SE Europe Energy Outlook 2016/2017

10th SE Europe Energy Dialogue

"Connecting SE Europe's Energy Markets"

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A Presentation by Mr. **Costis Stambolis**,
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Institute of Energy for S.E. Europe (IENE), Athens

INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE

Presentation Outline

1. Study Scope & Focus
2. Methodology
3. Raison d' Être
4. The SE Europe Area Defined
5. The Political and Economic Context
6. Basic Energy Data for SE Europe
7. Key Regional Energy Issues: Decarbonisation and Energy Security
8. Towards a Redefinition of the South Corridor
9. Gas and Electricity Markets
10. A Natural Gas Trading Hub for SE Europe
11. Energy Demand and Supply Projections
12. Regional Energy Mix: What lies ahead?
13. Energy Demand and Consumption Trends over 2005-2050
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15. Sources of Finance vs Country Risk
16. Key Messages

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

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Methodology

- **Data acquisition and analysis from various regional conferences and workshops organised by IENE between 2013 and 2016**
  - 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 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 E3M Lab at the National Technical University of Athens (NTUA)
- **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

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Contents of SEEEO 2016/2017 Study

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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 Europe 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"*.

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The SE European Region Defined

Core Countries

- Albania
- BiH
- Bulgaria
- Croatia
- Cyprus
- FYROM
- Greece
- Kosovo
- Montenegro
- Romania
- Serbia
- Slovenia
- Turkey

Peripheral Countries

- Egypt
- Hungary
- Israel
- Italy
- Lebanon
- Moldova
- Syria
- Ukraine

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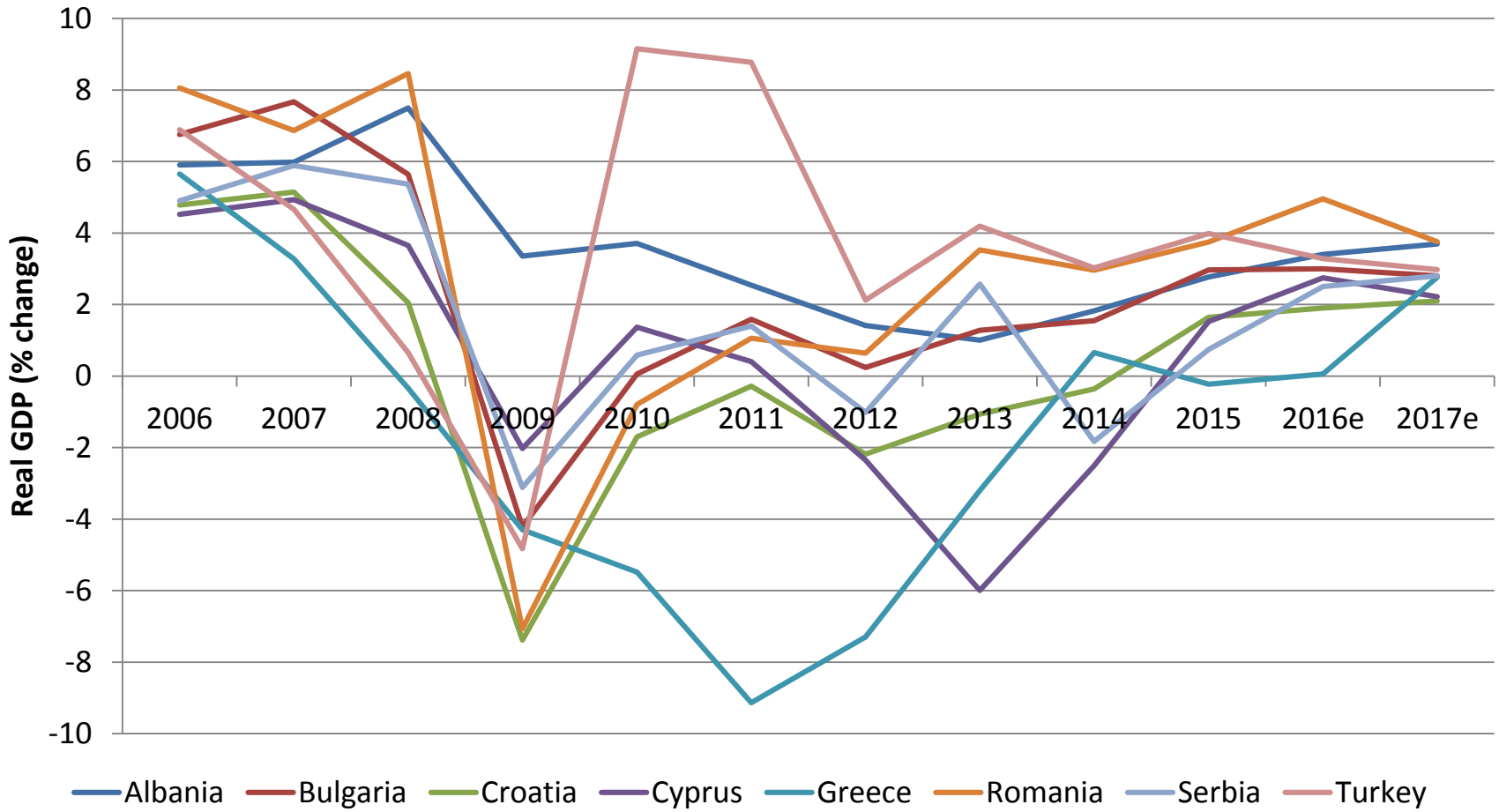
The Political Context

Historically restful, SE Europe even today appears to be somehow in turmoil. This impacts the economy and energy.

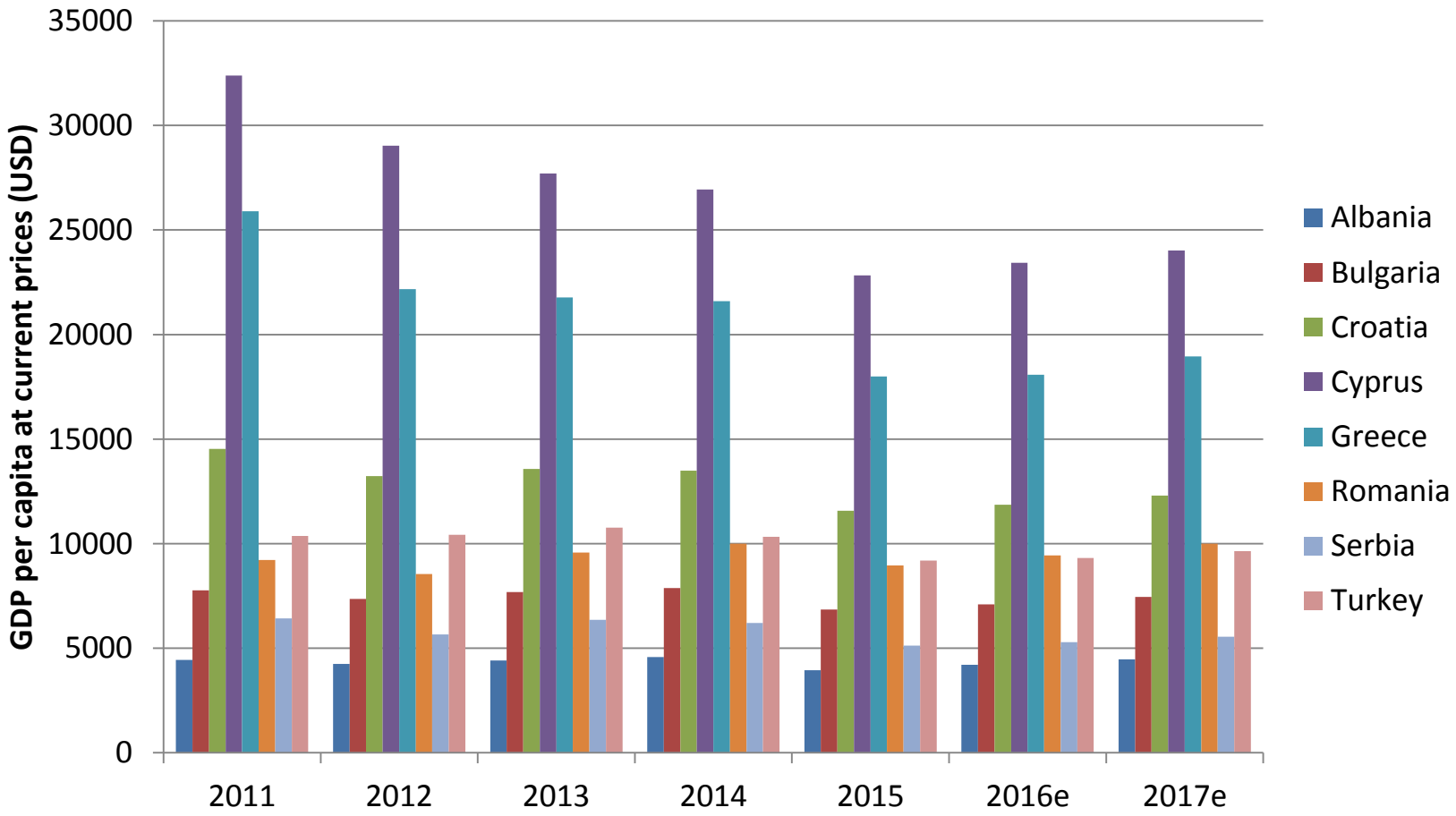
- **Croatia:** Political turmoil, after the PM dismissed three ministers. Junior party quits government coalition.
- **Turkey:** Political persecutions continue at all levels of the administration following the failed coup of last July. Rising tensions in relations with EU, Greece and Cyprus and unresolved problems with Kurdish minority. Entanglement in Syrian crisis.
- **Kosovo:** Fall of the government following a motion of censure after a long period of political instability. Constant tension with Serbia, while the country lacks recognition by many UN members.
- **FYROM:** Besides the name dispute, faces a dangerous spike in ethnic tensions as Albanian minority demands increased rights and changes in the constitution.
- **Albania:** Opposition has vowed to boycott the 18 June parliamentary elections. Accusations by Serbia and FYROM for internal intervention on behalf of the Albanian PM and Minister of Foreign Affairs over statements concerning the Albanian communities in these countries.

The Economies of SE Europe – Real GDP



Source: World Economic Outlook Database (IMF, October 2016) and IENE

The Economies of SE Europe – GDP per Capita



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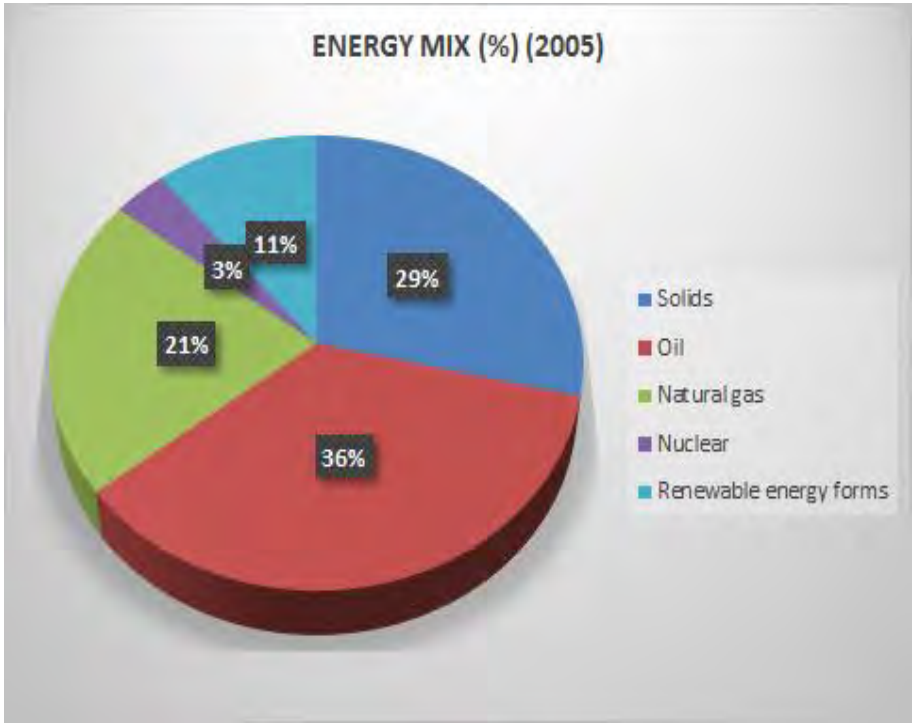
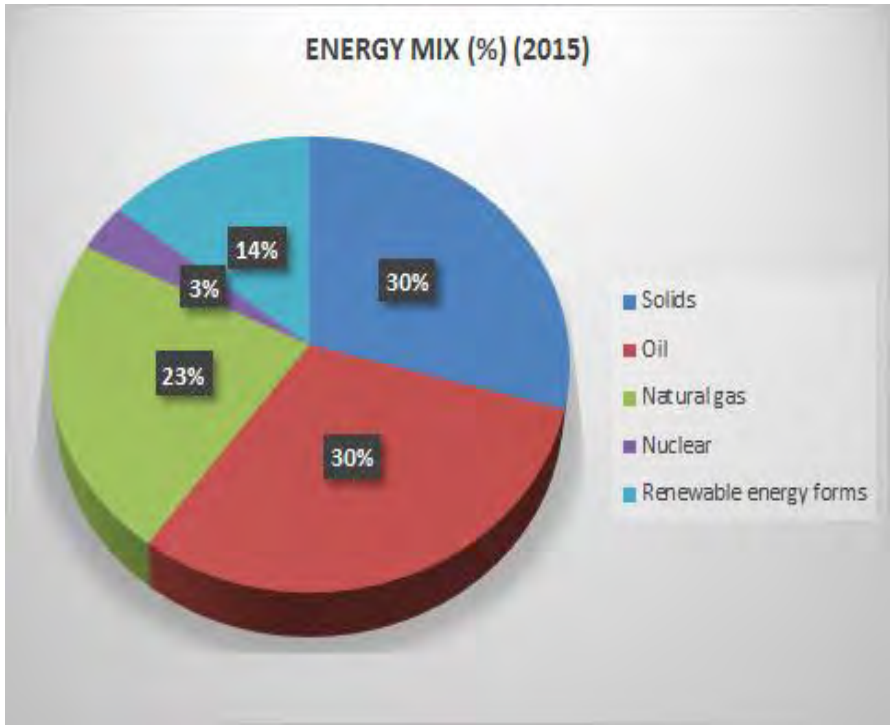
2015 Basic Energy Data for SE Europe

Region	Oil Consumption (b/d)	Gas consumption (bcm/y)	Electricity consumption (TWh)
SE Europe	1,579,870 (≈13.9% of EU-28)	67.00 (≈16.8% of EU-28)	504.2 (≈18.4% of EU-28)
EU-28	11,376,680	397.7	2,745

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

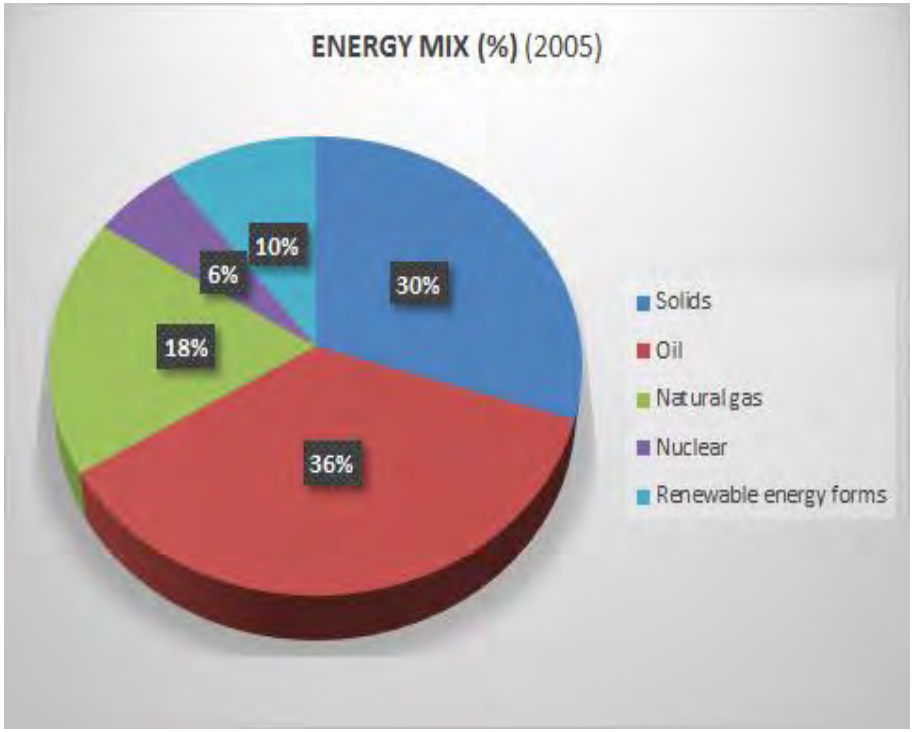
SE Europe: Gross Inland Consumption by Source, **Including Turkey** (2005 and 2015)

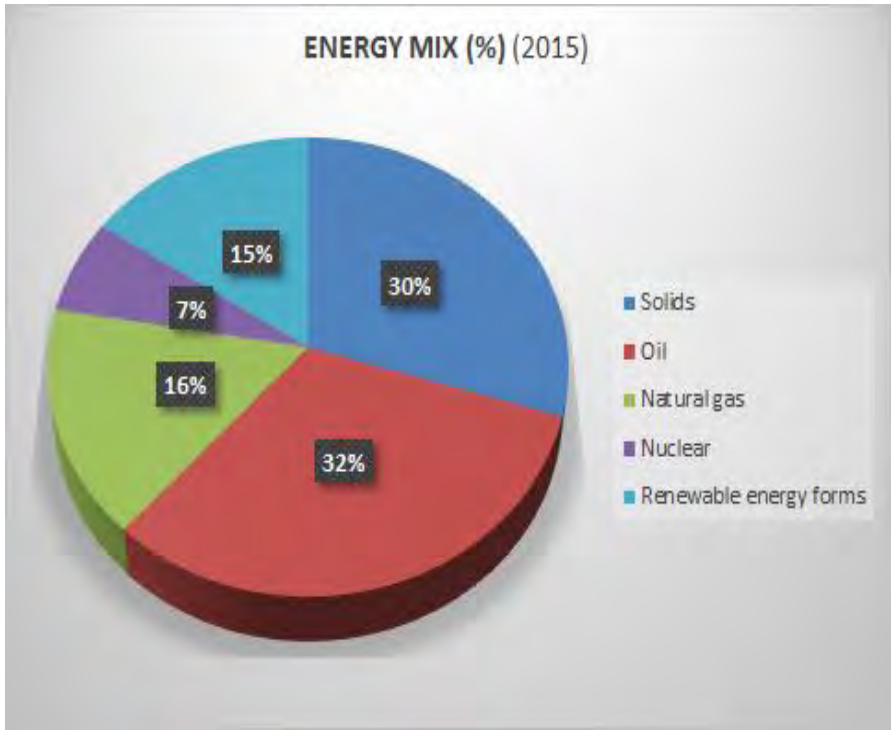




Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Gross Inland Consumption by Source, **Without Turkey** (2005 and 2015)





Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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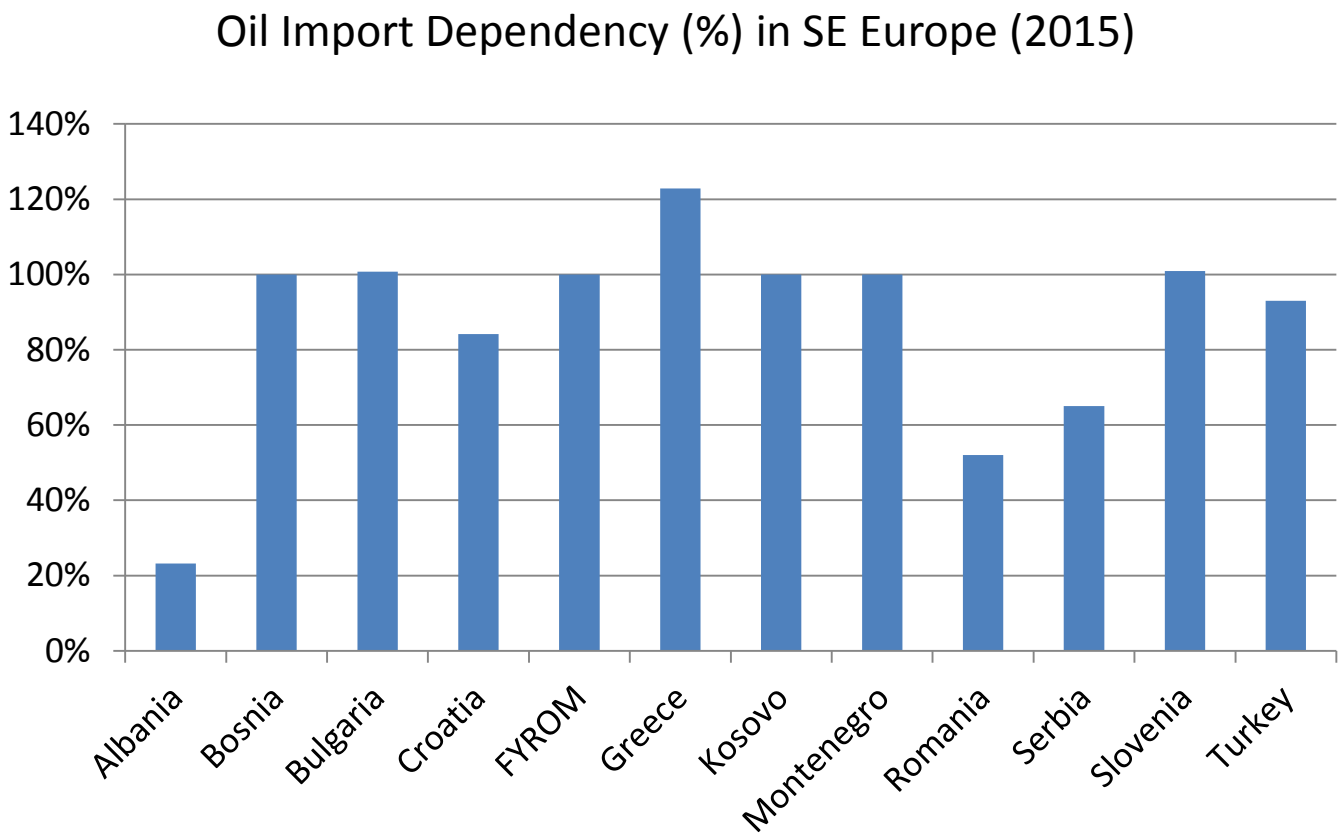
Key Regional Energy Issues

- 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 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.

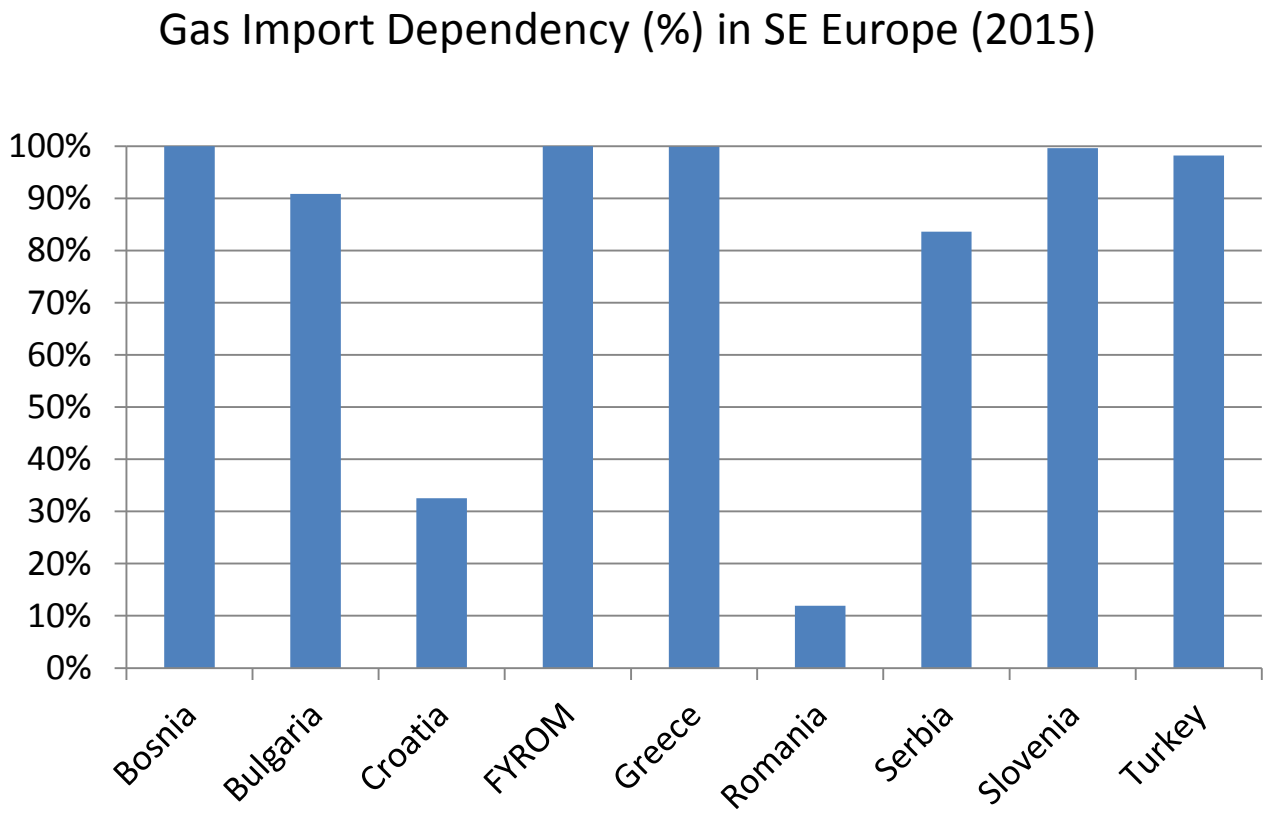
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Oil Production and Consumption in SE Europe

Country	Oil Production (bbl/d)	Oil Consumption (bbl/d)
Albania	21,100	24,000
Bosnia and Herzegovina	0,00	33,000
Bulgaria	3,600	90,000
Croatia	18,000	76,000
Cyprus	0,00	53,000
FYROM	0,00	18,000
Greece	1,900	285,300
Montenegro	0,00	6,100
Romania	103,000	187,200
Serbia	20,560	76,000
Kosovo	0,00	12,000
Turkey	61,000	719,270
Total	**229,160**	**1,579,870**

Source: IENE study “South East Europe Energy Outlook 2016/2017”, Athens, 2017

Key Regional Energy Issues – Gas Import Dependency



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

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Key Regional Energy Issues – Gas Import Dependency

Natural Gas Production and Consumption in SE Europe (2014)

Country	Gas Production (bcm/y)	Gas Consumption (bcm/y)
Albania	0,00	0,00
Bosnia and Herzegovina	0,00	0,25
Bulgaria	0,20	2,65
Croatia	1,52	2,50
Cyprus	0,00	0,00
FYROM	0,00	0,15
Greece	0,00	2,70
Kosovo	0,00	0,00
Montenegro	0,00	0,00
Romania	9,7	10,5
Serbia	0,50	2,70
Slovenia	0,00	0,85
Turkey	0,50	44,7
Total	**12,42**	**67,00**

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

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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 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.
  - **FYROM and Serbia are the second most coal dependent countries after Kosovo at regional level**, while future 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 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 (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.

- More information about energy technologies used in SE Europe is available at: www.iene.eu/microsites/technologies

Key Regional Energy Issues - RES growth in SE Europe is Hindered (I)

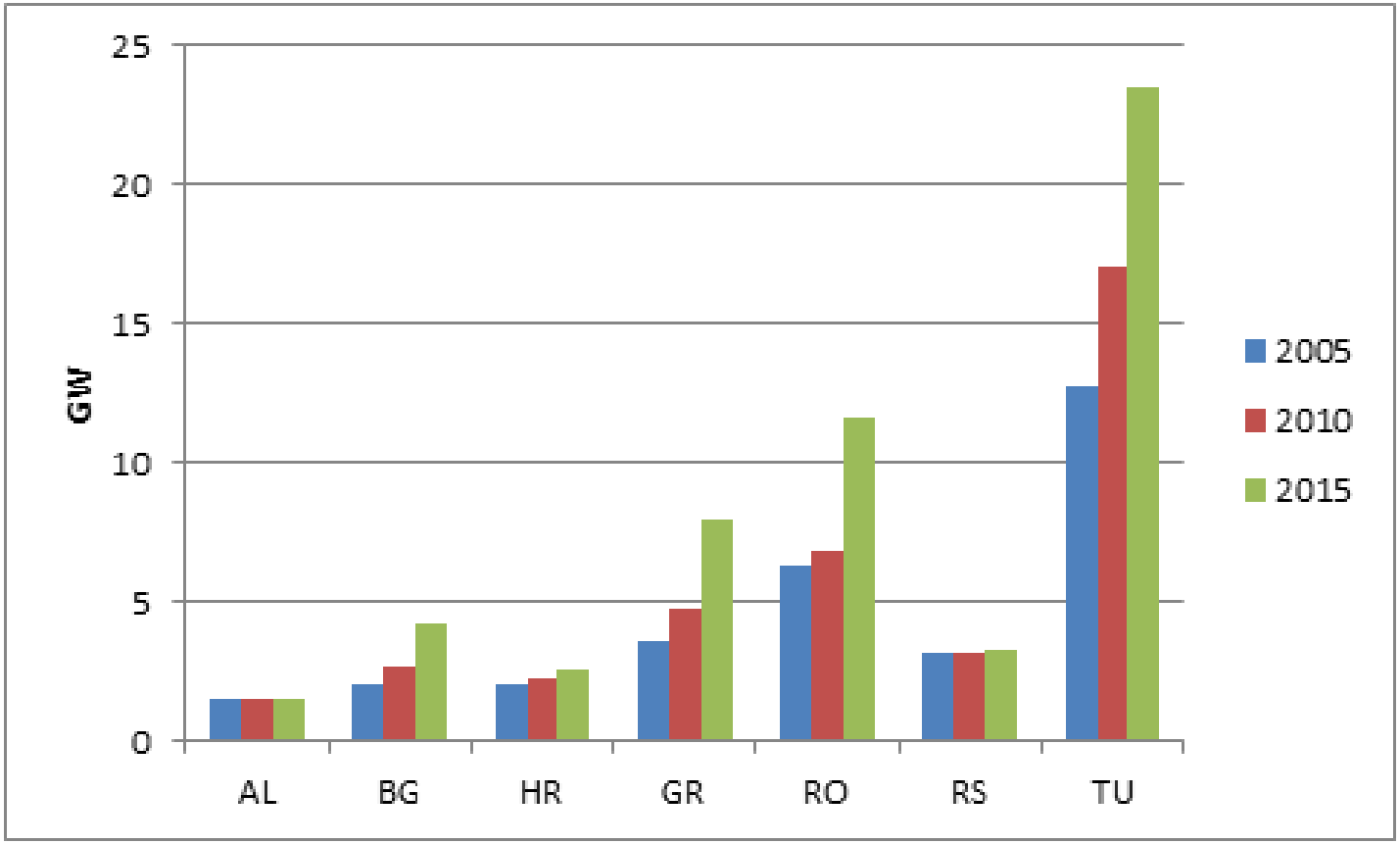
- **Greece** and **Bulgaria** introduced exceptionally high FiTs without a proper financial analysis and cash flow projections showing the impact that RES would have on the national accounts and electricity market operation over a long time period.
- This rapid and unplanned buildup of RES based on high FiTs had a dramatic impact on the electric system leading to large financial deficits for the market operator with big payments delays to producers.
- **Bulgaria** currently has an overcapacity problem and is exporting electricity to Turkey, Greece and the rest of the Balkans, meaning there is little motivation for investment in yet more RES generation capacity.
- **Romania** decided to slash incentives for renewable electricity generation following a dramatic boom in the sector between 2010 and 2013. Bucharest's generous "green certificate" incentive scheme attracted numerous international investors from Europe and Asia, in addition to local companies.
- **Greece** has two main support mechanisms for renewable energy: a feed-in tariff and investment subsidies. The actual impact of such measures has been limited, not because of the lack of incentives, but largely due to lengthy administrative processes. The latest legislation addresses those challenges and might significantly improve market development.

Key Regional Energy Issues - RES growth in SE Europe is Hindered (II)

- The cutbacks have raised questions about whether countries in the region will meet medium- and long-term renewables targets. The above abrupt changes to incentive schemes have discouraged many investors and it is uncertain whether they can be lured back.

- A strong RES growth is expected in **Turkey**. According to the Turkish 'National Renewable Energy Action Plan' the target for renewable energy generation capacity was set to 61GW by 2023; mostly in the forms of hydro, wind and solar generation. Turkey plans to have 34GW of hydro generation capacity; 20GW of wind; 5GW of solar; and 1GW in both geothermal and biomass generating capacity by 2023. Geothermal energy will play a small part too, increasing to 600 MW within a decade. These goals would require a sevenfold increase in non-hydro renewables output in less than a decade. The country also aims to be meeting 10% of the energy needs of its transport sector through renewable energy by 2023.

Key Regional Energy Issues - RES growth in Selected Countries



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

RES Development for Power Generation in SE Europe (2015)

Countries	Wind (MW)	PV (MW)	Hydro	SmH+ Large (MW)	Deep Geothermal	Biomass RES (MW)	Total Power Capacity	Total RES Capacity (MW)	Installed (%)
Albania	0.0	0.0	1.800	0.0	0.0	1.800	1.878	96%
Bosnia & Herzegovina	0.0	0.0	2.058	0.0	0.0	2.058	4.021	51%
Bulgaria	691,0	1.020	3.400	0.0	1,8	5.113	15.650	33%
Croatia	422,7	32,2	2.187	0.0	0.0	2.631	4.995	52%
Cyprus	157,0	64,8	0.0	0.0	9,7	231,5	1.740	13%
FYROM	37,0	0.0	581,0	0.0	0.0	618,0	1.987	31%
Greece	2.150	2.600	3.435	0.0	46,0	8.221	17.762	46%
Montenegro	0.0	0.0	660	0.0	0.0	660,0	886	74%
Romania	3.129	1.312	6.232	0,05	70,0	10.743	24.637	43%
Serbia & Kosovo	20,0	5,0	2.910	0.0	0.0	2.935	8.710	34%
Slovenia	3,4	257,0	1.270	0.0	0.0	1.530	4.183	36%
Turkey	4.718	54,8	23.661	600,0 (2016)	130,0	29.164	72.050	40%
Total	**11.328**	**5.346**	**48.194**	**600.05**	**257,5**	**65.704,5**	**158.499**	**41%**

Source: IENE study “South East Europe Energy Outlook 2016/2017”, Athens, 2017

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), a growing and uncontrolled refugee flow from the Middle East and North Africa and the location of some of its countries (i.e. Turkey, Greece, Romania) at vital energy supply entry points, faces **higher energy security threats** than the rest of Europe.
- 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 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 Hot Spots in SE Europe

Legal and Institutional Framework for Energy Security

Legal and Institutional Framework

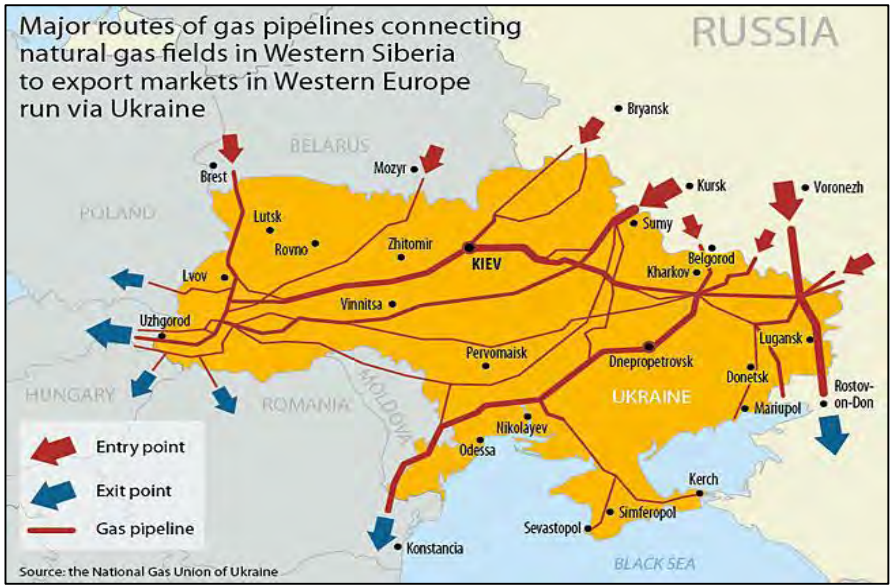
- Third package (Directive 2009/73, Regulation 715/2009)
- Directive 2004/67 on security of supply - binding acquis (from 31.12.2009); the ECS will contribute to public consultation on the Regulation 994/2010 revision
- EU's Gas Coordination Group
- Energy Community Treaty (safeguard measures, mutual assistance)

Stress Tests

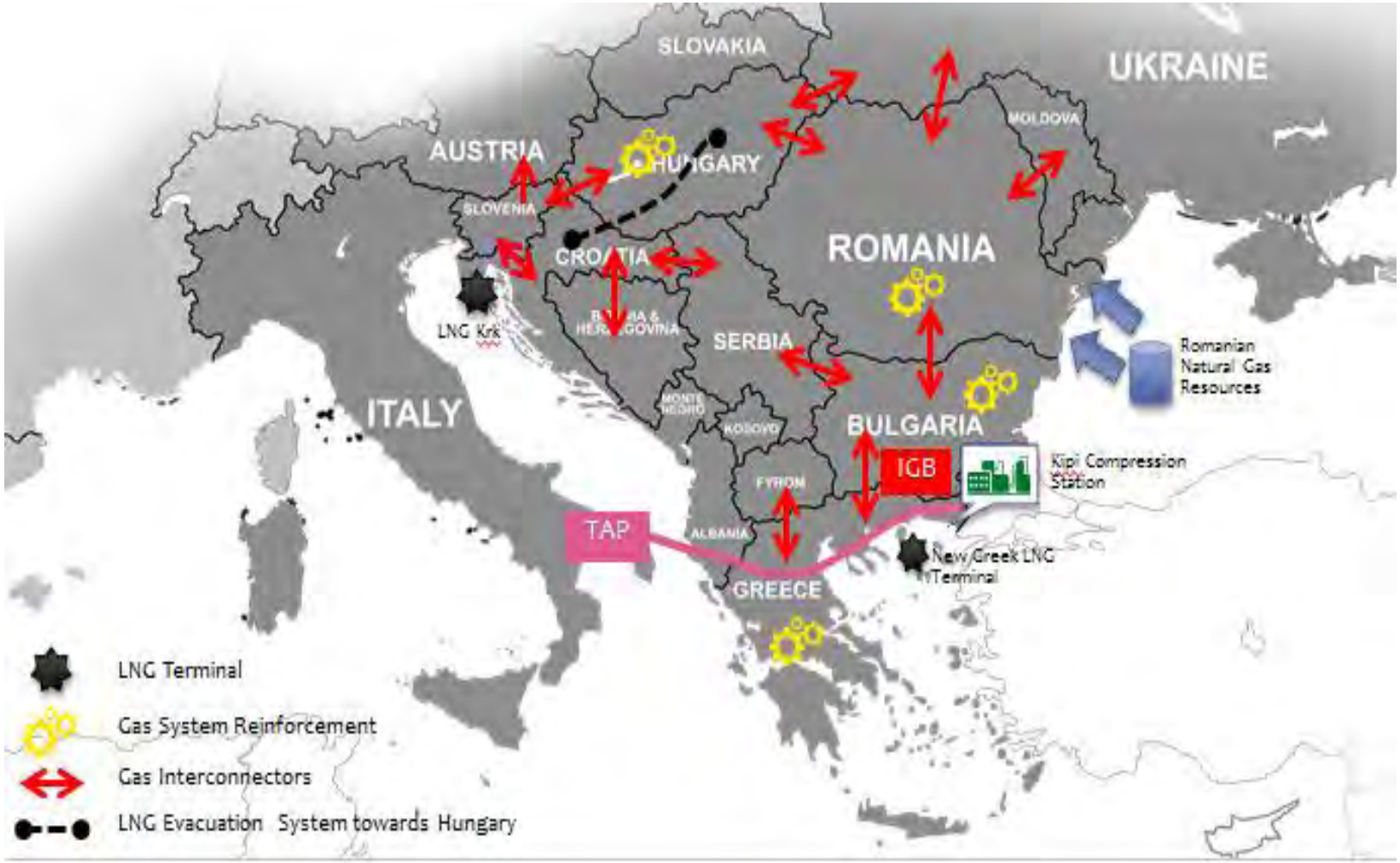
- 38 European countries, including all EU countries, carried out energy security stress tests in 2014. They simulated two energy supply disruption scenarios for a period of one or six months:
  - a complete halt of Russian gas imports to the EU
  - a disruption of Russian gas imports through the Ukrainian transit route

Results:

1. A prolonged supply disruption would have a **substantial impact on the EU**
1. Eastern EU and Energy Community countries would be particularly affected
1. If all countries cooperate each other, consumers would remain supplied even in the event of a six month gas disruption



Energy Security - List of CESEC* Priority Projects



***Central and South Eastern Europe Gas Connectivity (CESEC) initiative** is to enhance political support for the identification and implementation of crucial gas infrastructure projects in CS European region.

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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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 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 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.

Towards a Redefinition of the South Corridor (II)

- The **Turkish Stream**, now under construction, should also be considered as a potentially 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.

Towards a Redefinition of the South Corridor (III)

- 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 by 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.

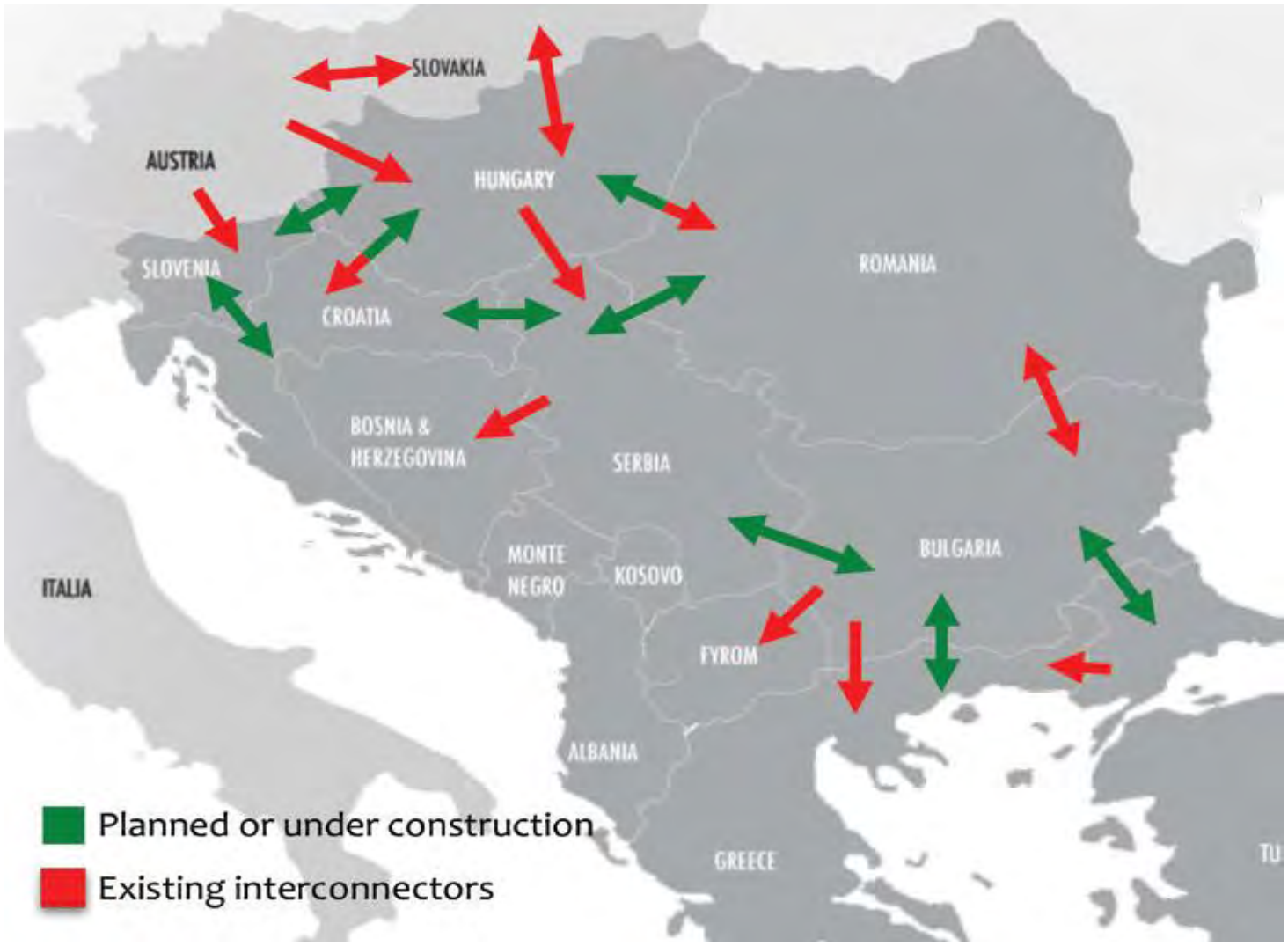
- In view of several new projects under development in the region, it is time to redefine the South Corridor by including these new potential gas supply sources and routes. Therefore an **expanded South Corridor** should be considered and defined as such, to include all major gas trunk pipelines and 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 Southern Gas Corridor

NB.: The TANAP and TAP gas pipelines as well as Turkish Stream are under construction, with IGB at an advanced planning stage with FID already taken. The IAP, the IGI Poseidon in connection with East Med pipeline and the Vertical Corridor are still in the study phase.

Gas Interconnections in SE Europe



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

The Growing Importance of LNG in SE Europe

- Today, there are **5 LNG importing terminals in operation** across SE Europe:
  - 2 land based and 1 FSRU in Turkey
  - 1 FSRU in Israel
  - 1 land based in Greece (Revithoussa)

- By 2020, a number of **new LNG terminals** will be added:
  - 2 FSRU in Turkey (Izmir, Gulf of Saros)
  - 1 FSRU in Greece (Alexandroupolis)
  - 1 FSRU in Croatia (Krk Island)
  - 1 FSRU in Cyprus (Vassilikos)

LNG Terminals in SE Europe

Source: IENE study “South East Europe Energy Outlook 2016/2017”, Athens, 2017

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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.
- The most important of those developments can be summarized as follows:
  - In 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.
  - In April 2013, the **Regulation EU 347/2013** was published, setting the rules for the development of the so-called Union-wide list of energy **Projects of Common Interest (PCI)**, which was almost immediately followed by the establishment of the list of the **Projects of the Energy Community Interest (PECI)**.
  - In June 2013, the selection of the Trans-Adriatic-Pipeline (TAP) as the **preferred option for the transportation of the gas produced in that field to Europe**, which signaled the initiation of the Southern Gas Corridor project.
  - In February 2015, the EC launched the **Central East South Connectivity (CESEC) initiative** to enhance political support for the identification and implementation of crucial gas infrastructure projects in CS European region.

Gas Market Liberalization in SE Europe (II)

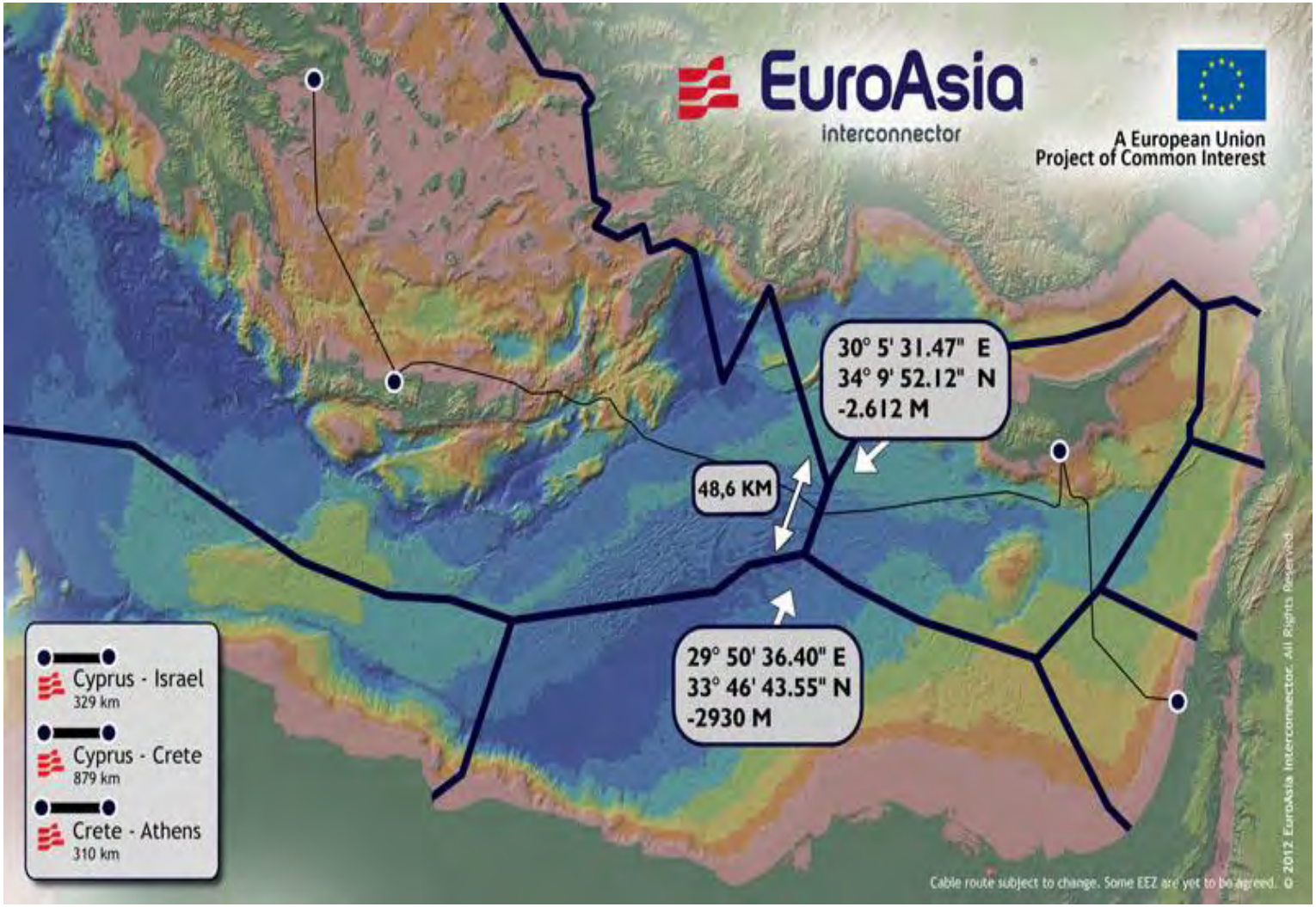
- There is **a highly fragmented landscape** for the gas market development in the SEE region:
  - no cross-border trading. Gas trading hubs are either non existent in the majority of the countries, or even where they exist (Slovenia and Romania) their liquidity is extremely low.
  - There are elements 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 2017-2026

EuroAsia Interconnector



Source: EuroAsia Interconnector

Nuclear Power Plants in SE Europe

- 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.

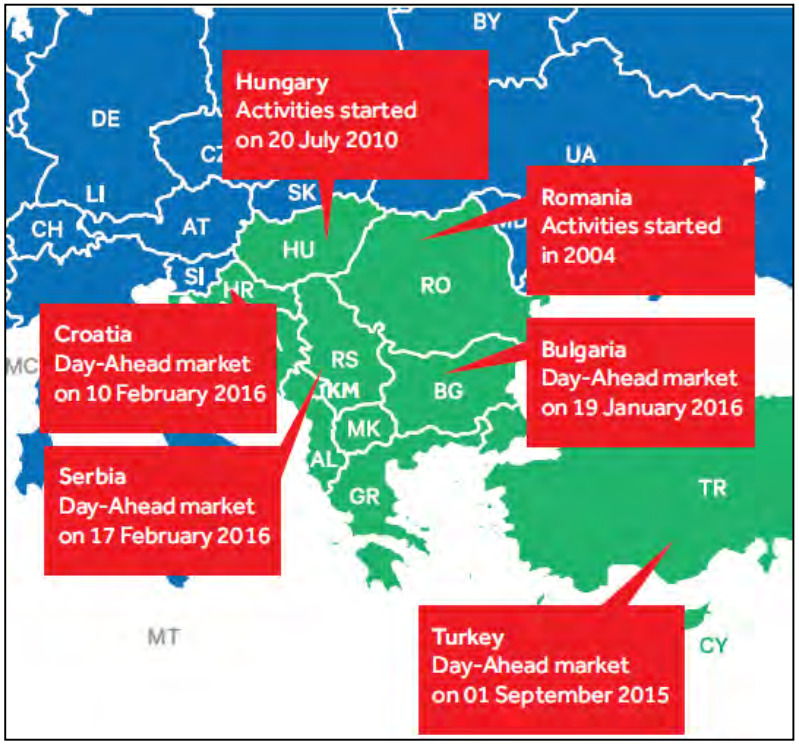
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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 **six active power exchanges** in SE Europe: in Bulgaria, Croatia, Serbia, Romania, Slovenia and Turkey.
- Bulgaria's power exchange will launch intra-day trade by the end of 2017, SEEPEX's intra-day later, while first intra-day trade in Croatia's power exchange was launched on April 26, 2017.
- However, there are plans for the establishment of power exchanges in Greece, Montenegro and a joint energy market between Albania and Kosovo.



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Greece Will Establish Its Own Power Exchange in 2018

- Greece plans to launch a power exchange in mid-2018 in order to reform its electricity market in line with European plans for an interconnected energy grid, which will help reduce costs and improve energy security, Greek Energy Minister George Stathakis announced on February 21, 2017.
- The exchange will be based on a day-ahead, an intraday, a forward and a balancing market. Greece's Electricity Market Operator (LAGIE) and Hellenic Exchanges Group signed a Memorandum of Understanding (MoU) for the creation of the power exchange, with technical assistance offered by the European Commission.
- When the target model starts to operate, stakeholders will be able to buy electricity either by cash or by futures derivatives. In order to function effectively, the new market must have participants (i.e. companies that provide electricity and companies that want to buy the product, whether they are suppliers or large consumers).

Montenegro Takes Steps Towards Establishing Power Exchange

- Former government of Montenegro adopted in early November 2016 a plan for the establishment of power exchange in 2017 by Montenegro **Electricity Market Operator (COTEE)**, Montenegrin **Power Transmission System (CGES)** and **Elektroprivreda Crne Gore (EPCG)**.
- The Government's decision stipulates that COTEE and CGES will hold 2/3 of the stake in the new company with minimum initial capital of €100,000, whereas COTEE is to invest €50,000. Other energy entities in the country, besides EPCG, can be also offered to participate in the third founder's equity.
- Montenegro has adopted new laws on energy and on cross-border electricity exchange with a set of bylaws, while the **Montenegrin power distribution system (CEDIS)** was separated from EPCG.
- The installation of the under construction Italy-Montenegro underwater cable will be useful not only for Montenegro, but also for the regional market, as it will increase traffic on power exchanges, as well as supply and demand in Italy, and contribute to connecting with EU. Montenegro will dispose with 20% of the transmission capacity of the cable, which is expected to be finished by early 2018.
- With Montenegro hosting the **regional electricity capacity allocation office (SEE-CAO)**, with main aim to facilitate cross-border electricity trade by allocating cross-border transmission capacity between the seven participating TSOs (Greece, Croatia, Montenegro, Bosnia and Herzegovina, Albania, Kosovo and Turkey), the development of further interconnections is of vital importance.

Albania and Bosnia and Herzegovina Also Plan To Set Up Power Exchanges

Albania

- On March 30, 2016, Albania's Energy Minister Damian Gjiknuri and his Kosovar counterpart Blerand Stavileci agreed to create a joint energy market.
- Albania Power Exchange (APEX) is one of the objectives of the Albanian government in 2017. The Energy Regulator Authority Board (ERE) approved the specificities on how it would operate over the first months of this year.
- According to Albania's Energy Ministry, its establishment was initially planned in March 2017, but its operation is delayed due to the lack of technical expertise and experience. In Q118, APEX should be ready for go live operation, according to Albania's Transmission System Operator (OST).

Bosnia

- **Bosnia**'s plan is to set up a project company which would establish a power exchange with headquarters in Mostar, the town in western part of the country.
- However, in its March 2016 report, the Energy Community Secretariat criticised Bosnia and Herzegovina for not achieving any progress in establishing its own power exchange.

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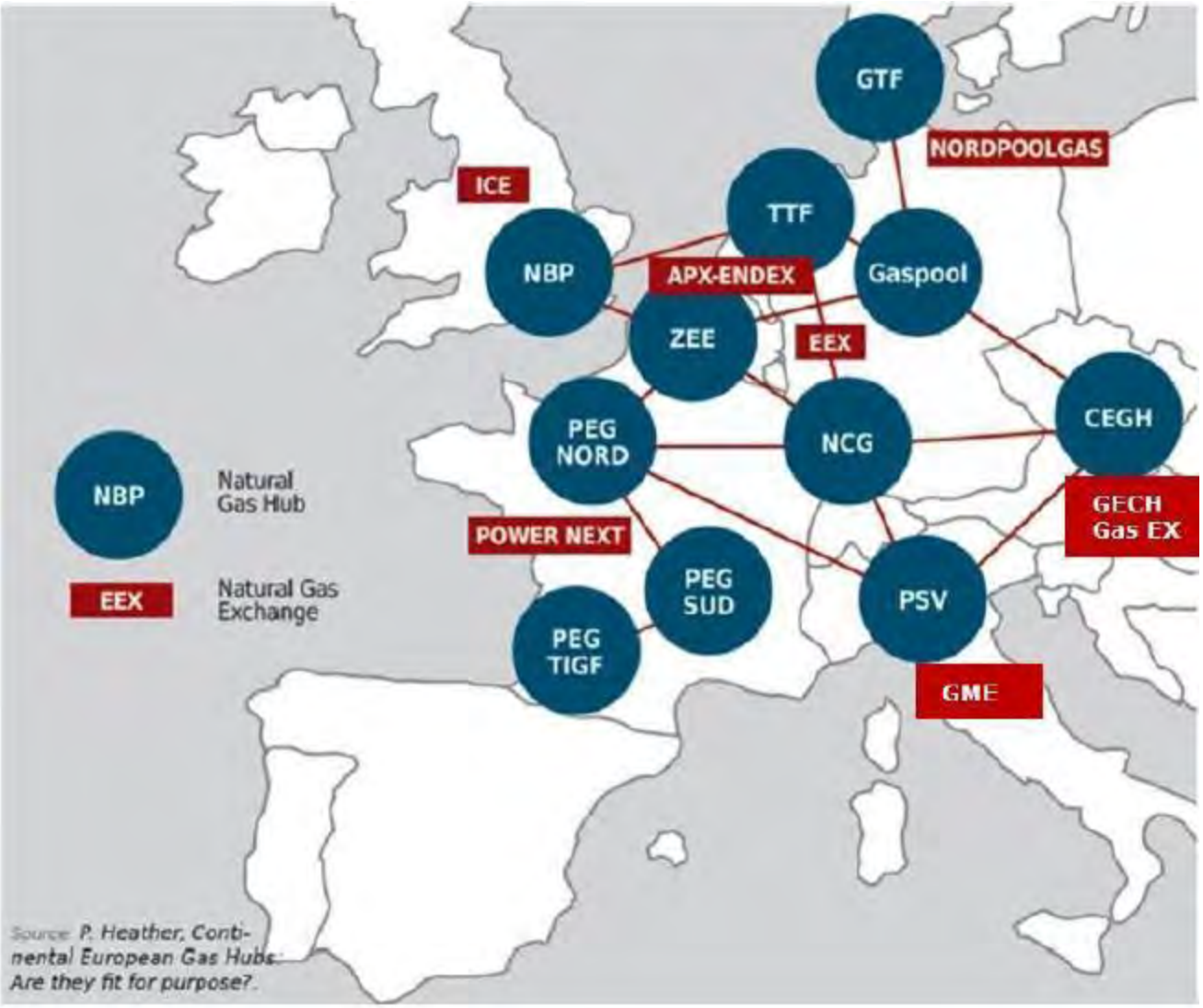
European Gas Hubs and Exchanges



Source: P. Heather, Continental European Gas Hubs: Are they fit for purpose?.

What Makes A Good Gas Hub?

Underlying conditions for trade:

- Multiple buyers and sellers
- Access to capacity to bring gas to the hub
- Multiplicity of gas supplies / sinks – including storage
- Counterparties with imbalances to trade at the hub (customer churn, new supply contracts, LNG, gas release)
- Market-based balancing

Good hub design:

- Title transfer
- Backup/backdown to ensure firmness
- Clearly defined role of incumbent to support trading
- Price disclosure
- Standardised terms and conditions
- Well-designed, transparent network access terms, harmonised with interconnected systems

Enabling legislation: customer eligibility, fair network access (unbundling), stability through transparency & governance, lack of cross-subsidisation between monopoly and competitive businesses.

Network access terms: title transfer point(s), secondary capacity markets, reasonable balancing terms, reasonable credit terms, emergency procedures, clear definition of *Force Majeure*

Source: European Federation of Energy Traders (EFET), 11th Gas Forum, Ljubljana, September 2016

Creating Natural Gas Trading Hub in SE Europe (I)

- The establishment of a regional natural gas hub is expected to **facilitate the wholesale trading of natural gas between participants** in South Eastern Europe.
- It will allow **gas supply and demand to meet in a marketplace** by providing a platform for physical and/or financial transaction.
- It will **enable competitive markets to function**, even though it will probably have an administrative role in the beginning of its operation.
- Although it is difficult, at this stage, to predict market behaviour and its reflection on spot prices, once the hub enters 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.

Creating Natural Gas Trading Hub in SE Europe (II)

- The operation of the proposed South Eastern Europe Gas Trading Hub is therefore predicted to have a positive effect on wholesale markets by **channeling needed gas volumes at competitive market rates**.

- The attraction of sizeable tradable gas volumes and the trading activity arising from this will help to reassure markets in terms of **gas availability and security of supply**.

- A SWOT analysis has revealed far **more strengths and opportunities** than weaknesses and threats.

INSTITUTE OF ENERGY
FOR SOUTH-EAST EUROPE

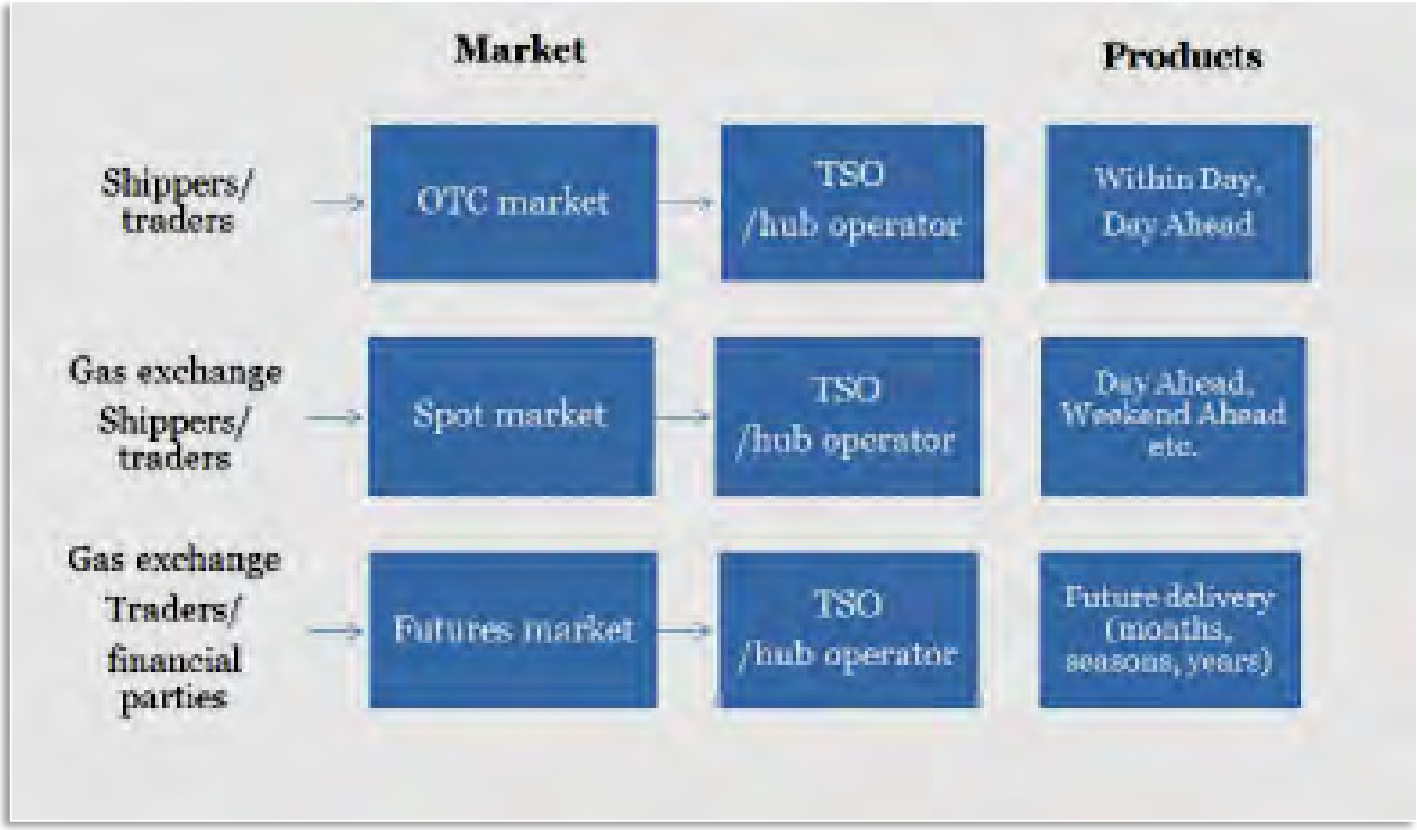
THE OUTLOOK FOR A NATURAL GAS TRADING HUB IN SE EUROPE

An IENE Study Project (M19)

September 2014

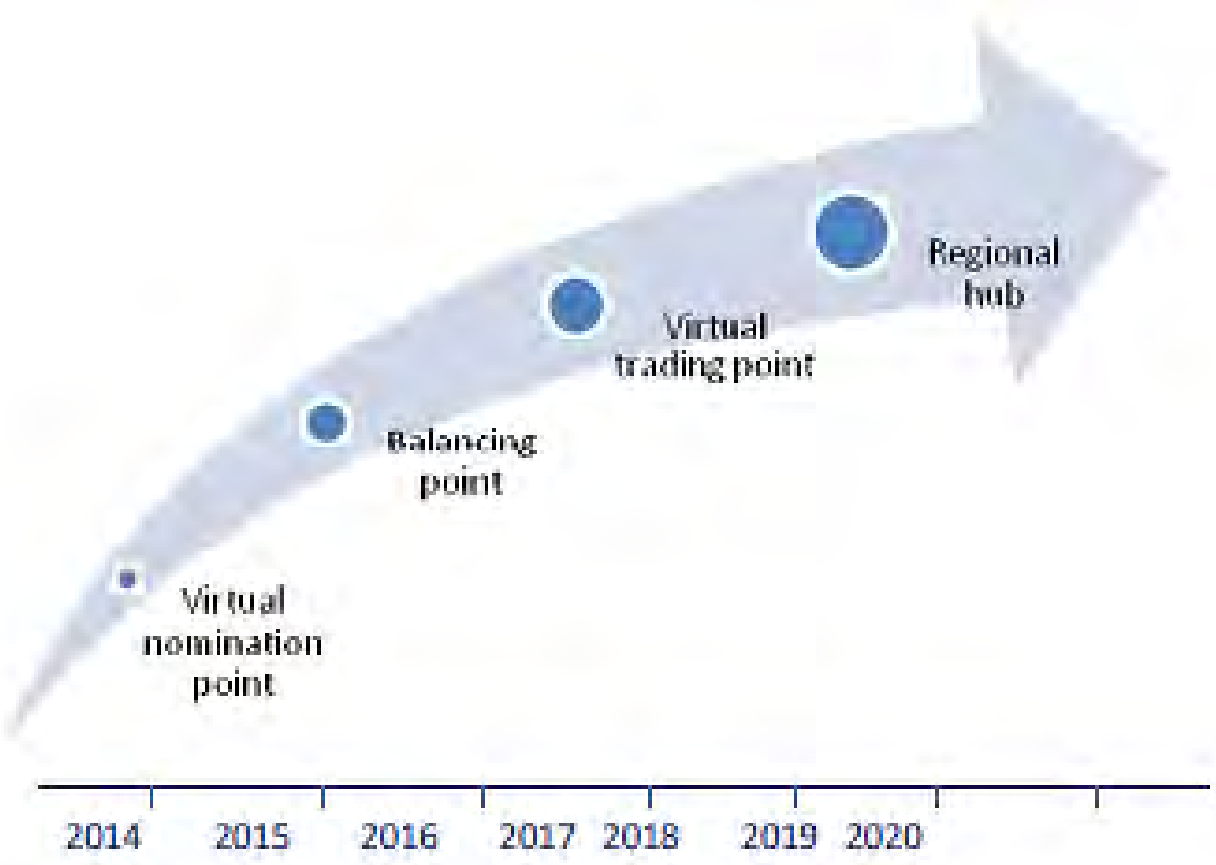
Athens, Greece

Proposed Hub Design



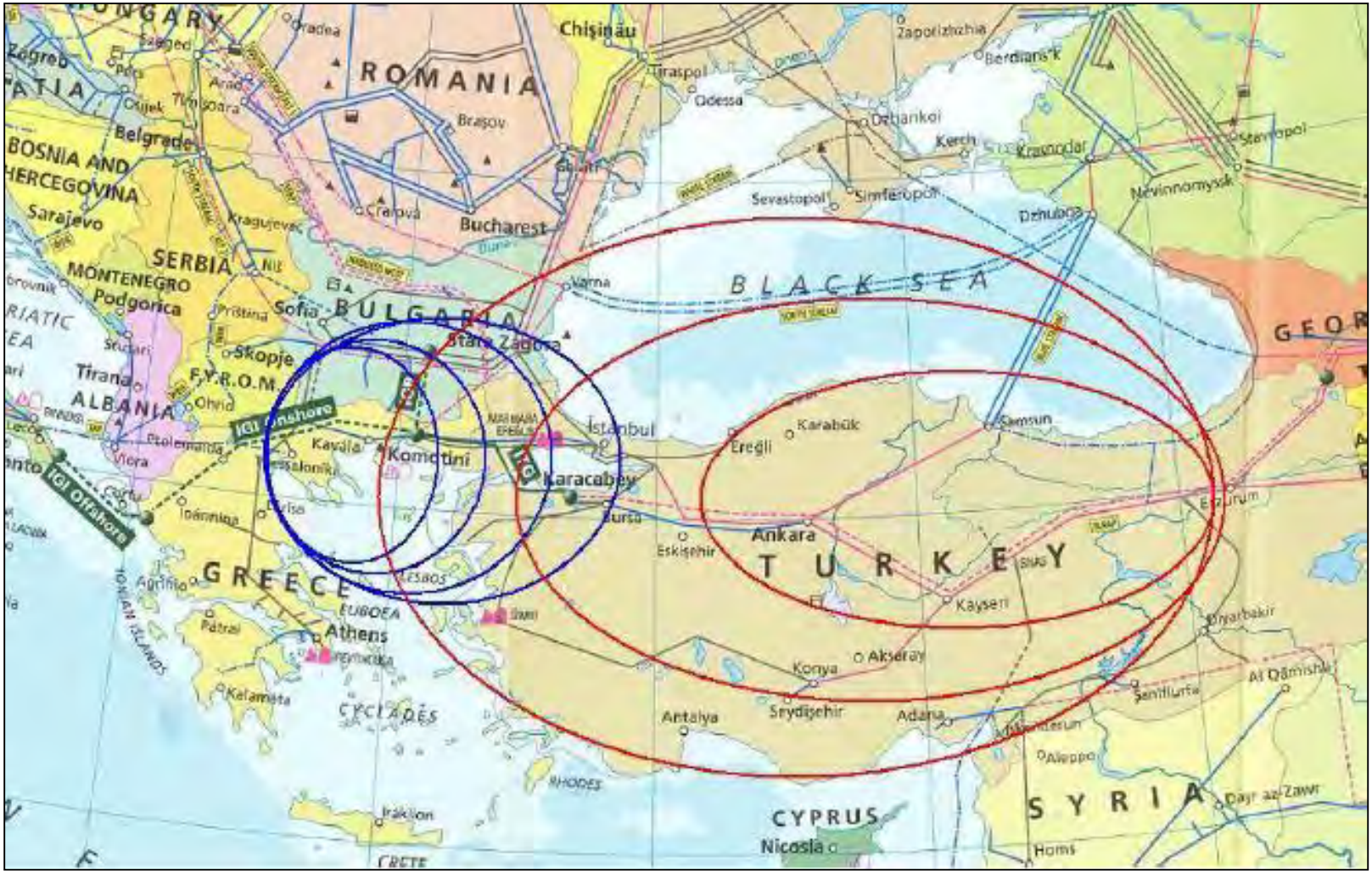
Source: IENE study, "The Outlook For a Natural Gas Trading Hub in SE Europe", (M19), Athens, September 2014

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



Source: IENE study, “The Outlook For a Natural Gas Trading Hub in SE Europe”, (M19), Athens, September 2014

Gas Hubs in Greece and Turkey Can Coexist



Source: IENE study, “The Outlook For a Natural Gas Trading Hub in SE Europe”, (M19), Athens, September 2014

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Energy Demand and Supply Projections in SEE (I)

- One scenario, namely the **"Base" scenario**, was developed by 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 Capros**.

- Certain assumptions were formulated in the Base scenario concerning basic parameters which are likely to govern future energy demand and supply:

  - **Macroeconomic** and **demographic information**
    - Current trends on regional population and economic development, including latest statistics by EUROSTAT and most recent projections by international organisations of GDP growth in SE Europe
  - **Technological progress**
    - **Penetration of new technologies**, notably in power generation and transport, largely based on RES.

Energy Demand and Supply Projections in SEE (II)

- **Policy information**
  - Reflects current policies in the SEE countries as already adopted
    - **Does not include** policies which may be enacted in the future
  - For the non-EU countries, the projection assumes a moderate adjustment of the energy mix, notably for RES, towards EU's aspirations.
  - For the EU countries, the Base scenario includes all binding targets set out in EU legislation regarding development of RES and reductions of GHG emissions, as well as the latest legislation promoting energy efficiency.
  - The Copenhagen-Cancun pledges are expected to be respected through carbon prices as well as dedicated policies and measures.
    - **Does not include** the Paris 2015 commitment in this scenario as the corresponding policies have not yet been adopted.

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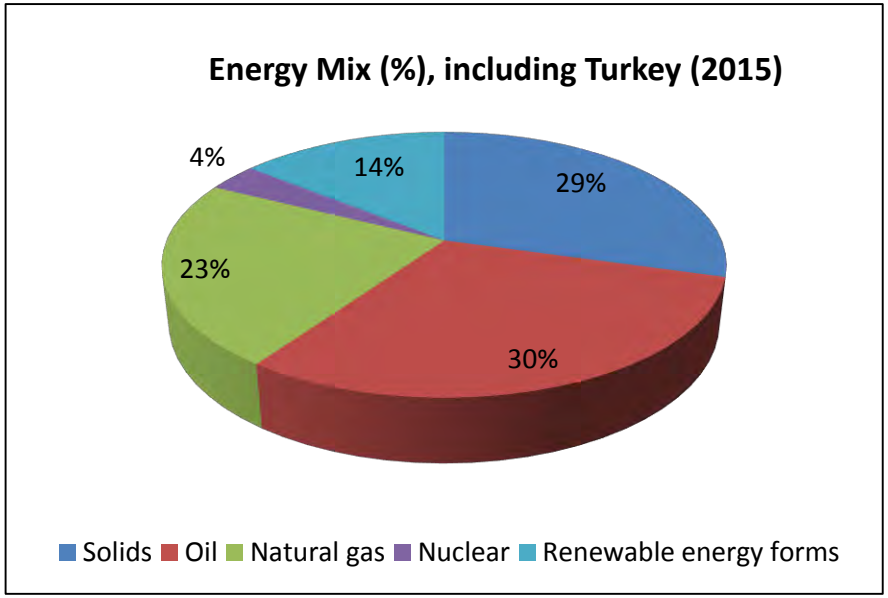
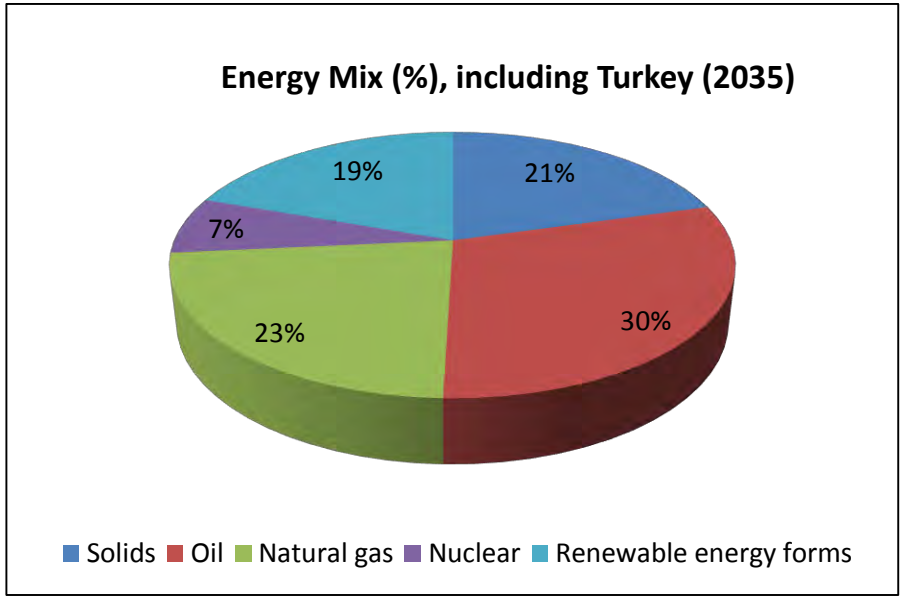
Regional Energy Mix: What Lies Ahead?

- 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.





Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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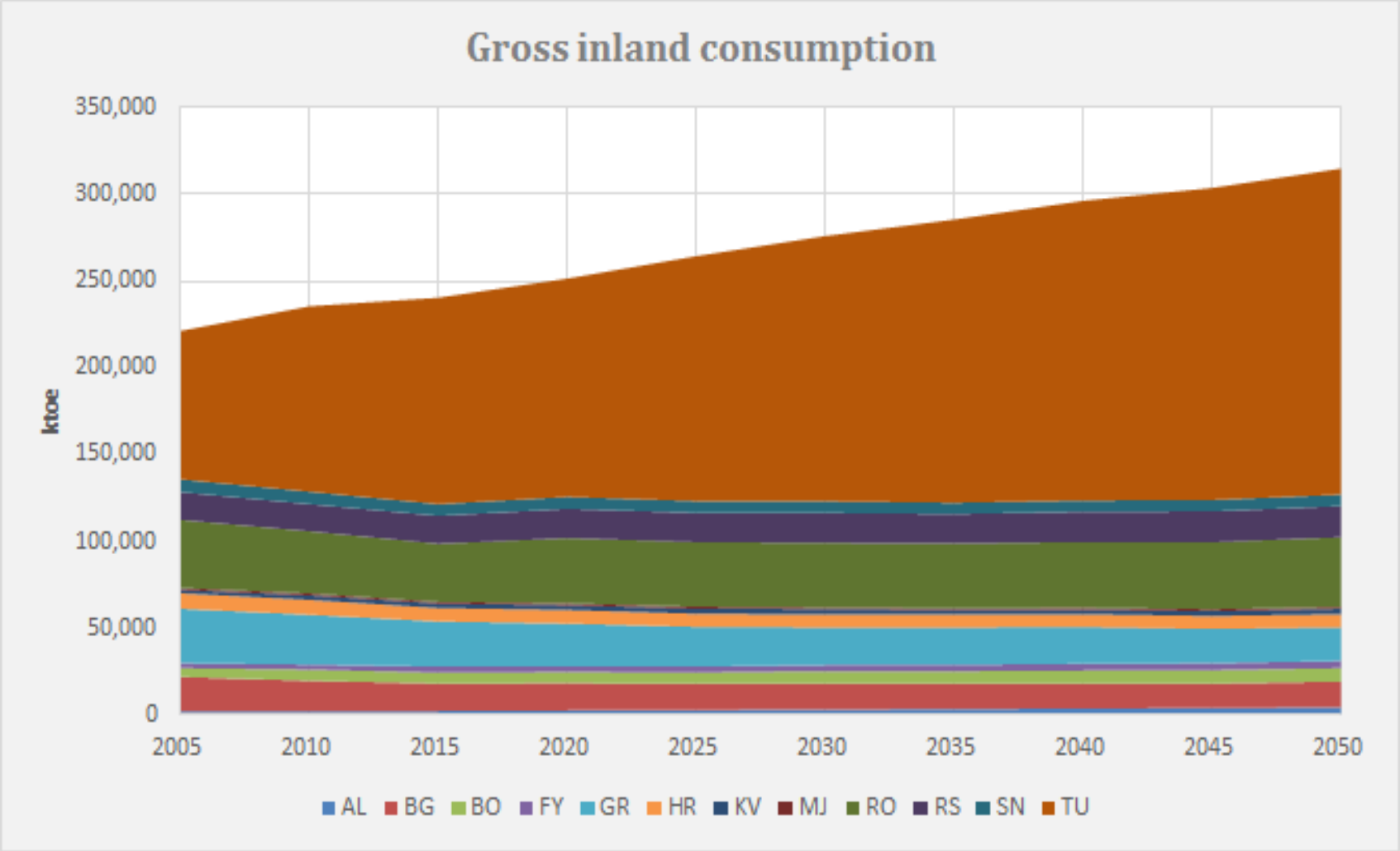
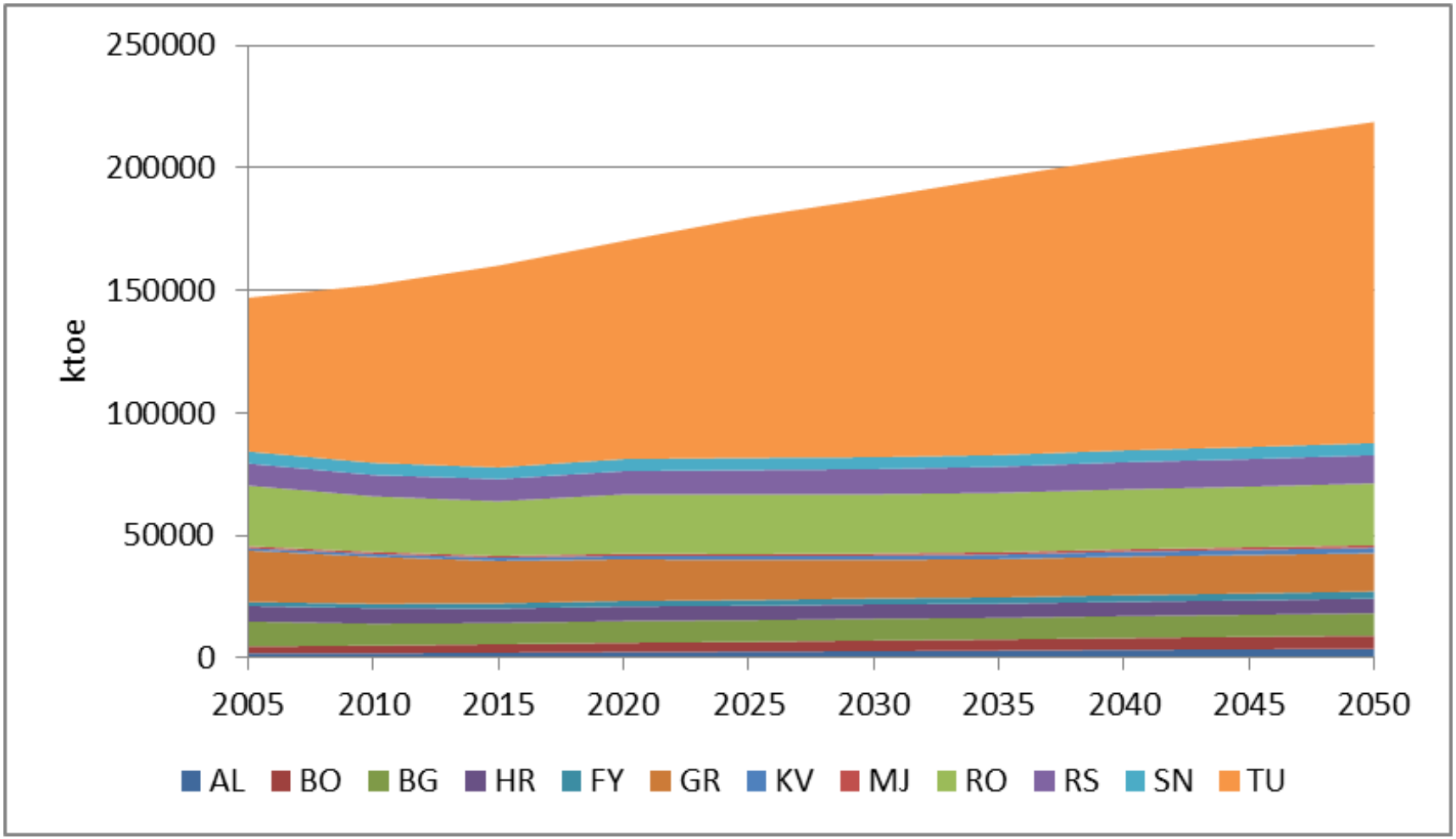
SE Europe: Gross Inland Consumption, **including Turkey** (2005-2050)



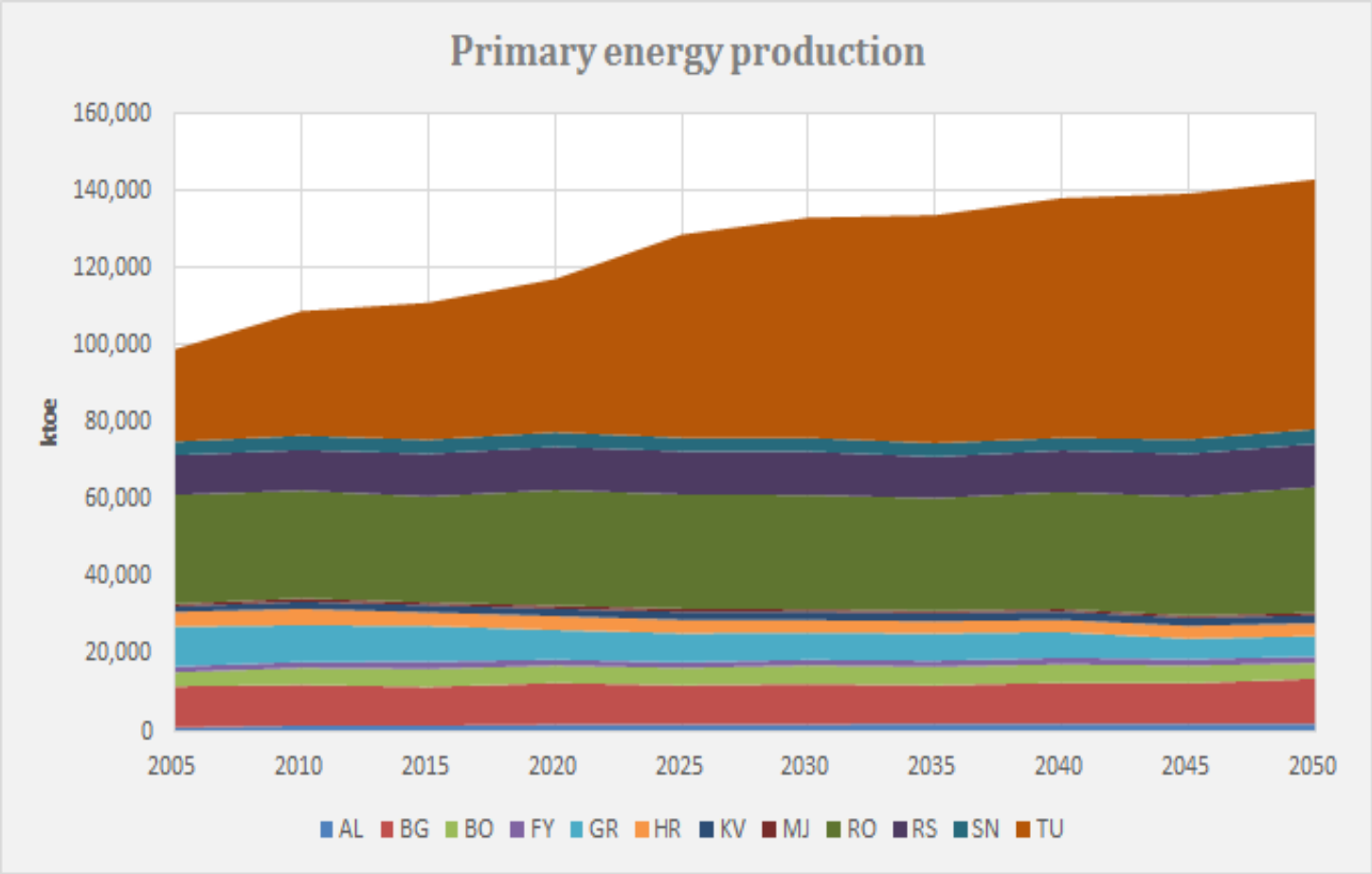
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Final Energy Demand, **including Turkey** (2005-2050)



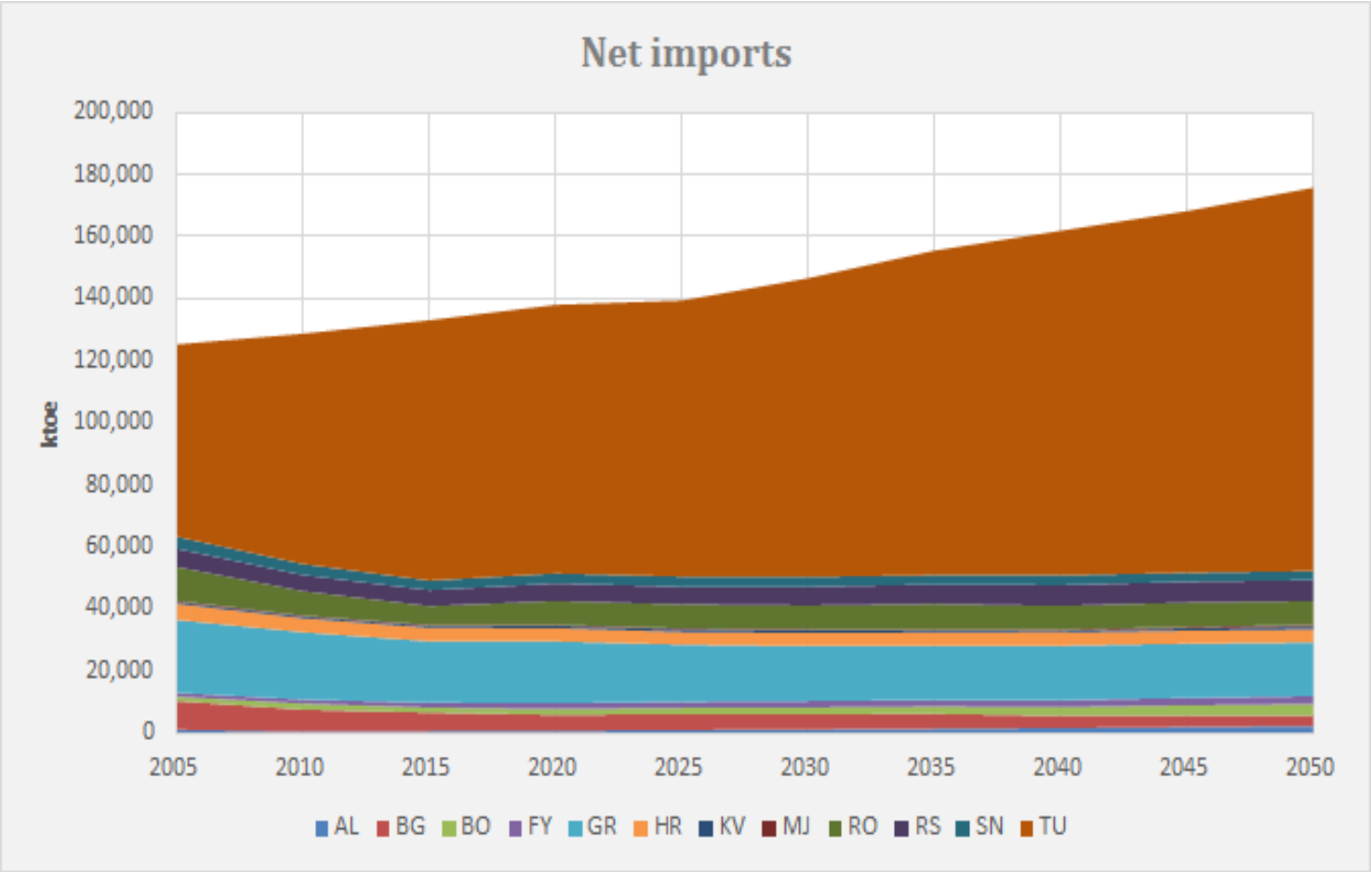
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Primary Energy Production, **including Turkey** (2005-2050)



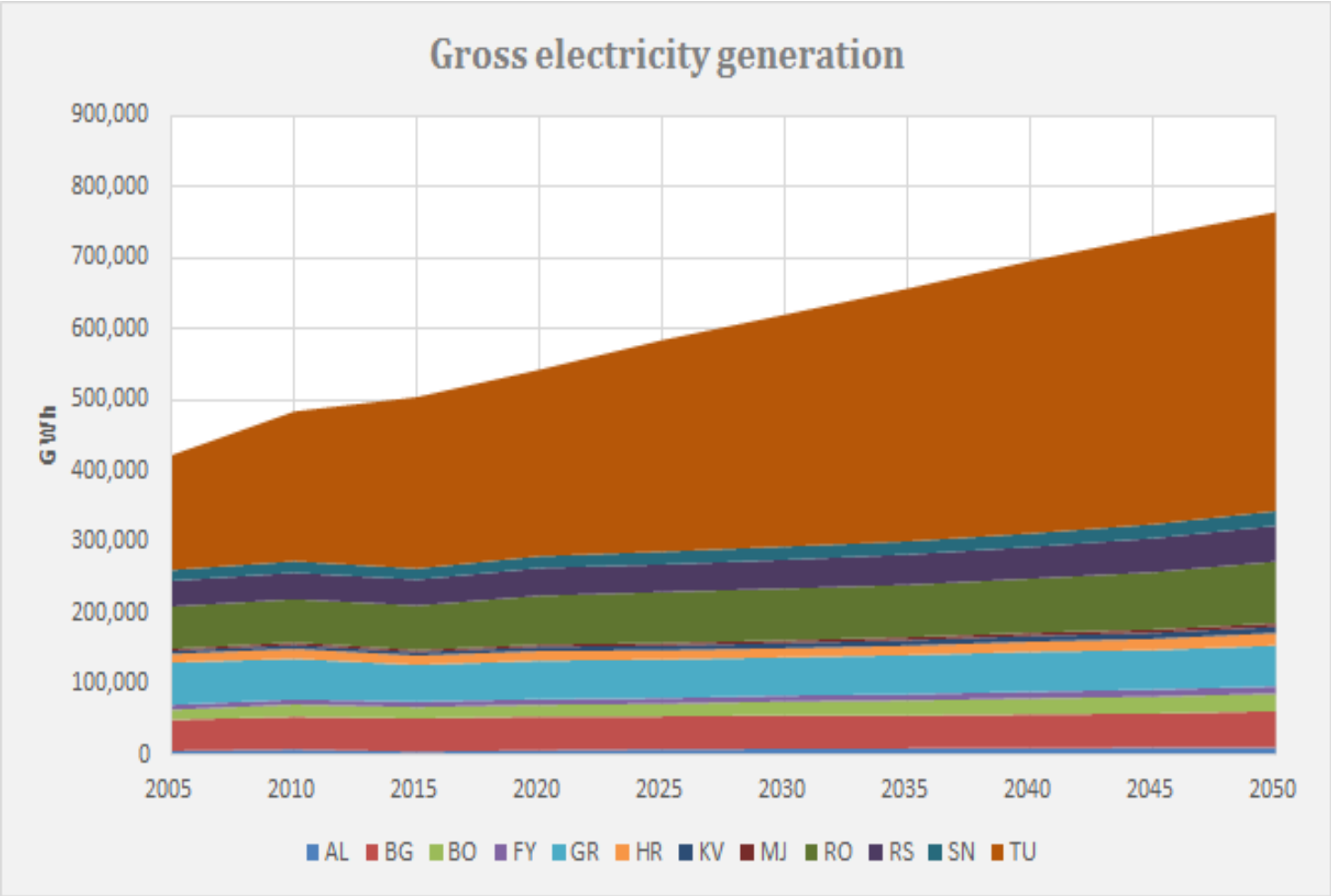
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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



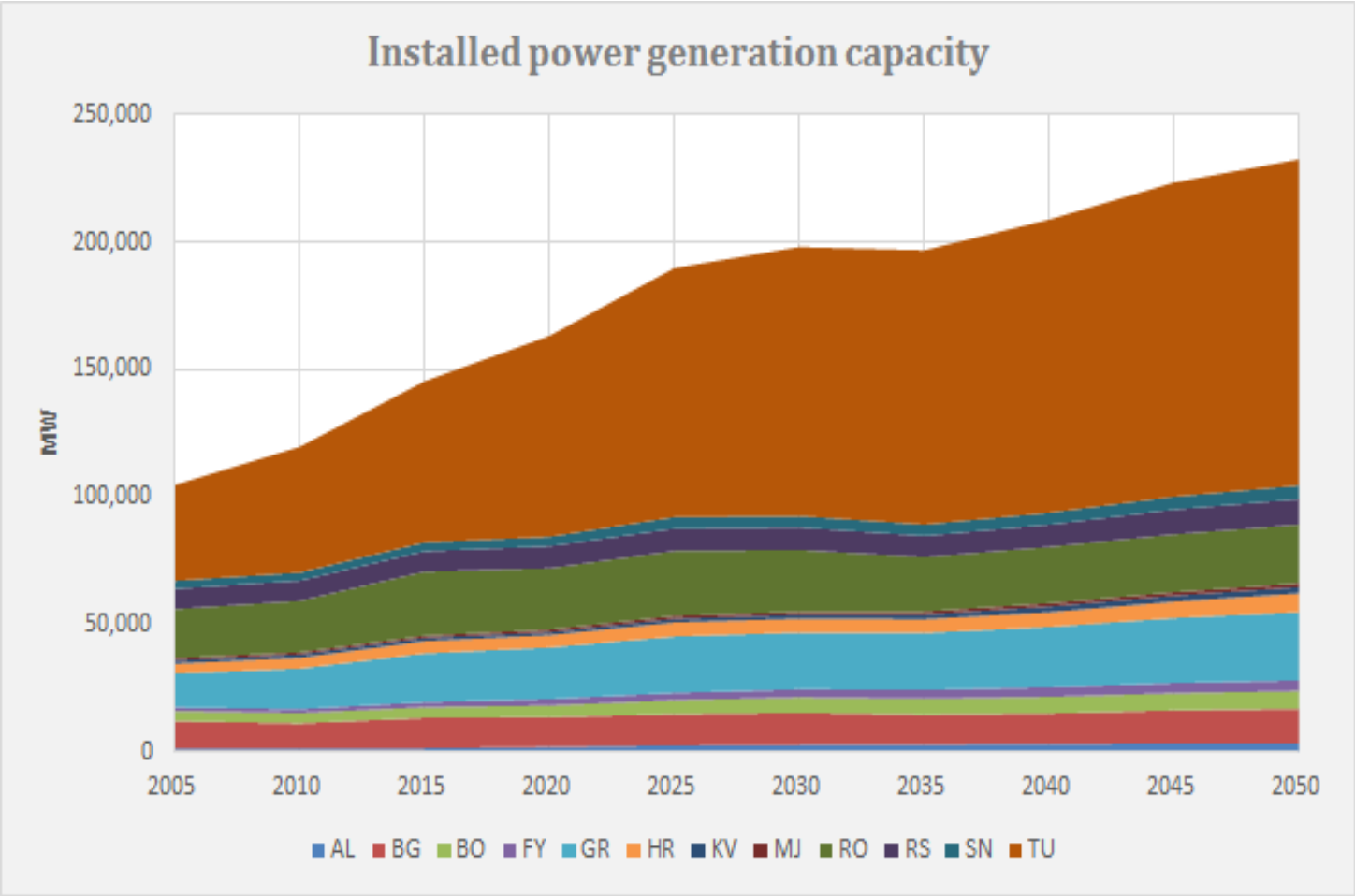
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Gross Electricity Generation, **including Turkey** (2005-2050)



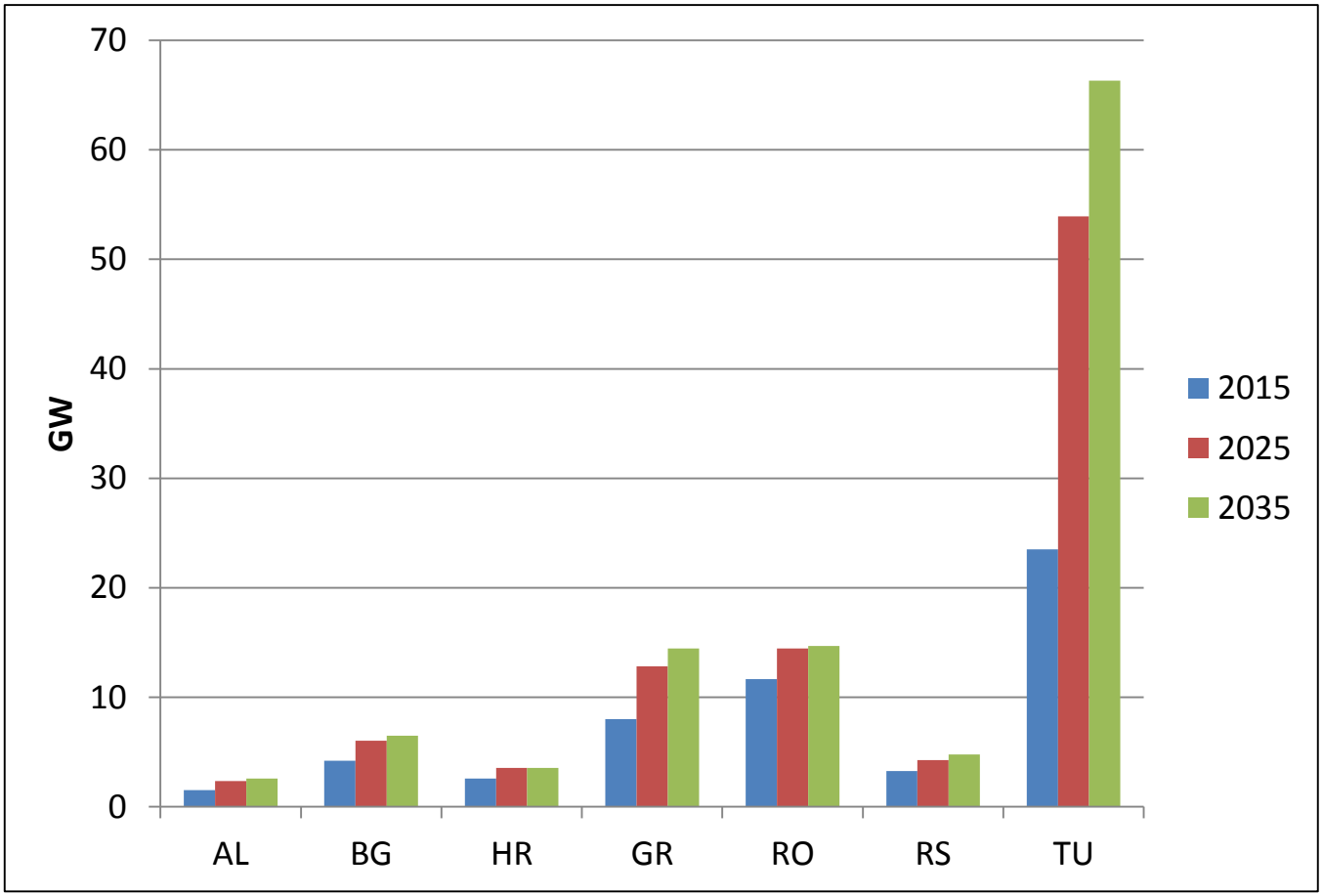
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Installed Power Generation Capacity, **including Turkey** (2005-2050)



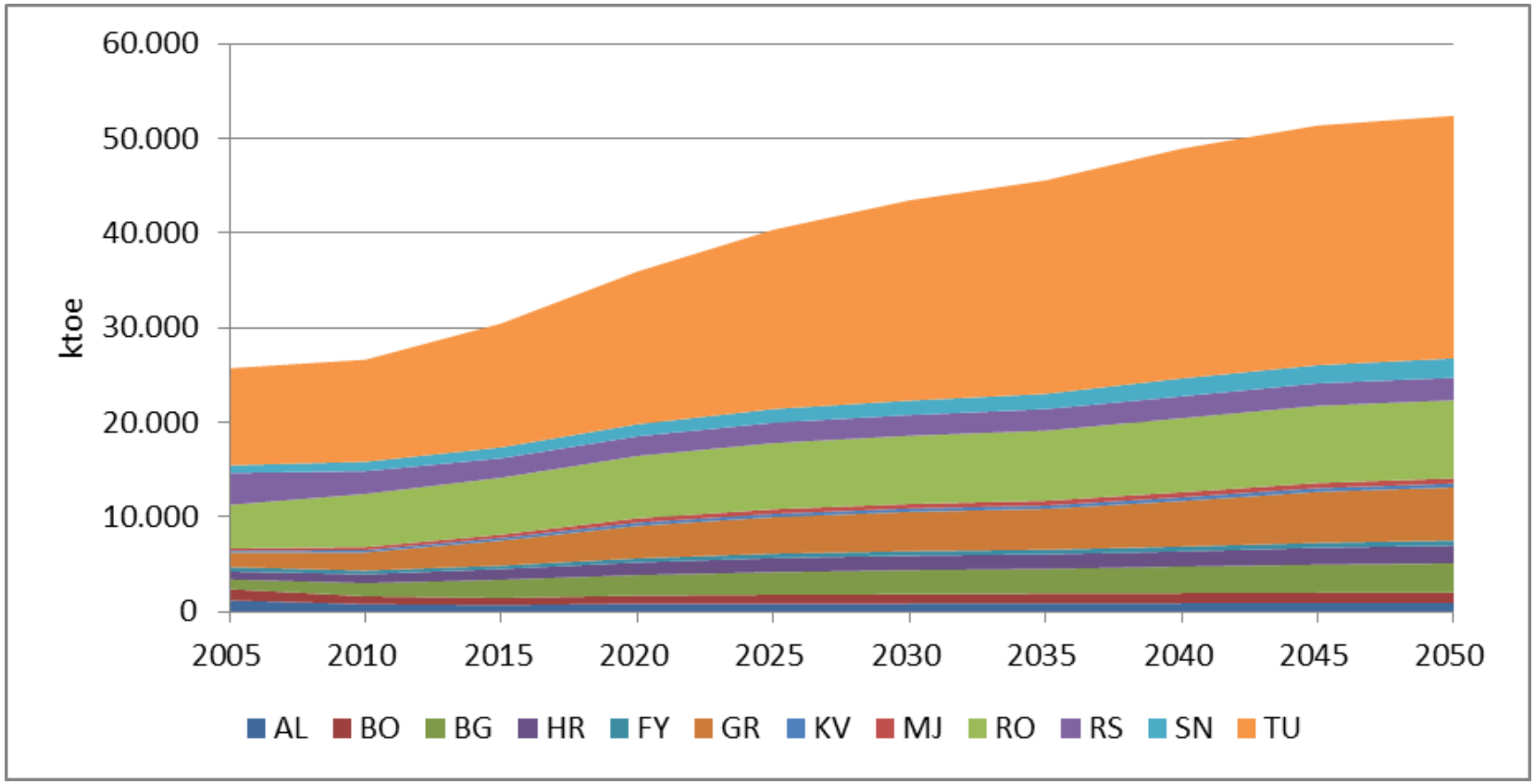
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Net RES Generation Capacity in 2015, 2025 and 2035



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

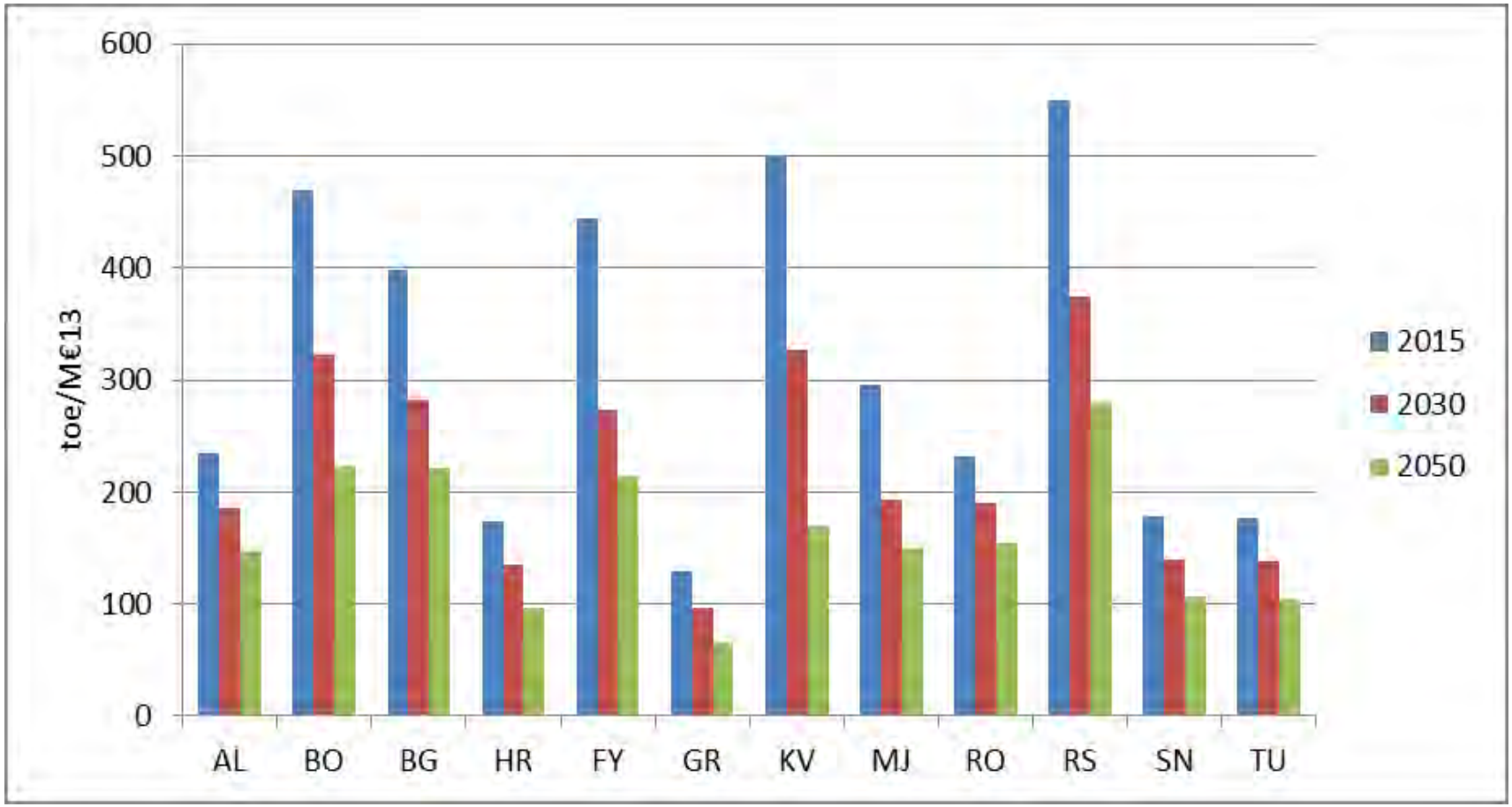
SE Europe: RES in Gross Final Energy Consumption*, **including Turkey** (2005-2050)



*including the part of electricity and heat generated by RES

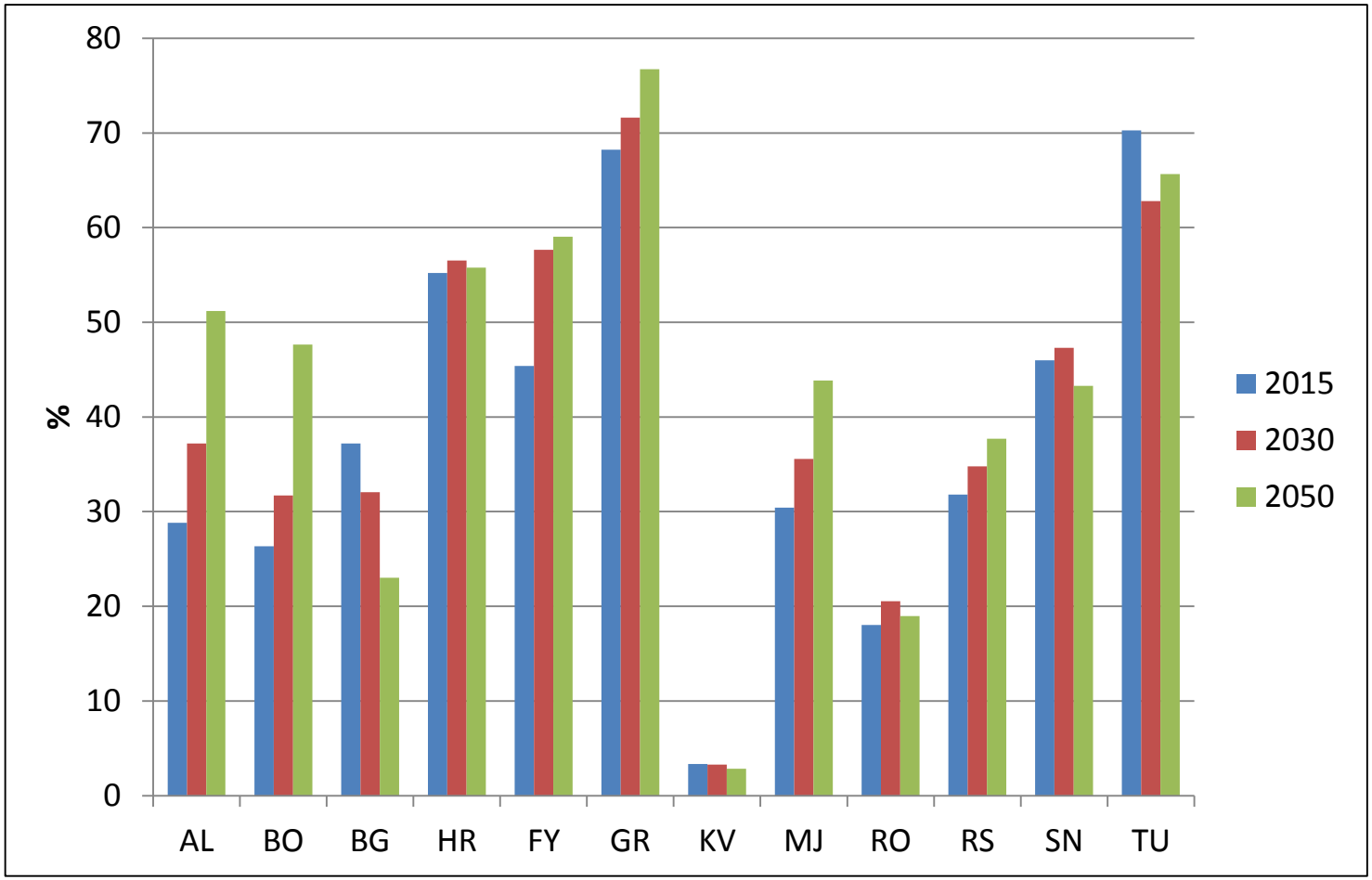
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Energy Intensity in 2015, 2030 and 2050



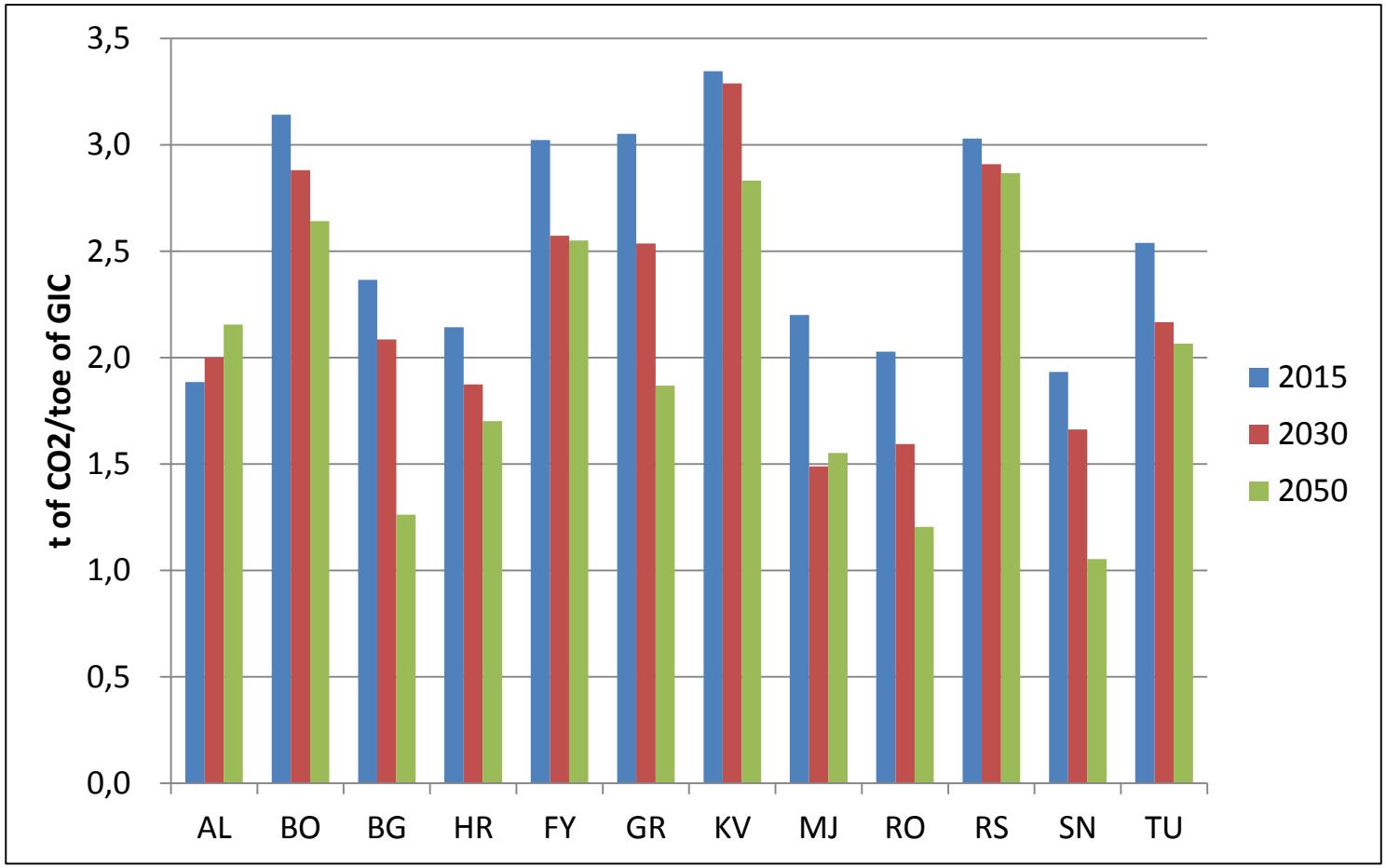
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Import Dependency in 2015, 2030 and 2050



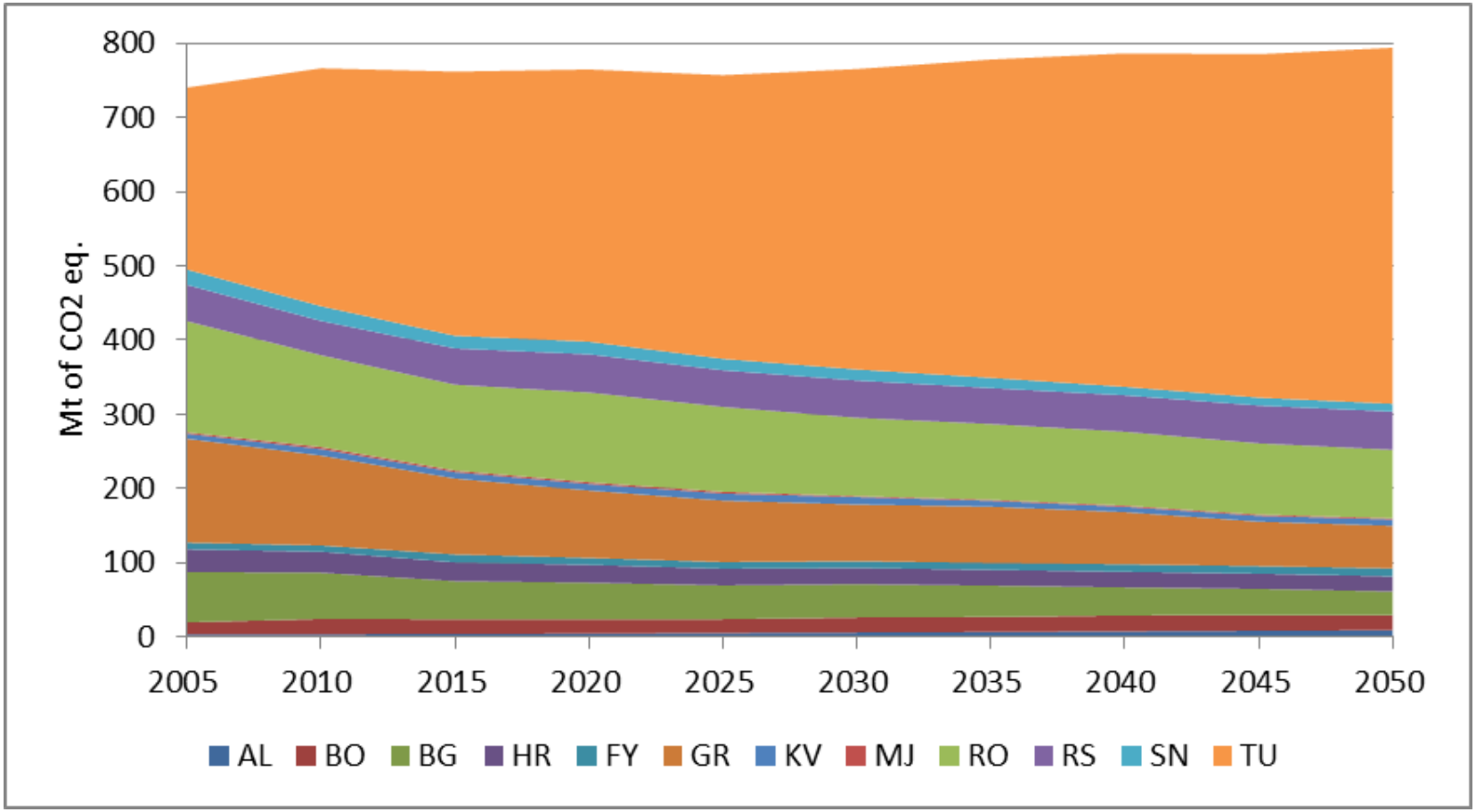
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Carbon Intensity in 2015, 2030 and 2050



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

SE Europe: Total GHG Emissions, **including Turkey** (2005-2050)



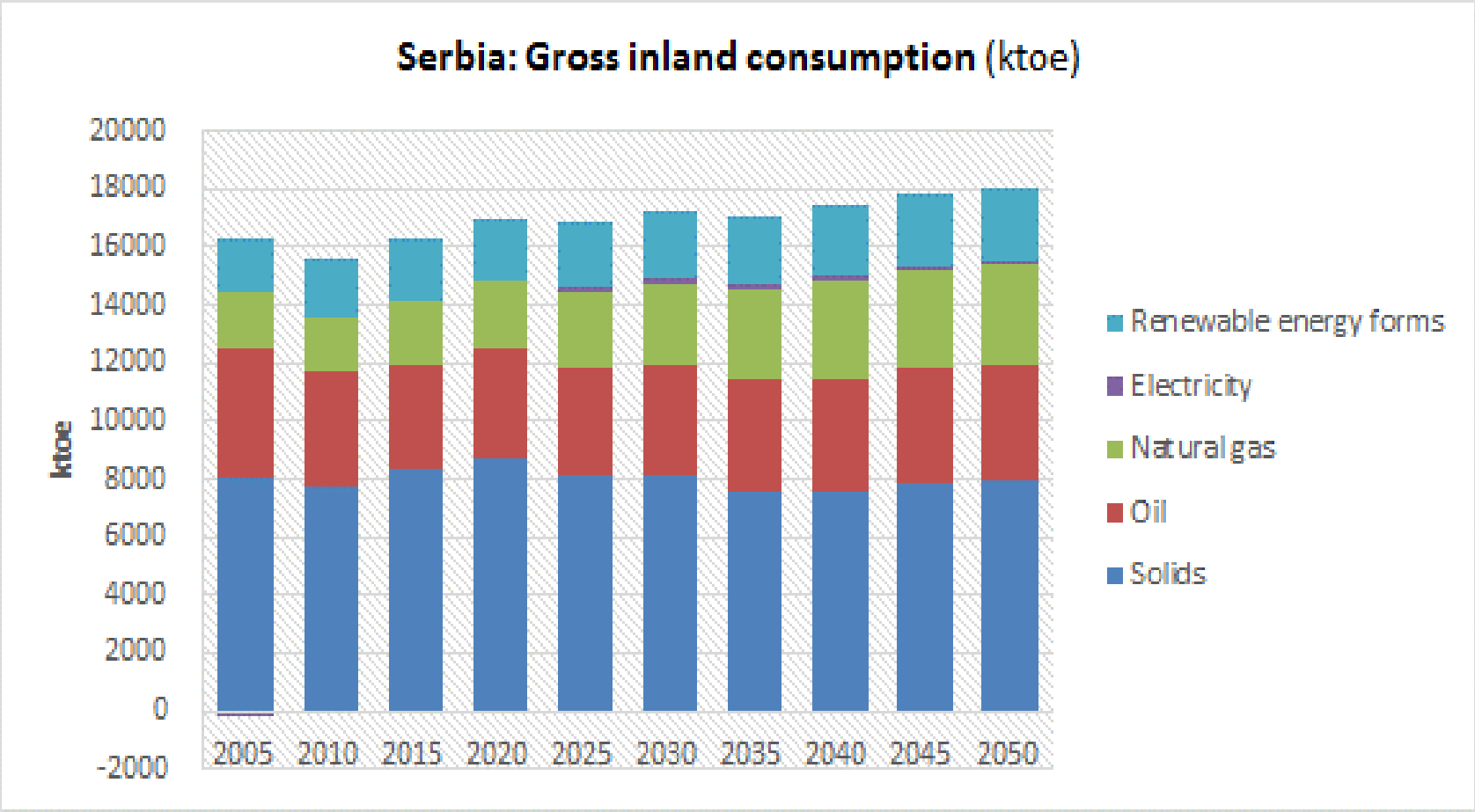
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Country Profile of Serbia

2016 Country Information	
Capital	Belgrade
Official language	Serbian
Government	Parliamentary Republic
President	Aleksandar Vučić
Prime Minister	Ivica Dačić
Area	77,474 km2
Population	7,021,000
GDP (current prices)	$37.745 billion
GDP per capita (current prices)	$5,376
Inflation (average consumer prices)	1.12%
Unemployment rate	15.9%

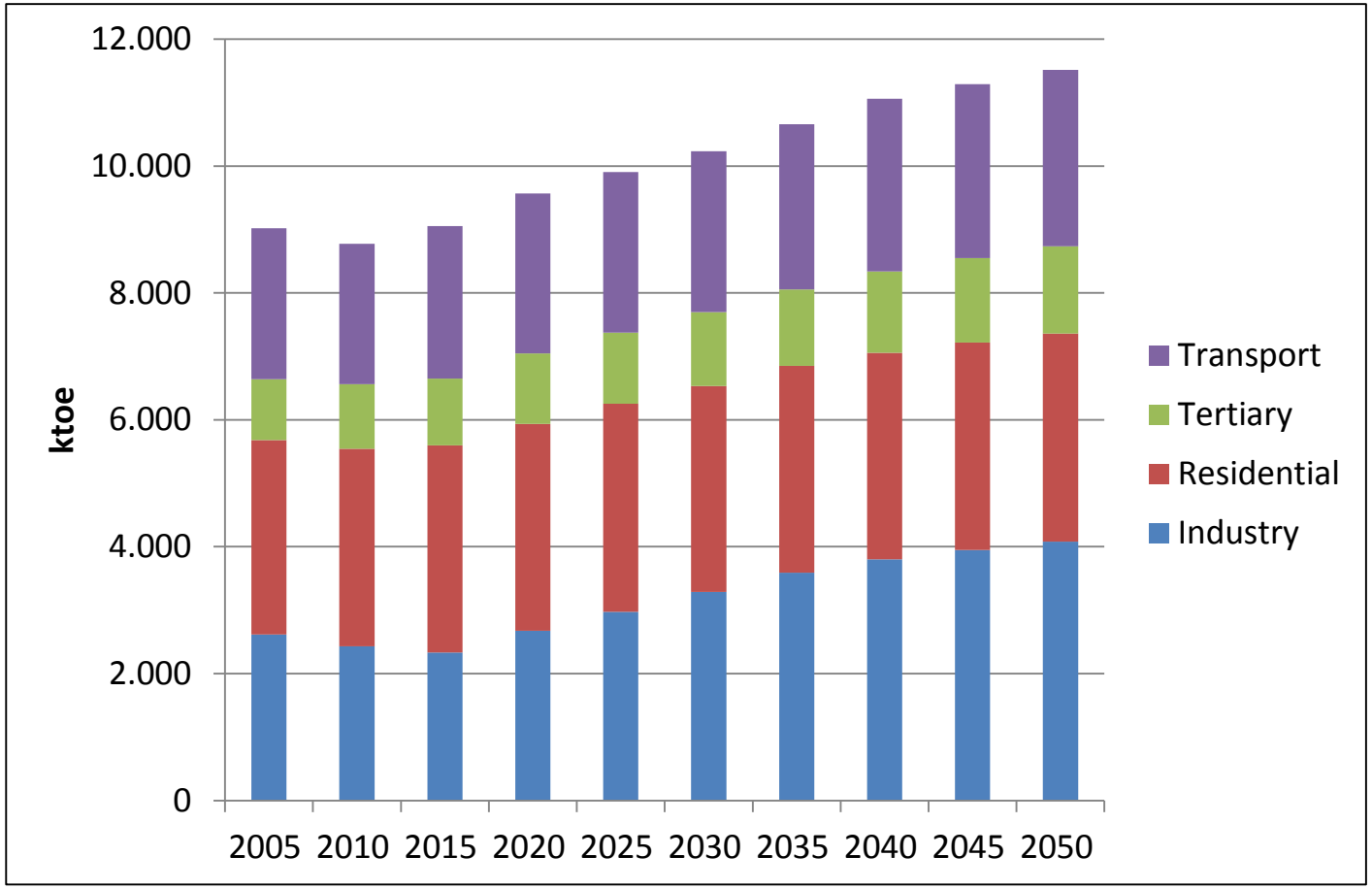
Source: IMF World Economic Outlook Database, April 2017

Serbia: Gross Inland Consumption (2005-2050)



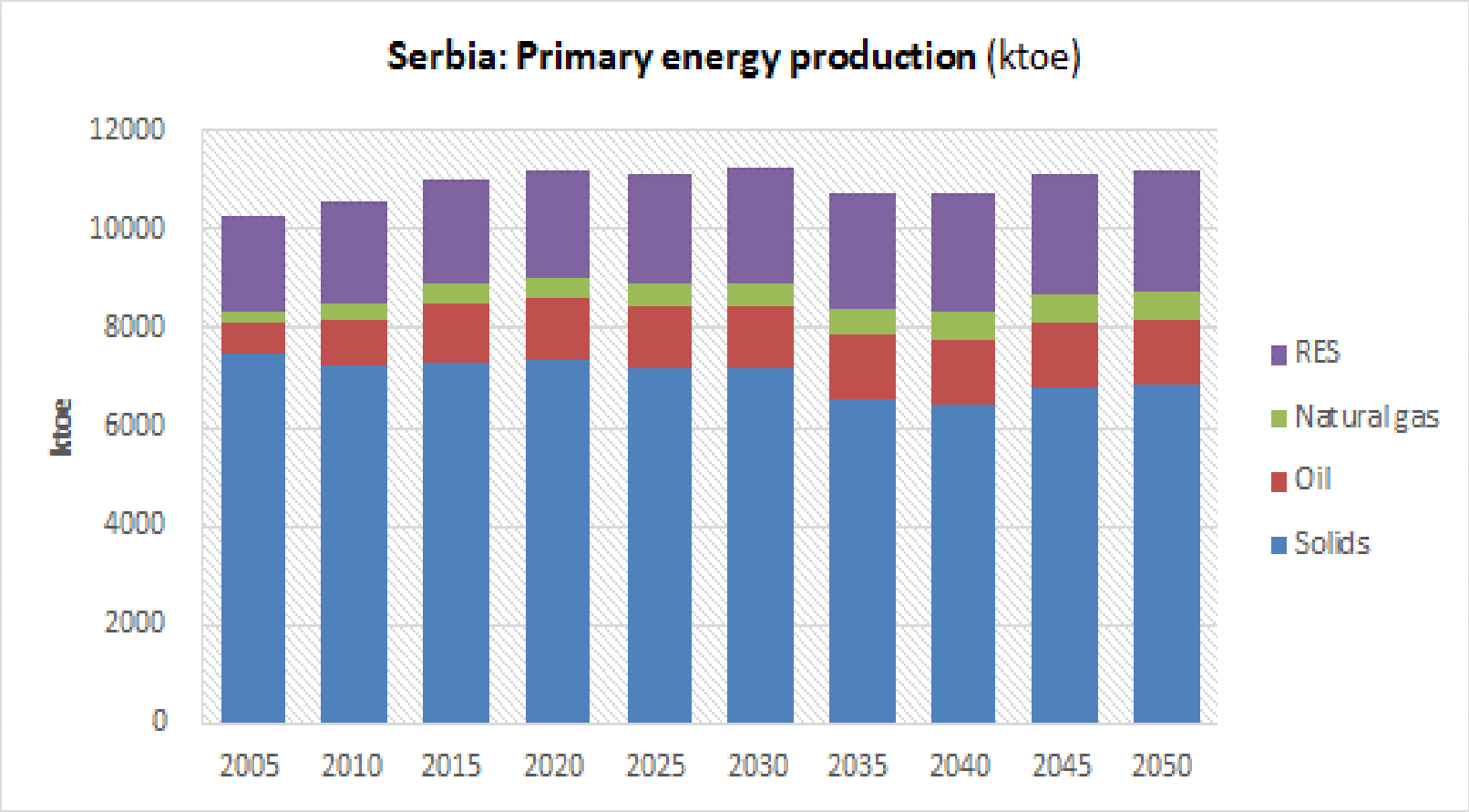
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Serbia: Final Energy Demand by Sector (2005-2050)



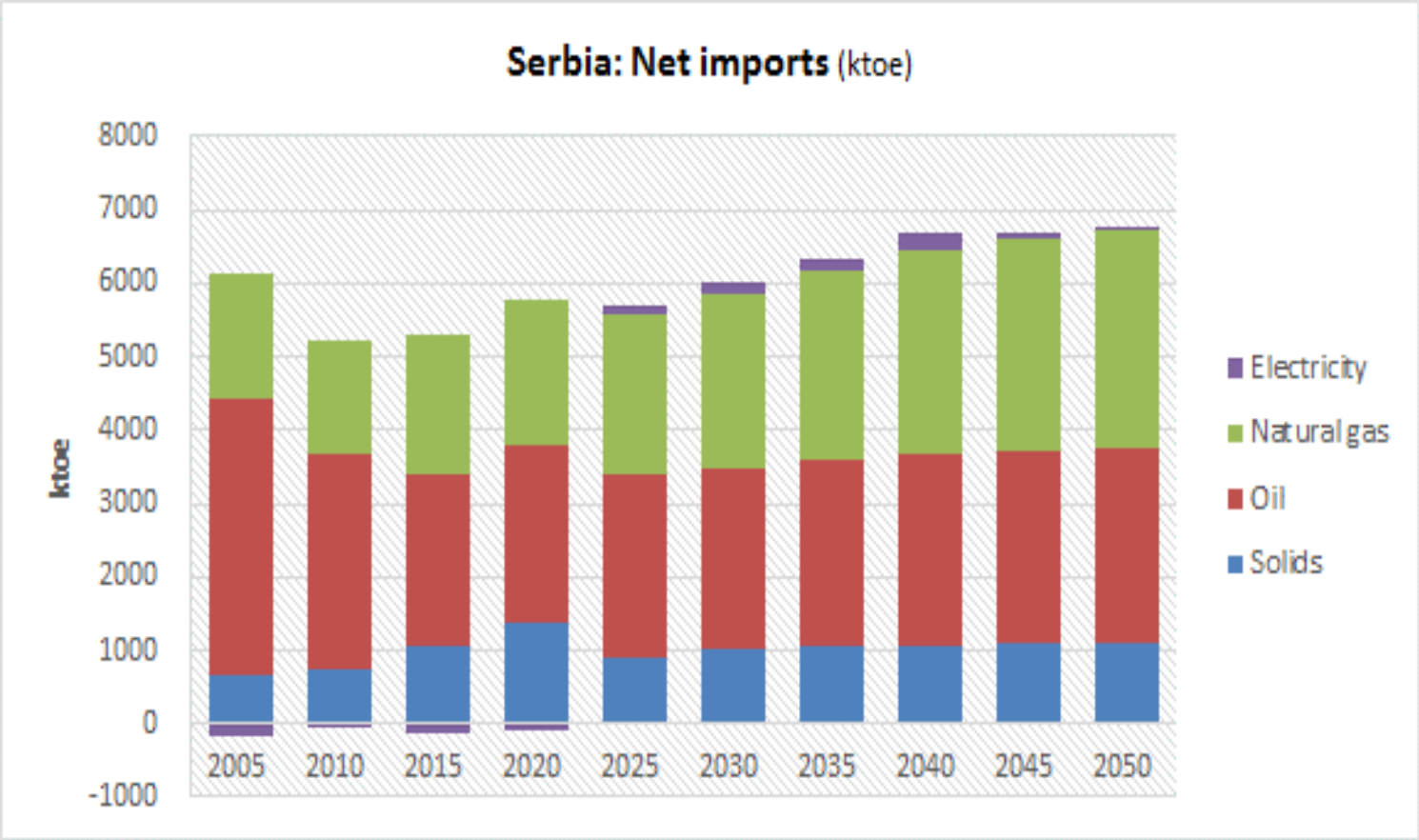
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Serbia: Primary Energy Production (2005-2050)



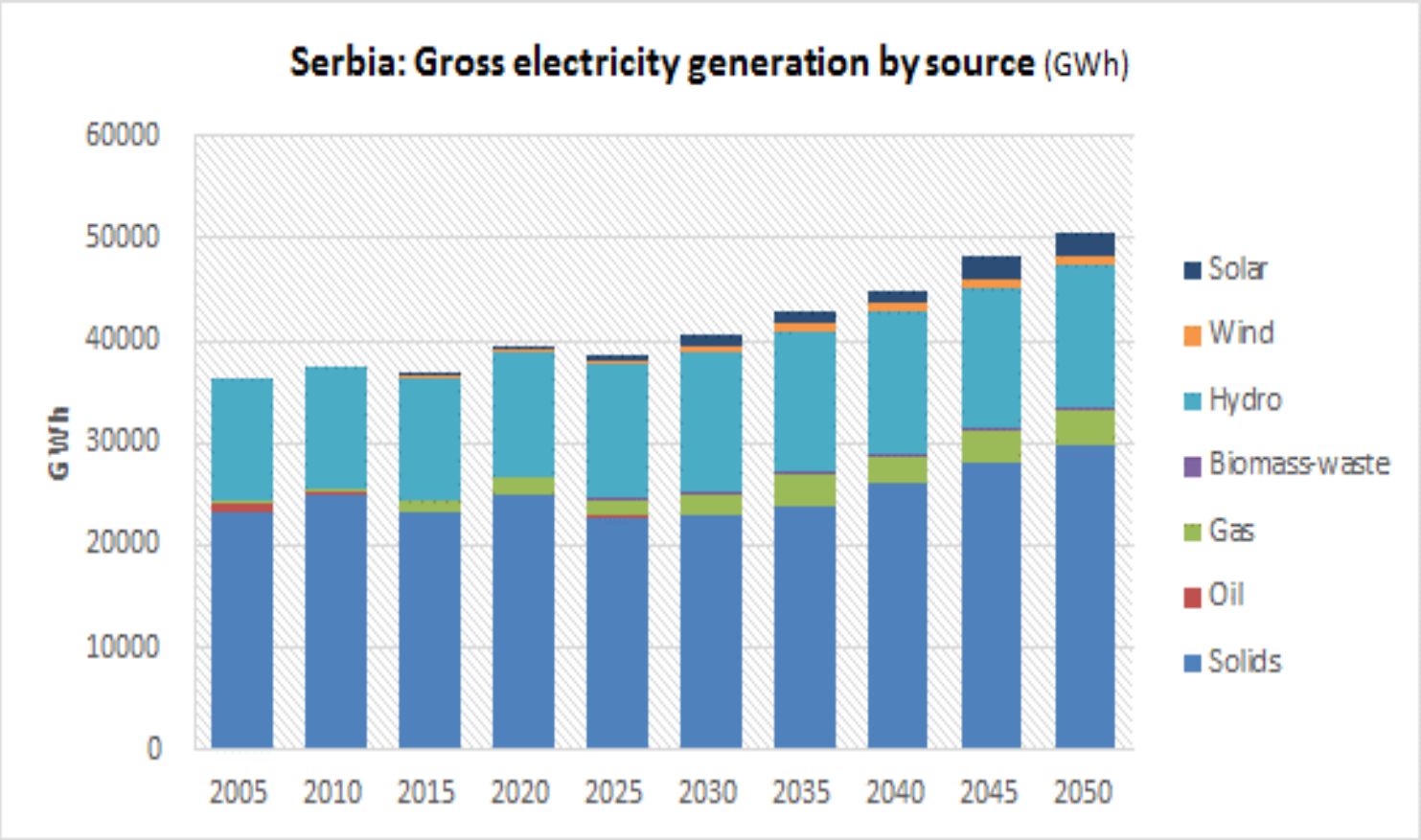
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Serbia: Net Imports (2005-2050)



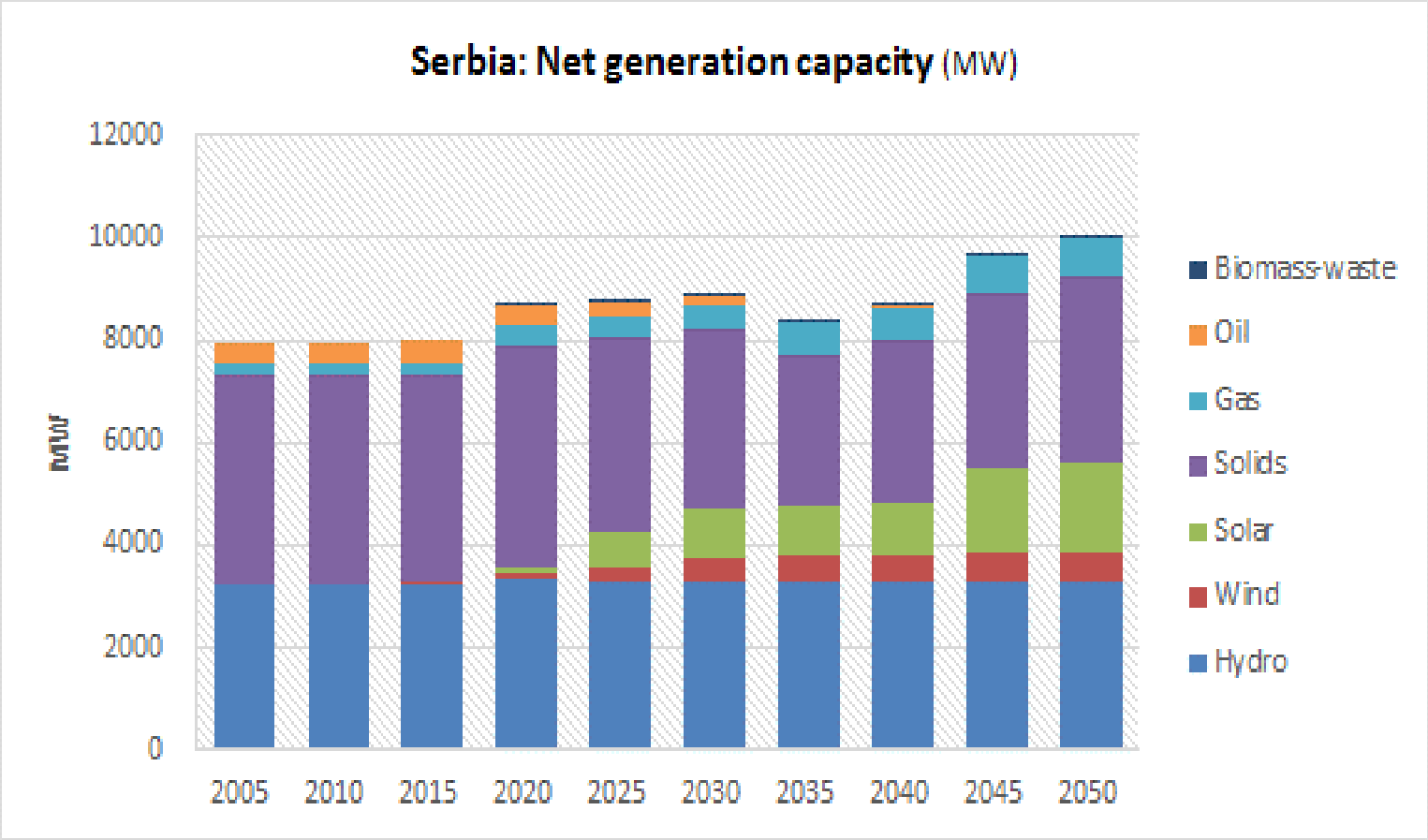
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Serbia: Gross Electricity Generation (2005-2050)



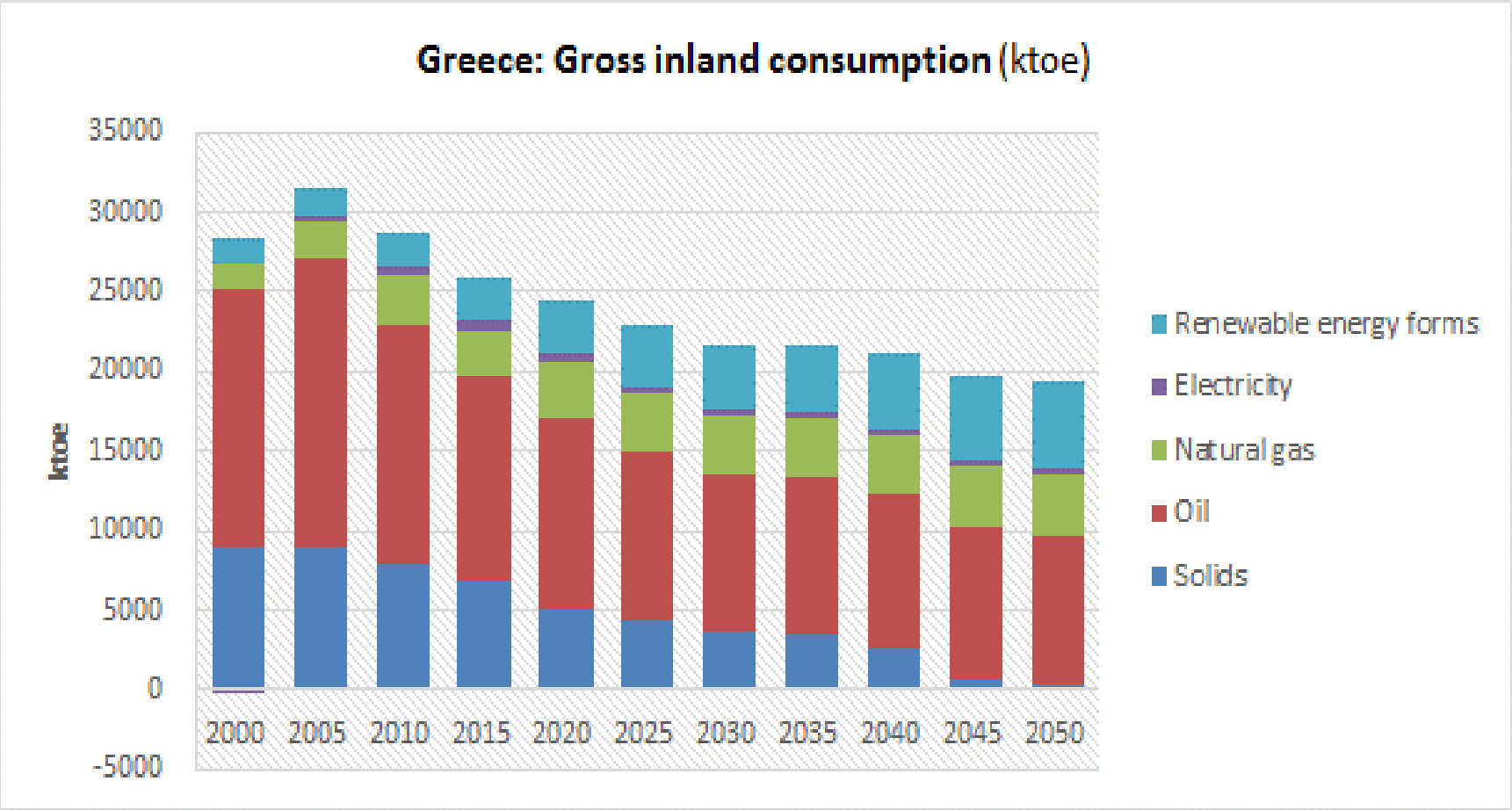
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Serbia: Net Generation Capacity (2005-2050)



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Greece: Gross Inland Consumption (2000-2050)



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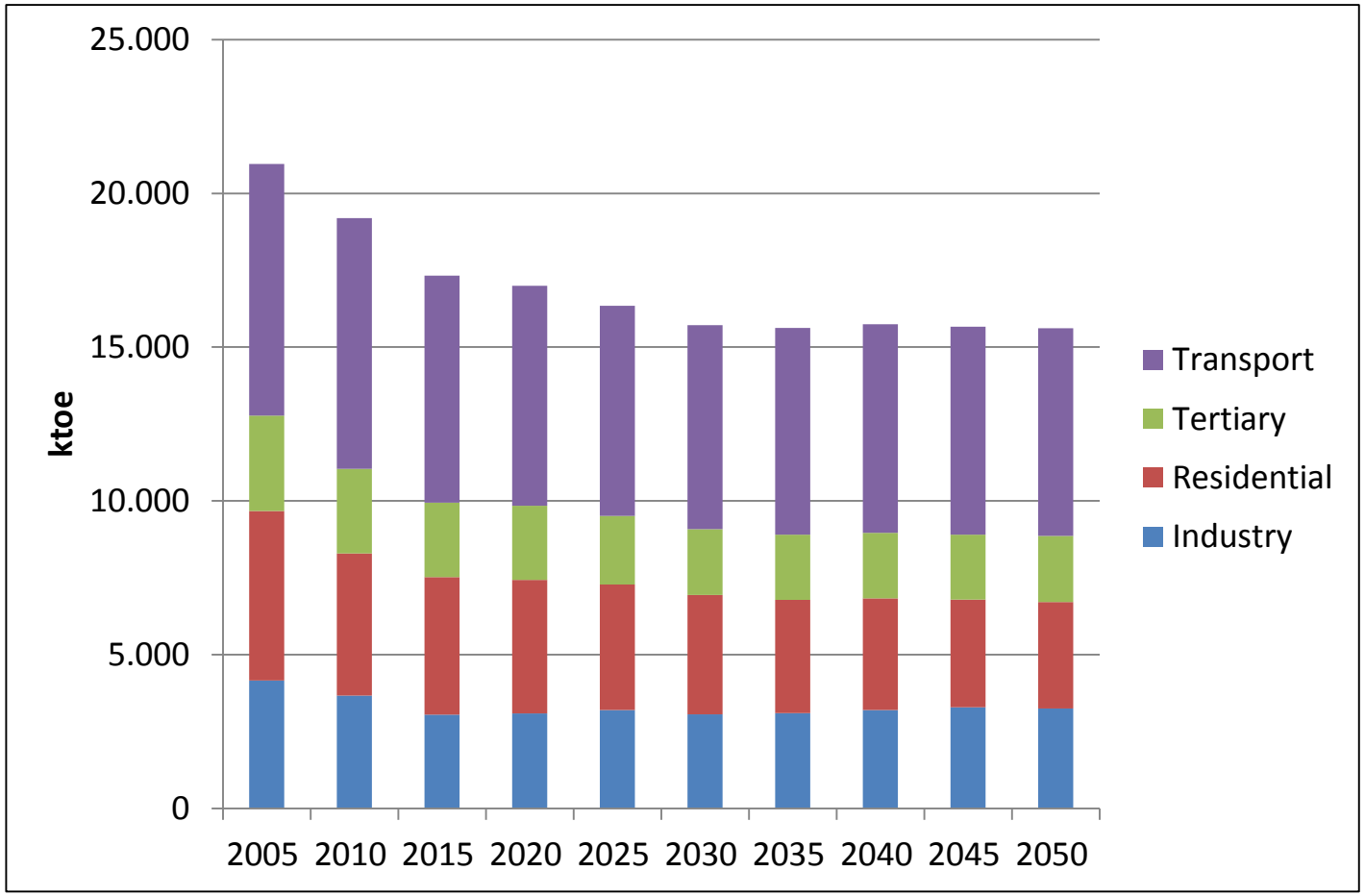
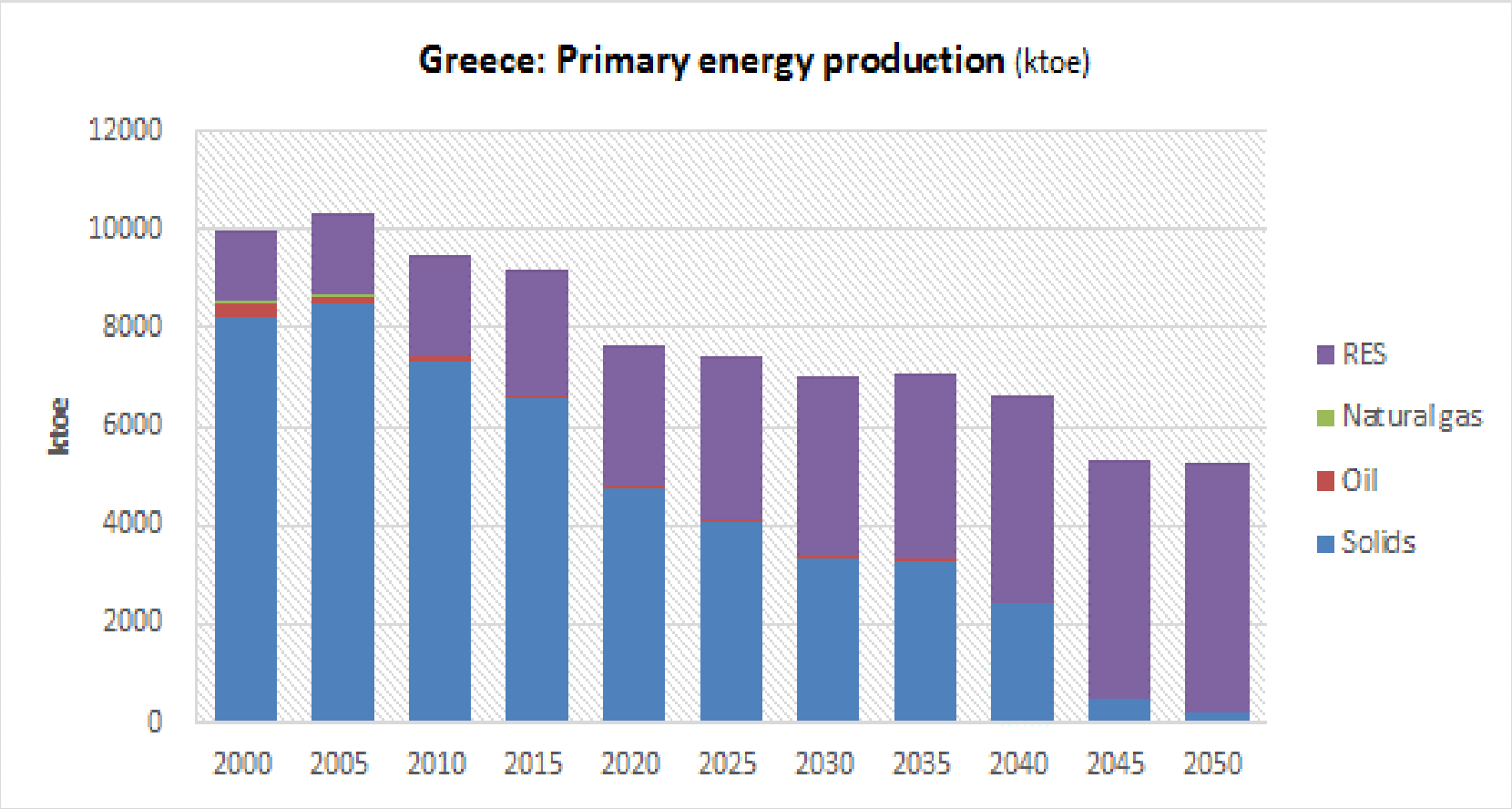
Greece: Final Energy Demand by Sector (2005-2050)



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Greece: Primary Energy Production (2000-2050)



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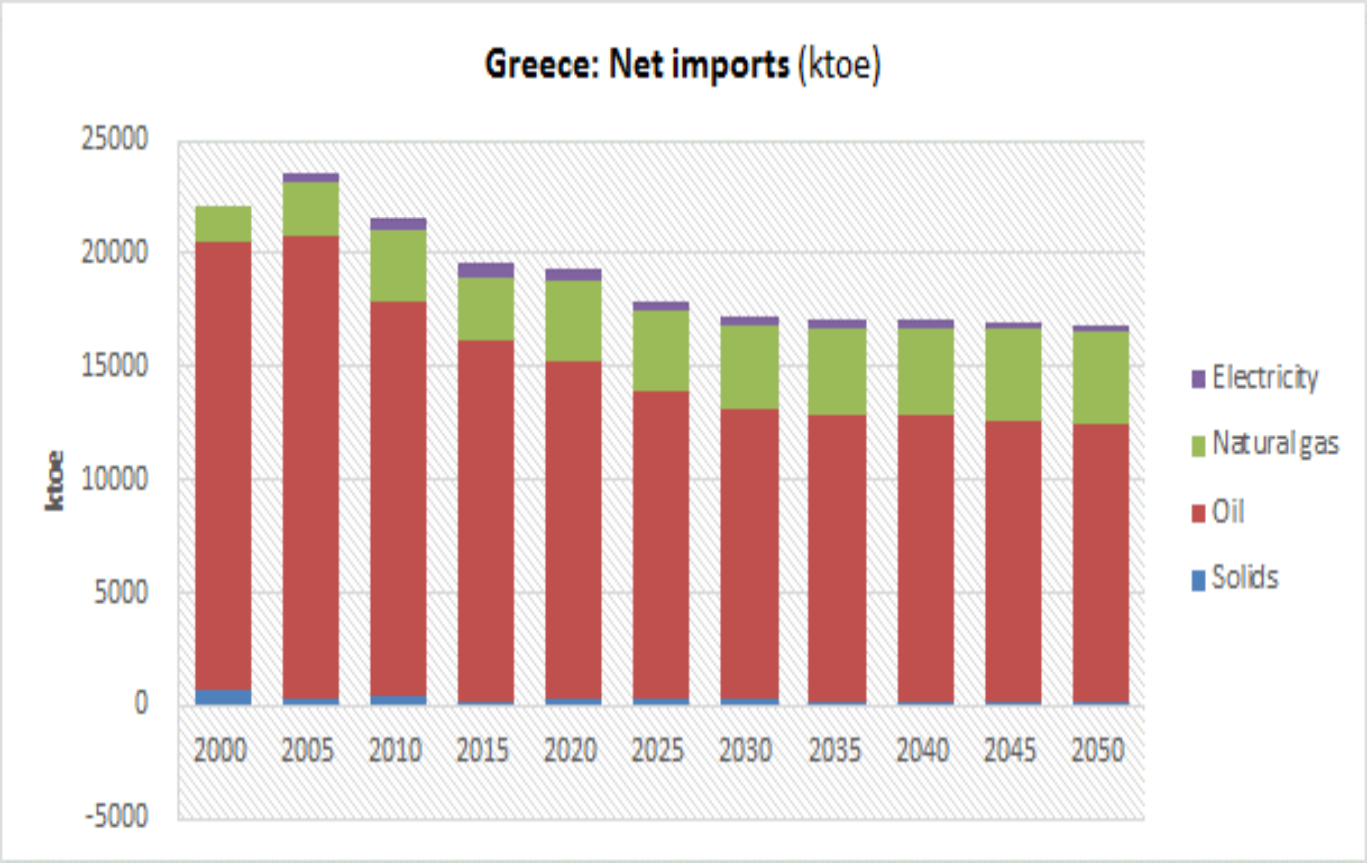
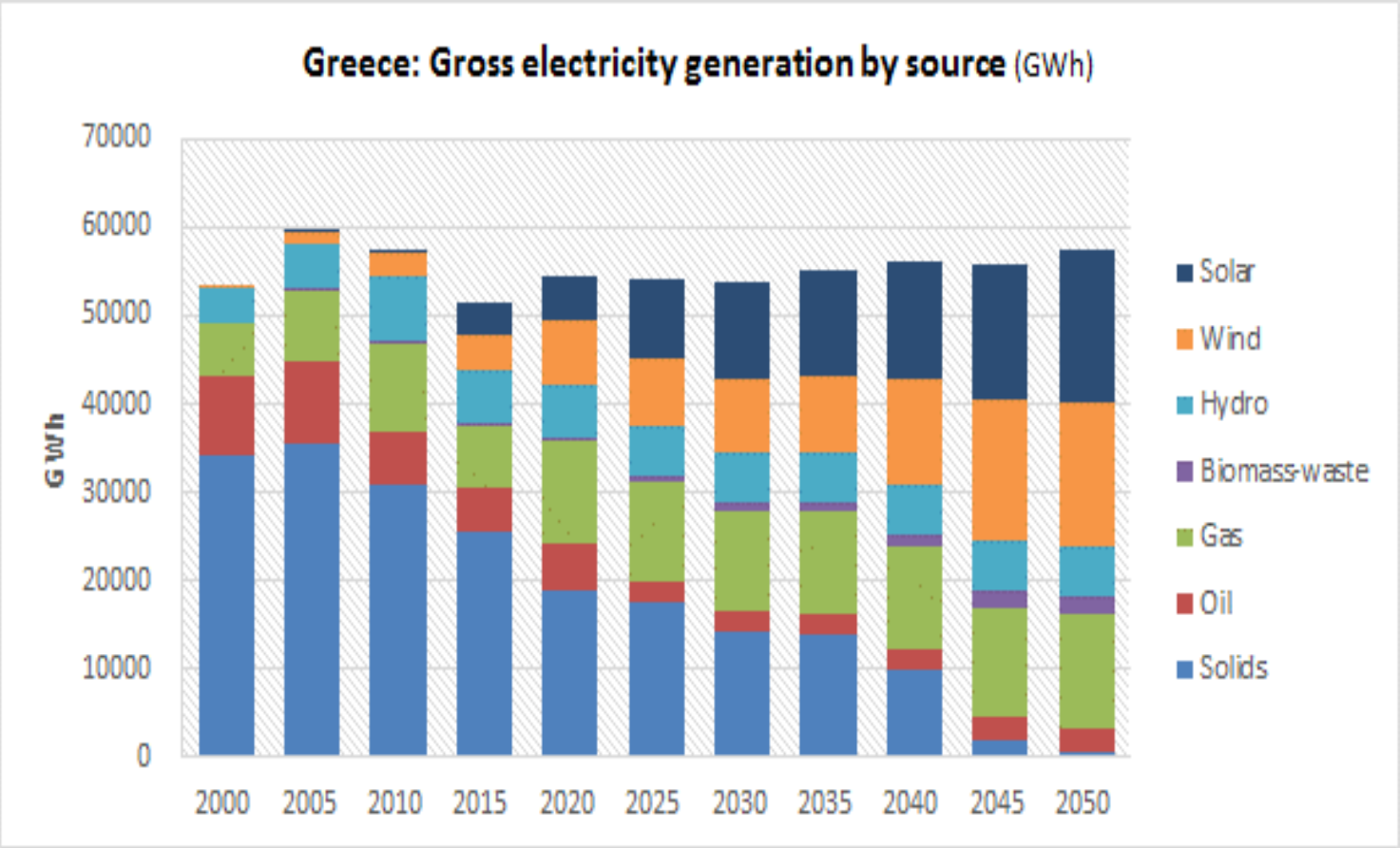
Greece: Net Imports (2000-2050)



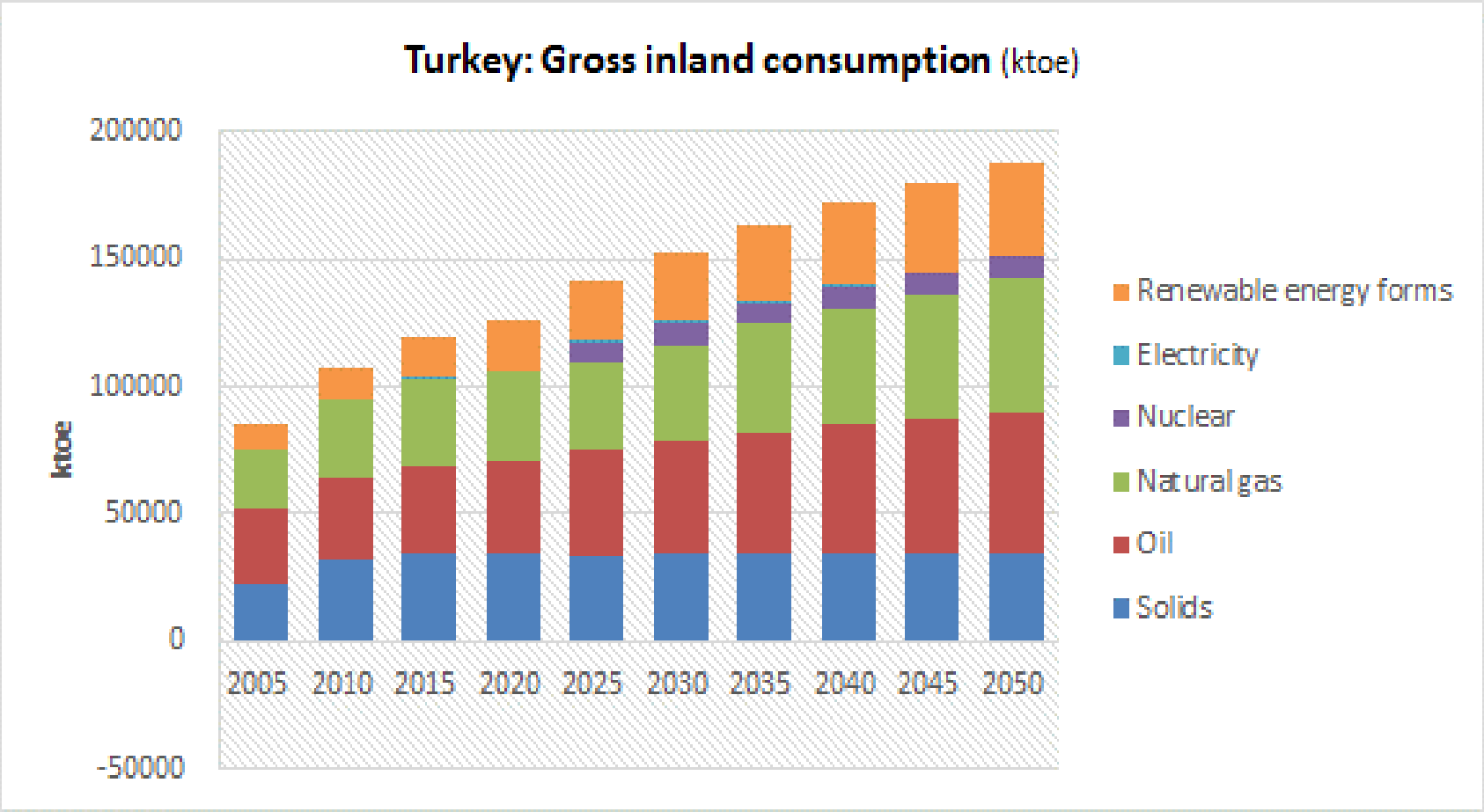
Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Greece: Gross Electricity Generation (2000-2050)



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Turkey: Gross Inland Consumption (2005-2050)



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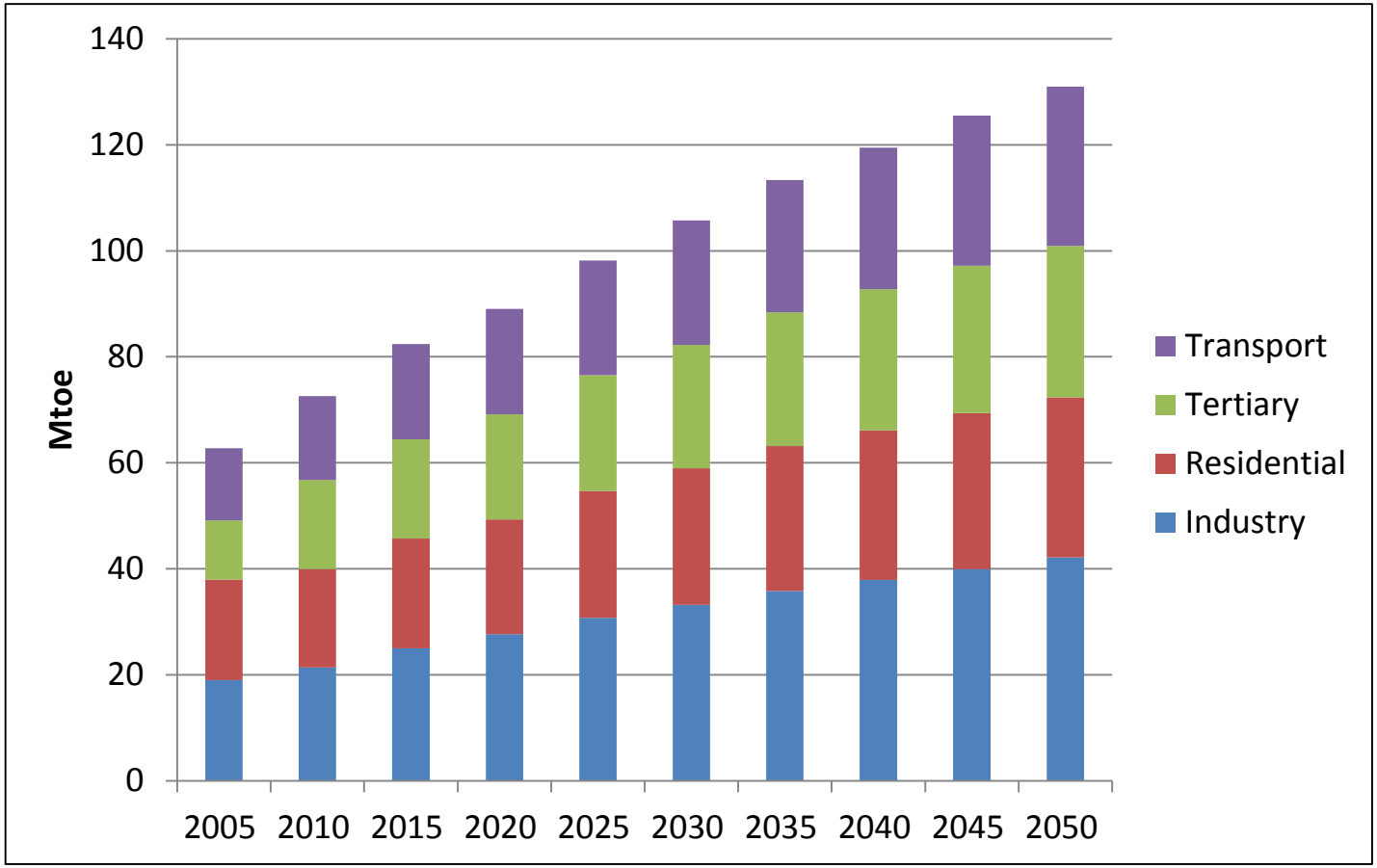
Turkey: Final Energy Demand by Sector (2005-2050)



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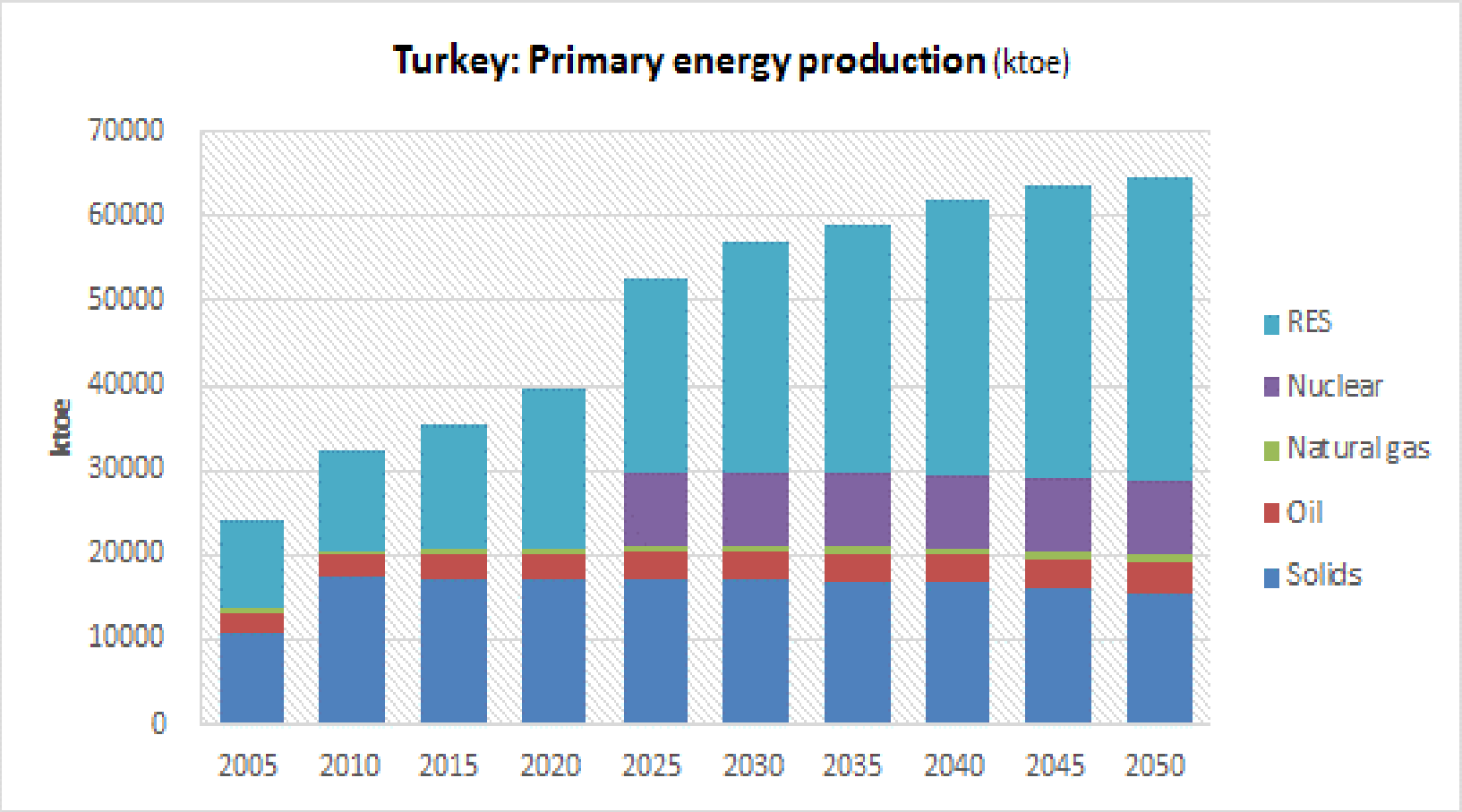

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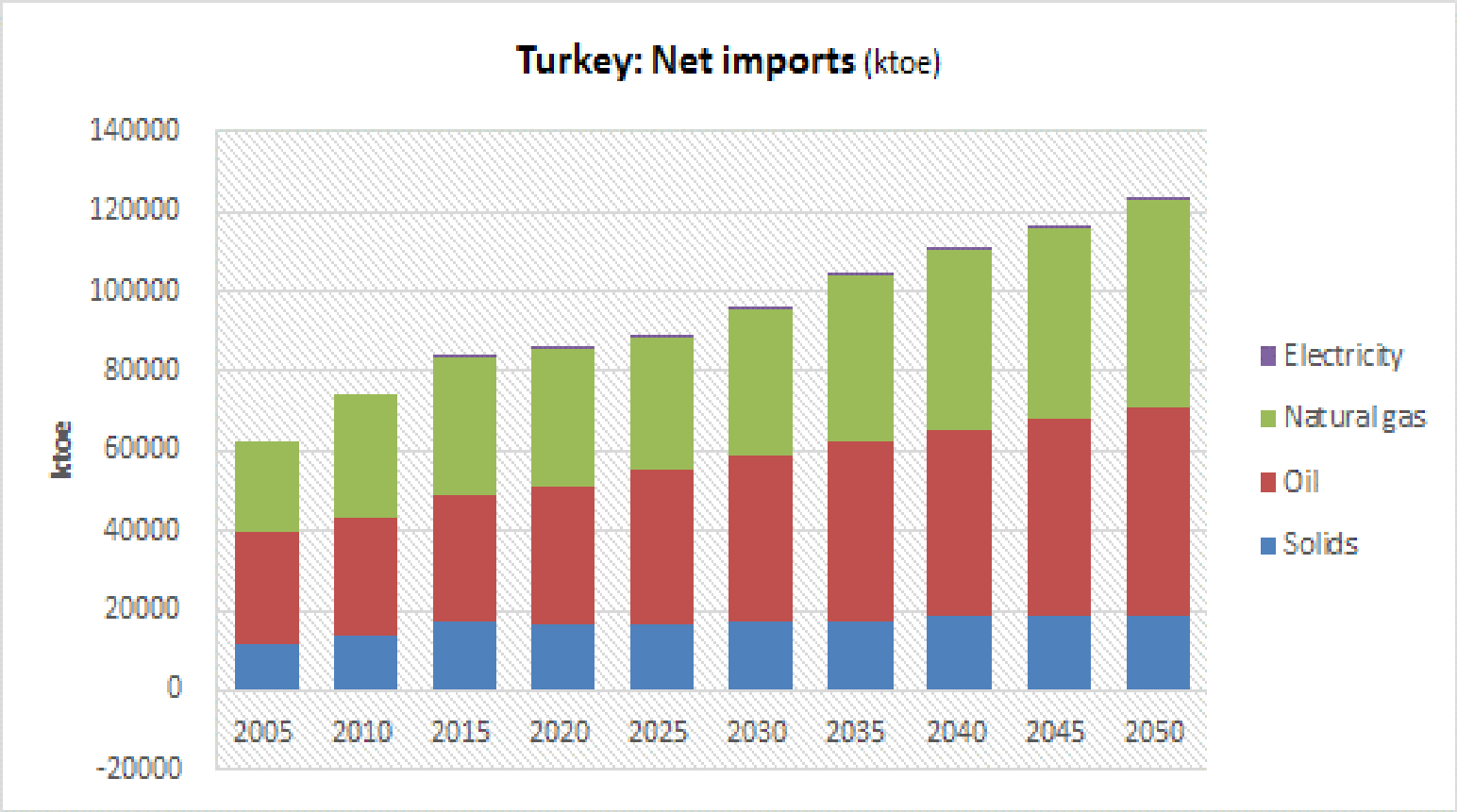

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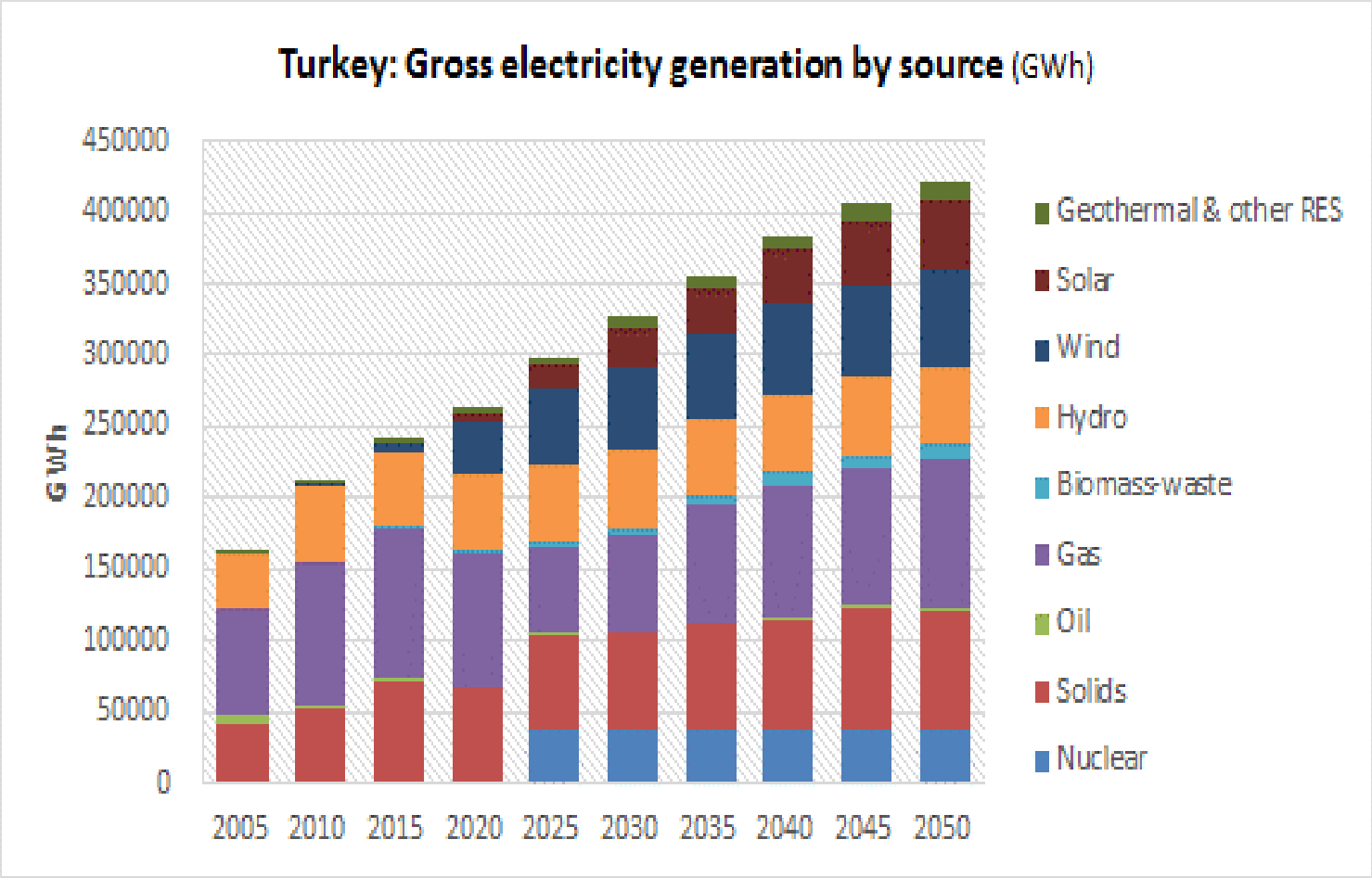

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Presentation Outline

1. Study Scope & Focus
2. Methodology
3. Raison d' Être
4. The SE Europe Area Defined
5. The Political and Economic Context
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SEE Energy Investment Outlook 2016-2025

- 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. This analysis involves **two scenarios:**
  - An **optimistic one** (with an average real GDP growth of 3% over 2016-2025 and maximum investments) and
  - A **reference one** (with an average real GDP growth of 1% over 2016-2025 and substantial part of investments).

Findings of SEE Energy Investment Outlook 2016-2025 per country

SEE Countries	Scenario A: Total Investments (in million euros)	Scenario B: Total Investments (in million euros)
Albania	7,460	8,258
Bosnia & Herzegovina	8,722	10,060
Bulgaria	11,050	12,663
Croatia	8,525	9,178
Cyprus	7,350	8,769
FYROM	3,400	4,373
Greece	23,300	30,192
Kosovo	2,605	3,377
Montenegro	2,400	3,653
Romania	20,630	22,716
Serbia	11,260	13,527
Slovenia	3,185	4,891
Turkey	124,935	141,623
TOTAL	**234,822**	**273,280**

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

Findings of SEE Energy Investment Outlook 2016-2025 per sector

Sector	Total Investment (in million euros)	
	Scenario A	Scenario B
Oil Upstream (Research, Exploration and Production)	25,450	32,288
Oil Downstream/Midstream (incl. liquid biofuels)	13,340	18,757
Electricity		
Thermal Plants		
Nuclear Plants	139,473	146,369
Lignite Mine Development		
Grids - Upgrade and Expansion		
HV Transmission Lines		
Gas		
Main and branch gas pipelines		
Gas Storage	16,550	26,460
Town grids		
LNG Terminals and Liquefaction plants		
RES (Wind, PV, Biomass, Mini Hydro, Geothermal)	40,009	49,406
TOTAL	**234,822**	**273,280**
Intraregional Mega Projects		
Oil Pipelines	-	1,000
Gas Pipelines	33,350	51,361
Electricity Interconnectors	4,700	7,150
Grand Total	**272,872**	**332,791**

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

The Case of Oil Refining in SE Europe

- Oil refining has emerged as an important and viable economic activity in several countries in SE Europe over the last 20 years.

- In SE Europe, the refining picture appears to be totally different as compared to the main European refinery scene, with new units opening up and plans under way to revamp and upgrade old installations, but also expand refining capacity in green-field sites.

- The **current refining capacity in SE Europe is about 2 mb/d**, 13.3% of European and about 2% of global refinery capacity.

- The following Table and Map present the 22 existing refineries in SE Europe and their capacity.

- Latest data suggests a trend for increased oil storage in certain countries (Turkey, Greece, Cyprus, Croatia) since SEE is an oil transit area.

Oil Refineries in SE Europe and their capacity

Country		Refinery	Company	current CDU cap. (kbpd)	currentCDU cap. (Mt/y)
Albania	1	Ballsh Refinery	ARMO	20	1.0
Albania	2	Fier Refinery	ARMO	10	0.5
Bosnia & Herzegovina	1	Bosanski Brod	Zarubezhneft	80 (30)	1.5
Bosnia & Herzegovina	2	Modrica	NeftegazInKor (75,65%) NestroPetrol	-	-
Bulgaria	1	Burgas	Lukoil	175 (190)	9.5
Croatia	1	Rijeka	INA	90	4.5
Croatia	2	Sisak	INA	85 (61)	2.2
FYROM	1	OKTA Skopje	Hellenic Petroleum	50	2.5
Greece	1	Aspropyrgos	Hellenic Petroleum	147,5 (148)	7.5
Greece	2	Elefsis	Hellenic Petroleum	100	5.0
Greece	3	Thessaloniki	Hellenic Petroleum	90 (93)	4.5
Greece	4	Corinth	Motor Oil Hellas	180	9.0
Romania	1	Ploiesti	Lukoil	50 (58)	2.4
Romania	2	Petrobrazi Ploiesti	OMV (Petrom)	84 (90)	4.5
Romania	3	Vega Ploiesti	Romepetrol	20	1.0
Romania	4	Petrolsub Suplacu de Barcau	OMV (Petrom)	15	0.75
Romania	5	Petromidia Constanța / Midia	Rompetrol	100	4.8
Serbia	1	Pancevo	NIS (56% Gazprom)	103 (96)	4.8
Serbia	2	Novisad	NIS (56% Gazprom)	63 (52)	2.6
Turkey	1	Izmir	Tupras	221	11.0
Turkey	2	Izmit	Tupras	221	11.0
Turkey	3	Kirikkale	Tupras	100	5.0
Turkey	4	Batman	Tupras	22	1.1
Turkey	5	Petkim	SOCAR	60	3.0
Turkey	6	Star Refinery (under construction)	SOCAR/TURCAS	214	10.0

Source: IENE study “South East Europe Energy Outlook 2016/2017”, Athens, 2017

Oil Refineries in SE Europe

Source: IENE study “South East Europe Energy Outlook 2016/2017”, Athens, 2017

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Sources of Finance vs Country Risk (I)

- 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

Sources of Finance vs Country Risk (II)

- However, the implementation of a set of planned energy projects in SE Europe may be hindered by the **high Country Risk** of several SEE countries and the **increased cost of capital**.

Country	Moody's ratings	S&P ratings	Fitch ratings
Albania		B1 (August 2014)	B+ (February 2016) n.a.
Bosnia and Herzegovina	B3 (February 2016)	B (November 2011)	n.a.
Bulgaria	Baa2 (June 2015)	BB+ (December 2014)	BBB- (December 2016)
Croatia	Ba2 (March 2016)	BB (January 2014)	BB (July 2016)
Cyprus	B1 (November 2016)	BB (September 2016)	BB- (October 2016)
FYROM	n.a.	BB- (May 2013)	BB (August 2016)
Greece	Caa3 (October 2016)	B- (January 2016)	CCC (September 2016)
Montenegro	B1 (May 2016)	B+ (November 2014)	n.a.
Romania	Baa3 (December 2015)	BBB- (May 2014)	BBB- (July 2016)
Serbia	n.a.	BB- (August 2012)	BB- (December 2016)
Slovenia	Baa3 (September 2016)	A (June 2016)	A- (September 2016)
Turkey	Ba1 (September 2016)	BB (July 2016)	BBB- (August 2016)

Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

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Key Messages (I)

- Geography, followed by economy, have emerged as key factors 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
- A robust upward trend in final energy demand in SE Europe over the projection period up to 2050 is forecasted, reaching 219 Mtoe in 2050, up by 59 Mtoe compared to 2015 levels
- The persisting relevance of solid fuels which contributed about 33% of the gross inland consumption and 38% of gross electricity generation of the SEE region respectively in 2015
- High oil and gas import dependence with crude oil and oil product imports corresponded to 82.65% of total oil consumption and 69.5% of natural gas, compared to 53.5% of the EU average.
- 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 supplies only 6.0% of the electricity mix in SEE remains a viable option since it covers important base load in certain key countries (Romania, Bulgaria, Croatia and Slovenia) and is fully compatible and supportive of EU's decarbonisation policies.
- For Renewables to achieve greater penetration in the SEE energy mix, and thus facilitate the region's decarbonisation, clear policy measures backed by EU funds will be required
- Energy Efficiency in SE Europe is not being 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
- In terms of security of energy supply the SEE region as a whole appears more vulnerable than the rest of Europe. Regional Connectivity of electricity and gas grids is a priority.
- Investment prospects for energy related basic infrastructure and energy projects across the board look positive over the next decade.

Funding for **“SE Europe Energy Outlook 2016/2017”** came from a number of companies and IENE’s budget

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