



# INTERNATIONAL BUILDING DECARBONIZATION 2022 CONFERENCE

*International Building Decarbonization 2022  
ASHRAE Conference  
Athens, October 5, 2022*

## Energy Crisis, Opportunities and Challenges in SE Europe

A keynote presentation by  
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Chairman and Executive Director,  
Institute of Energy for SE Europe (IENE)



**The Economist**

How the pandemic ends  
Latin America's growth opportunity  
Will there be a wage-price spiral?  
More threats to free speech

OCTOBER 16TH-22ND 2021

# The energy shock

**The Economist**

The Democrats pass peak progressive  
After Abe  
Post-quantum solace  
Let Catholic priests wed

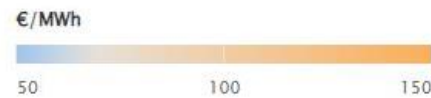
JULY 16TH-22ND 2022

# EUROPE'S COMING WINTER PERIL

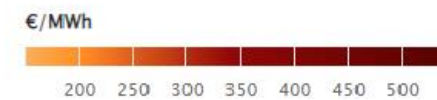
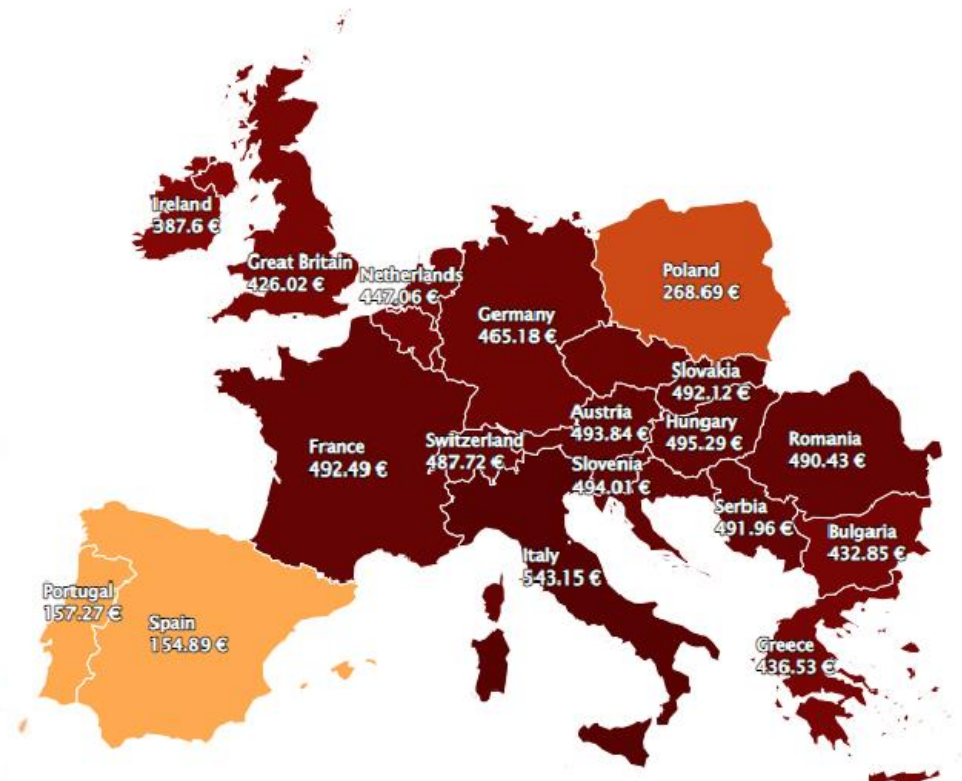
- ❑ An unprecedented energy crisis has been unfolding over the last 14-18 months with steep rises in oil, gas, coal and electricity.
- ❑ A far worse crisis than the ones in 1973 and 1979 since it has affected the whole spectrum of energy sources.
- ❑ The fundamental reasons behind the crisis appear to be a real supply shortage as the global economy has expanded exceedingly fast in the post Covid-19 period.
- ❑ Europe is worse hit by the current energy crisis than other parts of the world as the continent has to import from Russia and elsewhere more than 60% of the energy it consumes.
- ❑ The energy crisis in Europe has been further exacerbated by an ill conceived EU embargo against Russian oil, gas and coal imports.
- ❑ By blocking imports from EU's biggest energy supplier, the continent's energy markets have been destabilised with steep electricity and gas price rises and uncontrolled fluctuations.
- ❑ Substituting Russian gas with imported LNG can only substitute part of the missing gas volumes since the market produces finite gas quantities and no new major LNG suppliers are coming on stream before 2024.
- ❑ Likewise in oil, there appears to be a supply shortage as a result of years of underinvestment. Hence, the global market cannot increase much production, while OPEC+, which includes Russia and controls 50% of global oil supply, is not willing to open up the taps for fear of actual shortages in the near future.
- ❑ As a result of actual supply constraints and steady global demand, oil and gas prices are most likely to stay high over the next 12-18 months.
- ❑ A predicted global economic recession may curb demand but this is expected to be marginal, while oil and gas supply shortages are expected to influence a lot more price dynamics.
- ❑ As demand for oil and gas (especially LNG) is not expected to wane any time soon, the outlook for increased shipping activity is expected to remain strong with freight rates maintaining for sometime their current elevated level.

# Average Day-ahead Electricity Prices in Europe

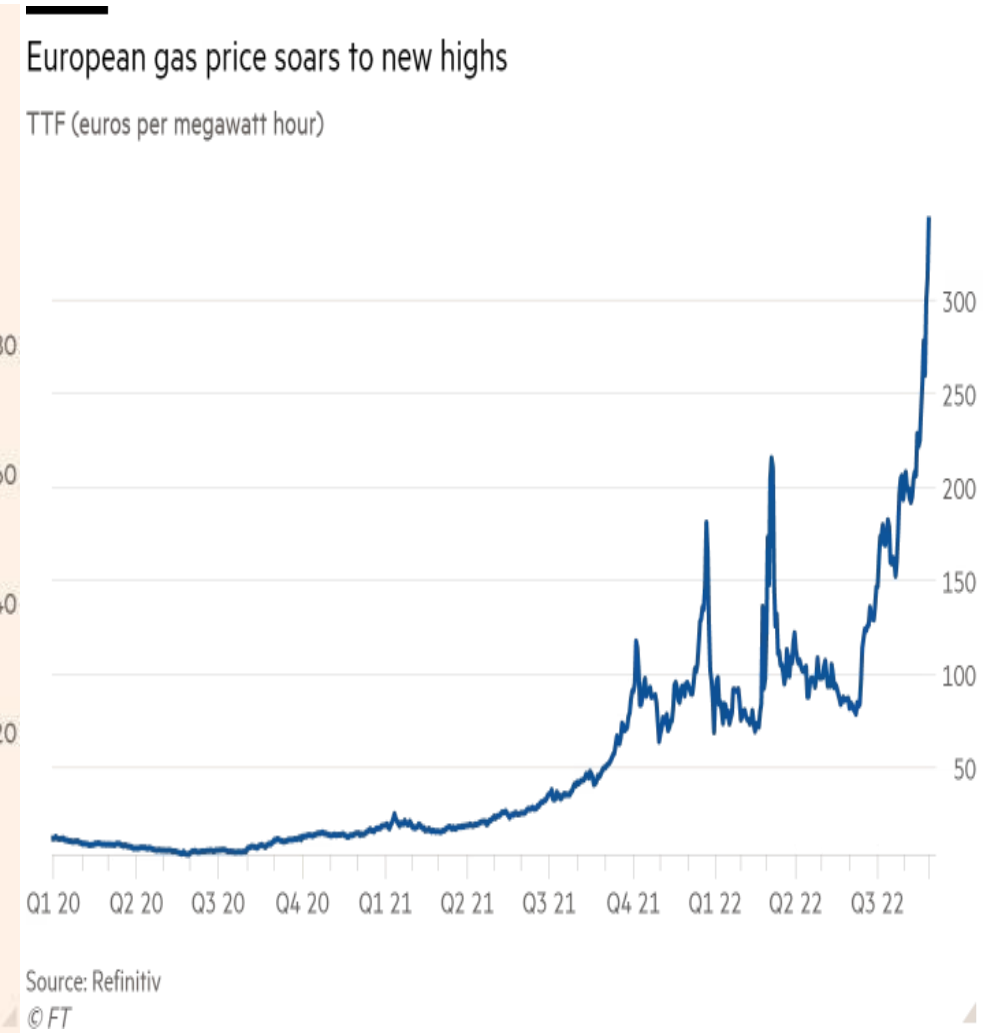
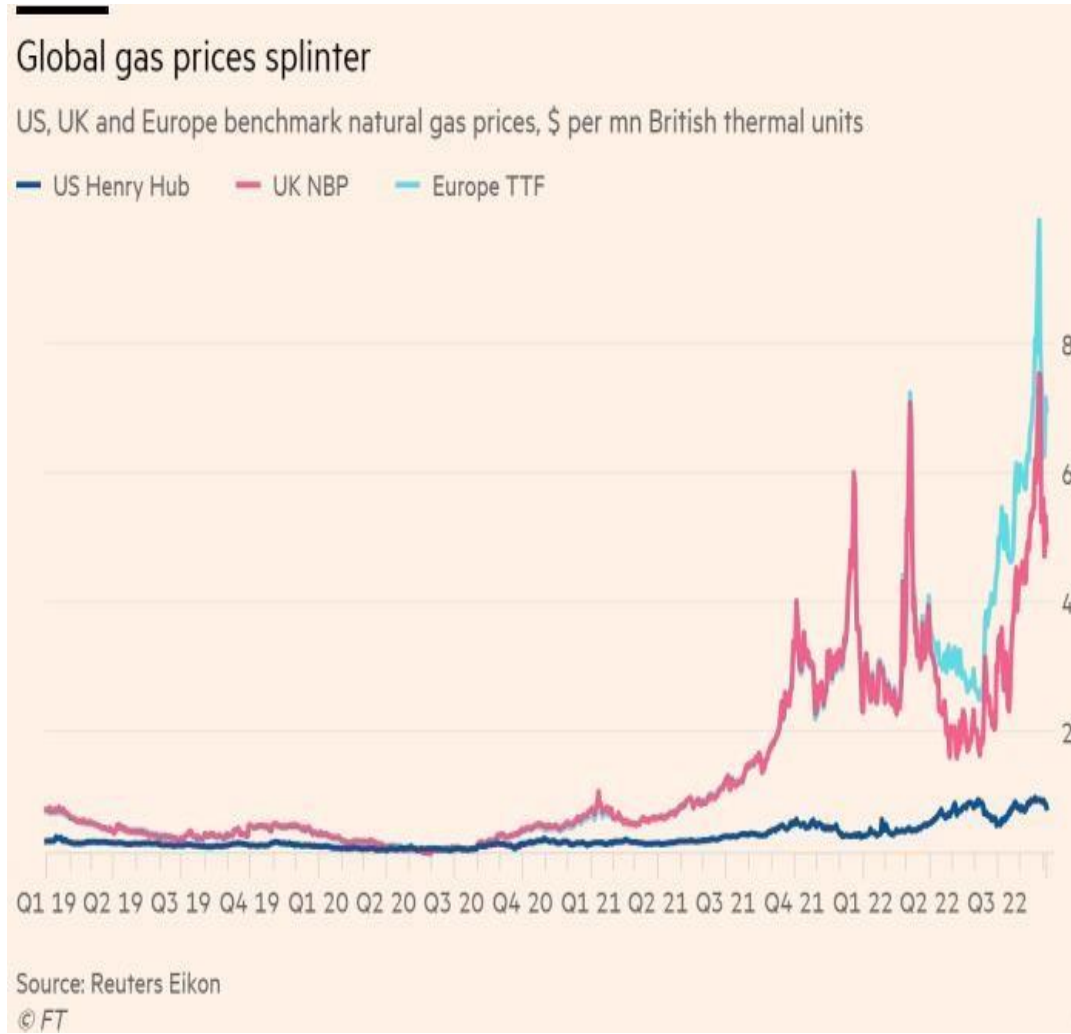
Monthly day-ahead prices for 2021-08



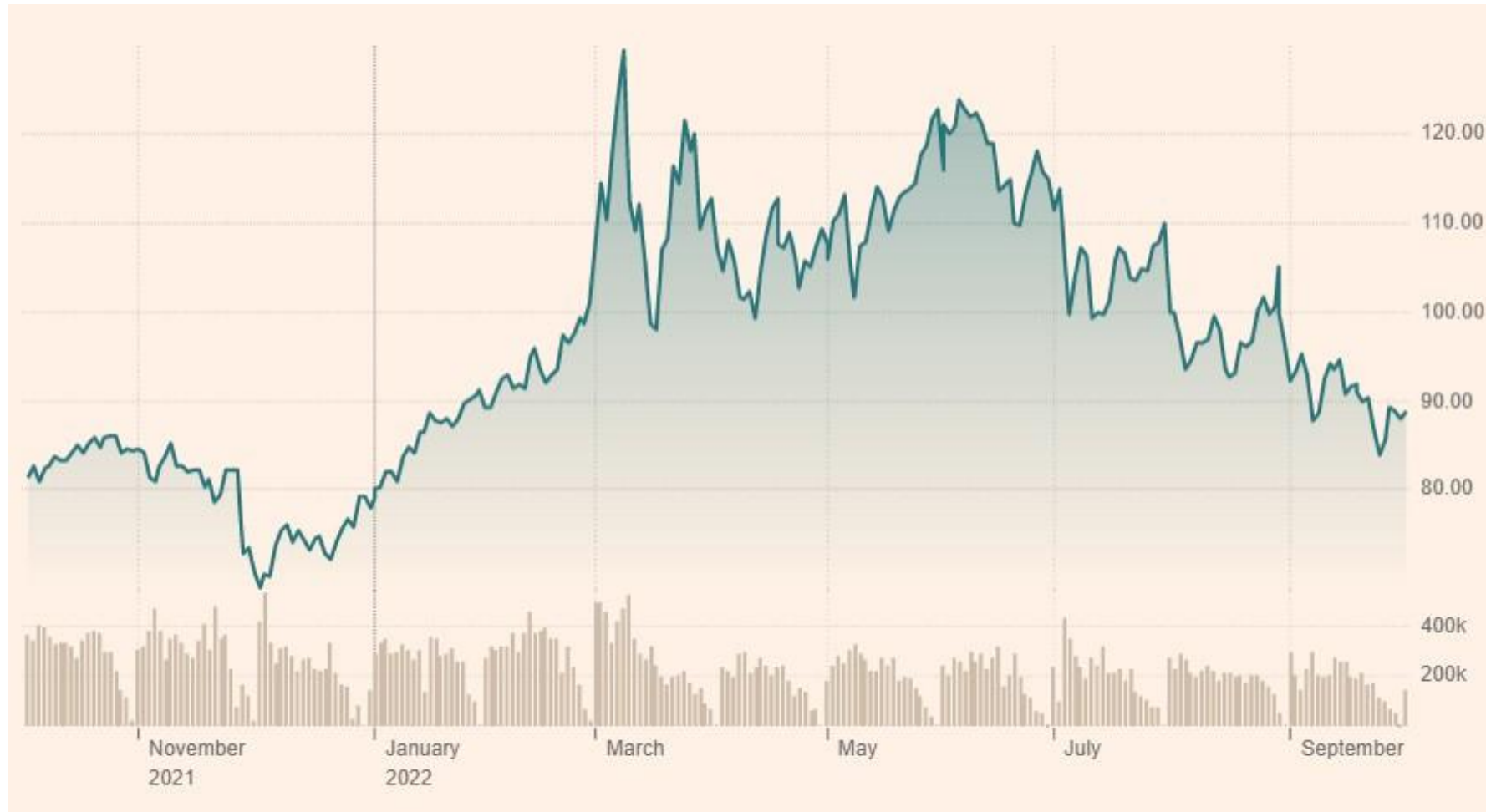
Monthly day-ahead prices for 2022-08



# Global and European Gas Prices

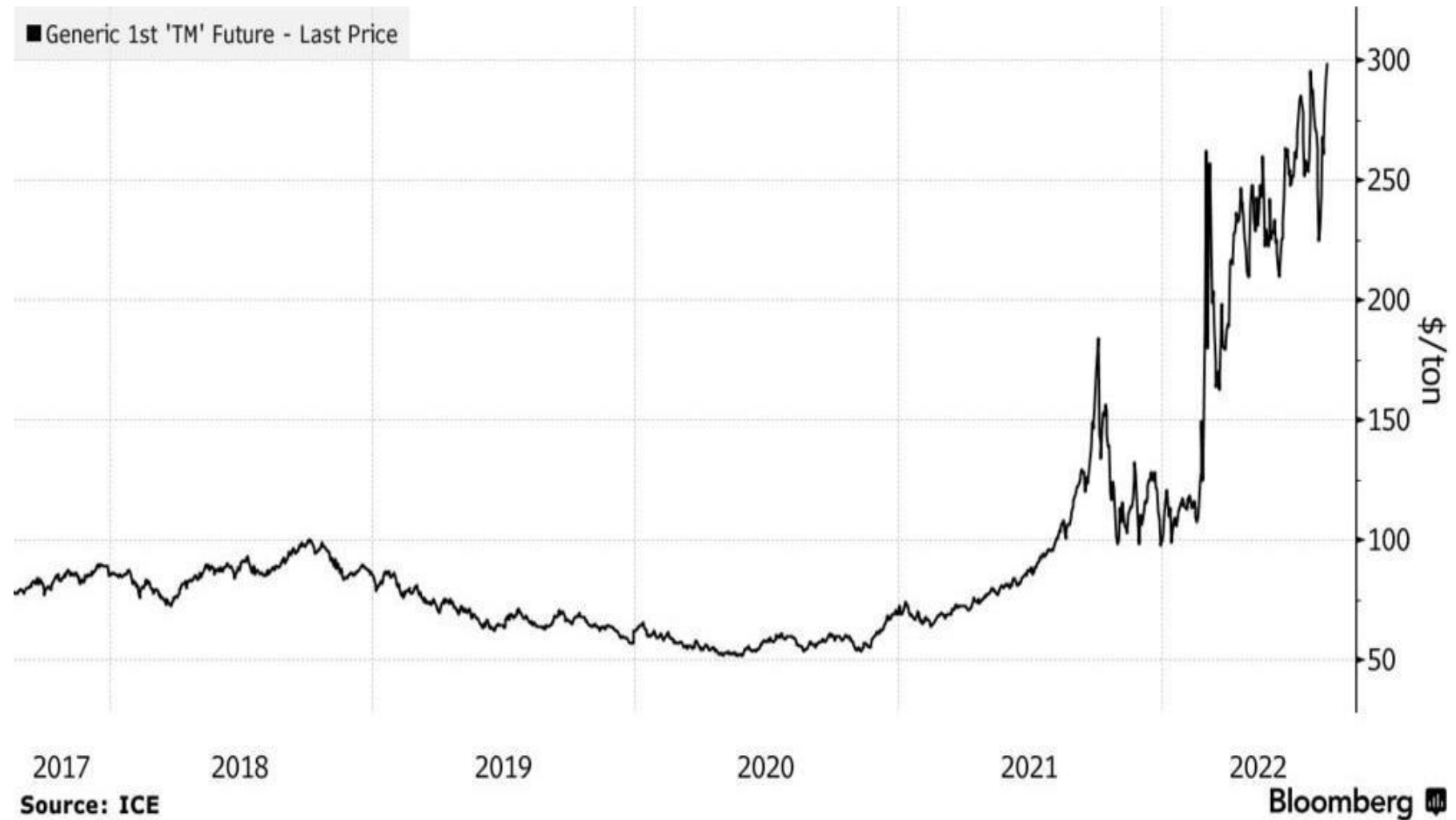


# ICE Brent Crude Oil Front Month (1 Year)



Sources: ICE, Financial Times

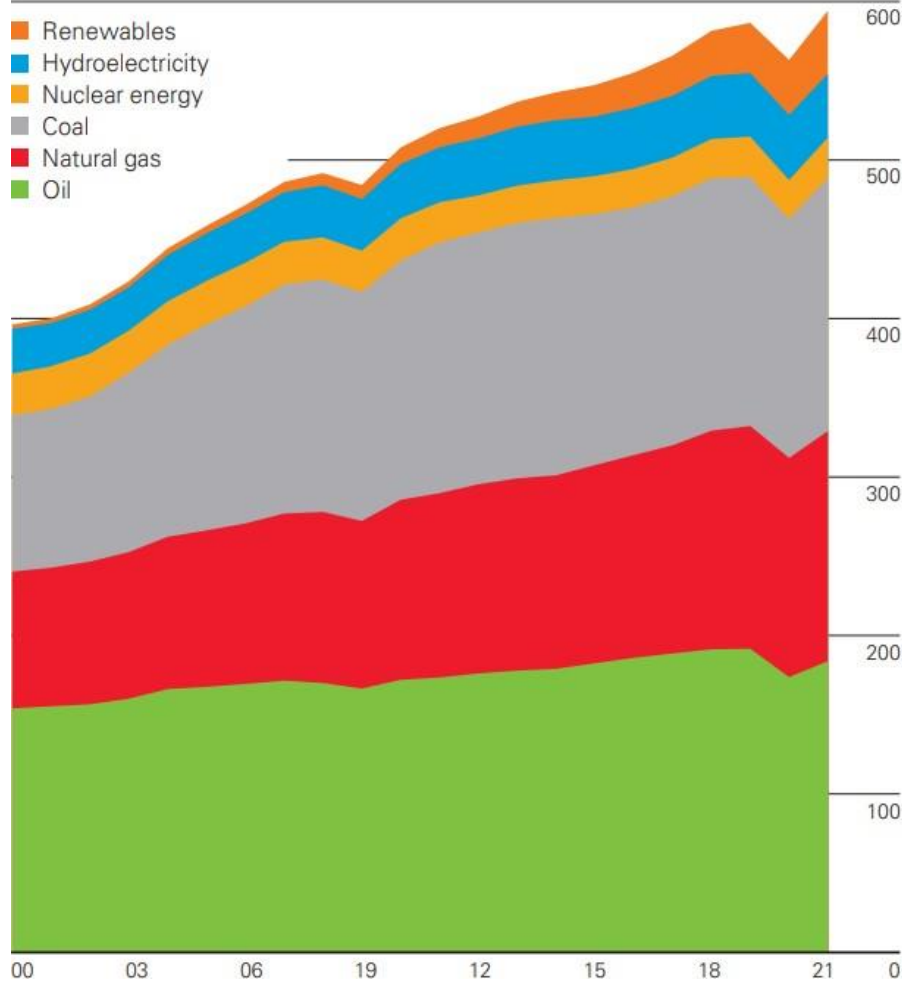
# European Coal is in the Midst of an Historic Rally as Demand Surges



# Global Energy Consumption and Shares of Global Primary Energy

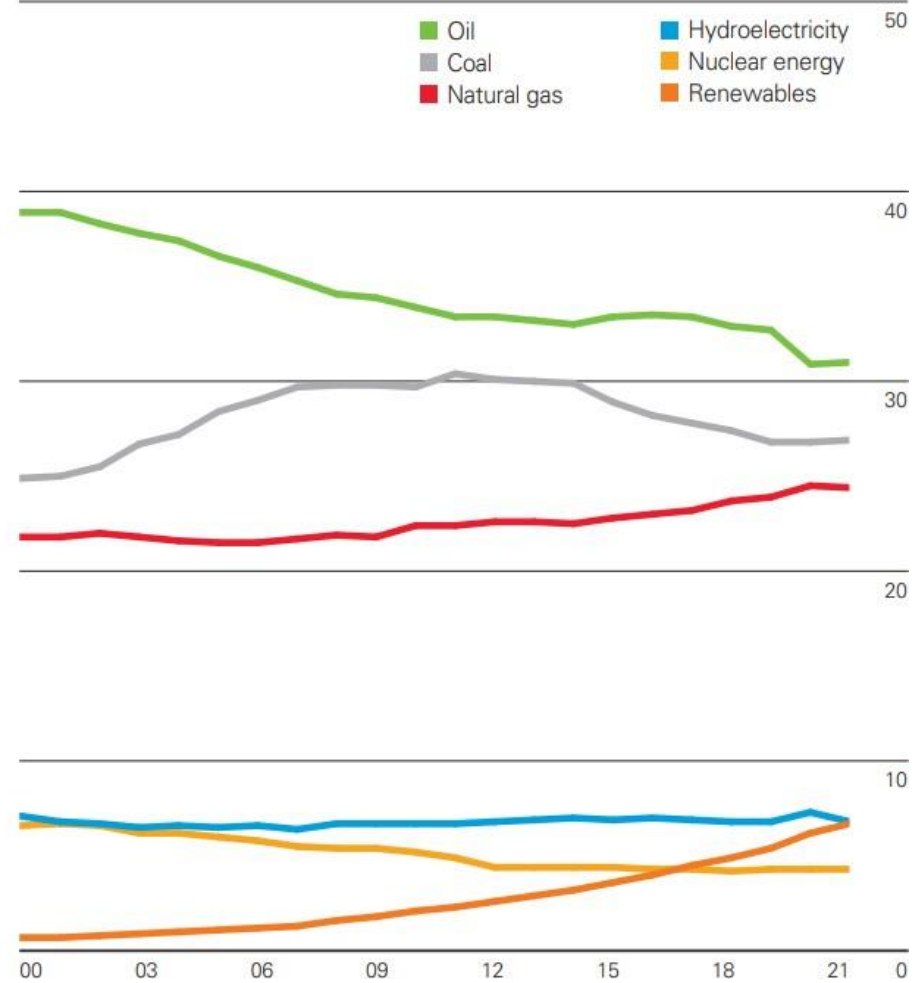
## World consumption

Exajoules



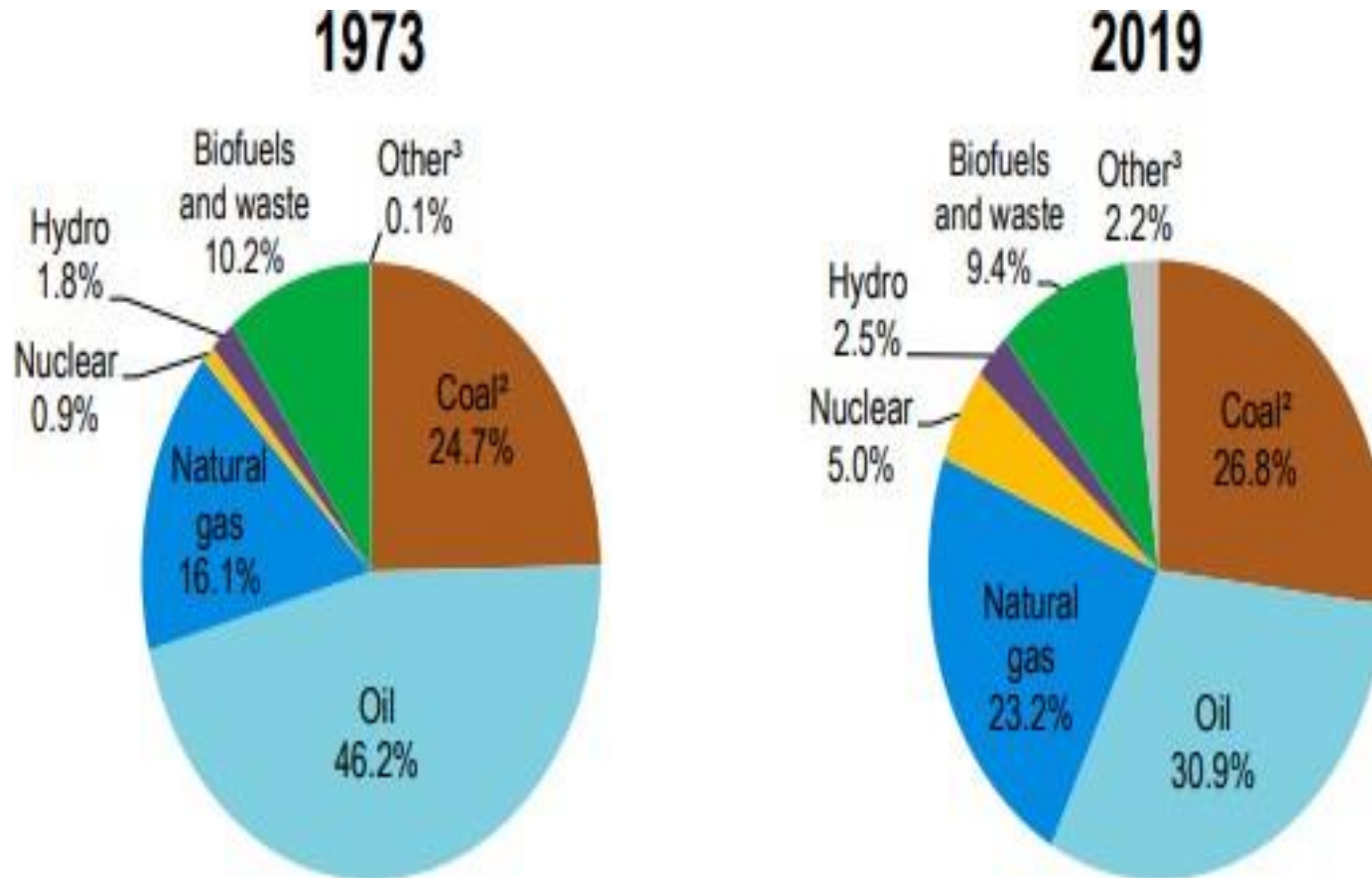
## Shares of global primary energy

Percentage



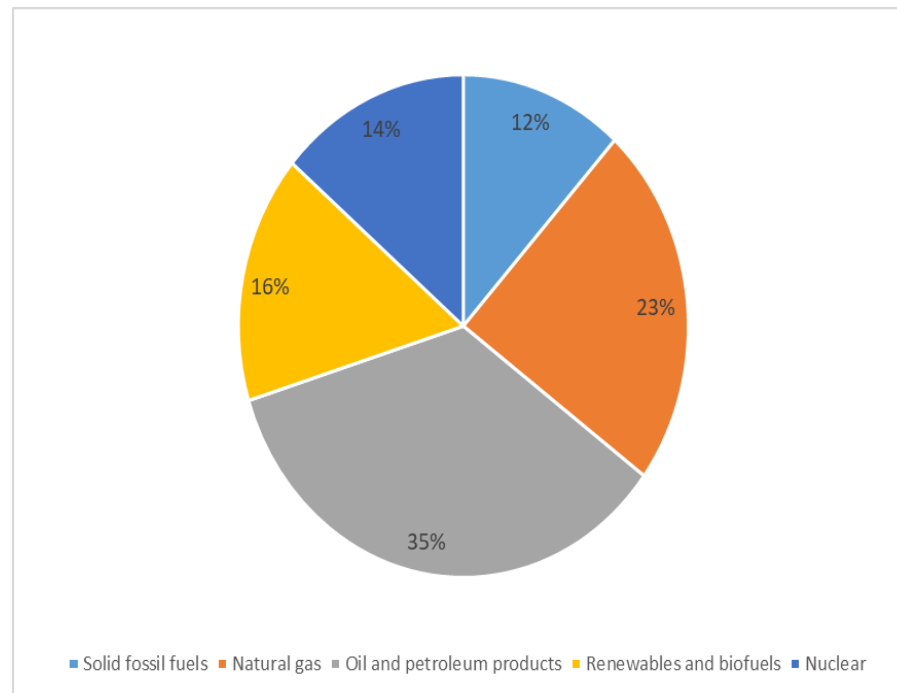


# Global Energy Mix, 1973 and 2019

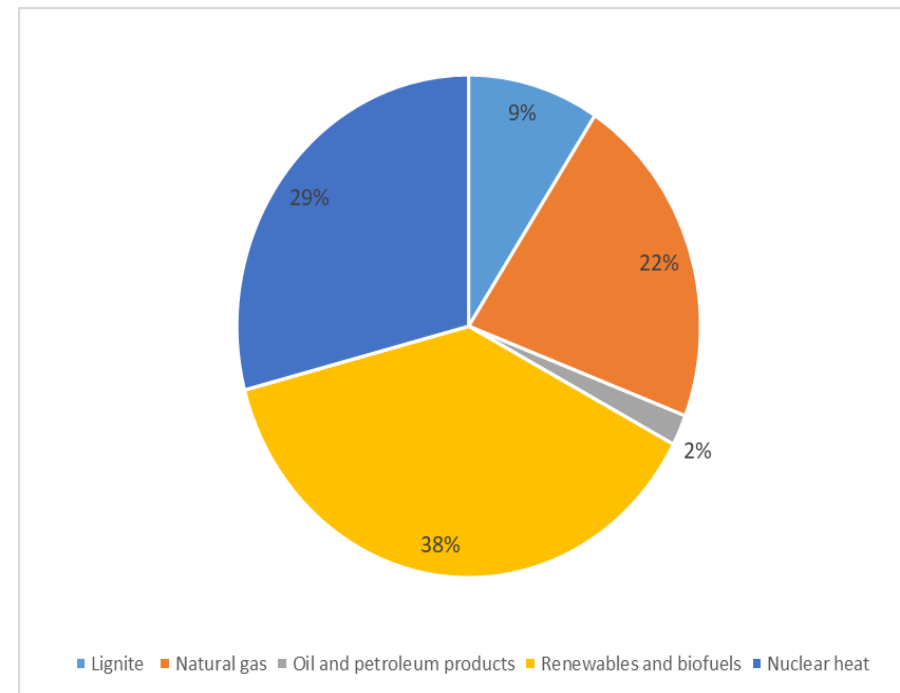


Source: IEA's World Energy Statistics 2021

## Energy Mix in EU-27



## Electricity Mix in EU-27

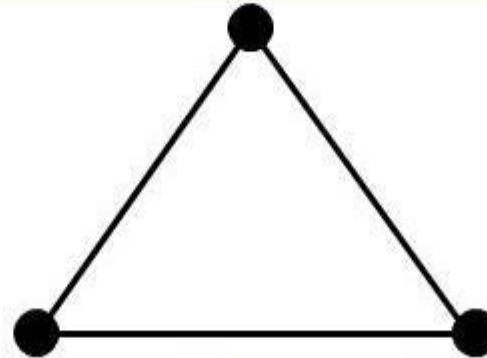


Source: Eurostat

# 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

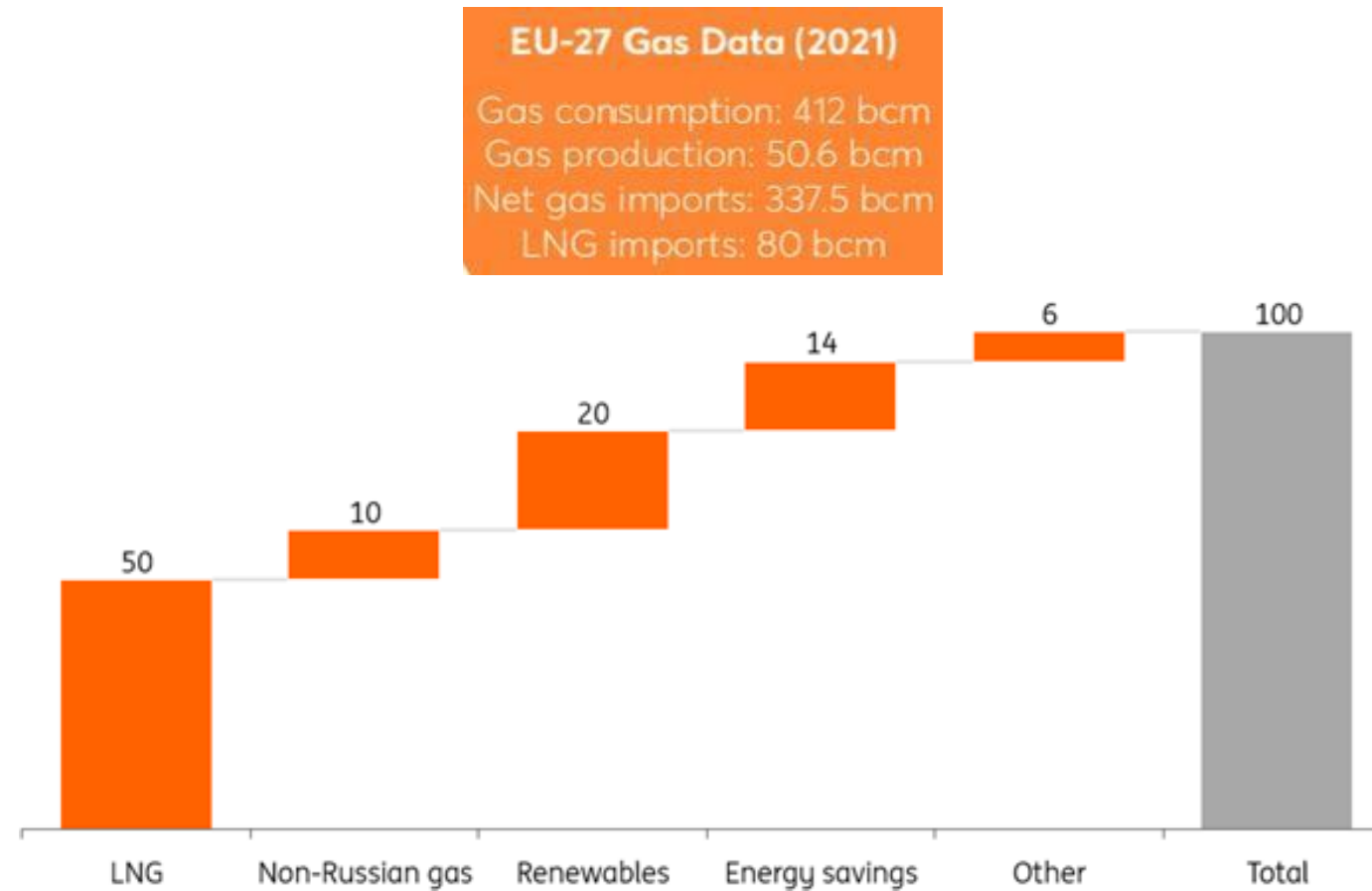
- reduce Europe's dependence on energy imports
- help balance trade

## SUSTAINABILITY

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

Source: Eurostat

# REPower EU's Targets Aiming to Reduce Gas Consumption by 100 bcm, by 2022



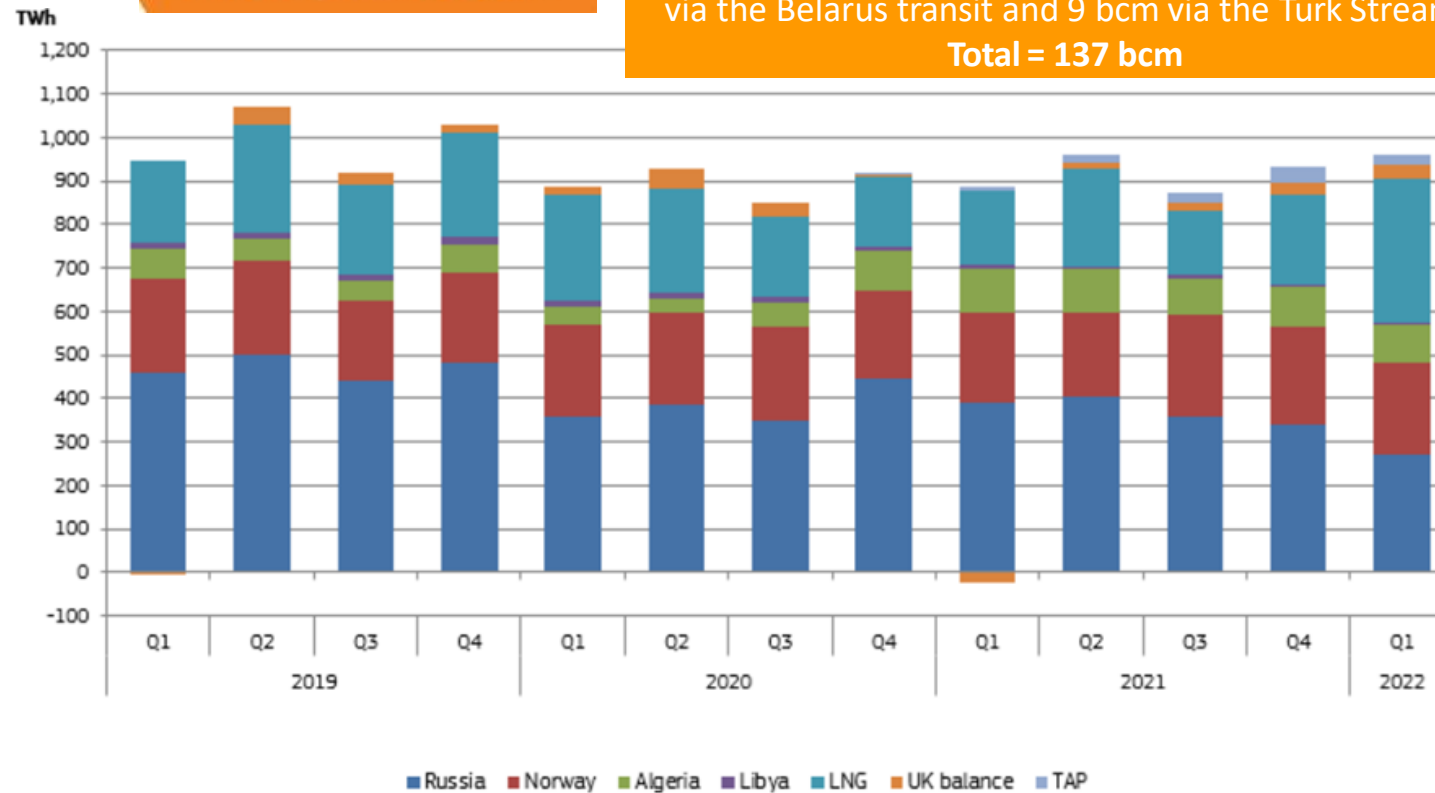
# EU Imports of Natural Gas by Source

## EU-27 Gas Data (2021)

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

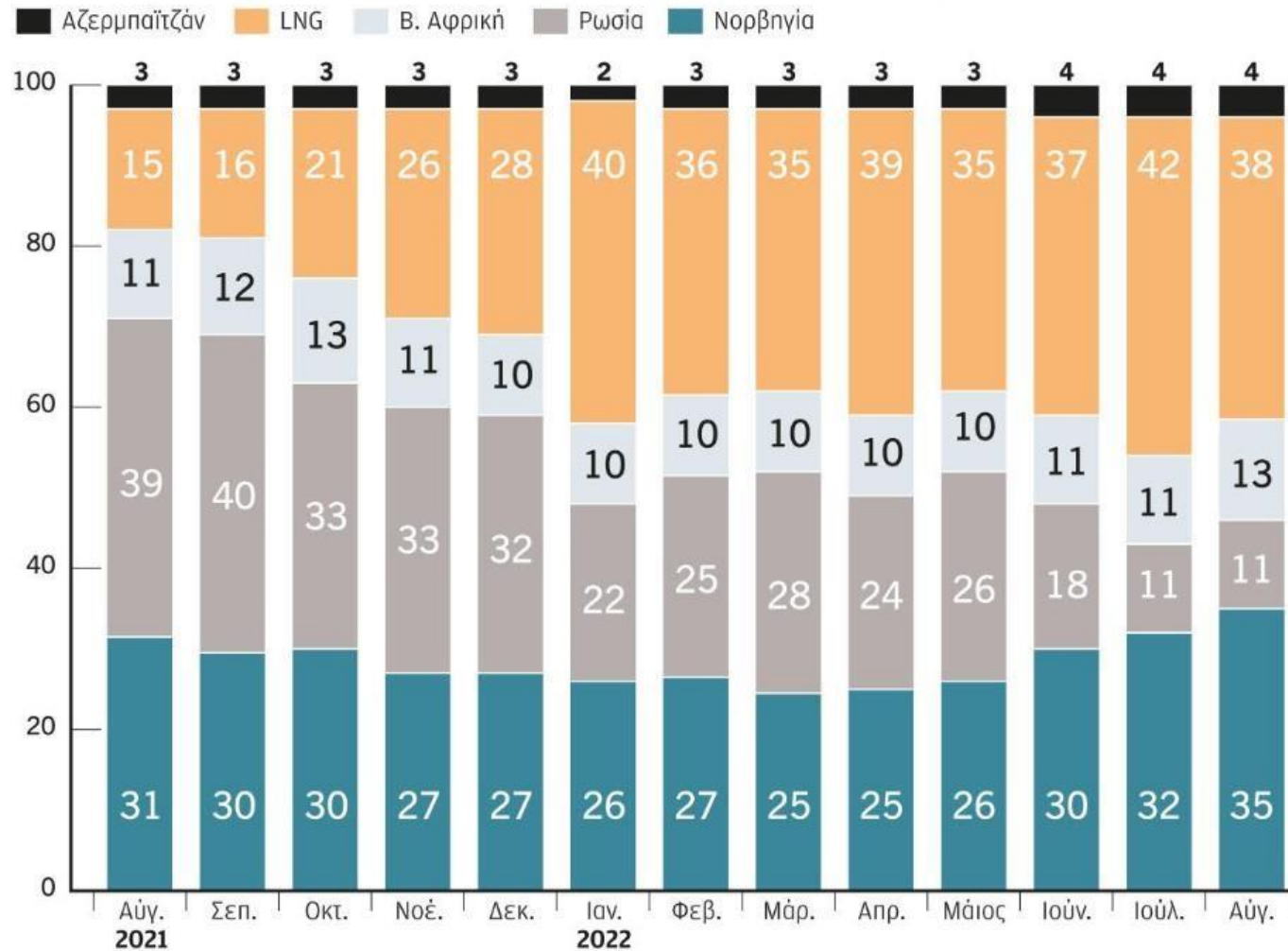
In 2021, the EU imported 58 bcm of Russian gas via Nord Stream, 37 bcm via the Ukrainian route, 33 bcm via the Belarus transit and 9 bcm via the Turk Stream.

**Total = 137 bcm**



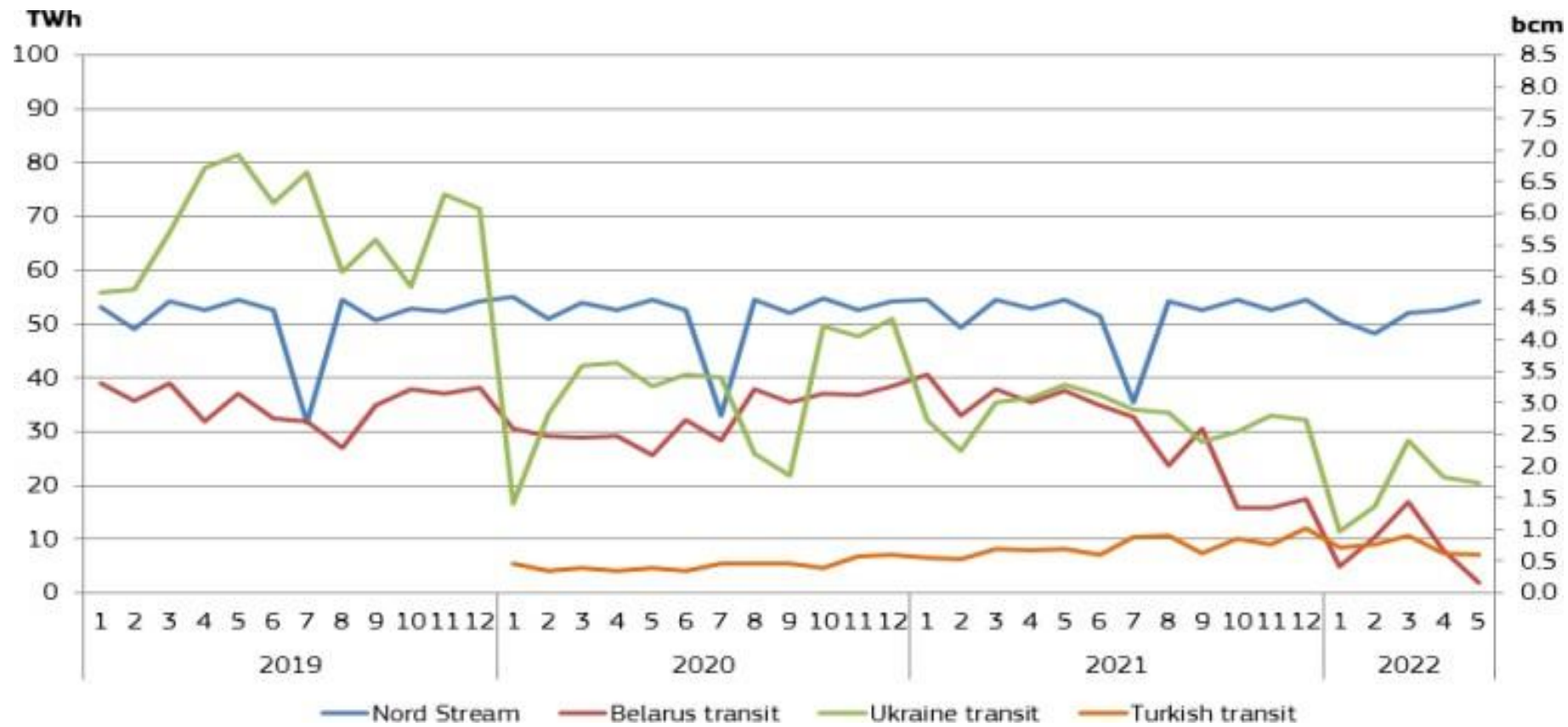
Source: European Commission

# Share of European Gas Imports (%)



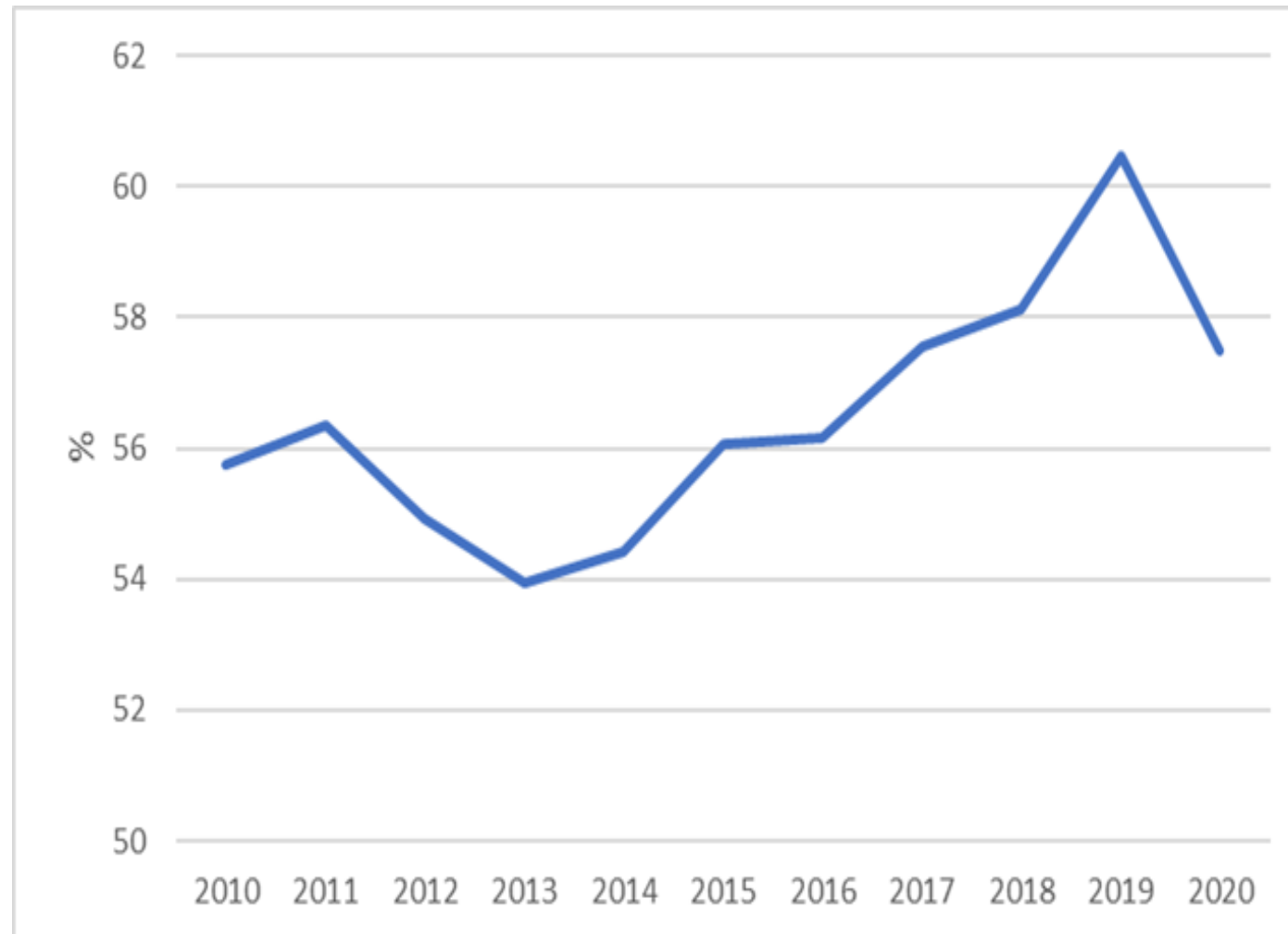
Source: European Commission

# Monthly EU Imports of Natural Gas From Russia By Supply Route



Source: European Commission

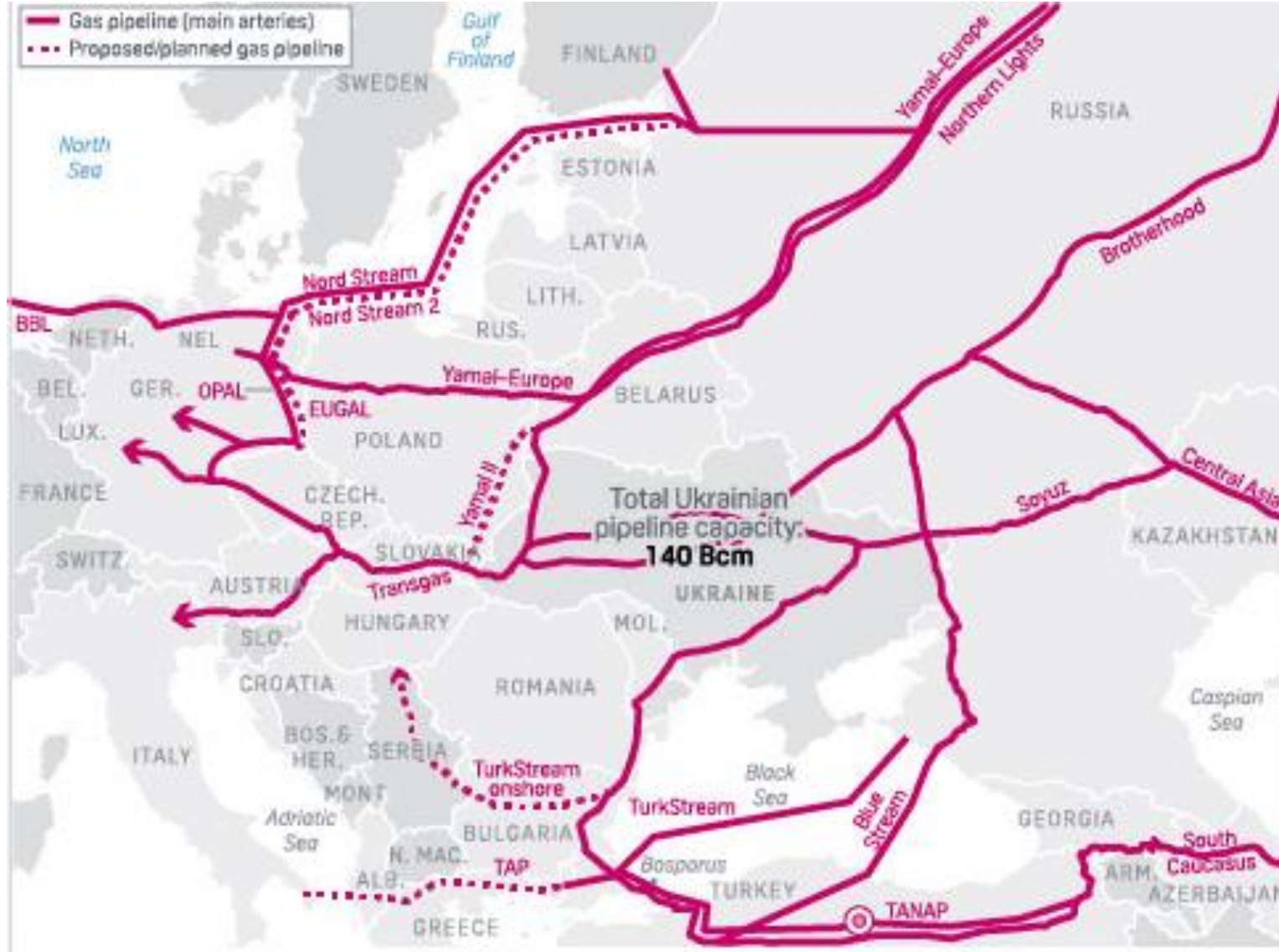
# Evolution of the EU Energy Dependence (%) over 2010-2020



Sources: Eurostat, IENE



# Europe's Gas Pipeline Ties to Russia



Source: S&P Global Platts

- ❑ With such high energy dependence, it makes sense for Europe to develop its own hydrocarbon resources.
- ❑ With gas being an indispensable fuel of the energy mix and an accepted part of the energy transition, it makes sense for Europe to develop ASAP its indigenous hydrocarbon resources as well as coal, nuclear and RES.
- ❑ By developing its indigenous gas resources, Europe will not only lessen its energy dependence but will also reap important economic benefits. There is a complete lack of clearly defined guidelines and a positive outlook for the development of the continent's enormous gas resource base.
- ❑ Europe has huge potential utilizing its indigenous oil and gas resources to be found in the North Sea, in the Adriatic, in the Black Sea, in the Ionian and in the East Mediterranean.
  - ❑ Some 10-12 tcm of proven and contingent reserves with conservative estimates that could cover 40-50 years of the European consumption<sup>1,9</sup>

INSTITUTE OF ENERGY FOR SE EUROPE

## South East Europe Energy Outlook 2021/2022



- ❑ The «**SEE Energy Outlook 2021/2022**» is a comprehensive study which deals with the current energy situation in the SE European region but also covers the “Outlook” from now until 2040.
- ❑ The study covers all 15 countries in the region: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Greece, Hungary, Israel, Kosovo, Montenegro, North Macedonia, Romania, Serbia, Slovenia, Turkey.
- ❑ The present “Outlook” provides energy information on a number of peripheral countries including Egypt, Syria, Lebanon, Moldova, Ukraine, Slovakia, Austria, Azerbaijan and Italy which are economically and geographically related SE European core countries.
- ❑ This is the third time that such a major study has been undertaken by IENE with the first one published in 2011. The study contains substantial comparative data, detailed sectorial analysis, and energy demand and production estimates and projections.
- ❑ Through a series of introductory chapters, where the economic and political background together with the key energy policy issues of South East Europe are presented, the study examines the impact of the regional integration process and energy competition issues on SE Europe’s energy prospects. EU’s decarbonization policy and the Green Deal are also discussed at length in relation to needed investment but also in terms of energy security.
- ❑ The study comprises the following parts: energy policy, energy security, country energy surveys, legal framework, regional economic issues, sectorial analysis, energy demand and supply projections for 2040 (oil and gas, electricity, renewables, energy efficiency), energy technologies and energy investment outlook.
- ❑ The energy sector analysis focuses on the region’s main energy drivers such as petroleum (upstream, midstream, downstream), natural gas, power generation, renewables, energy efficiency, co-generation, and environmental protection.

# 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

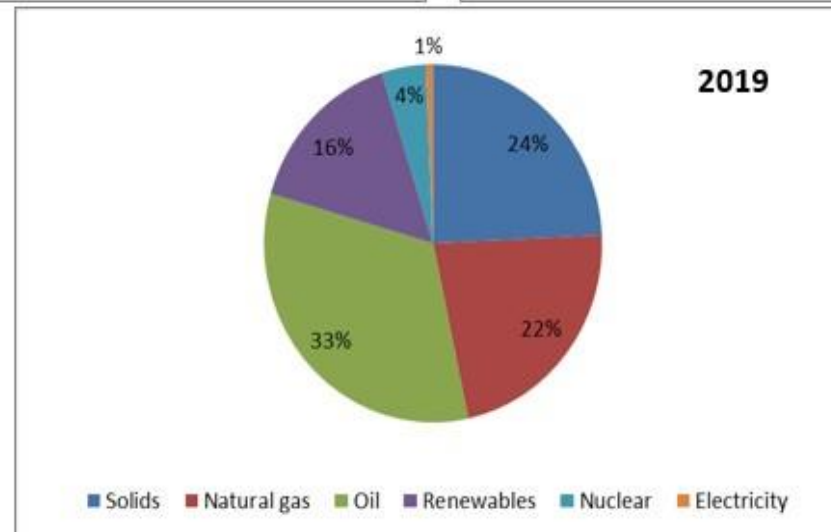
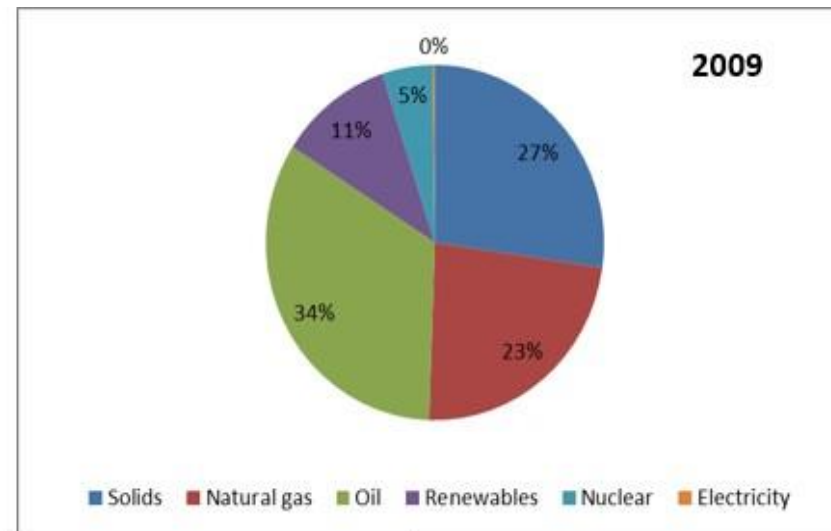
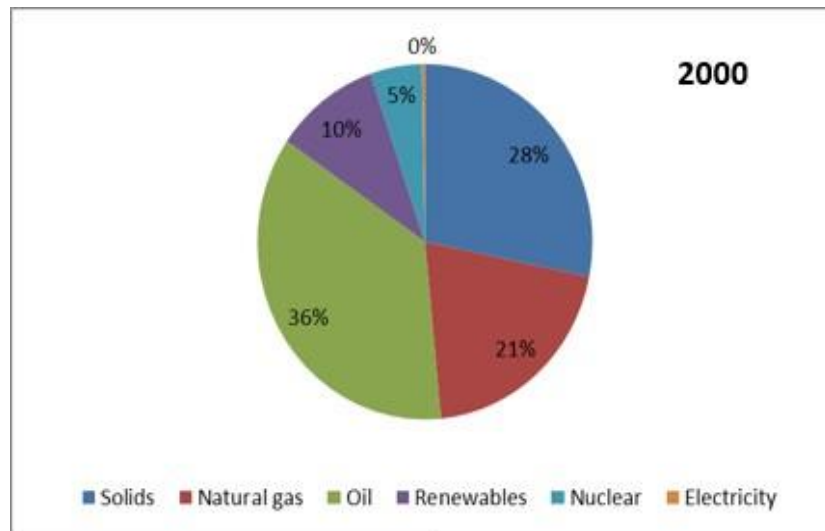
## Peripheral countries

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

# Contents of SEEOO 2021/2022 Study



# SE Europe's Energy Mix, including Turkey, 2000, 2009 and 2019

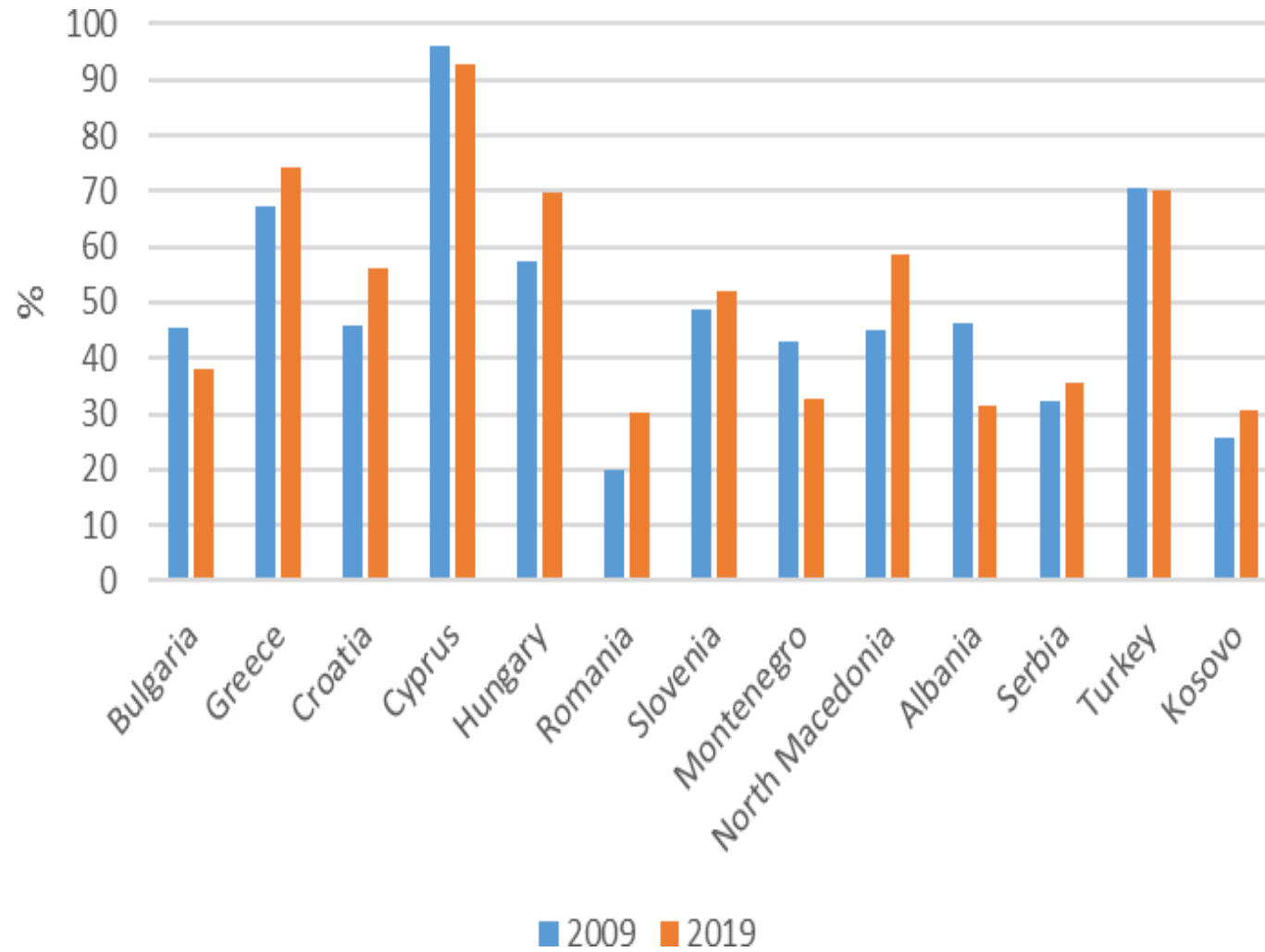


Source: Eurostat

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

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

# Energy Dependence in SE Europe (2009 and 2019)



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



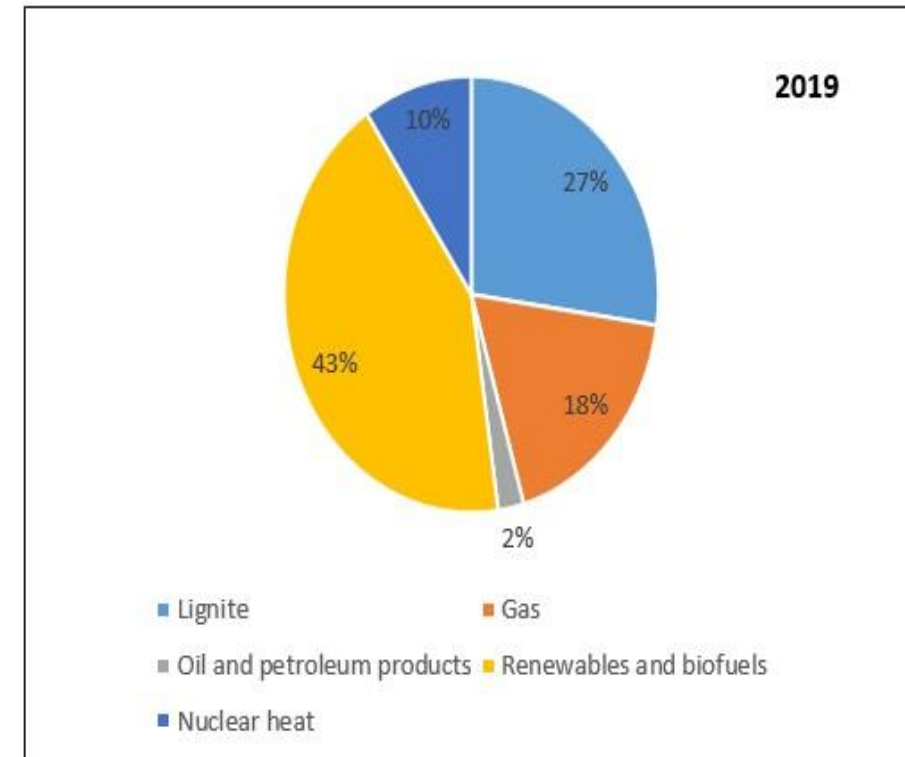
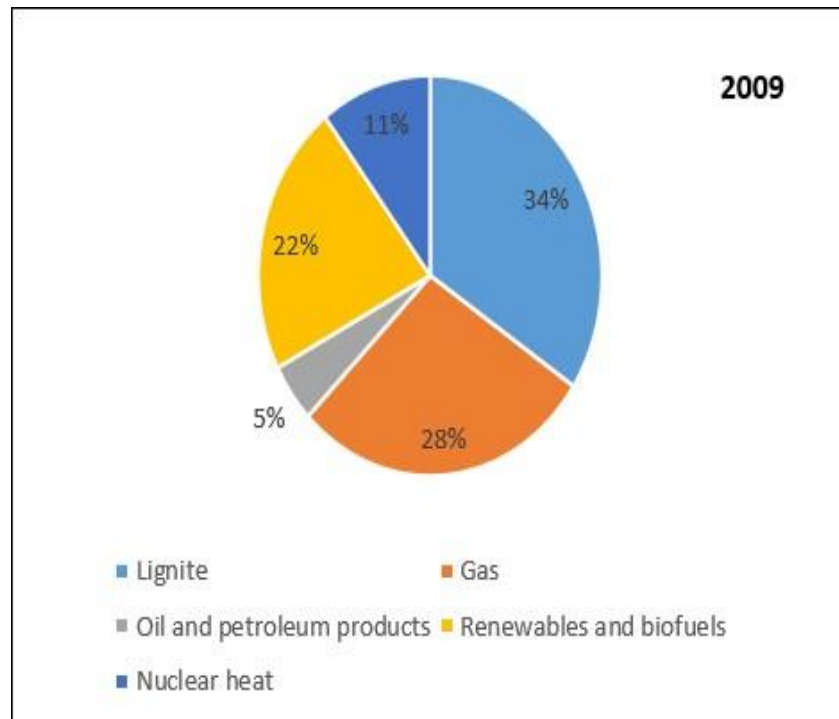
## Challenges and Trends Towards SE Europe's Decarbonisation:

- 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.

- 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.

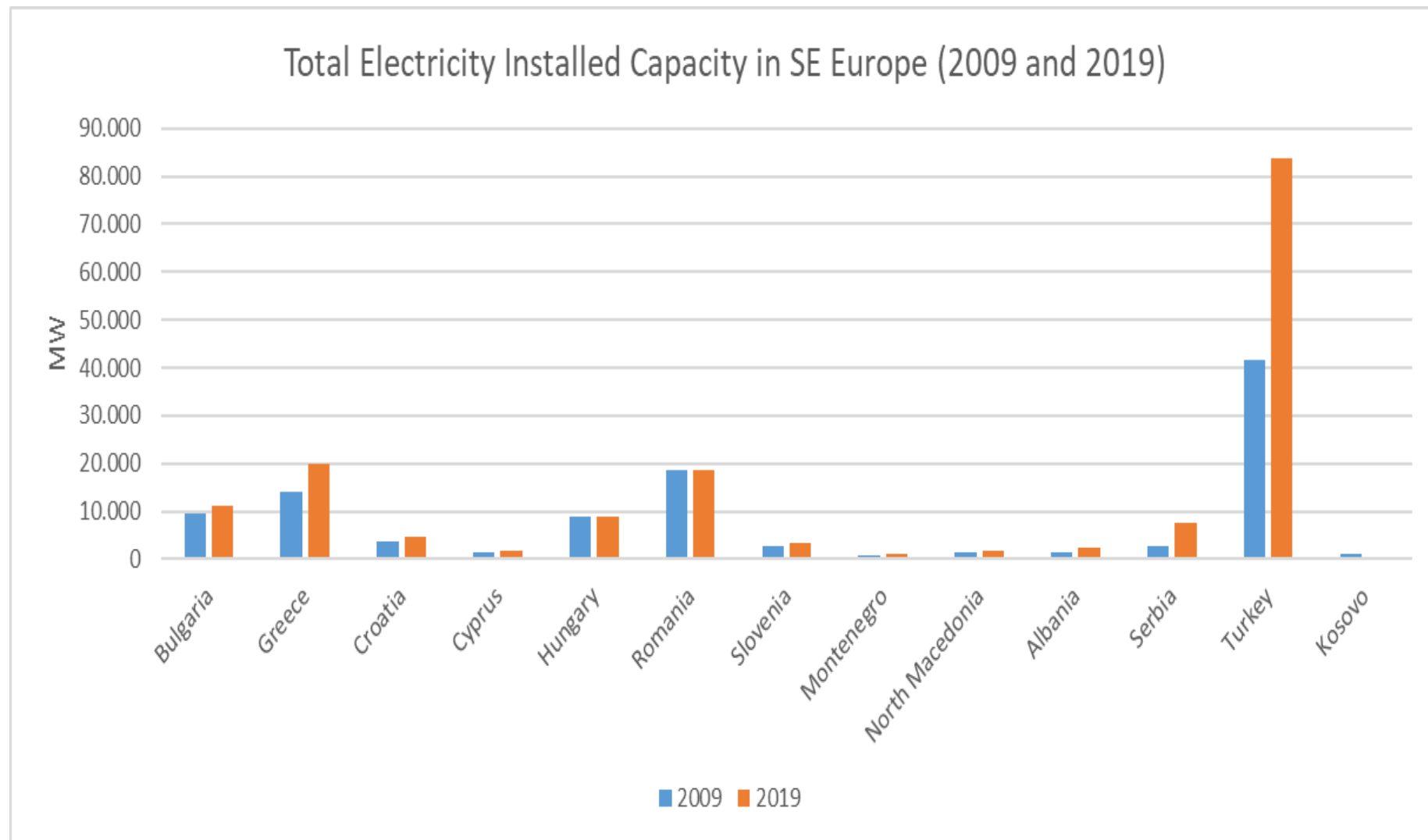
- ❑ Marked divergence between EU and SEE energy strategies
- ❑ SEE is more energy security vulnerable than the rest of Europe
- ❑ SEE's high hydrocarbon dependence
- ❑ Electricity's newcomer gas alters supply balance
- ❑ Lack of adequate electricity and gas interconnections
- ❑ Coal/lignite is and will 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

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



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

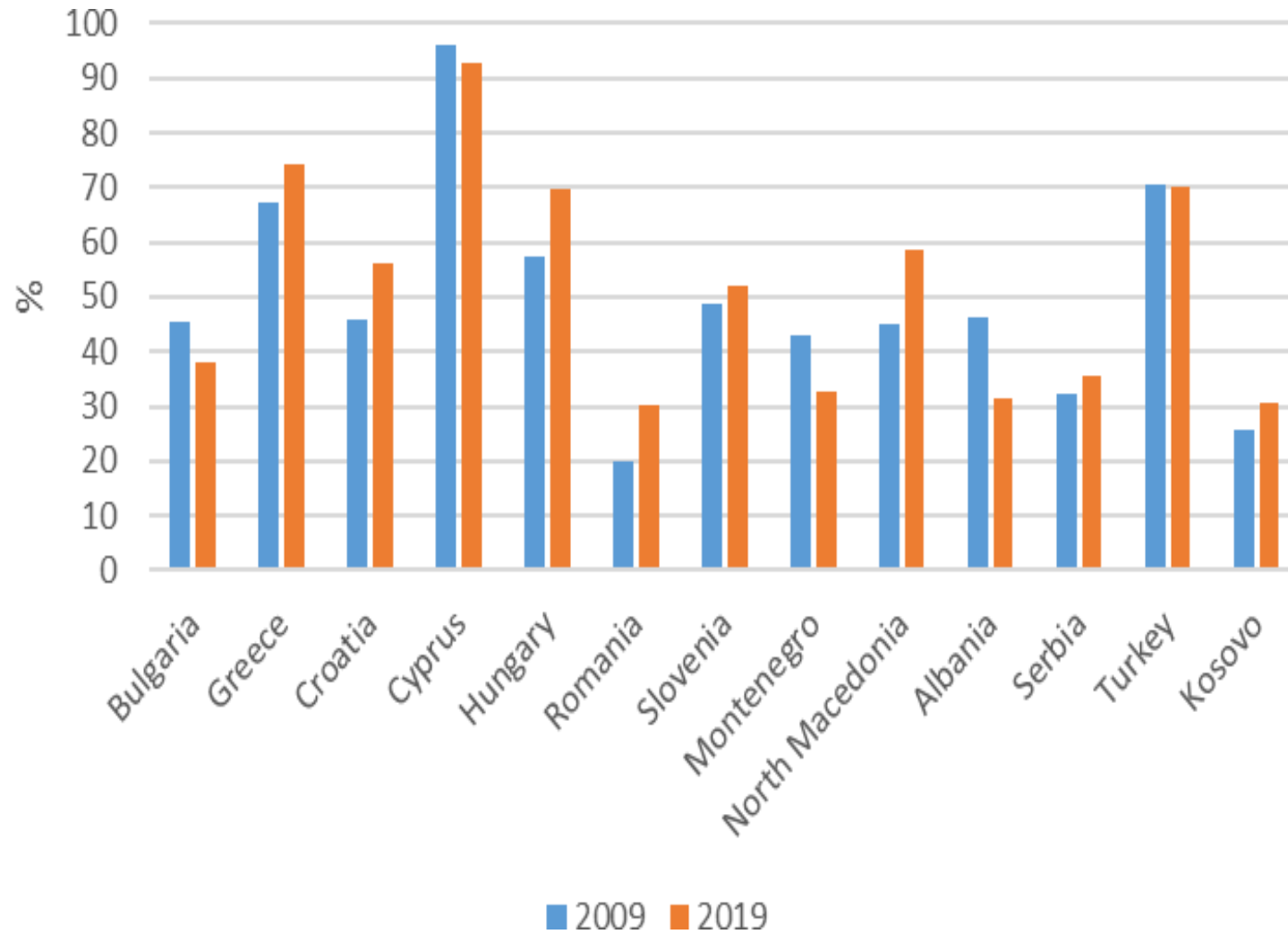
# Total Electricity Installed Capacity (MW) in SEE (2009 and 2019)



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

- **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.

# Energy Dependence in SE Europe (2009 and 2019)



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

- 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).



- 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.

- ▣ 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 and Turk Stream have been completed, while BRUA and IGB are still under construction. The IAP, the IGI Poseidon in connection with East Med pipeline and 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)

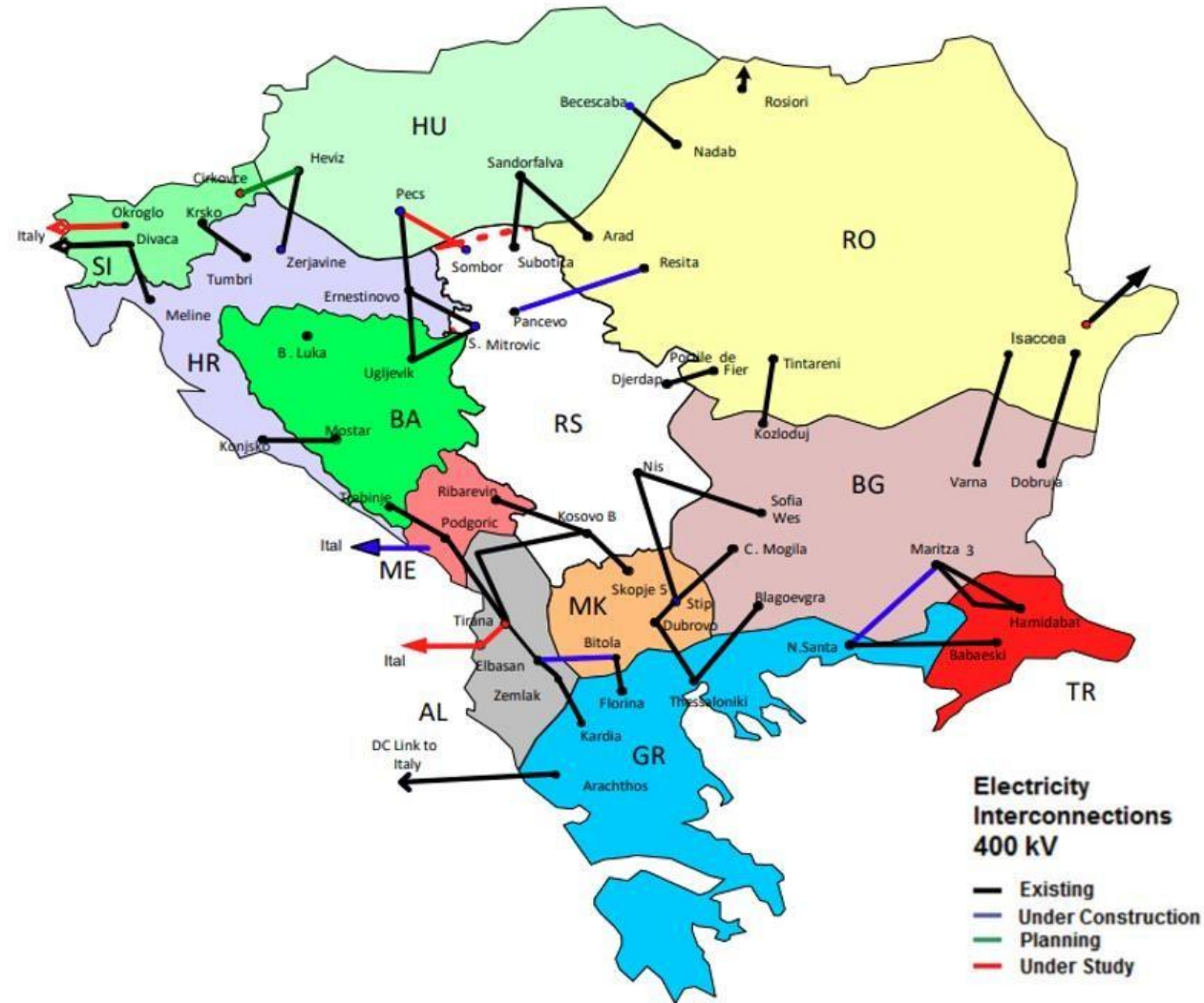
# LNG Terminals in SE Europe



Source: IENE

- 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



# EuroAsia Interconnector





# 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.



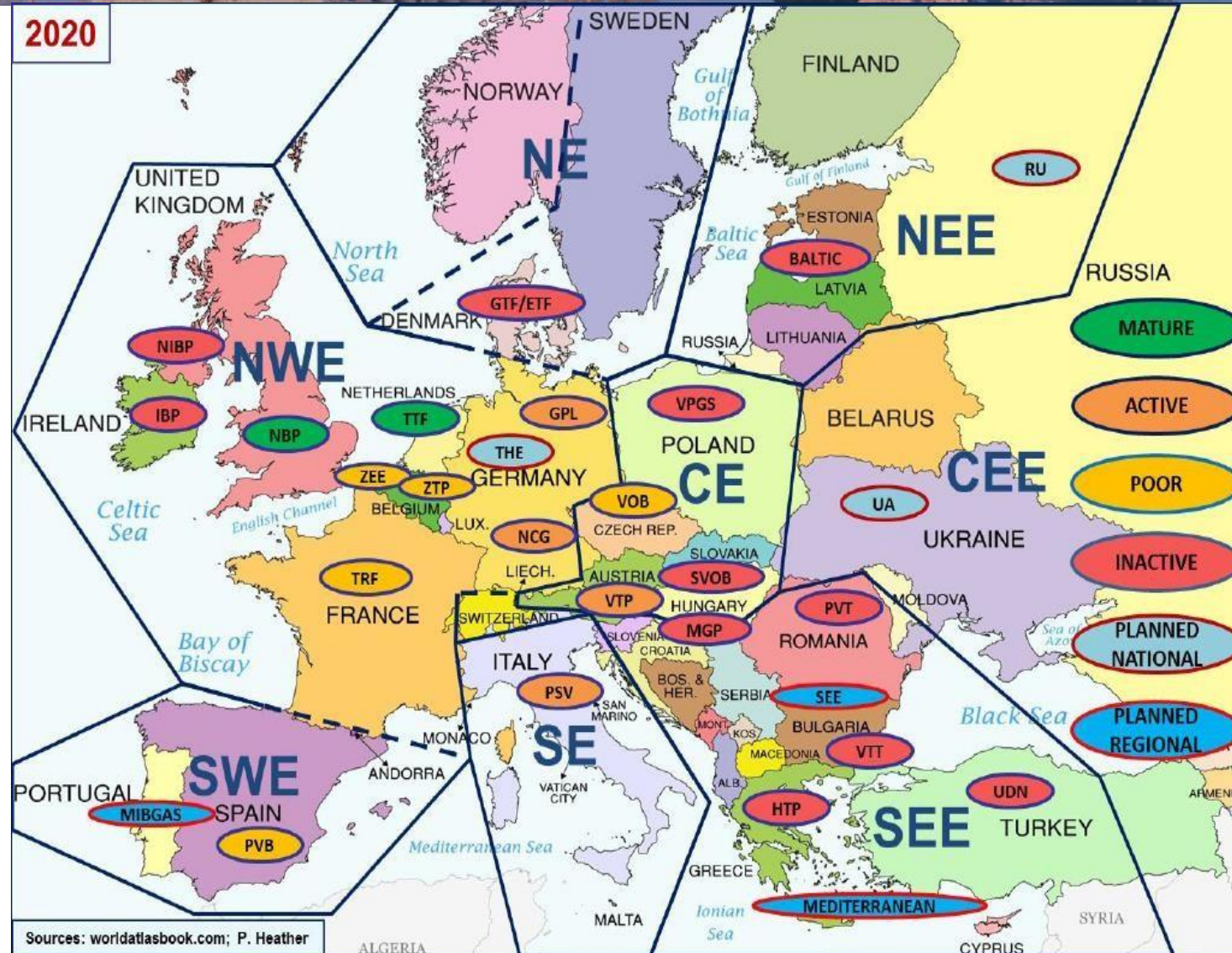
- ❑ In SE Europe, the electricity market liberalization has faced **several difficulties and numerous non-technical obstacles** in the past as the incumbent companies in almost all countries solidly resisted any change on the grounds of losing control of the market and hence weakening of their bureaucratic 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.

- 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.**



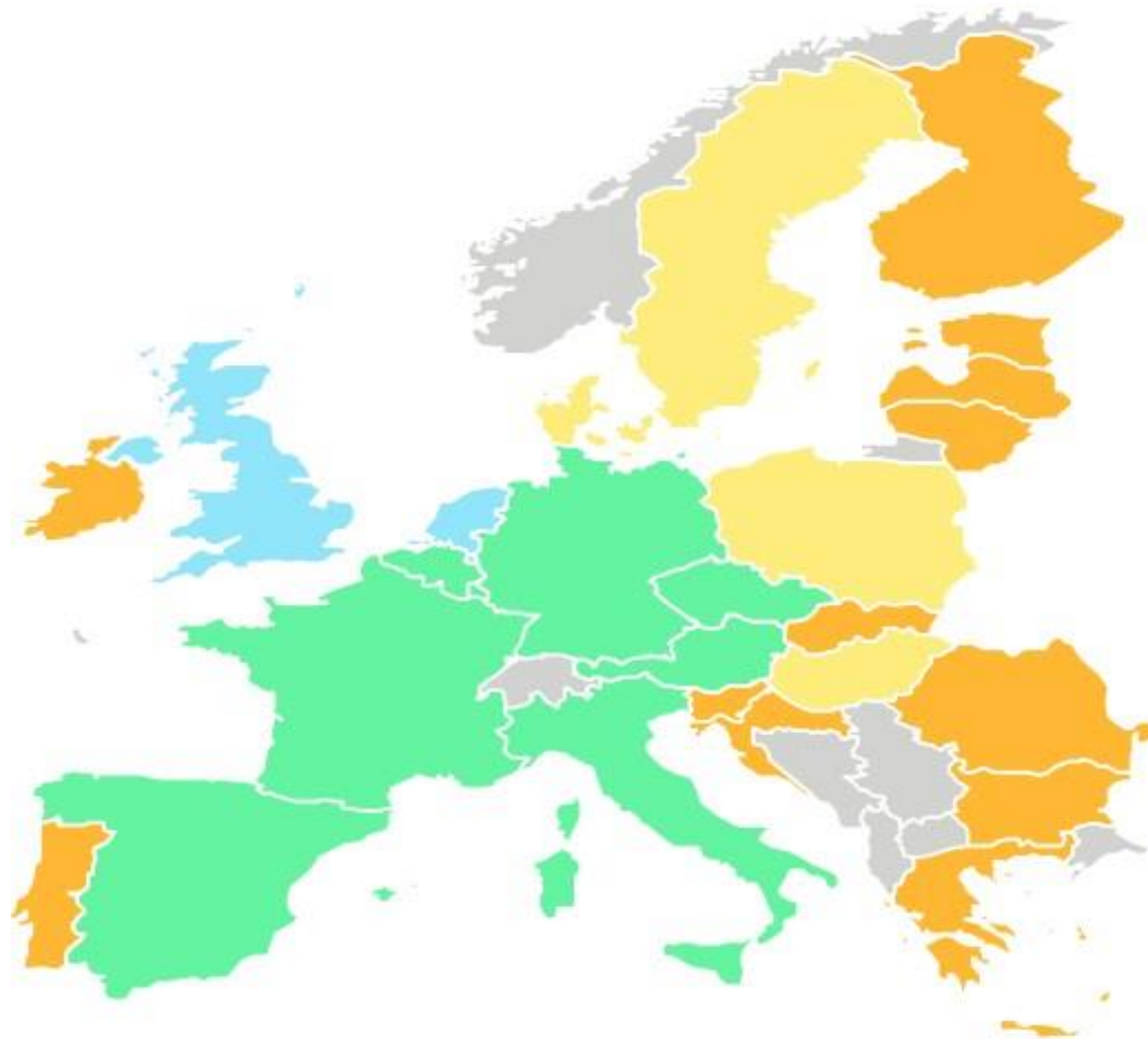
- ❑ The establishment of regional natural gas hubs is expected to **facilitate the wholesale trading of natural gas between participants** in SE Europe.
- ❑ They will allow **gas supply and demand to meet in a marketplace** by providing a platform for physical and/or financial transaction.
- ❑ They will **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

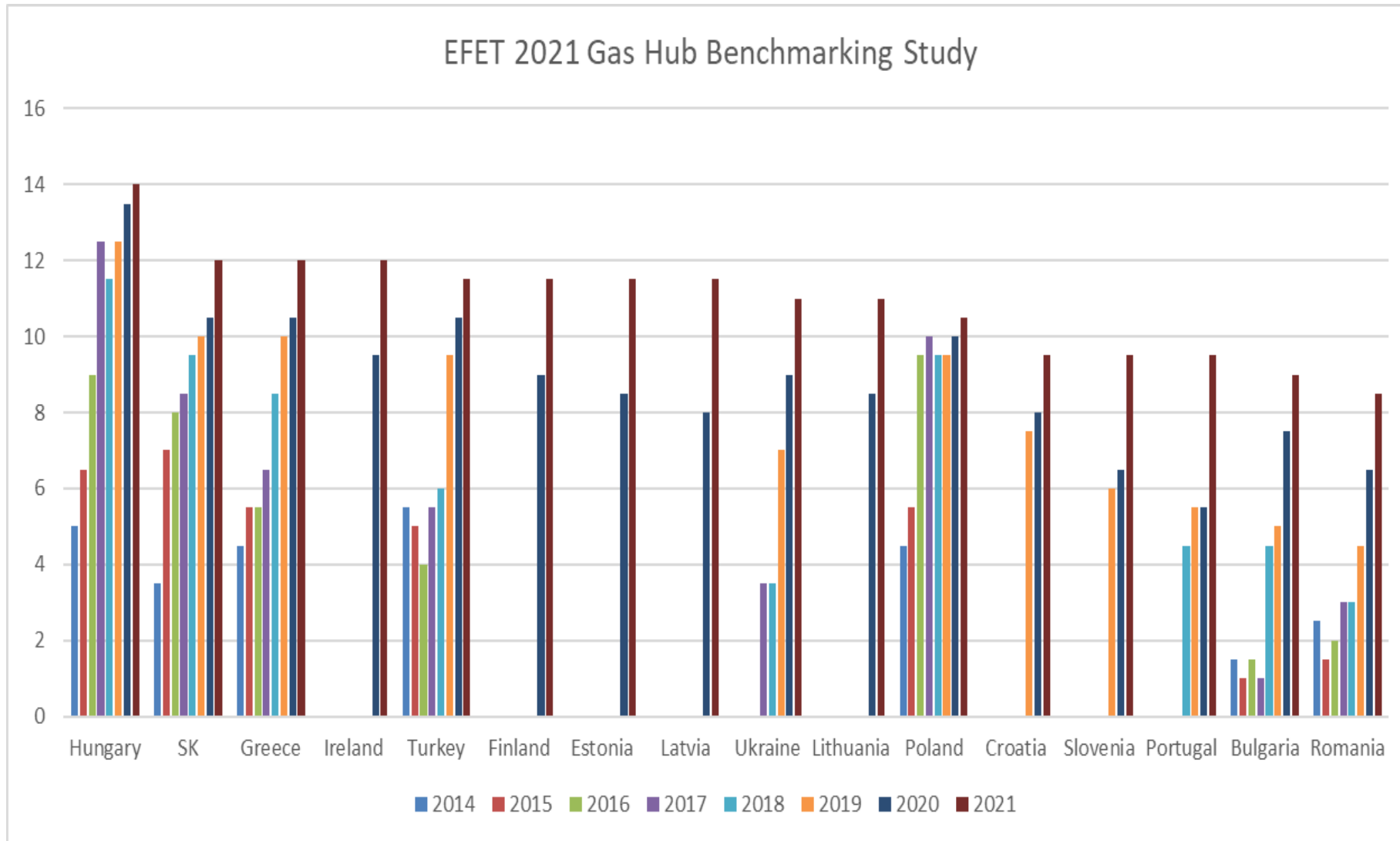
- High liquidity
- More reliant comparatively on spot products
- Progress on supply hedging role but relatively lower liquidity levels of longer-term products

## 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

## Illiquid-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



- All states in the Region have transposed the EU legislation on Energy Efficiency, EE, (EED – Green Deal, etc.)
- The Outlook analyses the NEEAP and NECP of each SE European M-S, as EU requested each Member State, M-S, to set their own indicative national EE target, to prepare and publish a three-year National EE Action Plan, NEEAP, as well as to prepare an annual progress report.
- The Outlook presents the incentives/plans for the promotion of EE and EE Programmes funded by EU & IFIs.



## SEE EU M-S National Energy Efficiency targets for 2020 and EU-28

EU MEMBER STATE	PRIMARY/FINAL ENERGY CONSUMPTION IN 2020 [MTOE]	
	PEC	FEC
Bulgaria	16.9	8.6
Croatia	10.7	7.0
Cyprus	2.2	1.9
Greece	24.7	18.4
Hungary	26.6	18.2
Romania	43.0	30.3
Slovenia	7.1	5.1
Sum of indicative targets SEE EU M-S	<b>131.2</b>	<b>89.5</b>
Sum of indicative targets EU-28	<b>1,543.1</b>	<b>1,095.8</b>

Country	In compliance with EED	Targets by 2030
Bulgaria	√	PEC 17.46 Mtoe - FEC 10.32 Mtoe
Croatia	√	PEC 8.3 Mtoe - FEC 6.89 Mtoe
Cyprus	√	PEC 2.4 Mtoe - FEC 2.00 Mtoe
Greece	√	PEC up to 21.0 Mtoe - FEC 16.5 Mtoe ambitious twice revised
Hungary	√	FEC up to 18.75 Mtoe (2005), meaning steady annual saving 0.17 Mtoe or 0.8% annual saving
Romania	√	PEC: BAU=58.7 Mtoe to 32.3 Mtoe (-45.1%) FEC: BAU=43.2 Mtoe to 25.7 Mtoe (-40.4%)
Slovenia	√	Up to PEC 6.35 Mtoe and FEC : 4.72 Mtoe
Israel	√	PEC: BAU = 8.25 Mtoe to 6.88 Mtoe (-16.7%)
<b>Turkey</b>	√	-23.9 Mtoe of PEC
Albania - B & H- Montenegro - N. Macedonia - Serbia		NECPs expected in late 2021

# Incentives for Promoting Energy Efficiency



Country	Actions
Bulgaria	DESIREE Programme grant 10.9 m€ for gasification 10,000 households Important role of European Structural Fund, ESF
Croatia	EE of Family Houses (2014-20) 26.7m€ - Renovation of Public/Apartment buildings 211 m€ + 25 m€ loan from IFIs
Cyprus	ESF: 8.7 m€ for SME- 18.4 m€ for households- 20 m€ for Public buildings- 1.17 m€ for pilot HECHP (hospitals, etc)
Greece	Envisaged National EE Fund (lending & guarantee fund) +role of ESCOs- Important role of EE in households of EXOIKONOMO -3 <sup>rd</sup> phase (500+ m€)
Hungary	EU- Operational Programmes/ESF for EE actions in households/SMEs
Slovenia	EE in households via subsidies/soft loans (100% for weak households) - ESF
Israel	145m\$ for qualified EE projects via tender
Serbia	Funds for EE in all sectors by EU- JICA - UNDP
<b>Turkey</b>	Actions for EE through incentives - Loans from IFIs (WB, etc.)
Albania - B & H - Kosovo- Montenegro - N. Macedonia	Critical the role of IFIs (EU/WB/UNDP/etc) and International Funds

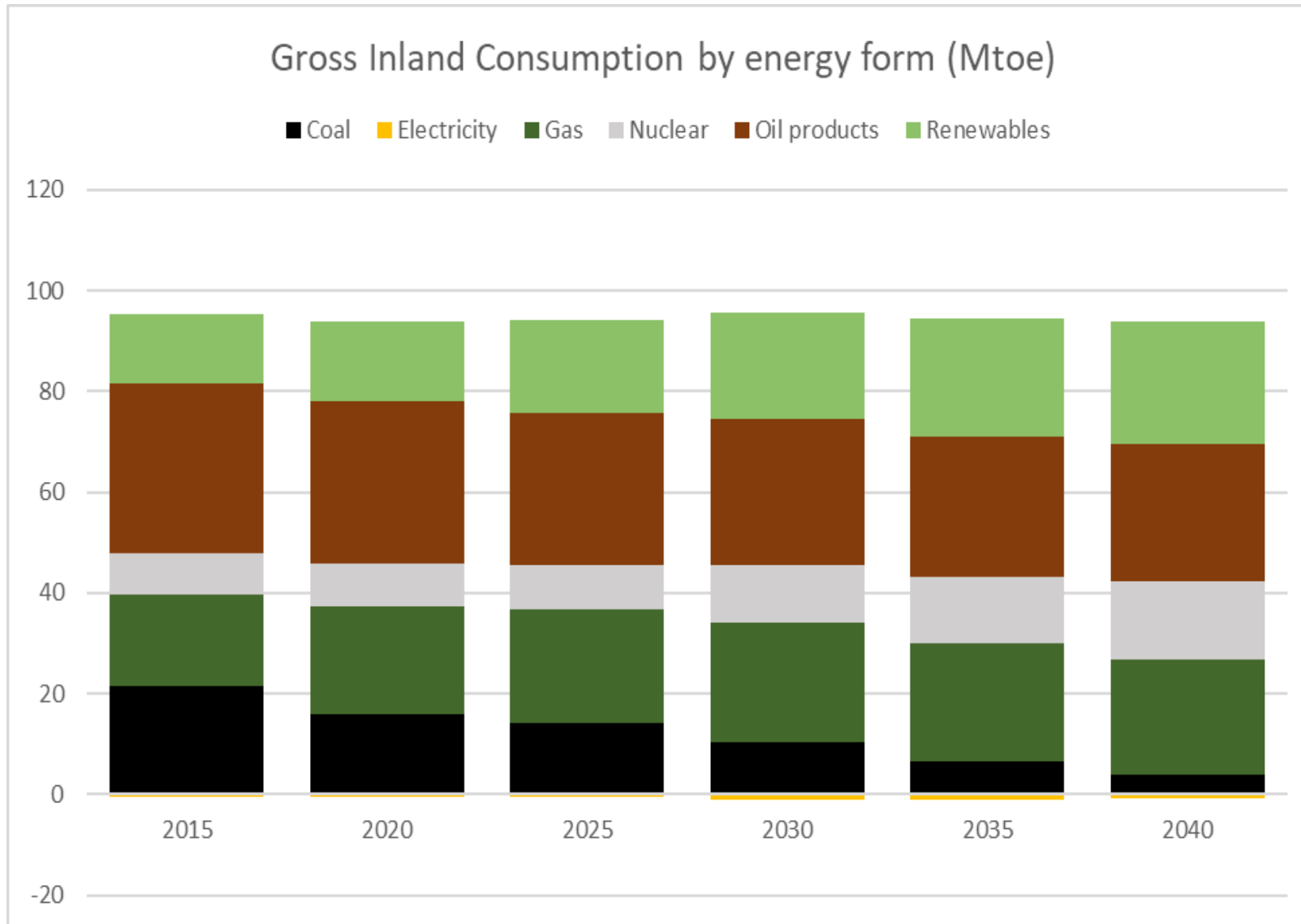
- ❑ EE in building sector (especially public buildings) is acting as a “locomotive train” pushing forward other sectors as transportation and SMEs/Industry.
- ❑ Summing up the situation of energy efficiency in SEE states, it is evident that there is an **ongoing plethora of national efforts and programmes** in support of the EU long-term target to become the first “climate-neutral” continent, by 2050.
- ❑ However, as Eurostat announced in early 2020, the EU energy consumption is rising despite the efforts to reduce it across Europe.
- ❑ The EU-27 gross domestic product grew rapidly, between 2014 to 2017, from €11,782billion to €13,964billion, indicating that economic activity has not yet decoupled from energy consumption.

- The COVID-19 pandemic, which severely hit the European Union from 2020 onwards, is likely to result in a decrease in energy consumption in 2020, as a result of the wide spread lockdowns and slowdown of the economic activities.
- However, it is expected that economic recovery will lead to a rebound in energy consumption, or at least bring it up to its previous levels.
- Accordingly, the proposed NECPs by all EU M-S in the region and the ones to be submitted shortly from the other states, are of great importance and they must be applied with reverence and great attention to detail, in order to achieve all of the proposed targets.

- 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.

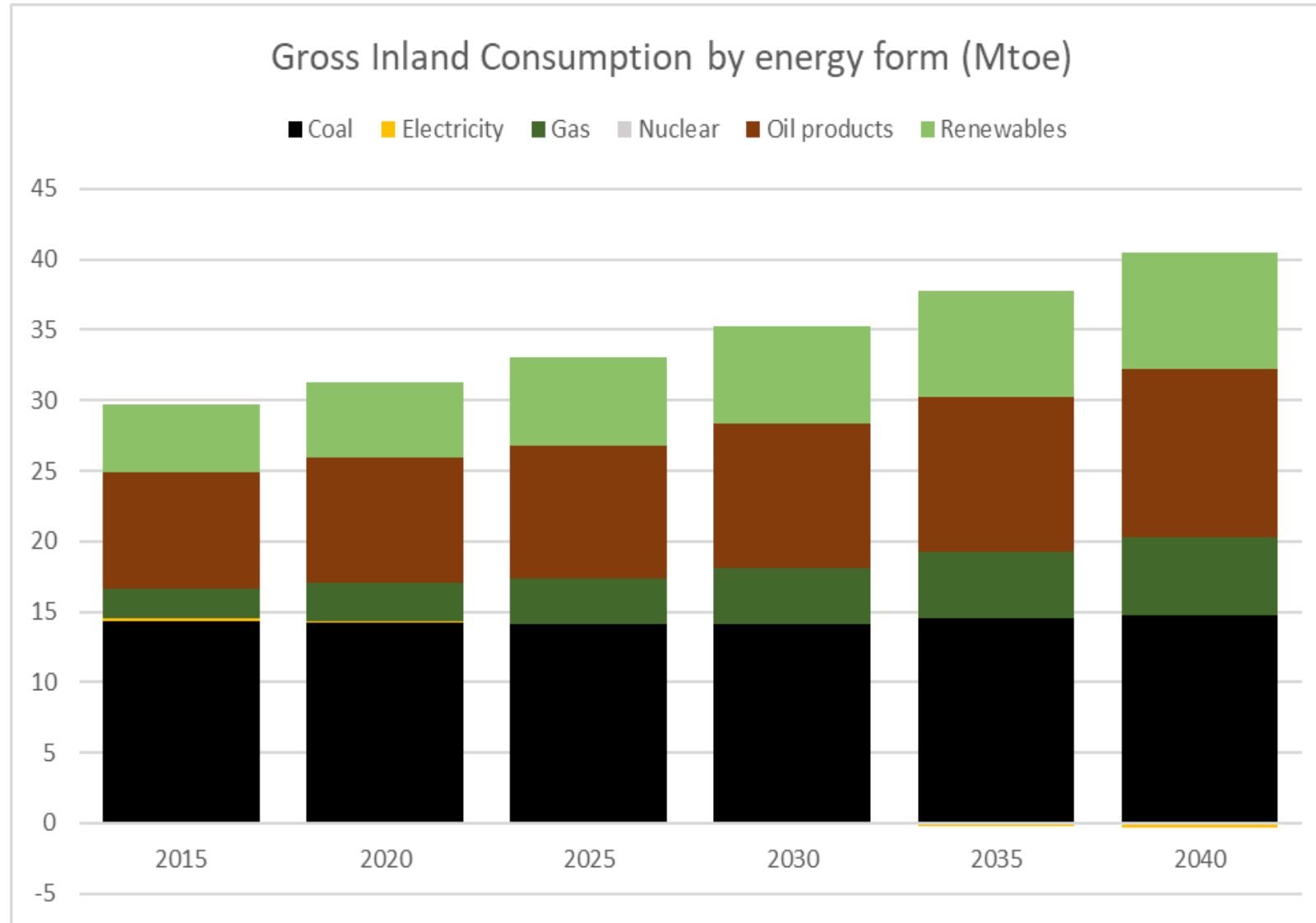
- Looking at the projection of the gross inland consumption in the **EU member states of the SEE region** (Bulgaria, Croatia, Cyprus, Greece, Romania, Slovenia), the overall tendency shows a stabilisation and even a small reduction in the time horizon to 2040.
  - The decrease of the use of coal is evident, 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.

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

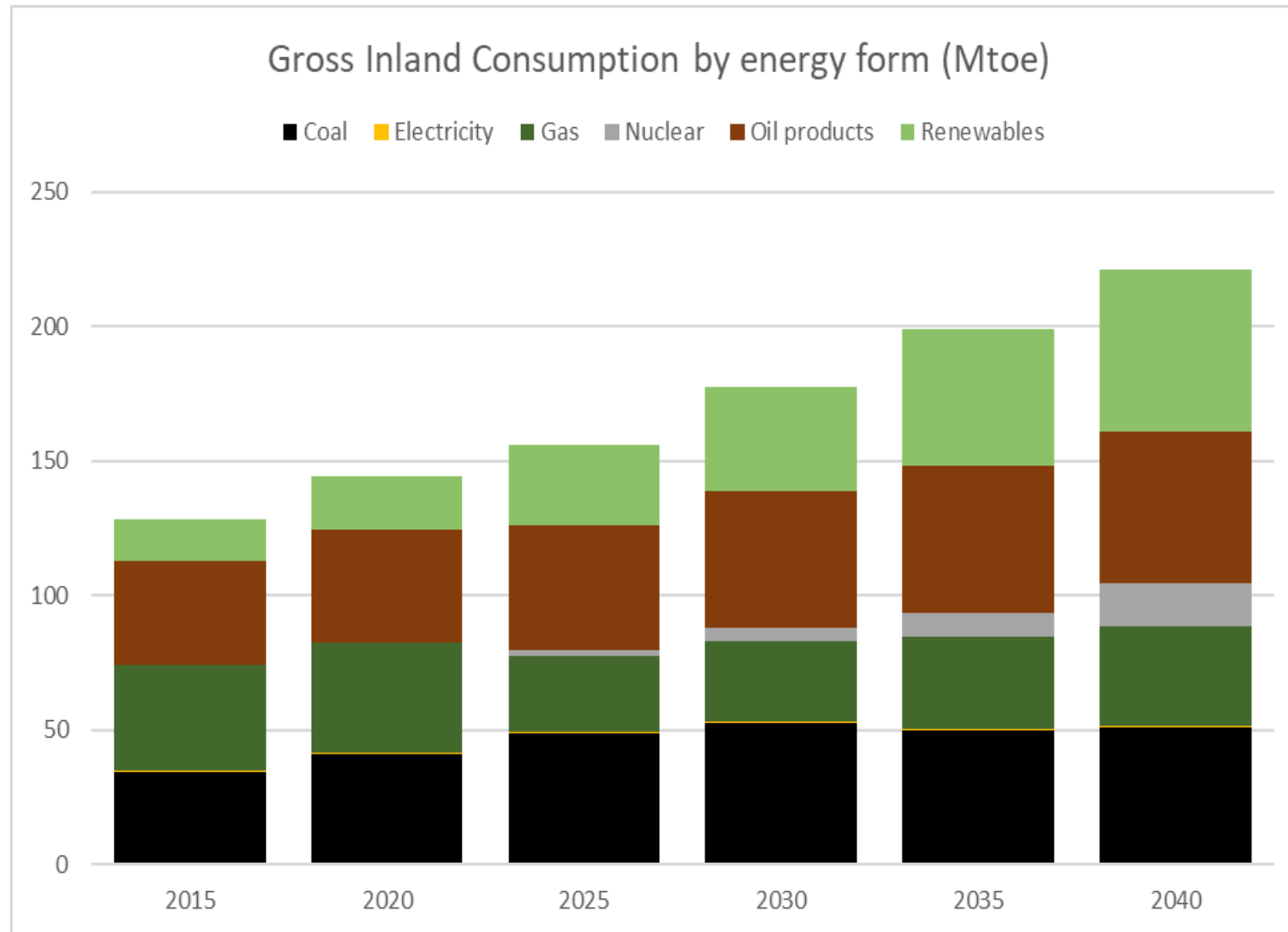




# Western Balkan Countries: Gross Inland Consumption (2015-2040)



# Turkey: Gross Inland Consumption (2015-2040)



- 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
<b>TOTAL</b>	<b>436,900</b>	<b>234,822</b>		

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)*
<b>OIL</b>	Upstream	<ul style="list-style-type: none"> <li>Field Exploration</li> <li>Development of new oil and gas wells</li> </ul>	63,000	38,790
	Downstream	<ul style="list-style-type: none"> <li>Refining (upgrading)</li> <li>Loading Terminals</li> <li>Storage facilities</li> <li>Crude / Product Pipeline(s)</li> </ul>		
<b>GAS</b>	Country Gas Network	<ul style="list-style-type: none"> <li>Grid development</li> <li>Main intra country pipeline(s)</li> <li>Storage facilities</li> <li>FSRU and LNG Terminals</li> </ul>	25,150	16,550
<b>ELECTRICITY</b>	Power Generation	<ul style="list-style-type: none"> <li>Lignite</li> <li>Coal</li> <li>Gas (including CHP)</li> <li>Nuclear</li> <li>Large Hydro</li> </ul>	150,150	139,550
	Electricity Grid	<ul style="list-style-type: none"> <li>New H/V transmission lines</li> <li>Upgrading and expansion of existing grid</li> </ul>		
	RES	<ul style="list-style-type: none"> <li>Small Hydro</li> <li>Wind farms</li> <li>Photovoltaics</li> <li>Concentrating Solar Power</li> <li>Biomass (including liquid biofuels)</li> <li>Geothermal</li> </ul>	109,900	40,009
<b>ENERGY EFFICIENCY</b>		<ul style="list-style-type: none"> <li>Buildings</li> <li>Industry</li> <li>Electric vehicles</li> </ul>	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
<b>Grand Total</b>			<b>468,643</b>	<b>272,872</b>

\*(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.

- 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

- ❑ **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

- ❑ **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.



- ❑ 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.**

