The contribution of Greece to the liberalization of the Energy Market in the Balkans.

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1 Abstract

This dissertation was written as part of the MSc in Energy Law, Business, Regulation and Policy at the International Hellenic University.

Over the last decades, the European energy market liberalization process is unfolding. In this study, we provide an overview of the energy market status of South-East Europe countries compared to the relevant European acquis. We explore how delignitization, gas pipelines, the Energy Community, interconnection infrastructures interact with the national markets under the scope of a liberalized European Internal Market. Further, we reflect on the geopolitical role of the Balkan peninsula and the delays of the energy market reforms in the region.

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Keywords: Balkan Energy Market liberalization, Obstacles, Energy Community, Energy Market Coupling, Balkan Energy Exchange

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2 Introduction

The European energy market liberalization process started more than 20 years ago, one of its main purposes being to organize the provision of electricity and gas more efficiently by introducing competitive forces where possible and regulation where needed. Most Member States of the European Union (EU) have liberalized their electricity market, but to achieve a European internal market a number of remaining obstacles need to be removed, e.g., efforts are required to increase retail competition and to remove regulated retail prices or to physically integrate existing regional electricity markets, by removing the existing barriers between regions and countries. During those 20 years a number of initiatives have been established that shaped the legal framework in force today in the EU. The most important milestones are presented hereafter.

2.1 The European legal framework

The legal basis for the formation of a European Internal Energy Market (IEM) is provided by the treaty on the Functioning of the European Union (Gouardères, et al. (2018)). The ultimate goal is to create a well-functioning European energy market, putting fair access and a high level of consumer protection in the centre, while also guaranteeing adequate levels of generation and interconnection capacity. The European Legislation has built the road from the monopoly regime, to the market functioning under competition.

The European Law in Electricity and Gas: The first steps towards the European Internal Energy Market (IEM) were actually set in the 1970s but it was the climate change problem in the late 80s and early 90s that highlighted the importance of developing coordinated policies on energy (Kanellakis, et al. (2013)). This led to several electricity market liberalization waves. In 1996, the first European Directive concerning the liberalization of the electricity market was adopted. The main purpose of the Directive 96/92/EC was to allow the entrance of privates and secure the transparency and the avoidance of discrimination. A similar initiative was taken for gas leading to the Directive 98/30/EC two years later. These two directives, known as the First Energy Package, initiated the European energy market liberalization process. The first electricity Directive defines the common rules for an internal electricity market and introduces the idea of competition in generation and so-called third party access, which means that all generators should have access to the electricity grid at an affordable and correct price in order to be able to transport their product to the end users. The idea of unbundling of generation, transmission and distribution was also initiated in this first Directive.

In 2003, the Second Energy Package was adopted, including a second Directive on the electricity (and gas) market (Directive 2003/54/EC and Directive 2003/54/EC). The second electricity Directive put forward two major changes in the market; it allows suppliers to enter markets in other Member States; and allows consumers to choose their suppliers.

One of the most important initiatives as of 2000, is the Energy Action Plan, dating from March 2007. The plan identifies three major issues: sustainability, security of supply and competitiveness (IEA (2014), Langsdorf (2011)). In 2009, the Third Energy Package was adopted. The Directive 2009/72/EC, provides the rules for the generation of electricity, the transmission system operation, the distribution system operation, the unbundling and transparency of the accounts, the access to the system, the role of the national regulatory authorities in the operation of the sector, the operation of the retail market etc. Furthermore, Regulation 714/2009 was issued, on the conditions for accessing the network on cross-border exchanges in electricity and repealing Regulation 1228/2003. The Regulation aims at setting fair rules on cross-border exchanges in electricity. This package completes the integration of the European electricity and gas markets. Its main elements are ownership unbundling (separation of generation and retail activities from transmission activities), the obligation for all member States to establish a National Regulatory Authority and the installation of an Agency for the Cooperation of Energy Regulators (ACER), a forum for National Regulators to cooperate at the EU level.

For quite the same reasons, Directive 2009/73/EC was issued, concerning common rules for the internal market on natural gas and repealed Directive 2003/55/EC. The Directive provides the rules for the transmission and storage of Liquid Natural Gas (LNG), the organization of the operators of the sector, the rules for the distribution and supply, the unbundling and the transparency of accounts, the organization of accessing the system, the role of the national regulatory authorities in the sector and the principal rules of the operation of the retail market. Furthermore, Regulation 715/2009 was issued, on conditions for accessing the natural gas transmission networks and repealed Regulation 1775/2005. The Regulation aimed at setting non-discriminatory rules for accessing natural gas transmission systems, LNG facilities and storage and facilitating the emergence of the well-functioning and transparent wholesale market, taking into consideration the special characteristics of the national and regional markets. The aforementioned 2009 Directives and Regulations constitute the so-called “Third Liberalization Package”.

Another important initiative is the *Climate and Energy Package 2020* of 2008. The package sets out three important targets for EU policy making that have a significant impact on the creation of an internal electricity market: i) reduce EU greenhouse gas emissions by 20% vs 1990 levels, ii) increase the share from renewables in EU energy consumption to 20%, and iii) improve energy efficiency by 20% relative to 2007 projections about energy consumption in 2020. Each of these goals has a potentially significant impact on the functioning of the internal energy market.

The European Union agreed in 2014 to set a 40–27–30 set of targets for 2030 (more precisely: -40% greenhouse gas (GHG) emissions; > 27% renewable energy; and > 30% increase in energy efficiency), with primacy given to the 40% reduction in greenhouse gas emissions. The EU wide targets for CO2e reduction and renewables share are disaggregated into national-level targets (some greater or less than the aggregate target), whereas all member states are expected to meet the energy efficiency target. These targets are themselves in the process of further tightening at the beginning of 2019 (Pollitt 2019).

In 2016, following negotiations, the Commission, the European Parliament and the Council adopted what became known as the ‘Clean Energy for All Europeans’ package. The package contained two legislative proposals on electricity market design. Relevant to market liberalization, the governance regulation (EU(2018)1999) was adopted, requiring each Member State to draft integrated 10-year national energy and climate plans (NECPs) for 2021 to 2030. The new electricity regulation (EU(2019)943) and the new Electricity Directive (Directive (EU) 2019/944) were adopted, to be put in force on 01.01.2021, outlining rules for the generation, transmission, distribution, supply and storage of electricity, together with consumer protection aspects. The Directive contains rules on retail markets for electricity, whereas the Regulation mainly contains rules on the wholesale market and network operation. The previous Directive (2009/72/EC) will be repealed by 01.01.2021.

2.2 Balkans geopolitical significance

The energy raw materials are not found everywhere. Oil, natural gas and carbon are exploited in specific areas only. All Balkan countries have strategic advantages based on their geographic location as the Balkan Peninsula constitutes an East-West and North-South crossroad. However, a regional complex environment such as the Balkans requires alternatives, for securing a supply dispersion, energy security, proper

infrastructure design, specialized investment incentives, all within the up-to-date legal framework (Deniozos, Vlados et al. 2019).

Russian gas: Since the Ukraine-Russia conflict in Gas Transit and the subsequent decision from Russian government not to transport gas through Ukraine, the role of Balkans as transit countries has been upgraded. Russia announced that the Trans Balkan Interconnector will not be used beyond the end of 2020 and the alternative route, the Turk Stream, will be commissioned in January 2020. The Turk Stream brings gas from Russia to Turkey through the Black sea and plugs to the Trans Balkan Interconnector to distribute gas to big European consumers. When the Trans Balkan Interconnector ceases operation, Russian gas can reach Europe through three alternative routes: a Bulgaria-Serbia-Hungary Interconnector, a Turkey-Greece-Italy interconnector, or the Trans Adriatic Pipeline (91% completed in Dec 2019). The last solution may be the most feasible one, although the other routes cannot be excluded: interconnection between Bulgaria and Serbia is expected to be operating by 2022, the Greece-Italy interconnection is supported by the East Med Pipeline (final investment decision by 2022).

Azeri gas: The Southern Gas Corridor extends from Azerbaijan through Turkey to Greece, Albania and Italy, is slated to transport natural gas from the Caspian Sea to the EU. The corridor includes TANAP and Trans-Adriatic Pipe (TAP), which is expected to be operational by 2020. Both TANAP and TAP benefited significantly from the EU's urge to diversify its natural gas intake away from Russia. Political affinity between Turkey and Azerbaijan was a major factor in the success of TANAP. TANAP, together with the South Caucasus (SCP) pipeline and the TAP, PCIs included in the Southern Gas Corridor (Semkoua, Kolovosa et al. 2019). Tesla, TAP and Eastring will be commercially operational in 2019, 2020 and 2025 respectively.

Figure 1. The TANAP Project, the South Caucasus Pipeline (SCP) and the Trans-Adriatic Pipeline (TAP) of the Southern Gas Corridor bringing natural gas produced from Azerbaijan's Shah Deniz-2 gas field to Europe.

In the last two decades, producers and consumers of hydrocarbons proposed numerous pipeline projects to transport rich natural gas resources of Eurasia to Europe. While some of these projects (e.g. TANAP and Nord Stream) were successfully concluded, others (e.g. South Stream and Nabucco) have famously failed (Öge 2019).

Levantine gas: The East Med pipeline was first proposed in 2012 due to two realities. First, a lot of gas had been found in Israel and Cyprus; Second, when Shah Deniz selected the Trans-Adriatic Pipeline (TAP) as its preferred route, other pipelines, like the Italy-Greece-Interconnector, no longer had any gas to ship (Tsafos N. 2020).

Israel, Greece and the Greek Cypriot part of the pipeline are planning to move the region's gas supplies to Greece, and from there on to Europe, with the construction of a stop-start pipeline. The pipeline currently planned has economical and technical feasibility issues. Furthermore, it is still debatable whether or not the amount of gas available in the region is sufficient to meet the needs of the European Union or other customers in the region, as well as the likelihood of continued or non-sustained demand for future energy resources in the region. The discovery of oil and gas in the Mediterranean and especially around the island of Cyprus and the discovery of new resources in special economic zones can play a special role in the energy security of neighbouring countries.

Russia is by no means willing to reduce its share of the European gas market, therefore is carefully monitoring developments in the region. Reducing Europe's dependence on Russian gas and increasing liquefied natural gas (LNG) imports from the United States

are among the important goals of the U.S. energy diplomacy agenda. It would not be in the United States interest if the Mediterranean Sea were to provide Europe with energy resources. Currently, major energy companies around the world, such as ExxonMobil America, Nobel, Shell France etc., are active in the region together with U.S., Russian and other naval vessels (Kalehsar S. 2019).

Geopolitical factors and domestic factors will most likely affect the gas exploitation. East Med is not a region as countries are politically far apart. The 'gas dividend' is not big enough to overcome the historic and deep-rooted problems. Countries will be keen to diversifying their sources of supply and reluctant to depend on pipeline gas. It is not certain if domestic 'almost bankrupt utilities' are willing and capable of pay market prices. Furthermore, international companies continue to push for LNG as their preferred choice and push for shared facilities to reduce costs with the ambition to create gas hubs. The political risks are high and many companies may be reluctant to take these risks on top of commercial risks.

East Mediterranean gas will not impact the European energy balance in such a way as to dent Russian market share (Fattouh 2019). The impact is rather regional and significant for the individual countries if the reserves eventually get exploited.

2.3 Energy market status by country

2.3.1 Greece

Greece electricity market became fully liberalized when PPC's monopoly was lifted on all the non-interconnected islands, apart from Crete and Rhodes where private electricity suppliers already existed. Since 2007 all electricity customers in the interconnected system had the choice of alternative suppliers. Enhanced competition though is still weak, since PPC's dominates the market share (79.76% in Jan.2019). At the top of the list of alternative providers market share are: Mytilineos, Heron, Elpedison, Watt and Volt, NRG and Voltera, all with <5% share (HAEE 2019).

Until the start of 2018, the electricity market in Greece operated through the public company LAGIE, which was responsible for undertaking the operation and monitoring the Day-Ahead market and Intraday coupling. LAGIE's further responsibilities comprised clearing, settlement and reporting of transactions to both the Regulatory Authority for Energy (RAE) and the Agency for the Cooperation of Energy Regulators (ACER). Aiming to modify this structure, Greek authorities in co-operation with the European

Commission, have jointly formed a framework towards the implementation of Target Model guidelines.

The Greek energy market framework was shaped radically in February 2017, when LAGIE and Athens Stock Exchange (ATHEX) signed a memorandum of cooperation, aiming to establish the Hellenic Energy Exchange (HEnEx) that is designed to replace the current system of mandatory pool by the end of 2020.

In line with the Third Energy Package, the transition to the new Target Model of the European wholesale energy market, includes the formation of voluntary basis Power Exchanges, in parallel with the existence of Over the Counter (OTC) bilateral contracts. HEnEx operates in this exact way, by permitting participants to submit different orders for the supply of electricity for different production levels and time intervals. The procedure of user acceptance internal testing and fixing possible errors will follow and the processes of (i) Commissioning, (ii) Participants Training and (iii) Dry Run will take place by May 2020. In June 2020 the transition to the new system will take place (naftemporiki 2019).

Greece fully liberalized its electricity prices with effect from 1 July 2013, depending on factors such as: supply and demand, cost of generation, transmission and distribution, and level of taxation. Despite the full price liberalization, price regulation continues to exist under public service obligations. These include the so-called last resort and universal service suppliers. Under this model, buyers are able to sell these electricity amounts to household and industrial consumers at a discount price, with the objective being to end the monopoly maintained by PPC in the country's two cheapest sources of electricity production (lignite and hydropower).

The final investment decision for Alexandroupolis Floating Storage Regasification Unit (FSRU) project will be connected via a pipeline with the country's national gas system in order to establish an import point in Greece and an important entry gate to SE Europe. This project is expected to operate in parallel to the Greek-Bulgarian Gas Interconnector (IGB) (Bowden 2019).

Another major project, the construction of TAP, will deliver gas from Azerbaijan. At the same time, the agreement between the governments of Greece, Italy, the Republic of Cyprus and Israel for the implementation of the submarine pipeline, known as the East Med pipeline project, creates a new dynamic. Following the successful privatization tender for DESFA the Independent Gas Transmission Operator, new gas infrastructure projects are expected to proceed, such as the Interconnection Greece-N. Macedonia

and the reverse flow of the Greek-Turkish gas pipeline that is in operation for over a decade.

The monopoly of Gas Supply Companies (EPAs) was lifted, as household consumers are able to switch gas supplier ((IENE) 2019). This means that the option for combined electricity and gas packages is now open as a single energy product. Another important development in Greece's gas sector is expected to be the separation of the Public Gas Corporation (DEPA) into two different companies in order to comply with the unbundling European Directives ((IENE) 2019). Last, gas is the second energy product planned to be traded through HEnEx in the future (naftemporiki 2019).

Greece has a large potential to enhance clean power share once its non-interconnected islands (NIIs) become integrated into the mainland electricity system. RES produce 21% of electricity in the country (which has the unlikely 40% target for). Wind power produces 7.6% of electricity demand in Greece. Worldwide, the country ranks fourth as a leader in solar photo voltaic (PV) power per inhabitant. Solar PV electricity generation is dedicated primarily to solar water heating systems, providing roughly 7.6% of annual demand.

Oil has been the dominant energy source in Greece, accounting for roughly 45% of the country's total primary energy supply. Greece has negligible domestic oil production as it imports 99.5% of the country's oil. Greece's oil product exports have significantly increased in the last decade. As a net exporter of refined oil products, nearly 40% of the country's total exports were gasoline/diesel oil in 2012.

2.3.2 North Macedonia

North Macedonia adopted the new Energy Law in 2018, harmonizing its energy legislation with the EU Energy Community's Third Energy Package. Unbundling and certification of the electricity transmission system operator was completed in accordance with the EU *acquis*. The wholesale market was further liberalized with the introduction of an obligation of a public supplier. The incumbent power producer is not obliged to provide electricity to meet the needs of tariff customers at regulated prices anymore. The Macedonian Electricity Market Operator (MEMO), established as a spin-off of the transmission system operator, became operational (Community 2019).

In the retail market, the undertakings providing public services are, currently, exempted from balancing responsibility, against the acquis. In addition, balancing services are still provided at regulated prices. The retail market is liberalized which grants eligibility to all customers. Universal supply is performed by the supplier selected in a competitive

procedure. Activities on market coupling between North Macedonia and Bulgaria are supported (OECD, Foundation et al. 2019).

The new Energy Law cleared the way towards ownership unbundling and certification of the country's gas transmission system operator. As the supply market is dominated by one source – Russia's Gazprom - and is limited to bilateral trading agreements, the market is illiquid (Community 2019). Gas penetration is still limited, partly due to disputes between the State and Makpetrol (the country's biggest gas importer and supplier), concerning the ownership of the transmission system operator GA-MA. However, the company tasked to develop transmission infrastructure, Makedonija Energy Resources, is making progress (Bank 2019). The country continues its efforts to build natural gas interconnections with Greece and Bulgaria to diversify gas sources. Oil is transported to the country's only refinery, OKTA (Hellenic Petroleum), via a pipeline from Thessaloniki. The pipeline and refinery are currently not in use, but discussions of re-opening the dormant oil pipeline are underway.

Regarding renewable energy, until the establishment of the intraday market, the market operator (single buyer of renewable energy), will continue to take balance responsibility for the entire portfolio of preferential producers. The government is considering converting the heavy oil-fired "TEC Negotino" power plant to natural gas, as well as constructing new gas-fired power plants. The government is also looking at options to connect the domestic network to alternative supply sources such as TAP and the liquefied natural gas (LNG) terminal in Greece.

2.3.3 Turkey

The Turkish energy market has become a competitive market structure by attracting private sector investments. The energy market is in a growth and liberalisation process, with privatisation, licensing deals and strategic alliances in the market. Turkey produces its electricity mainly from thermal sources. The import ratio of Turkey's natural gas, its most important sources of electricity, 43% of total reserves are located in the Middle East; 29% in the countries of Russia and the Commonwealth of Independent States; and 16% in Africa/Asia-Pacific countries.

Generation of energy can be carried out by public and private companies and organized industrial zones with a generation license from the Energy Market Regulatory Authority (EMRA). EÜAŞ is the state-owned company established to carry out electricity generation activities. The total licensed installed capacity is as follows: Independent power producers (64.8%), EÜAŞ (a state-owned company) (22.2%), Build-operate

power plants (7.3%), Power plants privatized under transfer of operation rights (4.06%), Build-operate-transfer power plants (1.6%). Transmission is a monopoly belonging to the Turkish Electricity Transmission Company (TEİAŞ). Turkey's electricity distribution network has been divided into 21 distribution regions. After the privatization process between 2009-2013, all distribution companies (each privatized through transfer of operation rights of the network for their respective regions) obtained a distribution license from EMRA. Although the distribution system assets are still held by the state-owned Turkish Electricity Distribution Company (TEDAŞ), the distribution activities are now carried out by the private sector. It should be noted that Turkey is not a member of the European Community.

Energy is one of the most important subjects of Turkey-EU relations. Turkey joined the Energy Community with an observer status in 2006. Within the scope of Turkey's accession negotiations with the EU, the screening process of the Energy Chapter was completed in 2007. Work on the update of the Report on the screening of the Energy Chapter is currently ongoing by the EU side. Turkey expects that the Energy Chapter is opened for negotiations as soon as possible. Turkey-EU High-Level Energy Dialogue was launched and regular meetings are held. Turkey-EU High Level Energy Dialogue is expected to continue in the coming period.

In parallel, Turkish Electricity Transmission Company (TEİAŞ) and the relevant boards of European Network of Transmission System Operators for Electricity (ENTSO-E) signed a long-term agreement on 15 April 2015 providing for the permanent physical integration of the Turkish and EU electricity markets. Since beginning of 2016 TEİAŞ is an observer member of ENTSO-E (Affairs 2019).

2.3.4 Albania

Albania is a net importer of electricity, almost entirely dependent on hydropower and imports. The generation of power is performed by entities licensed by the Energy Regulatory Authority (ERE). Albanian Power Corporation - KESH (state-owned) is the main producing entity operating three hydropower plants (HPPs).

Structural reforms of electricity sector show little progress. The transmission operator, OST, is unbundled but unbundling between distribution and supply is delayed. Since the owner of all services is the integrated company OSHEE, unbundled subsidiaries are incapable of individual performance. International partners requested not to integrate OSHEE and the state-owned generation company KESH due to the impact of the integration on competition and liquidity (Export.gov 2019). Wholesale prices are still

regulated through a public service obligation. An agreement between OSHEE and KESH covers the entire volumes of electricity (supply and losses in the distribution). The Council of Ministers tasked OST to establish the Power Exchange and defined shareholding structure, but no deadline was set. Transitional balancing rules are still applied but KESH is still the sole provider of balancing services. All customers except those connected to high voltage can be supplied at regulated prices by OSHEE (Community 2019).

Albania is participating in the project for market coupling with Italy, Montenegro and Serbia (Community 2019). OST signed a memorandum with transmission operators of North Macedonia (MEPSO) and Bulgaria (ESO) on the development of the electricity market and strengthening regional cooperation (Aranit 2019).

Albania does not possess any natural gas production capacity yet. Albpetrol Sh.a, the state-owned company is entitled to produce and trade oil and/or gas. The Trans Adriatic Pipeline's (TAP) and the gas market model are the most significant developments of the past years. Nevertheless, implementation of Gas Master Plan and the country's gasification are pending (Dhima 2019). The state adopted an act for transmission and distribution of natural gas to ensure interconnections with neighbouring gas systems. The emergency oil stockholding system is assigned to the oil industry. The system is not compliant with Directive 2009/119/EC (Community 2019).

The implementation of the infrastructure Regulation is particularly urgent to facilitate the realization of ongoing strategic infrastructure projects, particularly the interconnection 400 kV OHL between Albania and North Macedonia. The project is expected to improve security of supply and overall operation of the energy system of Albania.

The Trans-Adriatic Pipeline (TAP) is expected to increase demand for gas-fired energy and manufacturing investments in Albania (Export.gov 2019). TAP as well as the start of the Ionian-Adriatic Pipeline (IAP) project and the plan of linking Albania and Kosovo (Albania's national energy strategy 2030) through a gas pipeline is expected to be a cornerstone of Albania's gasification (Jonuzaj 2018).

2.3.5 Bulgaria

Bulgaria is almost totally dependent on imported fuels from Russia. Bulgaria has 12,668 MW of installed capacity enabling the country to meet and exceed domestic demand. The highly regulated Bulgarian electricity market is dominated by a few major players that have built a supply monopoly in the country. Bulgarian Energy Holding EAD (BEH EAD) highlights the state capture in the energy sector, the high dependency of the

country on the imports of Russian gas and technology, the frequent changes in the legislative and regulatory environment and energy poverty as the major challenges in the energy restructuring process. Today there is a strong thermal power plant complex (TPPs) which consists of three lignite-fired thermal power plants. Bulgaria's energy generation includes nuclear energy, solid fuels, such as lignite, as well as small quantities of gas. The role of renewable energy sources (wind, solar, biomass, and hydro) has increased; renewables make up nearly 14% of Bulgaria's electricity production. Bulgaria's domestic market for natural gas is met by supplies from Gazprom, delivered through the Trans Balkan pipeline.

The Bulgarian power market is dominated by state owned producers. Bulgarian Energy Holding (BEH) manages the most important companies in the energy sector, Kozloduy nuclear power plant (NPP), TPP Maritsa Iztok, the National Electric Company (NEK), Electric System Operator (ESO), Bulgargaz, Bulgartransgaz and Bulgartel.

Changes of the Bulgarian regulatory framework removed fees for the export and import of electricity. In another major legislative change, the mandatory participation of larger renewable generators on the liberalized market was introduced bringing 750 MW of renewable capacity to the free.

Wind, solar and hydro represent the main RES which produce roughly 13% of the electricity. According to official figures, Bulgaria has fully achieved, in advance, the objectives of the "Europe 2020" strategy on the consumption of energy from renewable sources; however, there is a question regarding the sustainability of electricity produced by RES as the difference between the purchase price and the market cost is covered by the National Electric Company (NEK), which passes on part of its losses to the final consumers.

Domestic oil production is minor as Bulgaria relies on oil imports mostly from Russia. (Bulgaria imports about 75% of its primary energy resources – oil, gas, nuclear fuel, coal – from Russia.) Oil exploration is ongoing in the Black Sea and on the Romanian border. A significant part of Bulgaria's oil industry income is derived as a transfer point on east-west and north-south transit lines.

2.4 The role of Greece in Balkan energy market liberalization

The European electricity market is the largest in the world, since 42 Transmission System Operators (TSOs) in 35 countries serve over 500 million customers. Given the ongoing coupling between various regions in Europe, in the coming years we are likely

to witness a significant integration among energy markets. Cross border trading of electricity denotes 13% of total sales in Europe (2017).

Greek electricity system is interconnected with Italy, Turkey, Albania, North Macedonia and Bulgaria, allowing exports and imports. This provides a potential for market coupling for instance, interconnection with Italy represents around 50% of total exports (Ioannidis, Kosmidou et al. 2019). The Greek TSO in a published study, on long-term electricity demand (2017 – 2027), envisages a power production shortage in the Greek market from the year 2020 – 2021 onward. This makes imperative to couple our electricity market with our neighbouring EU and Energy Community Countries and to fully implement the proposed Target Model by 2020.

Greek energy market is envisaged, within 2020 to be coupled with, first, Italy and, then, Bulgaria, under the Provisions of Act 4425/2016 for the Implementation of the Target Model. Currently the electricity interconnection with Bulgaria carried 3459 GWh in 2017 and, approximately, 3500 GWh in 2016 from, mainly, Bulgaria to Greece through the Thessaloniki – Blagoevgrad line of 400 kV. The new Nea Santa – Maritsa East line is still under construction, an overhead 400kV AC line with an approximate length of 151 km, 122 km on Bulgarian territory and 29 km on Greek territory. The line is expected to be operational by 2023.

Greece being an EU country, has already lined up with the EU acquis on most Regulatory and administrative requirements for participating in an Internal Energy Market, positioning it as a set partner in market coupling. Furthermore, Greece has the infrastructure, comprised of an extended and relevantly updated electricity network, a substantial and fast-growing gas network and industrial and commercial activity that supports both electricity and gas energy markets. Having the largest GDP among its Balkan neighbours Greece can pull up neighbouring energy exports and be a final destination for energy transits as well.

Greece can serve its northern neighbours as the energy gate to SE Mediterranean. East Med gas enters continental Europe through Greece and could be directed through the Balkans and together with TAP place neighbouring countries on the energy path of central Europe. Besides the PV climatic potential of the country, the interconnector with Libya brings RES energy to facilitate the EU decarbonization by 2050. The LNG deliquidification station together with the Bulgaria-Greece pipeline construction sets the Balkans as key players in gas supply diversification.

3 Obstacles of the Energy Market liberalization

3.1 Lignite impact and the need of delignitization

To date, the Energy Community Contracting Parties (see 4.1) have taken limited steps to follow the EU in its decarbonisation pathway. The Energy Community's acquis related to decarbonisation essentially ends with energy efficiency and renewable targets for 2020. A common target for the reduction of CO2 emissions and the incorporation of the Emission Trading Scheme Directive, has not even been discussed. A proposal for 2030 targets is still to be discussed for agreement but, even so, the implementation after years of delays is doubtful.

Countries favour lignite as a primary energy fuel in their national energy strategies due to affordability and security-of-supply concerns. It is available domestically and it is perceived to be cheaper than imported gas, oil, or renewable energy since environmental and social costs are usually not considered (Bank 2018). Despite a significant natural potential for the development of renewable energy sources and effective regional energy market integration, countries in the Western Balkans rely heavily on lignite (Table 1). This most toxic and polluting form of coal remains the main source of the regional energy production (Bank 2018). As countries rely on coal, which, together with coal mines, is mostly state-owned and not competitive due to future CO2 emission costs, power production remains unbundled and electricity market rests not attractive for new market players and investments.

While some financial institutions such as the European Investment Bank are not financing new coal-fired power plants, there are market players such as Chinese state banks and the China Development Bank that have reportedly signed financing agreements for lignite power plants in Serbia and Bosnia and Herzegovina. China is also reported to be participating in three other coal projects in Bosnia and Herzegovina and one in Romania.

Greece is phasing out coal by 2028. At the United Nations Climate Action Summit in New York in September 2019, Greece announced shutting all its lignite power plants by 2028. With its huge potential for renewable energy Greece must ensure that the transition away from coal is one towards 100% renewables. A region in Greece (Western Macedonia), hosting a number of coal power plants of the Public Power Corporation (PPC), is a priority under the European Union's new Coal Regions in Transition Platform. PPC's share in the Day-Ahead market, includes imports, hydro, and renewable energy sources, as well. PPC plans to have decommissioned more than 3000MW in total from 2010 to 2025. The

company planned to commission two new lignite units with a total capacity of 1100 MW during the period 2017-25, plans that are currently under reformation, as Greece latest energy strategy targets the power production delignitization to be in force by 2028 (ΕΣΕΚ, 2019). The under-construction power plants will use CO2 storage technologies and/or different fuel (natural gas) to adopt to the new targets (Energyn 2019).

In Bulgaria the main share of the produced energy is provided by lignite coal and nuclear energy (Tchalakov and Mitev 2019). Bulgaria still does not have a long-term energy strategy and a coal phase-out is currently not being discussed. Old and polluting coal power plants are still in operation. The government relies on derogations from EU laws to keep the power plants active and avoids taking responsibility for just transition actions.

Almost all Albania's generation capacity is hydropower. As thermal power production is limited in the country, lignite is not the major problem to Albania's market liberalization, but it should be ensured to remain this way. Two waste incineration plants were recently constructed. Italy's Enel has proposed building a coal-fired thermal power plant near the Albanian port of Durres. The plant plans to use imported coal and "clean coal" technology to supply the Albanian grid and the Italian market via a proposed underwater interconnector across the Adriatic Sea.

Turkey is planning to double its coal power capacity to 30 GW by 2023. Currently, around 37.5 GW of new coal capacity are in the development pipeline, the fourth largest new coal increase globally. Around a third of the pipeline belongs to state utilities EÜAŞ and Turkish Coal Enterprise. EÜAŞ has been trying to make these lignite assets attractive for investors through generous state subsidies, exemptions, land allocations, and price & purchase guarantees. Retrofitting is a widespread practice, expanding the capacity and lifetime of the country's oldest and dirtiest plants.

North Macedonia has not any known significant oil or gas reserves, but it is a lignite producer. During 2016, the majority of electricity was generated from lignite. However, the country has significant renewable energy potential (Thermos 2019). The electric power production system in North Macedonia consists of two thermal power plants, several hydro power plants. The two thermal plants produce 70% of the country's total electricity. Modernization of the "REK Bitola" thermal plant was performed, but its equipment is still largely obsolete, modernization is under way although unlikely to be finished before 2025. REK Oslomej is mostly used as a backup unit and no significant investments were made in the last two decades. Although a modernization of the plant is mentioned, it is more likely that it will be officially phased out with the upcoming North Macedonia Energy Strategy 2020-2040 (Ciuta, Gallop et al. 2019).

Table 1. Overview: National coal phase-out announcements in SE Europe.[1]

Country	**Coal phase - out status**
Albania	Not applicable
Bulgaria	No phase-out discussion
Greece	Phase-out announced
N. Macedonia	No phase-out discussion
Turkey	No phase-out discussion

3.2 Networks and interconnections

Oil Pipelines: There is no significant oil pipeline infrastructure in the region. A completed oil pipeline project insignificant for the international market was built recently and operated in the Balkans, the 210 km Thessaloniki-Skopje pipeline. It was related to the business plans of the Hellenic Petroleum SA, to cover the needs of OKTA in Skopje. Since 2013, the refinery has been inactivated because N. Macedonia proceeded to legal actions against OKTA in 2012, but there are plans to reopen the pipeline in both countries.

Natural Gas Pipelines: The connection of the natural gas networks between Greece and Turkey was achieved in 2007. The extension of BakuTbilisi-Erzurum starts at western Turkey and finishes at Greece.

Greece and Bulgaria signed a deal to establish a natural gas interconnector (the IGB pipeline) to connect the Greek National Natural Gas System with the respective Bulgarian. The 180km long pipeline contributes to the effort of minimizing the energy dependency to Russia -together with TAP and the Alexandroupolis LNG station. IGB has been connected to the interconnector pipeline IBR Ruse (Bulgaria) – Giurgiu (Romania) (Deniozos, Vlados et al. 2019).

When the Nabucco pipeline project (a route bypassing Greek territory) was rejected, the Azerbaijani SOCAR and the Turkish BOTAS agreed on the construction of TANAP

[1] *Source:* https://beyond-coal.eu/wp-content/uploads/2019/10/Overview-of-national-coal-phase-out-announcements-October-2019.pdf

(TransAnatolian Pipeline). The extension of TANAP is the 550km long TAP (Trans Adriatic Pipeline), on Greek territory with a projected increased capacity of 100%, belonging to a consortium of the energy companies SOCAR, Snam, BP, Fluxys, Enagás and Axpo.

At Fier (Albania), TAP is projected to bifurcate and cross Adriatic underwater towards Italy, while will be also heading onshore north to Croatia, by crossing Montenegro and Bosnia & Herzegovina as the Ionian Adriatic Pipeline (IAP). The construction plan of ITGI (Poseidon) aiming at transporting Russian natural gas through Turkey and Greece to Italy, did not result positively because both US and European Commission opposition, due to the fact that it could lead to further energy dependency to Russia and be competitive to TAP (González and Francisco J. R. 2012).

After Russia announced the termination of South Stream due to obstacles erected by the European Union, Russia went on to construct the Turkish Stream, as well as the construction of a natural gas distribution centre that would be established on Turkish ground (adjacent to Greek borders) and effectively channel natural gas in Europe. The TurkStream flows in two directions: One pipe supplies the Turkish market with those quantities that are currently arriving in Turkey from Bulgaria, while the second arrives in the Greek-Turkish borders and subsequently to Greece and further to other neighbouring countries (Deniozos, Vlados et al. 2019). As TAP and Turkish Stream pipelines become operable, Greece acquires an upgraded energy role in Balkans, making Greece an energy hub of strategic importance because IGB enhances the security of energy supply (Haase and Bressers 2010).

In 2016, the Hellenic Gas Transmission Operator (DESFA) and the respective company in N. Macedonia agreed to build an interconnection line to transport natural gas from Nea Mesimvria (Greece) to Stip (N. Macedonia) (Agency 2016). Both Greece and Bulgaria are largely energy dependent to Russia, while appearing in some cases as competitors, e.g. with respect to the planned pipeline. The gathering of pipelines crossing the Turkish ground increase the commitment and dependency of the receiving countries, including Greece, to Turkey.

Constructing the East Med Pipeline is designed to serve Israel, Cyprus and Greece by transporting natural gas to Europe via Crete and Peloponnese, up to the interconnection point of Poseidon pipeline (extension of the ITGI). The discovery of large natural gas fields in the maritime area between Cyprus, Lebanon, Israel and Egypt signified new geopolitical balances. Both Cyprus and Israel have enrolled into negotiations for the

building the East-Med pipeline that could link the two natural gas fields to Greece and Italy and further to the EU.

Greece will play an upgraded role if TAP, IGB and the construction of a new LNG terminal station at Alexandroupolis are finally implemented, and emerge as a new energy hub (Deniozos, Vlados et al. 2019).

N. Macedonia has no domestic production and its relatively small imports are from Russia through Ukraine. The country has only one main gas pipeline and less than 15% of its capacity has been used primarily by industrial customers.

Figure 2. Existing and under construction main pipelines in the region and the Alexandroupolis off-shore Independent Natural Gas System (INGS).[2]

[2] Source: SE-Europe-gas-markets-towards-integration-NG-150.pdf

Electricity network infrastructure

The region electricity interconnection infrastructure comprises of two interconnections between Albania and Greece; five interconnections of North Macedonia with Greece (2) and Bulgaria (3); two interconnections between Bulgaria and Greece; three interconnections of Turkey with Bulgaria (2) and Greece (1). Table 2 presents the capacities and typical loads of the interconnectors.

The Greek electricity system is interconnected with Italy, Turkey, Albania, North Macedonia and Bulgaria, allowing exports and imports. This provides a potential for market coupling, interconnection with Italy for instance, represents circa 50% of the total exports (Ioannidis, Kosmidou et al. 2019). Within the country, the Independent Power Transmission Operator (IPTO)'s subsidiary company, known as "Ariadne Interconnection", set up the implementation of the Crete-Attica interconnection project. At the same time, EuroAsia Interconnector is moving ahead independently to connect the electricity systems of Israel, Cyprus and Greece. Electricity interconnections with the Dodecanese island complex and the North Aegean island group are planned for 2029 and 2031 respectively.

Albania interconnection capacities are allocated on all borders, except with Kosovo, pending resolution between operators of Kosovo and Serbia. Albania is participating in a pilot project for market coupling with Italy, Montenegro and Serbia (Community 2019). Albanian OST signed a memorandum with transmission operators of North Macedonia (MEPSO) and Bulgaria (ESO) on the development of the electricity market and strengthening regional cooperation (Aranit 2019).

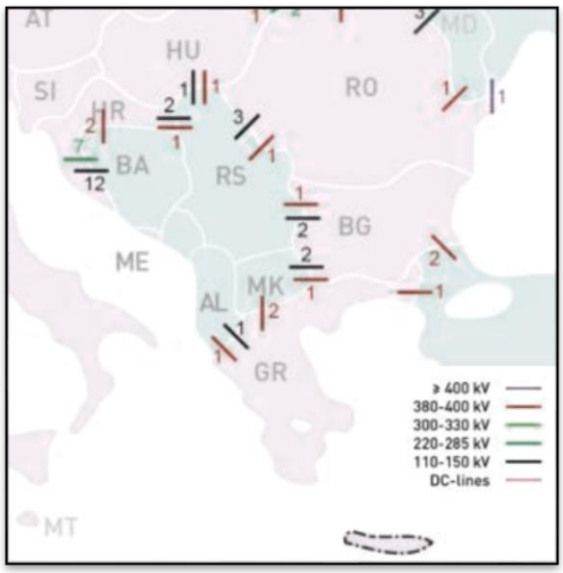

Figure 3: European Union and 3rd countries interconnections.

Bulgaria is traditionally a net exporter of electricity. Since November 2019 Bulgaria participates in the Single Intraday Coupling (SIDC), where buyers and sellers of energy (market participants) are able to work together across Europe to trade electricity continuously on the day the energy is needed. Bulgaria is interconnected to the SIDC market through Romania (Nemo-committee 2019). Other coupling projects include the pilot projects of Bulgaria-North Macedonia (BG-NM) and Bulgaria-Serbia-Croatia couplings.

Table 2. Technical information on the capacity and use of the EU-3rd countries existing interconnectors (November 2018)

Border	**Nominal capacity of the interconnectors (MW)**	**Actual electricity flows (exchanged, 2017, GWh)**		**Scheduled commercial flows (2017, GWh)**	
		EU --> 3rd country	**EU <-- 3rd country**	**EU --> 3rd country**	**EU <-- 3rd country**
Albania-Greece	533	1692	79	874	1209
N. Macedonia - Bulgaria	950	2451	1	1583	59
N. Macedonia - Greece	1632	422	1718	929	2095
Serbia - Bulgaria	1073	2124	9	2004	683
Turkey - Bulgaria	2485	2081	102	566	1253
Turkey - Greece	1900	1	3194	16	516

Interconnectors from North Macedonia to Bulgaria and Greece are equally used for trade and security of supply purposes with exports considerably prevailing from Bulgaria and imports to Greece. Also, the interconnector between Albania and Greece is regularly used for electricity trades and offers imports of cheaper electricity.

The Western Balkans have the most advanced technical cooperation with the European electricity systems as the Transmission System Operators (TSOs) from the neighbouring countries in that area are members of the European Network of Transmission System Operators for electricity (ENTSO-E): Albania, Bosnia and Herzegovina, Serbia, North Macedonia and Montenegro. It implies that the TSOs are fully involved in the preparation and adoption of ENTSO-E strategic documents such as the Ten Year Network

Development Plan, are represented in all bodies of the association and participate in the preparation of the closed network and other related methodologies. They also have to comply with the Operational Handbook and be solely responsible for the frequency containment reserve (FCR) and the frequency restoration reserve (FRR) and for maintaining the power interchange within their control area.

Turkey is synchronously connected with continental Europe through one electricity line to Greece and two lines to Bulgaria. Both EU member states trade electricity with prevailing imports contributing to the security of supply. Turkey, it has and ENTSO-E observer status.

Although there is electricity cross-border transport infrastructure in place between the neighbouring countries, there is an emerging need for strengthening the capacities, as discussed in Section 4.2. Reflecting this need, EU and Energy Community members support a number of ongoing and planned projects, discussed in 5.2.

4 Key Solutions

4.1 The Energy Community

Through various initiatives, the European Commission, the International Finance Corporation of the World Bank Group, the United Nations and other relevant international institutions support the aims of transforming the Balkan energy market to achieve energy sustainability, efficiency, security and reliability through the development of an integrated energy network, harmony of regulation, diversification of supplies and market liberalization. Aiming at regional markets interconnection and subsequent integration, the Energy Community was founded in 2005, and put in force since 2006. The Energy Community is an international organisation which brings together the European Union and its neighbours to create an integrated pan-European energy market. The mission of the Energy Community Treaty is to: establish a stable regulatory and market framework capable of attracting investment in power generation and networks; create an integrated energy market allowing for cross-border energy trade and integration with the EU market; enhance the security of supply to ensure stable and continuous energy supply that is essential for economic development and social stability; improve the environmental situation in relation with energy supply in the region and foster the use of renewable energy and energy efficiency; and develop competition at regional level and exploit economies of scale.

As of July 2017, the Energy Community has ten members: the European Union and nine Contracting Parties - Albania, Bosnia and Herzegovina, Georgia, Kosovo, North Macedonia, Moldova, Montenegro, Serbia and Ukraine. Armenia, Norway and Turkey participate as Observers.

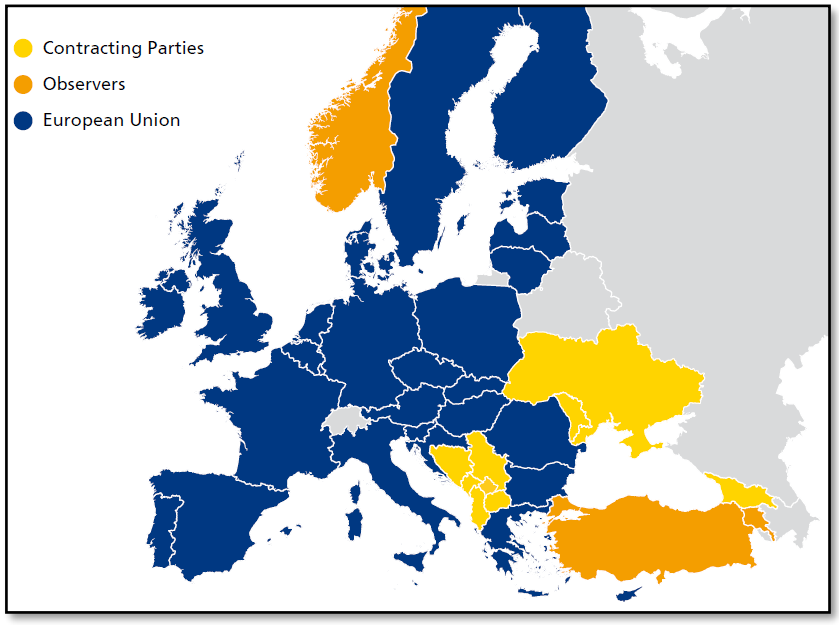

Figure 4. Energy Community members, Contracting Parties and Observers. Source: (Community 2019).

4.2 Strengthening collaborations

In 2016, the six Western Balkan contracting parties and a number of EU member states agreed on a Roadmap for a regional electricity market for the Western Balkan (Union 2012). The agreement outlines steps to develop an electricity market through spot trading and links between markets in the region. The overall purpose is to create a regional electricity market. The cooperation was further reinforced by the Sofia Declaration[3], which among others, aims at increasing the interconnectivity and expanding the Energy Union to the Western Balkans, including by completing the regional electricity market, creating single regulatory space and ensuring its integration with the EU internal energy market.

Energy cooperation with Turkey received more attention with the launch of the High-Level Energy Dialogue in 2015 as a complement and support to Turkey's accession

[3] Sofia Declaration, EU-Western Balkans Summit, 17 May 2018, available at http://www.consilium.europa.eu/media/34776/sofia-declaration_en.pdf

process. The dialogue's objective is to cooperate further for securing and diversifying energy supplies and for ensuring competitive energy markets. As regards the EU accession negotiations, the Chapter on trans-European Networks has remained open since 2007 and no progress has taken place. In this regard, the Expert Group notes, that Turkey's accession negotiations have effectively come to a standstill as stated in the conclusions20 of the General Affairs Council of June 2018 (Union 2014).

A number of initiatives supported by the Energy Community relate to market liberalization of Albania and N. Macedonia.

Launched in 2014, the Western Balkan 6 Initiative aims to support the six Contracting Parties of the Energy Community in Southeast Europe, Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro and Serbia, in strengthening regional cooperation and driving sustainable growth and jobs. Under the auspices of the Grant Contract "Technical Assistance to Connectivity in the Western Balkans - Component 2: Regional Energy Market" between the European Commission and the Energy Community Secretariat, the Secretariat was defined as one of the main implementing organizations of the WB6 initiative. The overall objective of the 24 months technical assistance project, CONNECTA, was to assist the Western Balkan governments to achieve their goal of a regional energy market. The Secretariat was to facilitate the implementation of so-called "soft measures" that will remove existing legislative and regulatory barriers and enhance the institutional structures necessary for the functioning of this market in line with the Energy Community Treaty and relevant EU acquis (Community 2016).

Another relevant initiative, the so-called Priority projects of Energy Community, refers to infrastructure projects that comply with the general and specific criteria, as defined in the adapted Regulation 347/2013 on guidelines for trans-European energy infrastructure; most importantly the projects long term benefits outweigh their costs and have a cross-border dimension. In October 2015, the Energy Community adopted the Regulation 347/EU/2013, with certain adaptations. The purpose of this Regulation is to streamline the permitting procedure and facilitate investments in energy infrastructure, in order to achieve the Energy Community's energy and environment policy objectives. The Regulation, as adapted for the Energy Community, establishes rules for identifying projects of Energy Community significance, called Projects of Energy Community Interest (PECIs) and Projects of Mutual Interest (PMIs). These projects benefit from streamlined permitting procedures within Contracting Parties – in case the Competent Authorities are put in place, here applicable, from cross-border cost allocation. PECIs

may also be eligible for European Union technical and financial assistance from the Instrument for Pre-Accession Assistance (IPA) and the Neighbourhood Investment Facility (NIF) (Community 2018).

The identification of PECIs and PMIs has evolved in three tiers in 2013, 2016 and 2018 projects, while a fourth tier has been initiated by a call for new project proposals opened in February 2020. The PECI/PMI projects involving the countries of interest in this study, currently active in Energy Community are (Community 2019):

- Gas_04B / North Macedonia - Greece Interconnector (PMI).
- Gas_09 / Gas Interconnector Serbia – Bulgaria (PECI).
- Gas_11 / Gas Interconnector Serbia - North Macedonia (PECI).
- Gas_13 / Albania - Kosovo Gas Pipeline (ALKOGAP), (PECI).
- Gas_16 / Ionian Adriatic Pipeline (Fier, AL - Split, HR), (PMI).
- Gas_20_21 / TAP and SCPE (PECI)
- Gas_22 / SCP-(F)X and TCP strings 1-2, (PECI).
- EL_02 & EL_13 / 400 kV OHL Bitola (MK) - Elbasan (AL), (PECI)

CESEC – Central South Eastern energy connectivity

Work has progressed also from the Central and South Eastern Europe (CESEC) perspective, for a region that, despite its geographic proximity to its main gas supplier, still pays higher gas prices than Western Europe. In 2016 and 2017, the High-Level Group has made important progress on the Bulgaria-Romania-Hungary-Austria interconnector (BRUA) and on the first phases of reinforcing the Bulgarian grid. However, presently, it is of key importance to implement without further delay the remaining three priority projects to ensure that the construction of the LNG terminal in Croatia (Krk LNG), the Greece-Bulgaria interconnector and the Bulgaria-Serbia interconnector starts as currently planned.

Building on the successes in gas, in 2017 the Commission, the CESEC Members States and Energy Community Contracting Parties concluded the Memorandum of Understanding which extends CESEC to electricity market and infrastructure, energy efficiency and renewable development. Furthermore, the High-Level Group also agreed to extend its geographical scope to cover the entire Western Balkans. In October 2019 the European Investment Bank (EIB) announced a €110 million loan to state-owned Bulgarian Energy Holding (BEH) to fund part of the Gas Interconnector Greece-Bulgaria (ICGB) project. The project is a PCI project supported and co-financed by the EU. It is a key part of the strategy for greater integration of European energy markets focusing on

the Bulgaria-Greece, Bulgaria-Romania and Romania-Hungary interconnections (Commission 2019).

5 Discussion

5.1 Gas usage as a stepping stone towards delignitization.

Natural gas has always been a long-term business because of large scale investments, long asset lives and long-term contracts. Decarbonisation poses different long-term challenges that can lead to a combination of renewables and electricity storage taking over much of the market in both the power and heat sectors. The gas community needs to engage now with proposed government policies and targets for decarbonisation in a 2030 – 2050 timeframe, even if those policies and targets seem unrealistic and to ignore short term, low cost gains which can be achieved by switching from coal to gas in power generation.

While building coal-fired plants may make economic sense in the short term, one current issue concerning Balkan energy strategies is the question of how Balkan countries with EU membership aspirations plan to reconcile their continuing reliance on coal-fired power plants with:

(a) the carbon price set by the EU Emissions Trading System. In August 2015, the price was approximately €8 per tonne, but this is projected to rise to about €30 per tonne which would significantly increase the cost of energy generated from this source, and energy costs, in turn, impact national economies; and

(b) the EU commitment to reduce carbon emissions by 40% on 1990 levels, increase the share of renewables by at least 27% and increase energy efficiency by at least 27% by 2030[4].

The clearest example is prioritizing for emissions by running existing gas-fired plants instead of coal-fired plants to generate electricity. The International Energy Agency estimates that up to 1.2 Gt of CO2 could be abated in the short term by switching from coal to existing gas-fired plants, if relative prices and regulation are supportive, globally. The vast majority of this potential lies in the United States and in Europe. Doing so would bring down global power sector emissions by 10% and total energy-related CO2 emissions by 4%.

[4] Balkan Economic Forum, http://www.balkaneconomicforum.org/wp/balkan-energy-strategies/

On average, coal-to-gas switching reduces emissions by 50% when producing electricity and by 33% when providing heat. Best practices all along the gas supply chain, especially to reduce methane leaks, are essential to maximise the climate benefits of switching to gas.

The reform of the EU Emissions Trading Scheme (which will place surplus carbon allowances in a Market Stability Reserve from 2021) has raised the generating costs for fossil fuel plants, particularly coal. The favourable combination of low gas prices and high coal and carbon prices has recently put a large portion of Europe's gas fleet within a switching range. However, the switch has also provoked a drop in coal prices, making the range a moving target.

Coal phase-out policies also provide an opening for natural gas, along with renewables, to replace the retiring coal capacity. Sixteen European countries are part of the Powering Past Coal Alliance, which is pushing for the closure of existing coal-fired power plants over the coming decades. In the New Policies Scenario, these plans lead to the retirement of over 80 GW (or half of the total coal capacity) by 2040, with the remainder subject to strong competitive pressures due to higher CO2 prices. There is around 220 GW of installed gas capacity in the European Union, with utilisation rates over the past five years averaging 28%.

Compared with building new renewables, switching to existing gas plants can provide faster emission reductions. This can be an important consideration for a European energy system focused on delivering a rapid turnaround in emissions. For example, replacing a supercritical coal plant with an existing 400 MW combined cycle gas power plant could provide a slightly higher level of CO2 savings in the first five years of operation than a new onshore wind project (given the time needed to commission new renewable capacity).

However, the costs of renewables are falling rapidly, making several mature technologies, such as onshore wind and solar PV, very competitive with the costs of generating electricity from existing gas-fired power plants. The role of switching in Europe is therefore time limited. The retirements in coal capacity do not translate automatically into increased gas use: the combination of government support and higher carbon prices provides strong incentives for an increased market share for renewables.

The business case for new gas-fired capacity to reduce emissions is also challenging. Weak wholesale power prices in renewables-rich systems are not incentivising investments in new thermal capacity; over half of the revenue from a new combined cycle

gas turbine would, therefore, need to come from sources other than wholesale power prices. As a result, gas plants may largely remain on standby and recover their costs by fulfilling balancing functions, rather than providing significant quantities of baseload power.

Short-term peaks in the demand for gas in the power sector are set to rise in order to help integrate larger shares of renewables. There is, therefore, a strong case for gas-based infrastructure for the flexibility and backup capabilities it provides for power systems with high levels of intermittent renewable energy, such as solar and wind.

This case is being challenged, in some respects, by increasing investments in battery storage and grid management capabilities, which –if brought to scale– could fulfil the same short-term flexibility functions as gas. The technological potential is promising but not yet definitive; demand-side response, for example, can reduce peak loads in Europe by up to 25% by 2040, while cheaper battery storage could obviate the need for a further 5 GW of peaking gas plant capacity (or around 10% of the fleet).

The future for gas in Europe's electricity market depends, in particular, on how services such as flexibility and capacity provision are remunerated and incentivised in a system with increasingly variable power delivery, and how quickly renewables can be added. There remain, however, fewer low-carbon alternatives to gas in meeting seasonal heat demand, a consideration that is spurring interest in the costs and supply potentials for low- or zero-carbon gases.

As SE Europe is investing in being a gas transit region and as market reforms and grid infrastructure upgrading and interconnections are delayed, gas as an alternative for coal for the transition period seems promising. Albania has launched a tender in 2019 to supply one of its thermal plants with natural gas from TAP, while in Greece, the under-construction PPC power plants will use CO2 storage technologies and/or different fuel (natural gas) to adopt to the new targets adopted by the country for delignitization by 2028.

5.2 Strengthening the networks

An interconnected European grid is essential to the ultimate goals of the Energy Union to ensure affordable, secure and sustainable energy to all Europeans. A system to which renewables will contribute around half of the power production in 2030 and that will be fully decarbonised by 2050 poses significant challenges in terms of infrastructure, regulation and funding (Commission 2017).

The Trans-European energy networks (TEN-E) aims to reach a fully European energy grid where all Member States are interconnected and protected against sudden supply. To ensure the timely delivery of these investments and the construction of the necessary infrastructures, the European Union adopted the Regulation on guidelines for trans-European energy networks in 2013. This was accompanied by the Connecting Europe Facility (CEF) created to support financially the development of trans-European energy, transport and telecommunication networks[5] (Union 2013).

The Commission Expert Group on electricity interconnection targets prioritize interconnectors with countries that share a high level of regulatory convergence and have reliable and well-grounded political, technical and environmental cooperation with the EU .The Expert Group assesses that such high level of cooperation can be observed with the Energy Community contracting parties, i.e. in Western Balkans as well as with Ukraine and Moldova. Existing interconnectors with these countries, planned Projects of Common Interest (PCI), Projects of Energy Community Interest (PECI) and Projects of Mutual Interests (PMI) should be given the highest priority (George, Kreusel et al. 2019).

Two key regional gas pipeline projects involving Greece and backed by the US, the Greek-Bulgarian IGB gas grid interconnection and a pipeline to link Greece and North Macedonia, are at the centre of regional attention.

Besides the prospective gas pipeline from Greece to North Macedonia, talks between the countries also focus on an upgrade of the electricity grid interconnection linking the systems of the two countries, as well as an upcoming relaunch of the Okta oil pipeline, stretching from an ELPE (Hellenic Petroleum) facility in Thessaloniki to the company's Okta refinery and storage facility in North Macedonia. The gas pipeline is the most important project of the three as an interconnection of the Greek and North Macedonian gas systems does not exist.

The Greek-Bulgarian IGB gas interconnection, along with TAP, to carry Azeri natural gas through northern Greece, Albania and across the Adriatic Sea to central Europe via Italy, are Greece's two most significant international energy projects.

Greek gas grid operator DESFA and its state-controlled North Macedonian counterpart MER plan to upgrade a memorandum of cooperation signed in 2016 for the construction of a 120-kilometer gas pipeline from Thessaloniki's Nea Mesimvria area to the northern neighbour. The two countries have agreed to sign a series of bilateral agreements and

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013R1316

memorandums of cooperation. The project, to interconnect the Greek and North Macedonian gas transmission systems, is regarded as one of the most significant energy investments being prepared by the two countries. Subsequently, the Greek-North Macedonian natural gas pipeline, once constructed, promises to offer a new supply route to Balkan markets.

The EU supports the Interconnector Greece-Bulgaria (IGB) with an initial annual capacity of 3 bcm/year; the gas interconnector with Romania is completed and the current Government committed to advance the gas interconnectors with Greece and Serbia. There is a plan for increased capacity for electricity interconnectivity, primarily with Greece.

Bulgarian, Greek and Romanian TSOs have agreed in July to establish a Regional Coordination Centre (RCC) by the end of the year for calculating capacity and assessing regional generation adequacy. RCCs are required to calculate cross-zonal capacities based on data from TSOs and respecting operational security limits. Other tasks include creating common grid models or coordinating regional outage planning (Energy 2019). Bulgaria is traditionally a net exporter of electricity to the rest of the region, especially Greece. In August, Greece commissioned a new subsea cable connecting mainland with the Peloponnese peninsula, marking an important milestone in the grid expansion programme run by the local DSO. The interconnector will stabilize the electricity system in the western part of the country and should eventually link up with the island of Crete, Greece's largest autonomous power grid. Crete and dozens of other island power systems have plenty of underutilized renewable capacity. Network limitations have led the grid operator to place caps on the capacity of installed wind and solar resources on these islands, with almost four fifths of that cap already filled.

ENTSO-E has established cooperation with Med-TSO – the voluntary Association of the Mediterranean TSOs for electricity, whose members operate the high voltage transmission networks of 19 Mediterranean Countries. Ten Med-TSO Members are also members of ENTSO-E (Albania and Montenegro in the Western Balkan as well as Croatia, Cyprus, France, Greece, Italy, Portugal, Slovenia and Spain on the EU side).

Med-TSO has been set up as a technical platform that facilitates the integration of the Mediterranean power systems and fosters security and socio–economic development in the Region. The primary objective is promoting the creation of a Mediterranean energy market, ensuring its optimal functioning through common methodologies, rules and practices for optimising the operation of the existing infrastructures and facilitating the development of new ones. The results of the cooperation should be the development of

new interconnectors and harmonised regulatory framework. In that regard, a similar cooperation exists between the relevant regulators in the framework of MEDREG - the Association of Mediterranean Energy Regulators. MEDREG primarily promotes a transparent, stable and compatible regulatory framework in the Mediterranean Region. Currently, no physical interconnectors exist between the EU member states and Southern and Eastern Mediterranean countries, except for one interconnector between Spain and Morocco. Several specific projects are already identified by the Ten-Year Network Development Plan for electricity to integrate the electricity of the system, enhance its stability and promote larger uptake of renewables including from the Northern African countries. In this respect, Med-TSO has recently published the first Master Plan of the Mediterranean Transmission Grid[6]. The document to be updated regularly should become a reference point for any further assessment of Mediterranean projects in the frame of the next editions of the TYNDP[7].

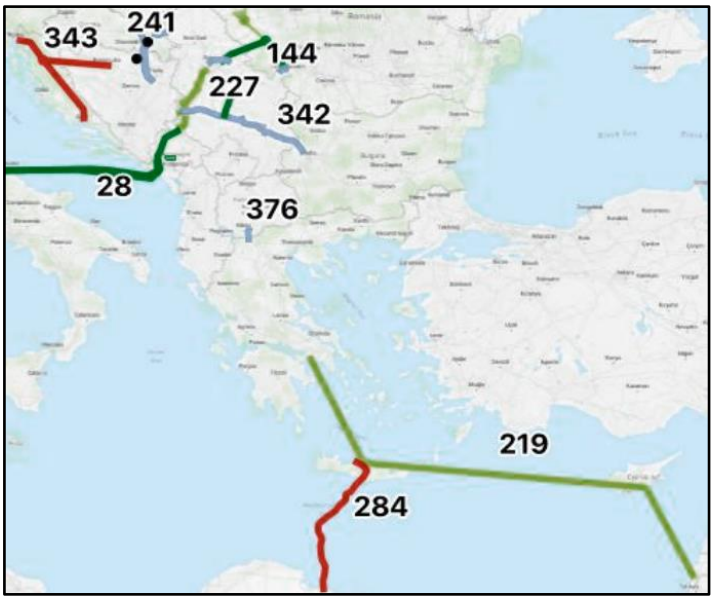

Figure 5: Planned electricity grid interconnectors between EU and third countries.

Besides the existing electricity interconnectors, several new lines are planned between the EU member states and their neighbours and twelve concrete projects are included in the latest ENTSO-E Ten Year Network Development Plan (ENTSO 2019).

Two of these projects are refurbishments of existing lines. The upgrade of the existing interconnector between Croatia and Bosnia and Herzegovina with an additional, higher voltage line aims to improve system flexibility and stability and will require further pre-feasibility studies. The refurbishment of the interconnector between Meliti in Greece and

[6] https://www.med-tso.com/publications2.aspx
[7] http://www.medreg-regulators.org/Home.aspx

Bitola in North Macedonia (376 in Figure 5) aims at increasing its transfer capacity. In this way, the upgraded interconnector will enable the reduction of price differentials, mitigate curtailment of renewables and improve accommodation of flows, which will improve system flexibility and stability.

Six projects aim at enhancing interconnectivity between the EU and the Western Balkan. The interconnector between Italy and Montenegro is part of the Transbalkan corridor that will further continue to connect Montenegro, Bosnia and Herzegovina and Serbia (227 in Figure 5). The project will help lower the price differentials between Italy and South Eastern Europe through the Balkans, integrate renewables and reduce system adequacy deficiencies.

Other projects in Western Balkans, the 400 kV OHL Bitola (MK)- Elbasan (AL) and two 400 kV SS Ohrid and Kumanovo, in N. Macedonia, contribute to increasing the transmission capacity in the East-West direction. The mentioned two SS-s will increase the security of supply in the South-West part of N. Macedonia. The construction of the lines is the last part of the implementation of the East-West power transmission corridor between Bulgaria, Macedonia, Albania and Italy.

The interconnector between Bulgaria and Serbia (342 in Figure 5) is part of the Central Balkan corridor and aims at improving East-West flows and reduce price differentials, while two interconnectors between Romania and Serbia are also expected to enhance energy flows, notably from renewable sources.

The planned interconnector between Greece (Crete) and Libya, currently known as LEG1 (284 in Figure 5), would allow for electricity exchange between Europe and the South-Eastern Mediterranean countries. It is part of a bigger project that would also comprise the development and operation of a large solar power generation plant in Tobruk, Libya. The project enables cost-efficient grid connection of high volumes of RES and it is designed also to offer more supply options to isolated areas (Crete).

The last planned project in the Mediterranean region is the Eurasia Interconnector between Greece (Crete), Cyprus and Israel (219 in Figure 5). Most notably, the project can end the full electricity isolation of Cyprus and enhance electricity exchange between the three participant countries (George, Kreusel et al. 2019).

5.3 Italy-Greece-Bulgaria Market Coupling

The term market coupling refers to the aim to form an interconnected (European) market for electricity. Market coupling is intended to link control areas and market areas in order to harmonize different systems of electricity exchanges and, in particular, to reduce price

differences. This way, the electricity market is to some extent aligned with the physical reality of electricity flows, since neighbouring electricity grids are in any case physically interconnected and electricity always takes the shortest route from producer to consumer - across market boundaries.

With the help of the Price Coupling of Regions (PCR) system introduced in 2010, the European countries implemented a nationwide market coupling of a total of 15 European countries in 2014, including the Baltic States, Great Britain and Poland in addition to the CWE and the Scandinavian countries. The SWE states joined this market coupling of North-Western European states (NWE), thus enlarging the unit area around Portugal and Spain. The last major change was in 2015: Italy coupled its borders with France, Austria and Slovenia. July 2016 saw the successful coupling of the markets of Austria and Slovenia. This means that this area in Europe, also known as Multi Regional Coupling (MRC), currently comprises 19 European countries. At 85%, these countries cover the majority of European electricity consumption. European countries that are linked within the Multi Regional Coupling (MRC) are highlighted. The European Union aims to link further markets to the MRC on the way to a pan-European internal market in order to ensure efficient electricity trading in Europe. (Status: July 2019)

The PCR is based on three premises: A uniform algorithm for calculating electricity prices ensures growing transparency and order within the day-ahead market. The PCR members do not collect the data on a central server, but manage it decentral. The individual power exchanges have their own responsibility for their market areas. So-called PCR-Matcher and a Broker Service calculate the different market and reference prices. According to EPEX-Spot - one of the seven PCR initiators - other European power exchanges may also join the PCR solution in order to guarantee even greater efficiency. Market participants can benefit from cross-border trading[8].

In 2018, HEnEx joined the Price Coupling of Regions (PCR) project, which is an initiative of eight Power Exchanges covering the majority of European electricity markets. One of the key achievements of PCR is the development of a single price coupling algorithm, known as EUPHEMIA.

Given the ongoing coupling between various regions in Europe, in the coming years a significant integration among energy markets is expected. Pooling of resources saves

[8] https://www.next-kraftwerke.com/knowledge/market-coupling

the European customers 13 billion euros per year. Cross border trading of electricity denotes 13% of total sales in Europe (2017).

Numerous benefits can be derived from cross-border trading. Namely, the optimal use of interconnections, the enhanced security of supply, the increased social welfare, the promotion of realistic and competitive prices, the encouragement for new investments through the allocation of efficient economic signals and finally the promotion of competition.

Multi-Regional Coupling (MRC) is known as the coupling of regions and efficient management of available transmission capacities between areas and countries. For MRC to be implemented the countries have to meet the following prerequisites:

- functioning power exchange in both countries
- implementation of network codes
- abolishment of Regulatory barriers to trade

The Italy-Greece-Bulgaria Market Coupling (MC) is a day-ahead MRC. In 2019 national regulatory authorities ADMIE (TSO) and HEnEx (Energy Exchange) has sent a request for Italy-Greece border go-live and relevant working groups work to complete the MC. The NRAs of Bulgaria and Greece approved to include the Greek-Bulgarian border into the Italian Borders Working Table (IBWT) day ahead market coupling project (Europa 2019). CESEC, in its updated electricity action plan in 2019, suggests that for the specific initiative immediate actions are needed towards identifying operational and regulatory preconditions and necessary changes, possible roadblocks & solutions, updating the Roadmap and drafting precise implementation plan and agreeing to common capacity calculation methodology. Regarding the prerequisites, HEnEx is not yet fully operational while Italy and Bulgaria power exchanges are, and Bulgaria abolished its export electricity tariffs in August 2019.

The expected go-live date for GR-IT day ahead market coupling is expected in Q4 2020. The coupling will follow after 3-4 months of operation of the HEnEx, expected to go live in June 2020. The go-live window definition for GR-BG coupling to the IBWT has not been defined yet (Mourtzikou 2019).

5.4 Towards a common power exchange operation in the Balkans.

For the implementation of multi-partner market coupling, it is needless to say that harmonization is definitely an issue, especially within the Energy Community Member States. Countries have different energy regulations. TSOs and PX’s, where yet in place,

have different local system solutions dealing with scheduling, nomination, trading. Energy management aims to optimize the complex and multiply essential energy system. While there is plenty of experience in optimizing energy generation and distribution, it is the demand side that receives increasing attention by research and industry.

Although physically closely linked to their neighbours, South-East Europe countries cross-border electricity trade is below the region's potential, reflecting the high level of market fragmentation. Albania and N. Macedonia -and neighbouring Kosovo and Montenegro, do not have the critical size to develop liquid markets in isolation. Liquid cross-border markets will lead to important cost savings for SEE energy consumers through more competition and more effective use of existing generation and transmission infrastructure in the region. This would also attract more investments.

Regional power trading is also a pre-condition to organise electricity markets in a more environmentally friendly manner. Aggregating generation and demand over larger trading regions will become a key condition for integrating energy from water, wind and sun. Expanding renewables in small isolated markets would require considerable investment into backup generation, which would further increase costs for customers. All of this market integration will also enhance security of supply. Unbundled and certified transmission system operators and a regionally coordinated capacity calculator are part of a functioning regional trading system. Not all countries have implemented the necessary institutional changes yet.

The Roadmap for a regional electricity market for the Western Balkan (Europa 2015), agreed and signed in 2016, identifies four key conditions needed to be fulfilled to comply with the obligation to implement electricity spot trading:

1. Adhere to a power exchange

2. Develop trading/market coupling with one or more neighbours

3. Participate in MoU and SEE Coupling Initiatives and implement agreed measures

4. Ensure, and if necessary, increase liquidity and monitor the progress with indicators

Bulgaria, is at an advanced level of market implementation, especially after the changes in the regulatory framework that removed fees for the export and import of electricity. The legal basis is already in line with EU energy legislation, also regarding to relevant non-energy rules (VAT, financial, etc.). The power exchange is operational. Even if there is a need to further improve DA market functioning, these markets can be considered technically ready for coupling with suitable neighbours. In Albania, Kosovo and

Montenegro, the 3rd EU package is transposed to national law and some of the required secondary legislation is ready. The remaining rules are in various stages of preparation or partly still not started. As to establishment of PX, Albania has a project on-going, Greece expects operation in June 2020, Kosovo plans to join the Albanian PX and Montenegro is about to decide on the concept. For North Macedonia quite some homework still remains as it has only quite recently started its market reform.

Regarding balancing markets, they are still rather undeveloped in most countries. The proper rules are or will come in place soon but lack of competitive supply of balancing services keeps the markets partly or fully regulated. Cross-border exchange would be easiest way to increase the offering. Some arrangements are implemented or planned but none of them is really market based yet.

Even if the small size of SEE market would justify it, no centralized market structures (e.g. 1 PX) are realistic at short term. The process will build on many national/bilateral initiatives which should lead later to an integrated regional market. There is a need to ensure that different projects do not choose incompatible solutions which hamper further integration. This is especially important for WB6 area which lacks obligatory coordination and endorsement procedures of EU.

ENTSO-e proposes that the WB6 Initiative does the coordination and steering while, the Energy Community Secretariat supports financially the work through its Technical Assistance-program. The CESEC initiative in the electricity sector (CESECe) by European Commission to enhance market development in the SEE and the surrounding EU could at best strengthen the political commitment and better incorporate EU and non-EU market development compared to current WB6 setup. There is a need to ensure coordination and alignment between existing and new initiatives, in order to avoid overlapping and inefficiency (ENTSO 2017).

Numerous benefits can be derived from a common cross-border electricity market. The optimal use of interconnections, the enhanced security of supply, the increased social welfare, the promotion of realistic and competitive prices, the encouragement for new investments through the allocation of efficient economic signals and finally the promotion of competition. Although not in a mature state for a single power exchange, SEE countries as small markets having high RES potential and energy transition roles, should progress steadily in steps towards an integrated common regional market.

6 Conclusions

In overall, the European Internal Energy Market (IEM) is expected to increase liquidity, efficiency, social welfare and transparency of prices and flows. A highly interconnected grid is a precondition for tackling power fluctuations in an electricity market based on RES, towards the 2050 decarbonization target achievement. SEE countries comprise a region delayed in complying with the IEM requirements although willing, engaged and active in reforming.

Balkan energy reform plans distancing reliance on fossil fuels towards dependence on renewable energy sources and energy efficiency innovation, are slow to be adopted by Balkan countries for a variety of reasons including the availability and low current cost of coal, state ownership of coal power plants, competition absence, and selection of relying on domestic resources.

Being ahead in infrastructure set and software implemented, Greece serves foremost as a ready potential market importer in the region and as such attracts power infrastructure investments indirectly to neighbour countries. Furthermore, provides paradigms and know-hows regarding the transition delignitization and network upgrading phases. Regarding the gas market, Greece is the entry point of the Turk Stream, TANAP/TAP in Europe and potentially also of the East med gas reserves. The Alexandroupolis LNG deliquidification platform is another supply point for international gas, e.g. Egypt or US gas, and may prompt Greece to establish an energy hub. North Macedonia plans on gas powered plants are based on pipeline connections with the Greek pipeline network. As this project progresses Greece will be a key gas node bringing gas in Europe from Russia, Azerbaijan and SE Mediterranean by pipelines and possibly US, Algerian and Egyptian LNG. Connecting capacities and markets enhances the significance of neighbour Balkan countries in securing gas supply, source diversification and competitive costs for the continent.

Greece is becoming also a South-North electricity gate through the LEG1 project bringing RES power from North Africa to Europe. Either as a gas or electricity power gate, Greece brings transit trading benefits to neighbouring countries.

EU countries and Energy Community countries in the area progress towards delignitization; Turkey on the contrary is investing in coal plants. Foreign (to Europe) capital is available for investments in coal power in Western Balkans but EU influence has discouraged such investments. The countries have great RES potential but depend significantly still on coal power. Gas, although negligibly produced by the countries, is

easily accessible due to the geopolitical conditions in the region and can serve as a clean and easy transition towards clean power production. However, battery storage and grid management capabilities, when brought to scale, will fulfil the same short-term flexibility functions as gas.

The SEE countries have common characteristics and differences, and advance administrative reforms and infrastructure in different pace. CESEC, the Energy Community, the WB6 initiative, have prioritized collaboration, provided coordination and access to funding towards infrastructure and market harmonization. A number of PECI/PMI projects are active in the region. Progress could be faster; sometimes national administrative obstacles are hard to overcome, or there is no realization follow up of executive decisions and sometimes EU lacks a defined will towards supporting reform implementation in third countries. The Energy Community role is of key importance, as it supports, monitors, facilitates and analyses the status of countries market and suggests and prioritize solutions and efforts. The Energy Community also assists countries in securing funding.

Whether hosting gas pipelines for the coal-RES transformation of energy thirsty industrialized Europe, or connecting the consuming grids of a decarbonized Europe to solar power plants in Sahara, SEE countries can play a key role in Europe's energy supply, given that they develop in time the political will for fast reforms and regional tight collaborations. Once markets are liberalized and interconnected forming a functioning internal market with a single PX, SEE countries could exploit their geopolitical and climate advantage by taking regional initiatives instead of being dragged after Central-Western Europe's energy strategic goals.

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