Background Paper*

"What Kind of Energy Transition?"

INSTITUTE OF ENERGY
FOR SOUTH-EAST EUROPE

***This Background Paper has been specially prepared by IENE in the context of the Vienna Energy Transition Forum. This Paper, in its present form, is stricter for information of the participants of the Forum and is not intended for wider circulation.**

WHAT KIND OF ENERGY TRANSITION?

BACKGROUND PAPER

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Introduction

As concern is growing, at least in the west, on the role of anthropogenic activities and their impact on climate change, energy is fast emerging as a key culprit. Hence, governments, international organisations and companies are unfolding plans on how to curtail energy use but also substitute polluting fuels such as coal and fuel oil with emission free energy sources, most notable of which are renewables such as wind and solar.

The drive towards decarbonisation has acquired a new meaning as the EC, notwithstanding the economic and social costs involved, pushes ahead regardless setting even more ambitious targets for 2030 and 2050. Other countries too in compliance to the Paris Agreement commitments are also pressing ahead with plans to substitute polluting fuels such as solid fuels and fuel oil, used for power generation. As more and more gas is used as a choice of fuel for electricity generation and power producers are switching more and more to renewables, an "energy transition" is taking hold.

The question now arising from this unprecedented change of energy policies in many countries, to move away from coal and substitute it with gas and renewables, is what kind of "Energy Transition" do we really want. Shall we move full speed ahead with a gigantic switch to renewables and gas, for base load, to the exclusion practically of everything else, or are we prepared to examine the inclusion of the traditional oil and gas industry together with nuclear energy as part of more balanced and down to earth decarbonisation policies?

Large industrial groups in Europe and the USA are coming under increased pressure by minority shareholders but also by liberal minded media to disclose their thinking but also announce action plans to be implemented which will align their energy policies with Paris Agreement goals for limiting the rise of temperature to 1.5^{o}C.

In 2017, Europe generated more electricity from RES than from coal, reaching 30% of annual consumption. This is a clear sign that a transformation in Europe is underway with positive influence in the countries beyond the continent, but we need to go further and faster if we are to achieve large-scale clean and affordable electricity. If we take into account that the new EU regulatory framework includes an energy efficiency target for 2030 of 32.5% with an upwards revision clause by 2023, the new objective shows EU's high level of ambition and demonstrates the remarkable pace of change of new technologies and reduced costs through economies of scale. Together with the agreed 32% EU RES target for 2030, Europe will be well equipped to complete the clean energy transition and meet the goals set by the Paris Agreement.

While market integration and transition to cleaner fuels is progressing well at European level, this is not the case for Central and SE Europe. In most SE European countries, regional energy cooperation has been perceived as a necessary part of the European integration process. At the beginning of the present decade, the main targets of EU energy policy were incorporated in the long-term strategies of SEE countries. Lately, the focus has been redirected towards modernisation of energy infrastructure, the construction of new facilities, including electricity and gas interconnections, improvement of energy efficiency and increased use of RES.

SE Europe, in particular and in contrast to the rest of Europe, remains committed to continuing coal use. Based on IENE's estimates[1], the share of solid fuels for power generation is

[1] IENE (2017), "SE Europe Energy Outlook 2016/2017", *An IENE M23 Study*, http://www.iene.eu/SEEEO-2015-2016-Promotional%20Booklet-p2317.html

anticipated to hold its present position if not increase in several countries of the region (most notably in Serbia, Kosovo, Croatia, Bosnia and Herzegovina, Montenegro, Greece and Turkey) over the next 10-15 years, as they will struggle to meet increased energy demand. Hence, the road towards decarbonization and the transition to a "greener" future in SE Europe, with higher use of natural gas and RES, appears difficult, if not uncertain, in comparison with the rest of Europe. Paris agreement is proving to be an important reference point and an accelerator to global energy transformation.

The Global Energy Transition

RES, particularly wind and solar, have grown at an unprecedented rate in the last decade and have consistently surpassed expectations. The growth of their deployment in the power sector has already outpaced that of any other energy source, including fossil fuels, which include oil, coal and natural gas. RES, in combination with energy efficiency, now form the leading edge of a far-reaching global energy transition[2].

This ongoing transition to RES is not just a shift from one set of fuels to another. It involves a much deeper transformation of the world's energy systems that will have major social, economic and political implications which go well beyond the energy sector. The term "energy transformation" captures these broader implications[3].

This ongoing global energy transformation will have a particularly pronounced impact on geopolitics. As the IRENA says, it is one of the undercurrents of change that will help to redraw the geopolitical map of the 21st century. The new geopolitical reality that is being shaped will be fundamentally different from the conventional map of energy geopolitics that has been dominant for more than one hundred years.

Fossil fuels have been the foundation of the global energy system, economic growth and modern lifestyles. The exploitation of fossil fuels lifted global energy use fifty-fold in the last two centuries, shaping the geopolitical environment of the modern world. The geographic concentration of fossil fuels has had a significant impact on the wealth and security of nations. An energy transformation driven by RES could bring changes just as radical in their scope and impact.

As a result, the majority of countries can hope to increase their energy independence significantly, and fewer economies will be at risk from vulnerable energy supply lines and volatile prices. Some countries that are heavily dependent on exports of oil, gas or coal will need to adapt to avoid serious economic consequences. At the same time, many developing economies will have the possibility to leapfrog fossil fuel-based systems and centralized grids. RES will also be a powerful vehicle of democratization because they make it possible to decentralize the energy supply, empowering citizens, local communities, and cities.

The Global Energy Transformation

Although rapidly growing RES have unquestionably started to transform the global energy landscape in an irreversible way, at the same time, considerable uncertainty still surrounds the energy transition that is taking place. As the rapid uptake in RES shows, we live in an age of exponential change and disruption. Which technological innovations will accelerate the

[2] IRENA, OECD/IEA and REN21 (2018), "Renewable Energy Policies in a Time of Transition", https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_IEA_REN21_Policies_2018.pdf

[3] We use the term "energy transition" to refer to the shift from fossil fuels to renewable energy sources. We use the term "energy transformation" to refer to the broader implications of this shift.

transformation cannot yet be foreseen. Political choices will affect the course and pace of the energy transformation, which is likely to progress at different speeds in each country and in each sector. However, three primary aspects characterize and underpin the transition: (a) energy efficiency, (b) the growth of RES, (c) the growth of natural gas and (d) electrification, according to IRENA's latest related report[4].

Energy efficiency enables economic growth with lower energy inputs. In the 20th century, the average growth rate of energy demand was 3%, about the same as the growth rate of global GDP, based on IRENA's data. In recent decades, improvements in energy efficiency have broken this link. Primary energy demand is now forecast to grow at 1% a year in the period to 2040[5].

Growth of RES: RES have emerged as the fastest growing energy source[6]. The main RES are bioenergy, geothermal, hydropower, ocean, solar and wind. Among these, solar energy and wind power are undergoing very rapid growth, while the others are growing more gradually. Solar and wind share a characteristic that is largely unique to them: the amount of power they generate varies with the weather and the time of day. This is why they are called variable RES.

Natural gas has environmentally friendly credentials for power generation and transport and can be characterized as a bridging fuel to a low-carbon future. Its price competitiveness and abundance make it the fuel of choice for energy-intensive industries such as chemicals, plastics, steel and textiles. Countries looking to rapidly increase electricity generation see gas as a cheaper and faster option than building coal, oil or diesel-powered stations.

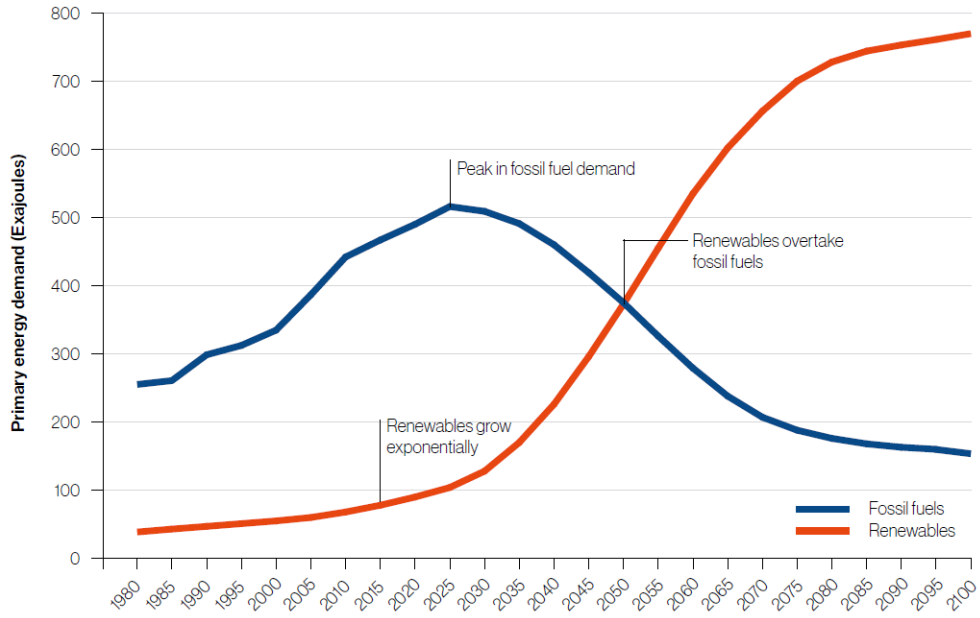
Even though **nuclear** energy is a low-carbon technology, the growth prospects for nuclear energy appear limited. After rapid expansion in the 1970s and 1980s, the growth of nuclear power has slowed in the last three decades. The share of nuclear in electricity generation declined from 17% in 2000 to 10% in 2017, based on IEA's WEO 2018 data. Around two thirds of today's nuclear power plants in advanced economies are more than 30 years old and will be shut down in the foreseeable future unless their lifetimes are extended, notes the IEA. Some countries are building new nuclear power plants, notably China, India, Russia, and the UAE. In others, governments are planning to phase out nuclear power, as in Germany, Switzerland, Spain and South Korea.

Electrification: Electricity accounts for 19% of total final energy consumption, but its share is expected to grow considerably as increased electrification of end-use sectors takes place, based on IEA's latest data. The deployment of heat pumps and electric vehicles, for example, permits electricity to be used for heating, cooling, and transport. Electricity has been the fastest growing segment of final energy demand, growing two-thirds faster than energy consumption as a whole since 2000. This trend is set to continue. Since 2016, the power sector has attracted more investment than the upstream oil and gas sectors that have traditionally dominated energy investment, another reflection of the ongoing electrification of the world's economy[7].

[4] IRENA (2019), "A New World: The Geopolitics of the Energy Transformation", http://geopoliticsofrenewables.org/assets/geopolitics/Reports/wp-content/uploads/2019/01/Global_commission_renewable_energy_2019.pdf
[5] IEA (2018a), "World Energy Outlook 2018", https://www.iea.org/weo2018/
[6] IEA (2018b), "Global Energy and CO_2 Status Report 2017", https://www.iea.org/publications/freepublications/publication/GECO2017.pdf
[7] IEA (2018c), "World Energy Investment 2018", https://www.iea.org/wei2018/

However, the speed of energy transformation remains uncertain. Because of the complexity of energy systems, there are as many scenarios on the future of energy as there are forecasters. Nevertheless, scenarios that model an energy future compatible with the goals of the Paris Agreement have a similar structure: a near-term peak in fossil fuel demand, a rapid uptake of RES, and a long decline in fossil fuel demand, according to latest British-Dutch company Royal Dutch Shell's report[8]. Figure 1 illustrates these dynamics. It is not a prediction, but shows a possible pathway which assumes that the world is able to achieve the goal of the Paris Agreement to limit temperature increase to 'well below 2°C'.

Figure 1: The Global Energy Transition Framework



Source: Shell Sky Scenario

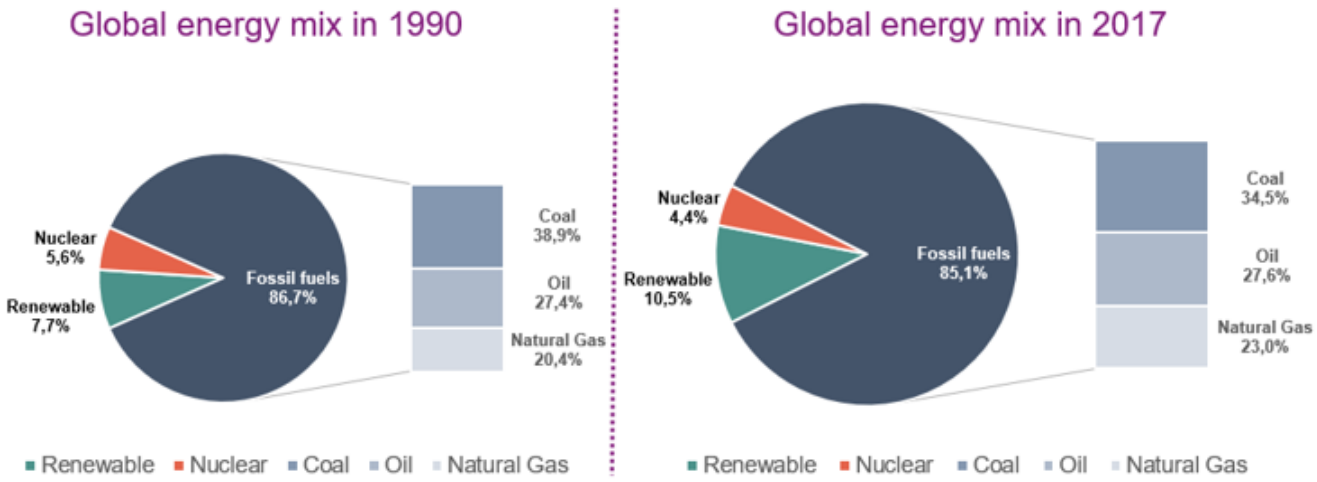
In the majority of scenarios, the global energy transformation is characterized primarily by a rapid growth of RES, and in particular solar and wind and increased use of natural gas. Oil, gas and coal will be affected differently by the energy transition because they have distinct characteristics and are used in a variety of sectors.

In a recent study[9] on energy transition, Edmond de Rothschild Financial Group examines countries' efforts to reduce the ecological footprint of their energy sector. The bank published a report assessing the evolution in 60 countries of carbon dioxide emissions linked to energy consumption, the share of fossil fuels in the energy mix and energy intensity which relates the amount of energy used over a year to a unit of GDP produced. While there has been visible progress in efficiency since 1990, the increase in the global energy mix is disappointing. Figure 2 shows the evolution of the distribution of the different energy sources in the global energy mix over the last 30 years (between 1990 and 2017).

[8] Shell Global (2018), "Shell Scenarios: Sky - Meeting the goals of the Paris Agreement", https://www.waterborne.eu/media/35584/shell-scenarios-sky.pdf

[9] Edmond de Rothschild (2019), "Energy and Environmental Transition", https://www.edmond-de-rothschild.com/site/International/en/corporate/theme/energy-and-environmental-transition

Figure 2: The Evolution of the Global Energy Mix (1990-2017)



Sources: Edmond de Rothschild Financial Group, IEA

In 2017, 85.1% of energy consumption came from fossil fuels, whereas in 1990 this rate was already 86.7%. The share of fossil fuels in the global energy mix has therefore only decreased by 1.6% over the past 30 years. It is interesting to note that the share of coal has decreased more significantly than other fossil energy sources, probably to the advantage of renewable energies but also of natural gas. In addition, global energy consumption increased by 2.4% per year on average between 2000 and 2009 and 2.0% between 2010 and 2017, so fossil energy consumption is much higher in absolute terms in 2017 than in 1990, but the same is true for the non-fossil share of the energy mix.

The report points out that to limit global warming to 1.5°C, CO_2 emissions will have to be reduced by 45% by 2030, according to the IPCC. It indicates that the two drivers that will be essential to achieve this will be the increase in the share of renewable energies in the energy mix and an improvement in energy efficiency. Whereas the share of renewable energy has been rather stagnant over the past three decades, energy intensity is following a positive trend with observed decreases of 12.6% since 2010 and 21.5% since 2000. This decline is mainly due to the developed countries, which have enforced new measures to limit the impact of factors such as low energy efficiency of buildings, high fuel consumption of vehicles, the use of inappropriate modes of transport and lower energy prices, all of which can increase the energy intensity of countries.

Since the IEA forecasts a 25% higher level of energy consumption in 2040 than in 2010, significant changes are urgently needed to drive the energy transition. For the evolution of the energy sources, considerable investments must be made to reduce the share of fossil fuels in the global mix. In parallel, the structural shift from an energy-intensive economy towards services and lighter industries, on the one hand, and the electrification of production processes and the use of more efficient technologies within different sectors (industry, building, services, transport) on the other hand, seem to be the main sources of improving energy efficiency, according to the estimates made in the report.

In addition, the UK's Committee on Climate Change recently released its "Net Zero" report[10] which recommends that the UK steps-up its GHG reduction targets to achieve net-zero emissions by the year 2050. This would represent a significant increase in ambition on the existing targets, which call for an 80% reduction in emissions by mid-century.

But according to the author of the UK's Cost of Energy Review, Professor Dieter Helm, proposals that aim for net-zero emissions within the borders of European countries are not a sufficient response to dealing with the causes of climate change. Targets need to take full account of the contribution of European consumption patterns to GHG emissions globally, he told the Flame conference in Amsterdam on May 15. "Our carbon consumption [in the UK] is 70% higher than our carbon production", he said. "What net zero really means is that you need to do this in consumption terms."

Helm's argument is that policies focusing exclusively on energy use within national borders will continue to drive the deindustrialisation of European economies. This trend is already pronounced in the UK and is partly to account for the country's success with reducing the carbon intensity of its power sector. "If you're interested in climate change, the question is what can Europe do to reduce global emissions, *not* what can Europe do to reduce European emissions - unless it's also true that reducing European emissions reduces global emissions," he said.

By shifting manufacturing and industry overseas – often to countries with dirty, coal driven industrial sectors – European countries are externalising emissions from their consumption patterns, instead of actively reducing them. The focus on energy production comes because policy makers are unwilling to recognise or communicate the true costs of dealing with climate change, Helm said. "Politicians will want us to focus on what can be done without impacting standards of living," he added. If we are to "unilaterally reduce carbon concentrations in the atmosphere," he said, politicians will need to "tell people the truth, tell them that it's expensive, and tell them why we have to do it."

Tackling climate change will require new policy measures, he argued, including the imposition of border taxes that account for the true emissions cost of imported goods. "If imports are polluting, the import price should make us pay for the pollution in those imports," he told the conference.

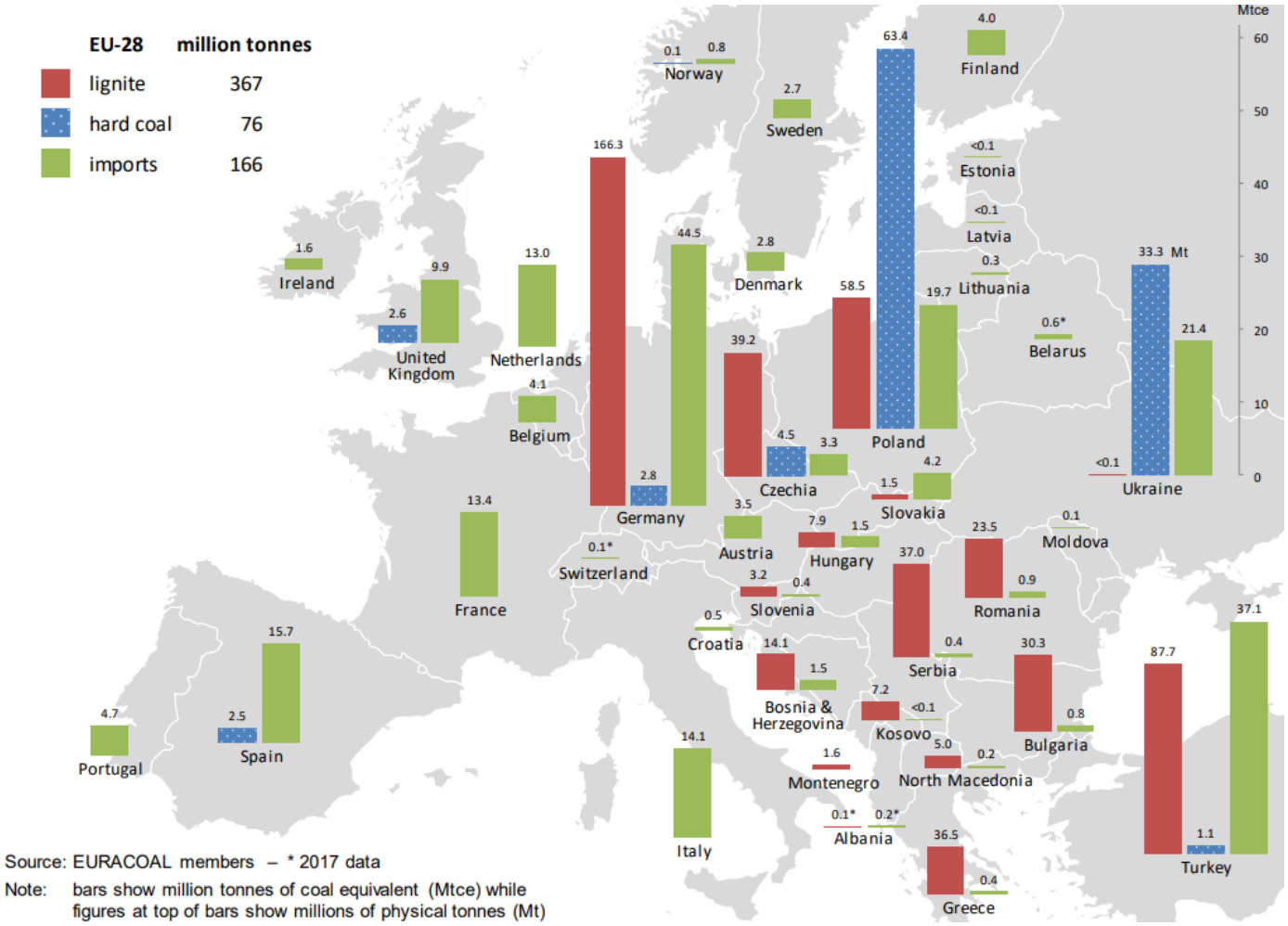
Efforts to introduce border tax adjustments have in the past met opposition on the grounds that they may be employed as a form of economic protectionism. Determining the appropriate amount of tax to apply to individual goods will also be a complicated process. But a properly calibrated border tax policy would provide a level playing field to goods produced at home and abroad, instead of punishing industries subject to domestic carbon taxes. A net-zero target introduced in this context would be more difficult to achieve - but also far more impactful in the global decarbonisation effort.

[10] Committee on Climate Change (2019), "Net Zero: The UK's contribution to stopping global warming", https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf

Energy Transition in Central and SE Europe

While the European Commission has committed to a long-term vision of a climate neutral economy by 2050, coal remains a key component in the energy mix of several EU countries as well as in the **CEE region**[11]**.** It is thus the most abundant fossil fuel in the EU and represents a significant source of economic activity that provides jobs to an estimated 240,000 people. That is a justifiable reason why the EU has struggled to phase out of coal. Moreover, it accounts for about a quarter of the total electricity production in the EU and it is an important fuel for industrial processes such as steel production, even though the production and consumption of coal has been steadily declining over previous decades. Coal has declined by about a third in Europe because of economics rather than climate change. The cost of renewables has gone down and makes it much cheaper to invest in renewables rather than new coal.

Map 1: Production and Imports of Lignite and Hard Coal in Europe, 2017



Source: EURACOAL

[11] The CEE region includes the following group of countries: Albania, Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, Estonia, Latvia and Lithuania.

The EU's objective to build a climate neutral economy implies the closing of mines across the region in order to phase out of coal. To ensure that no region is left behind, in December 2017 the Commission launched the "Platform on Coal Regions in Transition"[12]. It gives the chance for national, regional, and local representatives to exchange information on what the possibilities are for a clean energy transition that includes provisions for social equity, new job training skills and financing for the economy.

The European Commission has created a special secretariat that will be in charge of the Platform. Projects undertaken within the platform will include building geothermal and hydropower plants in former coal mines. The Commission will invest in e-mobility, digitalization, forming local energy communities, and developing tourism and agricultural activities. Pilot projects are currently operating in 14 regions.

However, there is a concern that Brussels, and Europe's wealthiest countries are out of touch with the reality of what this energy transformation requires of these regions. According to the World Health Organization (WHO), 36 out of the 50 most polluted cities in the EU are in Poland, largely as a result of the widespread use of coal and old boilers. Even today, 70% of single-family buildings in Poland use coal for heating[13].

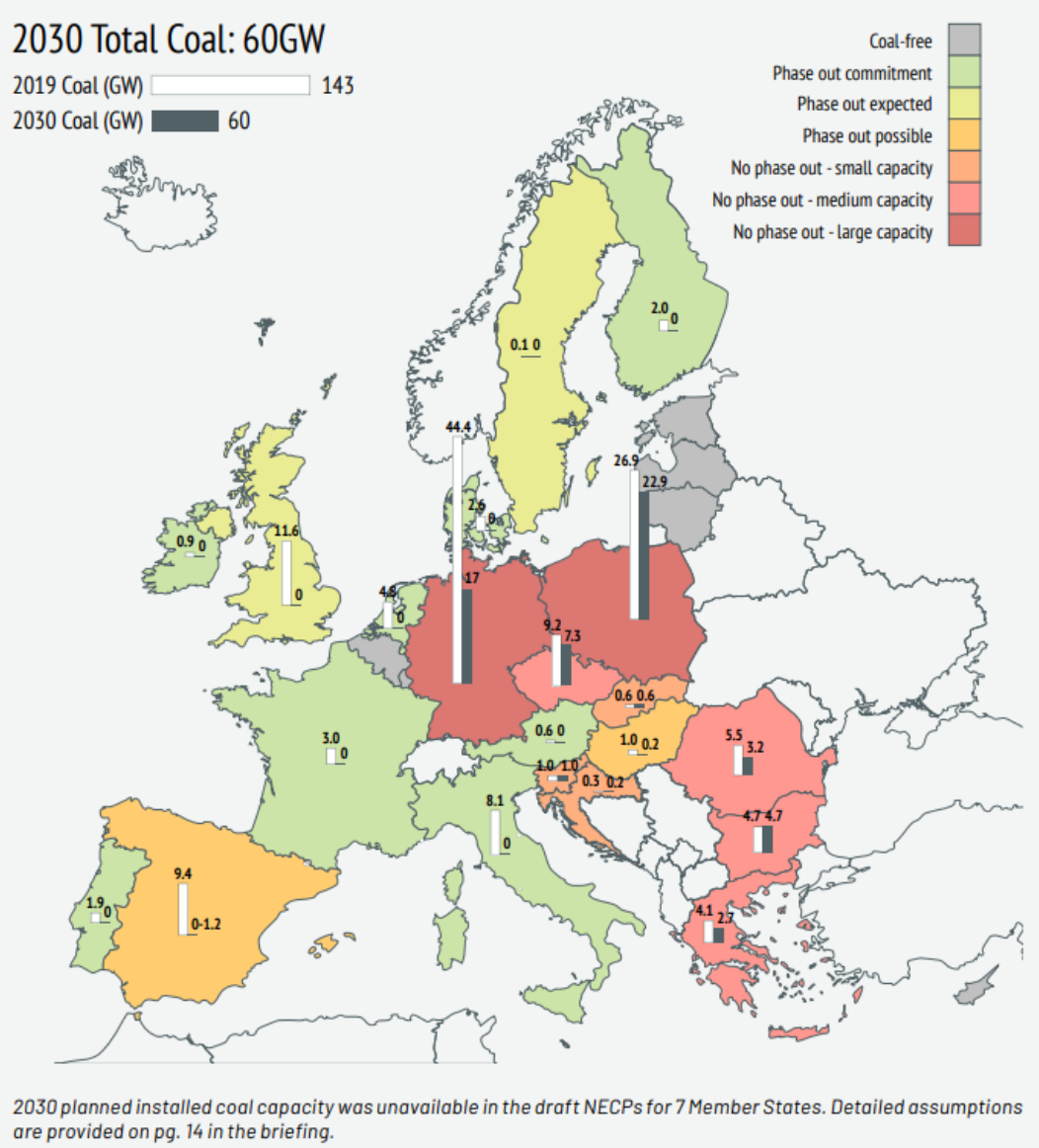
According to a recent report prepared by environmental groups Sandbag and CAN Europe[14], 11 EU member states have no plans to phase out coal by 2030, with most of the remaining coal power capacity located in six countries, i.e. Poland (27 GW), Germany (17 GW), Czech Republic (7.2 GW), Bulgaria (4.7 GW), Romania (3.2 GW) and Greece (2.7 GW). Under European rules, EU member states must define how they will reduce CO_2 emissions and boost renewables by 2030. They have to submit their final climate action plans to the EC by December 2019, after receiving feedback on their draft plans from the EC.

Many of the Member States with no plans to move away from coal are already benefiting from various EU energy transition support schemes and are asking for increased funding. The support and funding is reaching these countries, including through the EU Commission's Coal Regions in Transition Platform initiative - but the draft National Energy and Climate Plans (NECPs) make clear that in most of the benefitting countries the move away from coal has not yet been planned.

To fulfill the Paris Agreement and limit the global temperature rise to 1.5°C, and do so in the most cost-effective manner, EU countries need to stop burning coal for electricity by 2030. The aforementioned report shows that the EU is currently set to miss this goal by a wide margin. According to the draft NECPs, there would still be 60 GW of installed coal capacity in the EU in 2030, a fall of only 58% vs. the current levels (143 GW). This suggests that too few Member States have grasped the speed and scale of the action needed to transform their energy systems over the next decade.

[12] European Commission (2017), "Coal regions in transition", https://ec.europa.eu/energy/en/topics/oil-gas-and-coal/coal-regions-in-transition
[13] Robl, P. (2018), "Buildings for the Visegrad Future: Comparative Study", http://sanceprobudovy.cz/wp-content/uploads/2018/06/2018_buildings-for-visegrad-future_comparative-study_final.pdf
[14] Flisowska, J. and Moore, C. (2019), "Just transition or just talk?", http://www.caneurope.org/docman/coal-phase-out/3545-just-transition-or-just-talk/file

Map 2: EU Net Coal Power Capacity in 2019 and the Projection for 2030, according to the Draft NECPs



Source: CAN Europe

As the economies of **SEE countries** are developing with the view of catching up with those of the rest of Europe, energy plays an important role both from financial/investment perspective, but also in terms of market development (i.e. liberalization, competition, etc.). The region of SE Europe, as defined and covered by IENE, includes 13 countries from Slovenia in the North-West to Cyprus in the South-East, 11 countries of the Balkan Peninsula, plus Turkey and Cyprus (see Map 3). From these countries, 6 are EU member states, 7 are NATO members, 3 are OECD members and only 2 are members of the Paris-based International Energy Agency (IEA).

Map 3: The SE Europe Area Defined

Source: IENE

Although politically, culturally and economically diverse, these countries are related and bound in different degrees each to EU energy strategies, policies and objectives. Their economies appear widely divergent in terms of structure and level of development, but they share several challenges, which appear to be common to all. Among them, it is the priority they all give to the development of the energy sector, both in terms of infrastructure, energy mix and market operation. Six countries in the Western Balkans are contracting parties of the Energy Community and hence in the process of fully adapting their energy legislation to EU Directives, while Turkey has made a significant progress in adapting its legislation and market operation to EU requirements.

Large amounts of indigenous coal and lignite deposits, which provide relatively cheap and easily accessible energy supplies for most countries in the region, are preventing a determined move towards decarbonization. As can be seen in Table 1, most countries in SEE have well defined plans and running projects for new coal/lignite fired power plants which over the next 8-10 years will add some 10 GW of new electricity capacity. Hence, the region's dependence on solid fuels is likely to increase, notwithstanding commitments for increased RES use.

Table 1: Under Construction and Planned Coal Plants in SEE Countries (MW)*, as of January 2019

Country	Announced New Plants	Pre-permit	Permitted	Announced + Pre-permit + Permitted	Under Construction	Shelved	Operating	Cancelled (2010-2018)
Turkey	12,8	17,311	6,555	36,666	800	24,554	18,826	41,031
Bosnia & Herzegovina	2,38	0	1,7	4,08	0	0	2,073	1,02
Serbia	1	0	350	1,35	0	0	4,405	1,82
Romania	0	600	0	600	0	0	5,305	5,105
Kosovo	0	450	0	450	0	0	1,29	330
Greece	0	450	0	450	660	0	4,375	800
North Macedonia	300	129	0	429	0	0	800	300
Montenegro	0	0	0	0	0	0	225	1,41
Bulgaria	0	0	0	0	0	0	4,889	2,66
Slovenia	0	0	0	0	0	0	1,069	0
Croatia	0	0	0	0	0	0	210	1,3
Albania	0	0	0	0	0	0	0	800

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

Sources: EndCoal, IENE

Also, the high dependence on oil and gas imports of the region should be emphasized, which is driving many countries' exploration efforts to new finds. Natural gas is becoming increasingly important in the countries of the region for their energy mix, including power generation. However, the poor energy infrastructure and the lack of adequate cross-border interconnections, especially in the West Balkan countries, are obstacles for further penetration in the energy mix and market development. Moreover, the gas supply in SE Europe is characterized mostly by the lack of domestic production with one dominant supplier, Russia.

The liberalization of the electricity market has recorded impressive progress in most SEE countries, especially in its EU member states and Turkey. However, in terms of security of energy supply, the region appears more vulnerable than the rest of Europe and it can be strengthened by improving the interconnectivity for both gas and electricity across the region. There is high RES potential in the region, but its exploitation for power generation and non-electrical uses remains at widely different levels among the SEE countries, while good records in hydropower should be mentioned. Most of the EU member states and Turkey have made impressive progress with increased RES penetration, while other countries, as in the West Balkans, are at the beginning of solar and wind applications.

In addition, it should be underlined that attention on the deployment of energy efficiency solutions has been poor, to say the least, over the past years. Although the lack of energy efficiency has been recognized in recent years, clearly more work is required at state and local authority level for the successful introduction of energy efficiency schemes. The energy landscape in SE Europe is changing and there are exciting opportunities for clean energy and the digitalization of energy services in the region, as well as a need for qualified professionals in all areas of the energy sector.

As already mentioned, considerable progress has been achieved in recent years in European energy market integration, but the SEE region still faces serious challenges when it comes to adapting its energy systems and energy markets to meet EU basic targets (i.e. decarbonization, RES penetration and energy efficiency).

Today, we observe great divergence in the degree of adaptation between the different country groups of the region. EU member states have already achieved, to a large extent, energy market integration, while West Balkan countries lag behind due to lack of electricity and gas interconnections, despite the assistance over the last 12 years by the Energy Community.

Electricity Markets

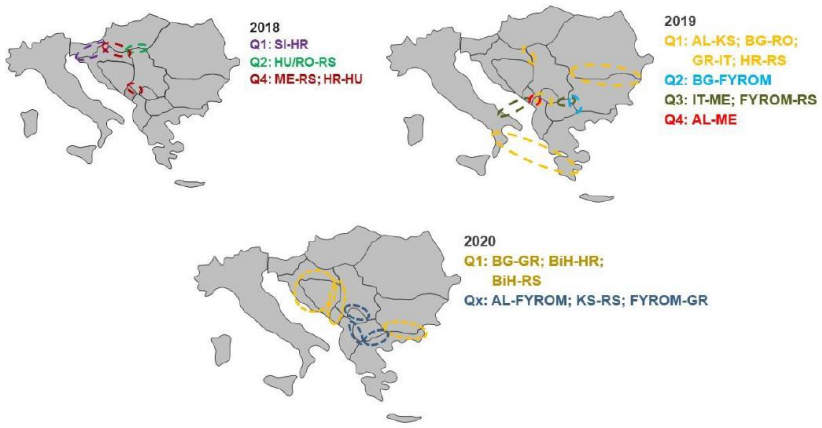
In the electricity sector, it is highly important to understand the current status of the market liberalization process in the SE European region, which has faced several difficulties and numerous non-technical obstacles in the past as the incumbent companies in almost all SEE countries solidly resisted any change on the grounds of losing control of the market and hence weakening of their bureaucratic hold. Currently, the situation in six SEE EU member countries, including Bulgaria, Croatia, Cyprus, Greece, Romania and Slovenia, looks varied with certain countries having managed to complete what appeared to be an anomalous transition period and other countries still trying to adapt to EU competition rules.

In the six SEE Energy Community Member States, including Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Serbia and Montenegro, we have the intervention of the Energy Community through the contracting parties, which has facilitated the overall transition process to European Acquis. In the case of Turkey, a much larger country compared to any of the other SEE states that affects to a large extent financial, trade and energy flows to the rest of SE Europe, the progress achieved in electricity market operation unbundling and competition in the retail area has been impressive and has now entered a critical stage with the market opening up much faster than anticipated.

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. The electricity markets in SE Europe are still fragmented. National markets are small and in different stages of maturity. In most countries, markets are not very developed in EU standards and still rely much on bilateral contracts. Markets also lack reliable price signals.

From the ongoing and potential market coupling initiatives, a tentative roadmap has been drawn to illustrate how the current fragmented SEE electricity market could possibly integrate regionally and with the rest of Europe. Even if such a roadmap is highly uncertain and subject to constant planning changes, some observations can be made. As shown in Map 4, the first wave of SEE electricity market couplings could take place in 2018 in the northern part of the region bordering the Day-Ahead electricity markets of the Czech Republic, Slovakia, Hungary and Romania and/or northwest and southwest Europe plus Italian borders.

Map 4: Tentative Roadmap Towards the SEE Electricity Market Integration



Source: ENTSO-E[15]

With rising preparedness in all countries, the year 2019 will be busy and can see some 6-8 borders coupled. This would reach, even if one year late, the Western Balkan 6 target to get every country coupled with at least one of its neighbors. It is reasonable to expect that coupling of the remaining borders will follow by the end of 2020.

Gas Markets

Over the past five years, important steps regarding the long-term development of the SE European gas market have taken place. However, a highly fragmented landscape for the gas market development in the region still exists. According to IENE, the only way forward for the development of a regional gas market is the consistent and rapid implementation of the provisions of the Third Energy Package, at least to the extent that the 6 SEE EU Member States and the 6 SEE Energy Community Contracting Parties have committed to adopt it in a legally binding way.

The Central and South-Eastern European Gas Connectivity (CESEC) initiative is highly relevant in this process as it brings together Energy Community Contracting Parties and their EU neighbours in Central and South-Eastern Europe and has helped to generate political support and boost regional cooperation on common challenges faced most notably in the gas sector.

According to a report by the Energy Community[16], the progress with respect to the transposition and implementation of the EU's flagship energy market legislation, known as the Third Energy Package, is varied in the Western Balkans. Four of the six Western Balkan countries, which include Albania, Kosovo, Montenegro and Serbia, have transposed the Third Energy Package to a sufficient degree.

However, progress in Bosnia and Herzegovina is not in sight due to the ongoing political deadlock over the division of state and sub-state competences. The country's lack of progress continues to hinder gas and electricity infrastructure and market development and security of gas supply at the expense of energy consumers.

[15] ENTSO-E (2017), "Enhancing market coupling of SEE Region", https://docstore.entsoe.eu/Documents/MC%20documents/170504_ENTSOE_ReportonDAMC_SEE_region.pdf

[16] Energy Community (2018), "Knocking on the EU's Door through the Energy Community: Integration of Western Balkans into the Pan-European Energy Market", https://www.energy-community.org/dam/jcr:f28990a7-1d9e-44a5-9e1d-db1d57187403/EnC_WB6Report_012018.pdf

Discussion

As already analysed, the **global** energy transformation driven by RES and natural gas will have significant geopolitical implications. It will reshape relations between states and lead to fundamental structural changes in economies and society. The world that will emerge from the current Energy Transition will be very different from the one that was built on a foundation of fossil fuels. Global power structures and arrangements will change in many ways and the dynamics of relationships within states will also be transformed. Power will become more decentralized and diffused. The influence of some states, such as China, will grow because they have invested heavily in RES and gas technologies and built up their capacity to take advantage of the opportunities they create. By contrast, states that rely heavily on fossil fuel exports and do not adapt to the energy transition will face risks and lose influence. The supply of energy will no longer be the domain of a small number of states, since the majority of countries will have the potential to achieve energy independence, enhancing their development and security as a result. While the precise scope and pace of the energy transformation cannot be predicted, its impact on countries, communities and companies will be profound.

In addition to market integration and market liberalization requirements, COP 21 targets and commitments are now complicating further the energy issues in **SE Europe**. EU member countries in the region (i.e. Bulgaria, Croatia, Cyprus, Greece, Romania and Slovenia) have no great difficulty in abiding to EU Directives and targets, in comparison with the Western Balkans. Although it should be stressed that the transition process for most of the EU countries was fraught with difficulties.

The transition to 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 base. Although all countries in the region to a larger or to a smaller extent are committed to gas and RES and energy efficiency programmes and specific targets, at the same time, they are pursuing a parallel carbonization agenda as we have several coal-fired power plants under construction or at an advanced planning stage. In short, carbon-based power generation is also moving ahead, adding 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). While new RES capacity over the last three-year period is less than 500 MW per year of installed capacity and approximately 1.5 GW, including Turkey. As a result, a substantial gap is foreseen between new coal-fired power plants and anticipated RES and gas installations.

In addition to this supply gap, between coal and RES, the likehood of power generation shortfall, as early as 2027, must be considered. In such an eventuality the region's electricity balance will be seriously disrupted as it will transform the region from an exporter of electricity to a net importer. This will drive up electricity prices and make low economic growth forecasts, predicted by various bodies, self-fulfilling. Underinvestment today and higher electricity prices in the near future will act as a brake to economic growth.

The arduous and rather complex decarbonization process, which SEE countries have to go through, is further burdened on account of their strong coal/lignite legacy, while they also have to deal with serious energy security issues.

From the analysis undertaken, energy security emerges as a key issue for SEE. There are no easy ways or readily available formulae to mitigate potential threats or provide fail safe solutions in order to guarantee uninterrupted energy flows. SE Europe, because of its

geography, its proximity to high risk conflict zones (i.e. Syria, Iraq, Ukraine), a growing and uncontrolled refugee flow from the Middle East and North Africa and the location of some of its countries (i.e. Turkey, Greece, Romania) at vital energy supply entry points, faces higher energy security threats than the rest of Europe.

In general, large-scale RES development can contribute towards improving the energy security situation of SEE countries. However, the degree to which RES can bolster energy security depends greatly on the type RES used, their connectivity to the national grid, their synchronicity to consumption patterns and their storage capability, according to IENE's Working Paper No. 19[17]. If RES development is to be pursued from an energy security perspective, then emphasis will have to be placed on dispersed and pumped storage schemes so as to overcome the drawback from the intermittent nature of RES, notably wind and solar. Energy efficiency applications can also help lessen a country's dependence on fossil fuels and/or imported fuels. However, considerable work is still required if one is to assess with any precision their potential impact in terms of improving energy security.

It is, therefore, obvious that the SE European region needs a well-defined and pragmatic strategy for energy security in tandem with decarbonization policies, which promote resilience to shocks and disruptions to energy supplies in the short-term, and reduced dependency on particular fuels, energy suppliers and specific routes in the long-term. Consequently, policy makers at national and regional level are faced with huge and complex challenges as they must be prepared to inform the citizens of the available hard choices that reducing this dependency means while making the move to cleaner fuels.

Key Energy Transition Challenges

The real challenge we face in the energy transition process is not potential, but time. As several authorities have pointed out, time is the resource we are running short of. The frequency and degree of physical disruption brought by global warming and extreme weather events keeps providing evidence of the dangers which are associated with climate change.

Concerns have been expressed by several environmental organisations that action on addressing climate change lags behind because, despite the pledges made by countries, planned policies still fall short of reaching the Paris Agreement's goals. The Intergovernmental Panel on Climate Change's 2018 special report[18] called for increased urgency of action and reiterated the need to attain zero GHG emissions, in order to avert significant climate-related consequences for ecosystems, human communities and economies.

This state of play is confirmed by the World Economic Forum's Fostering Effective Energy Transition 2019 report[19]. Every year, the report ranks 115 countries in terms of their performance and readiness for transition. What stands out in 2019 is that the year-on-year increase of the global average score was the lowest of the last five years. Moreover, considering the score evolution over the period 2014-2019, the dimension of "environmental sustainability" shows almost no enhancement. In short, the pace of energy transition is globally much too slow.

[17] Stambolis, C. (2014), "Renewable Energy Sources and Energy Efficiency and Their Role in SEE Energy Security", *Working Paper No.19*, https://www.iene.gr/articlefiles/wp%2019_final.pdf
[18] IPCC (2019), "Global Warming of 1.5°C", *Special Report*, https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf
[19] World Economic Forum (2019), "Fostering Effective Energy Transition - 2019 edition", *Insight Report*, http://www3.weforum.org/docs/WEF_Fostering_Effective_Energy_Transition_2019.pdf

If this were not enough, data from 2018 further proves the urgency of required action. As was recently reported by the International Energy Agency (IEA)[20], energy-related CO_2 emissions rose by 1.7% from 2017, to a high of 33.1 gigatonnes, with coal-fired power plants, mostly in Asia, being the main contributor to the increase. The counterbalance in emissions avoided through use of renewables and other clean energy technologies was important but still not to cover the surge.

Over the last few weeks, we have witnessed an unprecedented wave of attacks by certain funds on both sides of the Atlantic against the senior management of large oil corporations including ExxonMobil, BP and Shell in an effort to force upon them radical change of policies, just short of demanding their total capitulation and abandonment of their core business; which is the production and trade of oil and gas. However, such confrontational approach is clearly short sighted.

Rather than try to engage in a constructive dialogue with big oil, their critics and pro Climate Change activists are forgetting that these global companies hold the keys to Energy Transition. The mere size of their operation, the sophistication of their technological infrastructure and their extensive expertise in managing oil and gas are key elements of the know how that needs to be developed in the Energy Transition phase that we have now embarked.

Decarbonization efforts need to accelerate in all sectors, from electricity generation to transport, building and industry. Such issues as well as the role of gas as a fuel of choice and the need for further RES penetration under economically competitive terms will be discussed in some length in the Vienna Energy Transition Forum. EU's decarbonisation agenda and Energy Transition roadmap will come under scrutiny as a bundle of factors ranging from electricity market integration and grid performance to the slow pace of implementing vital gas interconnections and the role of nuclear power as a realistic alternative capable of delivering emission free power generation, will also be addressed. Another important topic, which will be fully discussed in the Vienna meeting, is the constructive role that the Oil & Gas industry can play during Energy Transition. A new energy agenda for CE and SEE is in the offing and this will form a focal point of discussions at the Forum.

[20] IEA (2019), "Global Energy & CO_2 Status Report", https://www.iea.org/geco/