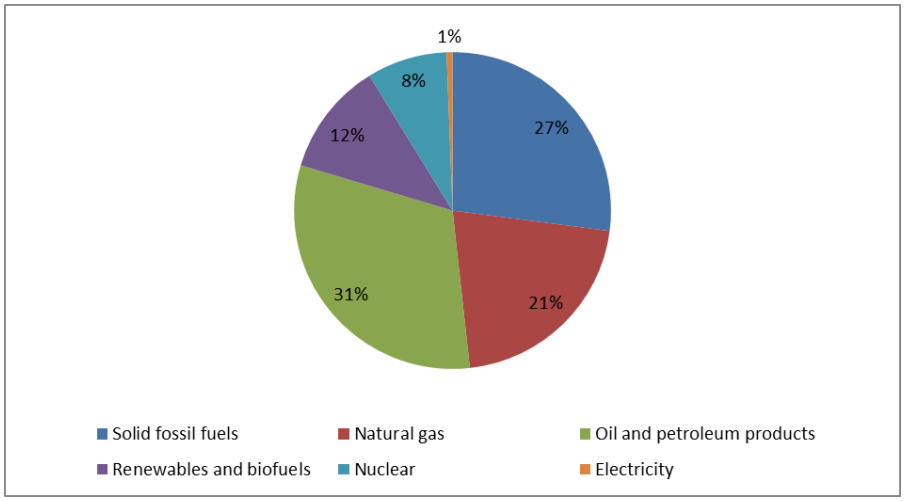


Figure 3: Gross Inland Consumption (%) in SE Europe, including Turkey, 2021 (Total=312.6 Mtoe)

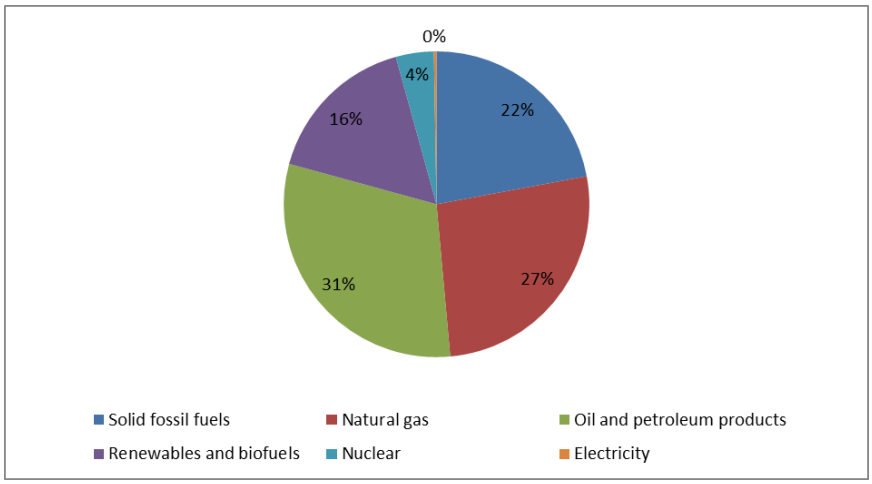
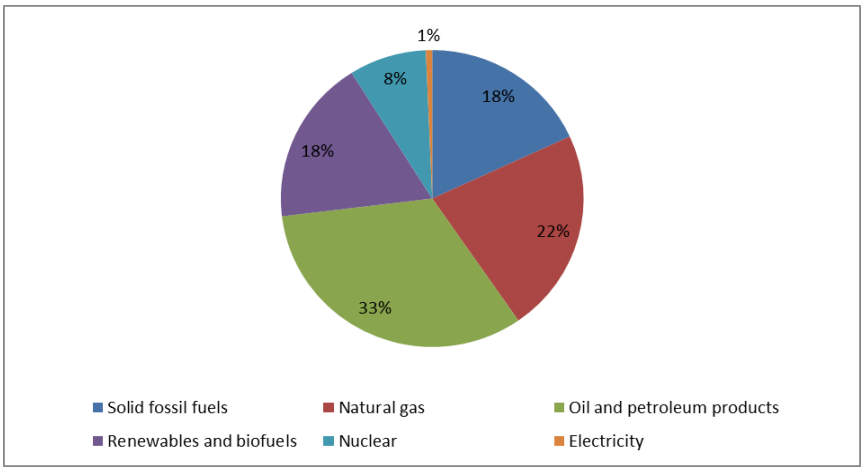


Figure 4: Gross Inland Consumption (%) in SE Europe, without Turkey, 2021 (Total=151.8 Mtoe)



Sources: Eurostat, IENE

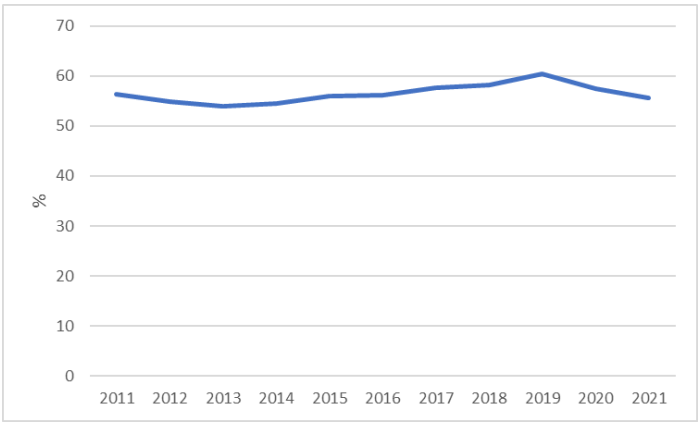
Examining closer the regional energy mix between 2011 and 2021, a number of useful observations can be made:

(a) Over the last 10-year period, only a minor differentiation of the region's energy mix has taken place, both in the case where this includes Turkey and in the other that it does not.
(b) The most noticeable change is the increased contribution of renewables in both cases.
(c) The contribution of gas, although higher in both cases, remains marginal.
(d) There is clearly less use of solid fuels in both cases, but the retreat is not as big as anticipated so as to advance EU's decarbonisation agenda.
(e) Oil has an almost constant contribution to the overall energy mix as it covers almost 100% of transportation needs in all countries.

2. High Energy Import Dependence

In 2021, the energy dependence[1] of the EU-27 stood at 55.5%, the lowest level over the last seven years. As illustrated in Figure 5, the evolution of EU-27 energy dependence has not been constant over 2011-2021; however, it has continuously stood above 50%.

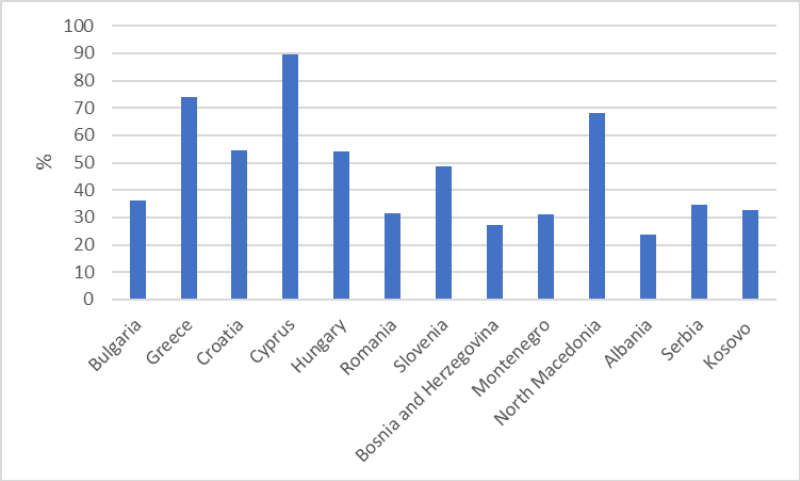
Figure 5: Evolution of the EU Energy Dependence (%), 2011-2021



Source: Eurostat

Regarding SEE countries, energy dependence also varies significantly and averaged at 46.60% in 2021, taking into account the countries shown in Figure 6. These figures are issued by Eurostat, along with the publication of the detailed 2021 annual results on energy supply, transformation and consumption in the EU.

Figure 6: Energy Dependence (%) in SE Europe, 2021



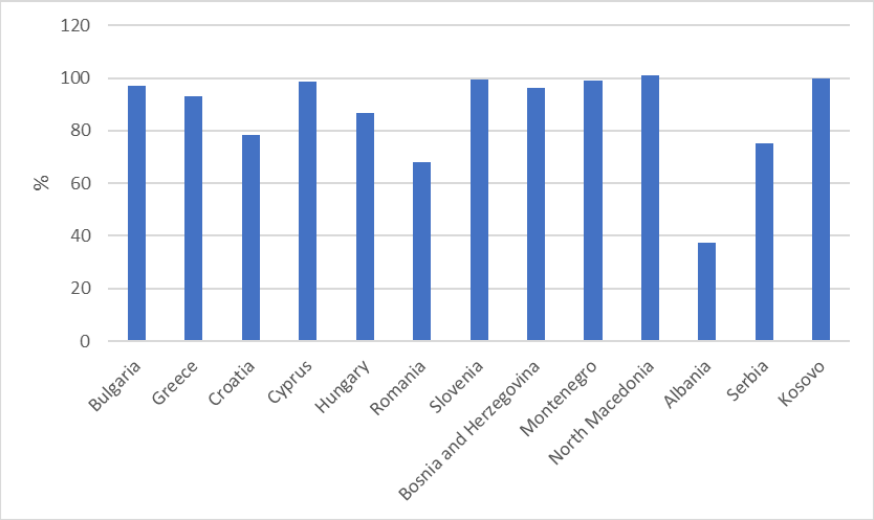
Note: Eurostat does not provide any 2021 data for Turkey.

Source: Eurostat

[1] The energy dependency rate shows the extent to which an economy relies upon imports in order to meet its energy needs. It is defined as net energy imports divided by gross inland energy consumption (which includes stock changes) plus fuel supplied to international maritime bunkers, expressed as percentage. A negative dependency rate indicates a net exporter of energy, while a dependency rate in excess of 100% relates to the build-up of stocks (Eurostat).

Eurostat also presents data for total oil and petroleum products, gas and solid fuels use separately for the SEE region in 2021. More specifically, almost all SEE countries (excluding Albania) relied more than 68% on oil and petroleum products imports in 2021, while Albania's dependence on total oil and petroleum products was about 37.3% (see Figure 7).

Figure 7: Total Oil and Petroleum Products Dependence (%) in SE Europe, 2021

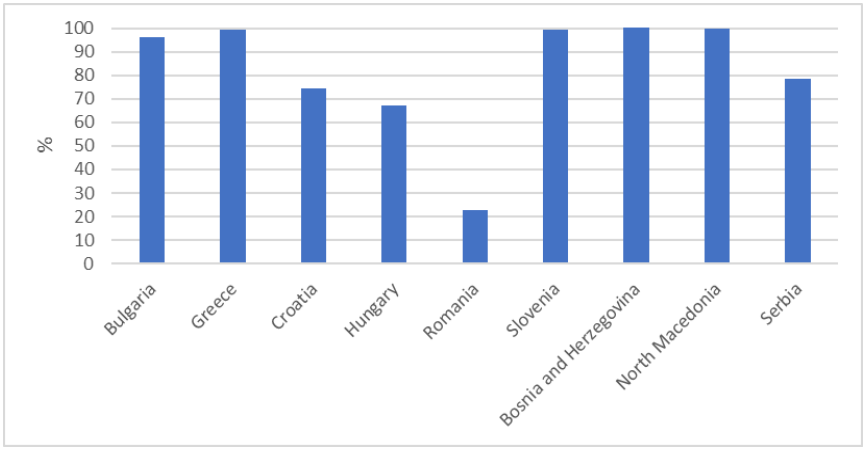


Notes: A dependency rate in excess of 100% relates to the build-up of stocks. Eurostat does not provide any 2021 data for Turkey.

Source: Eurostat

Regarding gas, the majority of the SEE countries (excluding Romania) depended more than 67% on gas imports in 2021, while the gas dependence of Romania was about 22.8% (see Figure 8).

Figure 8: Gas Dependence (%) in SE Europe, 2021

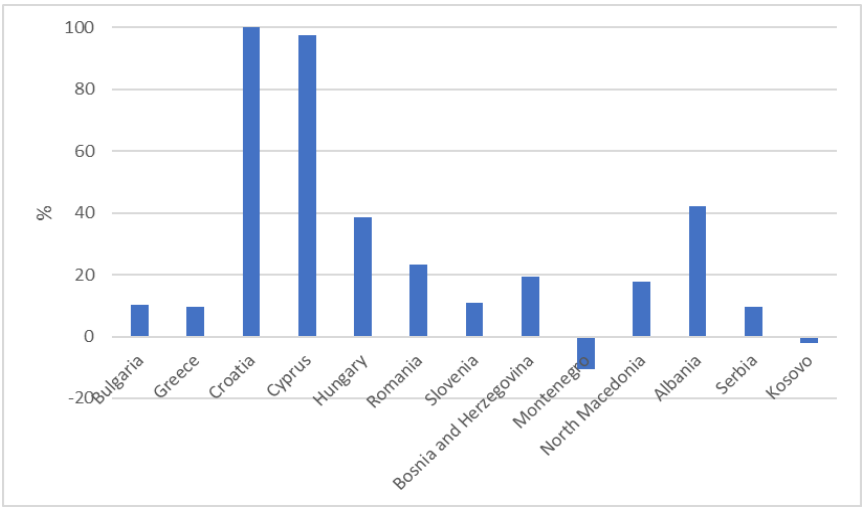


Notes: Albania, Kosovo, Cyprus and Montenegro do not import natural gas. Eurostat does not provide any 2021 data for Turkey.

Source: Eurostat

In terms of solid fuels, only four SEE countries (i.e. Albania, Croatia, Cyprus and Hungary) depended more than 38% on solid fuel imports in 2021, while the solid fuel dependence of the remaining countries was lower than 23% (see Figure 9). Montenegro and Kosovo were net exporters of solid fossil fuels in 2021.

Figure 9: Solid Fuels Dependence (%) in SE Europe, 2021



Notes: A negative dependency rate indicates a net exporter of energy. Eurostat does not provide any 2021 data for Turkey.

Source: Eurostat

Despite the fact that most of the SEE countries are highly dependent on oil and gas, which 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.

3. The Energy Security Dimension

The energy sector and pursued policies and strategies may be analysed through different angles - economic, environmental and geopolitical. The geopolitical approach to energy emphasises energy security, which in most cases appears to dominate energy policy. This stands in contrast to the economic or environmental approaches, which prioritise sustainability and competitiveness.

Energy security priorities are perceived both in terms of supply routes and origin of resources. The geopolitical approach primarily considers the geographical position of a particular country or region from the perspective of the location of the energy resources and how this affects the other parameters. These normally include access, the actors that control resources, their price, existing and alternative transport routes, relations with the regional and global markets, market mechanisms and the regulatory framework that may influence suppliers and marketeers, the availability and management of these energy resources, as well as political decisions and the manner and framework within which they are made.

Although most countries aspire to the lowest possible energy dependence and the maximum use of their indigenous energy resources, whether mineral or renewables, this is not always possible, either due to lack of mineral resources (oil, gas, solid fuels) or of finances. This is often the case where a long-term import deal (e.g. for oil and gas) is preferable in economic terms to the development of local mineral resources. However, in certain cases where a country's sovereignty is at stake and the inland or seaborne transport of energy supplies is vulnerable to enemy action, then, despite the high cost, it is preferable to aim for indigenous energy source exploitation (such was the case in Nazi Germany with the local production of synthetic oil from coal using the hydrogeneration process[2]). Putting for a moment aside the energy security dimension, we observe that countries, which have managed to take advantage of their indigenous mineral energy resources, produce oil and gas, much more cheaply and have an advantage when it comes to the domestic market, where they can achieve competitive prices, or aim towards exports to secure valuable income.

In Europe, and this applies largely to SE Europe, because of the long peace period the region has enjoyed since WWII, many countries placed energy security as a secondary priority. Their primary concern was market development and delivering affordable energy, whether electricity or oil, to as many people as possible. It was only after the war in Yugoslavia in the 1990's and the assertiveness of energy rich Russia following the collapse of the Soviet Union that energy security started to become a major priority of strategic planning.

With several countries in the region until very recently relying entirely on Russian gas imports, there was a major drive soon after the turn of the century to seek alternatives. Under much pressure from the EU, the South Corridor was developed along with a number of new LNG import terminals and cross-border interconnections. However, the region still remains vulnerable due to the limited number of suppliers and to even fewer supply routes.

The Russian invasion of Ukraine has exposed Europe's most painful energy security vulnerabilities. It exacerbated the energy crisis that had been driven by gas supply deficits since 2021. The war showcased the excessive reliance of many EU member states on Russian fossil fuel imports, spotlighting in particular the biggest consumers Germany and Italy. The "earthquake" on the energy markets threatens to slow down the low-carbon transition in Europe although the decarbonisation and the massive uptake of RES could be the strongest policy instrument to achieve sustainable energy independence. Countries in SE Europe are particularly vulnerable to such a scenario.

SEE countries need to immediately cut their dependence on Russian fossil fuel imports as a matter of national security. This is the way to stop funding Russia's war and to counter its malign economic and political influence across the EU. In the context of deteriorating ties with Gazprom, governments in the region have to take immediate measures to ensure the security of supply and the protection of vulnerable consumers. After the Russian decision to cut the natural gas supply to Bulgaria on its long-term contract, there will be a change in the

[2] Yergin, D. (2008), "The Prize: The Epic Quest for Oil, Money & Power", *Free Press; Reissue edition*

direction of physical natural gas flows as Bulgaria seeks to import alternative gas volumes in reverse mode from Greece.

In SE Europe, gas imports at the LNG regasification terminals in Greece, Croatia and Turkey would play a crucial role in maintaining the security of supply. However, it is imperative that Bulgaria, Greece and Romania sign solidarity agreements along the model of other EU member states to optimize the allocation of limited volumes of alternative gas supplies entering the region. The three countries should also seek to conclude a joint LNG import agreement with major suppliers such as Qatar, Algeria or the US that extends beyond emergency deliveries month by month.

As Bulgaria is a major transit country for Russian gas deliveries in the SEE region, a potential standoff with Gazprom over contractual breaches could set off a major gas security crisis, especially in countries with high gas dependence of the energy demand and no physical access to alternative deliveries. In case of a transit halt, Serbia, North Macedonia and Bosnia and Herzegovina, will be especially hard hit.

Energy security risks may increase even further if there is an EU-wide embargo imposed on Russian oil imports. The Bulgarian refinery Neftochim on the Black Sea coast, which is the biggest in SE Europe and also owned by the Russian private company Lukoil, is indispensable for the oil and fuels supply security for most countries of the region barring Greece and Romania. The diversification of the crude oil deliveries for the processing facility is possible as the refinery could operate with similar petroleum grades from Saudi Arabia and the United Arab Emirates. However, this diversification strategy could require Bulgaria to adopt difficult to enforce legal measures against the Russian company on the wholesale market including the possible need to put the refinery complex under state supervision. Retaliatory measures cannot be ruled out, which means that the SE European countries need to boost coordination efforts on jointly managing the oil and fuels stocks in the region as to prevent unsustainable price spikes and deficits on the wholesale and retail markets.

SEE governments should also work out a set of longer-term measures along the "REPowerEU" Plan put forward by the European Commission. They need to design a new energy and climate security strategy that not only tackles the region's excessive reliance on Russian fossil fuel imports, but also the critical role of RES, electrification, energy efficiency, and innovation for ensuring the long-term energy security of the EU without comprising the climate transition process.

The most important prerequisite for the success of energy security reforms in SE Europe is the strengthening of good governance. A radical improvement of the quality of governance that focuses on countering corruption and state capture risks in the energy sector is imperative for the design and implementation of an effective energy and climate security strategy.

4. The Decarbonisation Challenge

In view of high energy security requirements, the issue of decarbonization acquires a new dimension. The key issue, which emerges in the present situation, is how to be able to reconcile increased energy security demands with the need to advance at the same time decarbonization policies.

As the EU moves towards committing to the decarbonisation of its economy to net-zero greenhouse gas (GHG) emissions by 2050, the SE European EU member states are still struggling with dysfunctional energy markets, blatantly inadequate long-term planning capabilities and an overwhelming dependence on fossil fuels.

Combined, these factors represent significant impediments to decarbonisation objectives. The successful transition towards a low-carbon future in the EU relies on the resolution of these problems and the acknowledgement of the different starting points of the SEE EU member states in the decarbonisation process.

With the 'Clean energy for all Europeans' package , the Regulation on the Governance of the Energy Union introduced a new cooperation framework between member states and the European Commission, which requires rigorous and standardised national energy and climate planning. A novelty of this package is that binding targets will only be set at the EU level. Under this mechanism, each member state is required to produce an integrated National Energy and Climate Plan (NECP) for 2021-2030, which will be updated once by 30 June 2024. Member states must also release progress reports, with the first one due in 2023. The plans must be written in a binding template in which governments must outline the actions and strategies to be pursued for each dimension of the Energy Union. Member states will also be obliged to consider the long-term 2050 perspective. The long-term strategies should be revised every five years and updated every ten years.

This framework provides both opportunities and challenges for all SEE countries. While the absence of binding national targets means that this governance framework represents a 'softer' mechanism, it is not any less robust. The NECPs depend on national initiative and management of commitments, which can provide the needed flexibility for tailoring individual solutions. Moreover, by providing a binding template, the governance framework can trigger the development of rigorous national energy and climate planning, which has often been lacking in SE Europe.

At the same time, however, this system may also lead to tensions between SE Europe, generally reluctant to take on aggressive decarbonisation, and the Northern and Western member states. If SE European countries perceive their energy systems and security of supply to be vulnerable, they are likely to adopt very defensive positions at the EU level to maintain strict control over their national energy mixes. This can lead to insufficiently ambitious NECPs, which may prove difficult to correct at a later stage. Hence, if the governance framework is to deliver on its objectives, the concerns of SEE member states cannot be ignored.

While more than half of the electricity generation capacity in SE Europe currently relies on thermal coal and lignite, a power system with a much higher RES deployment has been shown to be realistic. This will require drastic changes in the status quo. While the need for strategic planning is evident, the energy transition will also rely on a mix of rigorous and ambitious policy design, access to diverse financial instruments for investments, as well as functional and transparent energy markets, accompanied by effective social protection for vulnerable energy consumers.

Under these circumstances, one condition for a successful decarbonisation of the European economy is to understand the particularities of the EU member states in the SEE region as well as the Western Balkan countries in order to address specific problems with targeted policy and financial interventions. This requires increased attention and cooperation from both EU institutions and other member states.

Based on a recent study **(2)**, the main key factors identified that hinder a sustainable energy transition vary for each country, but regionally we assess them as follows, starting with the most important:

- **State capture, geopolitics, lack of rule of law and accountability**. This broad set of issues encompasses energy sector decision-making which puts special interests ahead of the public interest. It includes everything from state-owned utilities' excessive influence on policymaking, to non-transparent energy deals with Russia and China and RES incentives schemes that benefit businesses close to governments.
- **Outdated view of the energy system, false solutions and lack of understanding of the speed of change**. It is often difficult to tell whether poor decisions on energy policy result from serving special interests or a lack of knowledge and analysis of the current state of the sector.
- **Incomplete transposition and implementation of EU rules affecting the energy sector.** EU environment, climate, energy and State aid rules, although not perfect, drive energy transition. The EU's environmental legislation also helps prevent destruction of sensitive areas, e.g. by energy and transport infrastructure. Though the countries vary in their adherence to EU law, pollution control, air quality, State aid and biodiversity protection remain problems in most cases.
- **Lack of political courage to tackle mine closure and just transition.** Direct political pressure from coal mining unions is not as high in some of the countries as might be expected, but indirect pressure exists. The governments count on public utilities' employees and subcontractors for political support in elections, again raising the issue of state capture. This, together with the fact that most governments have developed no plans to mitigate the social impacts of the transition in coal regions and other fossil fuel-dependent areas, makes many decision makers reluctant to commit to a coal or wider fossil fuel phase-out.
- **Lack of political will to open markets, cooperate and realise regional synergies.** Opening markets and moving to cost-reflective energy tariffs is a major political difficulty in several countries. People are used to low, regulated prices and many cannot pay more, due to a vicious circle of energy inefficiency and energy poverty.

Political barriers between certain countries clearly exist, but experience shows that national authorities can mostly cooperate with their neighbours when they want to, they just do not always prioritise it.

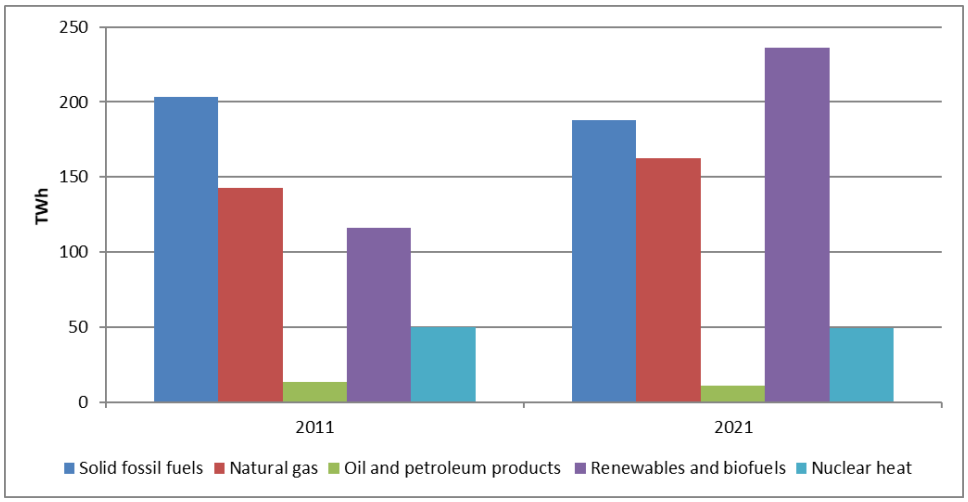
- **Political instability and lack of institutional capacity.** In countries like Montenegro, North Macedonia and Croatia, which are politically in favour of energy transition, a shortage of experienced staff at the central and local government levels is emerging as a key issue preventing better progress. It is also an issue in the other countries, but other factors such as state capture seem to play a stronger role at the moment.

5. The Role of Gas

In SE Europe, the majority of the renewables and biofuels as well as solid fossil fuels and natural gas were used for gross power generation and as a source of heat for industry and buildings in 2021, as shown in Figure 10. During 2011-2021, we observe a parallel decrease of solid fossil fuels and oil and petroleum products use on SE Europe's gross electricity generation.

It is worth noting that natural gas and nuclear are included in the EU Taxonomy[3] as transitional activities in a limited number of circumstances and under strict conditions since January 1, 2023. This aligns with EU's pathway to net zero, where they are recognised as stepping stones in the transition towards more RES. Targeted investments in both are still needed in the medium term. The inclusion of the transitional activities of gas and nuclear is a small, albeit necessary part of the whole EU Taxonomy, which is focused on RES.

Figure 10: Gross Electricity Generation (TWh) by Type of Plant in SE Europe, 2011 and 2021



Source: Eurostat

[3] The EU taxonomy is a classification system, establishing a list of environmentally sustainable economic activities. It could play an important role helping the EU scale up sustainable investment and implement the European green deal. The EU taxonomy would provide companies, investors and policymakers with appropriate definitions for which economic activities can be considered environmentally sustainable. In this way, it should create security for investors, protect private investors from greenwashing, help companies to become more climate-friendly, mitigate market fragmentation and help shift investments where they are most needed.

6. Is Hydrogen the Next Fuel?

The EU's strategy calls for setting up an electrolyzer fleet of total capacity between 5 GW and 6 GW by 2025, and then another 40 GW by 2030. The strategy promotes primarily hydrogen from RES, the so-called green hydrogen. Blue hydrogen, produced from natural gas, is addressed to a lesser degree. It requires capturing and storing carbon dioxide. Also mentioned is the pyrolisis of methane directly into hydrogen and carbon.

Projects for the production and use of green hydrogen are still more political than economic. The projects aim to create a green hydrogen value chain connecting the RES capacities in SE Europe with the growing interest in hydrogen in Western Europe. Recently announced investments in (SE) Europe will undoubtedly give a strong impetus to the technologies for hydrogen production, storage and transport, as well as for its conversion back to energy.

The aim of the EU member states of SE Europe is to meet their targets for hydrogen deployment, according to their NECPs, provided they have set up such targets. In the case of the Western Balkans' countries that are not EU member states, the main goal is to develop a hydrogen strategy. Among others, a good hydrogen strategy could reduce the share of coal/lignite in the regional energy mix and cut GHG emissions. In addition, several projects for the sustainable production of both green and blue hydrogen should be promoted and the majority, if not all, of the SEE countries should join in.

One example is in the transport sector, where Bulgaria is set to take part in the 2 GW Blue Danube project **(3)**, with an estimated budget of €5.8 billion. The project includes eight countries (i.e. Germany, Austria, Czech Republic, Hungary, Slovakia, Croatia, Romania and Bulgaria) and seeks to produce green hydrogen in SE Europe using off-grid wind and solar energy and transport hydrogen via the Danube river to users in countries of Central Europe. It remains to be seen if the SEE region will understand the importance of hydrogen over the next years or it will lag behind developments in Western and Central Europe.

7. The Role of Nuclear Power

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 no fewer than 3 NPPs over the next decade. Nuclear power 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 energy and 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 states have as an alternative the increase of imported gas, magnifying their already high dependence on gas.

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, RES. 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. 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 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. Detailed studies need to be undertaken to identify the real potential pitfalls of nuclear energy and to assess the compatibility of nuclear and RES power in the context of decarbonization.

8. RES as a Key Supply Source

SE Europe's RES potential

Better interconnections, a higher share of RES and better energy efficiency, are some ways to address SE Europe's energy dependence. In terms of RES, SE Europe has abundant resources, and their use is already part of many people's daily lives. Thanks to considerable installed hydropower capacity and the extensive use of biomass for residential heating, the SEE economies use a higher proportion of RES than the EU average **(4)**.

In fact, despite having an installed hydropower capacity of more than 22 GW, the SEE region still has the largest remaining unexploited hydropower potential in Europe, as its river

catchments have remained largely undeveloped. The technical potential of hydropower is estimated to be 522 PJ per year, as shown in Table 1.

While up to 140 large (above 10 MW capacity) greenfield hydropower plants and more than 2,700 small projects (below 10 MW capacity) are in the production pipeline, the sustainability of these projects has sometimes been questioned. In the last couple of years, opposition to the construction of small hydropower plants has been growing, mainly in Albania, Bosnia and Herzegovina, Croatia and Serbia. Local stakeholders and non-governmental organisations (NGOs) have called for a set of principles for sustainable hydropower to be respected, with one of these principles being the prioritisation of investment in rehabilitating existing plants.

Table 1: Technical Potential for Utility-scale Solar PV, Wind and Hydropower in the Electricity Sector in SE Europe (TJ)

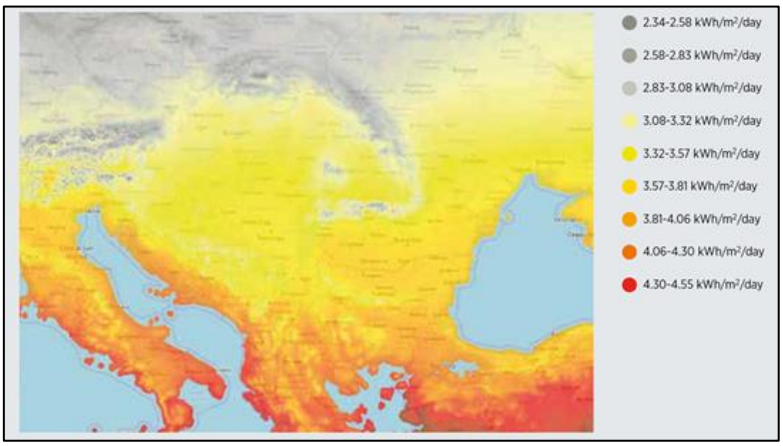
	Utility-scale solar PV	Onshore wind	Hydropower
Albania	13 342	49 154	56 059
Bosnia and Herzegovina	14 886	94 810	88 193
Bulgaria	36 468	190 264	48 071
Croatia	15 682	104 951	30 600
Kosovo*	3 006	13 860	4 853
Montenegro	3 874	23 332	18 079
North Macedonia	8 014	27 558	14 421
Republic of Moldova	21 758	180 450	12 099
Romania	92 902	554 522	136 800
Serbia	33 509	188 590	64 800
Slovenia	1 613	8 266	58 539
SEE	245 052	1 436 156	532 515

TJ = Terajoule

Source: IRENA

Global horizontal irradiance, a key parameter in solar PV installation, is higher in the southern part of the region, where it reaches over 4.5 kWh per square metre per day (kWh/m2/day). Solar resources in the northern part are more modest, down to 3 kWh/m2/day, but in line with or better than other European countries with large PV deployment, such as Germany (see Map 2). The utility-scale solar technical potential of the SEE region is estimated at around 245 PJ (see Table 1).

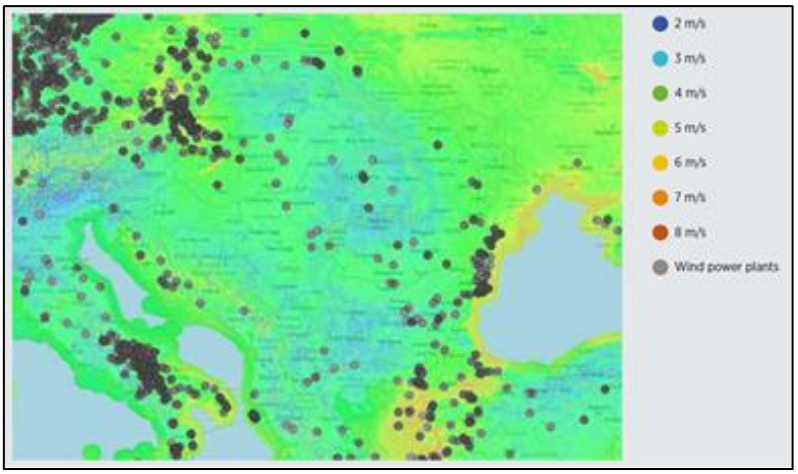
Map 2: Solar Resources in the SEE Region and Surrounding Countries



Source: IRENA

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 resources across the region, with higher average wind speeds in coastal areas and at high altitudes. The Eastern coast of the region (i.e. Romania) enjoys the best wind, with average speeds of 6-to-7 m/s (see Map 3). The Adriatic coast (i.e. Albania, Bosnia and Herzegovina, Croatia, Montenegro and Slovenia) enjoys similar average wind speeds, but this area is also regularly hit by winds that gust between 150 and 200 kilometres per hour. This puts additional stress on wind turbines. However, wind energy is not harvested at its full potential, as in nearby countries with similar wind resources, with the exception of the EU member states of the region. The technical potential of SEE's wind energy is currently estimated at 1,436 PJ (see Table 1). Notably, the presence of a good technical potential is a necessary but not sufficient condition for deployment. Other aspects to consider are the economic limits to supply, market constraints and the presence of appropriate supply chains.

Map 3: Wind Speed and Wind Power Plants in the SEE Region and Surrounding Countries



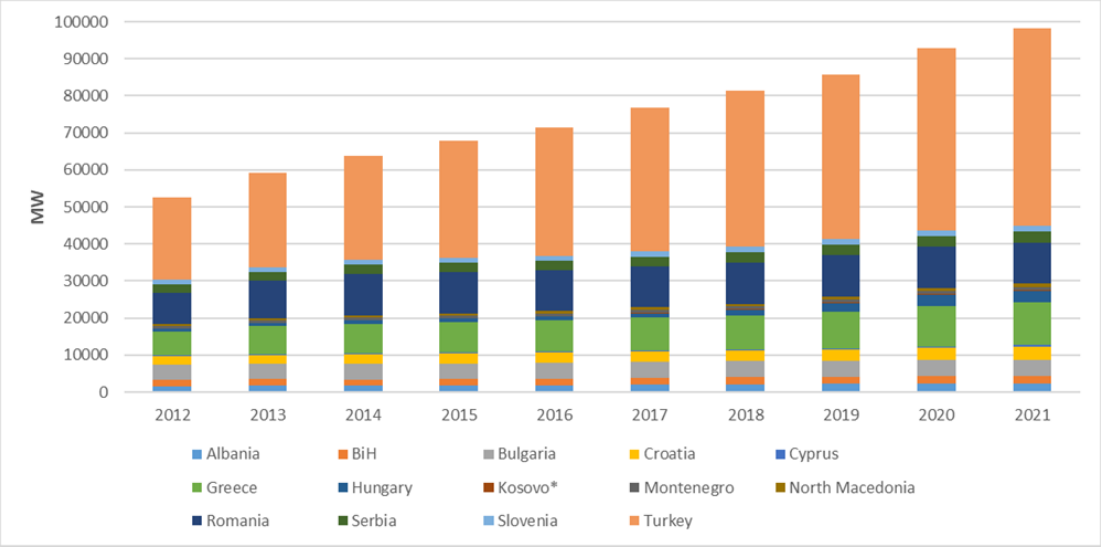
Source: IRENA

RES Increased their Share in SE Europe's Electricity Mix

As SE Europe doubles down on its efforts to decarbonize power generations, the installed capacity of renewable energy systems in the region has almost doubled during the past decade, with local systems reaching 98.19 GW of installed capacity in 2021, according to latest IRENA's data. This represents an increase of 86.7% since 2012, when the region counted 52.6 GW of installed RES units. In addition, the power generation from RES, including hydro, has exceeded 222 TWh in 2020, which corresponds to a 72.5% increase over the last decade.

Electricity generation from RES in SE Europe 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 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.

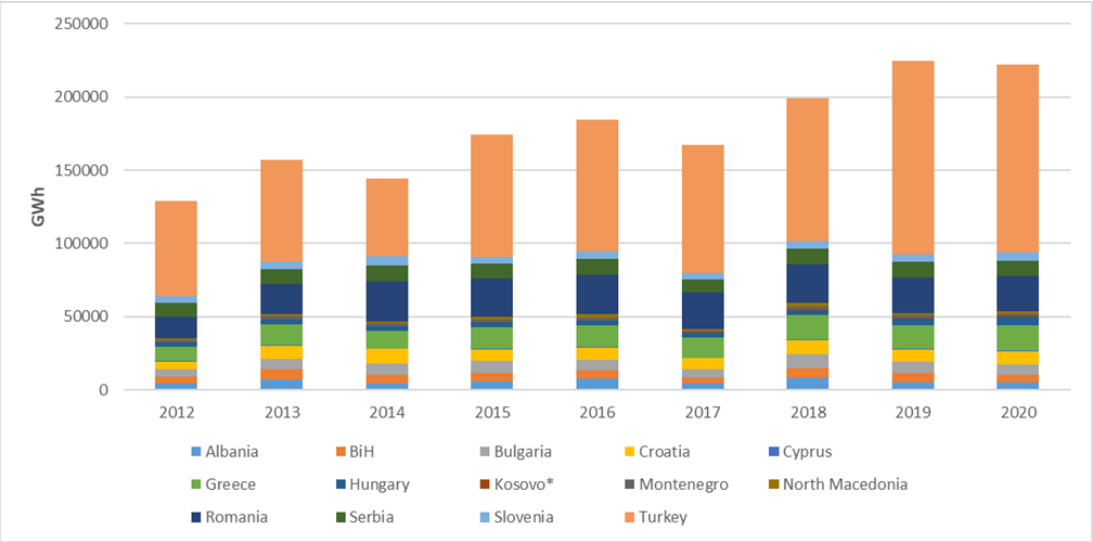
Figure 11: Total Installed RES Capacity (MW) by Country in SE Europe, 2012-2021



Source: IRENA

The most widely deployed renewables are by far in Turkey, which has an RES fleet that consists mostly of hydro and wind, with a considerable capacity of geothermal energy, which in total exceeded 53.2 GW of installed capacity in 2021. Turkey is followed by Greece and Romania, with installed RES capacity of 11.5 GW and 11.1 GW respectively in 2021.

Figure 12: Power Generation (GWh) from RES, Including Hydro, by Country in SE Europe, 2012-2020



Source: IRENA

As RES are being recognized as one of the most important energy resources in mitigating climate change, the global market is amidst an ongoing ramp up in terms of new installations, with production costs of variable renewables' systems having fallen rapidly during the past decade. Consequently, lower costs have driven an escalation in the deployment of solar PV and wind turbines across the region, making them competitive.

Figure 13: Global Weighted Average Total Installed Costs, Capacity Factor and Levelised Cost of Electricity Trends By Technology, 2010 and 2021

	Total installed costs (2021 USD/kW)			Capacity factor (%)			Levelised cost of electricity (2021 USD/kWh)		
	2010	2021	Percent change	2010	2021	Percent change	2010	2021	Percent change
Bioenergy	2 714	2 353	-13%	72	68	-6%	0.078	0.067	-14%
Geothermal	2 714	3 991	47%	87	77	-11%	0.050	0.068	34%
Hydropower	1 315	2 135	62%	44	45	2%	0.039	0.048	24%
Solar PV	4 808	857	-82%	14	17	25%	0.417	0.048	-88%
CSP	9 422	9 091	-4%	30	80	167%	0.358	0.114	-68%
Onshore wind	2 042	1 325	-35%	27	39	44%	0.102	0.033	-68%
Offshore wind	4 876	2 858	-41%	38	39	3%	0.188	0.075	-60%

Source: IRENA

The Time to Scale-up RES and Energy Storage in SE Europe is Now

Russia's war in Ukraine and the ensuing global energy market disruption has sent EU countries scrambling for alternatives to secure domestic energy supplies. With its

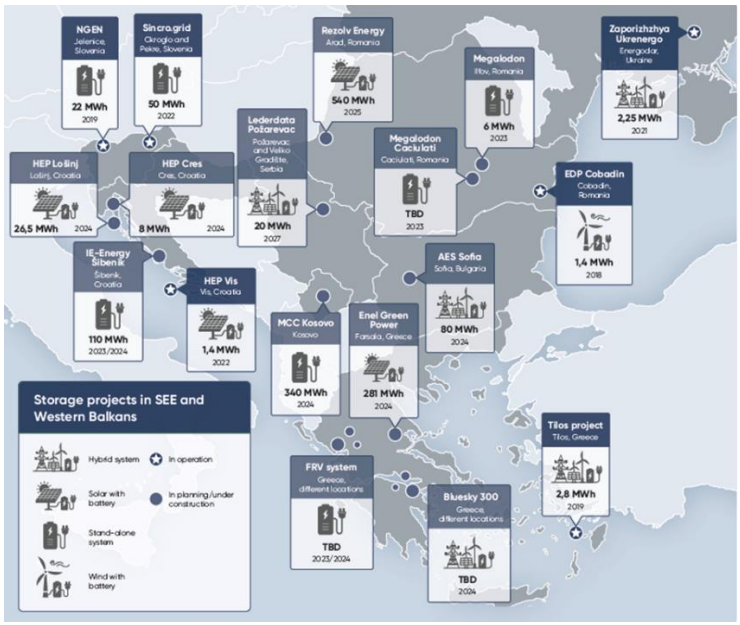
"REPowerEU[4]" Plan, the European Commission aims to accelerate the roll-out of RES technologies (which now rank among the cheapest sources of electricity worldwide) to replace fossil fuels in power generation, industry and transportation.

The fastest way to achieve decarbonisation goals in SE Europe is to accelerate the phase-out of coal and replace it with RES. Every year putting off the coal exit crowds out investments in cleaner and cheaper alternatives, increase the human and health costs of air and water pollution and slows the economic transition to sustainable development.

A cornerstone of a successful energy transition in the region is the accelerated uptake of energy storage technologies. While integrating 10%-20% shares of variable RES like wind and solar into the mix of most countries is achievable without requiring major investments, reaching higher RES penetration of 40% to 50% or more requires a concerted effort to improve power system flexibility. RES investments are growing rapidly in countries across the SE Europe, including Greece, Albania, Kosovo and Montenegro, which raises the need for faster integration of storage technologies.

One of the key findings of a new study **(5)**, published by Berlin-based E3 Analytics, in partnership with the European public policy institute Center for the Study of Democracy, is that storage can not only help improve the security of power supply and smooth the path to decarbonisation but can provide utilities with greater confidence as they increase the share of wind and solar power in the system. In addition, battery storage systems are starting to beat fossil gas on both price and performance, undermining one of the main arguments for prolonging countries' reliance on an increasingly unreliable fuel.

Map 4: Energy Storage Projects in SE Europe



Source: Center for the Study of Democracy

[4] "REPowerEU" is the European Commission's plan to make Europe independent from Russian fossil fuels well before 2030, in light of Russia's invasion of Ukraine. It is backed by financial and legal measures to build the new energy infrastructure and system that Europe needs.

EU member states in the SE European region have earmarked considerable public resources from the Recovery and Resilience Facility for power storage investments. Although government support for storage investments is welcome (and is among the recommendations of the aforementioned report), giving out substantial subsidies to large-scale storage projects, such as the 1,500 MW/6,000 MWh RESTORE project in the Bulgarian National Recovery and Resilience Plan, may be wasteful. **(6)**

A smarter approach to incentivise storage uptake would be to follow in the footsteps of Belgium and the UK and improve wholesale electricity market rules for the remuneration of storage services. In fact, investments in grid-scale batteries are already economically viable today in markets with a clear remuneration scheme for the market participation of storage plants. In turn, it may be more useful to focus public resources mainly on promoting battery recycling facilities and encouraging second-life applications.

Large projects are susceptible to corruption and mismanagement and may face implementation delays due to governance deficits. This means that rather than accelerating the transition process, focusing too much on large-scale storage projects may serve to bottleneck it.

The storage analysis lays out several key steps governments in the region can take:

- National update of wholesale power market rules to allow fairer compensation for storage system owners.
- A long-term strategy including clear targets to increase storage adoption in tandem with variable RES deployment
- Introduction of storage auctions and auctions for hybrid wind, solar and storage projects
- Removal of unnecessary technical and licensing requirements for the integration of storage technologies
- Avoiding putting all eggs in one basket by fostering a range of storage technologies
- Acceleration of the shift toward a circular economy, including investing in local facilities for battery recycling and developing second-life applications.

By harnessing more of the region's abundant RES potential and pursuing a balanced mix of grid-scale and behind-the-meter storage systems, countries in SE Europe can accelerate the phase-out of coal and gas while mitigating numerous energy and climate security risks. With a mild winter and calmer energy markets, there has perhaps never been a better time to unlock investments in a more sustainable and secure future energy system.

9. Energy Efficiency as a Champion Energy Source

On October 10, 2020, the European Commission adopted "An Economic and Investment Plan for the Western Balkans" **(7)**, which identified flagship initiatives related to clean energy and the transition from coal. An overall budget of €9 billion during 2021-2027 is proposed for the Plan's implementation, of which a fair share is expected to finance building renovation and decarbonisation of the heating and cooling sectors.

The Plan relies on support from the Energy Community Secretariat to implement the Renovation Wave. In this respect, its role may be manifold. The Secretariat offers its assistance to the Western Balkan Contracting Parties in improving the legal framework and removing regulatory barriers in the building sector; facilitating information sharing and exchanging best practices; and serving as a bridge between the providers of technical and financial assistance and beneficiaries.

In contrast to the Western Balkan countries, the EU has already acquired extensive experience in implementing financial and fiscal instruments to support building renovations. These instruments have different sources of finance, delivery mechanisms and approaches, and are available to more sectors, including residential, commercial and Small and Medium sized Enterprises (SMEs).

In the EU, only in the last four years, the Joint Research Centre[5] identified a total of 129 ongoing public financial and fiscal schemes supporting energy renovations, of which around 61% are in the form of grants and subsidies, 19% are soft loans, 10% are tax incentives and the remaining 10% a combination of the above. The same study showed that around €15 billion are being spent annually across the EU for energy efficiency in public and non-public buildings. The majority of the instruments applied in the residential sector in the EU Member States are based on grants and subsidies, traditional loans and soft loans and fiscal incentives.

Despite the many instruments at hand, the renovation of buildings in the EU has proved to be very difficult and quite slow, compared to expectations. Presently only 1% of buildings undergo energy efficient renovation every year, while about 75% of the building stock is considered energy-inefficient. In the Energy Community, the renovation process is even less advanced.

In the Western Balkans, it is estimated that approximately €1.06 billion were invested in energy efficiency projects in all building categories between 2010 and 2020, based on Energy Community Secretariat calculations **(8)**. The figure is significantly lower in the residential sector, which due to the many barriers is considered a difficult market to serve as it is fragmented, with small-scale investments, and riskier than the other building categories.

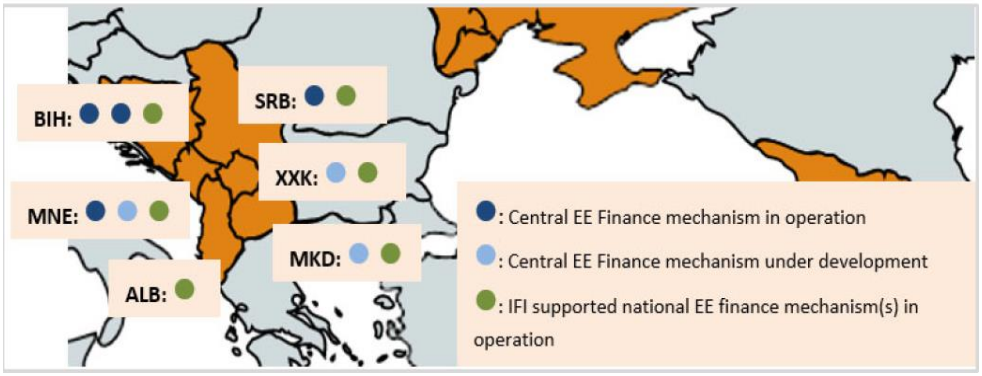
With the support of donor engagement in energy efficiency projects, many Western Balkan countries have established, or are in the process of establishing, centralised energy efficiency financing mechanisms. These are complemented by multi-country initiatives supported by International Financial Institutions (IFIs), as shown in Map 5.

One category is represented by multi beneficiary programmes, mostly funded by loans from IFIs with incentives and technical support provided by the European Union. However, despite the large number of regional energy efficiency credit lines (supported by IFIs and the

[5] Joint Research Centre (2019), "Accelerating energy renovation investments in buildings – Financial and fiscal instruments across Europe", https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/accelerating-energy-renovation-investments-buildings

EU) available to help improve energy efficiency in residential buildings in the Western Balkans, their uptake has remained modest and focused on high income segments and those living in detached houses.

Map 5: Overview of Centralised Energy Efficiency Financing Mechanisms in the Western Balkans



Sources: Energy Community Secretariat

The building sector accounts for over 40% of total energy consumption in the Western Balkans. Renovating public and private buildings to meet minimal energy performance standards can make a very significant contribution to the reduction of GHG emissions, improve living standards and health. A building Renovation Wave implemented with the help of the Energy Community will assist the Western Balkans and SE Europe in general in decarbonizing public and private building stock, with a strong emphasis on digitalisation and taking into account energy poverty. The EU, together with international financing institutions, will support the efforts of the Western Balkans partners to triple the current renovation rate and energy savings in existing buildings and achieving nearly-zero energy and emission standard in new buildings.

10. Electromobility Begins to Gain Momentum

Electromobility is one of the fastest growing sectors in today's economy. The simple but sustainable development framework for the future of this industry includes most big global automotive manufacturers presenting their own hybrid and purely electric models on the market. The cycle of production covers also the development of batteries and the manufacturing of charging infrastructure in which most engineering companies in the field become active as well. As a result, the number of electric cars in use grows every year, consumer and business attitudes are changing in a positive direction, national laws are adapting to this inevitable direction in the development of contemporary transport.

In SE Europe, electromobility is also developing but at a slower pace in comparison to other parts of the continent. In recent years, there are many different projects and initiatives related to the expansion of the sector in the SEE countries. Both local and foreign companies invest in technical and physical infrastructure, including power stations, service centres,

recycling of batteries, suppliers, electricity production, potential renewable energy sources, etc. In parallel, the EU legislation in terms of electric vehicles has matured a lot over the last decades, while there are many potential partner organizations for e-mobility development in the SEE countries and outside the region.

Another important aspect of the successful implementation of electromobility across SE Europe is the R&D and innovation infrastructure. More and more R&D labs, innovation centres, universities and companies are working in this direction, studying local and global market trends.

For the SEE countries, there are numerous opportunities for updating regional and national policies and strengthening common activities with western EU countries. The development of electromobility in the region is not simple and cannot happen fast. It needs to engage the regional and national authorities into the process and perceive the best practices for preparing electric vehicle infrastructure in the near future.

11. Energy Market Liberalization and Integration in SE Europe

Ever since the EU set up the process of developing the internal market, the energy sector and especially the electricity sector have monopolised the EC's attention. It has taken more than 20 years of persistent efforts and countless disagreements and legal cases with incumbent electricity authorities for the European Commission to manage the transition from state control of the electricity sector to an open and market-oriented system with competition among producers, suppliers and distributors. In SE Europe, this liberalisation process was fraught with difficulties and numerous non-technical obstacles, as the incumbent companies in almost all countries solidly resisting change in order to maintain market control and hence political influence.

Several years later, the situation in EU member countries and Turkey looks very different, with certain countries having managed to complete what appeared to be an anomalous transition period. In the case of Turkey, the progress achieved in electricity market unbundling and retail competition has been highly successful, with the market opening up much faster than anticipated. In the case of the Western Balkans, we have the intervention of an EU institution, the Energy Community, through the contracting parties, which has facilitated the overall transition process and acceptance of the European Acquis. Hence, some solid steps have been made towards electricity market competition. However, progress is not very satisfactory in most contracting parties, largely because of the inflexible market structure and the stiff hold of the state over market mechanisms.

Due to the increasing significance of having a secure electricity supply and its positive impact on the environment and society, the energy sector in SE Europe is characterized by vertically integrated natural monopolies. If one also takes into account that the energy sector has long been highly regulated, it is easy to see why electricity and gas markets have high operating costs and high retail prices, along with costly large-scale investments, low-quality services and lack of competition in supply and generation.

Reforms in several countries in SEE have already been implemented in order to generate electricity within actual marginal production costs. However, distribution and transmission services are expected to remain natural monopolies as they satisfy security of supply.

Furthermore, there is a kind of dilemma between bilateral trading and power exchange-based markets in terms of competition. Despite the fact that bilateral markets are more flexible than the exchanges, their negotiation procedure can be expensive, while exchanges provide higher security for market participants, lower trading costs, increased competition and full transparency. As the number of players in the electricity market of each country in SEE region increases, the higher the competition becomes. Several countries have already established an energy market and enjoy its benefits.

Indicatively, in the electricity sector of Bosnia and Herzegovina, there is no competition and no electricity trading platform, Albania and Kosovo have already signed an agreement to establish a joint power exchange, known as APEX, while competition in the Croatian market is very limited as it trades bilaterally. In Montenegro, the wholesale market is open for competition, including the balancing market, except for the balancing reserve.

In general, the SE European electricity markets can be characterized by the following issues: (a) only basic steps in the electricity market procedures were realized by the majority of the countries, (b) cross-border power trading has until now been based on bilateral agreements between countries, (c) market coupling especially via the flow-based approach has not yet been fully implemented, and (d) the transmission network in the SEE region seems to have different characteristics in comparison with the Central and Western European meshed grid, where market coupling procedures are more mature.

The main challenge for the economies of SE Europe is to commit to and insist on the implementation of long-term reforms that will target competitiveness and better integration among the EU member states of the region, their neighbors, candidate countries and potential candidate countries. Such reforms in the economy are likely to have a direct and positive impact on the further development of energy markets and the creation of favourable conditions in attracting suitable outside investment.

The real progress achieved in the gas markets of SE Europe during the last decade is rather poor. The nature of gas markets in the region remains predominantly national, with very little, if any, cross border trade taking place, other than that implemented through the long term supply agreements national incumbents have with their traditional suppliers.

With the exception of Croatia and Romania, whose indigenous production covers almost 60% and 80% of their domestic demand respectively, all other SEE countries that have a gas market are solely depending on imports. Albania, Montenegro, Kosovo and Cyprus still have no gas market, while only Greece, Croatia and Turkey possess LNG gasification terminals, representing the only LNG import points in the whole region.

In addition, the whole region is characterized by the lack of sufficient interconnectors, which would allow the development of gas trade between the countries. In practice, the only pipelines that link the countries of the region are the traditional transit pipelines, which have been developed to serve the long-term contracts signed several decades ago, mainly in implementation of Intergovernmental Agreements (IGAs). In most of the cases, these pipelines are subject to long-term capacity reservation through ship-or-pay transit contracts. The validity of all those transit agreements, concluded before countries such as Romania and Bulgaria joined the EU, supersedes the legal obligations arising from the European Acquis on energy. Therefore, access to these pipelines is, in principle, prohibited until the Intergovernmental Agreements expire.

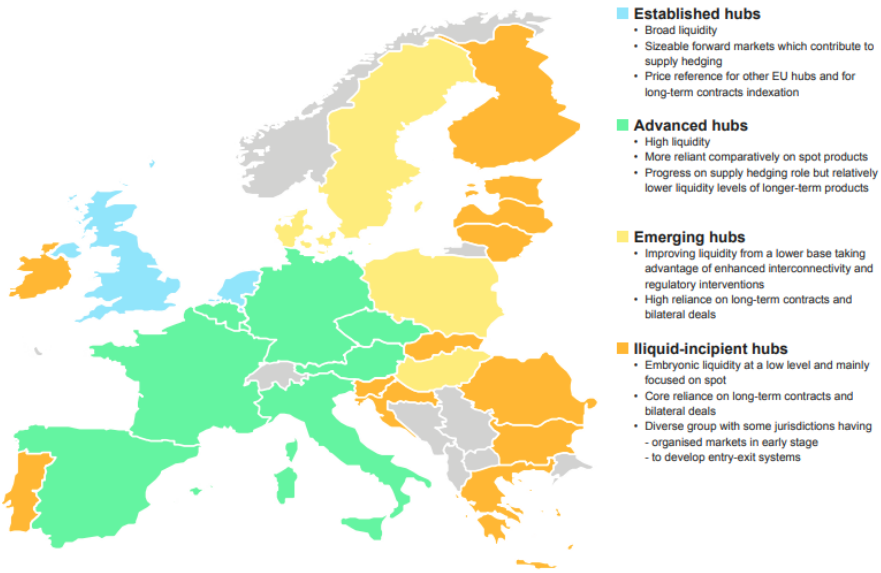
Over the last few years, the only important gas infrastructure developments in SE Europe included the operation of the Turkish Stream pipeline, TAP and IGB. Turkish Stream connects Russia with Turkey across the Black Sea. On January 18, 2020, the opening ceremony was held, marking the first deliveries of gas to Turkey.

The Trans-Adriatic Pipeline (TAP), forms part of the Southern Gas Corridor, which transports natural gas to Europe from the Shah Deniz II field in Azerbaijan. Commercial operation began on November 15, 2020. TAP AG, its builder, owner and operator, confirmed the commencement of gas flows from Azerbaijan on December 31, 2020. The first gas volumes reached Greece and Bulgaria via the Nea Mesimvria interconnection point with Greece's DESFA, as well as Italy, via the Melendugno interconnection point with Italy's SNAM Rete Gas.

In addition, the gas interconnector Greece-Bulgaria (IGB) started commercial operation on October 1, 2022. The first quantities of natural gas through the interconnector were transited at the beginning of the gas day from the TAP. IGB successfully connects the national gas transmission networks of Greece and Bulgaria at Komotini and Stara Zagora. The total capacity with which the gas pipeline begins operating is 3 billion cubic meters per year (bcm/y).

As it is evident from the above analysis and Map 6, we are still facing a highly fragmented landscape for gas market development in SE Europe, with effectively no cross border trading as yet, which is very difficult to support the development of competition and of liquid market trading, despite the high interest of several SEE countries in becoming gas trading hubs **(9)**. In this environment, it is too difficult to imagine how the pan-European vision of a Gas Target Model would be implemented in a reasonable time frame. Some analyses show that, despite this market fragmentation, there are elements of national gas market legislation and regulation that would allow gas trading as performed in the more mature gas hubs of Europe and the US.

Map 6: Ranking of EU and UK Hubs Based on Monitoring Results – 2020



Source: ACER (10)

This reveals that the only way forward for the appropriate development of the gas market in the region is the consistent and rapid implementation of the provisions of the Third Energy Package, at least to the extent that the countries have committed to implement it in a legally binding way, i.e. the EU Member States and the Energy Community Contracting Parties.

Turkey's plans are rather ambiguous. It is making efforts to enhance competition domestically, at least at the level of wholesale supply and, to some extent, retail. However, Turkey reveals a scepticism in implementing radical legal reforms that would allow its gas market, which is by far the largest and most dynamic in the region, to genuinely open to competition from the outside, by, for example, joining the Energy Community or, as an alternative, implementing crucial parts of the legislation for market liberalisation to which most of the countries in the region have already committed.

12. Energy Investments in SE Europe on the Rise

A short assessment of the energy investment outlook of each one of the 15 countries, which IENE's SE Europe Energy Outlook 2021/2022 study covered, has been made. This investment outlook covers a period of 10 years, i.e. 2021-2030, as it is important to be able to appreciate the long-term investment potential of the countries concerned and the region as a whole. With the danger that some of the estimates may not be that accurate, especially in the second five-year term, i.e. after 2026, it was nevertheless considered important to provide a far reaching investment outlook in the belief that this helps investors, especially institutional ones, in their search for attractive and viable investment opportunities in the region's energy sector.

What the tables which follow show is the broad energy related investment picture of the region. However, before looking at the data in the tables, it is important to consider two important aspects which shape investment forecasts. Firstly, data and estimates are not controlled for the impact of the pandemic on the policy priorities of the various countries. Secondly, the numerical estimates of investments per energy sector are based on the investigation undertaken by IENE associates in the context of the preparation of each country profile. Most figures are based on official government and corporate announcements involving future investments. However, in certain cases where hard information was lacking, IENE, on the basis of relevant information not necessarily originating at government or corporate level, has carried out its own independent estimates backed by its considerable experience and familiarity with the various energy activities in the various countries of the region.

A significant amount of forthcoming investment and the identification of energy related business opportunities is associated with a number of key cross-border energy projects, a small number of which are already in the implementation stage, whereas others, the great majority, are at an advanced planning stage. These projects cover gas pipelines, both interconnectors and major transnational projects, but also cross-border high-voltage electricity transmission lines.

The total energy investment estimate for the SE European region amounts to approx. €437 billion for the period 2021-2030, as presented on a country-by-country basis in Table 2. By adding the total country and cross border projects' estimated investment costs, which stand at €31.7 billion, we arrive at a global investment estimate for the entire region. Thus, the global investment estimate for the 15-country group in SE Europe stands at about €468.7 billion. This compares to €273 billion of Scenario A and €333 billion of Scenario B, as reported in the SEEEO study of 2016/2017 published in 2017, indicates a much higher investment potential level for the entire region.

Even if we are to exclude Hungary and Israel, which were not part of the SEEEO 2016/2017 study, the total corresponding investments for the 13-country group amount to €387.1 billion. A number, which is much higher in Scenario B (in the 2017 SEEEO publication). If we are to consider just Scenario A (corresponding to stated policies), we are talking about an increase of + €114.0 billion of anticipated investments over the 10-year period. This is a vast improvement compared to five years ago and indicates the region's increased attractiveness as an energy investment destination. Anticipated investments show an increase by 41.8% for the 13-country group compared to estimates complied 5 years ago.

Table 2: Total Anticipated Energy Investment per Country for 2021-2030

Country	Estimated Investment (mn €) 2021 Estimate	Estimated Investment (mn €) 2017 Estimate	GDP growth 2021 (%) IMF World Economic Outlook	GDP growth annual projection to 2025 (%)
Albania	4,500	7,460	5.3	3.5-4.5
Bosnia & Herzegovina	9,400	8,722	2.8	3-3.2
Bulgaria	47,000	11,050	4.5	3.1-4.5
Croatia	21,000	8,525	6.3	3.2-5.8
Cyprus	16,200	7,350	4.8	2.7-3.6
Greece	44,400	23,300	6.5	1.5-4.6
Hungary	25,300	-	7.6	2.6-5.1
Israel	39,300	-	7.1	3.2-4.1
Kosovo	7,400	2,605	4.8	n/a
Montenegro	4,600	2,400	7.0	2.9-5.6
North Macedonia	10,400	3,400	4.0	3.6-4.2
Romania	50,100	20,630	7.0	3.6-4.8
Serbia	15,200	11,260	6.5	4.0-4.5
Slovenia	12,100	3,185	6.3	2.9-4.6
Turkey	130,000	124,935	9.0	3.3
Total	**436,900**	**234,822**		

NB. Hungary and Israel were not included in the 2017 SEE Country Survey and hence no estimates have been prepared by IENE.

Source: IENE

Table 3: Total Anticipated Energy Investment per Sector for 2021-2030

	Project sector	Description	2021 Investment estimate (€ mn)	2017 Investment estimate (€ mn)
OIL	Upstream	• Field Exploration • Development of new oil and gas wells	63,000	38,790
	Downstream	• Refining (upgrading) • Loading Terminals • Storage facilities • Crude / Product Pipeline(s)		
GAS	Country Gas Network	• Grid development • Main intra country pipeline(s) • Storage facilities • FSRU and LNG Terminals	25,150	16,550
ELECTRICITY	Power Generation	• Lignite • Coal • Gas (including CHP) • Nuclear • Large Hydro	150,150	139,550
	Electricity Grid	• New H/V transmission lines • Upgrading and expansion of existing grid		
	RES	• Small Hydro • Wind farms • Photovoltaics • Concentrating Solar Power • Biomass (including liquid biofuels) • Geothermal	109,900	40,009
ENERGY EFFICIENCY		• Buidings • Industry • Electric vehicles	88,700	-
	Total anticipated investments by 2030		436,900	234,822
	Gas infrastructure		23,303	33,350
	Electricity Interconnections		8,440	4,700
	Cross-border energy projects (total)		**31,743**	**38,050**
	Grand Total		468,643	272,872

*(1) This estimate refers to Scenario A as stated in SEE Energy Outlook 2016/2017, p. 1123-1124.
(2) No investment estimates for Energy Efficiency applications were provided in the SEE Energy Outlook 2016/2017.

An analysis of the planned energy investments in the SEE region informs us that the bulk of the anticipated investments are to be found in the electricity sector, which covers power generation plants, electricity transmission lines and distribution grids. Electricity infrastructure projects lead the way with substantial new investments reported by almost all countries. These include the construction of new power generation stations (i.e. thermal, hydro, nuclear and RES), maintenance and upgrading of existing ones, new HV transmission lines, electricity grid extension and coal mine development.

The electricity-oriented investments correspond to approx. 34% of the total energy investments in the region at €150 billion. Following electricity investments are the RES related investments corresponding to 25% of the total at about €110 billion. Thus, electricity and RES form the backbone of investment activity in the region's energy market and it is in this area that new business opportunities are mainly to be found.

Third in line in terms of funding needs is energy efficiency, corresponding to 20% at €88.7 billion. The investment prospects in this area appear much improved compared to the estimations of the "SEE Energy Outlook 2016/2017". In fact, this is a fast growing business with building renovation for improved thermal performance being a core activity. Back in 2017, when the second SEEE Outlook was published, there appeared to be limited activity. So, 'energy efficiency' has grown exponentially in investment terms over the last 5 years.

Following that, a 14% at €63 billion corresponds to hydrocarbon investments, with the majority in the upstream sector. While natural gas fares lowest at 6.0% of the total anticipated investments at €25.1 billion, with the bulk of the funds channeled to major gas pipeline projects and LNG facilities.

Oil and gas oriented investments stand at the lower level of total anticipated energy investments in SE Europe, mainly due to the downturn experienced over the last two years in oil and gas exploration on account of the coronavirus pandemic and changes in strategic investment plans of major oil and gas companies. Therefore, in terms of planned investments, mainly in the upstream sector, activity has generally slowed down. This, among others, reflects the change of priorities by governments and companies as more and more attention is being paid to electricity related projects, which appear to lead the way in the new energy transition era.

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