INSTITUTE OF ENERGY FOR SE EUROPE

INSTITUTE OF ENERGY
FOR SOUTH-EAST EUROPE

South East Europe Energy Outlook 2021/2022

Concise presentation at the
10th Cyprus Energy Symposium,
Nicosia

November 17, 2022

By **Costis Stambolis**
Chairman and Executive Director of IENE

Study Scope and Focus (I)

Study Scope

(a) To present a **critical assessment** of the current status of the energy market in SE Europe

(b) To bring together the latest available knowledge on energy developments in the region and also **provide comprehensive data** on energy demand/ consumption, the major energy projects, pursued energy policies as well as trends, estimates and projections

(c) Taking into consideration the economic and political background of SE Europe, it **analyses the dynamics** of regional integration process from an **energy perspective**

(d) To provide an outlook for energy supply/demand, consumption and energy mix in the region

Study Scope and Focus (II)

- Study Focus

(a) Historical, political and socio-economic background of SE Europe

(b) Outlook on energy demand/consumption trends

(c) Sub-sector analysis: oil, gas, electricity (including solid fuels and nuclear), energy efficiency, co-generation, renewable energy sources

(d) Country Analysis

(e) Legal and Regulatory environment

(f) Major energy projects (national and transnational)

(g) Energy technology aspects

(h) Investment outlook

(i) Energy and environmental policy challenges

Methodology

- **Data acquisition and analyses from various regional conferences and workshops organised by IENE between 2018 and 2021**
  - Contributions by individual energy experts from all different countries of the region focusing on Country Profiles and Sectorial Analysis
  - From published sources including IEA, EIA, OPEC, IAEA, European Community, Energy Community, IENE and from several European bodies (ACER, ENTSO-E, ENTSO-G, GIE, Eurogas, Eurelectric, Fuels Europe, EWEA, Solar Power Europe, ESTIF, COGEN Europe, EREF). Also, from various national statistical organisations and national energy regulatory agencies
- **Analysis**

  Various conventional analytical tools and computer simulation models were used in analysing quantitative data for macroeconomic and energy demand forecasting. In this respect, IENE cooperated closely with external senior energy modelers **George Giannakidis** and **Rocco De Miglio**
- **Synthesis**

  Undertaken in-house by IENE's core study team comprising economists, engineers, political scientists, history and strategy majors and experts from all different areas of the energy sector

Editors and Authors of SEEEO 2021/2022

Peer Reviewers of SEEEO 2021/2022



















Contents of SEEEO 2021/2022 Study

Raison d' Être

- Why a regional approach?

Because SE Europe, on the strength of its history, cultural background and current urban and industrial setting, constitutes a region both geographically and geopolitically and it has a strong impact on the rest of Europe and the East Med (see Energy Security).

- The need to **understand** the geopolitical and geographical sphere within which IENE operates, but also to **define** and **evaluate** in an objective manner the major policy challenges of the energy sector of the region.
- To **study, analyse** and **understand** the region's energy market structure and associated energy flows.
- To **identify** the important investment and business opportunities across the SE European area and assess the region's energy related investment potential within the given business climate.
- Energy Atlas of the region.
- An in-depth study of the energy prospects and perspectives of a particular geographic region, such as SE Europe, has an impressive cumulative effect, as the **sum often exceeds the value of its constituent parts**. Very much along the lines of Aristotle's logic when he proclaimed the *"The whole is greater than the parts"*.

The SE European Region Defined

Core countries

- Albania
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- Cyprus
- Greece
- Hungary
- Israel
- Kosovo
- Montenegro
- North Macedonia
- Romania
- Serbia
- Slovenia
- Turkey

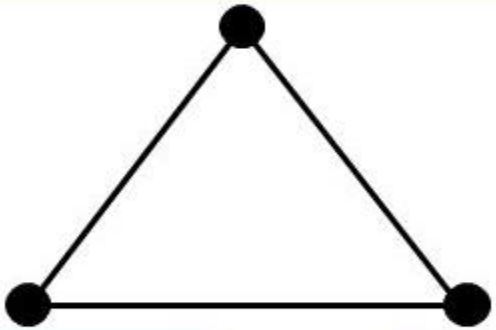
Peripheral countries

- Austria
- Egypt
- Italy
- Lebanon
- Moldova
- Slovakia
- Syria
- Ukraine

The Three Pillars of EU Energy Policy

COMPETITIVENESS

- complete single energy market
- cut Europe's energy bill
- create jobs
- boost R&D and create markets in which EU can become a global leader



SECURITY OF SUPPLY

- reduce Europe's dependence on energy imports
- help balance trade

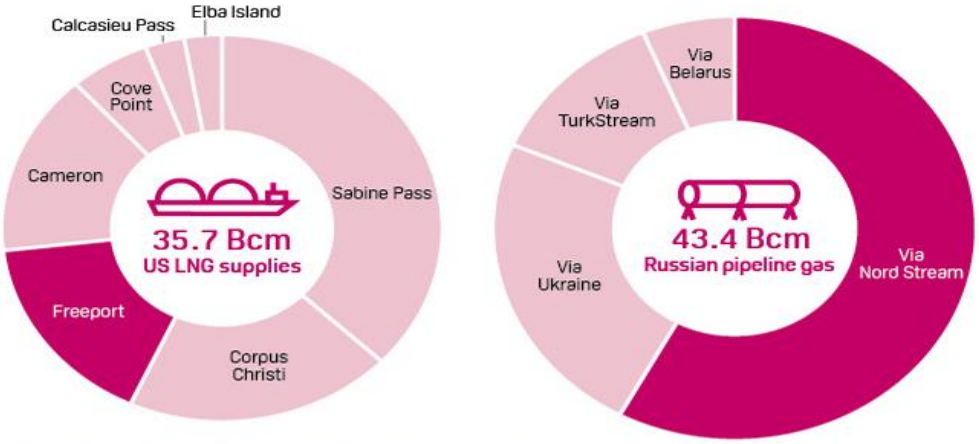
SUSTAINABILITY

- reduce environmental degradation and greenhouse gas emissions
- increase energy efficiency
- increase role for renewables

Source: Eurostat

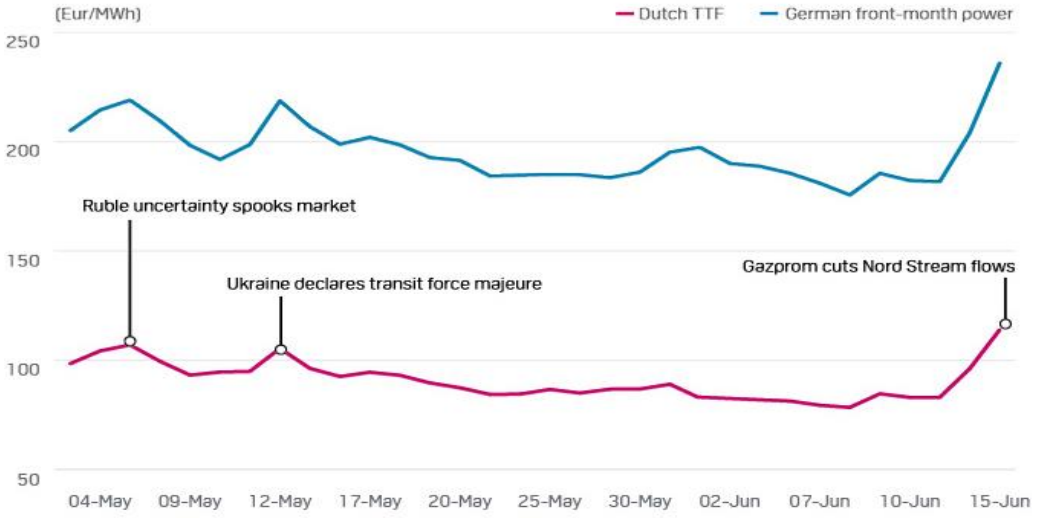
Europe on Brick of Gas Crisis as Russia Squeezes Market – Gas Has Emerged as a Strategic Energy Source

Freeport LNG key to US LNG supply to Europe*, Nord Stream provides bulk of Russian pipeline gas**
(Bcm, 2022 year-to-date)



*US LNG supplies to EU + UK, **Russian supplies entering at EU borders

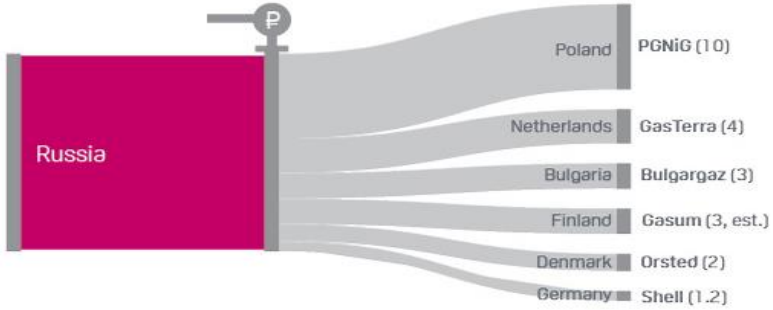
TTF month-ahead gas price jumps on Nord Stream cuts, power follows suit



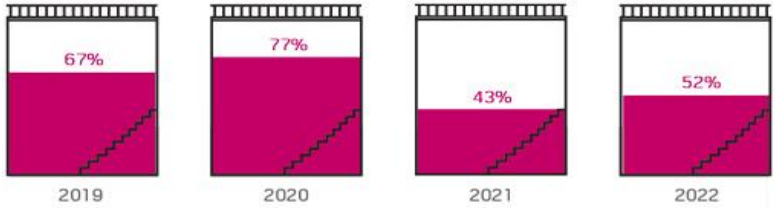
S&P Global Commodity Insights

Source: S&P Global Commodity Insights, GIE, EEX

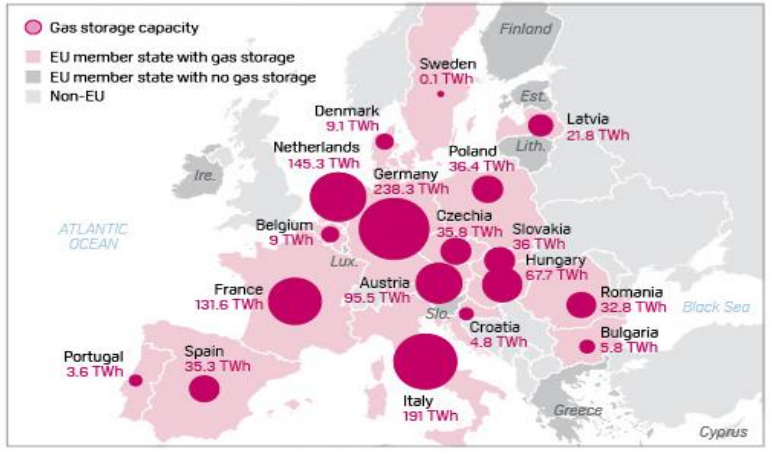
Gazprom cuts off supplies to six buyers on ruble payment dispute
(Bcm/year)



European gas storage still only 52% full as of mid-June



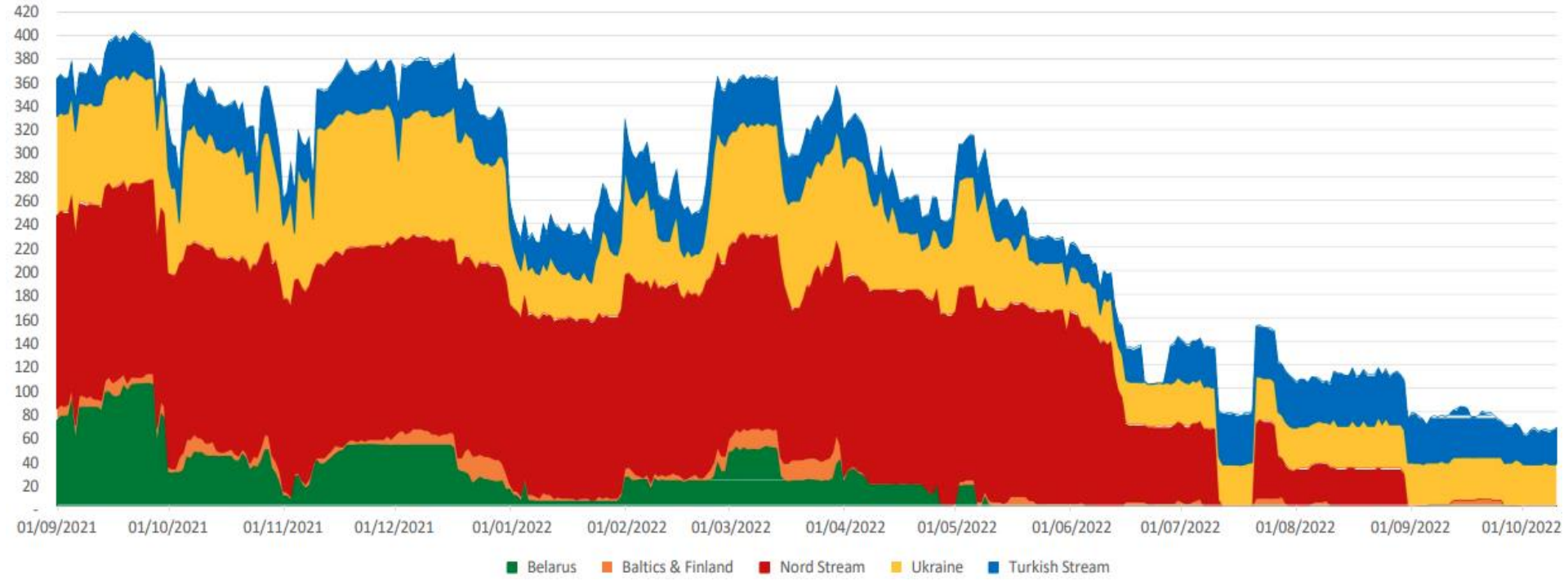
Gas storage capacities among EU member states



Developed by Stuart Elliott, designed by Reynaldo Dizon

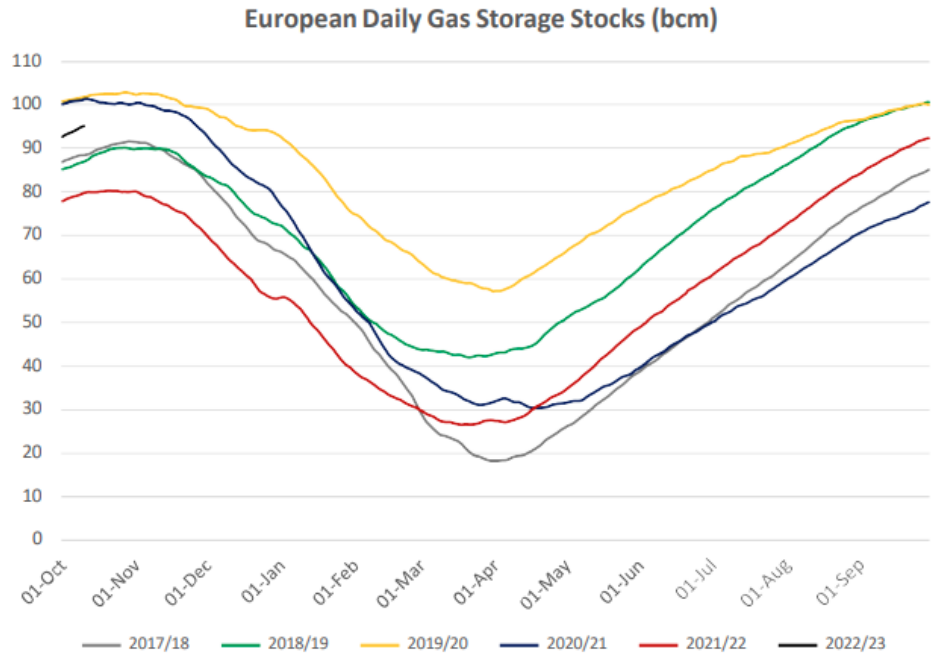
Source: Eurostat

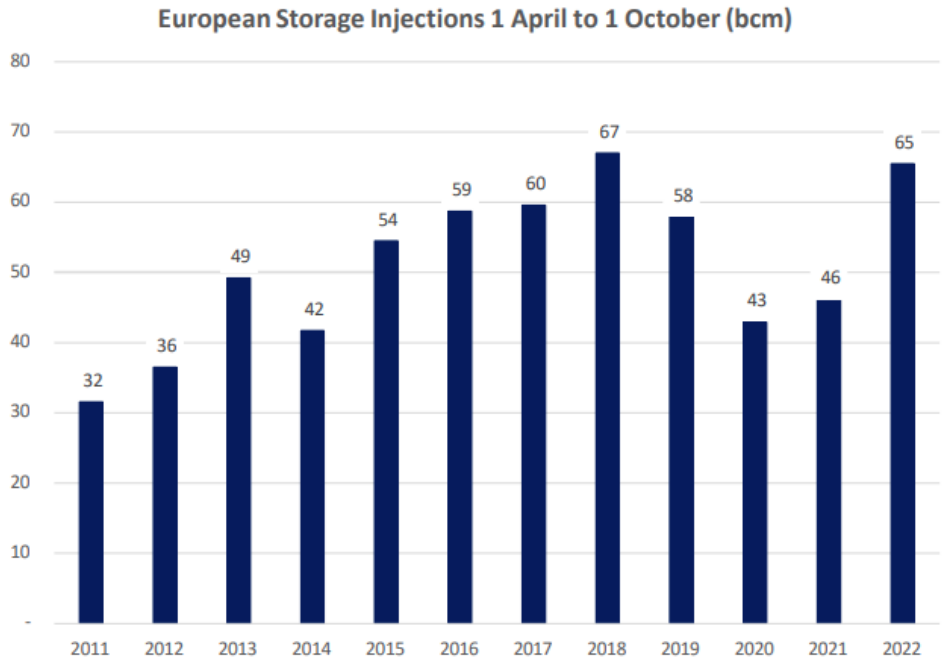
How Much Russian Pipeline Gas Will Europe Continue to Receive?



Sources: ENTSOG Transparency Platform; Eurostat;
Gas Infrastructure Europe (AGSI); Kpler LNG Platform

European Gas Storage: This Winter and 2023/24

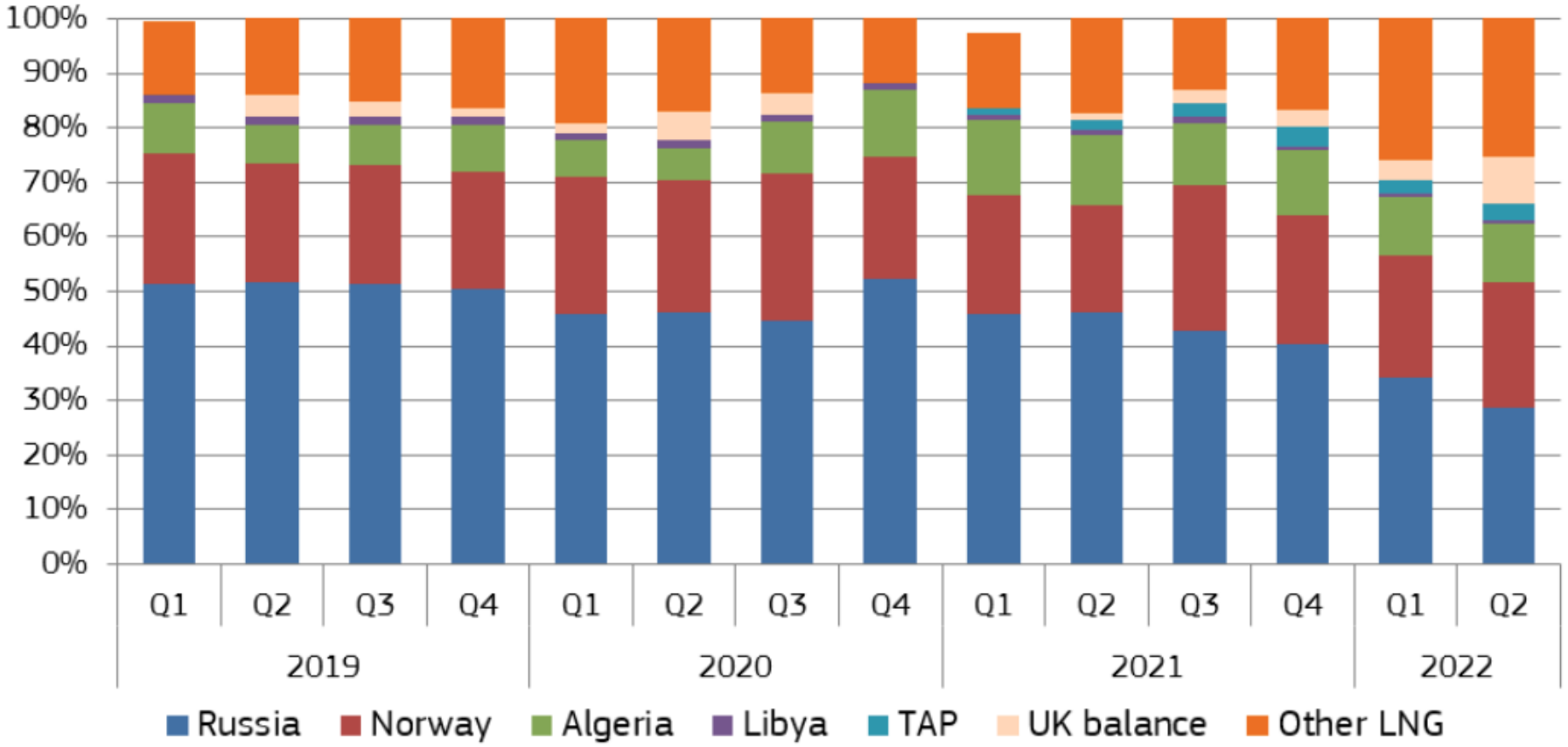




Sources: ENTSOG Transparency Platform; Eurostat;
Gas Infrastructure Europe (AGSI); Kpler LNG Platform

Source: Eurostat

The Share of Gas Imports Within the Total, Combining Both Pipeline and LNG Imports



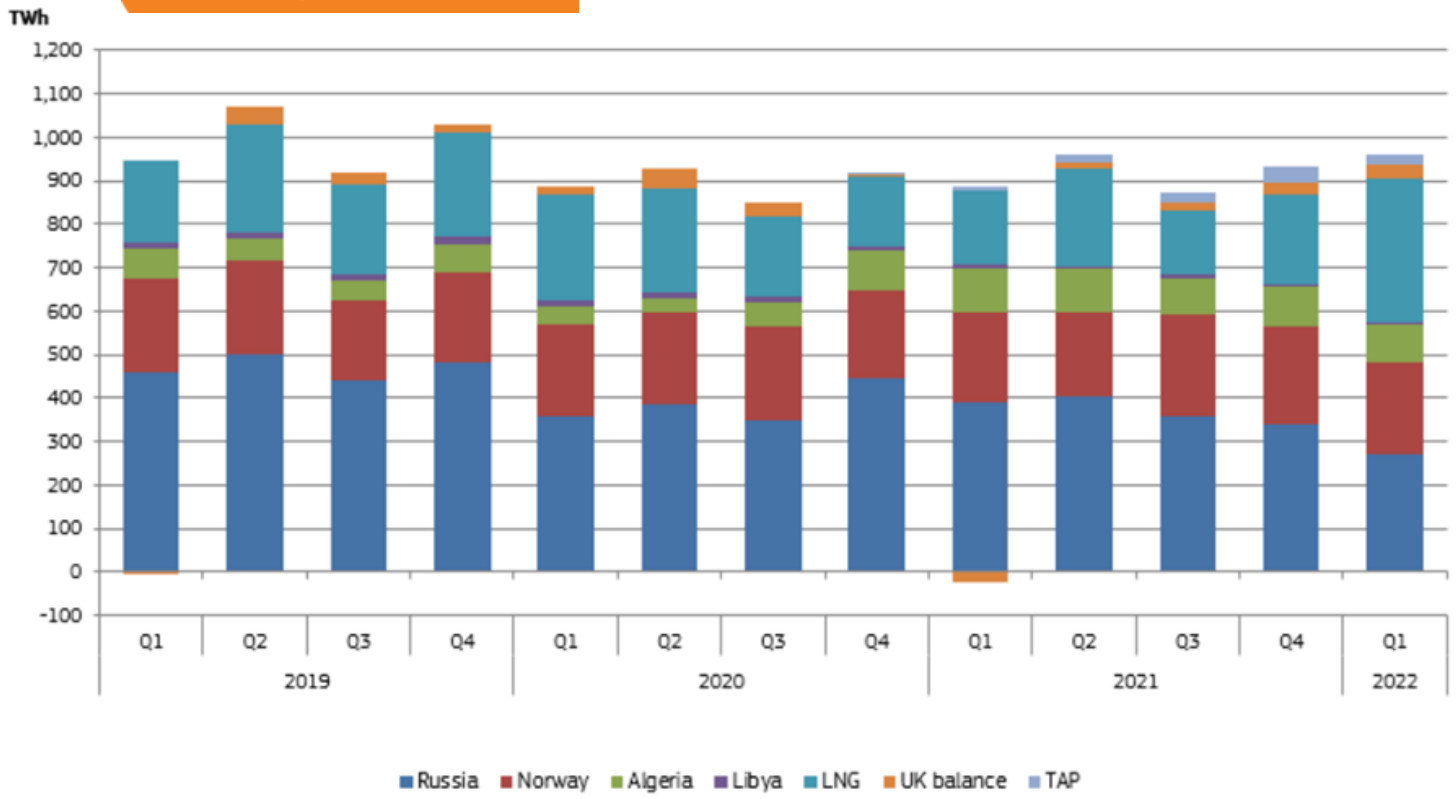
Source: European Commission

EU Imports of Natural Gas by Source

EU-27 Gas Data (2021)

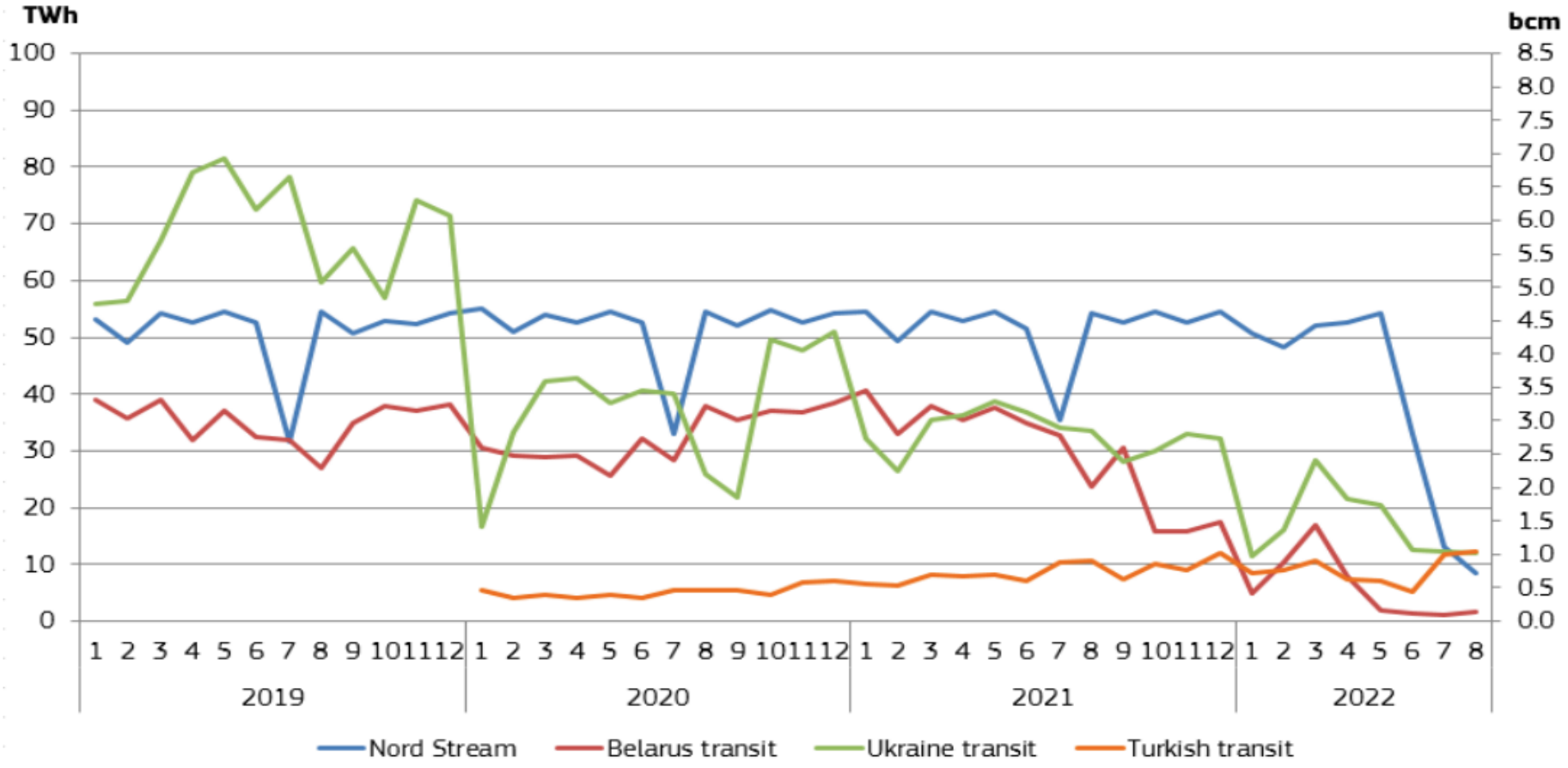
Gas consumption: 412 bcm
Gas production: 50.6 bcm
Net gas imports: 337.5 bcm
LNG imports: 80 bcm

In 2021, the EU imported 58 bcm of Russian gas via Nord Stream, 37 bcm via the Ukrainian route, 33 bcm via the Belarus transit and 9 bcm via the Turk Stream.
Total = 137 bcm



Source: European Commission

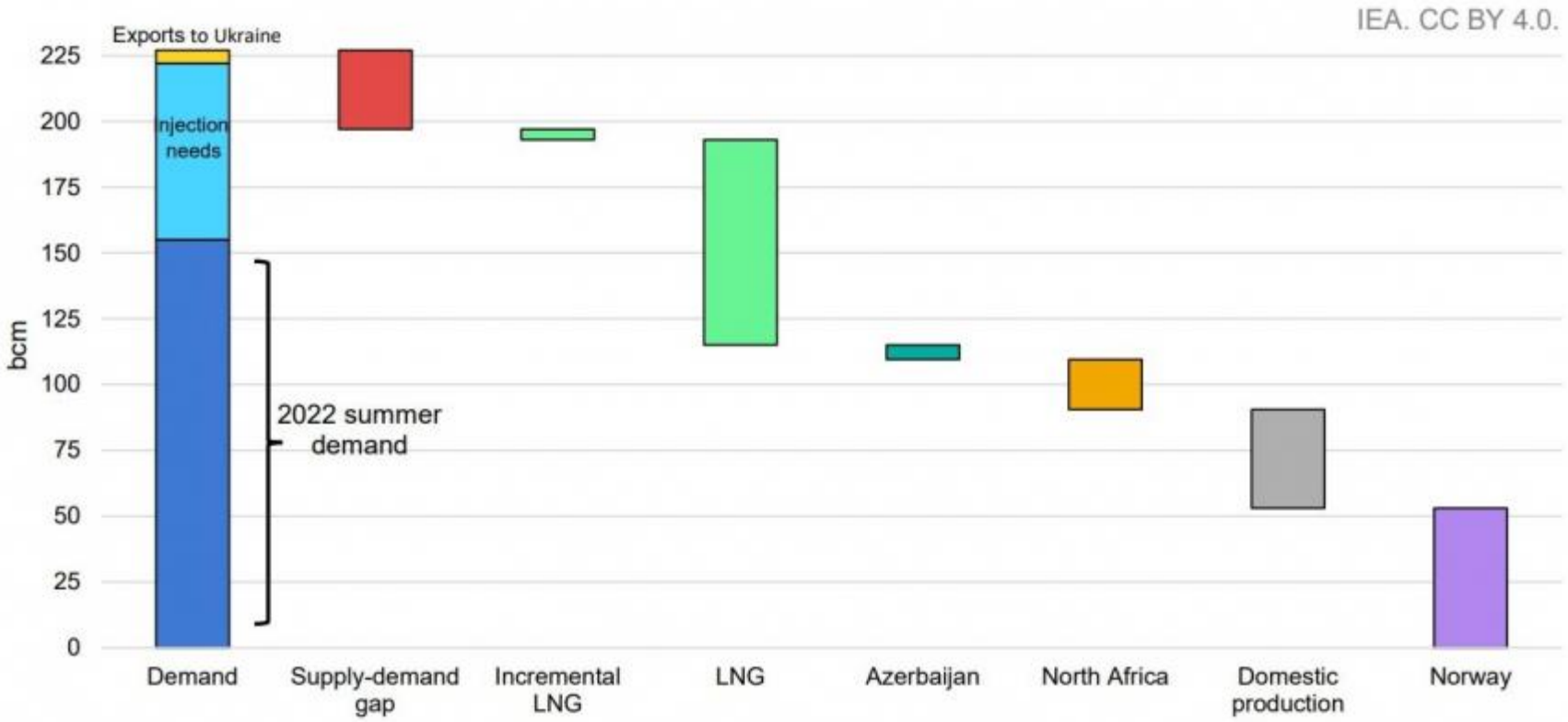
Monthly EU Imports of Natural Gas From Russia By Supply Route



Source: European Commission

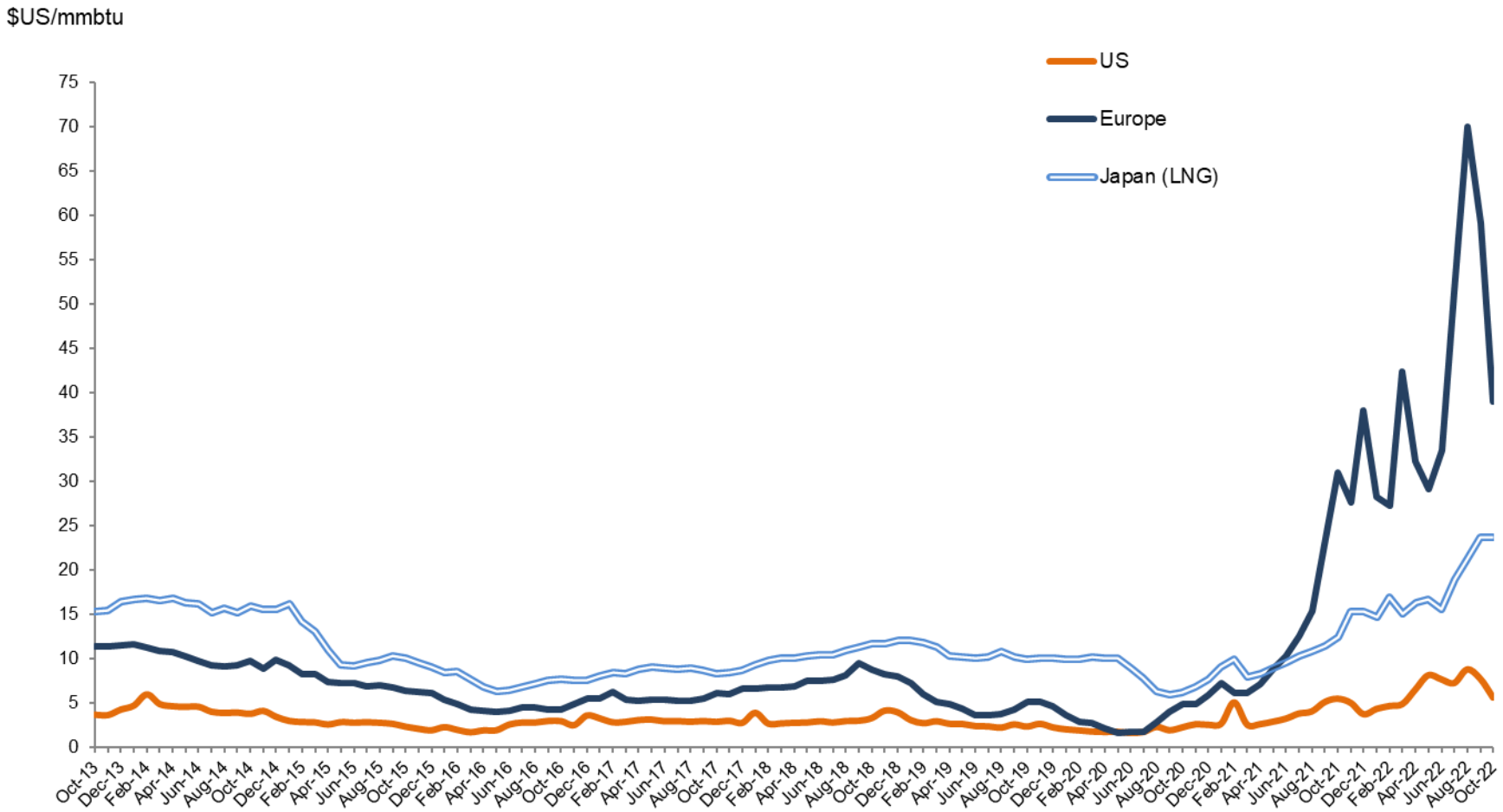
Natural Gas Demand-Supply Gap

Breakdown of the summer 2023 natural gas balance of the European Union and the United Kingdom in case of full cessation of Russian flows and limited LNG availability, April – September 2023



Source: IEA

Natural Gas Prices

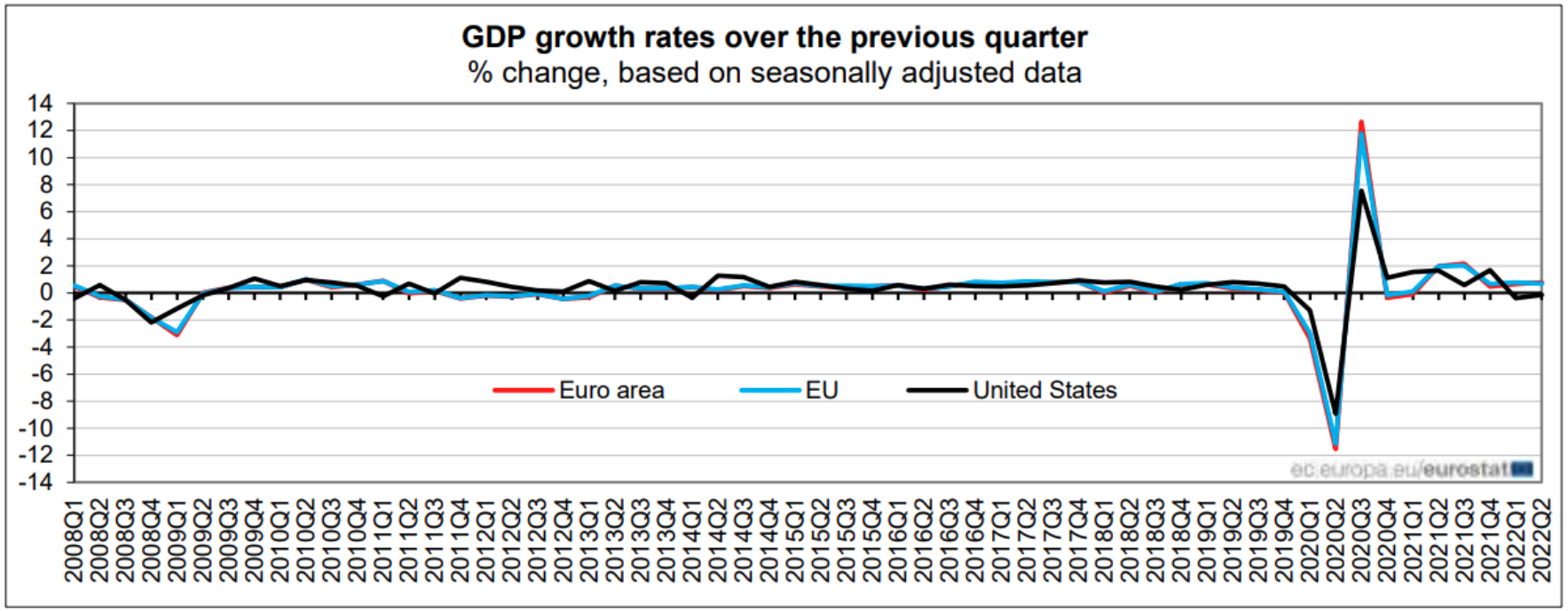


Source: World Bank

Source: Eurostat

The Economies in the Euro Area and the EU (I)

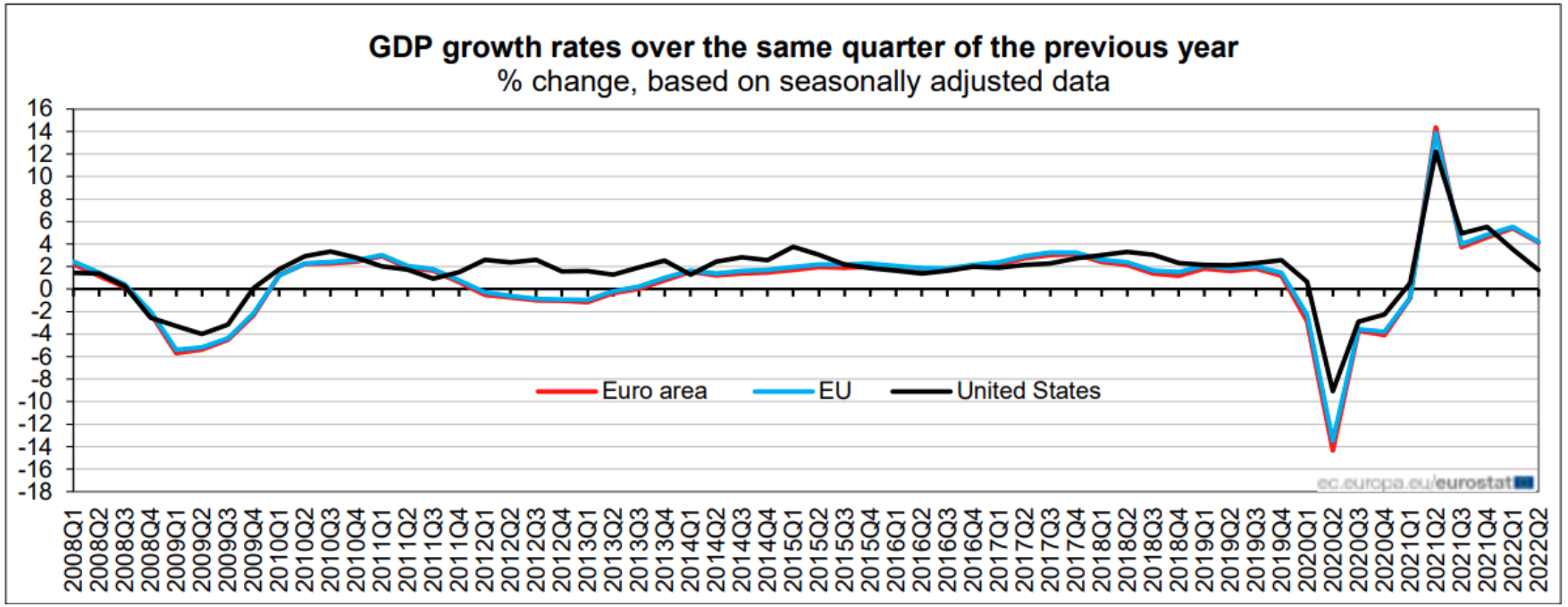
- In Q2 2022, seasonally adjusted GDP increased by 0.8% in the euro area and by 0.7% in the EU compared with the previous quarter, according to an estimate published by Eurostat. In Q1 2022, GDP had grown by 0.7% in the euro area and 0.8% in the EU.



Source: Eurostat

The Economies in the Euro Area and the EU (II)

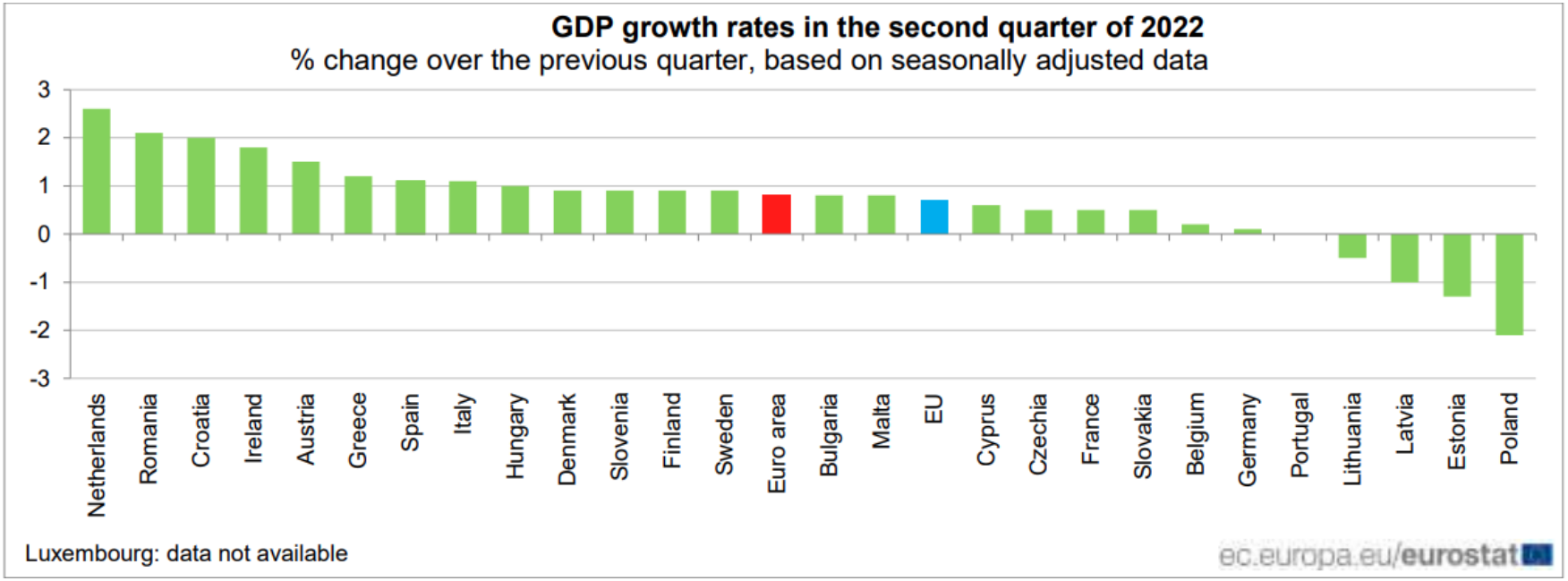
- Compared with Q2 2021, seasonally adjusted GDP increased by 4.1% in the euro area and by 4.2% in the EU in Q2 2022, after +5.4% in the euro area and +5.5% in the EU in Q1 2022.



Source: Eurostat

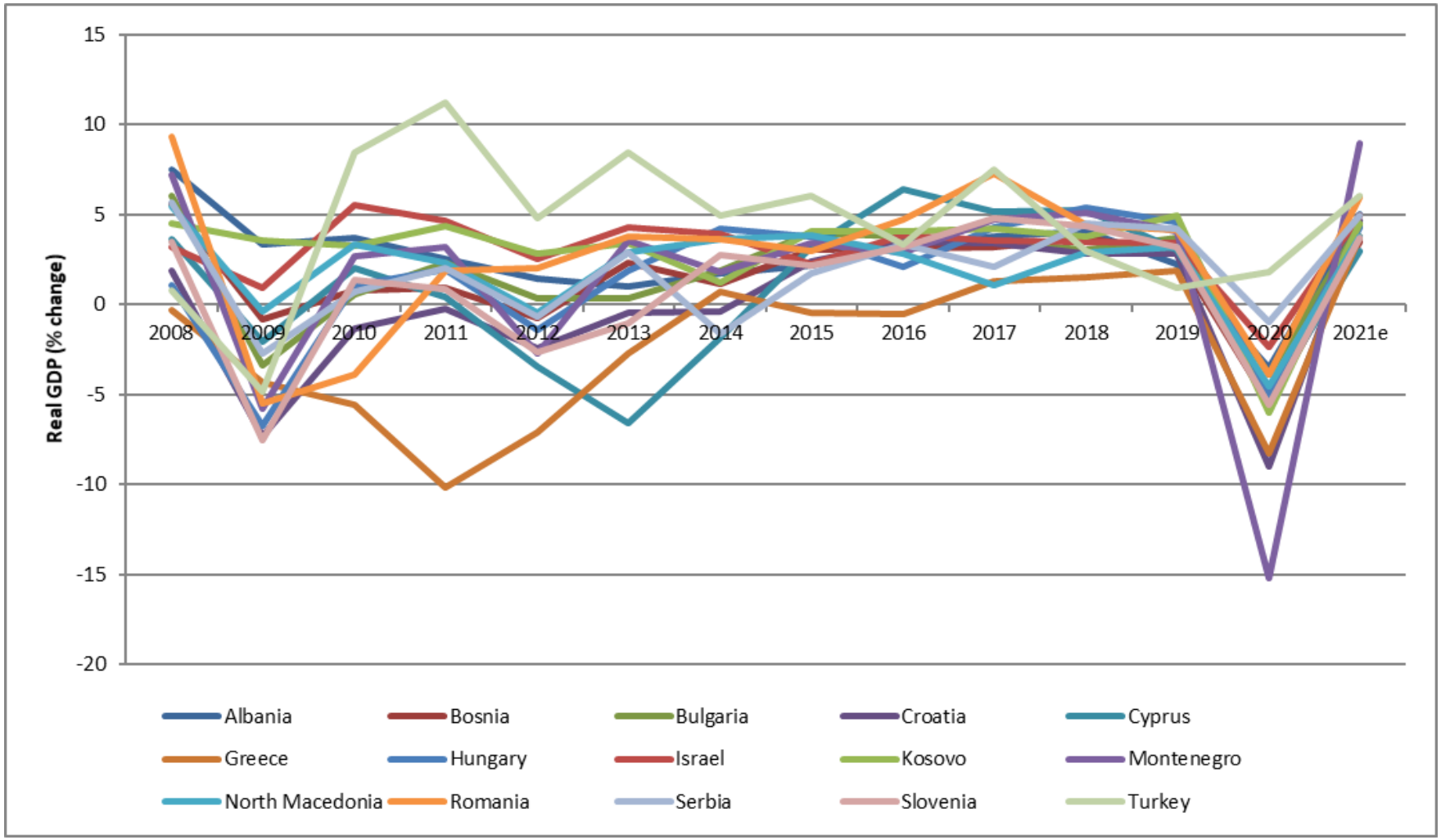
GDP Growth by EU Member State

- In Q2 2022, the Netherlands (+2.6%) recorded the highest increase of GDP compared to the previous quarter, followed by Romania (+2.1%) and Croatia (+2.0%). Decreases were observed in Poland (-2.1%), Estonia (-1.3%), Latvia (-1.0%) and Lithuania (-0.5%).



Source: Eurostat

The Economies of SE Europe – Real GDP, 2008-2021e



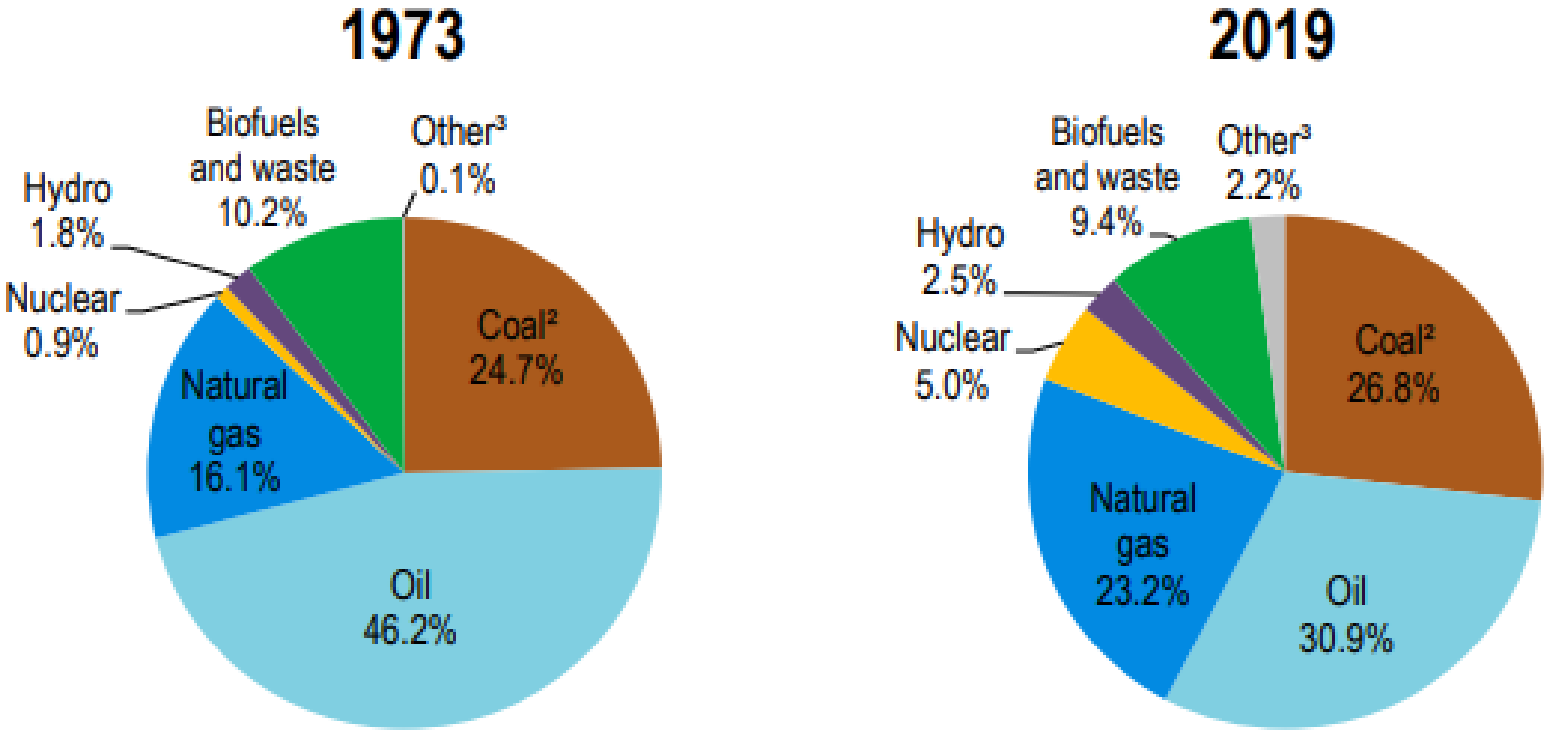
Sources: World Economic Outlook Database (IMF, April 2021) and IENE

2020 Basic Energy Data for SE Europe, **Including Turkey**

Region	Final Oil Consumption (thousand tonnes)	Gas Inland Consumption (bcm/y)	Gross Electricity Production (TWh)
SE Europe	**84,737.4 (20.6% of EU-27)**	**86.5 (21.6% of EU-27)**	**597.6 (21.4% of EU-27)**
EU-27	**411,530.4**	**399.6**	**2,786**

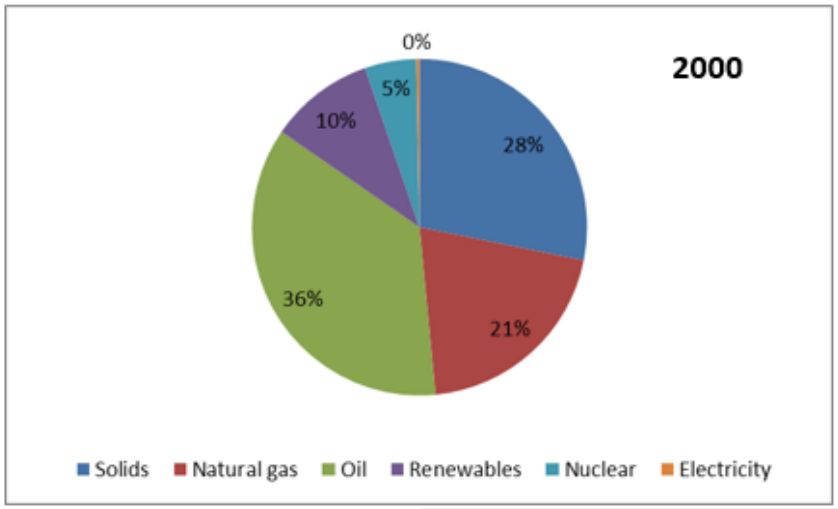
Source: IENE study “SE Europe Energy Outlook 2021/2022”, Athens, 2022

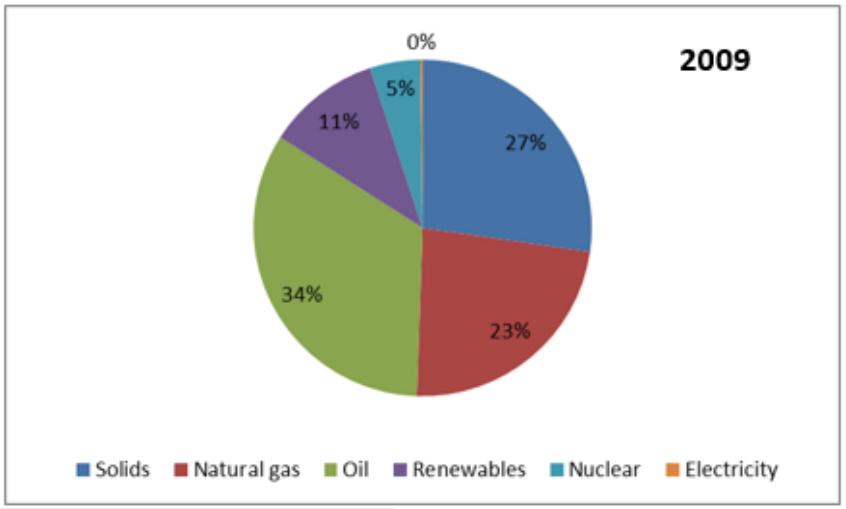
Global Energy Mix, 1973 and 2019

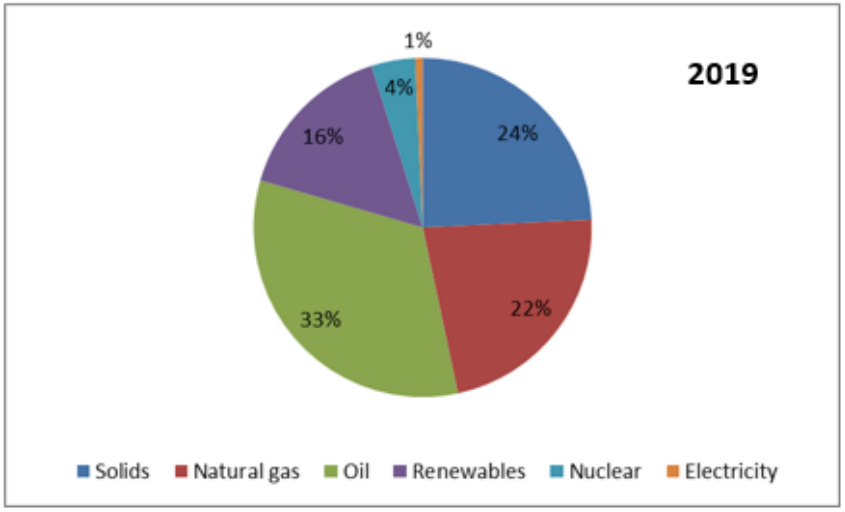


Source: IEA's World Energy Statistics 2021

SE Europe's Energy Mix, **Including Turkey**, 2000, 2009 and 2019

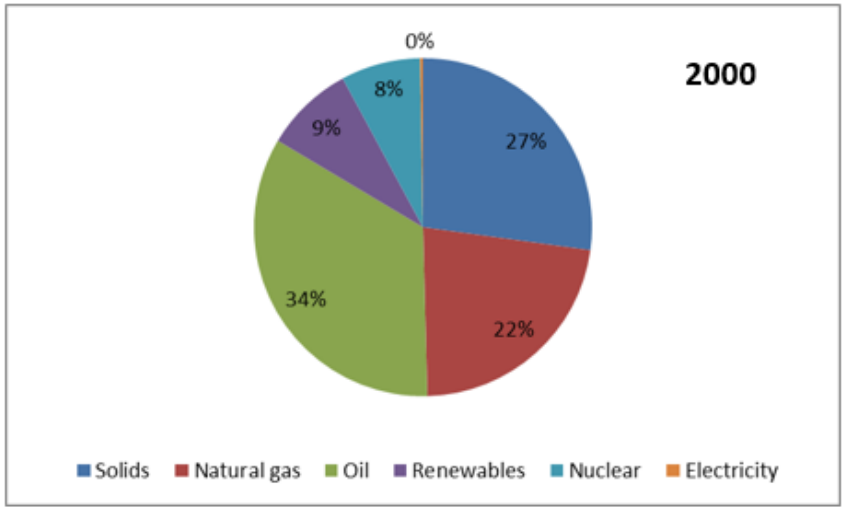


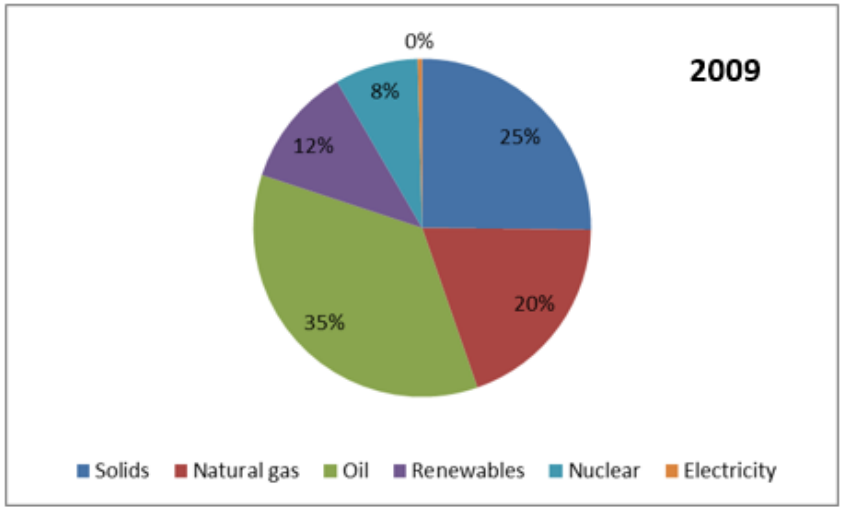


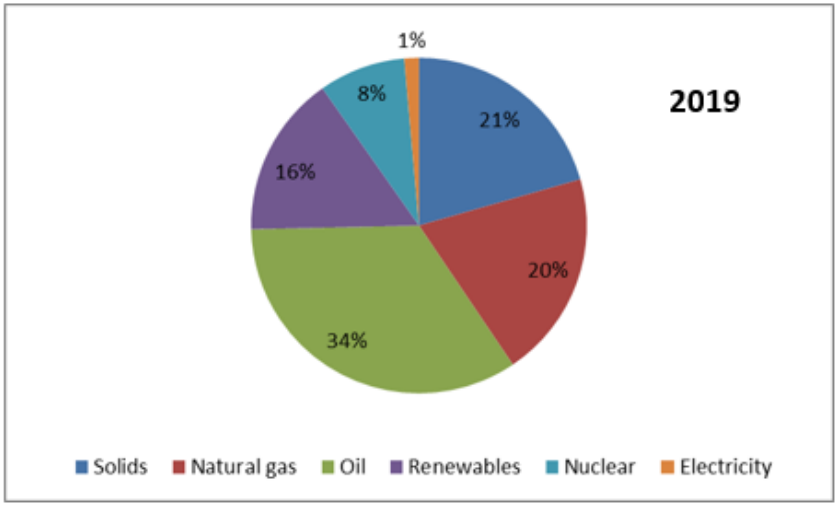


Source: Eurostat

SE Europe's Energy Mix, **Without Turkey**, 2000, 2009 and 2019





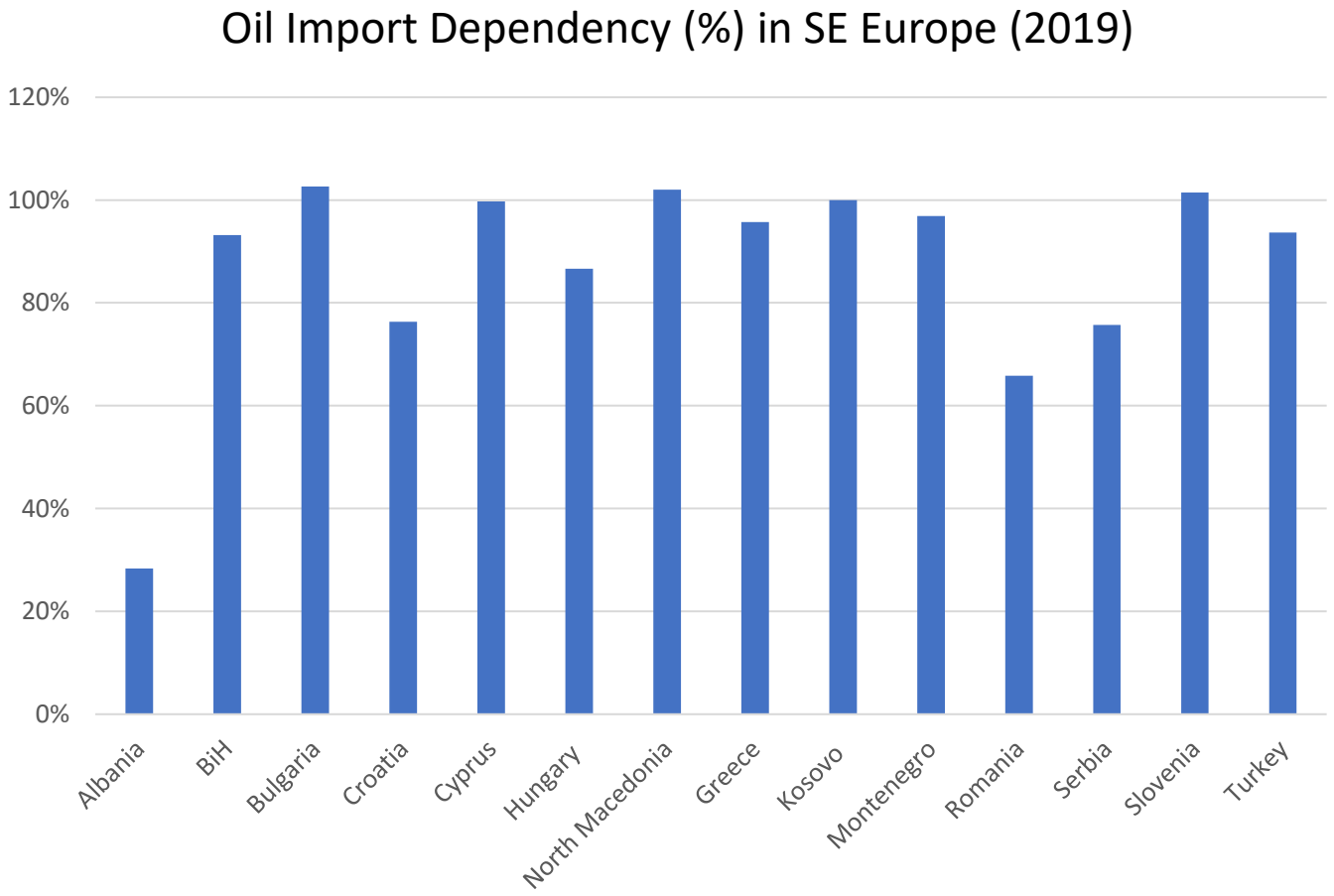


Source: Eurostat

Key Regional Energy Issues

- Marked divergence between EU and SEE energy strategies
- SEE is more energy security vulnerable than the rest of Europe
- SEE's high hydrocarbon dependence
- Electricity's newcomer gas alters supply balance
- Lack of adequate electricity and gas interconnections
- Coal/lignite is and will continue for sometime to be relevant
- SEE's path towards decarbonisation is difficult and uncertain
- Nuclear remains a viable option for SEE power generation
- RES growth impeded due to repeated policy failures and electricity grid constraints

Key Regional Energy Issues – Oil Import Dependency



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

Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

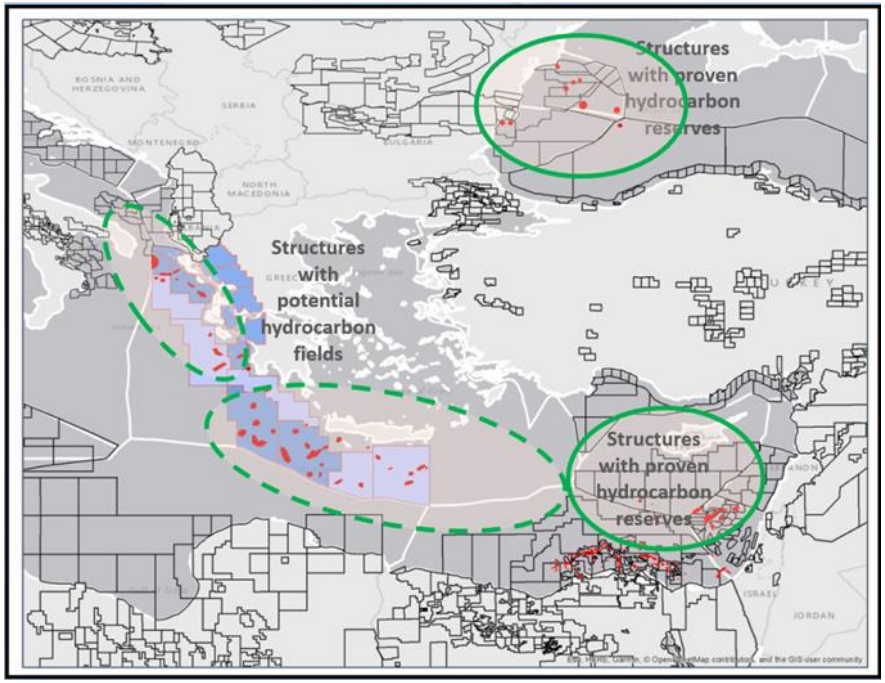
Oil Production and Consumption in SE Europe (2019)

Country	Crude Oil Production (barrels/day)	Gross Inland Crude Oil Refined Consumption (barrels/day)
Bulgaria	0	138,934
Greece	3,302	458,630
Croatia	13,600	53,136
Cyprus	0	0
Hungary	18,644	136,425
Romania	67,040	238,447
Slovenia	5	0
Montenegro	0	0
North Macedonia	0	0
Albania	20,183	6,732
Serbia	18,026	66,528
Turkey	62,297	709,676
Bosnia and Herzegovina	0	1,563
Kosovo	0	0
Total	**203,096**	**1,810,071**

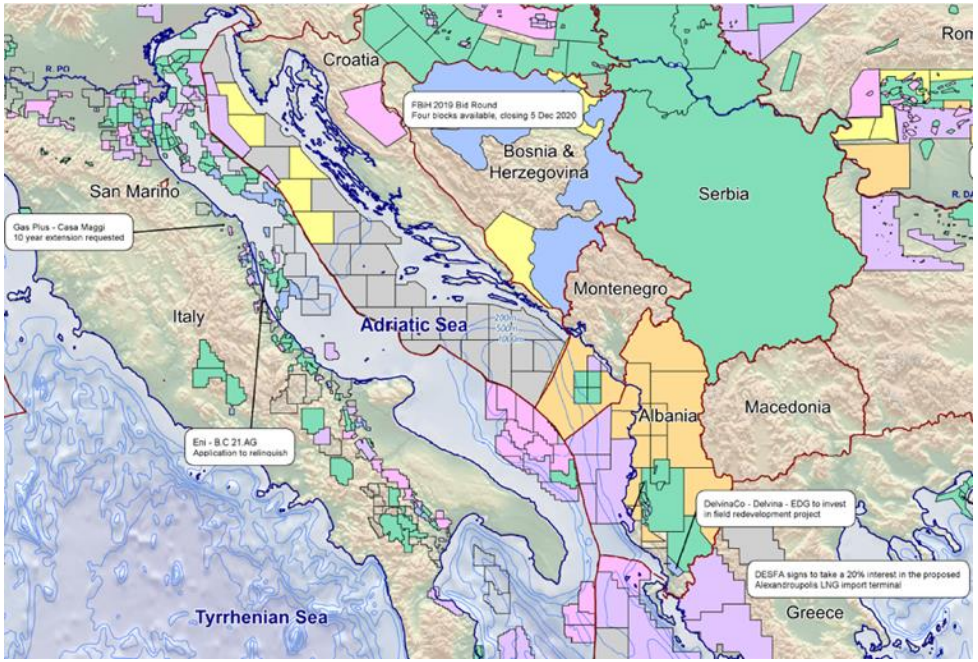
Source: IENE study “SE Europe Energy Outlook 2021/2022”, Athens, 2022

Hydrocarbon Exploration Activities in SE Europe (I)

Potential and proven hydrocarbon structures in East Mediterranean and the Black Sea



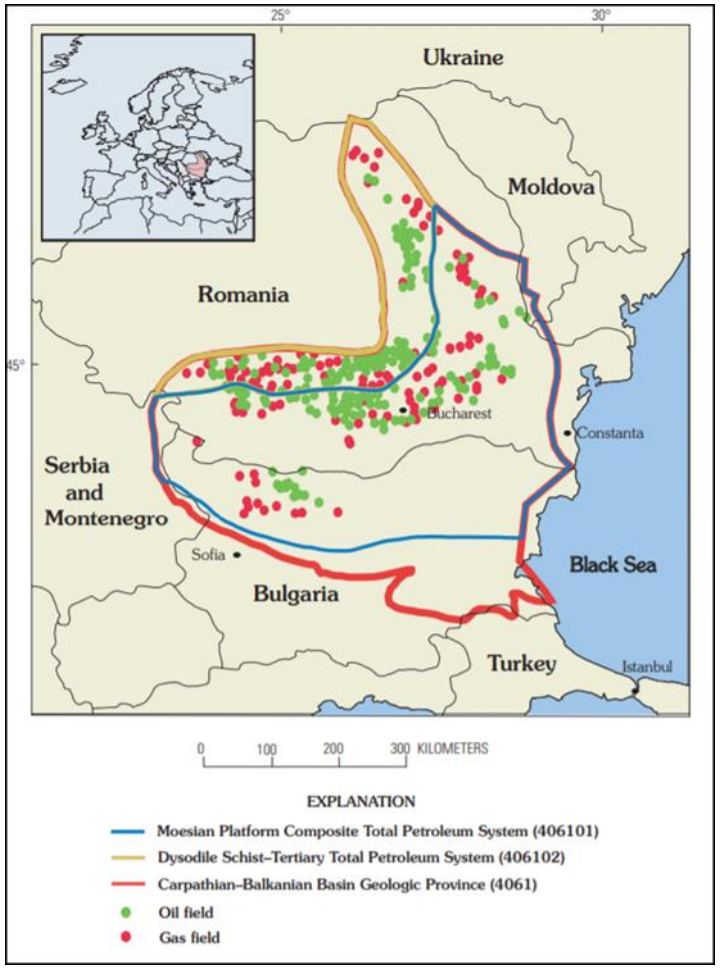
The Adriatic Sea



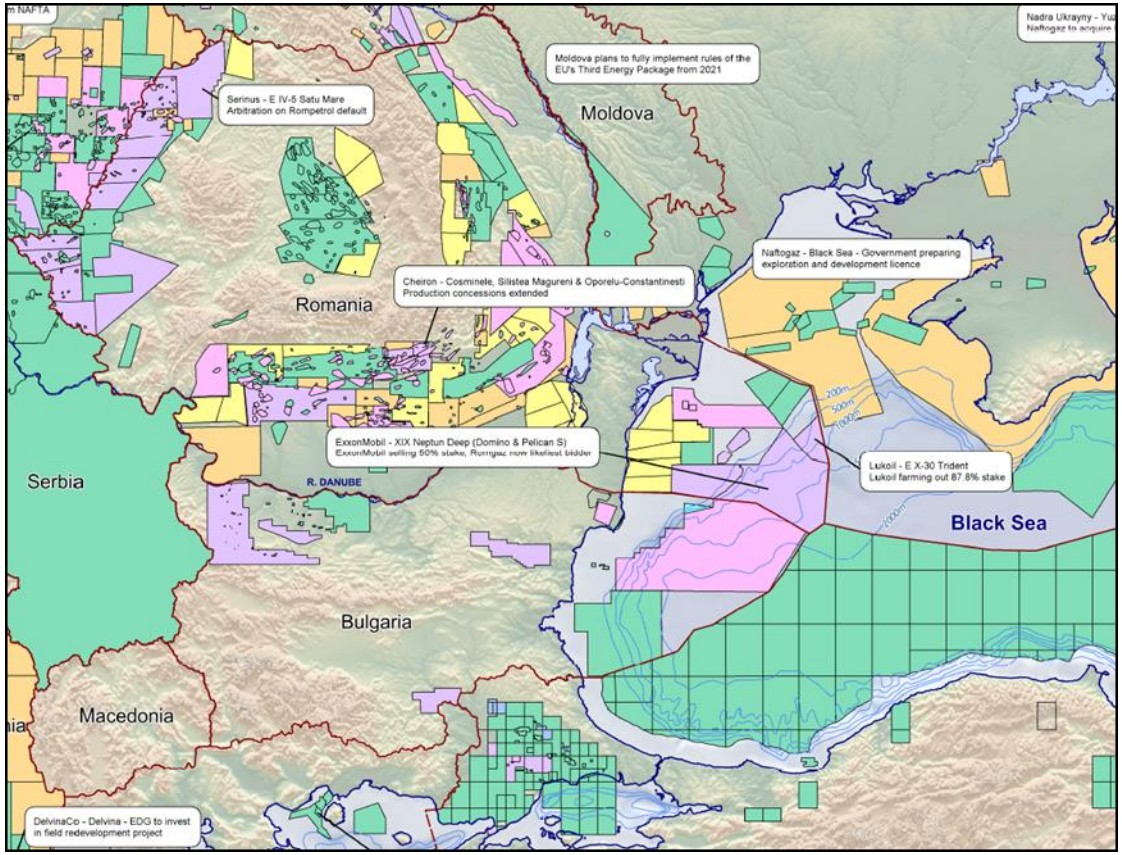
Source: IENE study “SE Europe Energy Outlook 2021/2022”, Athens, 2022

Hydrocarbon Exploration Activities in SE Europe (II)

Carpathian–Balkanian Basin Province



Eastern Balkans and Western Black Sea acreage



Source: IENE study “SE Europe Energy Outlook 2021/2022”, Athens, 2022

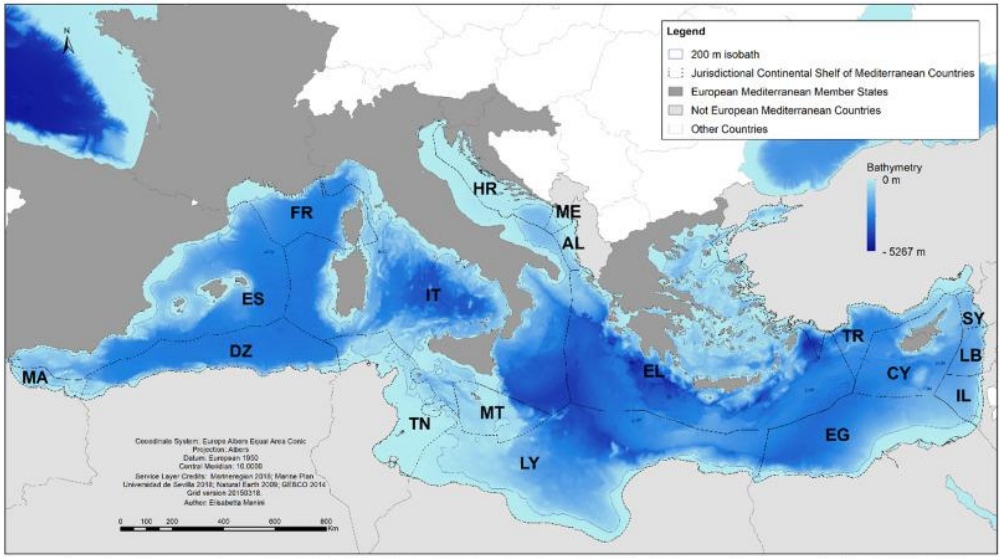
Hydrocarbon Exploration Activities in SE Europe (III)

Turkey and the Black Sea

Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

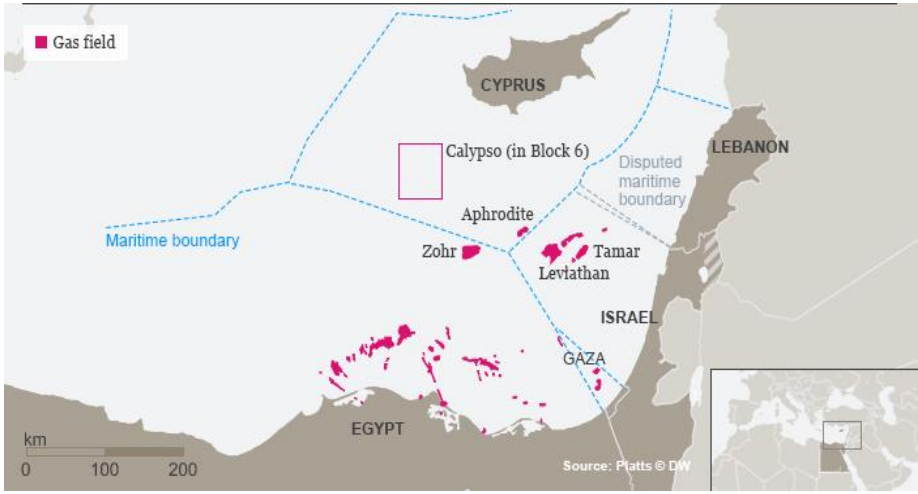
Hydrocarbon Exploration Activities in SE Europe (IV)

Jurisdictional continental shelf and deep Mediterranean Sea



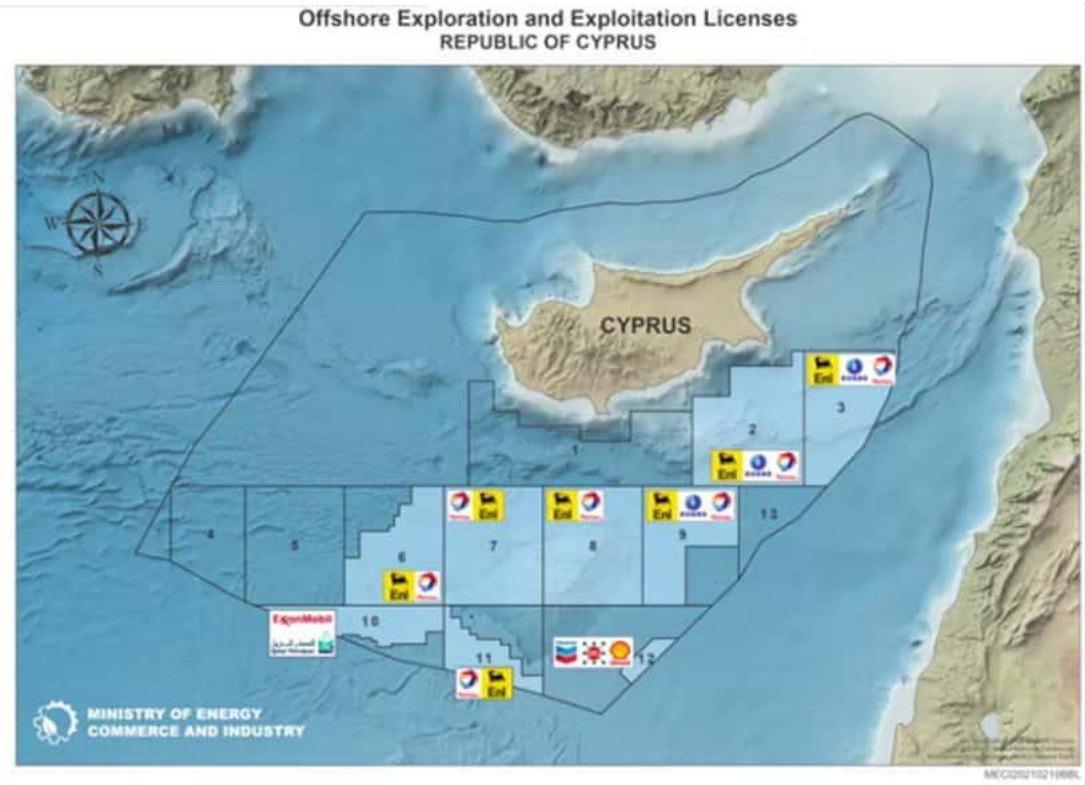
Approximantive percentages of Jurisdicional Contintental Shelf per Country related to the total area of deep sea, calculated with the 200 meters isobath limit, in the Mediterranean Sea: Albania (AL): 0,3%; Algeria (DZ): 6,1%; Croatia (HR): 0,5%; Cyprus (CY): 4,8%; Egypt (EG): 7%; France (FR): 3,5%; Greece (EL): 20,6%; Israel (IL): 1,1%; Italy (IT): 21,2%; Lebanon (LB): 0,95%; Lybia (LY): 15,1%; Malta (MT): 2,3%; Montenegro (ME): 0,15%; Morocco (MA): 0,6%; Spain (ES): 11,1%; Syria (SY): 0,5%; Tunisia (TN): 1,5%; Turkey (TR): 2,5%.

Overview of gas fields in the East Mediterranean Sea

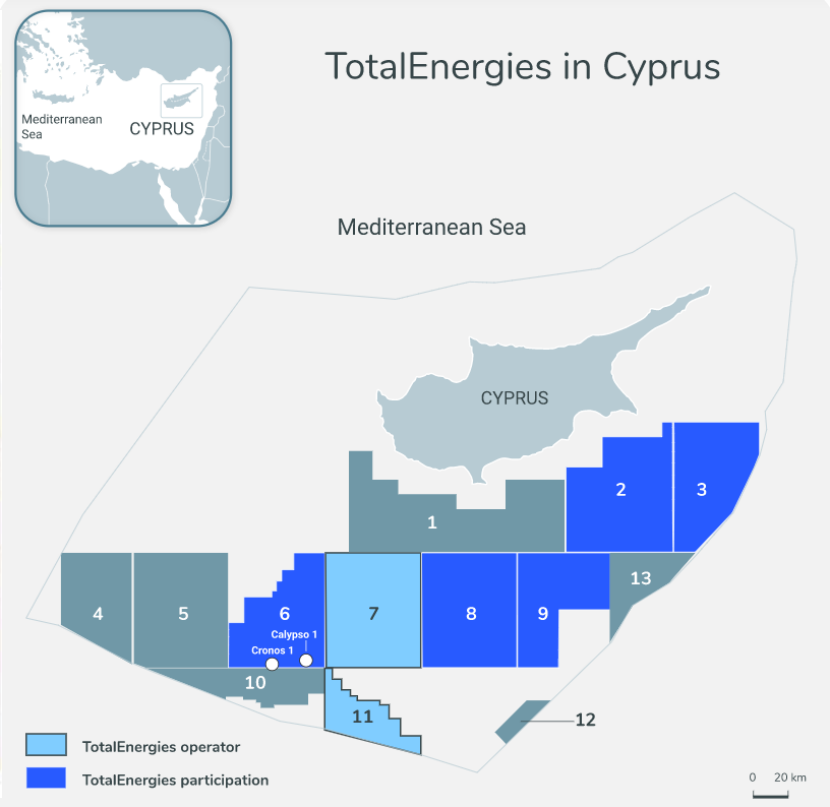


Source: IENE study “SE Europe Energy Outlook 2021/2022”, Athens, 2022

Hydrocarbon Exploration Activities in Cyprus

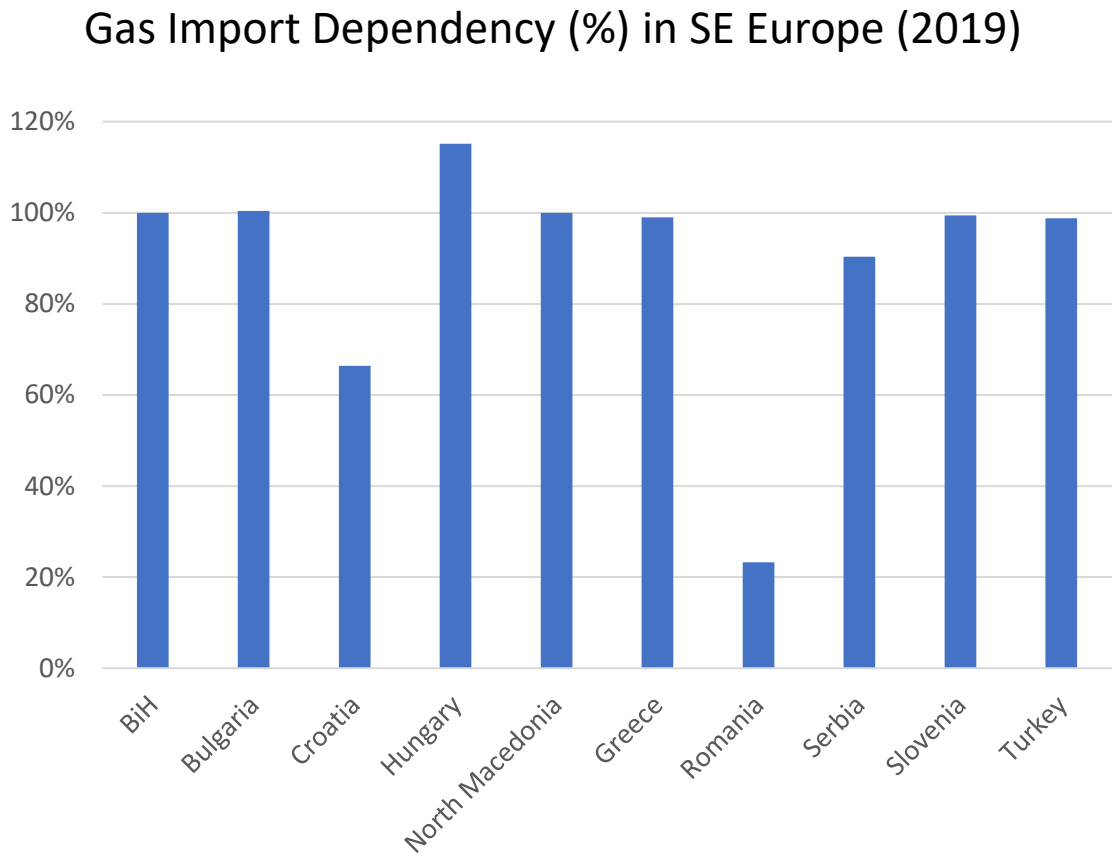


Source: Ministry of Energy, Commerce and Industry of Cyprus



Source: TotalEnergies

Key Regional Energy Issues – Gas Import Dependency



Note: Albania, Cyprus, Montenegro and Kosovo do not produce, import or consume natural gas. A dependency rate in excess of 100% indicates that natural gas has been stocked.

Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

Key Regional Energy Issues – Gas Import Dependency

Gas Production and Consumption in SE Europe (2008, 2020, 2025e)

Country	2008		2020		2025e	
	Gas production (bcm/y)	Gas consumption (bcm/y)	Gas production (bcm/y)	Gas consumption (bcm/y)	Gas production (bcm/y)	Gas consumption (bcm/y)
Albania	0.02	0.02	0.01	0.06	0.01	0.22
Bosnia and Herzegovina	0.0	0.31	0.0	0.22	0.0	0.45
Bulgaria	0.31	3.5	0.04	3.02	0.21	4.3
Croatia	2.03	3.1	1.03	3.04	1.52	3.3
North Macedonia	0.0	0.05	0.0	0.33	0.0	0.6
Greece	0.0	4.25	0.01	5.83	0.0	6.0
Kosovo	0.0	0.0	0.0	0.0	0.0	0.0
Montenegro	0.0	0.0	0.0	0.0	0.0	0.0
Romania	11.2	16.9	9.96	11.74	10.02	14.1
Serbia	0.25	1.92	0.44	2.49	0.51	2.8
Slovenia	0.0	0.51	0.01	0.8	0.0	1.07
Turkey	1.03	36.9	0.47	48.23	0.73	56.0
Total	**14.84**	**67.46**	**11.97**	**75.76**	**13.00**	**88.84**

Note: Albania, Cyprus, Montenegro and Kosovo do not produce, import or consume natural gas

Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

Key Regional Energy Issues – Decarbonisation in SE Europe

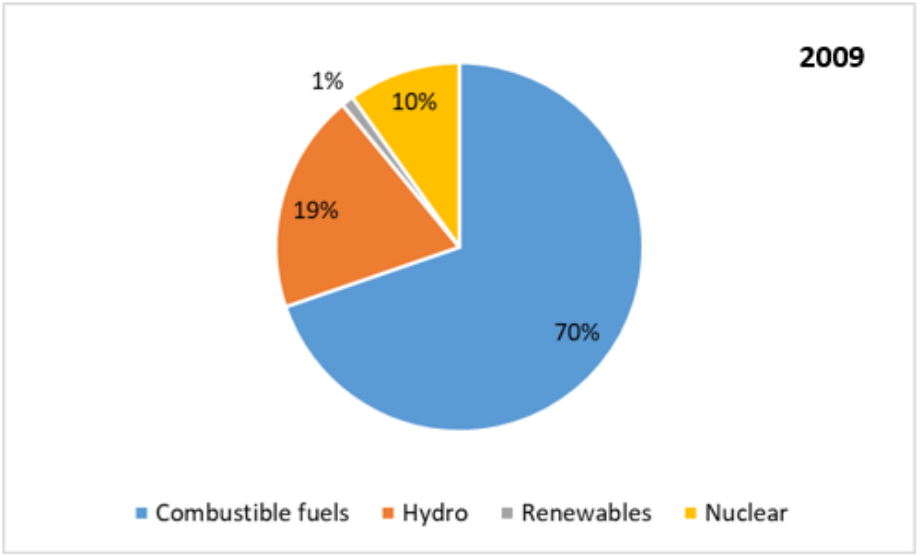
Challenges and Trends Towards SE Europe's Decarbonisation:

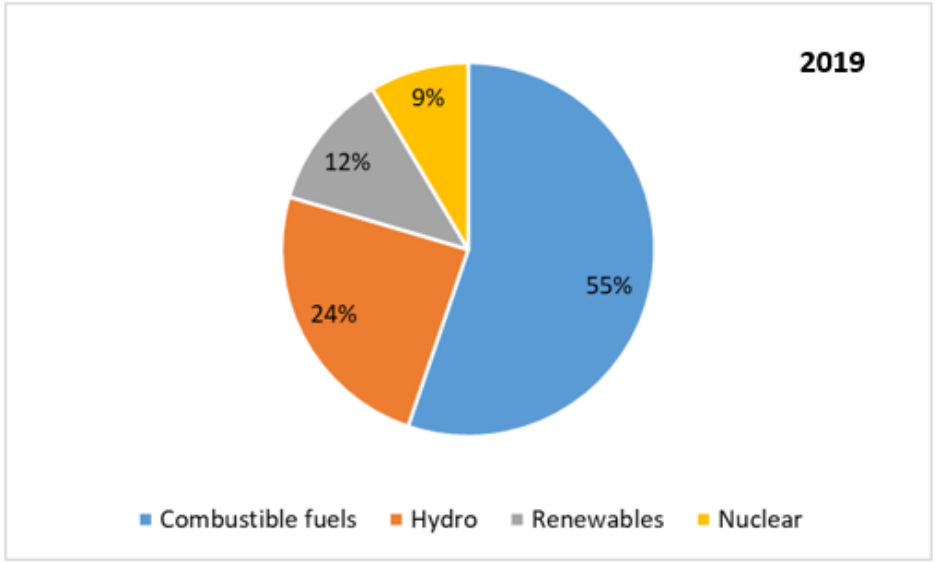
- The **coal predicament** of SE Europe – the region's great dependence on coal-fired power generation vs GHG emission reduction targets
  - According to IENE estimates, the **share of solid fuels to power generation** is anticipated to **increase steadily** in several countries of the region (most notably in Serbia, Kosovo, Croatia, Bosnia and Herzegovina, Montenegro and Turkey) over the next 10-15 years, as they will struggle to meet increased demand.
  - **North Macedonia and Serbia are the second most coal dependent countries after Kosovo at regional level**, while proposed lignite-based/coal-fired power plants in Bosnia and Herzegovina and Serbia would not be in line with EU climate targets, and would downgrade the solar PV, wind, hydropower, and biomass opportunities in the region.
  - **Effective climate change policies in SE Europe have not been implemented so far**, but there is still room for change in order to avoid becoming further "locked in" to the use of fossil fuels.
  - In SE Europe, **economic development**, largely based on the utilization of indigenous lignite/coal resources, **will have to be reconciled with COP 26 commitments**. Therefore, the planning of clean-cut and compatible long-term energy and economic strategies becomes a real challenge.
    - A lot more analytical and assessment work (e.g. examine CCS/CCU options) needs to be undertaken before introducing realistic policies for decarbonisation.

Decarbonisation and Related Technologies

- The road to decarbonisation can be approached at two levels:
  - through **policy**, which incorporates the aforementioned energy mix issue and economic assessment through which the rate of decarbonization is determined.
    - The main question arising therefore is **how the rate of decarbonization can be related to economic development and what the investment implications are** and
  - through **technology**, whose degree of deployment depends on the policies to be implemented and could contribute significantly towards decarbonisation through, for instance, the use of CCS/CCU or dual-fuel power plants.

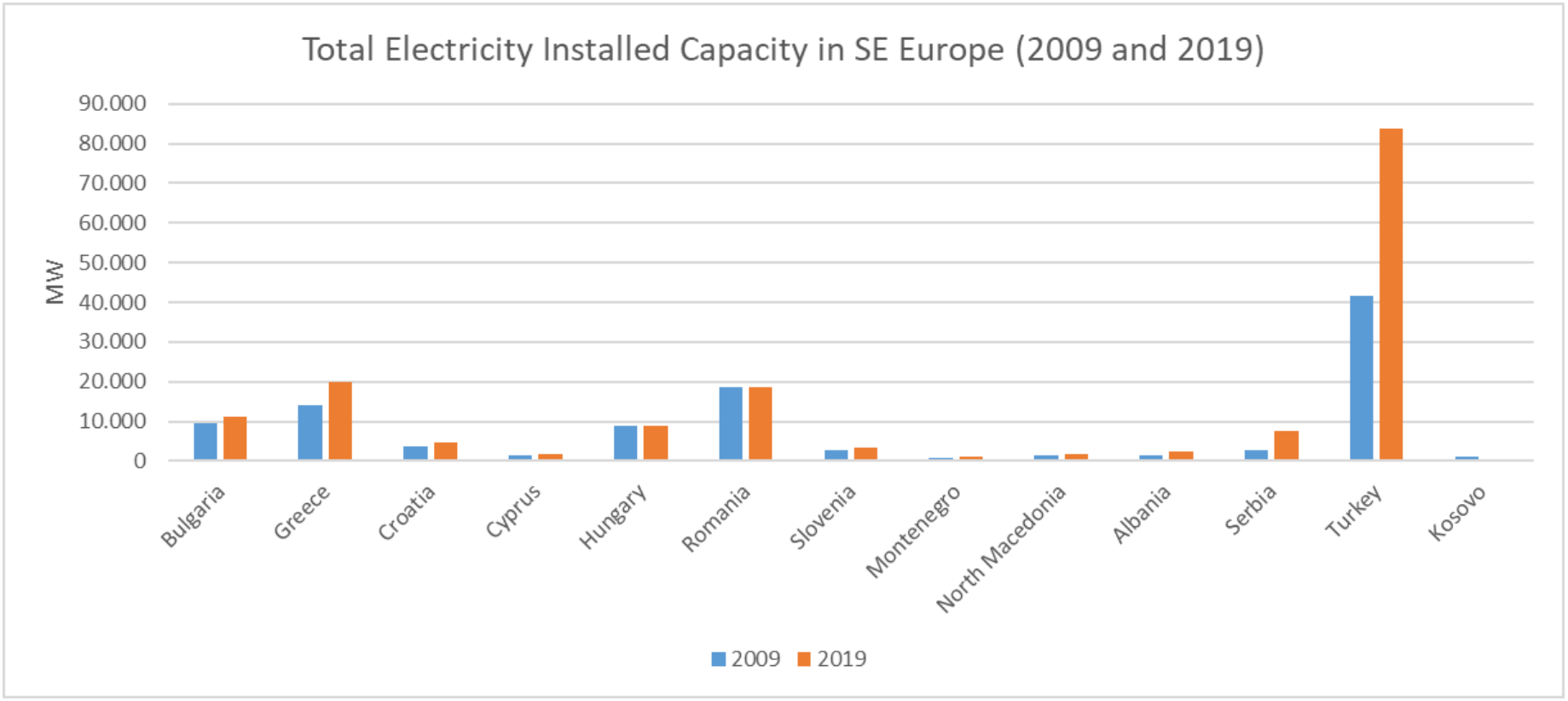
Power Generation Mix per Fuel in SE Europe (2009 and 2019), **Including Turkey**





Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

Total Electricity Installed Capacity (MW) in SE Europe (2009 and 2019)

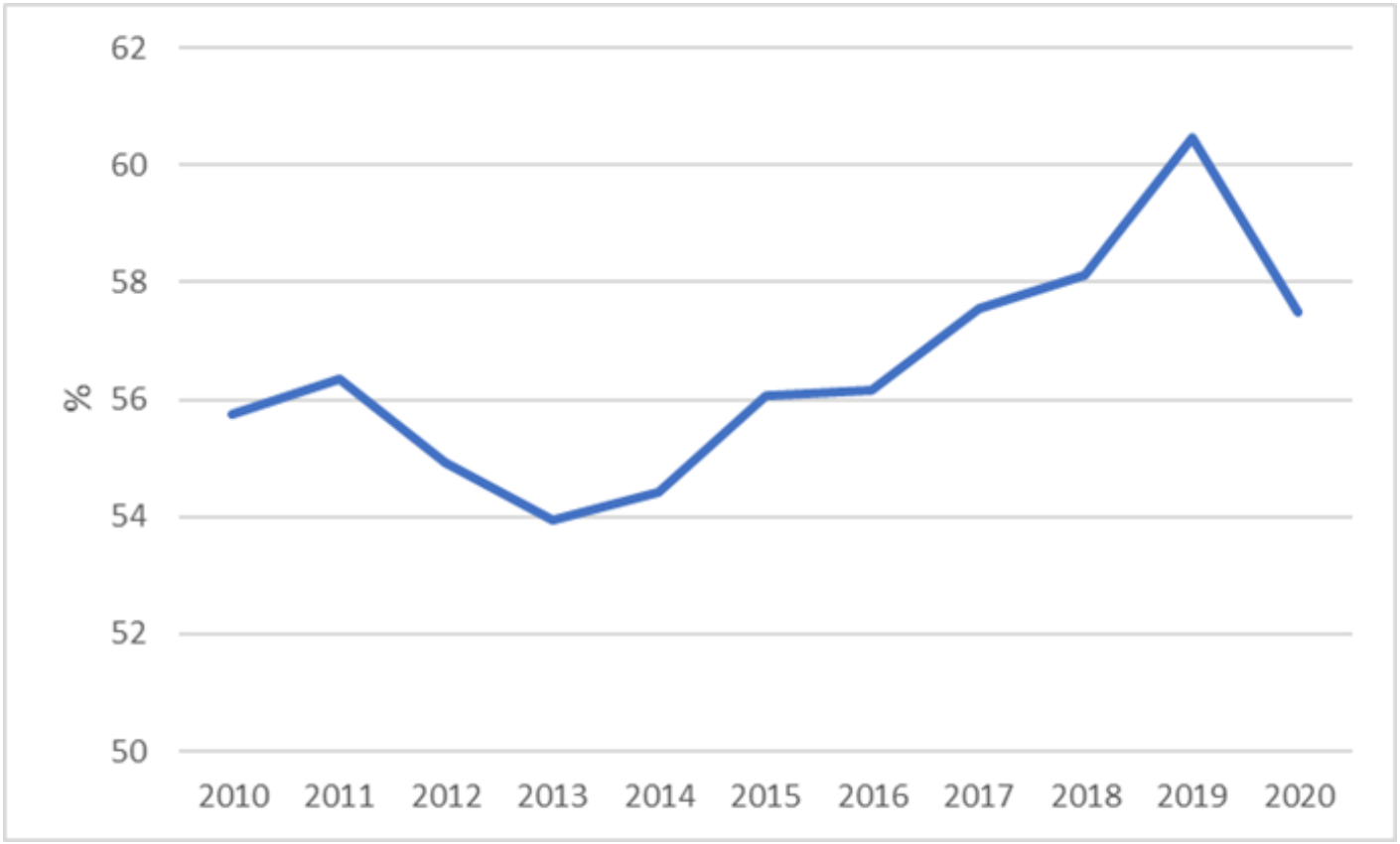


Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

Key Regional Energy Issues
- Energy Security in SE Europe (I)

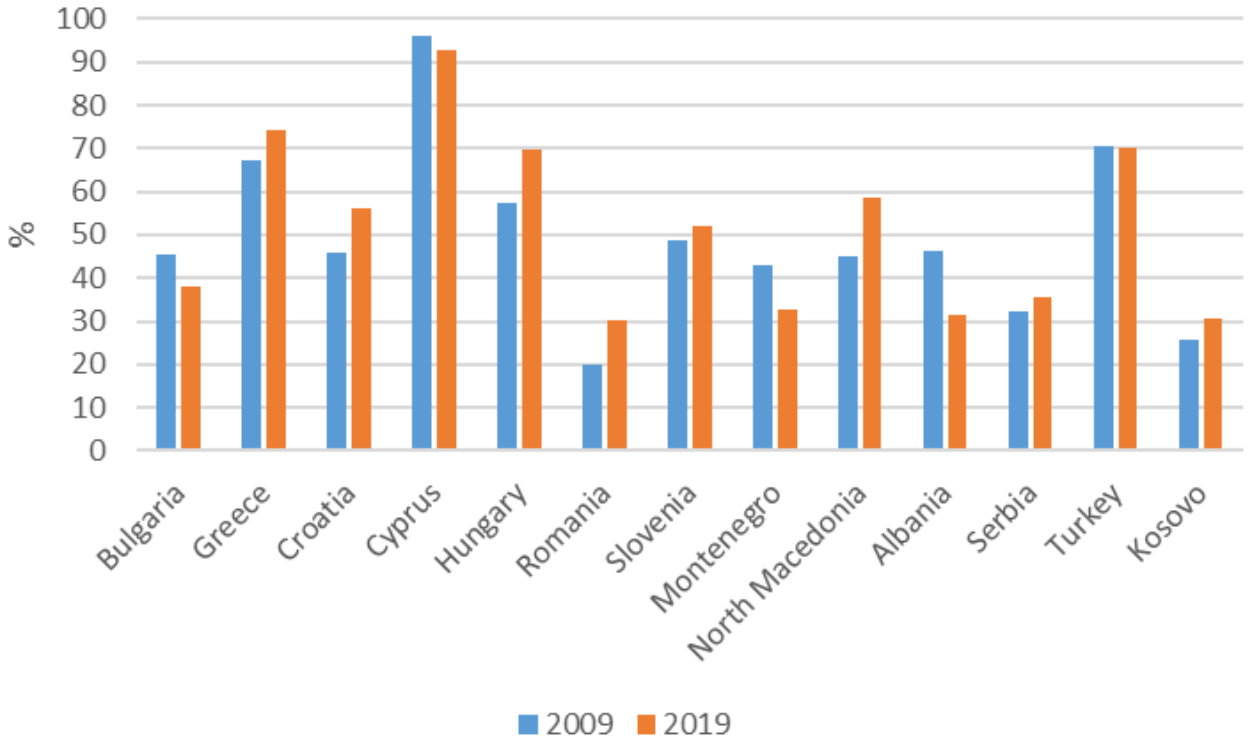
- **Energy security is a complex issue** and as such cannot be considered in isolation.
  - SE Europe, because of its geography, its proximity to high-risk conflict zones (i.e. Syria, Iraq, Ukraine), refugee flow from the Middle East and North Africa and the location of some of its countries (i.e. Turkey, Greece, Romania) at vital energy supply entry points, faces **higher energy security threats** than the rest of Europe.
- There is a need to strengthen available mechanisms
  - The **strengthening of Emergency and Solidarity Mechanisms** and the **maintenance of adequate oil, coal and gas stocks**, constitute a short- to medium-term relief solution.
  - The achievement of a **balanced energy mix** provides the best long-term option in enhancing energy security both at country and regional level.
- Security of **supply/demand** and **differentiation of supply sources**
  - In the case of gas, it is becoming more important and pressing compared to other fuel sources, such as electricity, oil, coal and possibly uranium.
  - Gas is a primary area of concern largely because of its rather inflexible transmission method, mainly by means of pipelines.

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



Sources: Eurostat, IENE

Energy Dependence in SE Europe (2009 and 2019)



Source: IENE study “SE Europe Energy Outlook 2021/2022”, Athens, 2022

Energy Security in SE Europe (II)

- Security of **transportation**, shipment of **oil and gas**
  - Gas deliveries were twice disrupted (i.e. 2006 and 2009) with the shipment of Russian gas, through Ukraine, to Europe but also from Turkey and Greece (i.e. 2011 and 2016).
- **Smooth supply of electricity** and urgent need to connect various island groups to the mainland grid
  - Mitigation of possible power supply failures and shortfalls and minimization of environmental impact through the retirement of fuel oil or diesel powered electricity generators on several islands.
- **Effective protection of energy infrastructure**
  - Mitigation of terrorist threats and advanced level of safety against of physical hazards (e.g. hurricanes, floods, earthquakes) and cyber threats (*IENE organised an Ad hoc meeting for energy security on March 15, 2017*).
- The various vulnerable key energy infrastructure locations in SE Europe constitute **potential energy security hot spots** and as such should be properly identified (***see following Map***), while also crisis management plans must be prepared in order to meet any emergencies (e.g. physical hazards, large-scale industrial accidents or terrorist actions).

Energy Security - Towards a Redefinition of the South Corridor (I)

- Meanwhile, several gas exploration projects are in the development stage in the **East Mediterranean** region, with important gas discoveries such as the Leviathan and Tamar fields in Israel, Zohr in Egypt and Aphrodite (which borders with Zohr) in Cyprus's EEZ.

- A number of alternative plans are under discussion for channeling this gas to Turkey, for local consumption, but also to Europe proper for transit to the continent's main gas markets. These plans include gas pipelines, liquefaction plants for LNG export and FSRU terminals to be tied up into the TANAP-TAP system

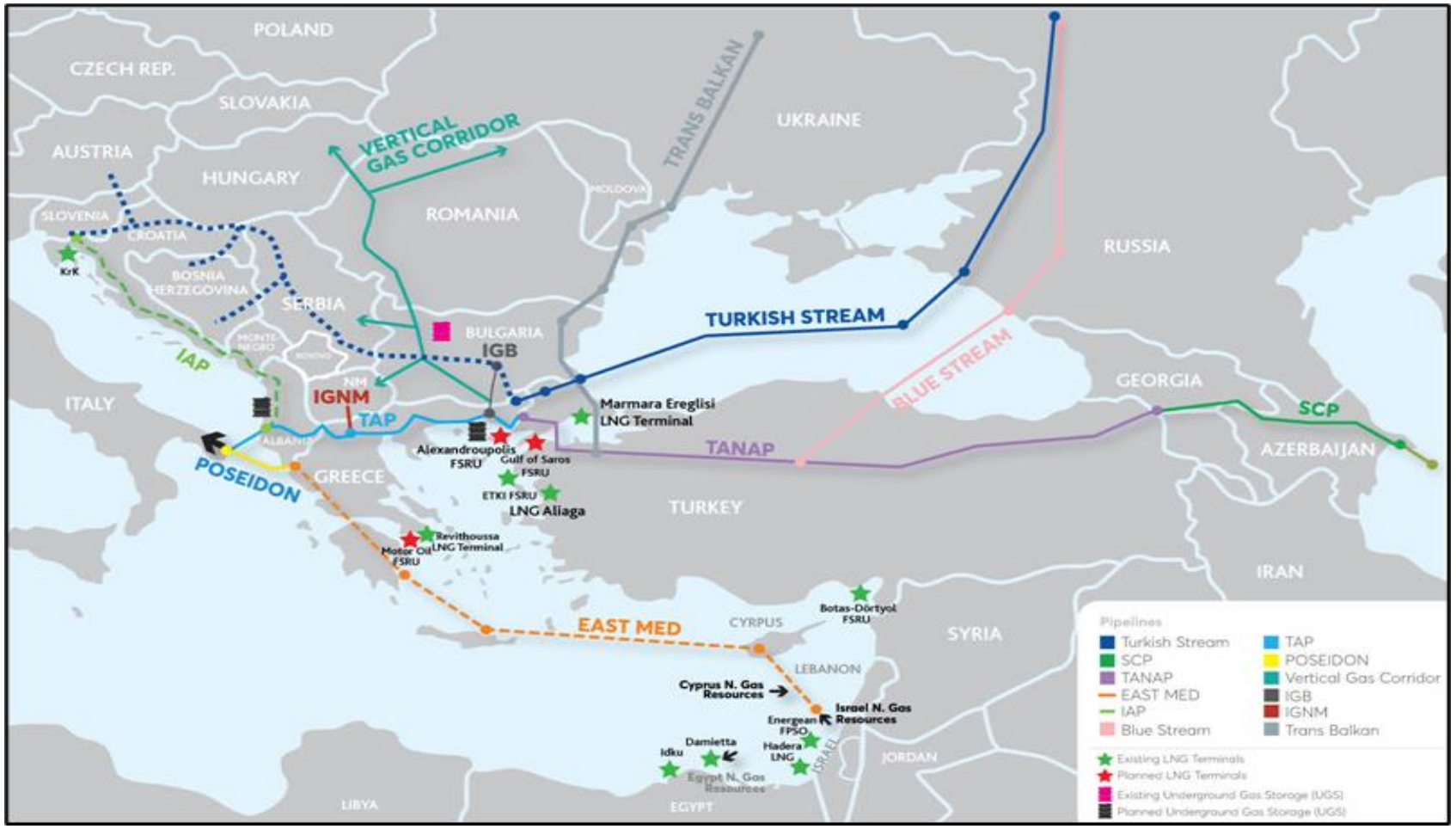
- Another option apart of TAP – TANAP system is the **East Med Pipeline** which again, due to the significant technical challenges, could also accommodate limited quantities of gas in the regions of 8.0 to 12.0 BCM's per year. Meanwhile, EC is actively exploring the possibility of massively increasing the member countries' LNG capabilities as part of Energy Union priorities, despite the recent negative stance from the US.

Towards a Redefinition of the South Corridor (II)

- The **Turkish Stream** is also a vital gas supply route. Furthermore, the Turkish Stream pipeline raises the prospect for the **stalled ITGI** natural gas pipeline to be built. ITGI (Greece-Italy Gas Interconnector) has also been included in the European Commission's latest PCI list although it is not linked as yet to any particular gas supplier. Russia's latest proposal for natural gas supply to Europe via the Greek-Turkish border could incorporate ITGI into its plan.

- Alongside of the East – West route, the **Vertical Corridor** is a gas system that will facilitate the connection between existing national gas grids and other gas infrastructure in East Balkans in order to secure easy gas transiting, thus contributing to energy security and market liquidity. Such a gas system (which will bring together national grids, underground gas storage facilities, interconnectors, LNG terminals) will form an important new corridor from South to North whose operation will be fully aligned with EU Directives and European energy policy.

An Expanded South Gas Corridor



Note: The TANAP, TAP, Turk Stream and IGB have been completed, while BRUA is still under construction. The IAP, the IGI Poseidon in connection with East Med pipeline, the Vertical Corridor and the IGF are still in the study phase. Blue Stream and Trans Balkan are existing pipelines.

The Growing Importance of LNG in SE Europe

- Today, there are **6 LNG importing terminals in operation** across SE Europe:
  - 2 land based and 2 FSRU in Turkey
  - 1 FSRU in Croatia (Krk)
  - 1 land based in Greece (Revithoussa)

- By 2025, a number of **new LNG terminals** will be added:
  - 1 FSRU in Turkey (Gulf of Saros)
  - 2 FSRU in Greece (Alexandroupolis and Dioryga Gas)
  - 1 FSRU in Cyprus (Vassilikos)

LNG Terminals in SE Europe

Source: IENE

Gas Market Liberalization in SE Europe

- There is **a highly fragmented landscape** for the gas market development in the SEE region:
  - no cross-border trading. Gas trading hubs are either non existent in the majority of the countries, or even where they exist (Slovenia and Romania) their liquidity is extremely low.
  - There are elements of the national gas market legislation and regulation that would **allow the development of gas trading** in the way performed in the more mature gas hubs of Europe and the US.

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

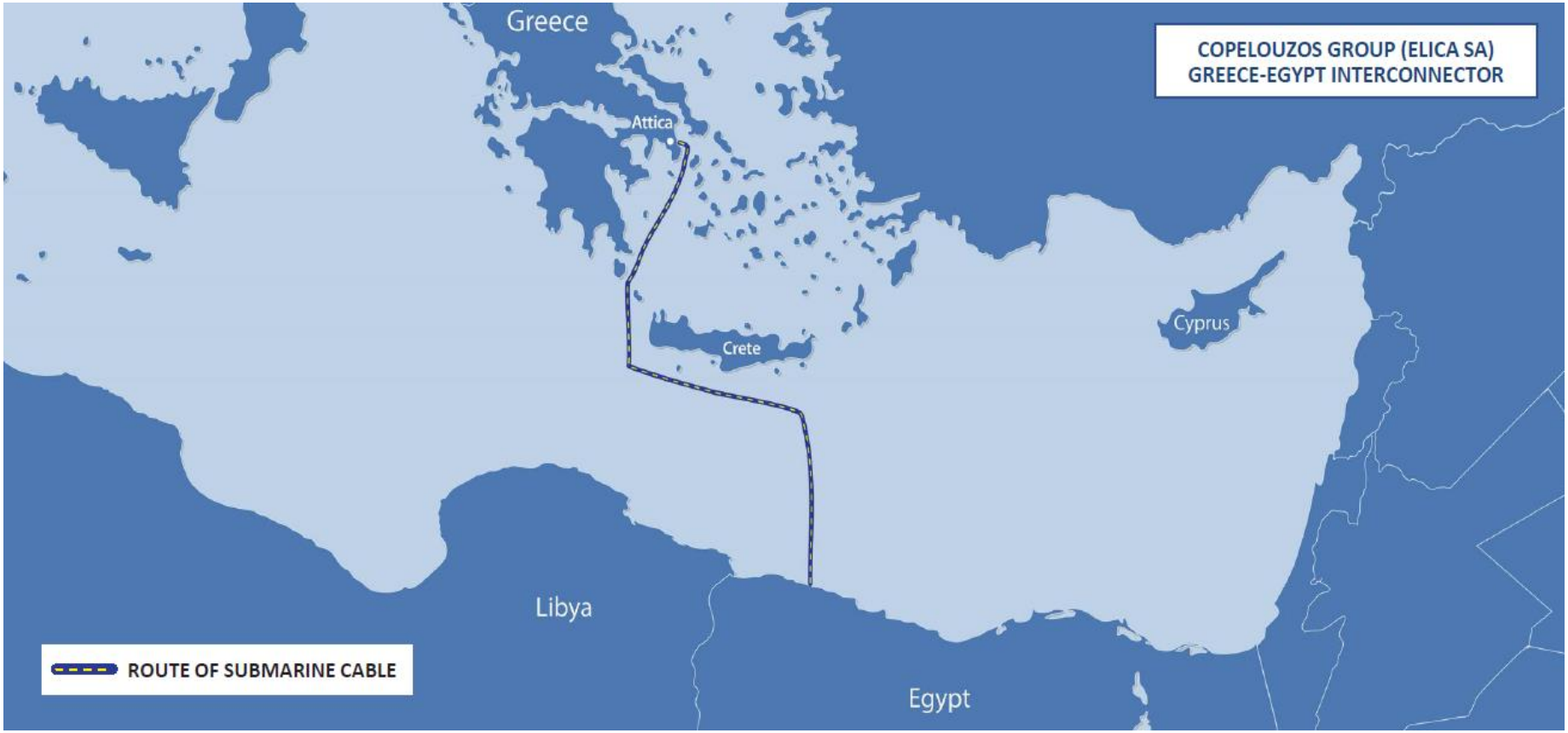
Electricity Interconnections in SE Europe

Source: IPTO's Ten Year Network Development Plan 2021-2030

EuroAsia Electricity Interconnector

Source: EuroAsia Interconnector

Greece-Egypt Electricity Interconnector



Source: ELICA Group

Nuclear Power Plants in SE Europe

- On February 2, 2022, the European Commission presented a **Taxonomy Complementary Climate Delegated Act**, which may reignite nuclear projects in SE Europe. There appears to be **limited interest for new nuclear power plants in the region**. Only Romania and Turkey have specific plans.

Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

Electricity Market Liberalization in SE Europe

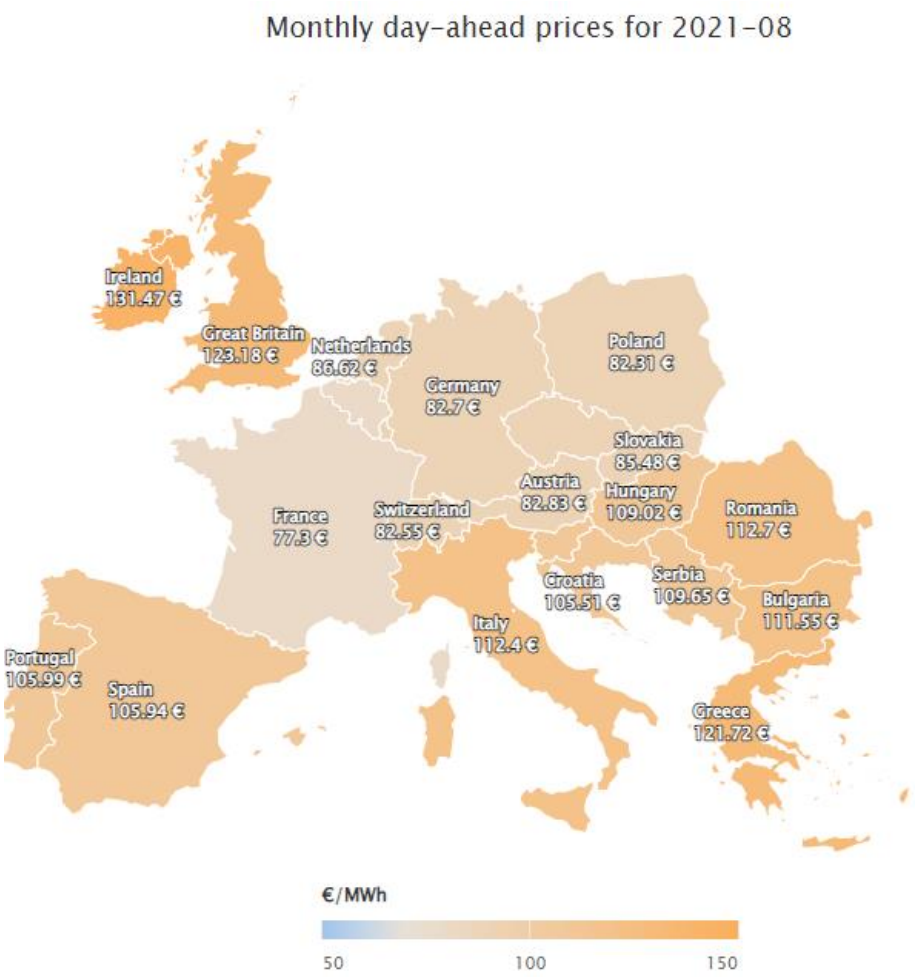
- In SE Europe, the electricity market liberalization has faced **several difficulties and numerous non-technical obstacles** in the past as the incumbent companies in almost all countries solidly resisted any change on the grounds of losing control of the market and hence weakening of their bureaucratic hold.
- Currently, the situation in **EU member countries** 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 case of **Turkey**, the achieved progress in electricity market operation unbundling and competition in the retail area has entered a critical stage with the market opening up much faster than anticipated.
  - In the case of the **Western Balkans**, we have the intervention of the Energy Community through the contracting parties, which has facilitated the overall transition process to European Acquis.
- Hence, some solid steps have been made towards electricity market competition. However, progress is not very satisfactory in most contracting parties, largely because of the inflexible market structure and the stiff hold of the state over market mechanisms.

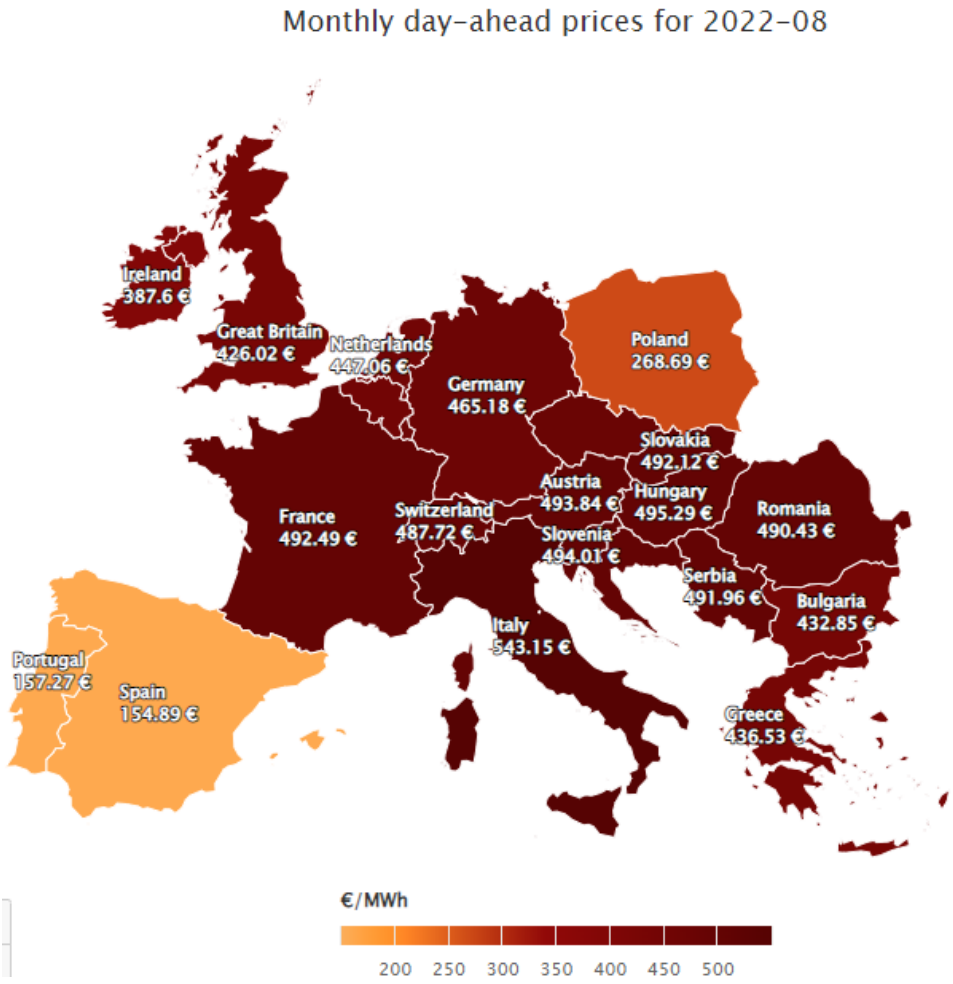
Power Exchanges in SE Europe

- Currently, there are **eight active power exchanges** in SE Europe: in Bulgaria, Hungary, Croatia, Greece, Serbia, Romania, Slovenia and Turkey.
- However, there are plans for the establishment of power exchanges in Montenegro and a joint energy market between Albania and Kosovo.
- **In Turkey, Intraday market started on July 1, 2015, while power futures market started on June 1, 2021.**

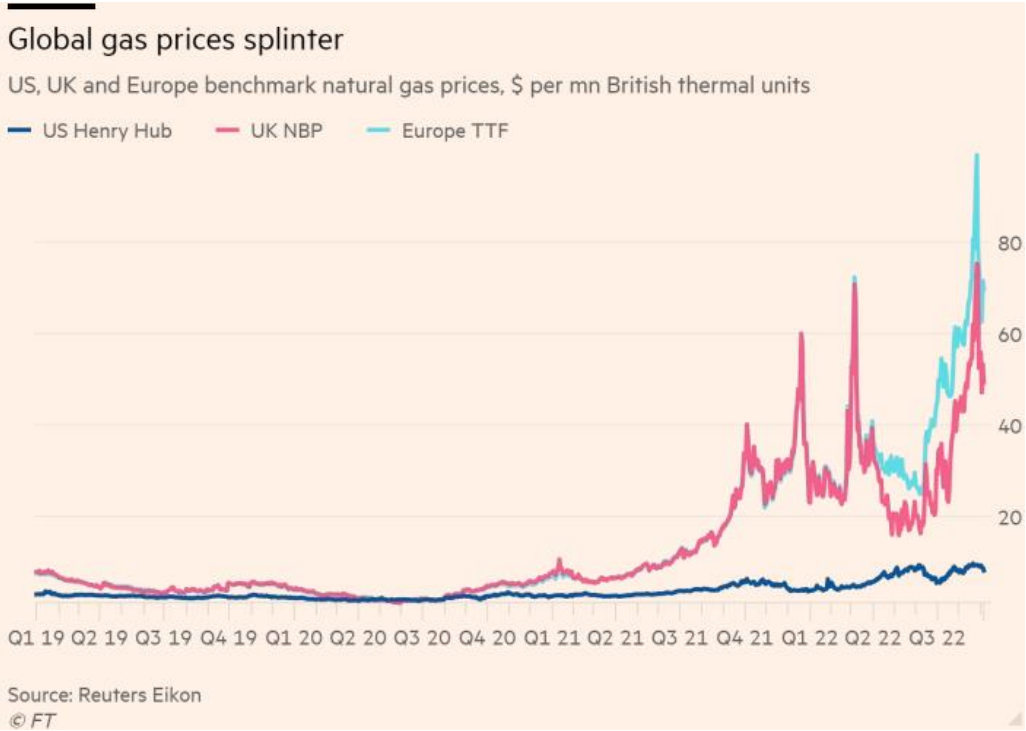
Source: IENE study "SE Europe Energy Outlook 2021/2022", Athens, 2022

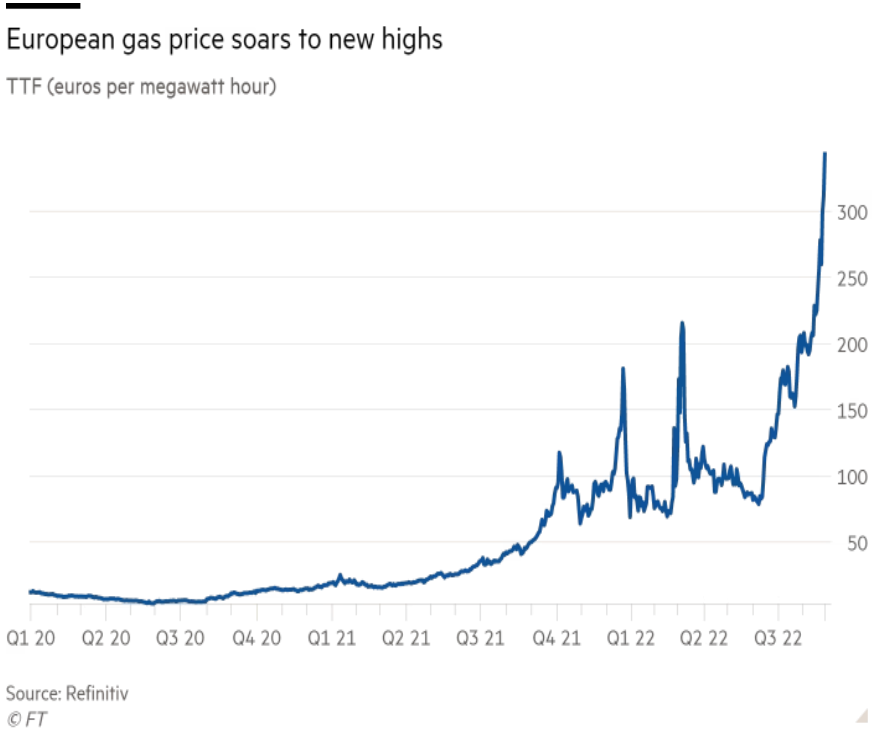
Average Day-ahead Electricity Prices in Europe





Global and European Gas Prices





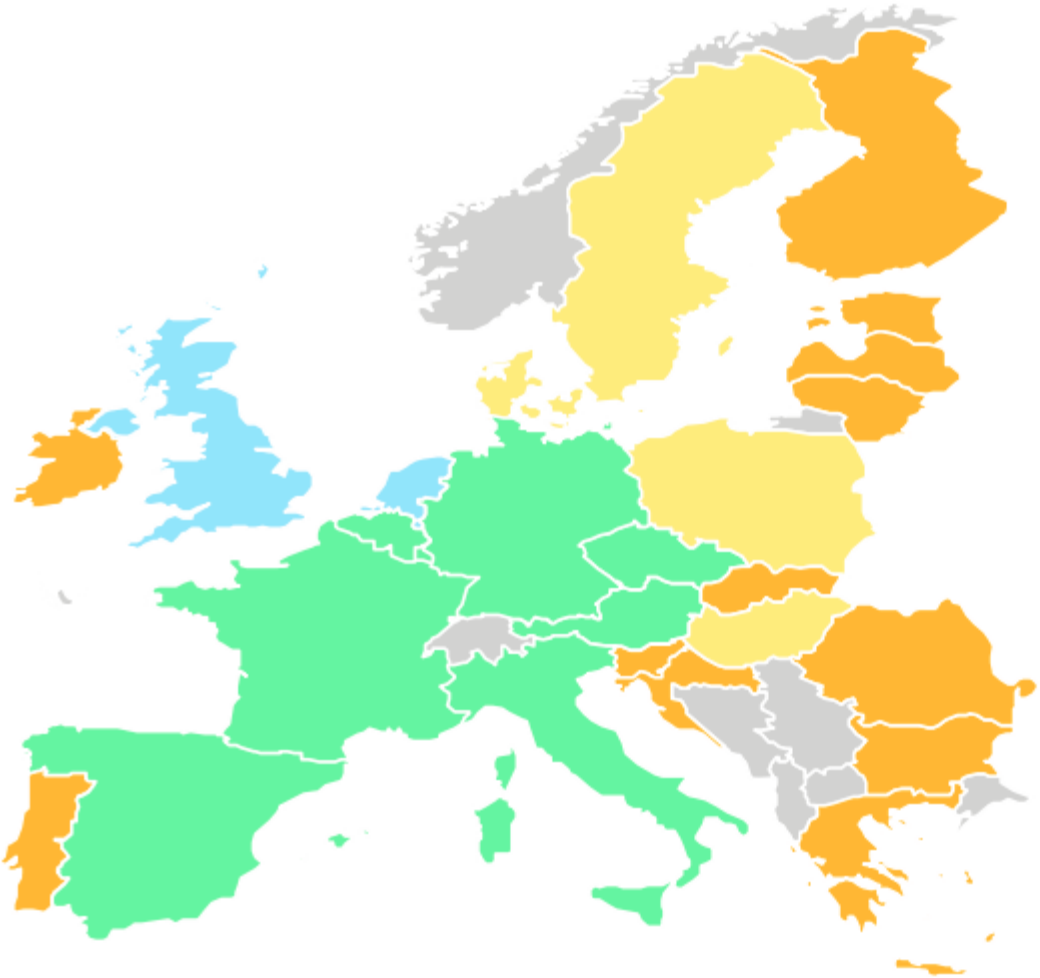
Creating Natural Gas Trading Hubs in SE Europe

- The establishment of regional natural gas hubs is expected to **facilitate the wholesale trading of natural gas between participants** in SE Europe.
- They will allow **gas supply and demand to meet in a marketplace** by providing a platform for physical and/or financial transaction.
- They will **enable competitive markets to function**, even though they will probably have an administrative role in the beginning of their operation.
- Although it is difficult, at this stage, to predict market behaviour and its reflection on spot prices, once the hubs enter full operation, based on European hub operation experience, one could safely assume that **spot prices determined through hub trading will be lower than oil-indexed ones**.
- Once the interconnections are in place and an effective gas exchange mechanism exists, traders would be willing to buy available gas, which will become available from main gas importers, by placing bids through the "hub" for both physical quantities and gas futures. Such trading activity will inevitably lead to the **formation of a new climate of competitive prices**, exerting pressure on traditional suppliers to revise their contract prices.

European Gas Regions, Markets and Hubs: 2020

Source: OIES

Where Does SE Europe Stand Today?



Established hubs
- Broad liquidity
- Sizeable forward markets which contribute to supply hedging
- Price reference for other EU hubs and for long-term contracts indexation

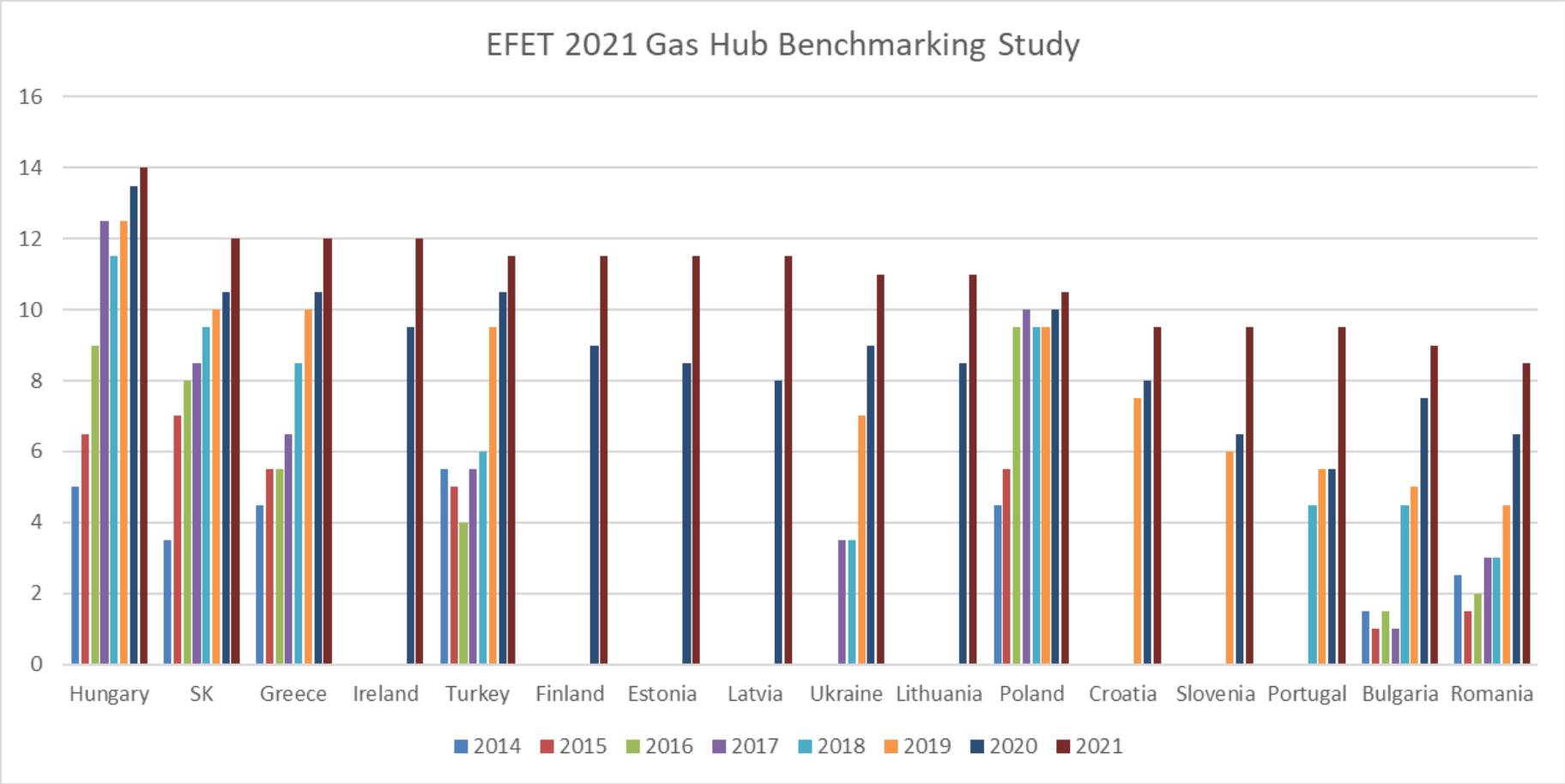
Advanced hubs
- High liquidity
- More reliant comparatively on spot products
- Progress on supply hedging role but relatively lower liquidity levels of longer-term products

Emerging hubs
- Improving liquidity from a lower base taking advantage of enhanced interconnectivity and regulatory interventions
- High reliance on long-term contracts and bilateral deals

Iliquid-incipient hubs
- Embryonic liquidity at a low level and mainly focused on spot
- Core reliance on long-term contracts and bilateral deals
- Diverse group with some jurisdictions having
  - organised markets in early stage
  - to develop entry-exit systems

Source: ACER Market Monitoring Report 2020

EFET's Annual Scorecard 2021



Source: EFET

Energy Demand and Supply Projections in SEE

- The projections for the development of the energy systems of the SEE countries under **a "Baseline" scenario** approach was considered appropriate in order to present the possible future pathways paved by current policies.

- The **most recently available studies** and the **official country submissions of strategic documents** (such as the Integrated National Energy and Climate Plans) were used in order to collect and analyse these projections.

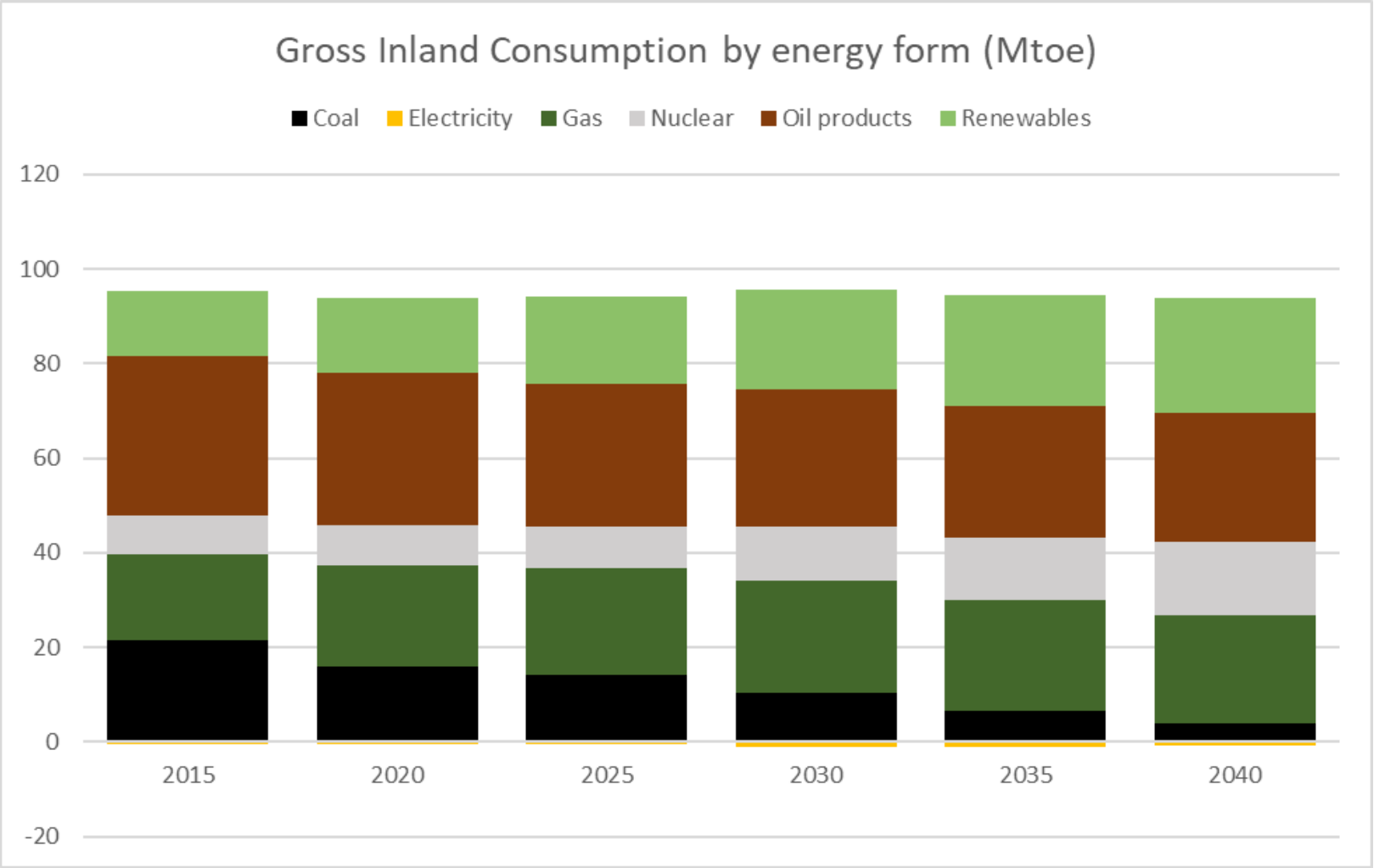
- The purpose is to present the evolution of the national energy systems corresponding to a **"where we are heading" storyline**, providing a simple but comprehensive picture of the energy and GHG emissions dynamics under the "current policy" efforts until 2040.

- **It should be noted that most of the available analyses do not include the effect of the COVID-19 pandemic and its possible long-term effects to the macroeconomic development and the energy systems of the countries in the region.**

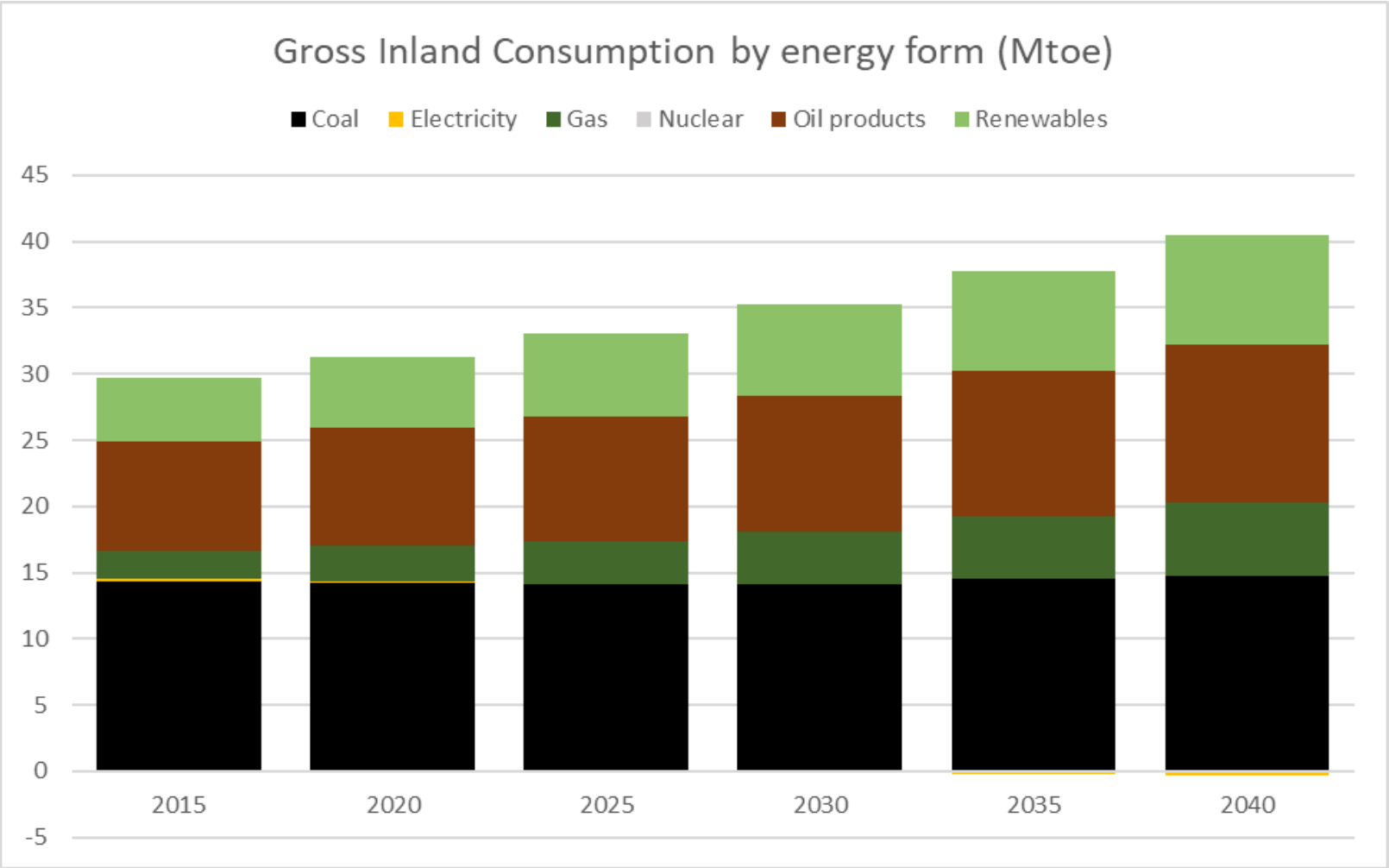
Results per Group of Countries

- Looking at the projection of the gross inland consumption in the **EU member states of the SEE region** (Bulgaria, Croatia, Cyprus, Greece, Romania, Slovenia), the overall tendency shows a stabilisation and even a small reduction in the time horizon to 2040.
  - The decrease of the use of coal is evident, reaching a minimum level by 2040 while oil products lose part of their share in the GIC. The winners to this change are renewable energy and nuclear energy. The group remains a net importer in the time horizon until 2040, but the import dependency is reduced between 2020 and 2030 and then stabilised at a level close to 42% until 2040. Crude oil and oil products cover the majority of imports (68% in 2040), imports of coal are reduced significantly, while imports of natural gas remain at a level close to 12 Mtoe after 2030.
- The projection of Gross Inland Consumption in the **six Western Balkan countries** (WB6: Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia) presents a rather different story from that of the EU member states in the region.
  - Following the expected growth of GDP, GIC is projected to increase by almost 40% between 2015 and 2040, with the amount of coal being held almost constant, close to 15 Mtoe. Natural gas is the emerging fuel with a constant gradual increase, connected with the pipeline expansion projects in the Western Balkans region. Crude oil and oil products increase by 45% reaching 12 Mtoe in 2040, and renewable energy increases substantially (by 70%) to 8.3Mtoe in 2040, but still covers only 20% of the total GIC of the group of countries. The group remains a net importer of energy and furthermore, import dependency increases to a level of 42% in 2040 (from 33% in 2015). Crude oil and oil products cover the largest part of imports reaching almost 11 Mtoe by 2040 and the imports of natural gas are continuously increasing, reaching 5.4 Mtoe in 2040.
- In **Turkey**, gross inland consumption is projected to increase by more than 50% between 2020 and 2040. The role of renewable energy is seen to increase notably, reaching 28% of the GIC in 2040, the amount of coal remains at the level of 50 Mtoe with its relative contribution being reduced to 23% in 2040 and the contribution of natural gas is decreased to 17% of the GIC. Nuclear energy appears for the first time in the GIC of Turkey after 2025 with the operation of the Akkuyu nuclear power plant and is increasing until 2050, following the nuclear expansion program of the country.

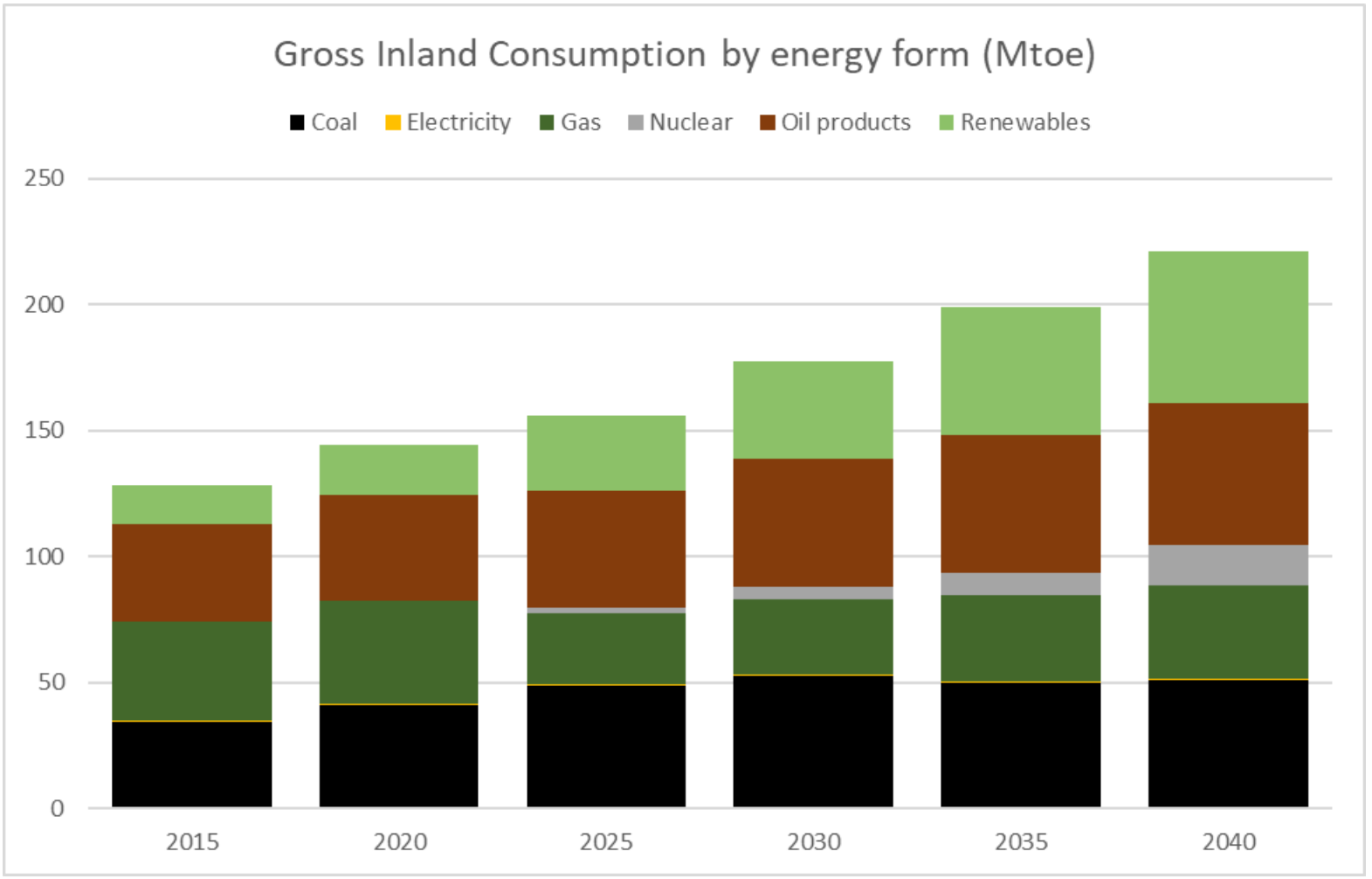
EU Member States in SE Europe: Gross Inland Consumption (2015-2040)



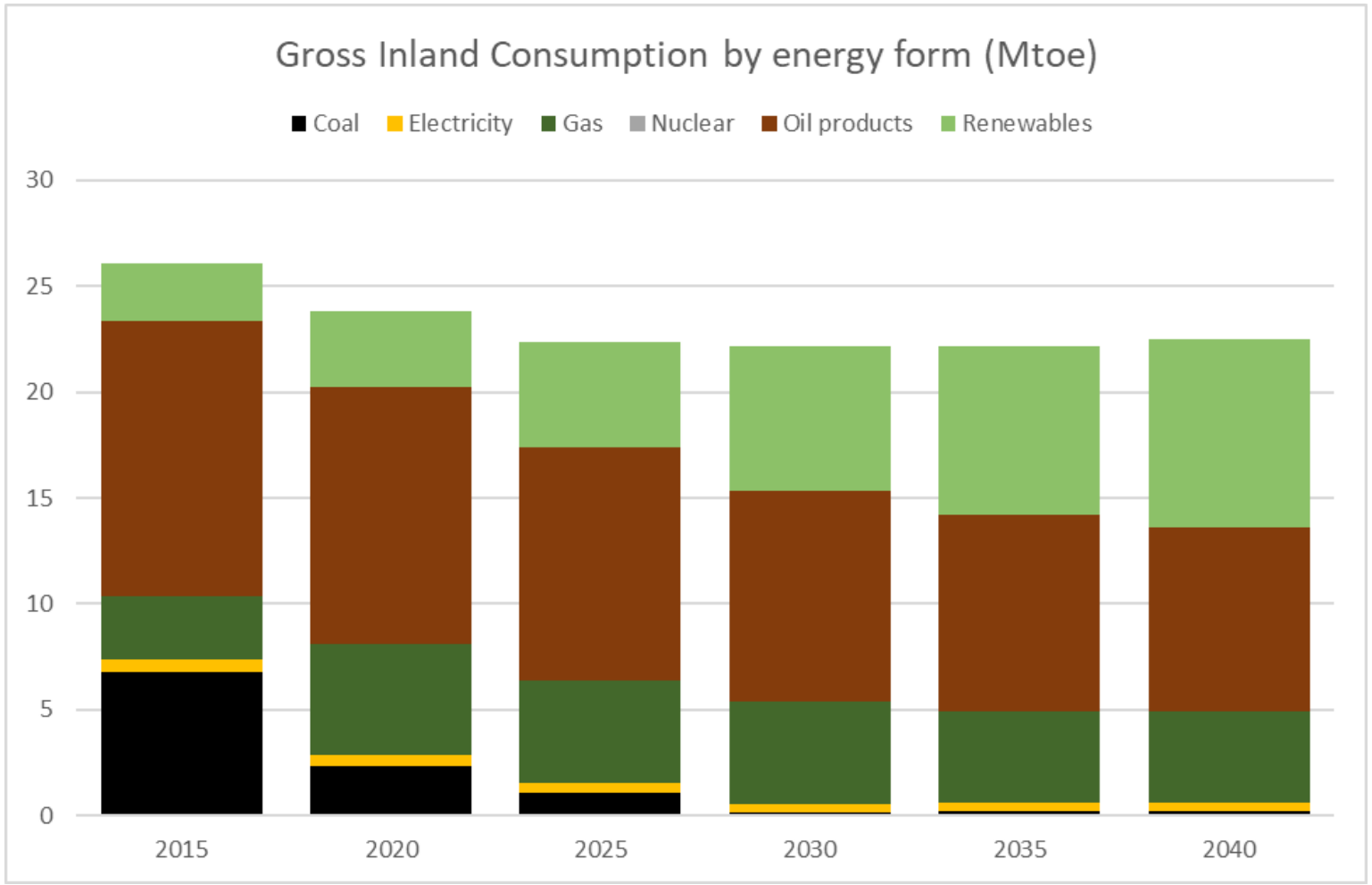
Western Balkan Countries: Gross Inland Consumption (2015-2040)



Turkey: Gross Inland Consumption (2015-2040)



Greece: Gross Inland Consumption (2015-2040)



SEE Energy Investment Outlook 2021-2030

- The **investment prospects** in the energy sector of SE Europe over the next 10 years can only be described as **positive**.

- In terms of planned investments, a group of **five countries (i.e. Turkey, Bulgaria, Romania, Serbia, Greece)** appear to be moving **much faster than others** in attracting the needed investment for a variety of energy projects, while progress in the rest of the countries is moving more slowly.

- The region as a whole can be considered as presenting **attractive business opportunities in almost all branches of the energy sector**. The present analysis shows that investment in the energy sector will be spread as follows between countries and interregional projects.

Findings of SEE Energy Investment Outlook Per Country (2021-2030)

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

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

Findings of SEE Energy Investment Outlook Per Sector (2021-2030)

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

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

Findings of Energy Investment Outlook Per Sector in **Cyprus** (2021-2030)

	Project sector	Description	Investment estimate (€ mn)
OIL	Upstream	• Field Exploration • Development of new oil and gas wells and associated infrastructure	8,200
	Downstream	• Loading Terminals • Storage facilities	
GAS	Gas Network	• Grid development • Main intra country pipeline(s) • Storage facilities • FSRU Terminal	800
ELECTRICITY	Power Generation	• Gas (including CHP)	1,200
	Electricity Grid	• New H/V transmission lines • Upgrading and expansion of existing grid	
	RES	• Small Hydro • Wind farms • Photovoltaics • Concentrating Solar Power • Biomass (including liquid biofuels)	1,000
ENERGY EFFICIENCY		• Energy upgrading of buildings/transport	5,000
	Total anticipated investments by 2030		**16,200**

Sources of Finance

- The **main sources of finance** for planned energy infrastructure projects in SE Europe include:
  - Government/own resources
  - International Financial Institutions (IFIs)
    - European Commission
    - European Bank for Reconstruction and Development (EBRD)
    - European Investment Bank (EIB)
    - World Bank
    - German government-owned development bank KfW
    - European Western Balkans Joint Fund (EWBJF)
    - International Development Association (IDA)
  - Commercial banks/private investors
  - Financial facilities for investments in energy efficiency and renewable energy

Key Messages (I)

- **Geography**, followed by **economy**, has emerged as a key factor in SEE's energy assessment
- **Energy strategies and policies:** There is considerable divergence between stated objectives and actual progress on the ground (e.g. Decarbonisation, RES penetration, regional co-operation)
- There is **clear failure at EU policy level** in achieving national targets especially in RES, as conflict is in evidence over strict budgetary rules and allowed deficit levels
- The **coronavirus pandemic (COVID-19)** led governments to impose unprecedented containment measures on transportation and economic activity in general. Combined with a fall in global oil prices, especially during March-May 2020, this crisis is producing imbalances in the energy sector, affecting both investments and the transition to decarbonisation
- The SEE region's **energy mix** is still characterized by glacial change in terms of differentiation of the dominant fuels
- The **persisting relevance of solid fuels** is explained on account of the large amounts of indigenous coal and lignite deposits and are seen as partly preventing a determined move towards decarbonisation
- The SEE region is characterized by **high oil and gas import dependence**
- The outlook for the SE European **upstream oil and gas industry** has rarely looked so uncertain
- **Peripheral countries** are playing an increasingly more influential role in the channeling of energy flows into the SEE region
- **Natural gas is becoming increasingly important** to the energy mix of the various SEE countries, both for power generation and commercial/domestic use

Key Messages (II)

- **Market liberalization** in the electricity sector has made huge strides over the last five years with unbundling having taken place and competition in the retail area now evident after many years of protectionism. Less impressive is progress in the natural gas sector where competition, is largely limited to the industrial sector with retail lagging seriously behind
- **Nuclear power**, although it contributes only 4.1% to total gross inland consumption in SEE, (including Turkey), remains a viable option since it covers important base load requirements in certain key countries (Romania, Bulgaria, Croatia, Slovenia, Hungary) and is fully compatible and supportive of EU's (revised) decarbonisation policies
- **Energy efficiency** in SE Europe until very recently was not given enough priority or attention although its role has been recognized in all EU Member States. Further efforts are required to introduce Energy efficiency as an integral part of national energy planning
- The SEE countries have particularly high levels of **energy poverty** due to low incomes, high energy needs stemming from energy-inefficient housing, and limited access to diversified energy supply
- In terms of **security of energy supply**, the SEE region as a whole appears more vulnerable than the rest of Europe (mainly Western European countries)
- Alongside power grid reinforcement, a diverse mix of **flexible generation technologies** in SEE can facilitate the integration of variable RES – especially wind and solar PV.
- In SE Europe, the **Electric Vehicle deployment** is still at a very early stage, even though it shows significant annual growth.

Key Messages (III)

- Looking at the **projection of gross inland energy consumption in the EU member states of the SEE region**, the overall tendency shows a stabilisation and even a small reduction in the time horizon to 2040
- In contrast, the **projection of gross inland energy consumption in the six Western Balkan countries** presents a rather different story from that of the EU member states in the region. Following the expected growth of GDP, gross inland energy consumption is projected to increase by almost 40% between 2015 and 2040, with the amount of coal being held almost constant, close to 15 Mtoe
- **Gross inland energy consumption in Turkey** is slated to increase by more than 50% between 2020 and 2040
- **Investment prospects** for energy related basic infrastructure and energy projects across the board look positive over the next decade
  - Compared to projections made in 2017 for the period 2016-2025, total estimated energy related investment in the region is much higher and amounts to €483.7 billion.
  - Corresponding investments for the original 13-country group (as they appear in the 2017 Outlook) are slated at €387 billion, which is 41.8% higher compared to the 2017 estimates.
  - **This is a vast improvement compared to 5 years ago and clearly shows the substantially increased interest and appetite for energy investments in SE Europe.**

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