

“SE Europe Energy Outlook 2015-2016”

9th SE Europe Energy Dialogue

“The Quest for a New Energy Balance”

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Presentation Outline

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2. The SE Europe Area Defined
3. Study Scope & Focus
4. The Economies of SE Europe
5. SE Europe: Energy Mix (%) by source, with and without Turkey (2005 and 2015)
6. Main assumptions for Energy Demand and Supply Projections in SEE
7. Energy Demand and Consumption Trends over 2005-2050
8. Focus on three countries of the SEE region (Albania, Romania, Turkey)
9. Electricity and gas market liberalization in SE Europe
10. Electricity Market Structure
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13. Gas interconnections in SE Europe
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1. Raison d' Etre

- (a) IENE's need to understand the geopolitical and geographical sphere within which it operates, but also to define and evaluate in an objective manner the major policy challenges of the energy sector of the region.
- (b) To study and analyse the region's energy market structure and associated energy flows.
- (c) To identify the important investment and business opportunities across the SE Europe area and assess the region's energy related investment potential.



South East Europe Energy Outlook

2015
2016

INSTITUTE OF ENERGY FOR SE EUROPE

2. The SE Europe Area Defined

- ❑ **Core Countries:** Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, FYROM, Greece, Kosovo, Montenegro, Romania, Serbia, Slovenia, Turkey
- ❑ **Peripheral Countries:** Ukraine, Moldova, Hungary, Italy, Israel, Lebanon, Syria



3. Study Scope and Focus (I)

□ Study Scope

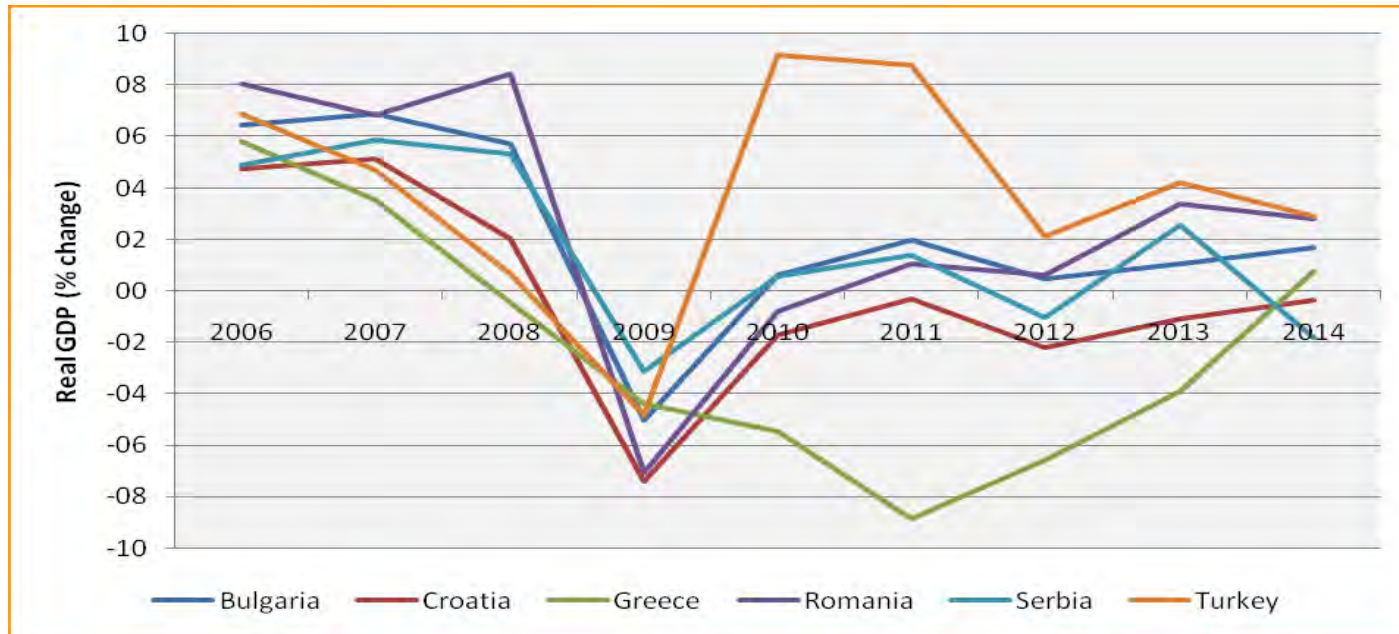
- a) To present a **critical assessment** of the current status of the energy market in SE Europe
- b) To bring together the latest available knowledge on energy developments in the region and also **provide comprehensive data** on energy demand/consumption, the major energy projects, pursued energy policies as well as trends, estimates and projections
- c) Taking into consideration the economic and political background of SE Europe **analyse 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) Investment outlook
- h) Energy and environmental policy challenges

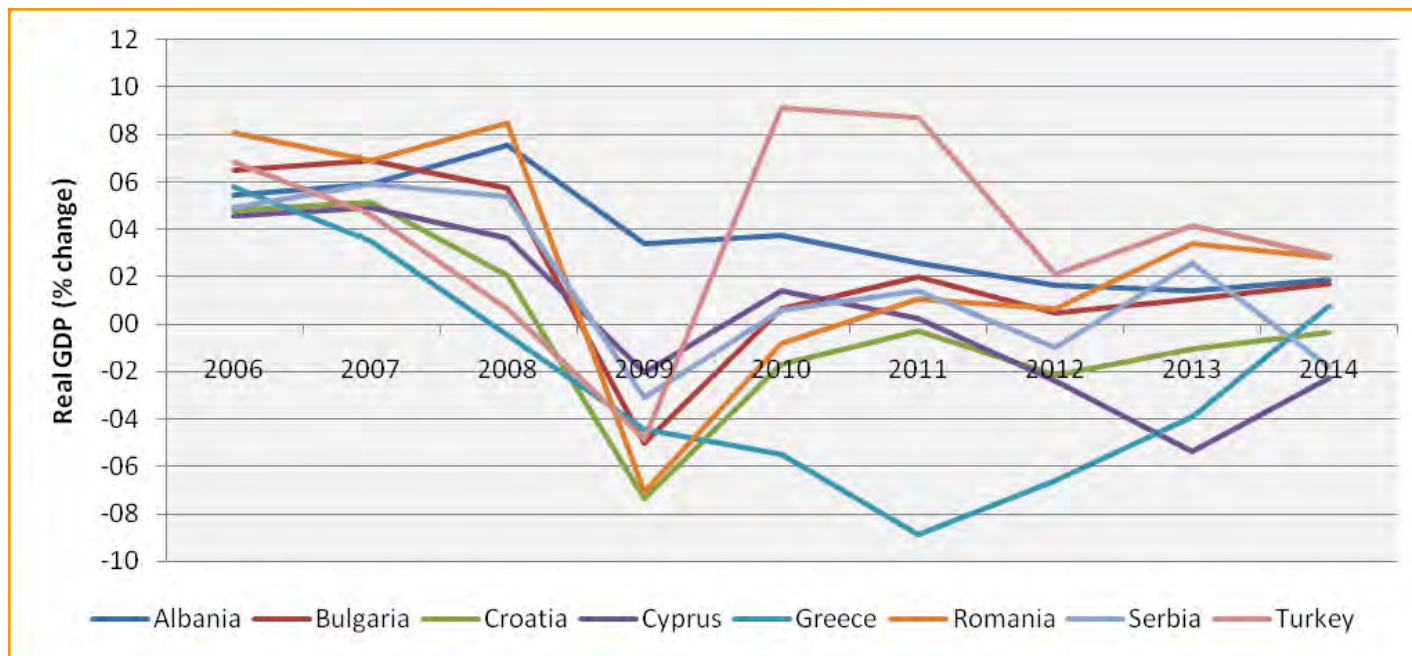
4. Economic Parameters (Real GDP % Change) – Scenario 1



	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bulgaria	6.5	6.9	5.8	-5.0	0.7	2.0	0.5	1.1	1.7
Croatia	4.8	5.2	2.1	-7.4	-1.7	-0.3	-2.2	-1.1	-0.4
Greece	5.8	3.5	-0.4	-4.4	-5.4	-8.9	-6.6	-3.9	0.8
Romania	8.1	6.9	8.5	-7.1	-0.8	1.1	0.6	3.4	2.8
Serbia	4.9	5.9	5.4	-3.1	0.6	1.4	-1.0	2.6	-1.8
Turkey	6.9	4.7	0.7	-4.8	9.2	8.8	2.1	4.2	2.9

Source: World Economic Outlook Database (International Monetary Fund, October 2015) and NBG calculations

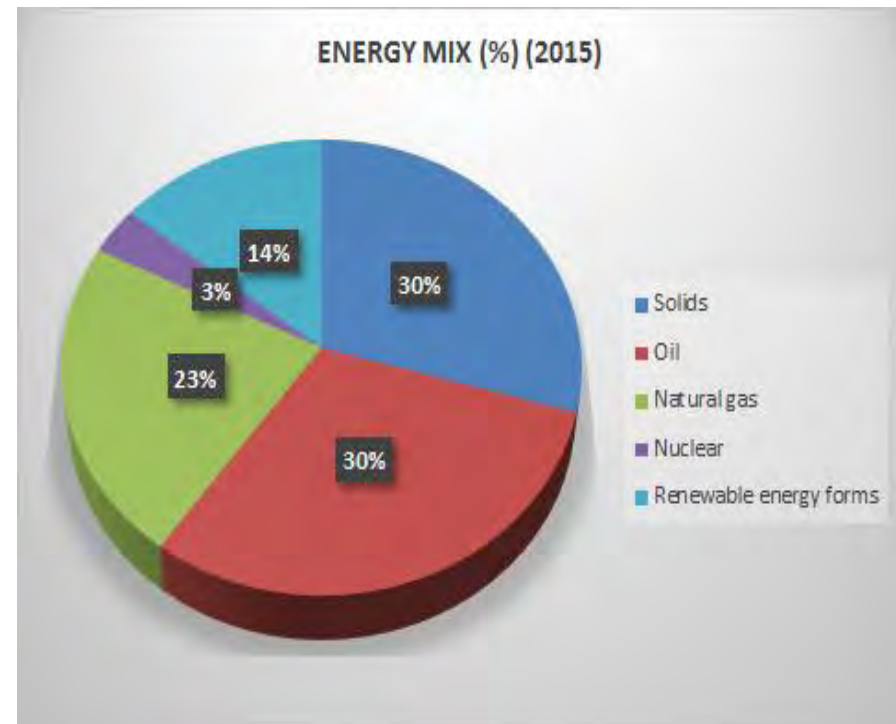
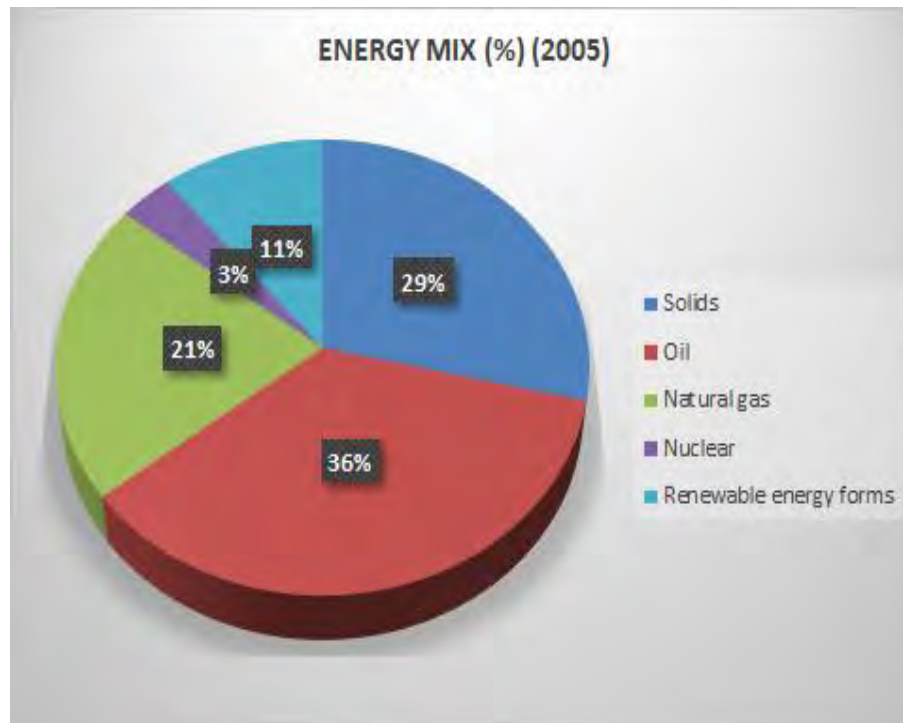
Economic Parameters (Real GDP % Change) – Scenario 2



	2006	2007	2008	2009	2010	2011	2012	2013	2014
Albania	5.4	5.9	7.5	3.4	3.7	2.5	1.6	1.4	1.9
Bulgaria	6.5	6.9	5.8	-5.0	0.7	2.0	0.5	1.1	1.7
Croatia	4.8	5.2	2.1	-7.4	-1.7	-0.3	-2.2	-1.1	-0.4
Cyprus	4.5	4.9	3.6	-2.0	1.4	0.3	-2.4	-5.4	-2.3
Greece	5.8	3.5	-0.4	-4.4	-5.4	-8.9	-6.6	-3.9	0.8
Romania	8.1	6.9	8.5	-7.1	-0.8	1.1	0.6	3.4	2.8
Serbia	4.9	5.9	5.4	-3.1	0.6	1.4	-1.0	2.6	-1.8
Turkey	6.9	4.7	0.7	-4.8	9.2	8.8	2.1	4.2	2.9

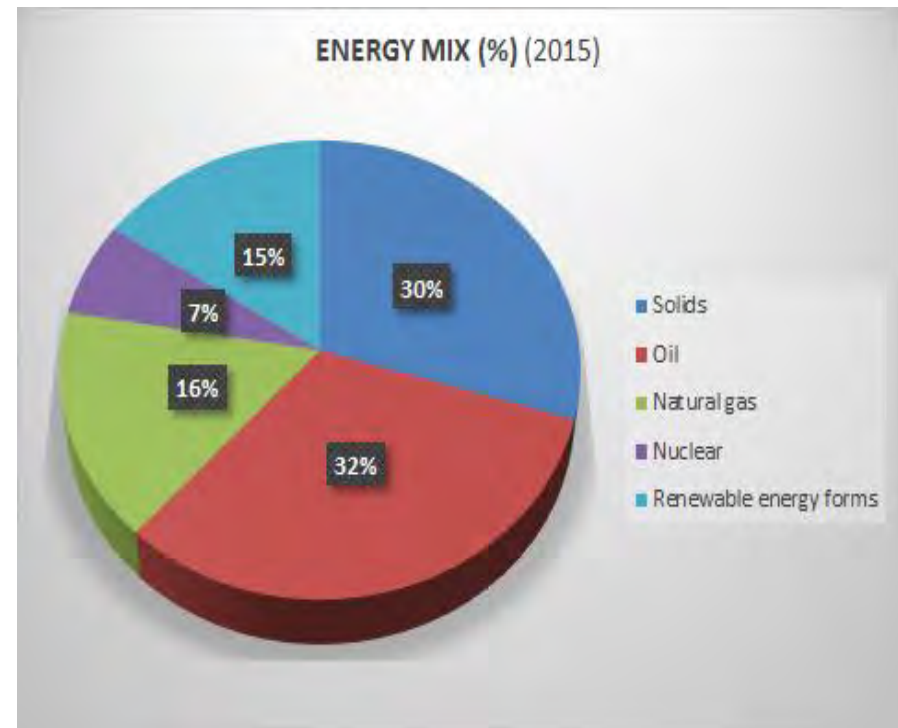
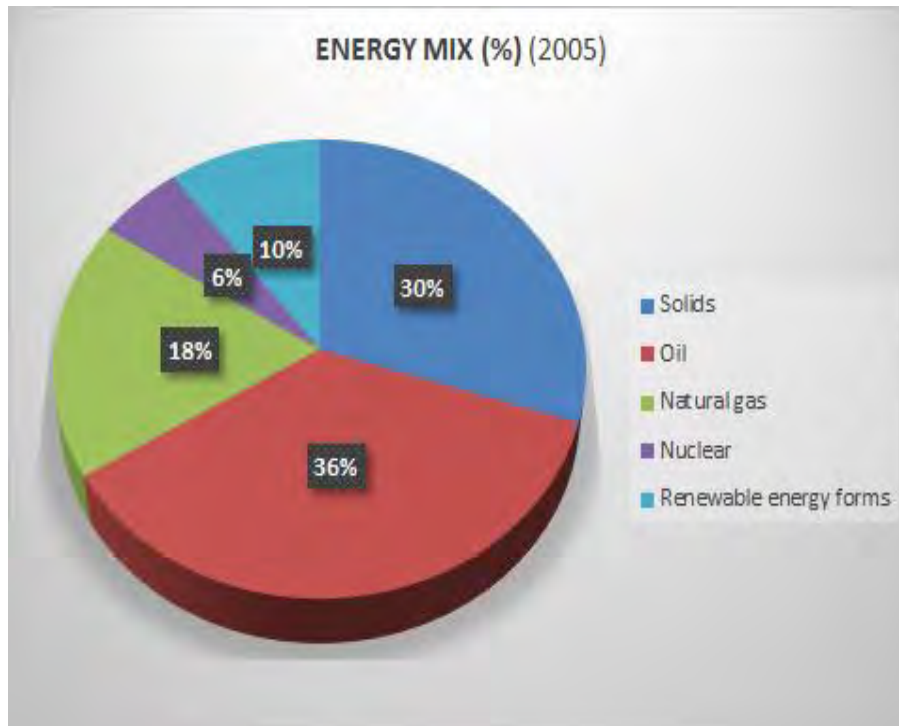
Source: World Economic Outlook Database (International Monetary Fund, October 2015) and NBG calculations

5. SE Europe: Energy Mix (%) by source, including Turkey (2005 and 2015)



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

SE Europe: Energy Mix (%) by source, without Turkey (2005 and 2015)

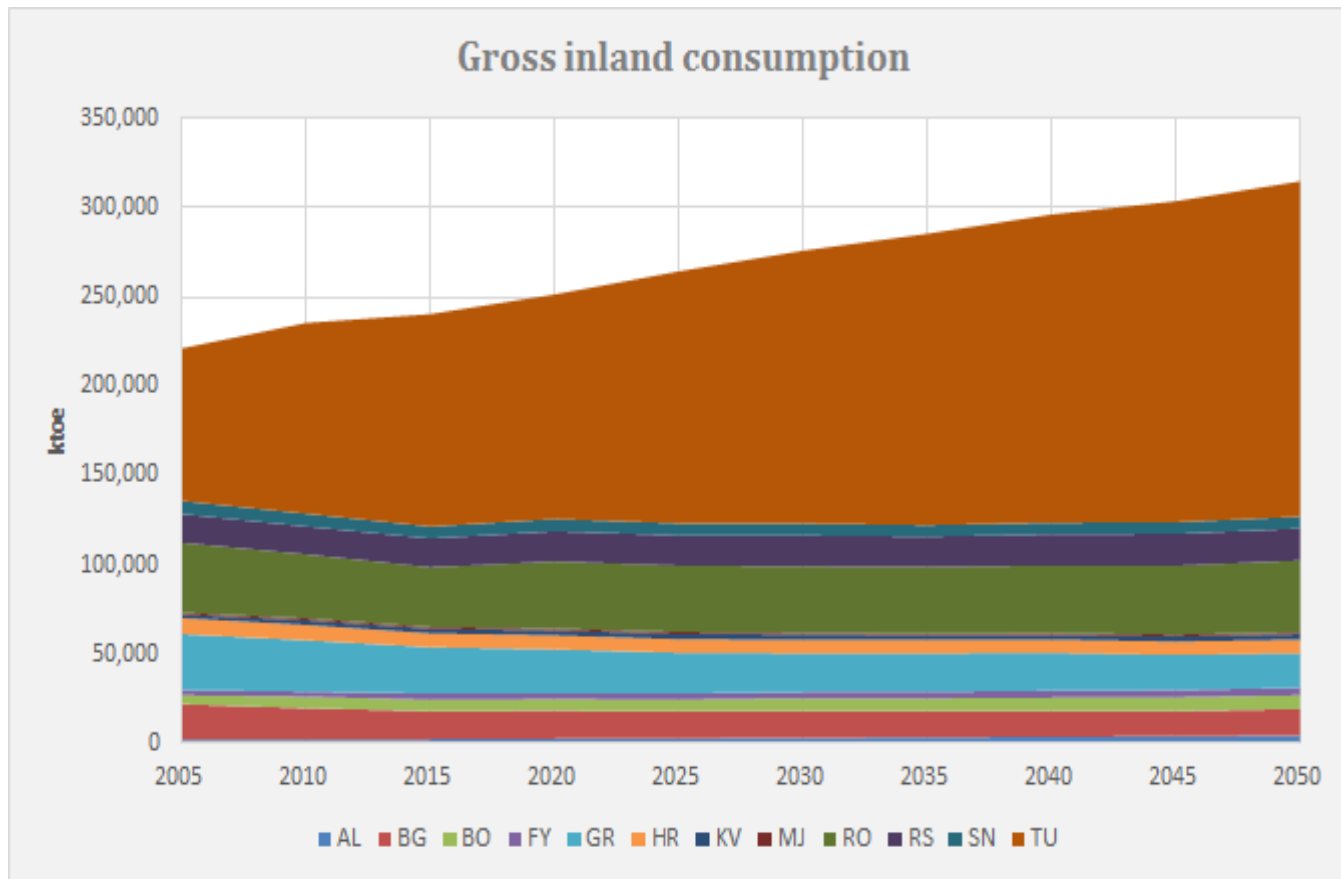


Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

6. Main assumptions for Energy Demand and Supply Projections in SEE

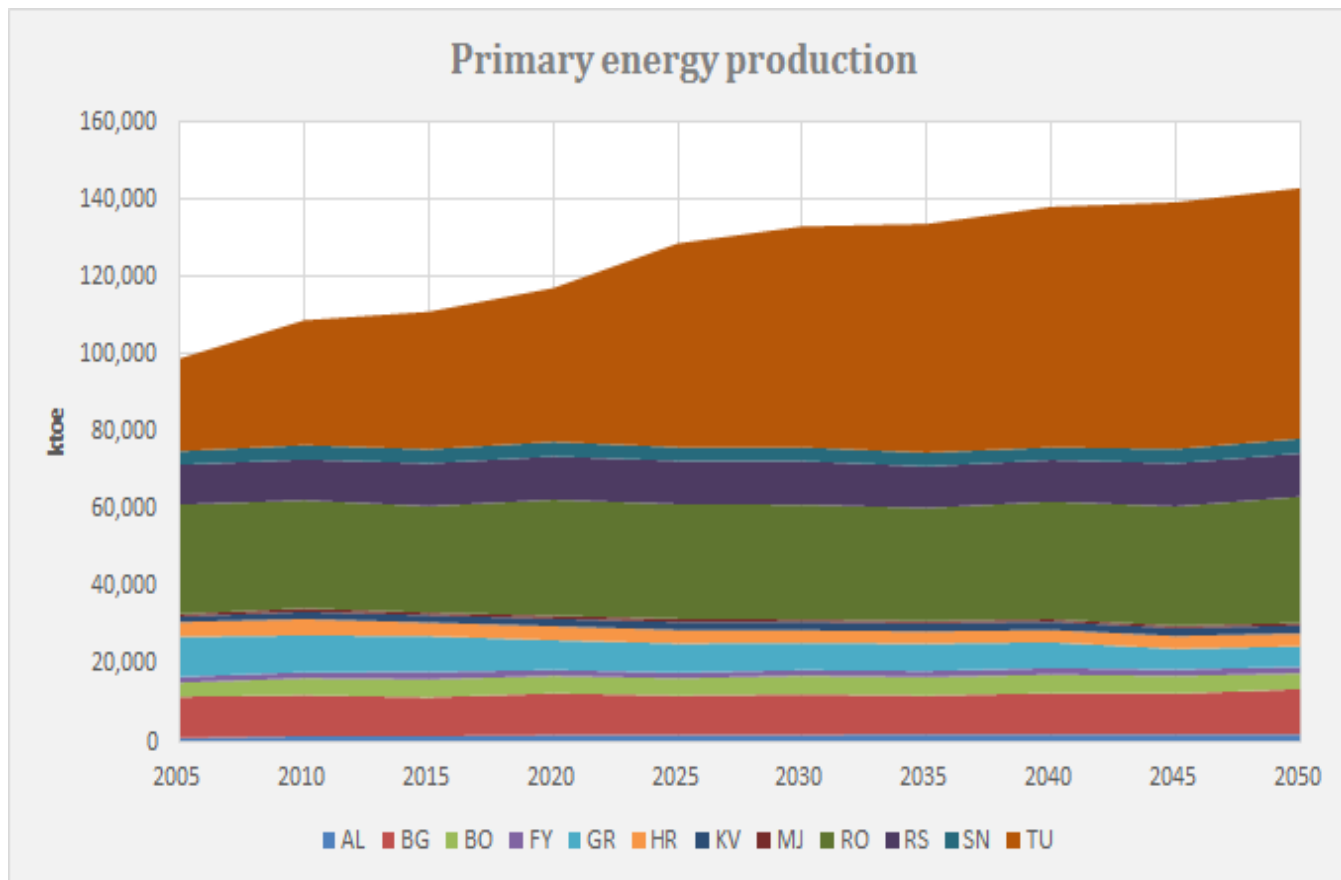
- ❑ In order to study energy demand and supply patterns, a scenario approach has been adopted whereby certain assumptions are formulated concerning basic parameters which are likely to govern future energy demand and supply.
- ❑ These parameters include primarily **economic, demographic and energy price information.**
- ❑ Given the funding and time constraints of the present “Outlook” study, only one such scenario was possible for elaboration, namely the “**Base**” scenario. In carrying out the scenario work, IENE has collaborated with the **E3M-Lab of the National Technical University of Athens (NTUA)**, which has a long-established track record and considerable in-house expertise in energy modeling work under the supervision of professor **Pantelis Kapros.**
- ❑ In selecting the Base scenario, a very conscious decision was made by IENE and E3M-Lab in considering the **penetration of new technologies**, notably in power generation and transport, largely based on RES. The penetration of new technologies, leads, among others, to changes in the energy mix, alongside other drivers such as relative prices and costs, policies to promote energy efficiency, RES and new technologies.

7. SE Europe: Gross inland consumption, including Turkey (2005-2050)



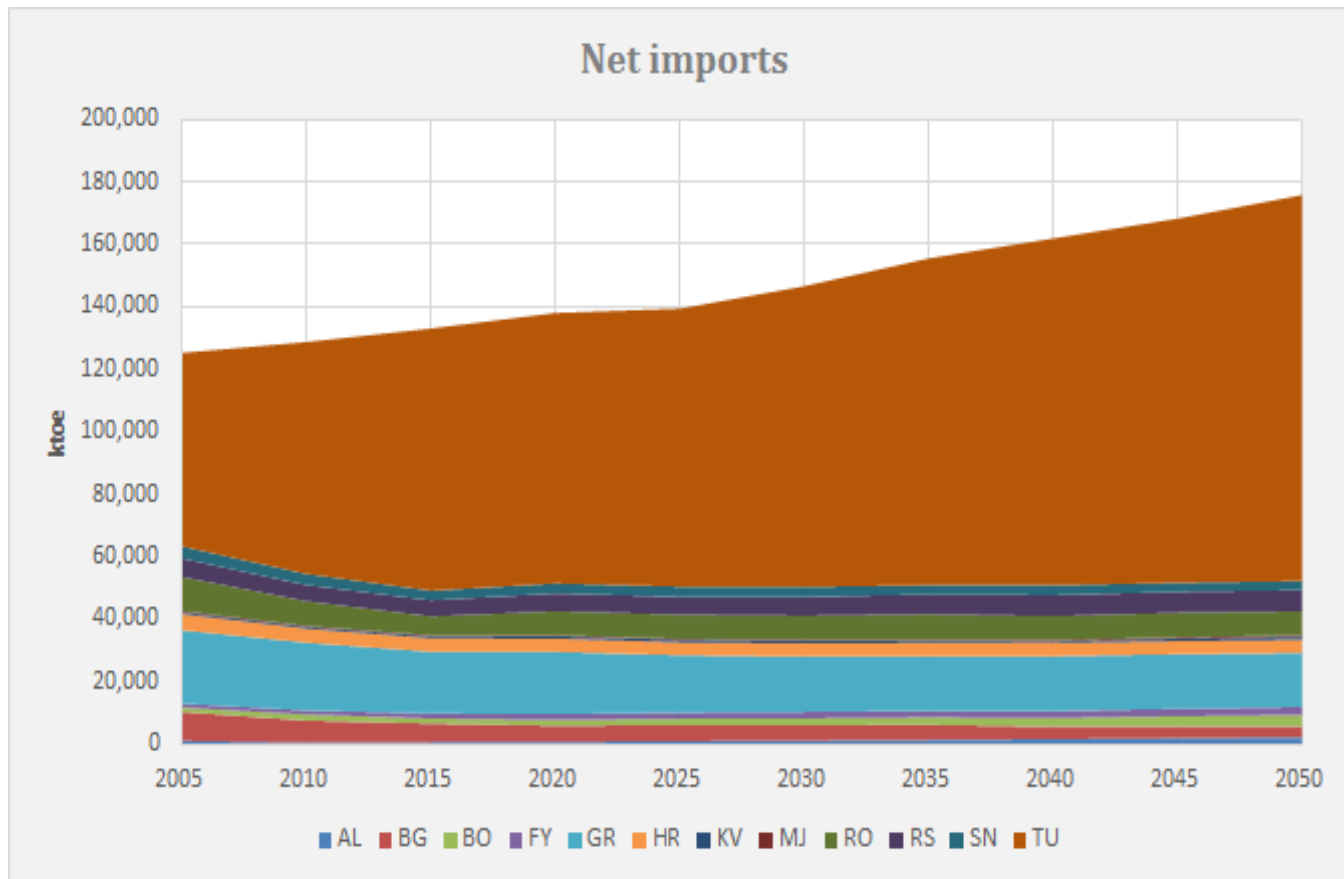
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

SE Europe: Primary energy production, including Turkey (2005-2050)



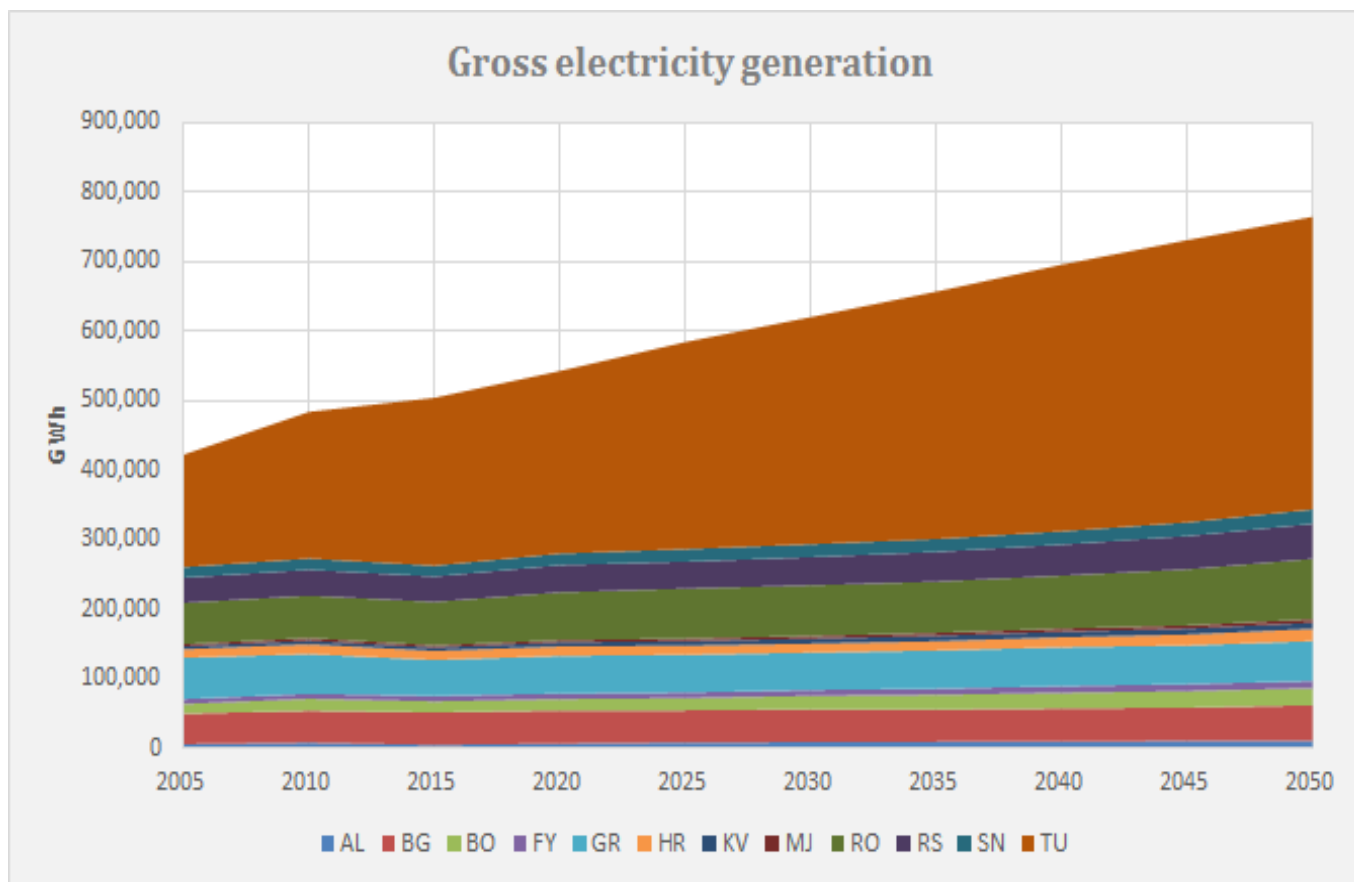
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

SE Europe: Net imports, including Turkey (2005-2050)



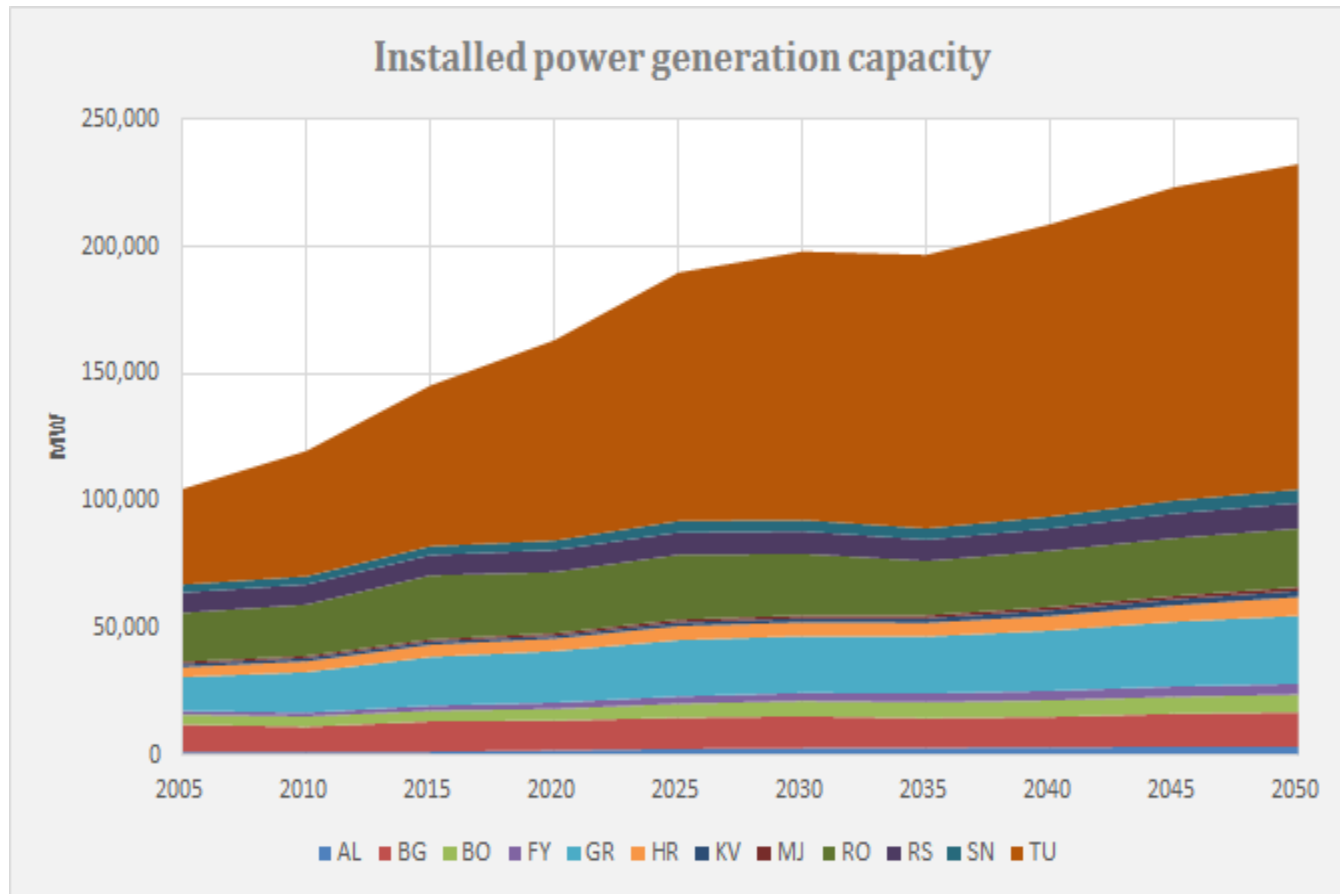
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

SE Europe: Gross electricity generation, including Turkey (2005-2050)



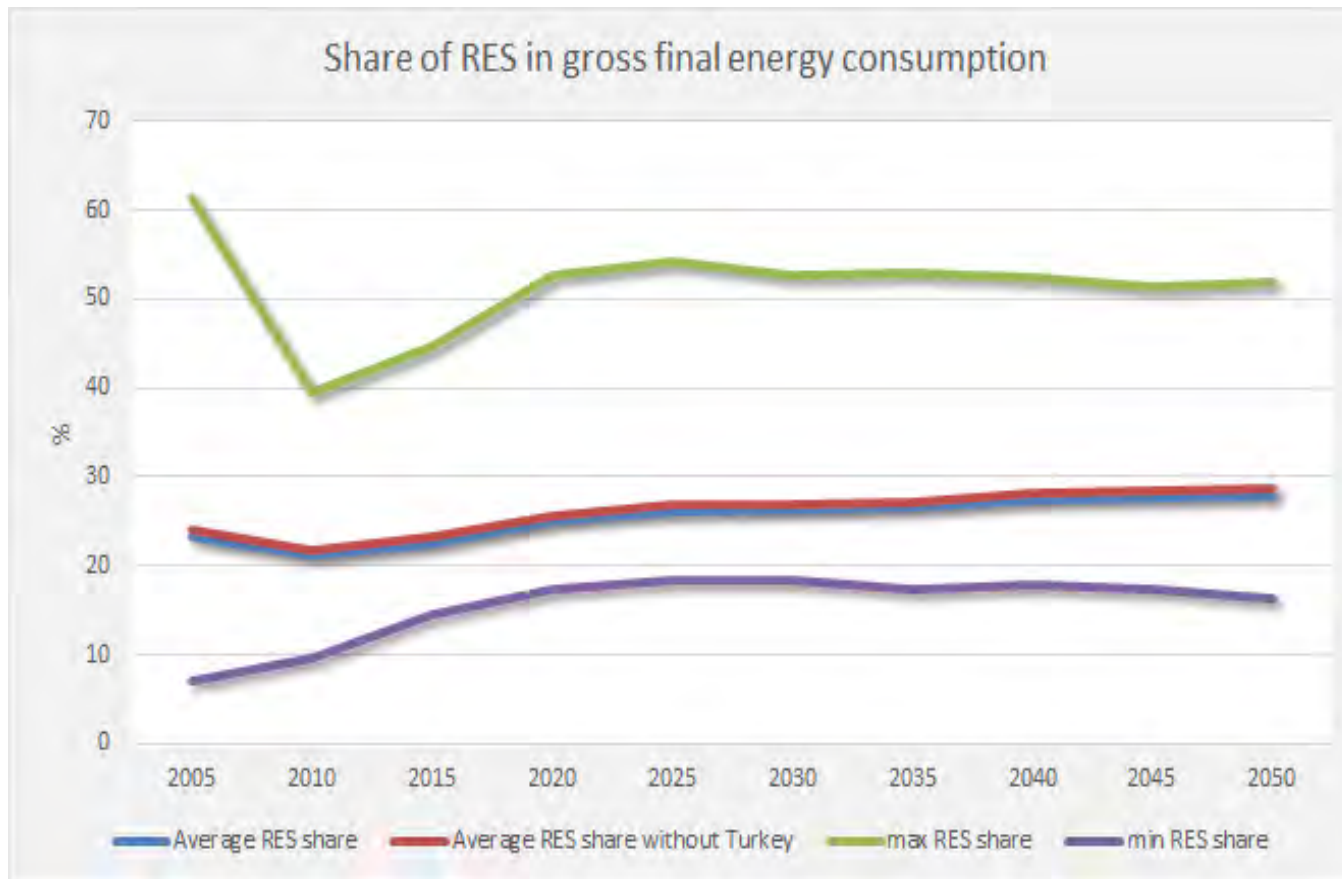
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

SE Europe: Installed power generation capacity, including Turkey (2005-2050)



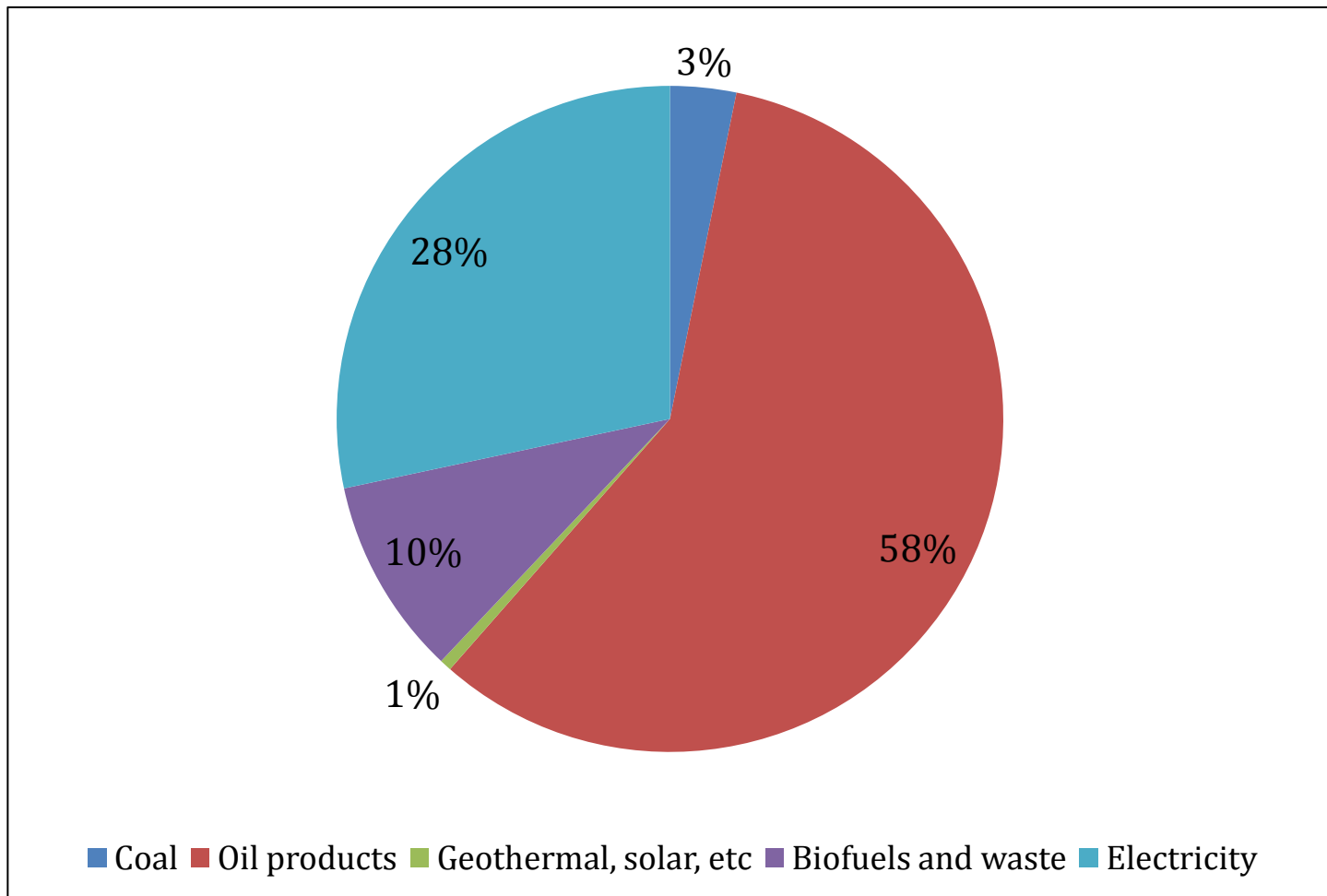
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

SE Europe: Share of RES in gross final energy consumption, including Turkey (2005-2050)



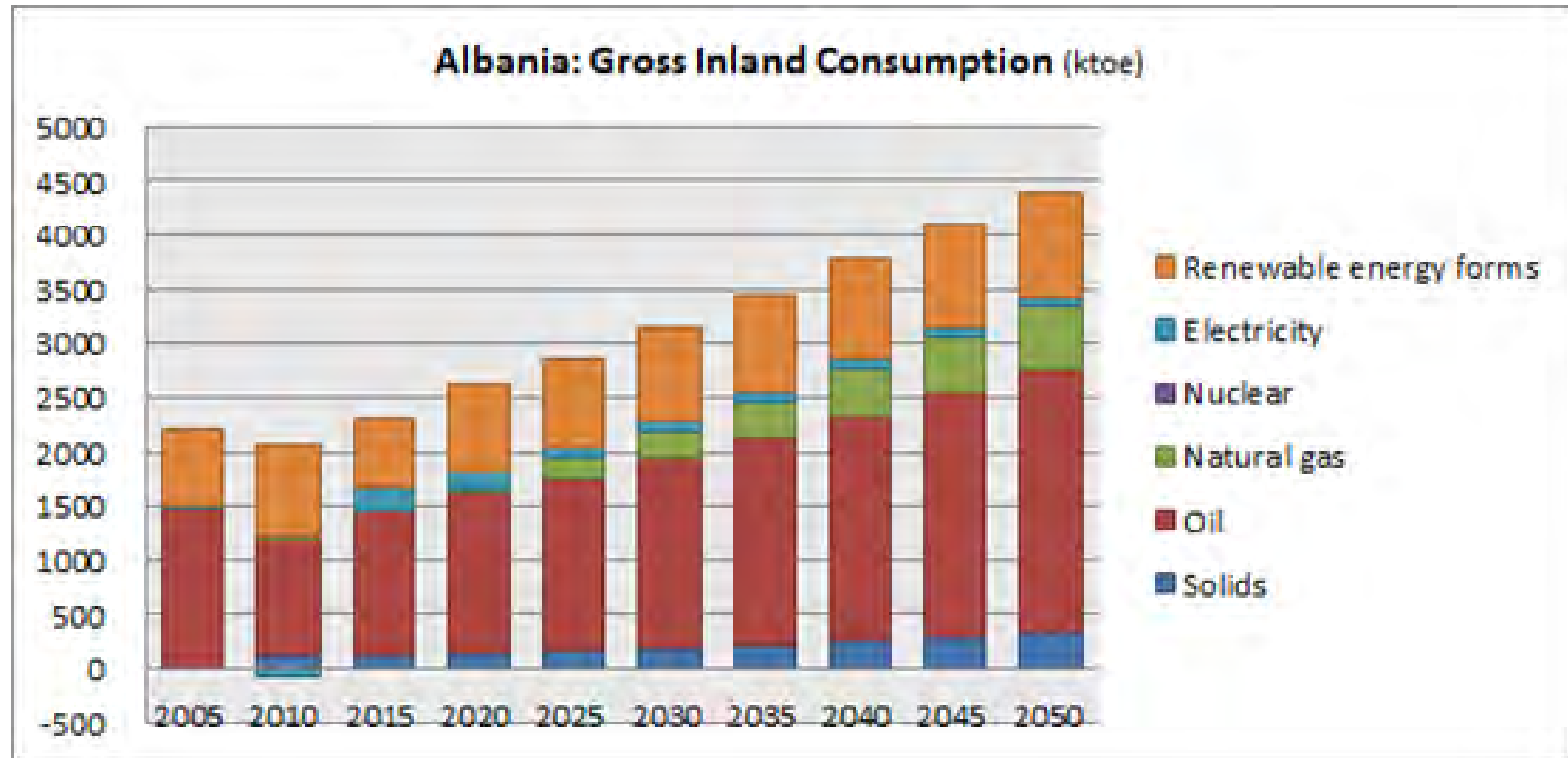
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

8. Focus on three countries of the SEE region: Energy mix in Albania (Total=2.09 Mtoe in 2013)



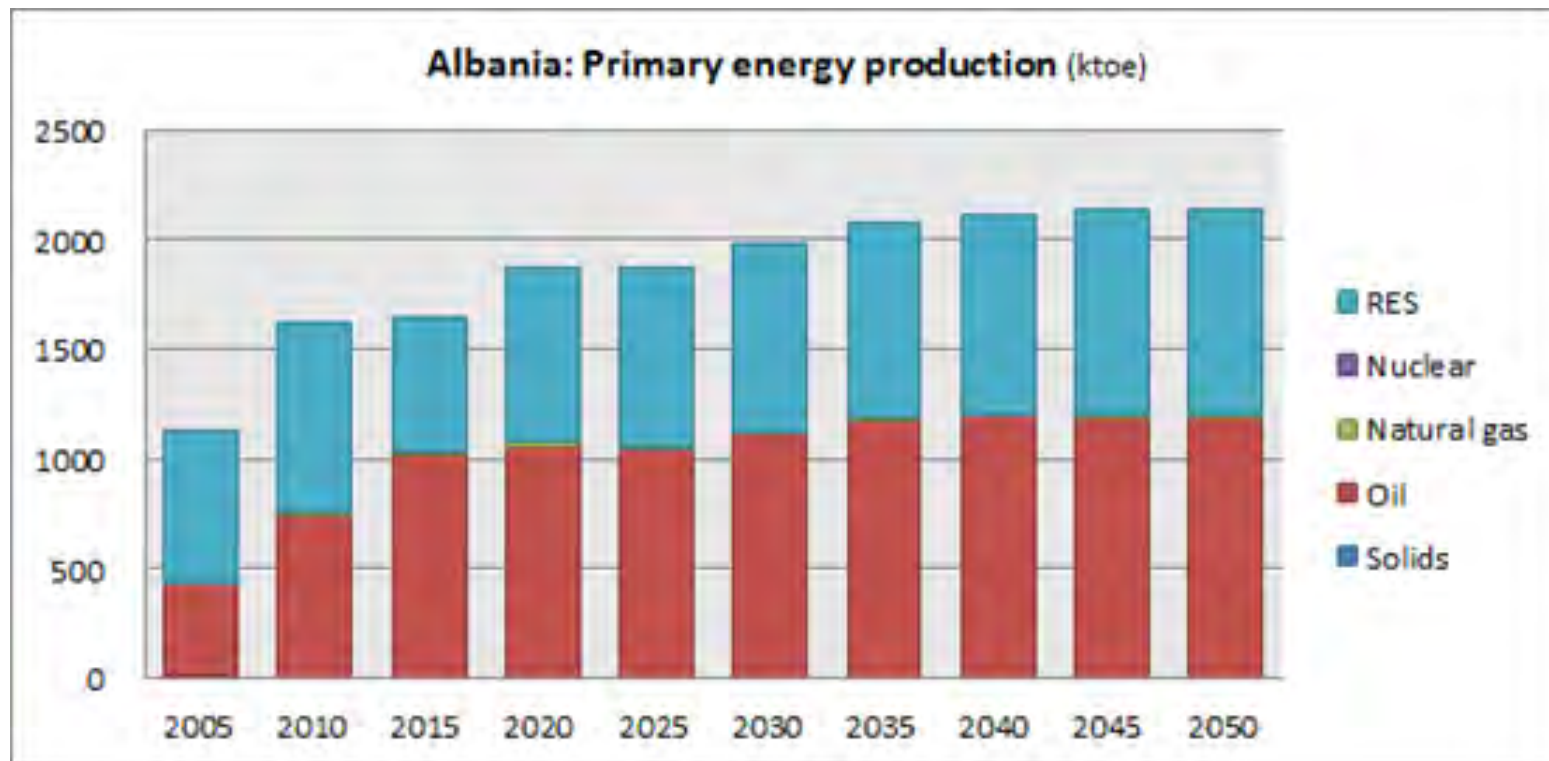
Source: IEA

Albania: Gross inland consumption (2005-2050)



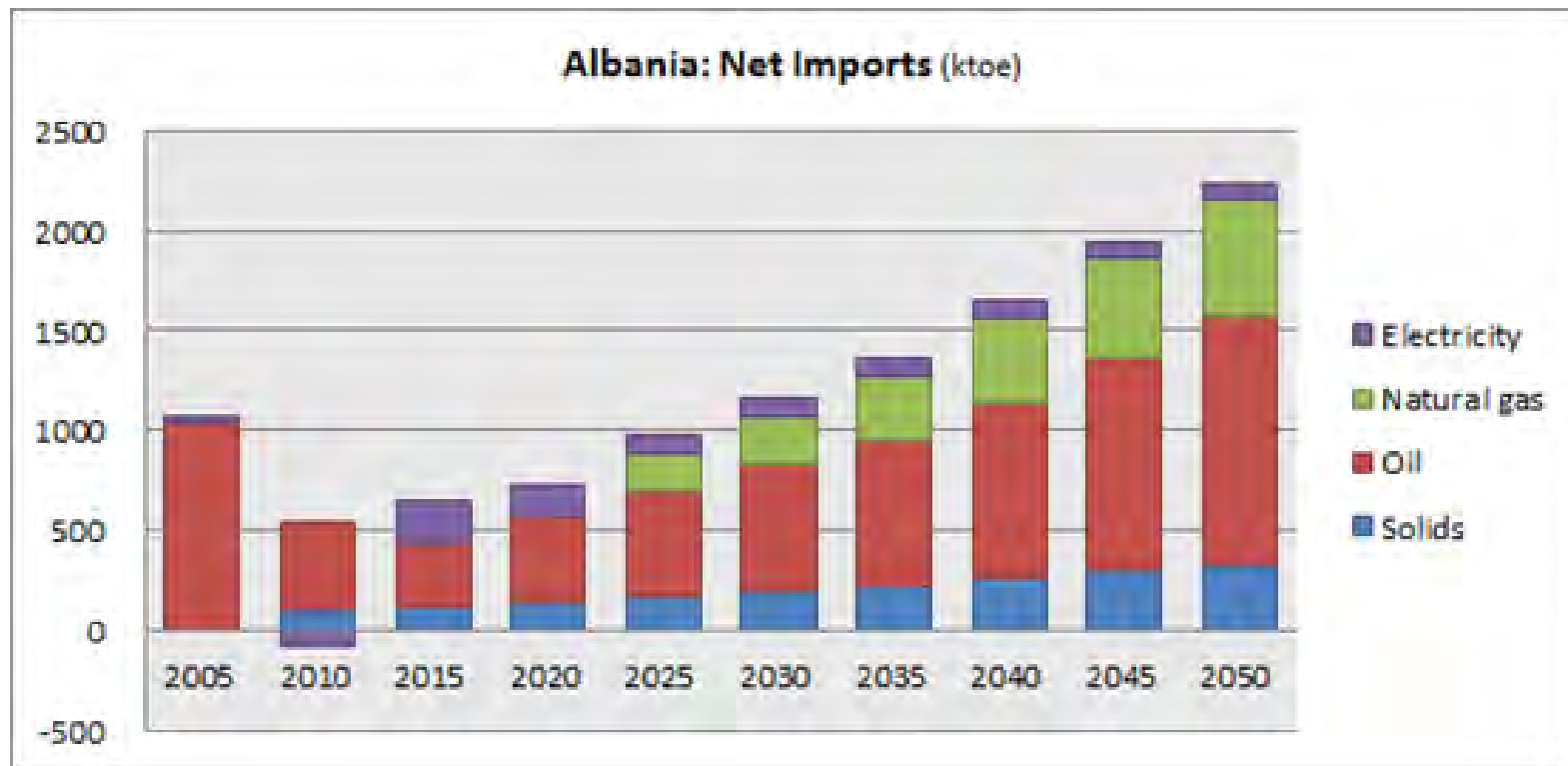
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Albania: Primary energy production (2005-2050)



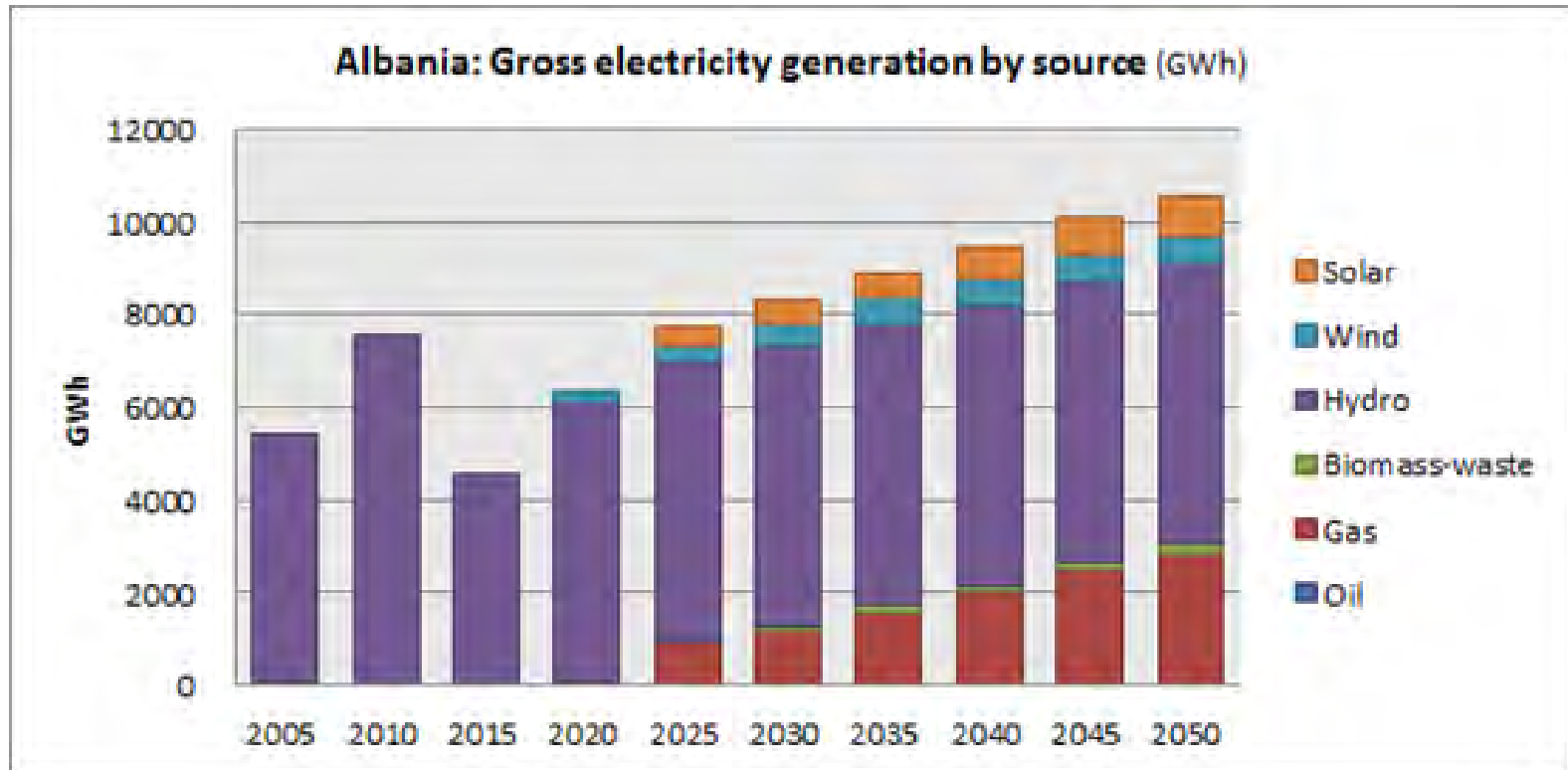
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Albania: Net imports (2005-2050)



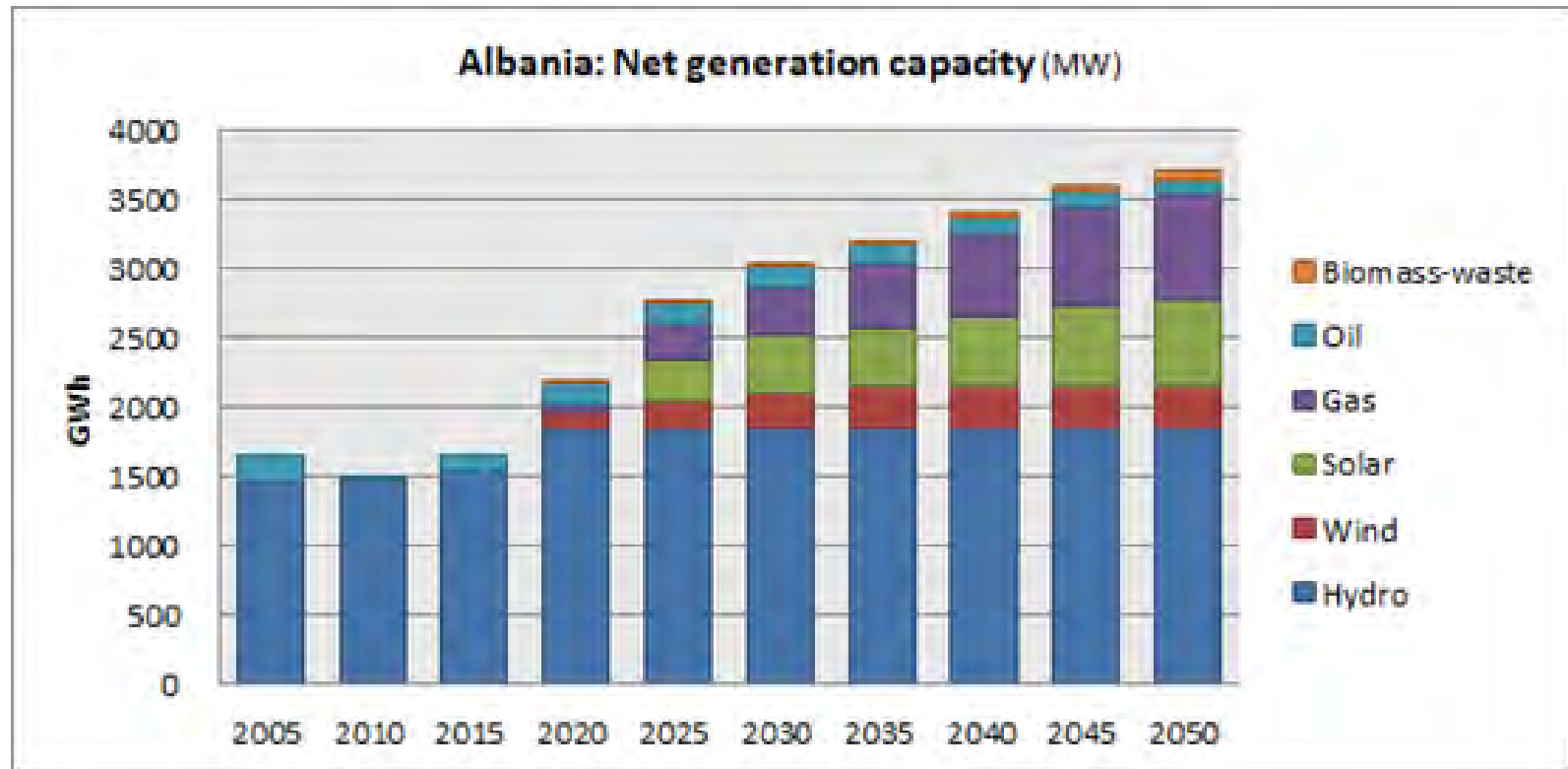
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Albania: Gross electricity generation (2005-2050)



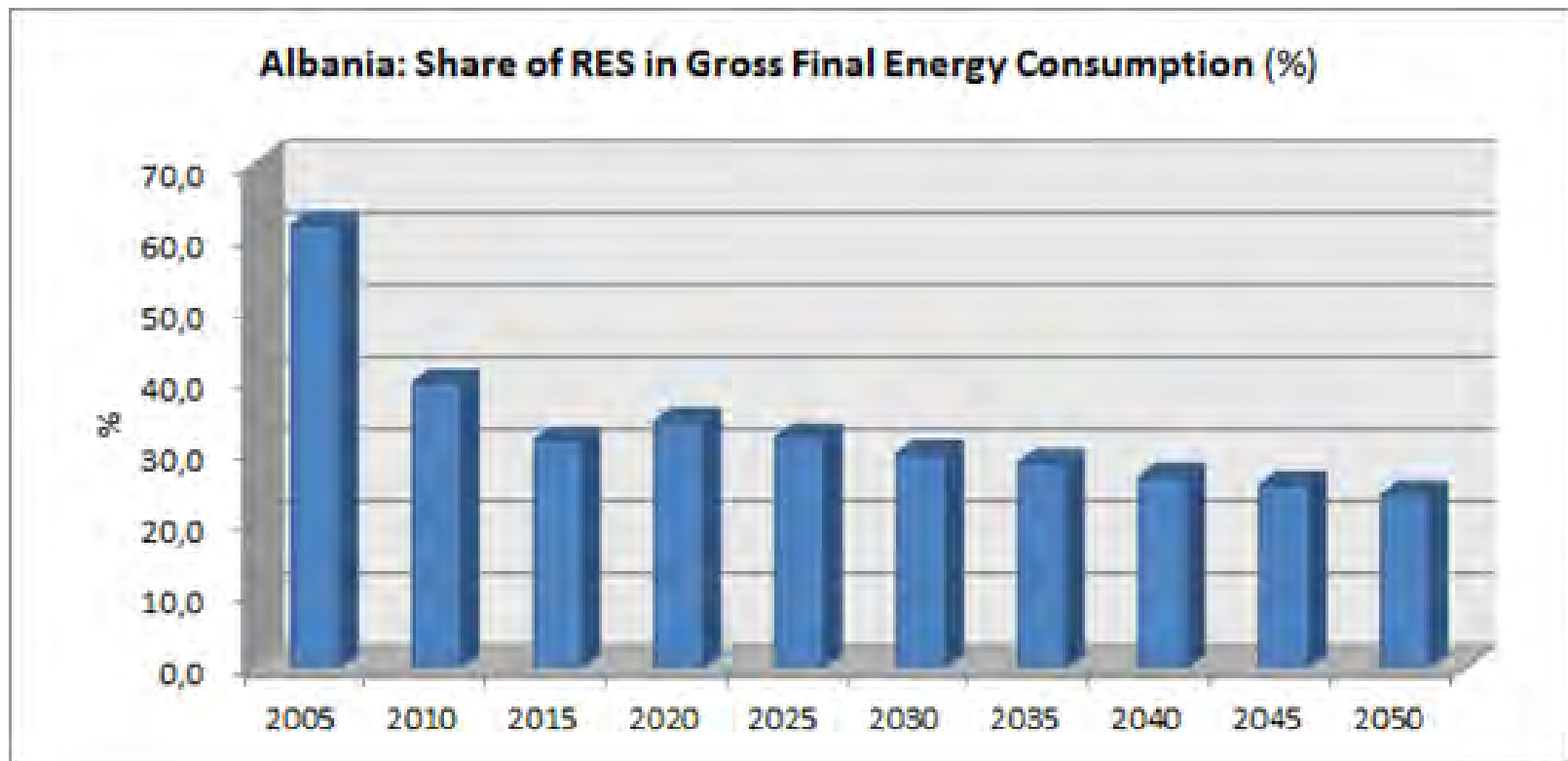
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Albania: Net generation capacity (2005-2050)



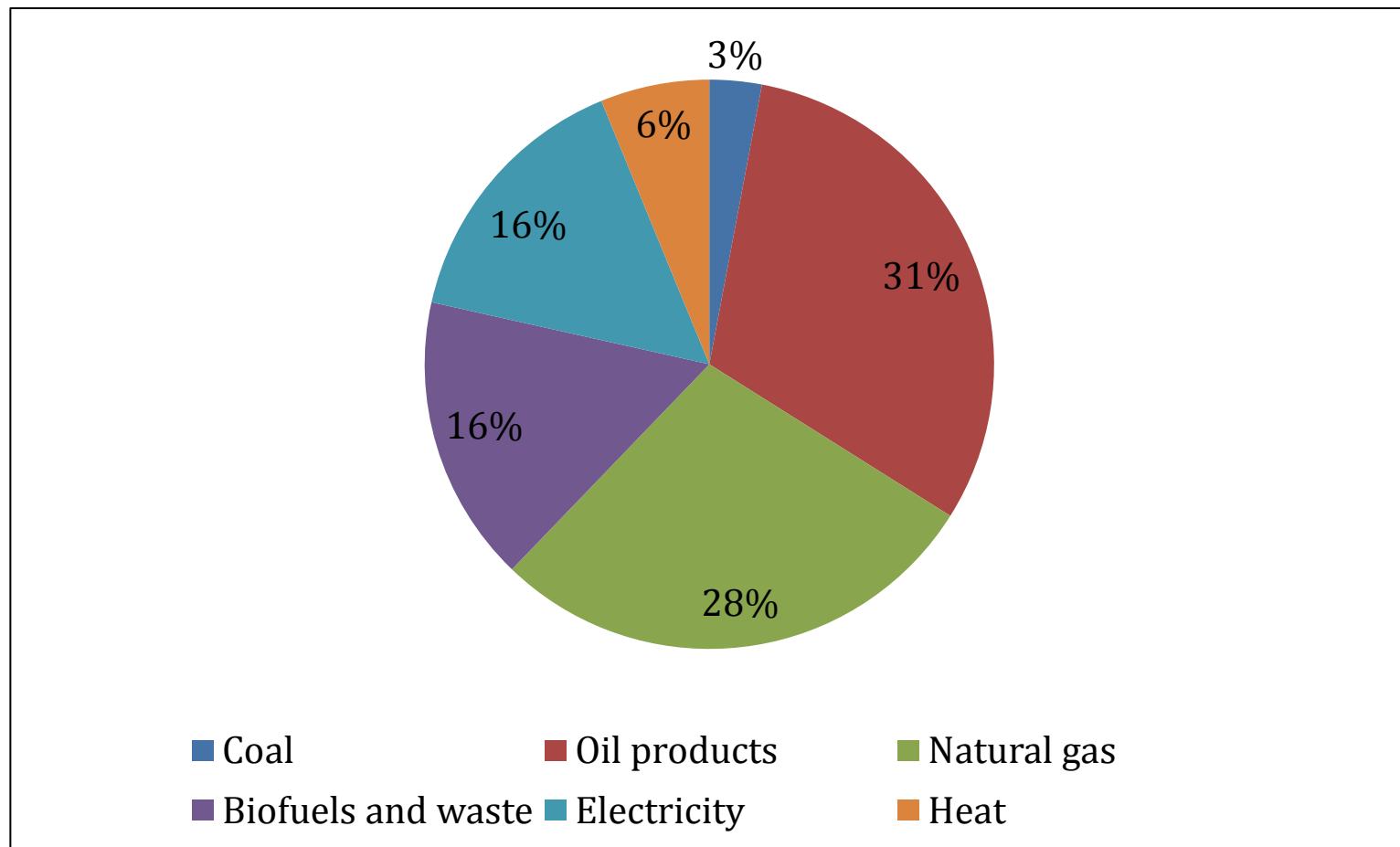
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Albania: Share of RES (%) in Gross Final Energy Consumption (2005-2050)



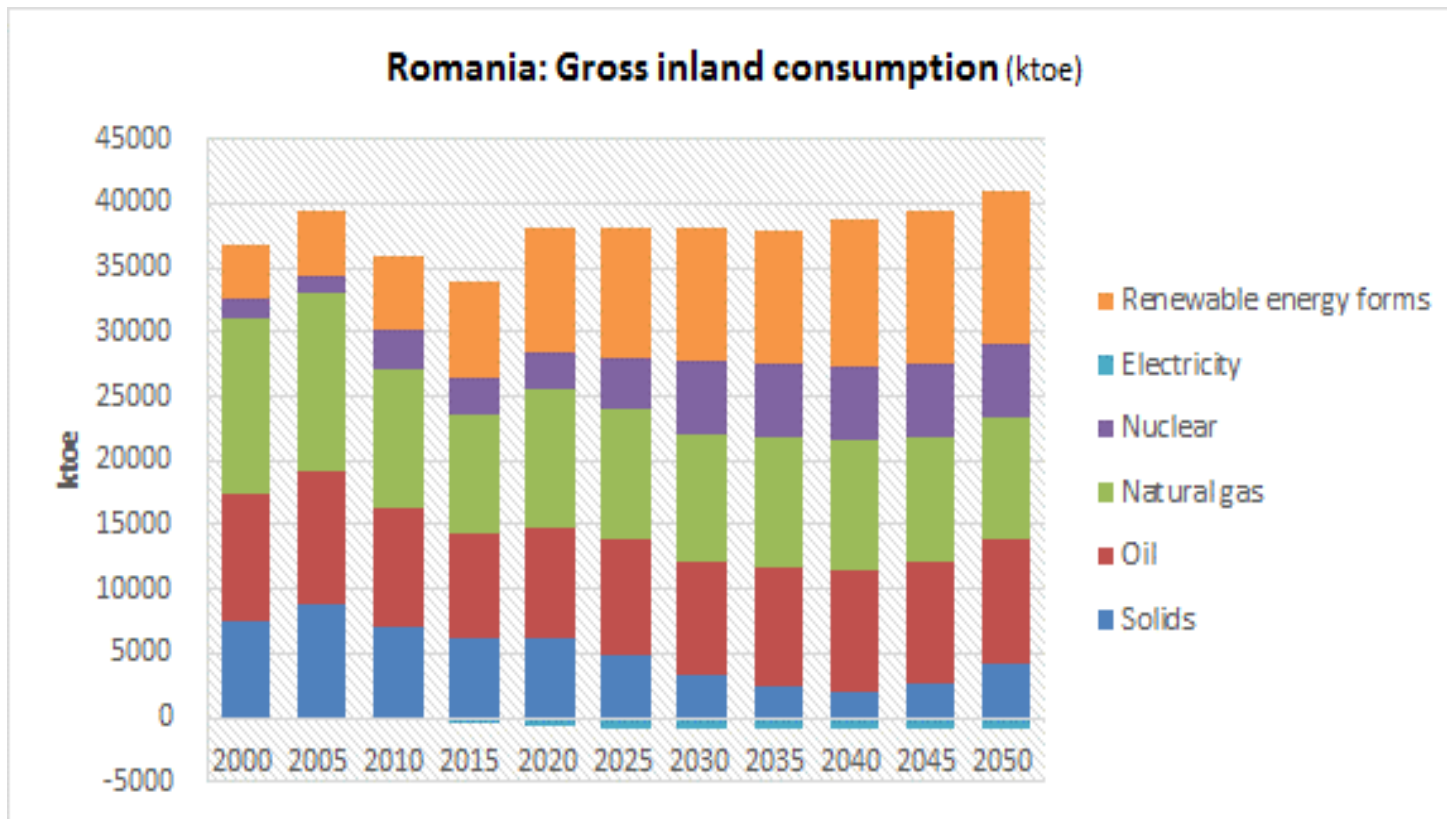
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Energy mix in Romania (Total=22.9 Mtoe in 2013)



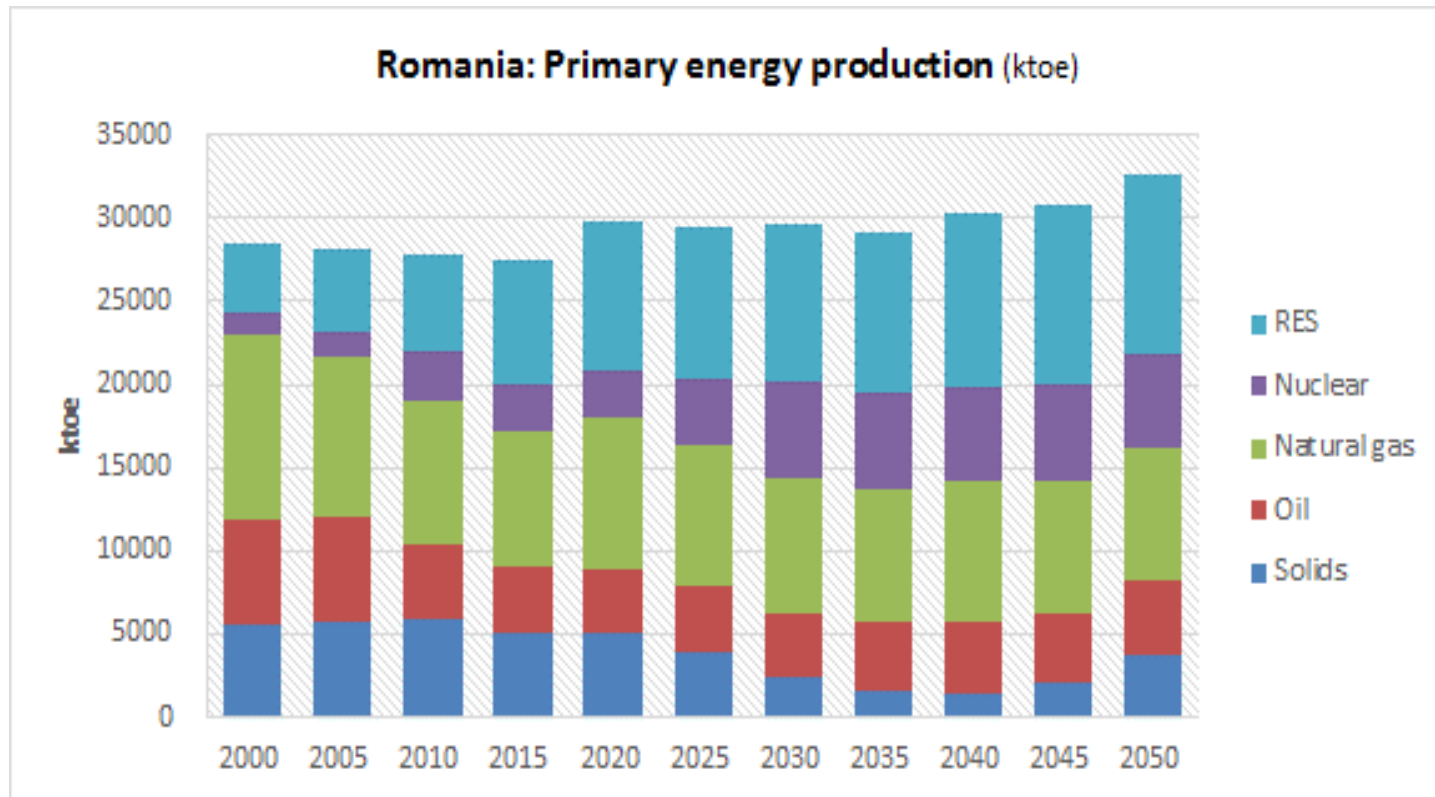
Source: IEA

Romania: Gross inland consumption (2005-2050)



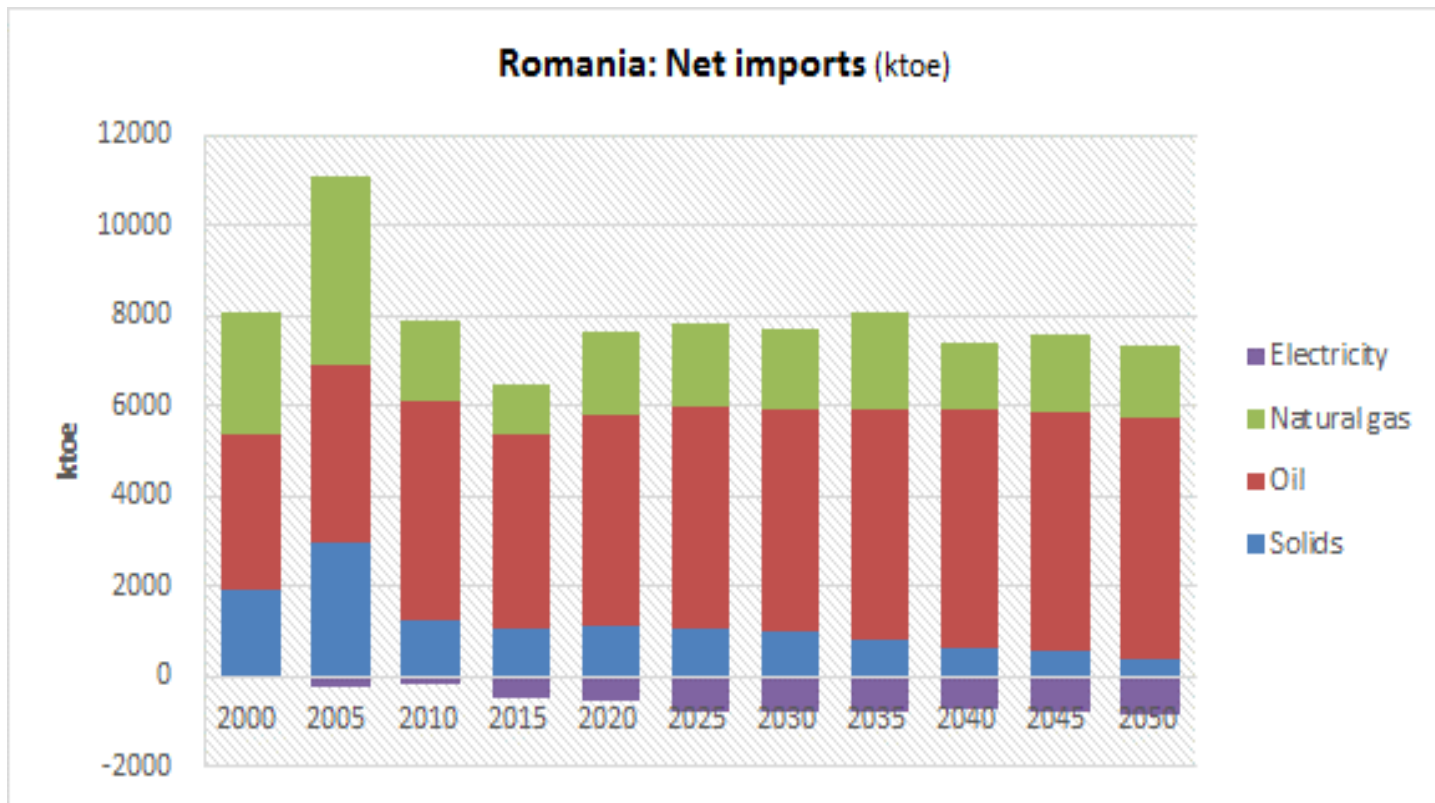
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Romania: Primary energy production (2005-2050)



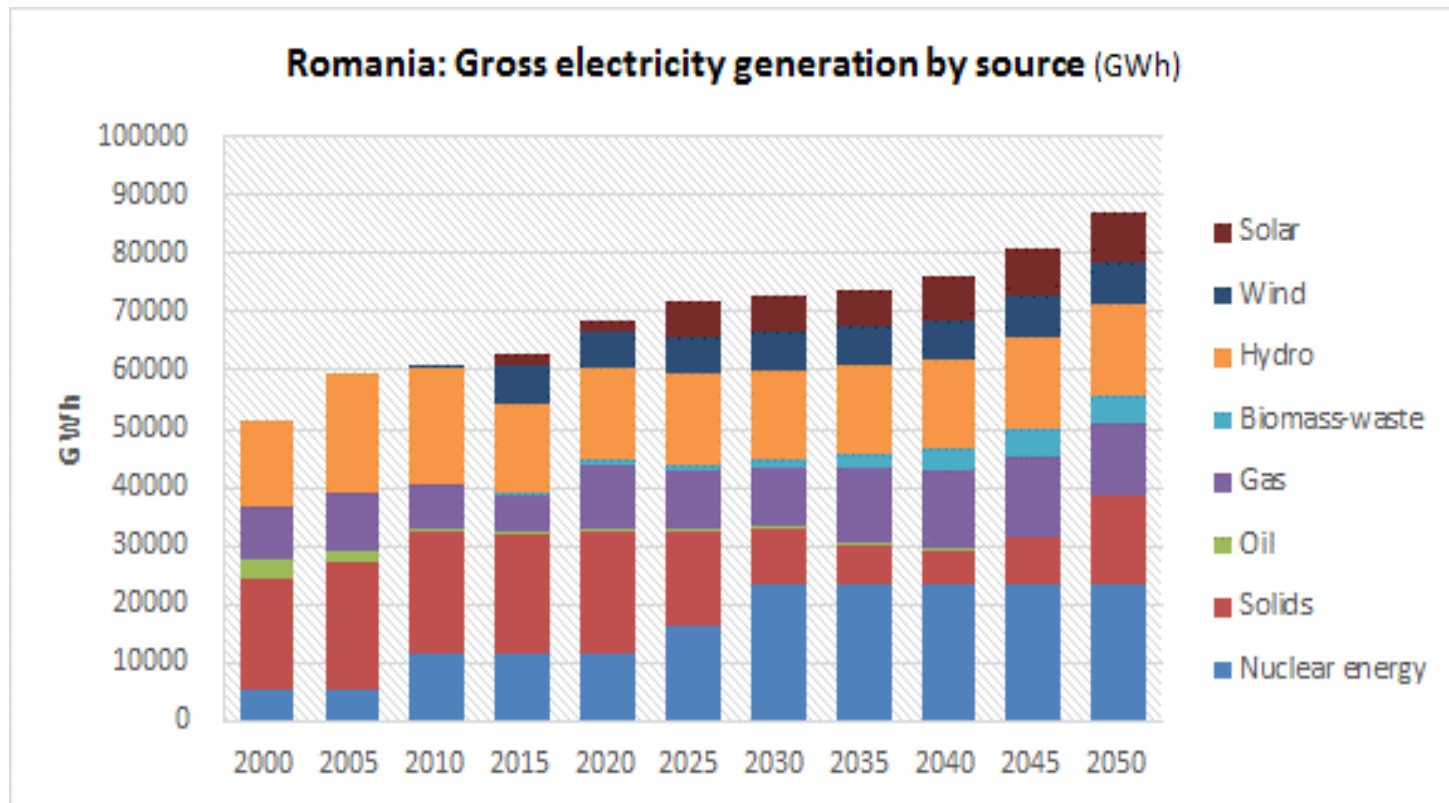
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Romania: Net imports (2005-2050)



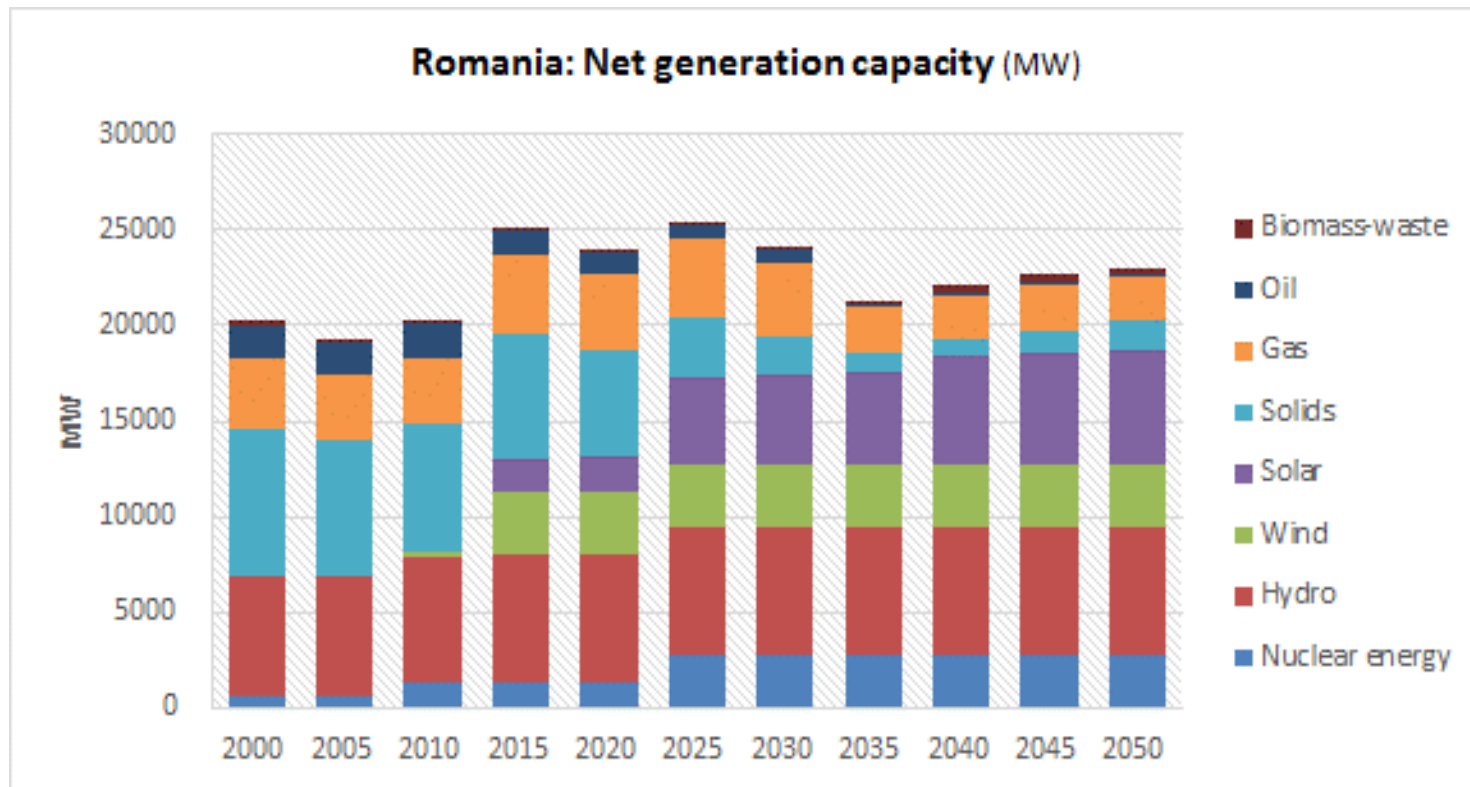
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Romania: Gross electricity generation (2005-2050)



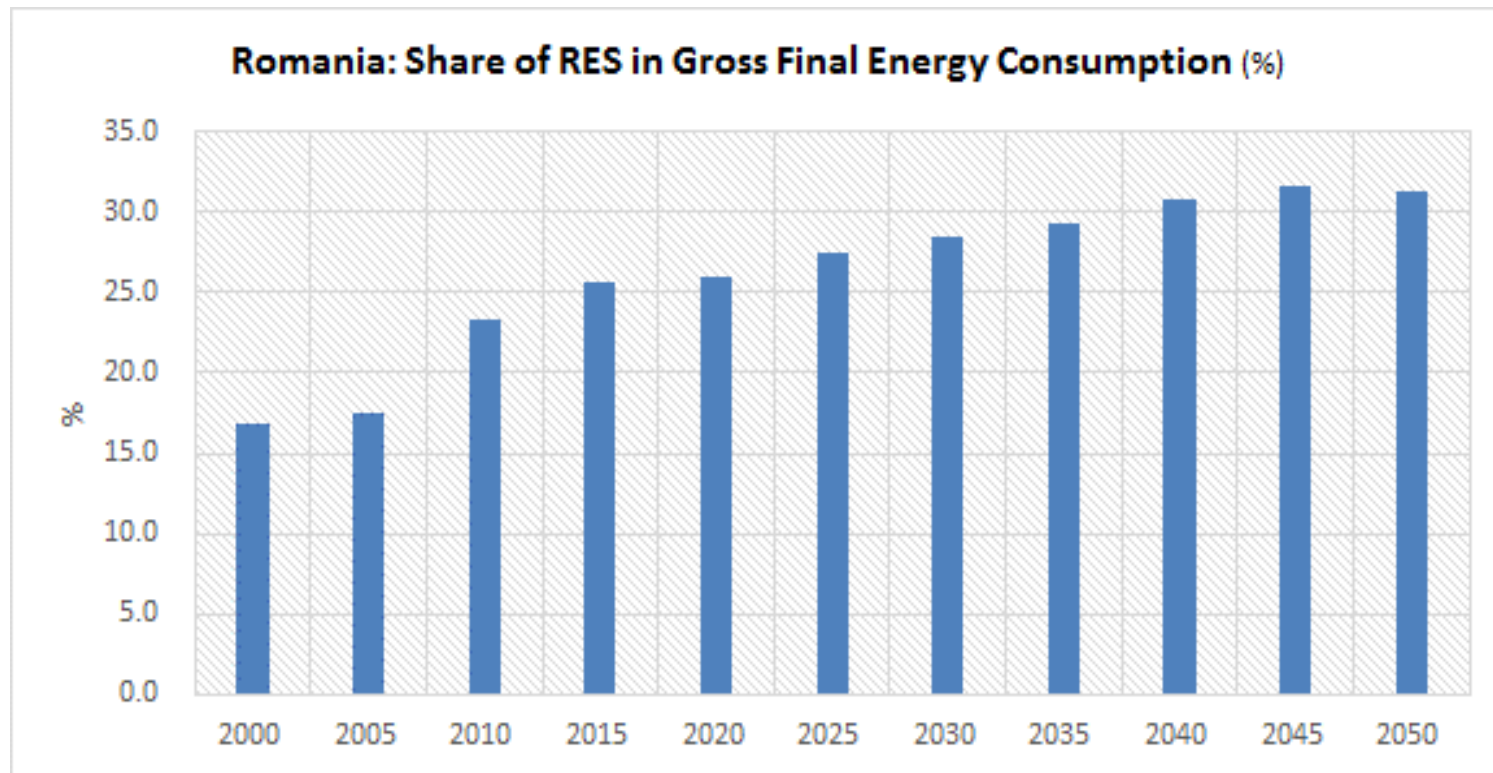
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Romania: Net generation capacity (2005-2050)



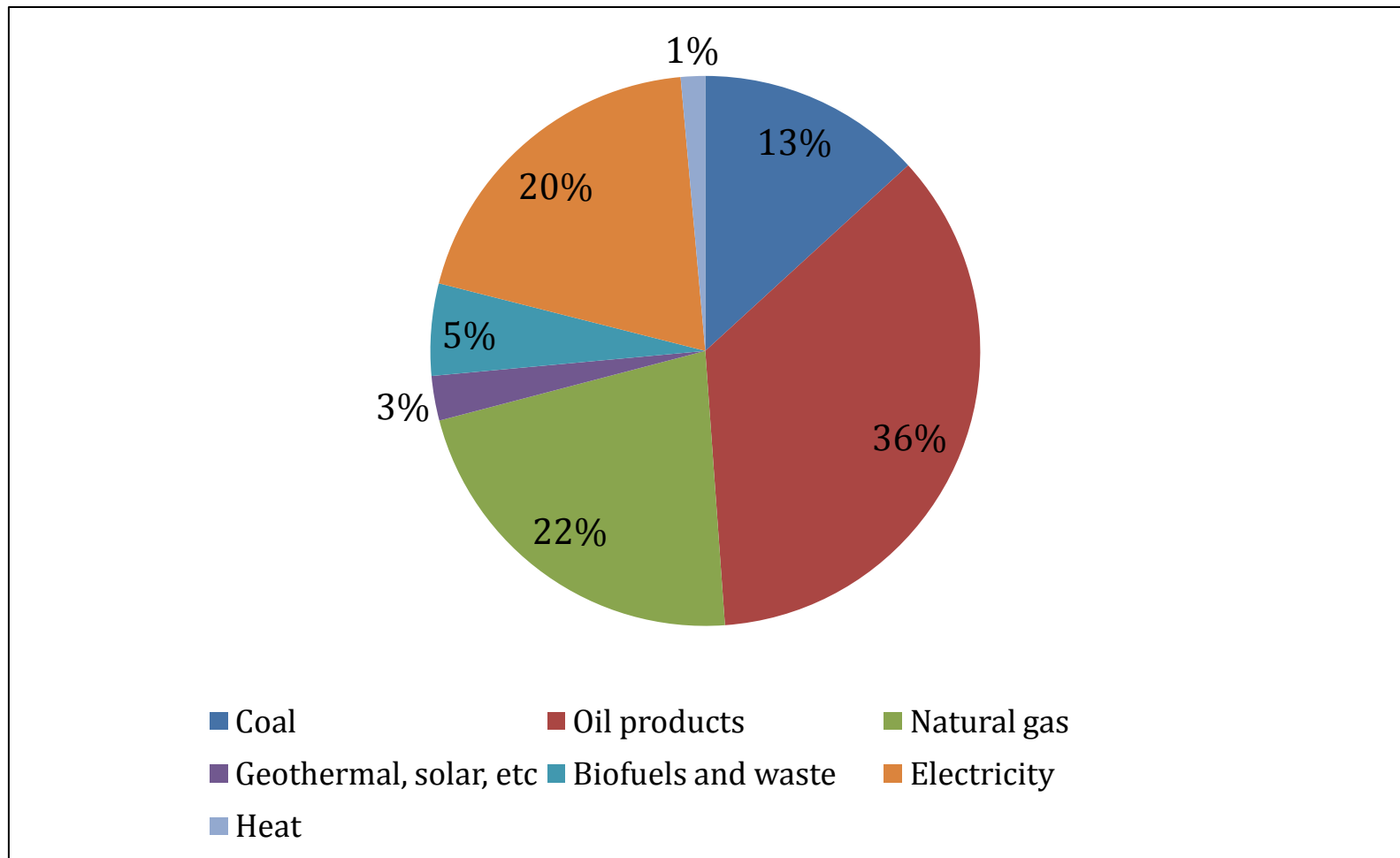
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Romania: Share of RES (%) in Gross Final Energy Consumption (2005-2050)



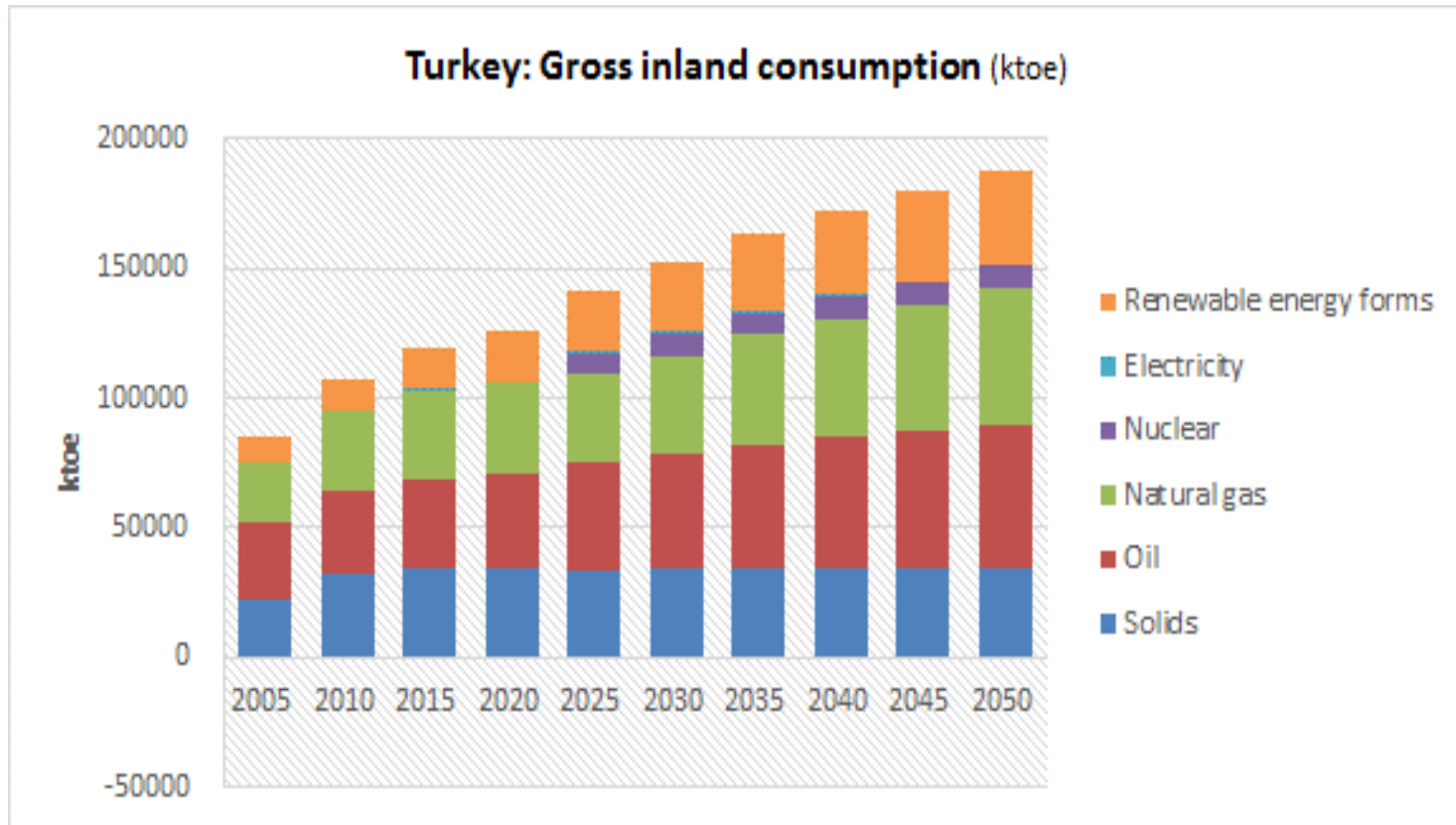
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Energy mix in Turkey (Total=86.02 Mtoe in 2013)



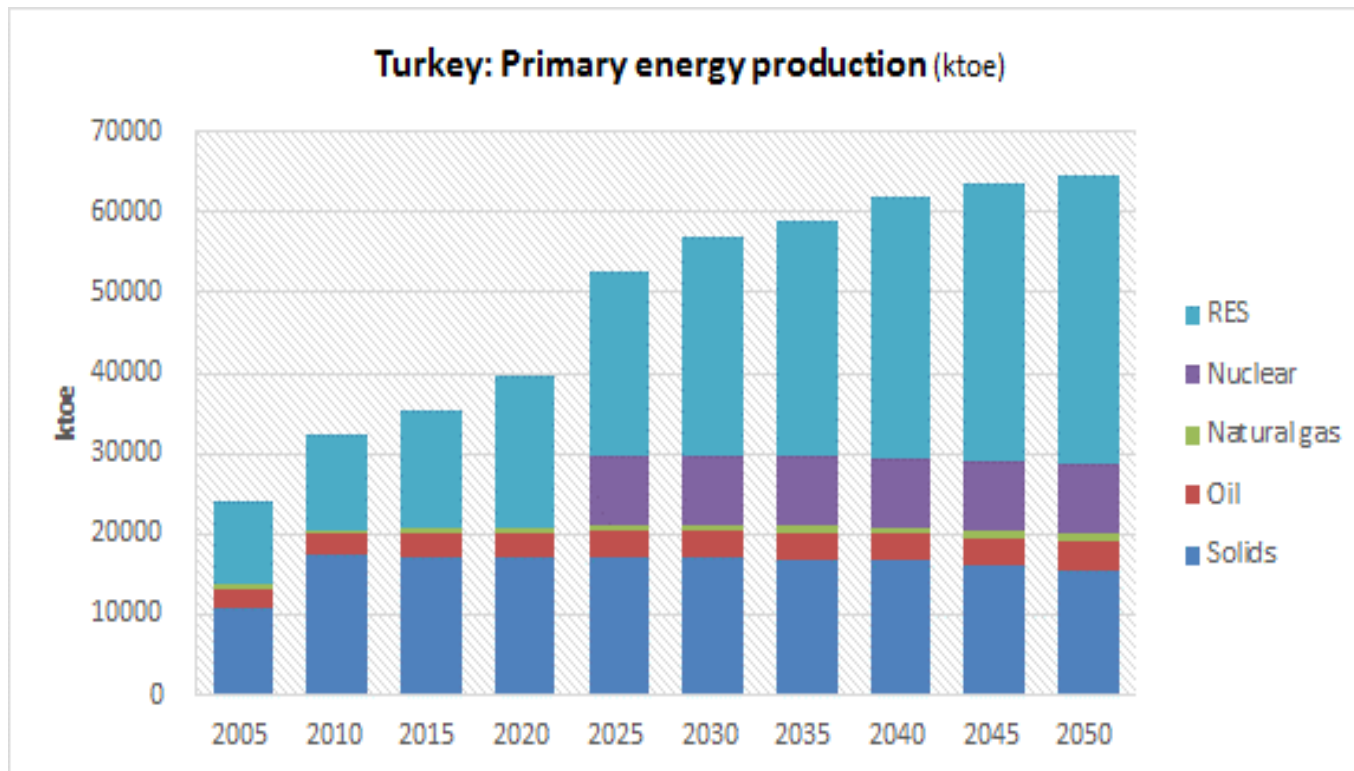
Source: IEA

Turkey: Gross inland consumption (2005-2050)



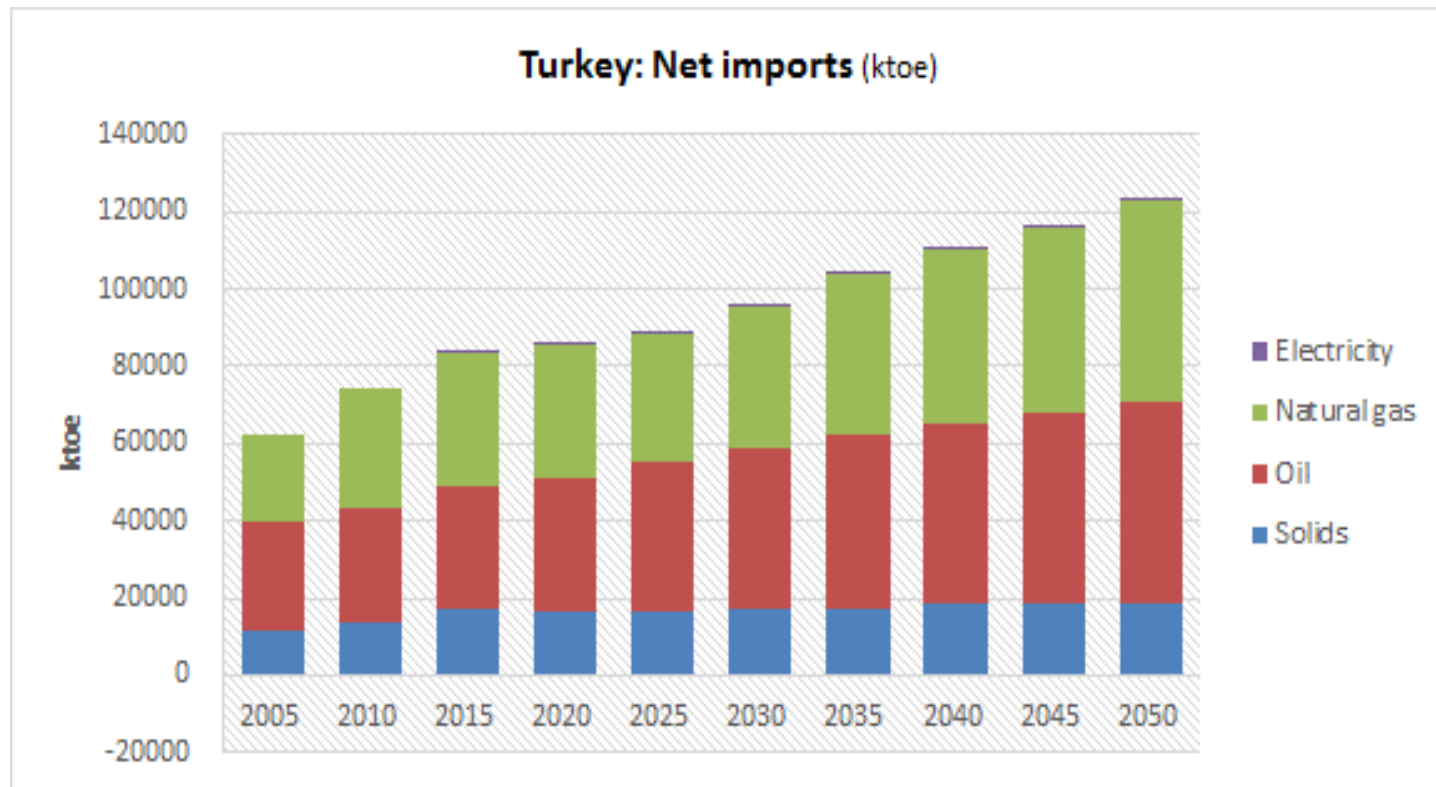
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Turkey: Primary energy production (2005-2050)



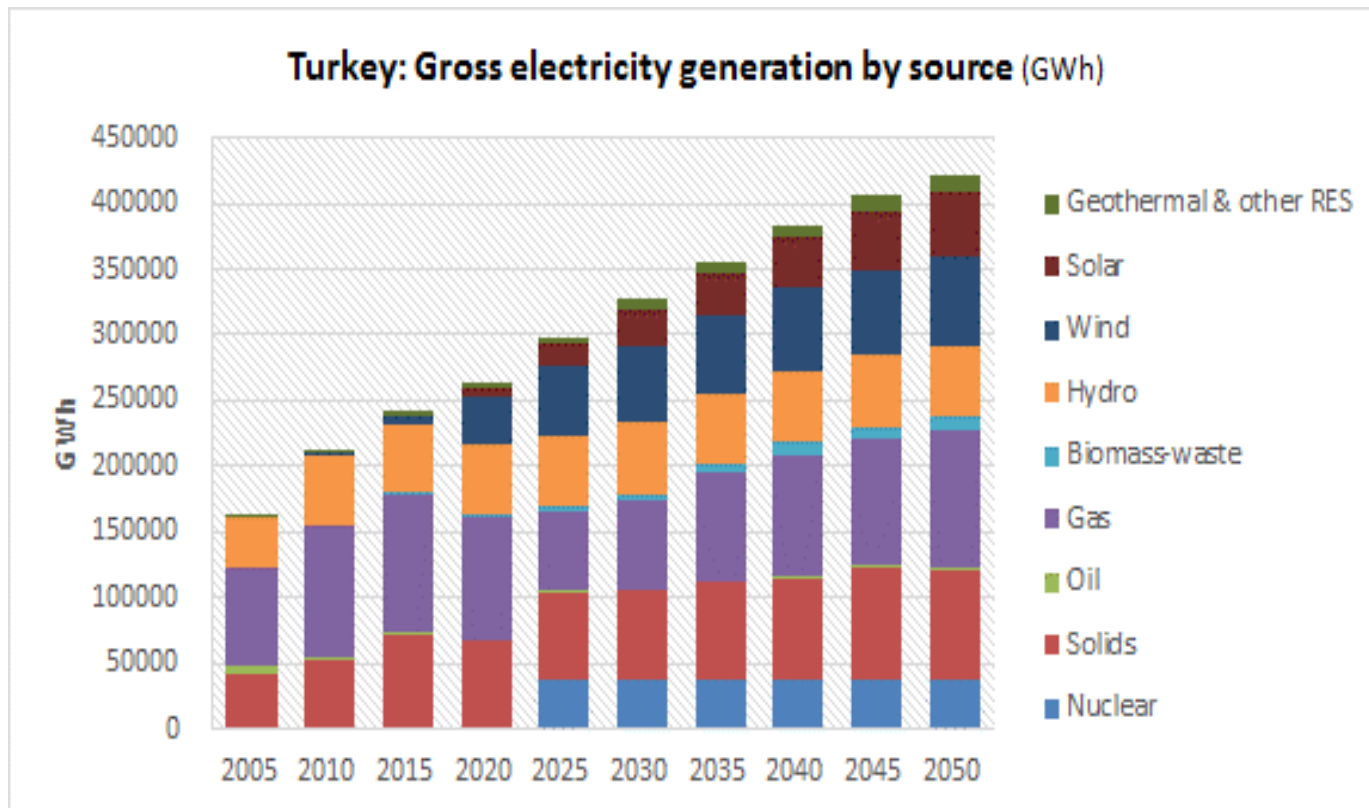
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Turkey: Net imports (2005-2050)



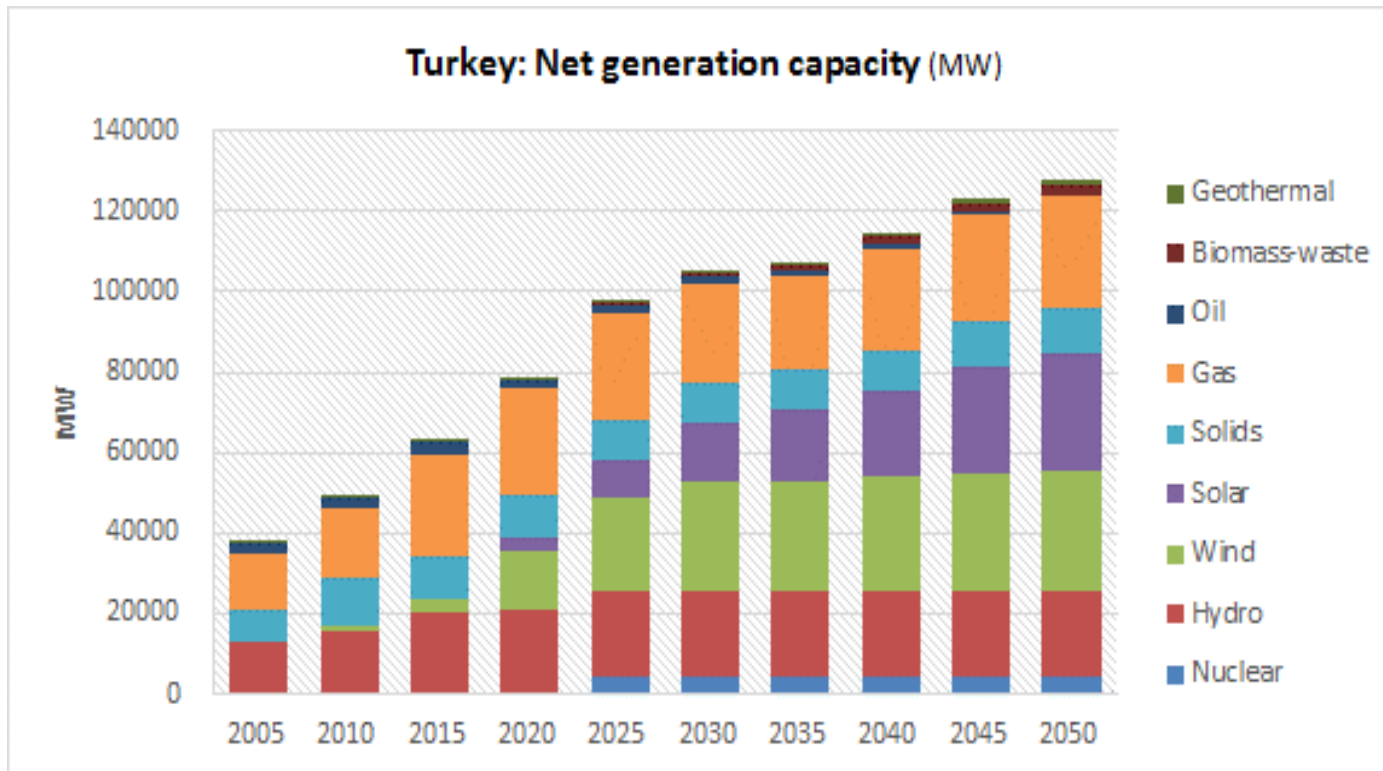
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Turkey: Gross electricity generation (2005-2050)



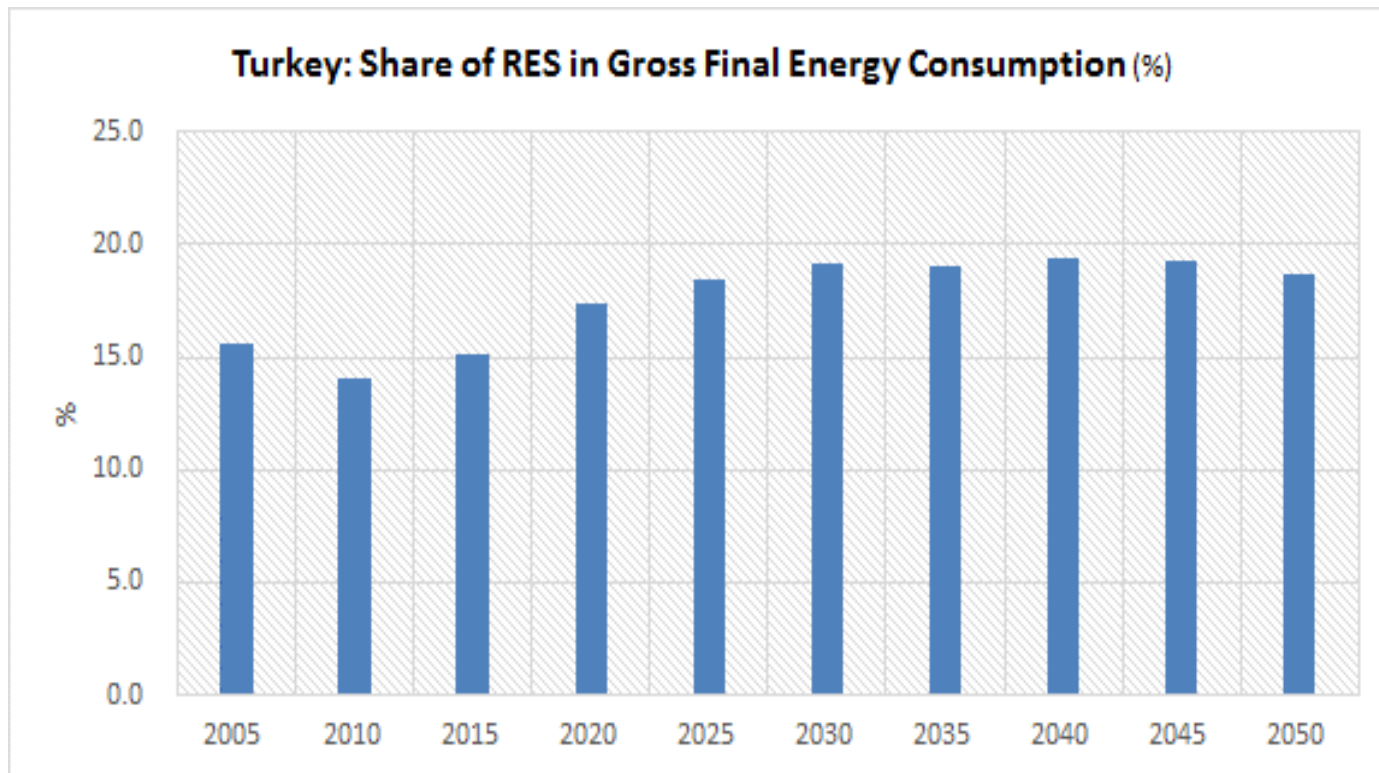
Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Turkey: Net generation capacity (2005-2050)



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Turkey: Share of RES (%) in Gross Final Energy Consumption (2005-2050)



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

9. 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 and Turkey looks very different with certain countries having managed to complete what appeared to be an anomalous transition period.
 - In the case of **Turkey**, the 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.

Gas market liberalization in SE Europe (I)

- During the past five years, evolutions regarding the long-term development of the natural gas market in SE Europe have been unprecedented. A **series of events** have led to the radical change of the circumstances of the gas market in SEE, in a way that even though has not produced any material results yet, may certainly mark a new era for the gas markets in the region and, to some extent, will affect the gas market evolutions for the rest of the EU.
- The most important of those developments can be summarized as follows:
 - The decision of the consortium for the development of the Shah Deniz II field in Azerbaijan, in June 2013, for the selection of the Trans-Adriatic-Pipeline (TAP) as the **preferred option for the transportation of the gas produced in that field to Europe**, signaled the end of the long standing selection process and the initiation of the Southern Gas Corridor group of infrastructures.
 - On 6 October 2011, the Ministerial Council of the Energy Community adopted the **so-called Third Energy Package (TEP) for electricity and gas**, with a general implementation deadline of 1 January 2015, for all the Contracting Parties of the Energy Community Treaty.

Gas market liberalization in SE Europe (II)

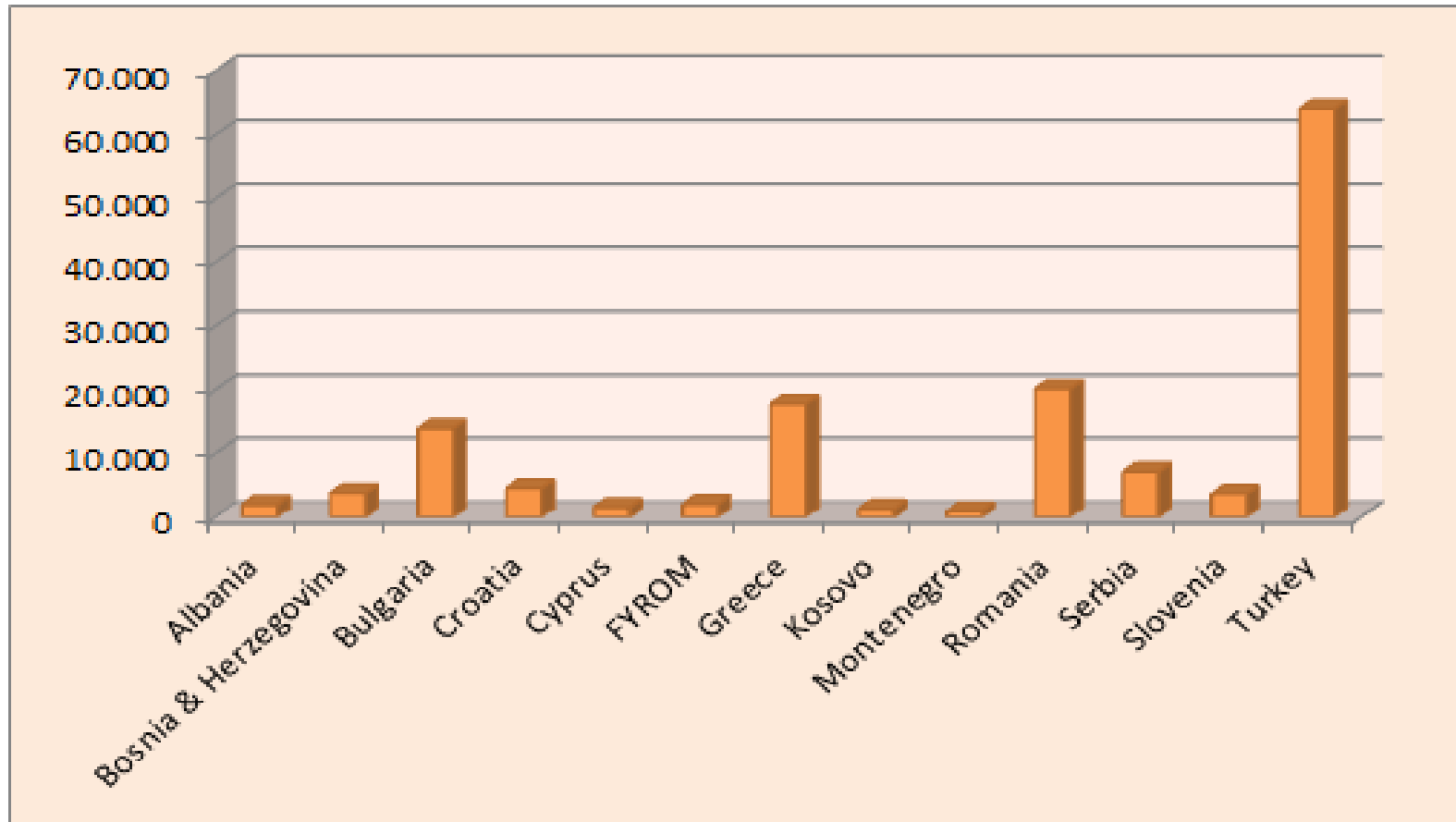
- ❑ In April 2013, the **Regulation EU 347/2013** was published. This Regulation sets the rules for the development of the so-called Union-wide list of energy **Projects of Common Interest (PCI)** and the subsequent facilitation for the development of the projects that will be included in that list. What is most important for the SEE is that this process was almost immediately followed by the corresponding procedure for the establishment of the list of the **Projects of the Energy Community Interest (PECI)**, a process which was formalized by a decision of the Ministerial Council of the Energy Community in October 2015.
- ❑ In February 2015, the EC launched the **Central East South Connectivity (CESEC) initiative**, in an effort to enhance political support for the identification and implementation of a series of crucial gas infrastructure projects in the region of Central and South Europe, which would either facilitate the imports in the region of gas from new sources, or would support the development of the corresponding missing links between the national gas networks of the countries of the region, which would allow such gas to flow into the networks of the neighboring countries. **It is the biggest and most intensive effort for the development of the gas market in the SEE since the beginning of the liberalization process in the EU and the Energy Community.**

Gas market liberalization in SE Europe (III)

- ❑ There is a **highly fragmented landscape** for the gas market development in the SEE region, with effectively no cross-border trading, which is very difficult to support the development of competition and of liquid market trading. Therefore, it is not surprising that 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. In this environment it is too difficult to imagine how the pan-European vision of a Gas Target Model would be implemented in a reasonable time frame.
- ❑ However, some analyses show that 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.

10. Electricity Market Structure (I)

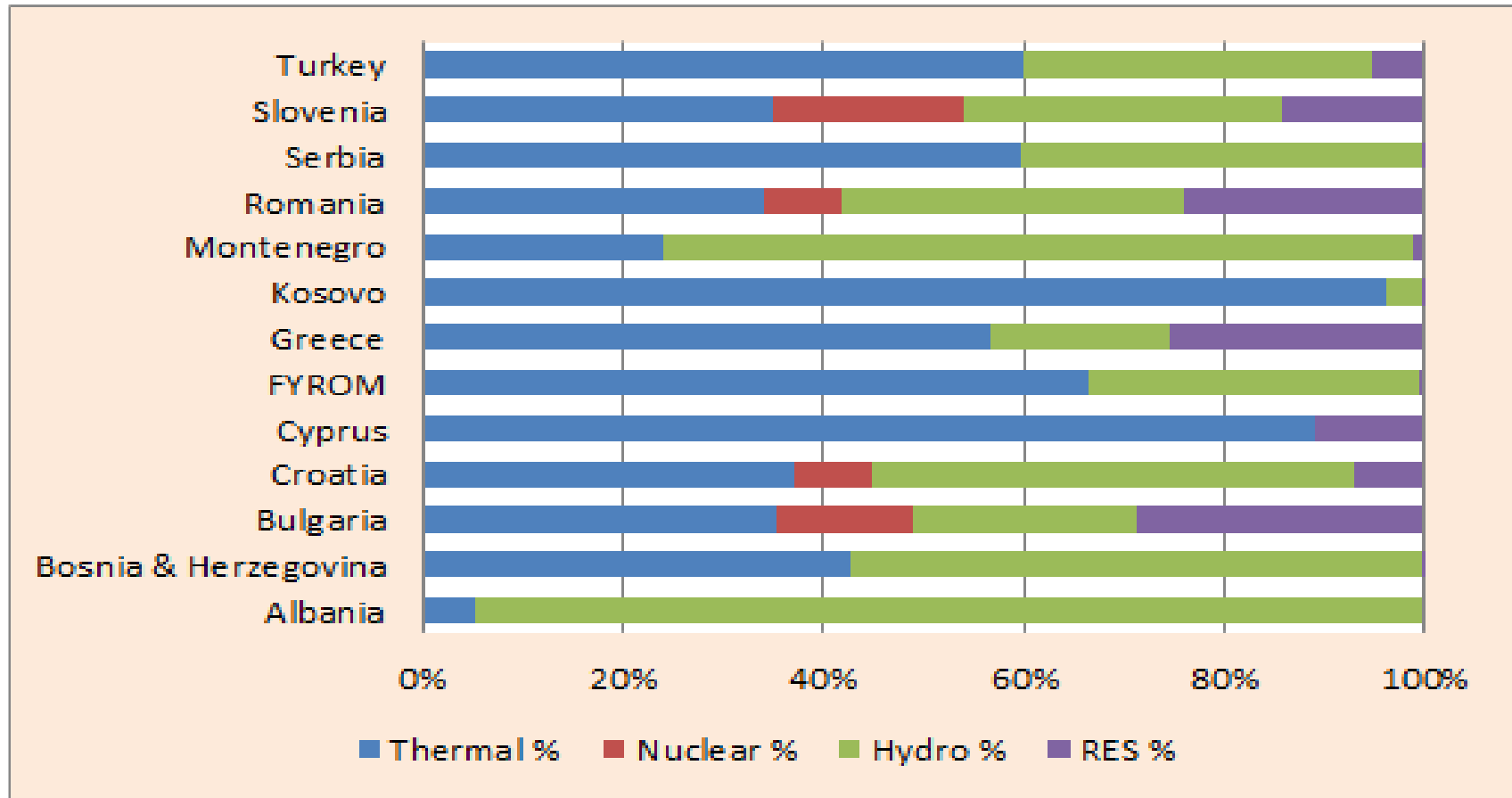
Total Installed Capacity (MW) - 2013



Source: IENE (based on TSOs' data)

Electricity Market Structure (II)

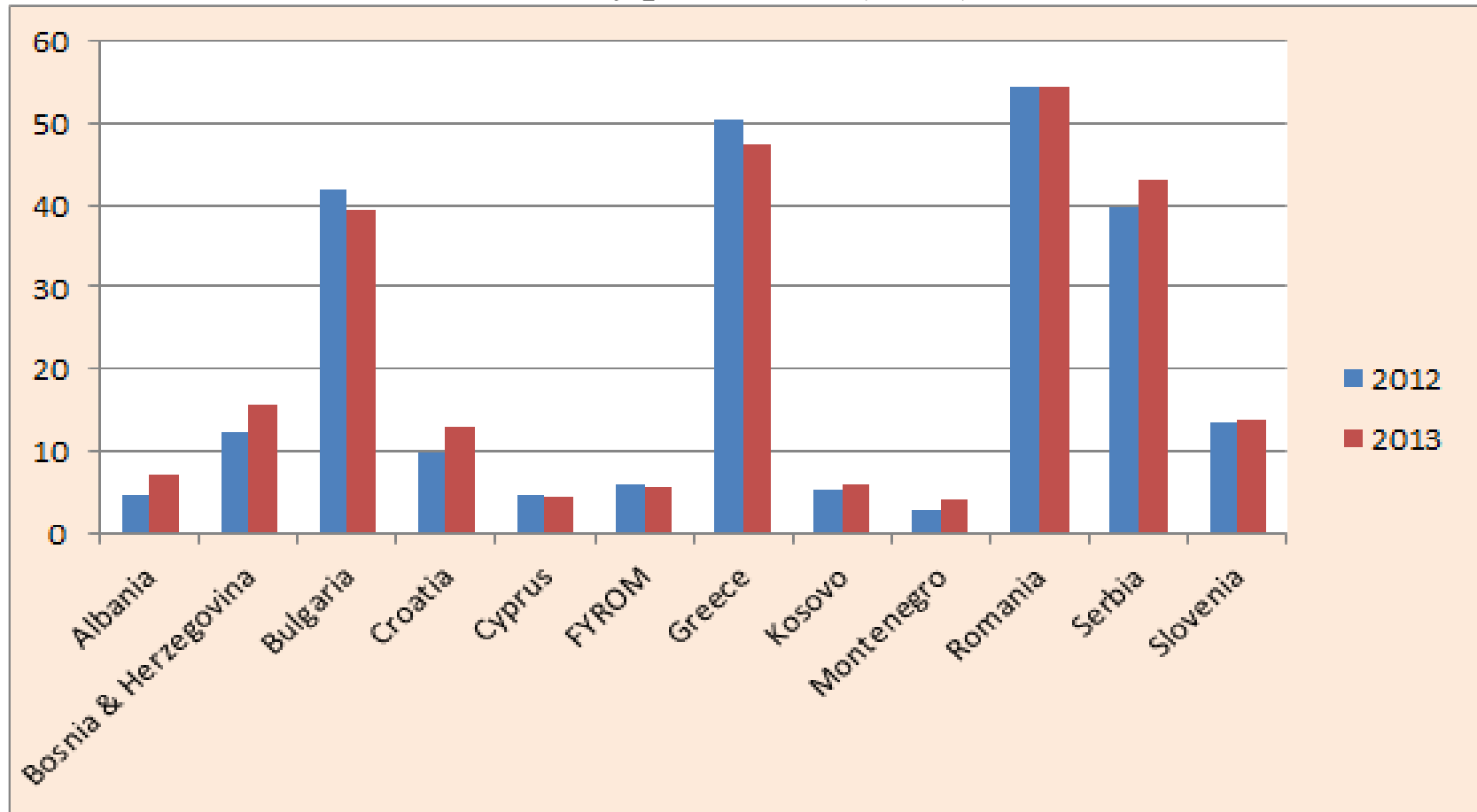
Power capacity mix per country (2013)



Source: IENE (based on TSOs' data)

Electricity Market Structure (III)

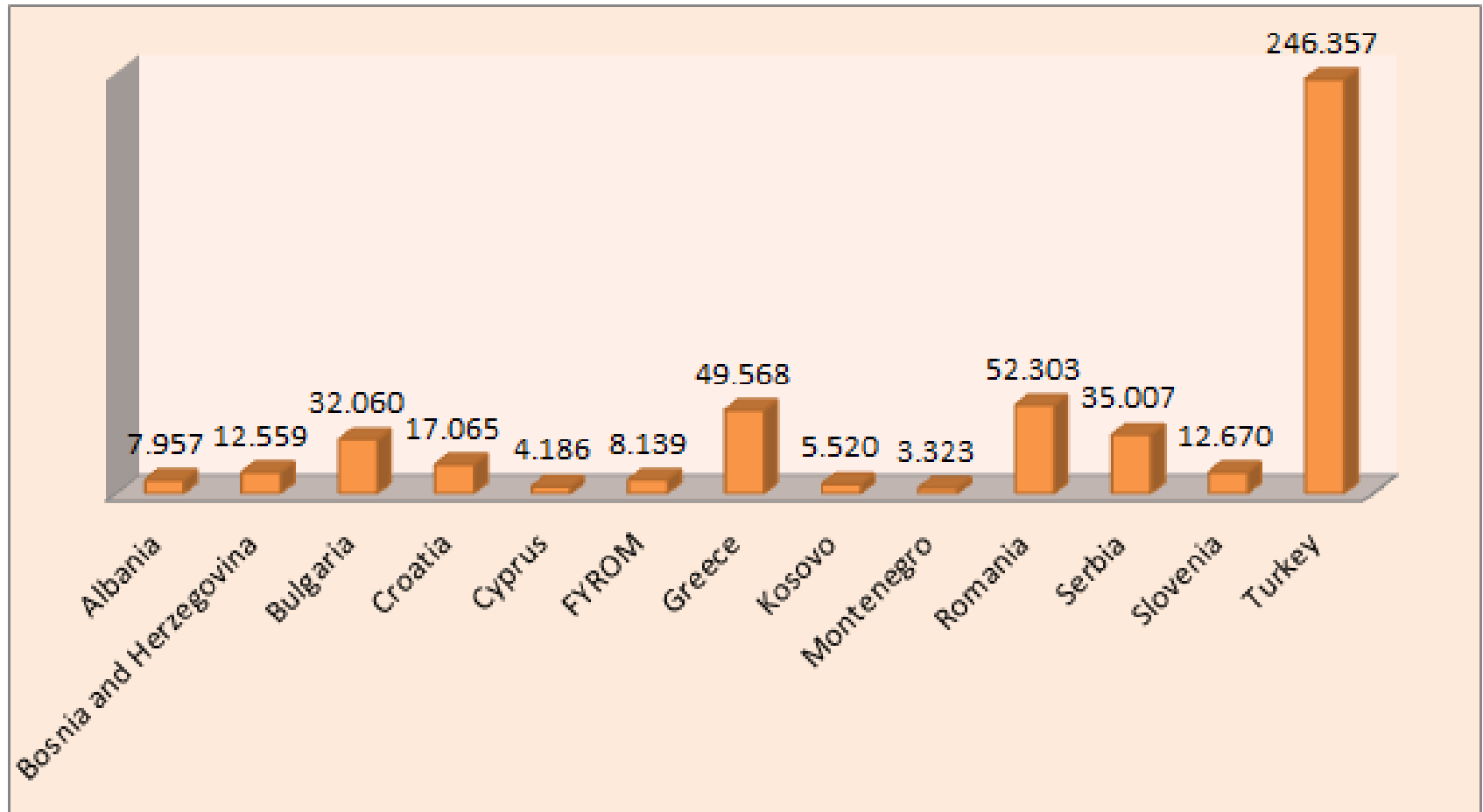
Electricity production (TWh)



Source: IENE (data provided by Entso-e and Energy Community)

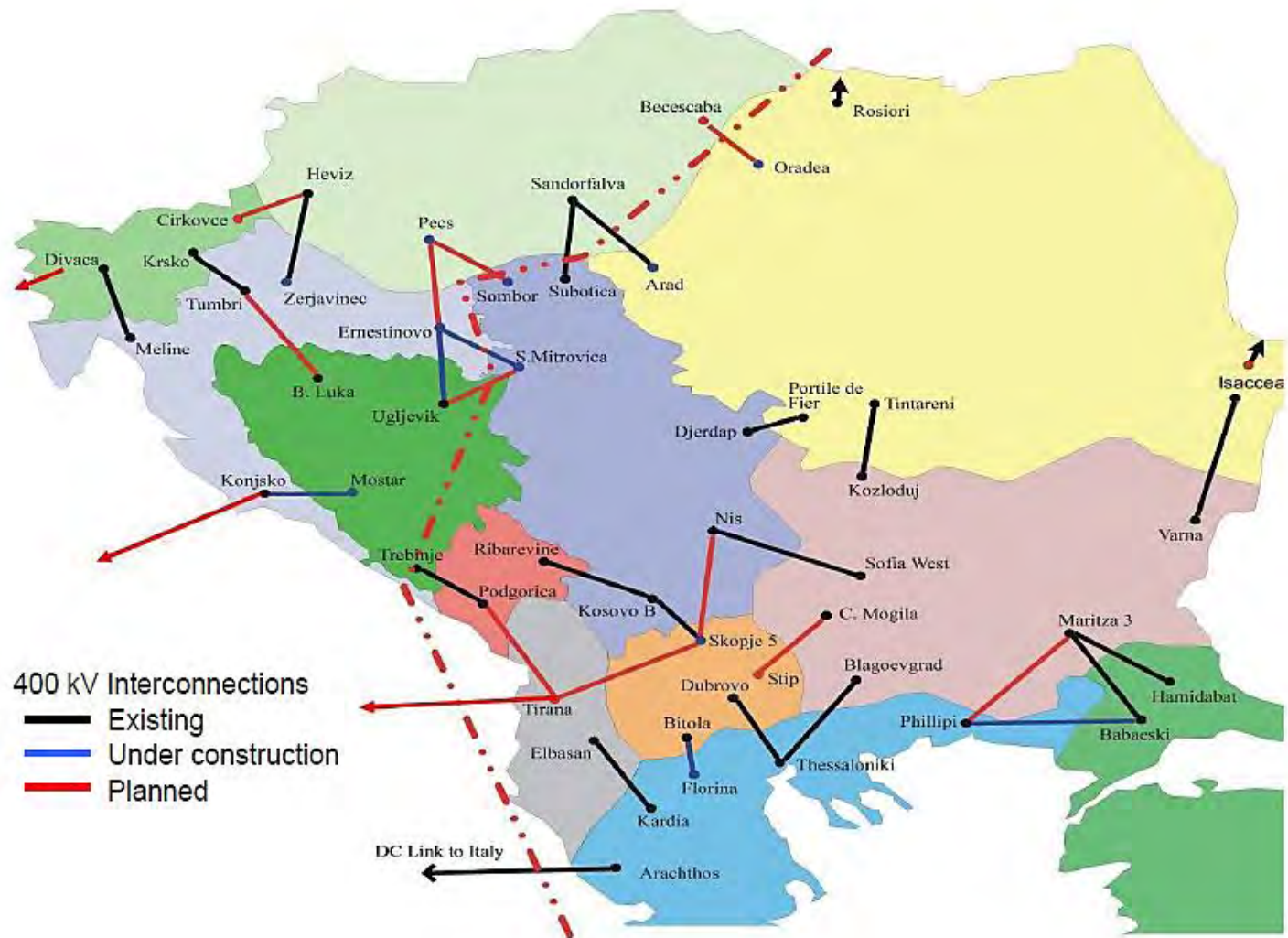
Electricity Market Structure (IV)

Electricity Consumption in 2013 (GWh)



Source: IENE (data provided by Entso-e, Energy Community and TEIAS)

Electricity cross-border interconnections in SE Europe



11. Existing Gas Pipelines in SE Europe



South Gas Corridor – Past



South Gas Corridor – Now (TAP and TANAP System)



12. Toward a Redefinition of the South Corridor (I)

- ❑ As European energy demand is set to grow over the next few years, there will be a need for increased imports as indigenous oil and gas production has reached its limits and is already declining. **Today EU 28 is more than 53% energy import dependent**, with this figure set to increase as in addition to oil and gas there is going to be a further decrease in locally produced coal and lignite in view of stringent environmental considerations.
- ❑ The **South Corridor** will play a pivotal role as an alternative entry gate for gas which will help Europe diversify both its energy supplies and its energy routes. It should be stressed that the South Corridor could strengthen the security of energy routes.
- ❑ **TANAP-TAP gas pipeline system**, which is now under construction, is the foundation of the South Corridor. However, the TANAP-TAP pipeline system is only capable of transporting limited gas volumes to Europe (i.e. 10 bcm per annum by 2020/21 plus 6 bcm which will be routed to Turkey and 20 bcm in phase two).

Toward a Redefinition of the South Corridor (II)

- Meanwhile, several gas exploration projects are in the development stage in the **East Mediterranean region** with important new gas discoveries such as the Leviathan and Tamar fields in Israel, Zohr in Egypt and Aphrodite (which borders with Zohr) in Cyprus' 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 TANAP-TAP 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 per year. Meanwhile, EC is actively exploring the possibility of massively increasing the member countries' LNG capabilities as part of Energy Union priorities.

Toward a Redefinition of the South Corridor (III)

- ❑ The now defunct **South Stream** and its possible successor the **Turkish Stream**, should also be considered as a potentially vital gas supply route.
- ❑ Furthermore, South Stream or the Turkish Stream pipeline raise the prospect for the **stalled ITGI** natural gas pipeline being developed. 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.

Toward a Redefinition of the South Corridor (IV)

- ❑ Initially, the Vertical Corridor will manage the transportation of some 3.0-5.0 bcm per year commencing from the Greek national grid in Komotini. Greece will then satisfy its domestic gas demand from four (4) different entry points (TAP, Revythousa LNG, Kipoi, FSRU Alexandroupolis), while there will be some excess gas quantities that can be exported.
- ❑ In view of several new projects under development in the region, it is time to redefine the South Corridor by including these new potential gas supply sources and routes. Therefore, **an expanded South Corridor should be considered** and defined as such, to include all major gas trunk pipelines and terminals which will feed gas into the system which will then be directed towards the main European markets.
- ❑ Finally, an expanded South Corridor with its multiple gas entry points and linked underground gas storage and LNG facilities will provide the necessary background for the operation of **regional Gas Trading Hubs** as IENE has already proposed in its relevant study “The Outlook for a Natural Gas Trading Hub in SE Europe” (IENE Study Project No. M19, September 2014).

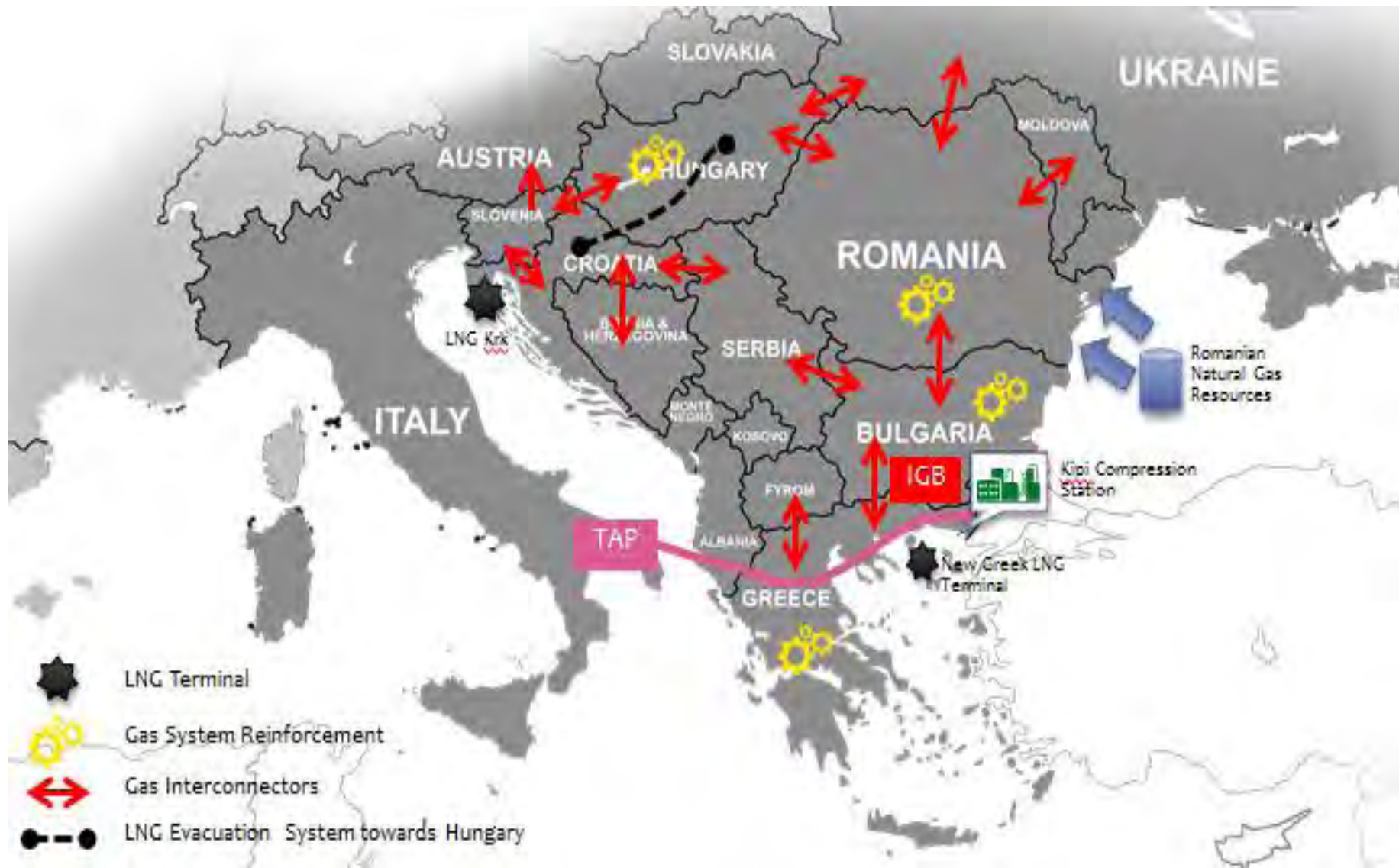
An Expanded South Corridor



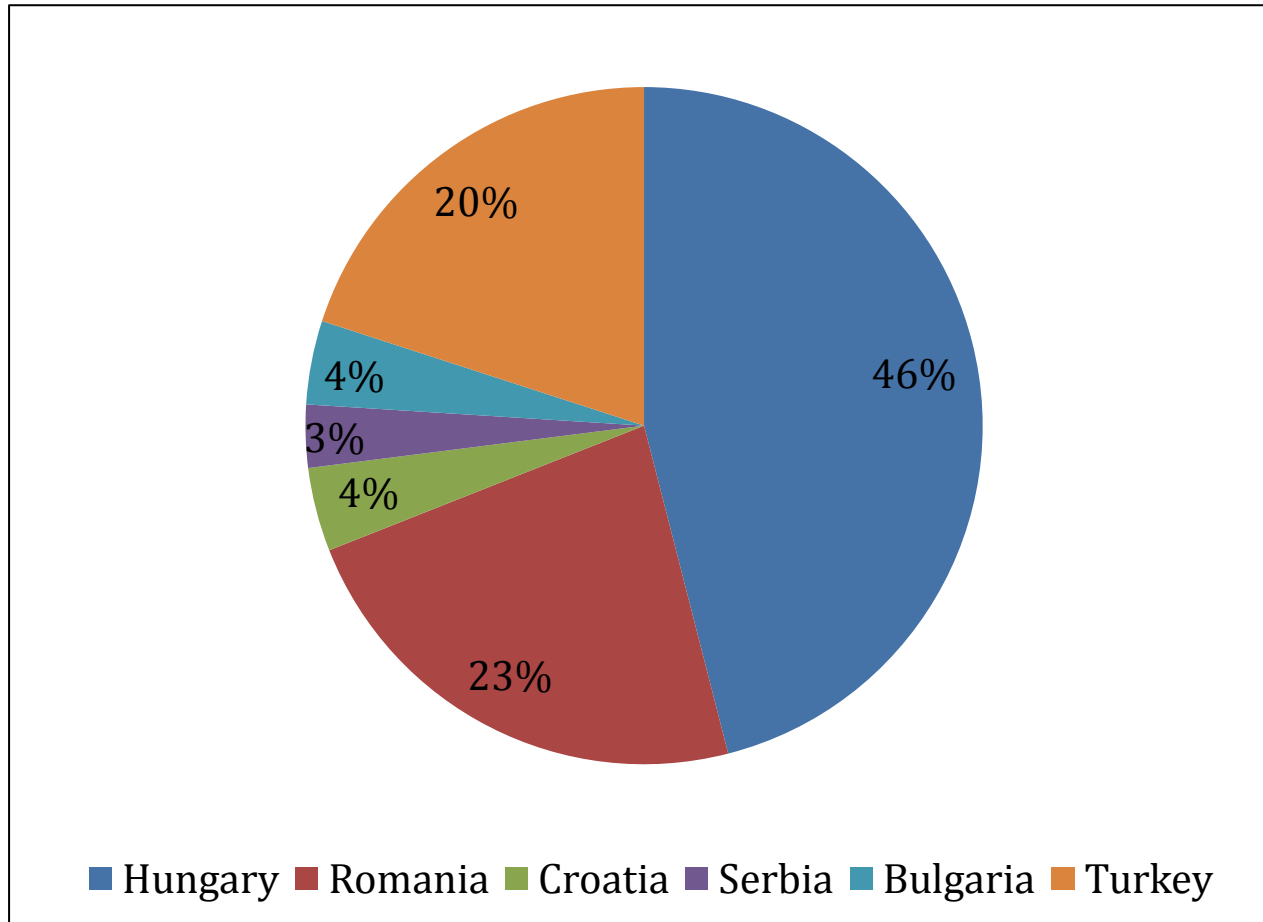
13. Gas interconnections in SE Europe



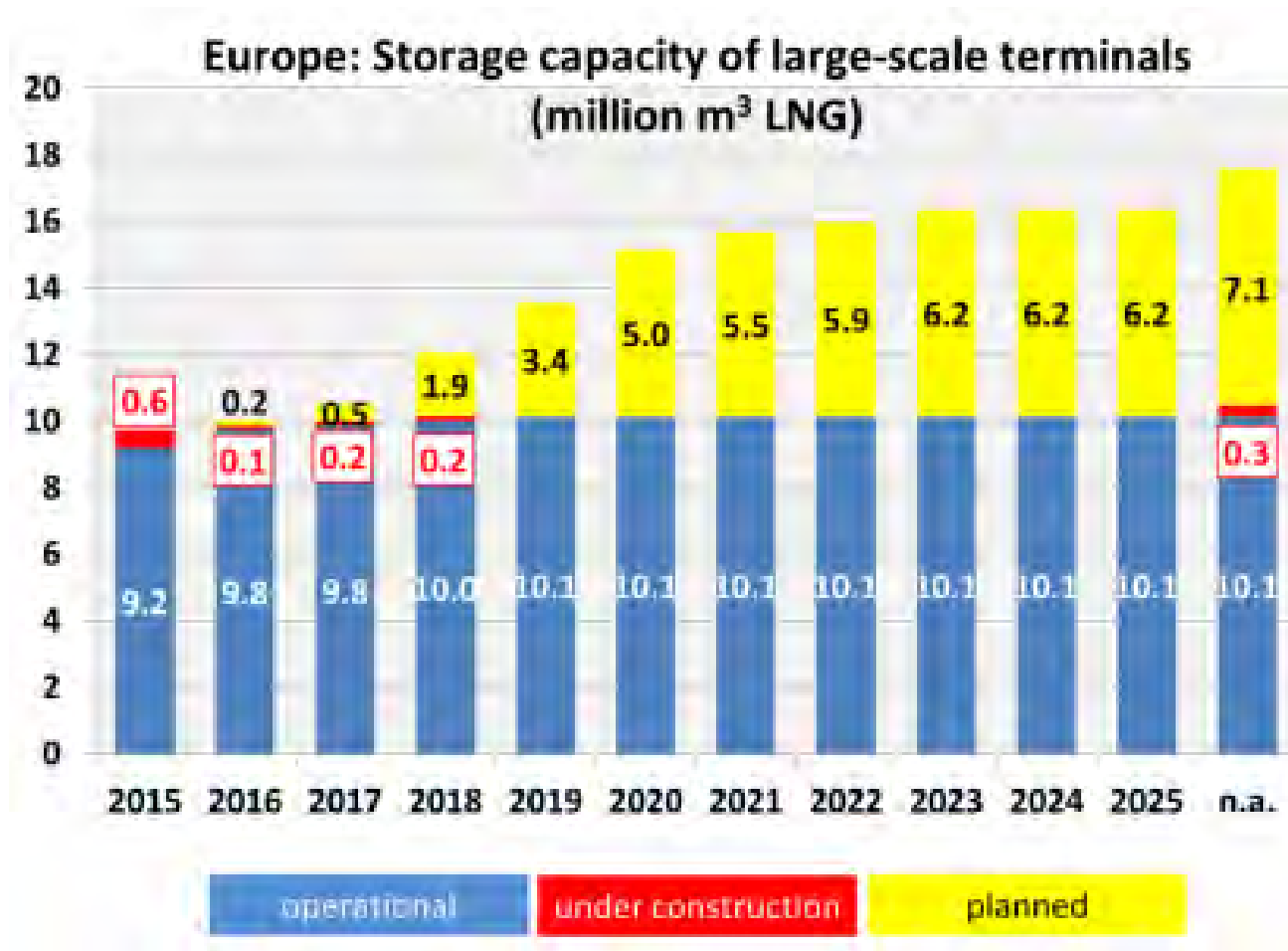
List of CESEC Priority Projects



14. Natural Gas Underground Storage in SEE (13.64 bcm in 2014)

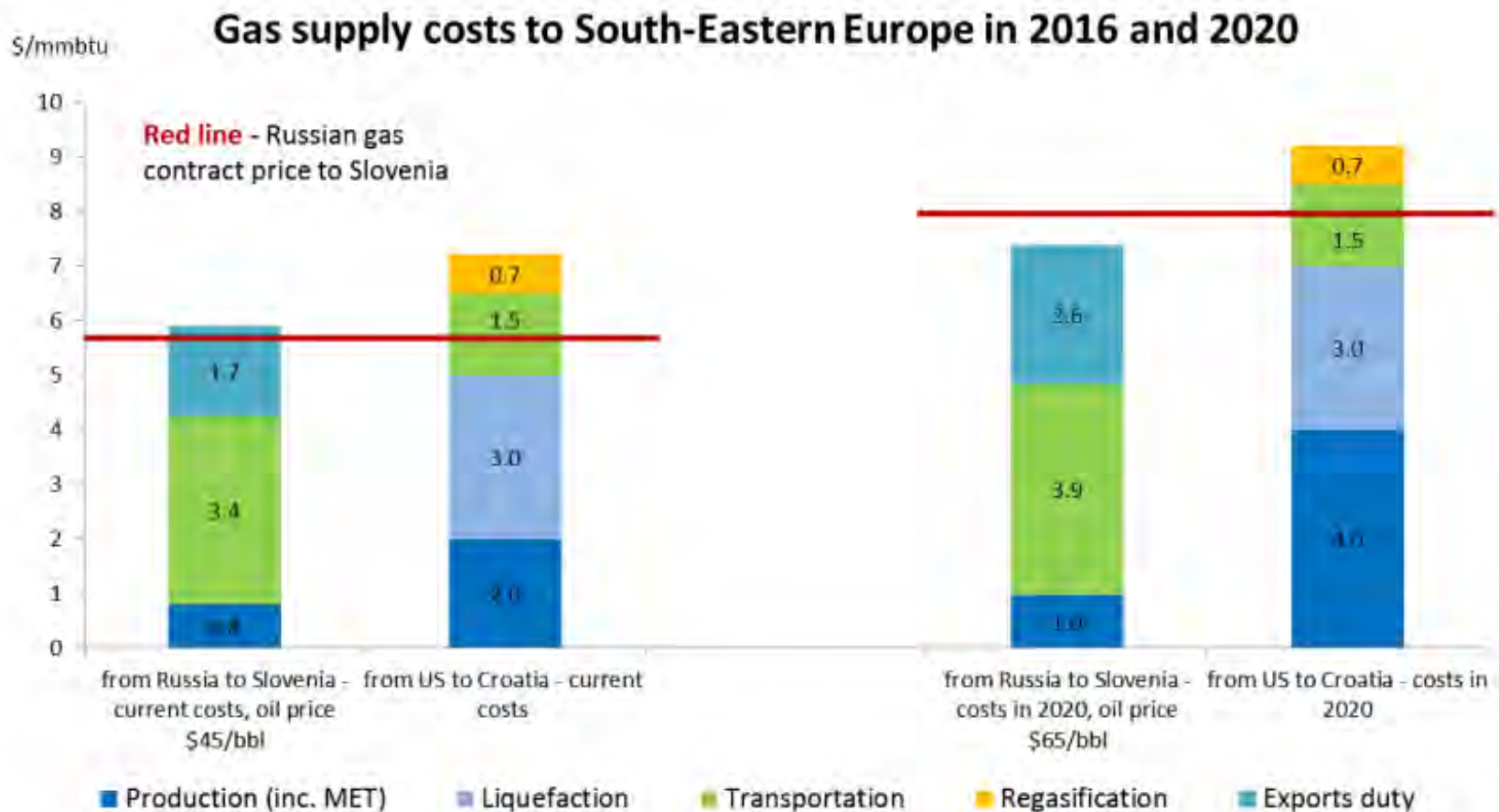


European gas storage capacity of large-scale terminals



Source: GLE LNG Map, June 2015

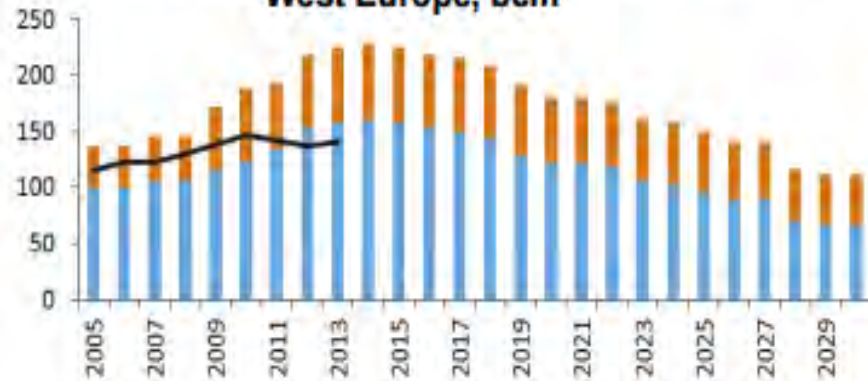
Russian gas supply costs to SE Europe are lower than those of US LNG



The shown gas supply costs are short-run marginal costs and don't equal to market prices.

Existing long-term contracts to Europe leave little room for additional gas supplies up to 2020-2025

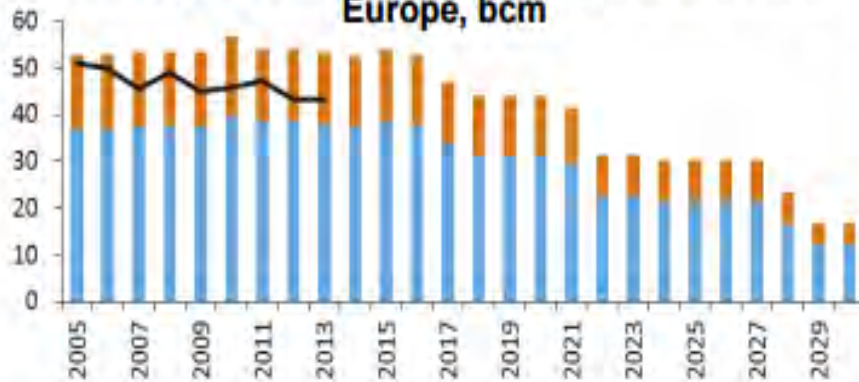
Gas supply contracts and net imports to North West Europe, bcm



Gas supply contracts and net imports to Mediterranean Europe, bcm



Gas supply contracts and net imports to Central Europe, bcm



Gas supply contracts and net imports to South East Europe, bcm



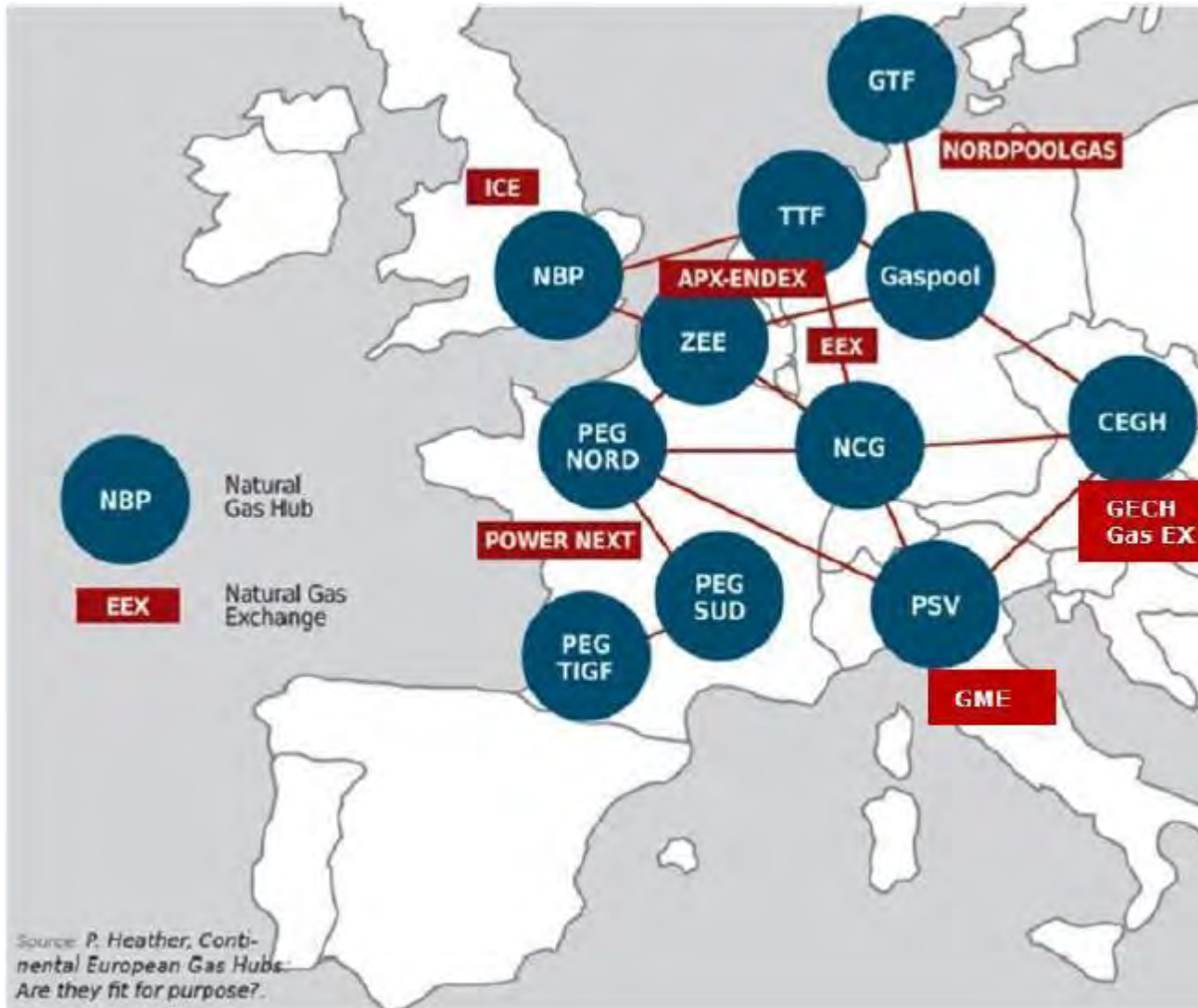
Source: Nexant, IEA database

■ Contracts MCQ
 ■ Contracts ACQ-MCQ
 — Net Imports

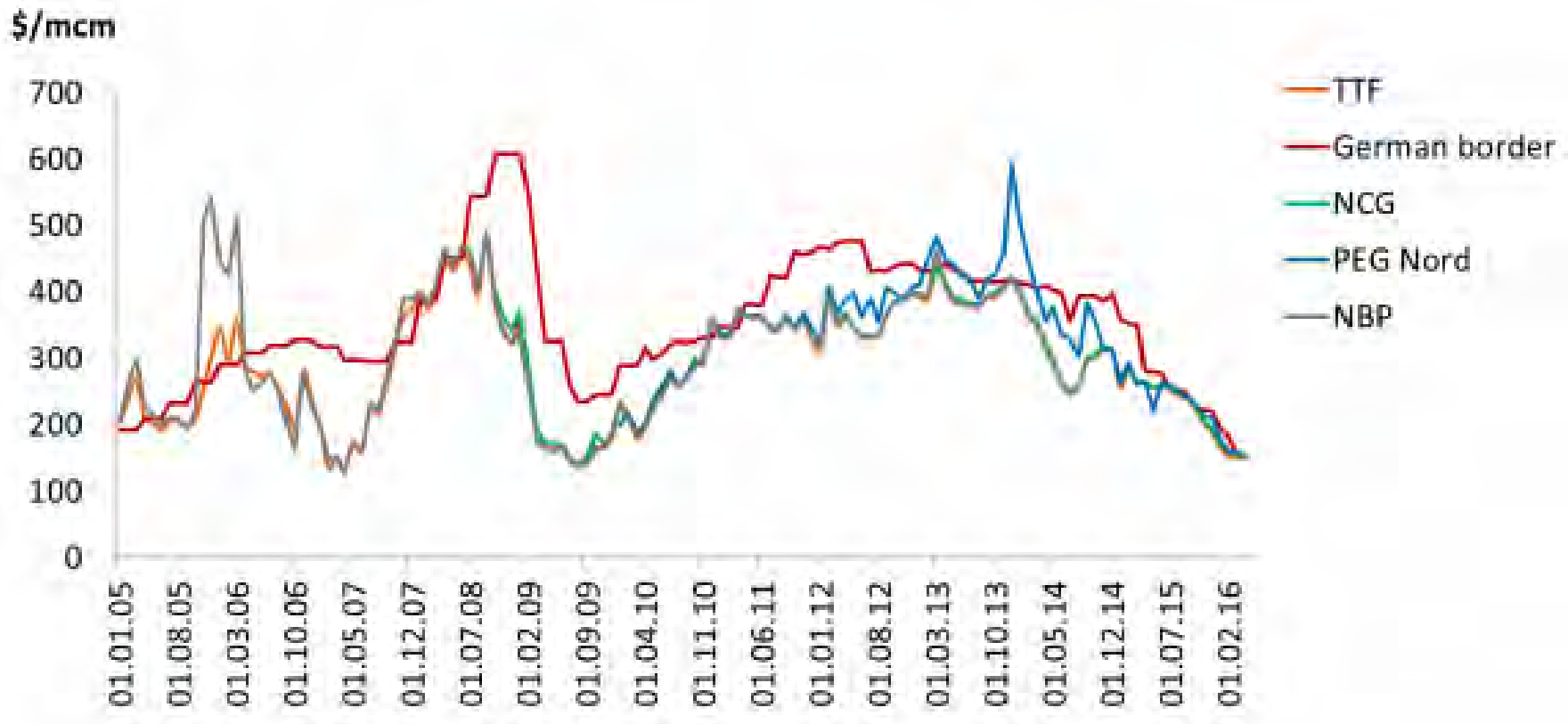
European gas market transformed irreversibly



15. European Gas Hubs and Exchanges

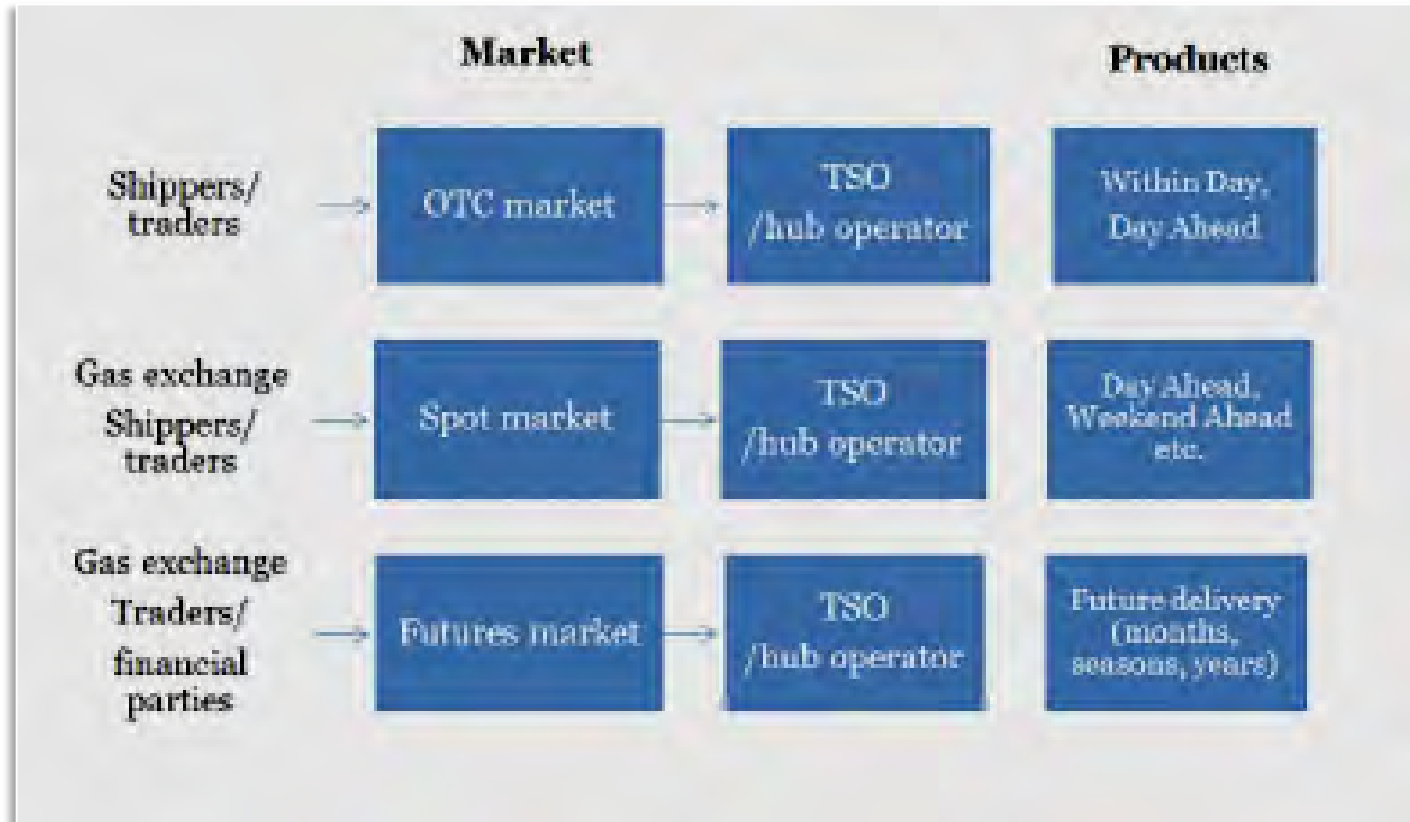


European gas prices over 2005-2016

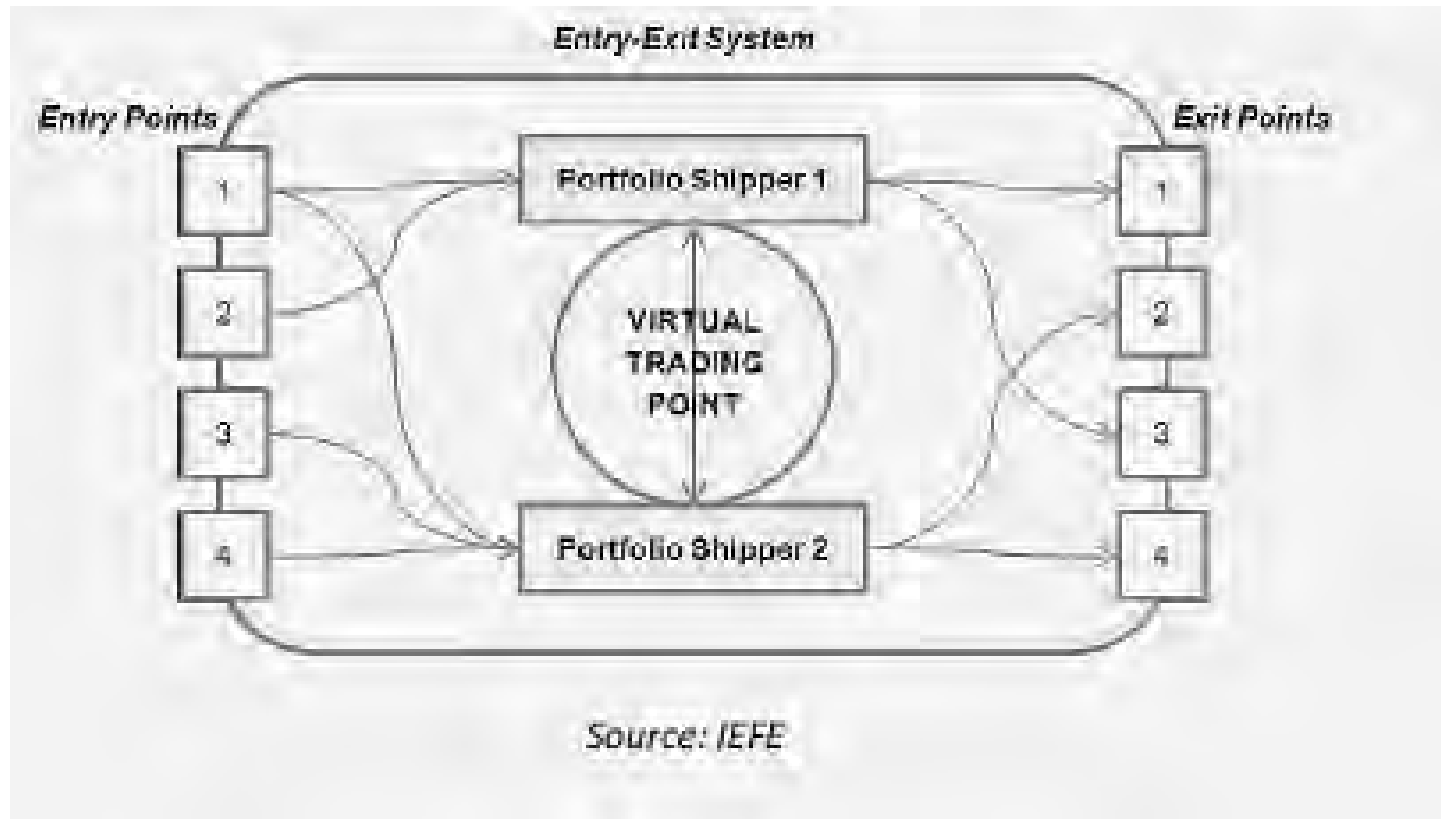


Source: EIA, NCG, Powernext, Bloomberg , IMF (2016)

Proposed Hub Design



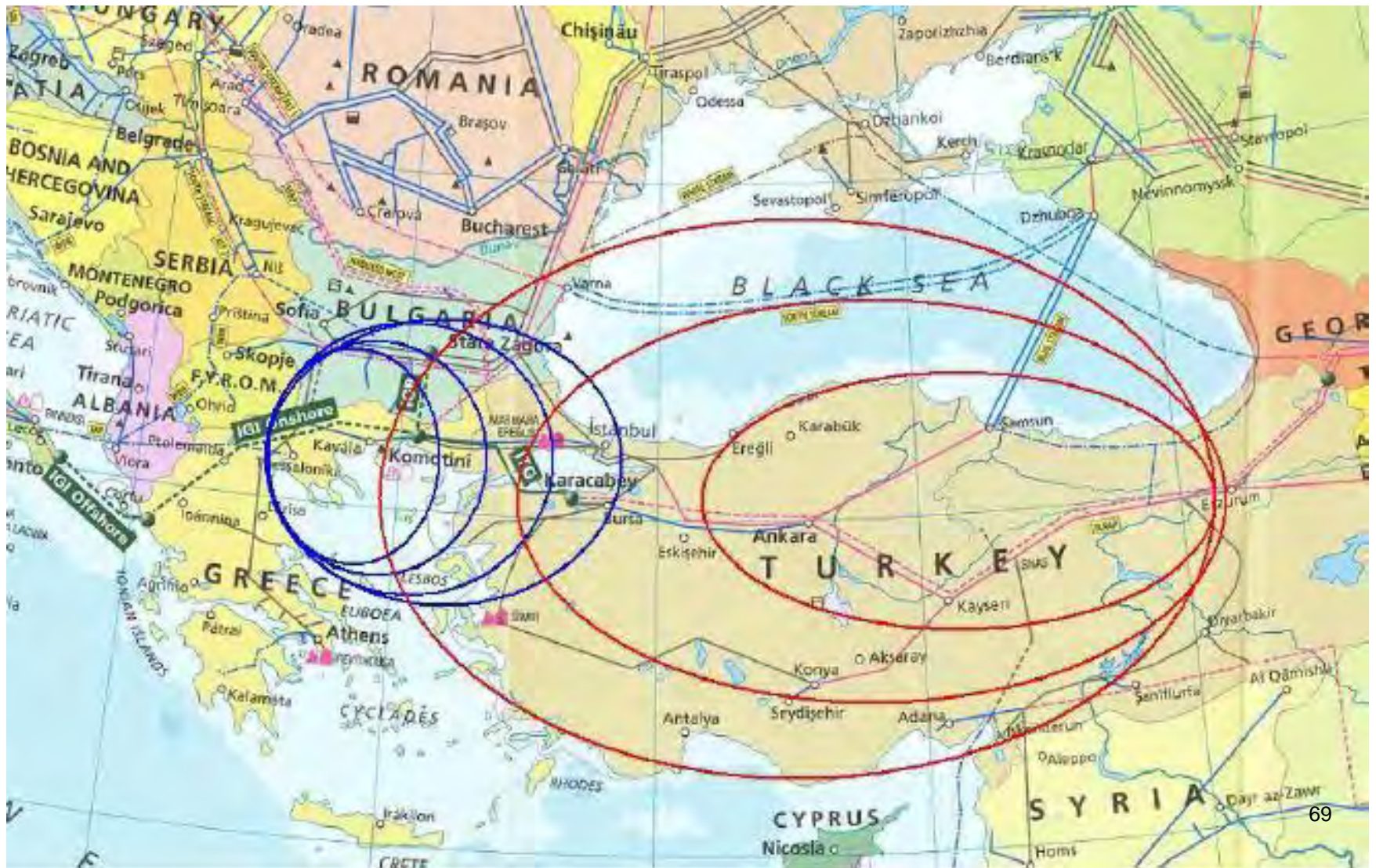
Scheme of an Entry-Exit System



Proposed Road Map for the Development of a Natural Gas Hub Based in Greece



The Thessaloniki and Istanbul Gas Trading Hubs will between them cover a wide geographical range and adjacent trading zones



16. Energy Investment Outlook 2016-2025 (I)

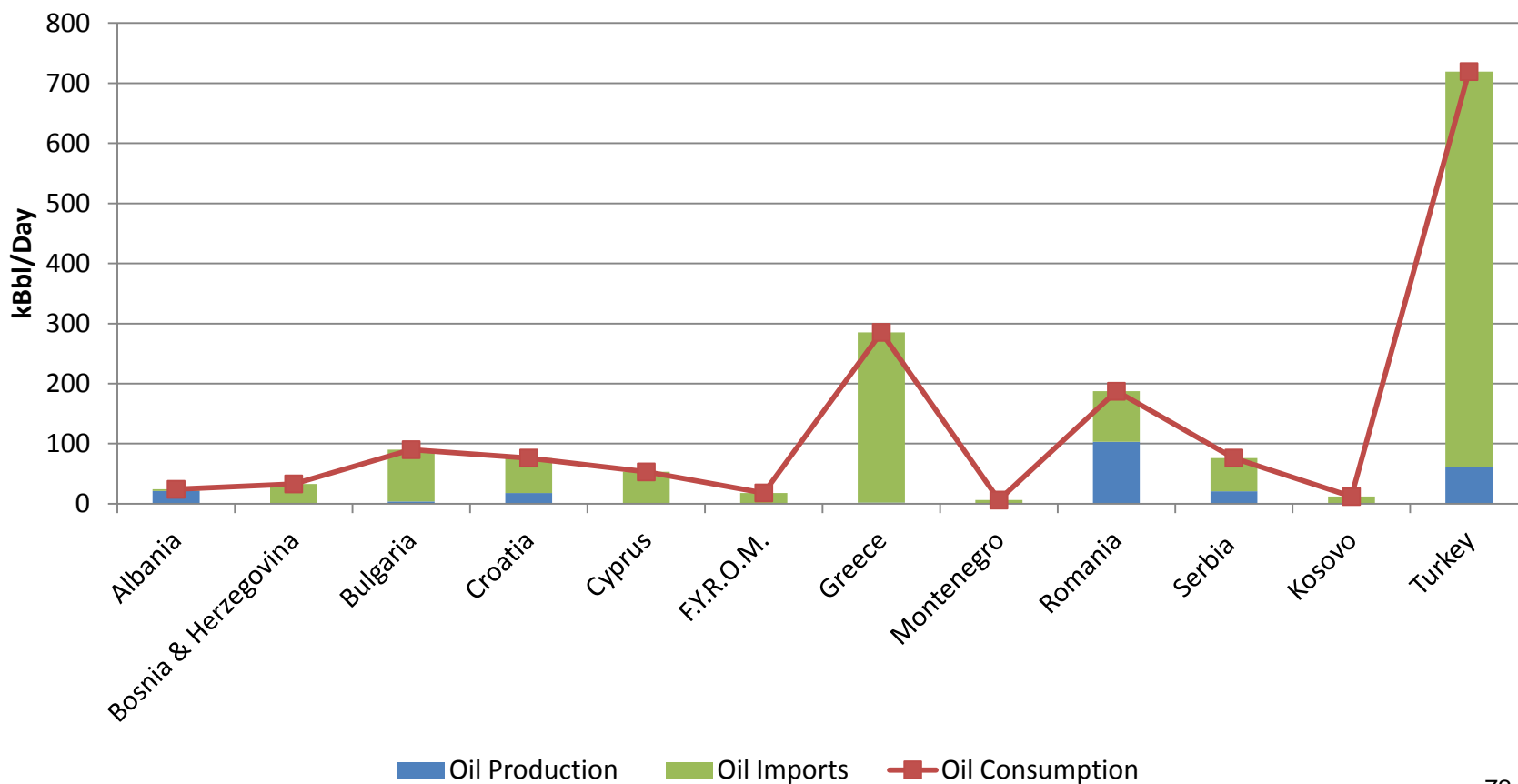
- ❑ The **investment prospects** in the energy sector of SE Europe over the next 10 years can only be described as **positive**. In terms of planned investments, we clearly have a multilayered situation as a group of six countries (e.g. Turkey, Bulgaria, Romania, Croatia, Greece) appear to be moving 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. This analysis involves **two scenarios**: An **optimistic one** with maximum investments and a **reference one**.

Preliminary Findings of Energy Investment Outlook 2016-2025 (II)

Countries	SBn	
	Scenario 1	Scenario 2
Turkey	140	95
Romania	35	26
Greece	25	20
Croatia	16	12
Cyprus	14	11
Bulgaria	11	7
The Other Countries	24	19
Regional infrastructure projects (TANAP, TAP, East Med, IBG/IGB, ITGI, Electricity interconnections)	25	15
Total	290	205

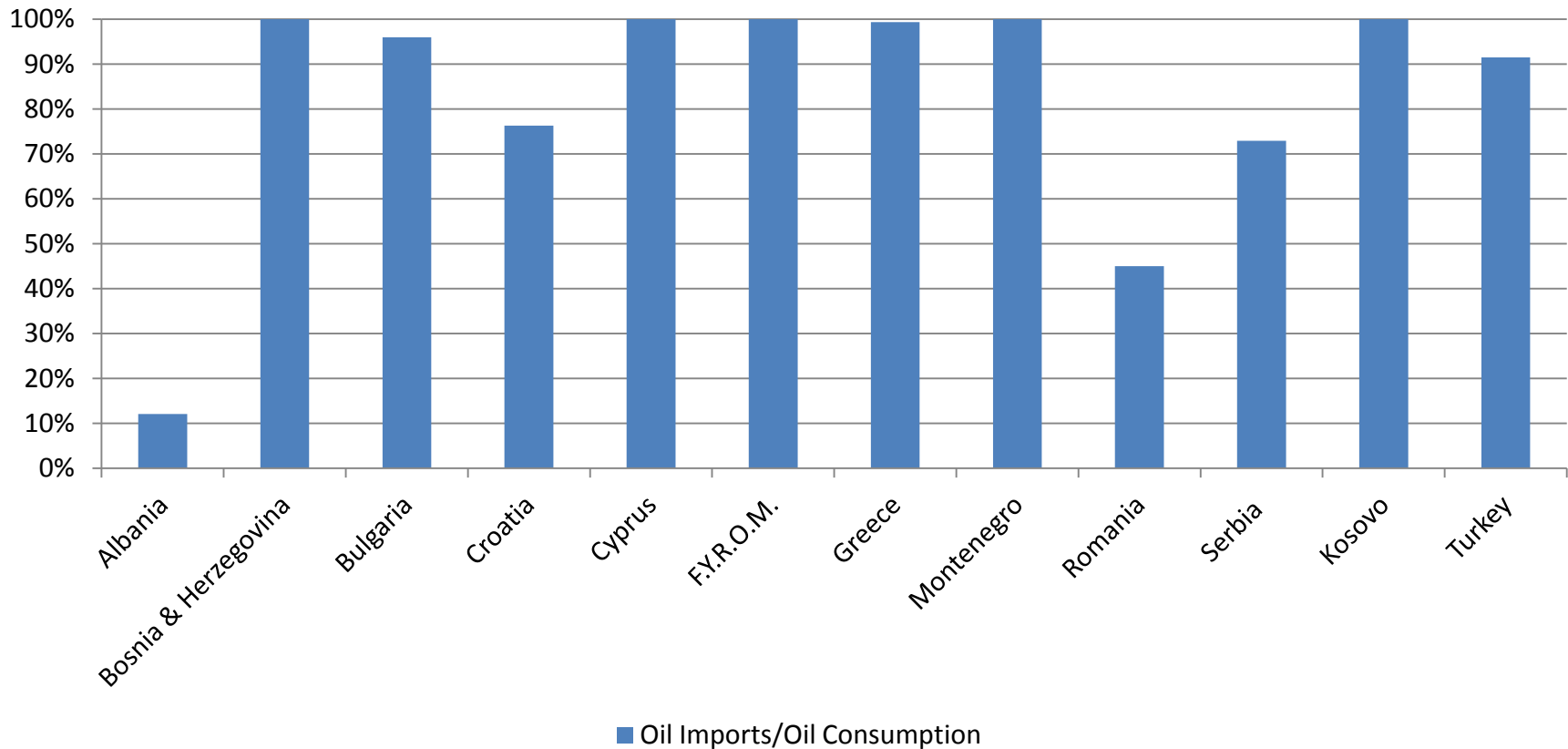
17. Key Regional Energy Issues – Current situation (Ia)

Oil Import Overdependency in SE Europe (2014 Provisional)



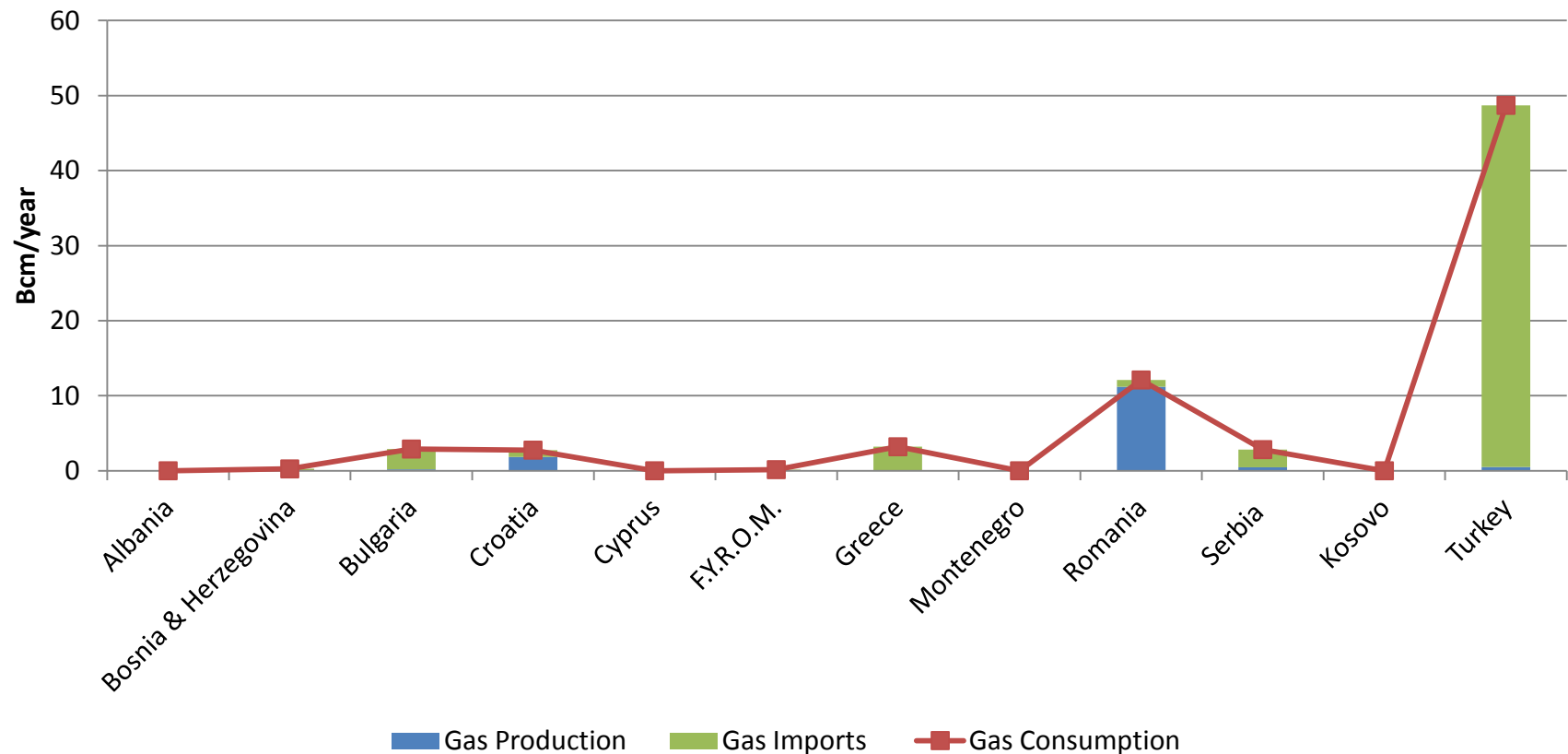
Key Regional Energy Issues – Current situation (Ib)

Oil Import Overdependency (%) in SE Europe (2014 Provisional)



Key Regional Energy Issues – Current situation (IIa)

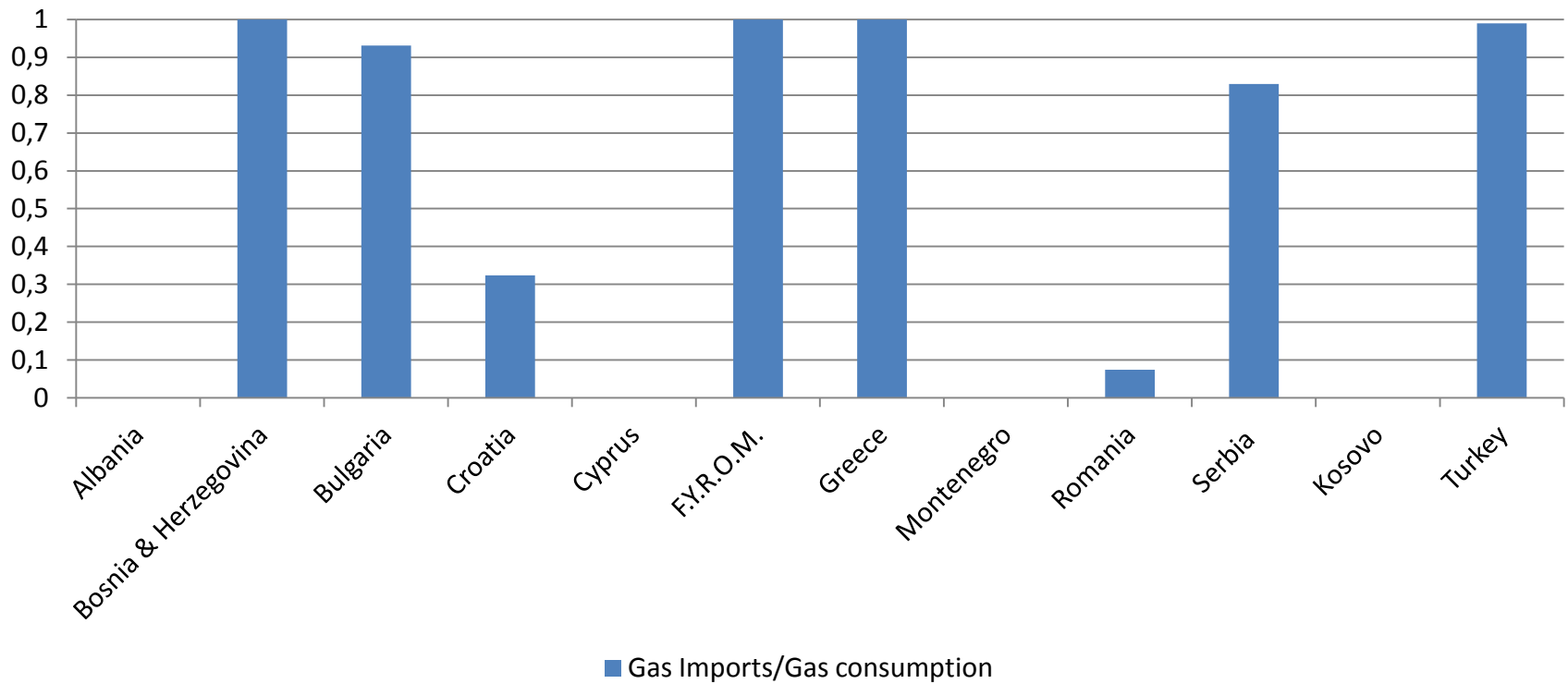
Gas Import Overdependency in SE Europe (2014 Provisional)



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

Key Regional Energy Issues – Current situation (IIb)

Gas Import Overdependency (%) in SE Europe (2014 Provisional)



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

Key Regional Energy Issues – Current situation (III)

- Impact of New Oil Price Regime (50% Plunge in Oil Prices)
 - **Positive** impact on public finances of most countries
 - **Negative** impact on oil and gas exploration activities
- Electricity and gas interconnections
 - **Gas interconnections:** Region lags seriously behind Central and North Europe.
 - **Electricity interconnections:** Following the commencement of SEE CAO, cross-border market coupling and new interconnections (eg. Greece-Turkey), the situation in electricity interconnections has improved.

Key Regional Energy Issues – Current situation (IV)

- The coal predicament of SE Europe – the region's great dependence on coal-fired power generation vs environmental protection
 - In the case of SE Europe, economic development, largely based on the utilization of indigenous lignite/coal resources, will have to be reconciled with COP 21 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 (eg. examine CCS/CCU options) needs to be undertaken before introducing realistic policies for decarbonisation.
- The ascending importance of RES and Energy Efficiency
 - There is high potential of RES in SE Europe, such as **solar, wind, hydro, biomass, and geothermal still remains largely unexploited by many countries**. In the West Balkans, RES remain largely unexploited, but in other countries, such as Romania, Greece and Turkey, RES have advanced considerably over last 10 years.
 - The region is characterized by distinctly different (in terms of structure and operation) and frequently segregated electricity markets. There are great difficulties of advocating common RES strategies most of which are linked to smooth electricity market operation.

Key Regional Energy Issues – Current situation (V)

- The Fukushima accident has reignited discussions on the future of nuclear energy globally and regionally. There appears to be limited interest for new nuclear power plants in the region. Only Romania and Turkey have specific plans.
- In the SEE region, a total of 493 TWh were produced in 2013, up by 1.6% compared to 2012. Thermal power plants have the biggest share in the region's electricity production. In 2013, their participation was approximately 64%, hydropower plants contributed 25% of total production, while nuclear power plants and RES contributed 6% and 5% respectively in the same year.
- The region's energy mix is changing but slowly.
 - There is higher use of coal (lignite), higher penetration of gas, more RES and lesser use of oil in comparison between 2005 and 2015, as shown previously.

18. Key Regional Energy Issues: What lies ahead? (I)

- Impact of Oil Price Plunge in Oil & Gas Exploration
 - **Short-term:** Noted **improvement** in public finances of most countries and **negative** impact on their exploration activities.
 - **Medium-term:** Cuts in CAPEX will reduce oil supply and thus, there will be a tendency for oil price recovery.
- Electricity and gas interconnections
 - **Gas interconnections:** Positive outlook as several new cross-border interconnections are entering final planning stage.
 - **Electricity interconnections:** In view of current plans by various TSOs, the region's interconnectivity will be improved considerably by 2025 (Italy-Greece and Italy-Montenegro electricity interconnections and Greek Archipelago and Crete connected to mainland).

Key Regional Energy Issues: What lies ahead? (II)

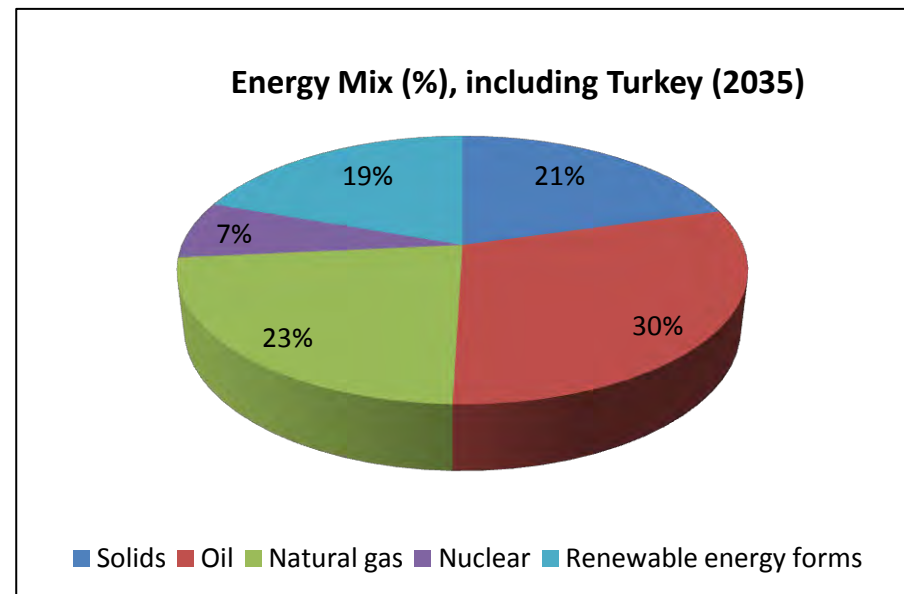
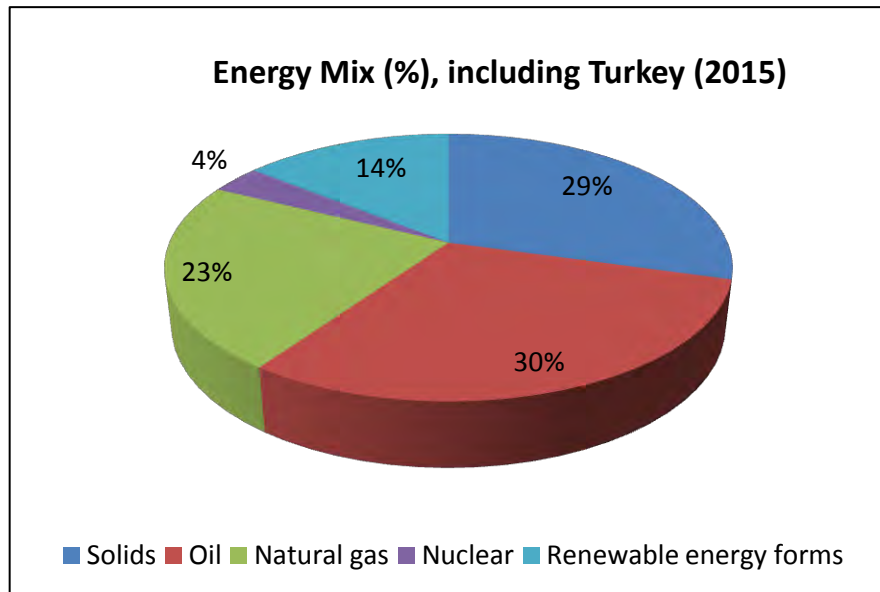
- Indigenous Coal Resources Vs Environmental and Decarbonisation Policies
 - **Lignite** and **coal** will continue to contribute to power generation in SE Europe but with decreasing trends in the long term. However, over the next ten years, the share of solid fuels is anticipated to steadily increase in some countries of the region in order to meet increasing demand at competitive prices (eg. Turkey and Greece).
 - **Gas** will continue to gain share in the energy mix, at least over the next 15 years in Europe and in the SEE region in particular, substituting old and inefficient lignite and coal units, mainly because of **its environmental friendly characteristics** and increased availability, the higher demand for gas-fired electricity and the expected socio-economic development. However, gas will compete with RES (eg. summer period).

Key Regional Energy Issues: What lies ahead? (III)

- The ascending importance of RES and Energy Efficiency
 - The power generation portfolio in SE Europe (excluding Turkey) **is dominated by coal and hydropower**, generating 47% and 48% of electricity respectively. RES deployment (excluding large and small hydropower) is at a relatively early stage in the region, generating less than 4% of the electricity (2013).
 - A **significant potential** for both wind and solar energy has been identified and capacities are expected to increase in the future. It is worth mentioning that RES applications will continue upward trend from 2017 onwards with emphasis on wind and biomass and rooftop PV.
- The 2011 Fukushima accident reignited discussions on the future of nuclear energy globally and regionally
 - The region's relative reliance on nuclear power is unlikely to diminish over the next decade. Neither Bulgaria nor Romania are likely to shut down their power plants as they are aware as they cannot replace nuclear capacity that easily.
 - According to stated plans, we are going to see the addition of at least 11 GW of new nuclear capacity by 2025 in the region.

Key Regional Energy Issues: What lies ahead? (IV)

- The region's changing energy mix (Comparison between 2015 and 2035)
 - Substantial changes are foreseen over next 20 years with lower use of coal (lignite), stable contribution of gas and oil, more RES penetration and higher use of nuclear power.



19. Methodology

□ **Data Collection**

- 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, GoGen Europe, EREF). Also from various national statistical organisations and national energy regulatory agencies
- Contributions by individual energy experts from all different countries of the region focusing on Country Profiles and Sectorial Analysis

□ **Analysis**

Various conventional analytical tools and computer stimulation models are used in analysing quantitative data for macroeconomic and energy demand forecasting. In this respect, IENE is collaborating closely with Professor Pantelis Capros and the EC3 Lab at the National Technical University of Athens (NTUA)

□ **Synthesis**

It is done in-house by IENE's core study team comprising economists, engineers, English language and philosophy majors and experts from all different areas of the energy sector



- The “SE Europe Energy Outlook 2015-2016” Study is funded by:

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