

“Review of Major Developments in the Energy Sector of S.E. Europe 2013 – 2014”

“8th SE Europe Energy Dialogue»

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Presentation Outline

1. The SE Europe region defined
2. The global scene
3. The oil sector
4. Natural gas
5. The electricity sector
6. Oil & gas upstream
7. Renewable Energy Sources (RES)
8. Concluding remarks

The South East Region Defined



SE Europe Basic Economic & Energy Parameters (2012 - 13)

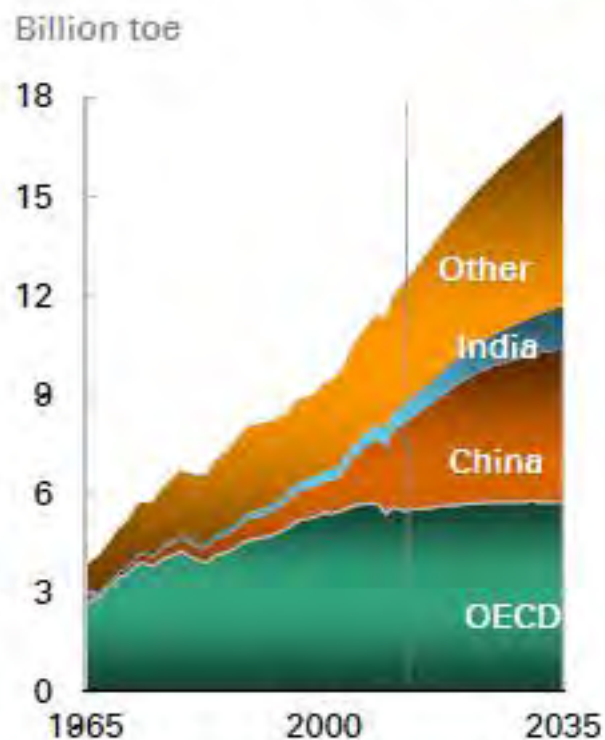


□ Population	137.02 million
□ GDP	1.462.3 USD billion
□ Installed Electricity Capacity	130 GW
□ Oil Consumption	1.761,4 bbl/day
□ Oil Production	223,8 bbl/day
□ Gas Consumption	63.03 BCMs
□ Gas Production	13.55 BCMs

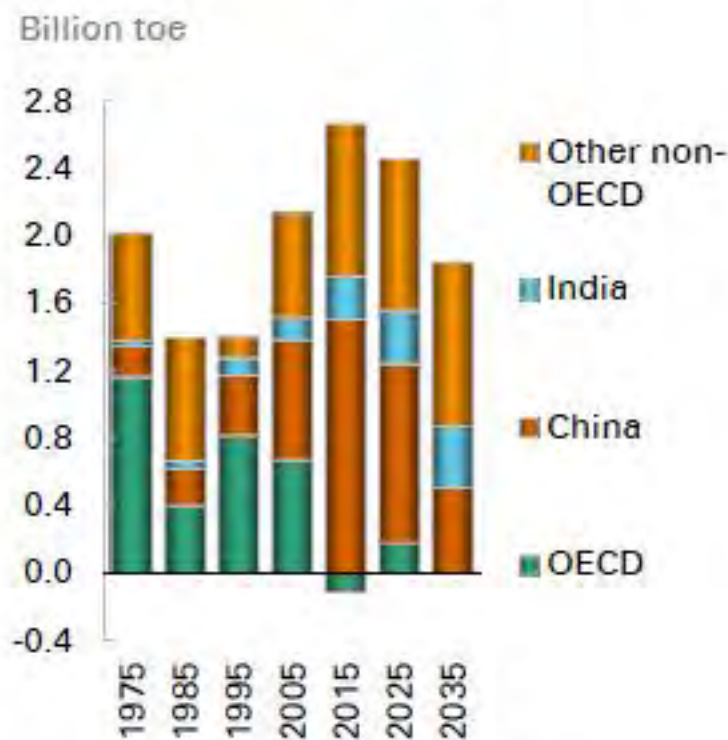
Primary Energy Consumption Growth Slows and the Growth is Almost All in The Non-OECD

- **Primary energy demand increases by 41% between 2012 and 2035, with growth averaging 1.5% per annum (p.a.). Growth slows, from 2.2% p.a. for 2005-15, to 1.7% p.a. 2015-25 and just 1.1% p.a. in the final decade.**
- **We are leaving a phase of very high energy consumption growth, driven by the industrialization and electrification of non-OECD economies, notably China. The 2002-2012 decade recorded the largest ever growth of energy consumption in volume terms over any ten year period, and this is unlikely to be surpassed in our timeframe.**
- **There is a clear long-run shift in energy growth from the OECD to the non-OECD. Virtually all (95%) of the projected growth is in the non-OECD, with energy consumption growing at 2.3% p.a. 2012-35. OECD energy consumption, by contrast, grows at just 0.2% p.a. over the whole period and is actually falling from 2030 onwards.**
- **China has emerged as the key growth contributor, but by the end of the forecast China's contribution is starting to fade. India's contribution grows, almost matching that of China in the final decade of the forecast.**

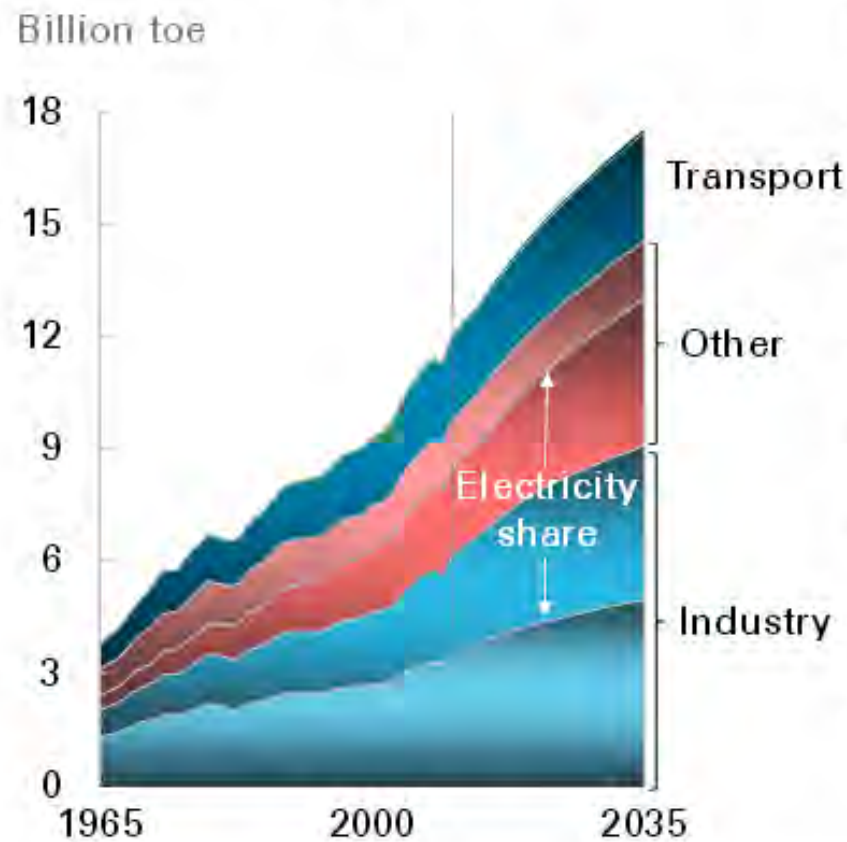
Consumption by region



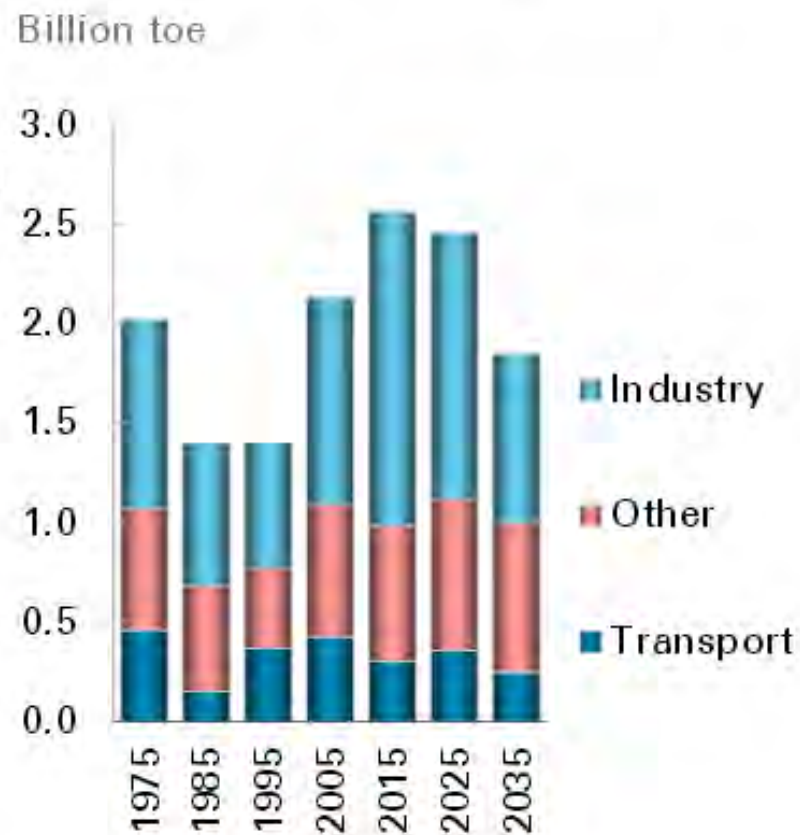
Ten year increments by region



Consumption by sector



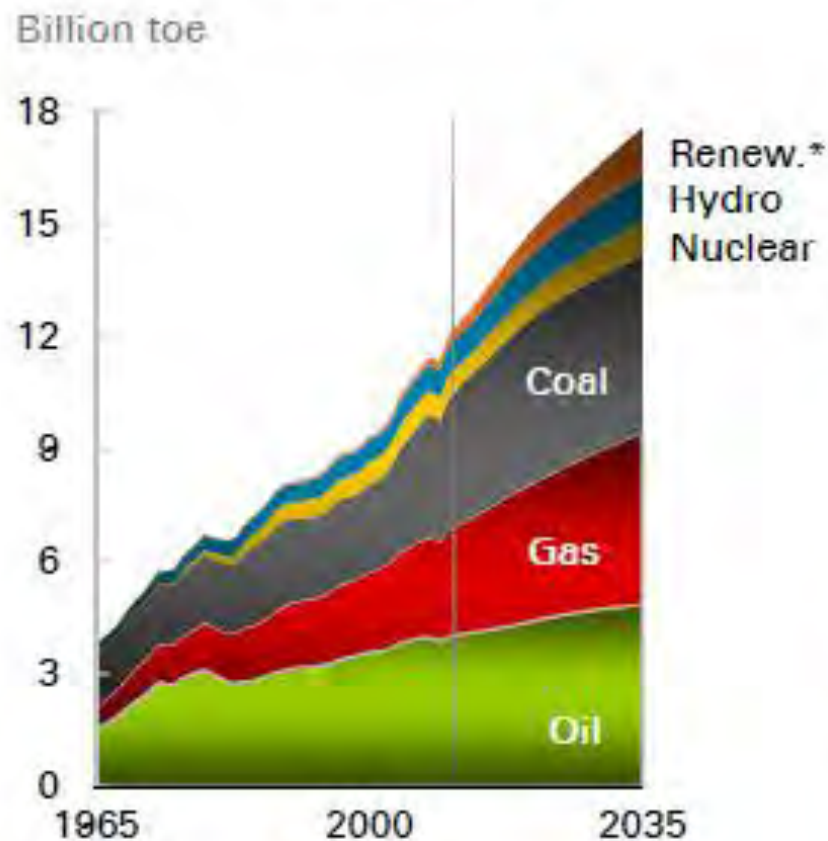
Ten year increments by sector



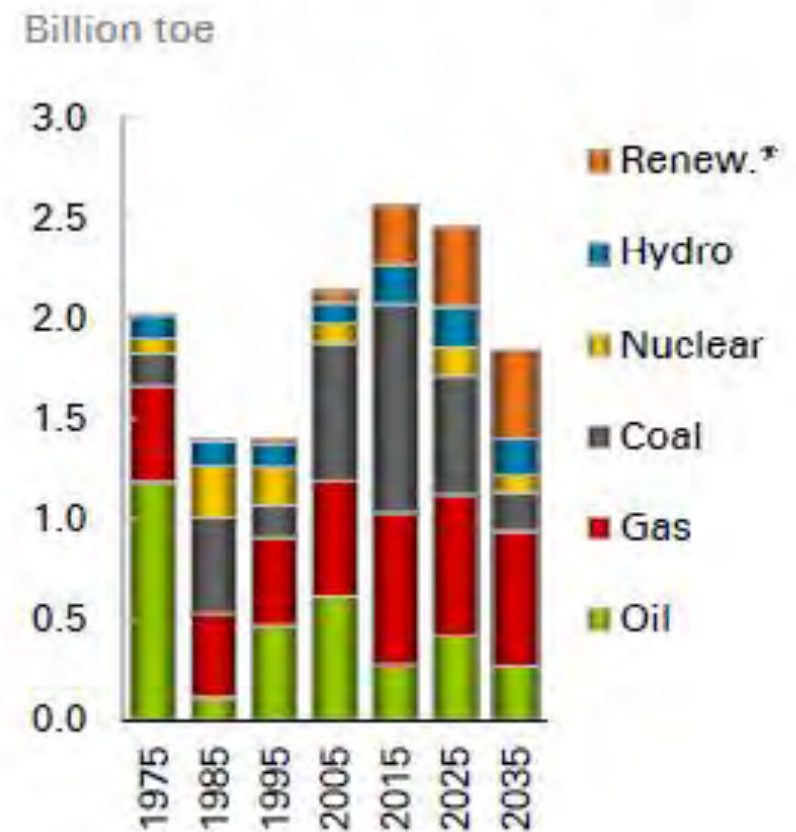
The Strong Impetus From Industrialization Starts to Fade Toward the End of the Forecast

- **By sector, industry remains the dominant source of growth for primary energy consumption, both directly and indirectly (in the form of electricity). Industry accounts for more than half of the growth of energy consumption 2012-35. This reflects the unprecedented pace and scale of industrialization in Asia. Energy for industry grows at 2.6% p.a. over the decade 2005-15, but this slows to just 1.0% p.a. in the final decade of the forecast as China's rapid industrialization comes to an end.**
- **The next major component of growth is energy used in the 'other' sector (residential, services and agriculture), predominantly in the form of electricity. By the final decade, growth in other sector energy use almost matches industry in volume terms.**
- **The transport sector continues to play a relatively small role in primary energy growth throughout the forecast, growing steadily but accounting for just 13% of total growth during 2012-35.**

Consumption by fuel



Ten year increments by fuel





The Slowdown in China And Industry is Reflected in a Marked Slowdown in Coal Growth

- **All fuels show growth over the forecast period, with the fastest growth seen in renewables (6.4% p.a.). Nuclear (1.9% p.a.) and hydro-electric power (1.8% p.a.) both grow more rapidly than total energy.**
- **Among fossil fuels, gas is the fastest growing (1.9% p.a.) and the only one to grow more rapidly than total energy. Oil (0.8% p.a.) shows the slowest growth, with coal (1.1% p.a.) only slightly ahead.**
- **Coal's contribution to growth diminishes rapidly. It is currently the largest source of volume growth, but by the final decade coal adds less volume than oil and is only just ahead of hydro. Again, this reflects the shift away from coal-intensive industrialization in China.**
- **In that final decade, gas is the largest single contributor to growth; but non-fossil fuels in aggregate contribute even more than gas, accounting for 39% of the growth in energy in that period.**

New Refinery Projects in SE Europe

Refinery	Country	Original Owner	Max Capacity (in mln TN per year)	Notes
Bosanski Brod	Bosnia and Herzegovina	Zarubezhneft	1.2	New line rehabilitation project, 2016
Neftochim Burgas	Bulgaria	LUKoil	8.8	New hydrocracker, 2015
Elefsis	Greece	Hellenic Petroleum	5.0	New hydrocracker - Flexicoker , 2012
Petromidia	Romania	Rompetrol Rafinare	4.8	New HDS Diesel and FCC Treater, 2012
Petrobrazi	Romania	Petrom	4.5	CDU Expansion and Hydrocracker, on hold
Pancevo	Serbia	NIS	4.8	New FCC and HDS Diesel units, 2012
Alliaga Petkim	Turkey	Socar/ Turcas	10.0	Greenfield Refinery, 2016
Izmit	Turkey	Tupras	11.0	Upgrade with addition of Coker/ Hydrocracker complex
Dogu Akdeniz	Turkey	Calik Holding	10.0	Greenfield Refinery (2018 ?)

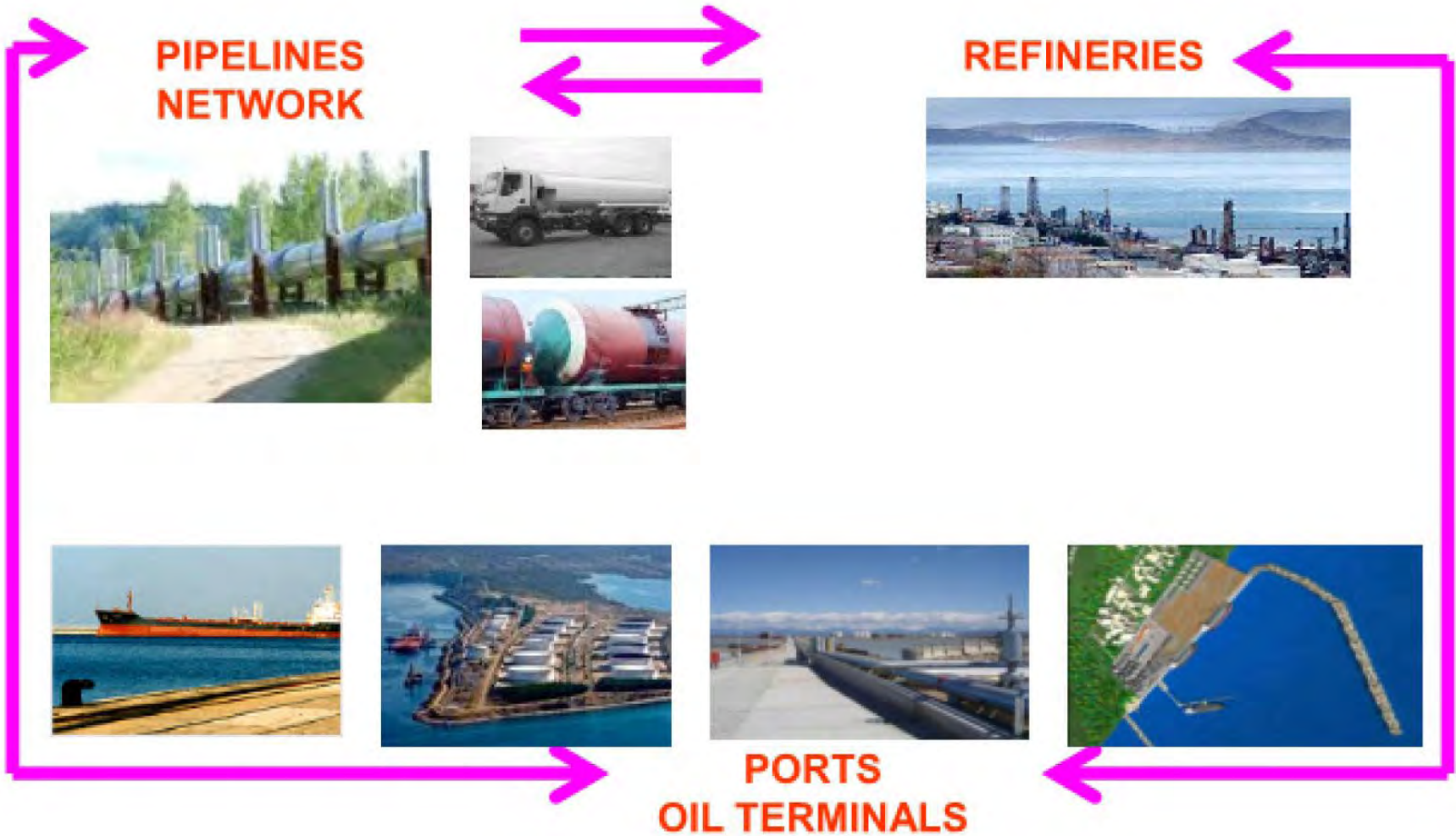


The Oil Sector in the West Balkans

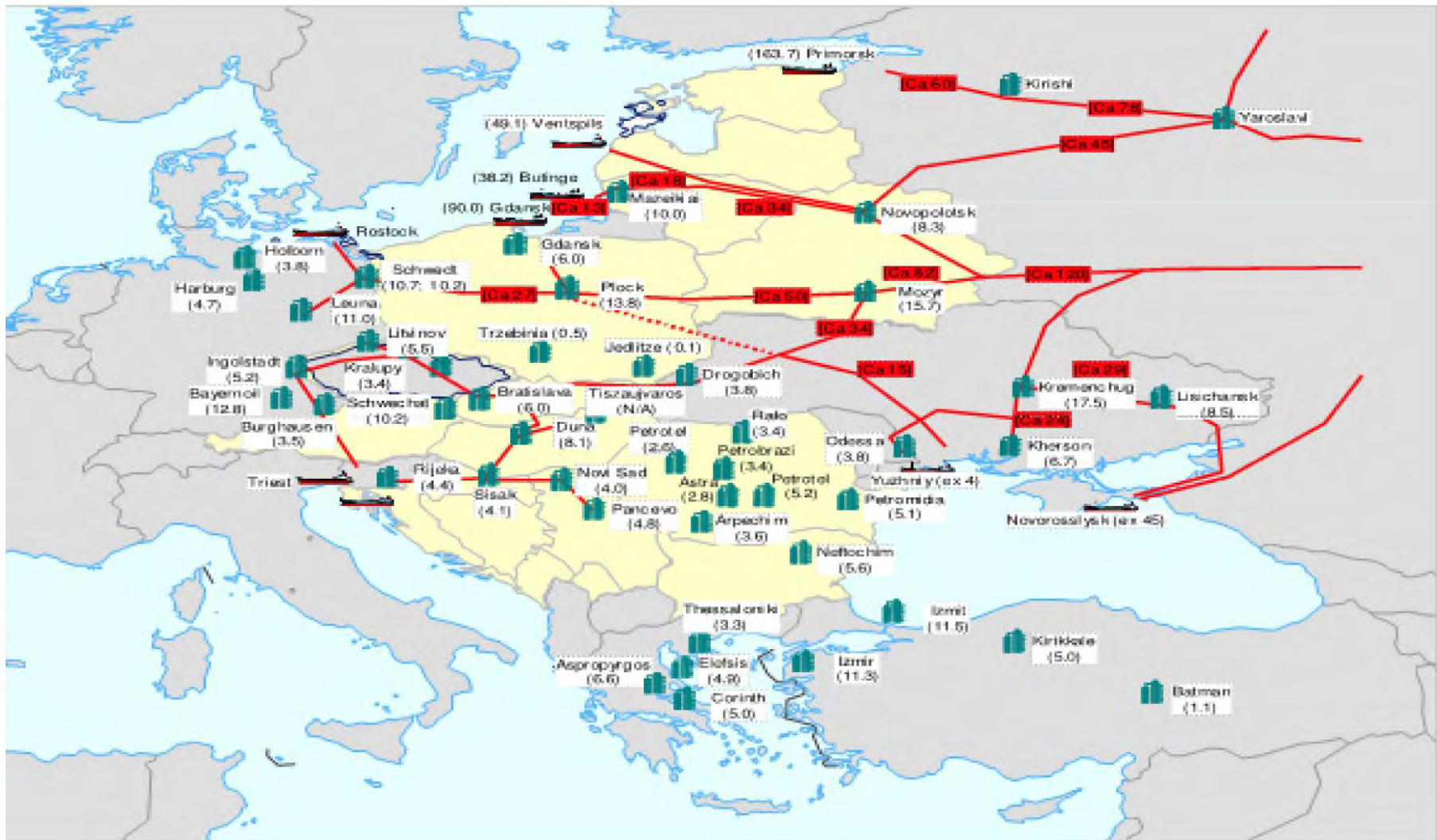
Oil infrastructure

With regard to the oil infrastructure, there have been no significant changes over the last 2 year. No additional storage capacities or oil terminals were built. The existing regional oil network infrastructure remains limited. Some envisaged new oil pipelines like PEOP and AMBO remain uncertain. Storage capacities in the Contracting Parties amount to 8.8 mcm. Most of them are in use by refineries for their daily operations. The existing storage capacity is a long way short of the additional 12.5 mcm required to comply with Directive 2009/119/EC. The oil markets in the Contracting Parties are relatively open. Suppliers can enter the market and gain access to networks and storage facilities.

Oil transportation network



Central and Eastern Europe – Refineries, Terminals and Pipelines



Brent Crude Oil Spot Prices (2012 - 2014)



JUN14

INTRADAY

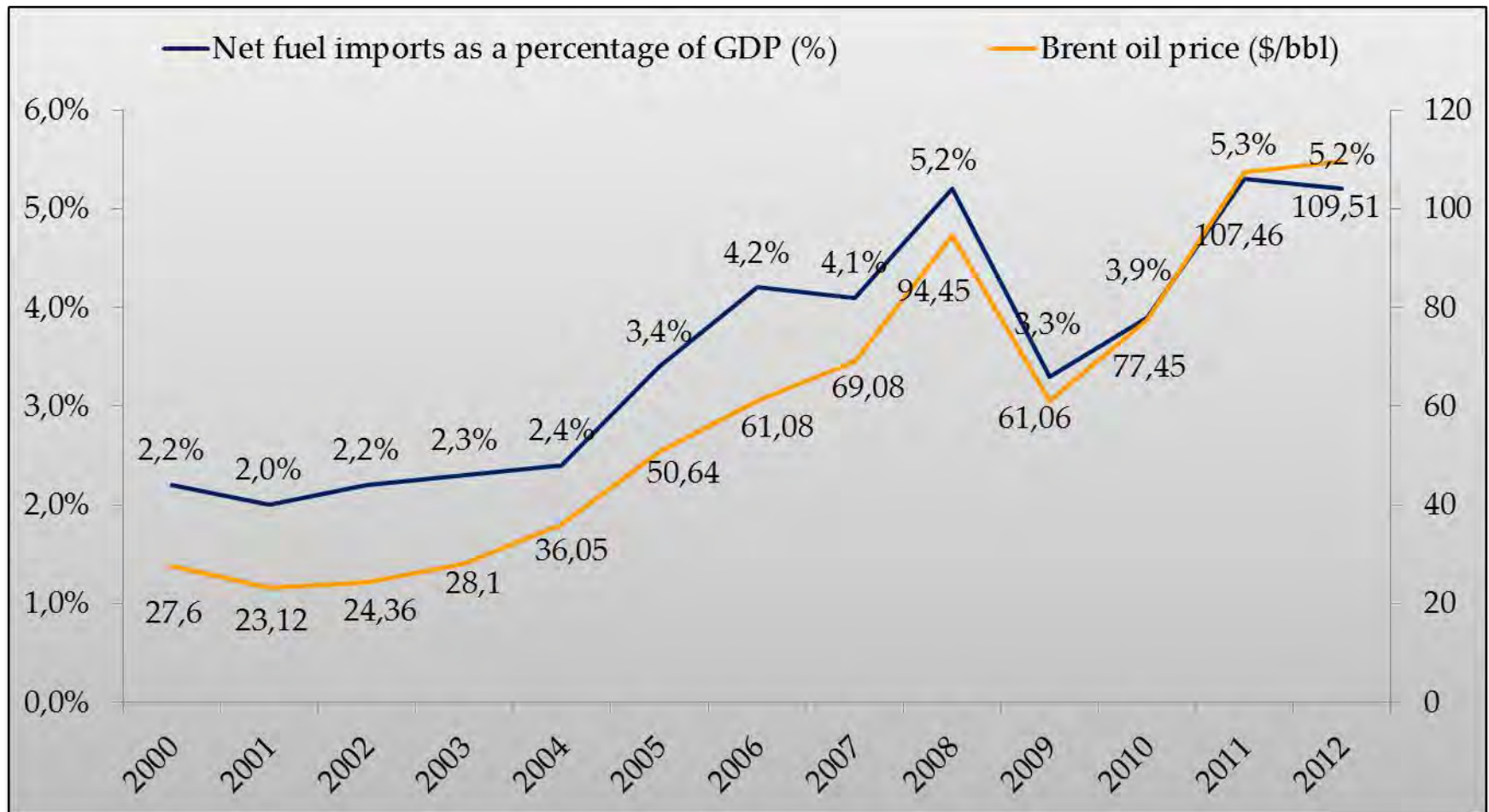
3 MONTHS

1 YEAR

2 YEARS



Net fuel imports as a percentage of GDP and Brent oil price



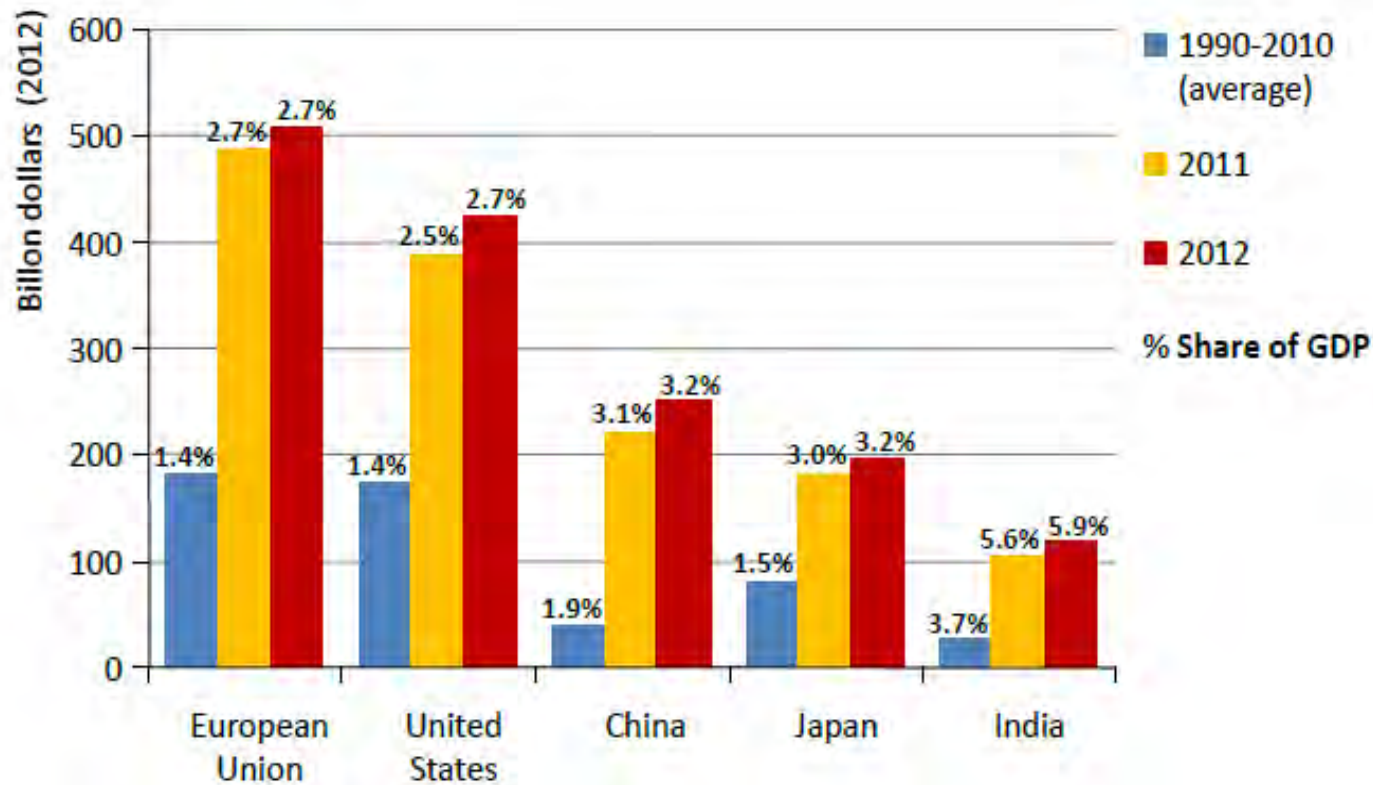
Source: IENE Study on the Economic dimension of the Oil dependency of Greece (2013)

Participation of net fuel imports in the Greek Trade in Goods deficit



Source: IENE Study on the Economic dimension of the Oil dependency of Greece (2013)

Annual expenditure on net imports of oil (billion \$)



Source: International Energy Agency

Natural Gas





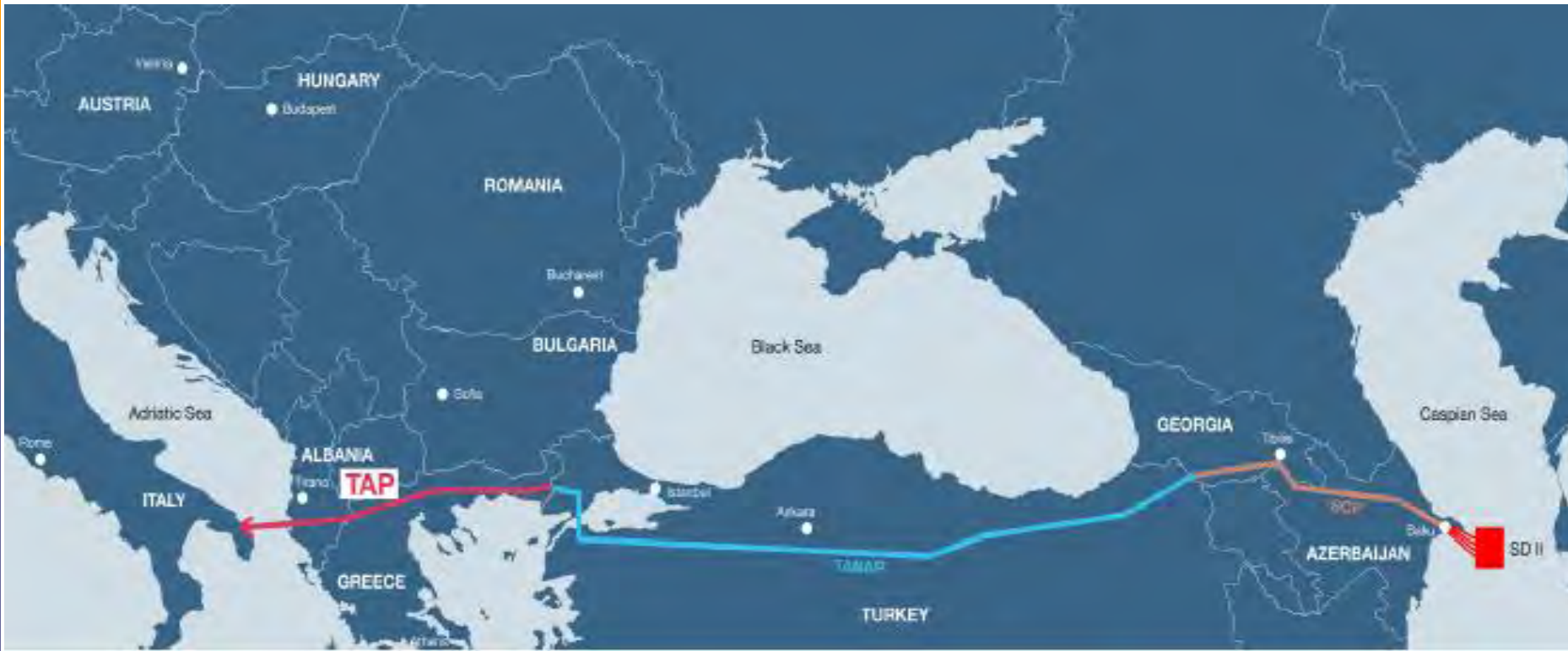
- ❑ On September 19, 2013, the Shah Deniz consortium concluded gas sales agreements with 9 major European energy utilities.
- ❑ On December 17, 2013, the Shah Deniz consortium announced the final investment decision (FID) for Shah Deniz II.
- ❑ Turkey signed an important agreement on May 30, 2014 with Azerbaijan, raising its share to 30% in the Trans Anatolia Natural Gas Pipeline (TANAP). Turkey also raised its share in the Shah Deniz consortium from 9 to 19 percent.

Shah Deniz Field

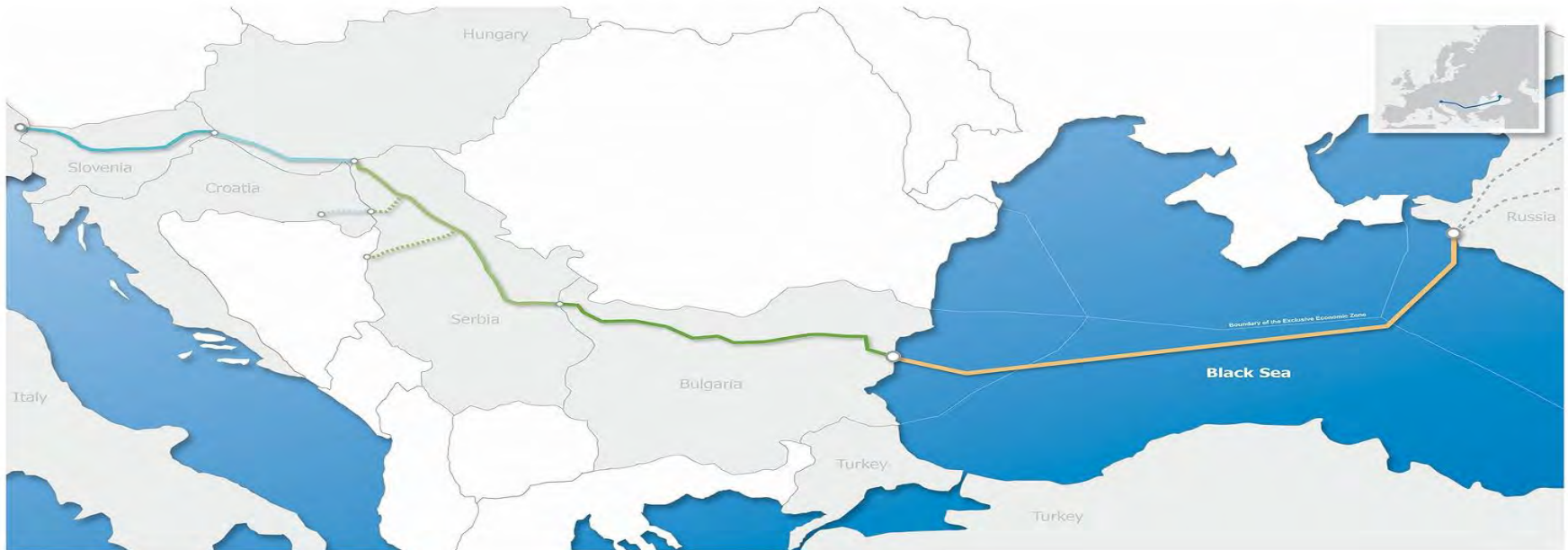


TANAP, TAP and IAP System

- On June 28, 2013, TAP selected to link with TANAP for transporting Azeri Caspian gas to European Markets
- Croatia, Bosnia, Albania, Montenegro, Azerbaijan signed the Southern Gas Corridor Pact
- Croatia aims for IAP's construction to kick off in 2016 at the latest



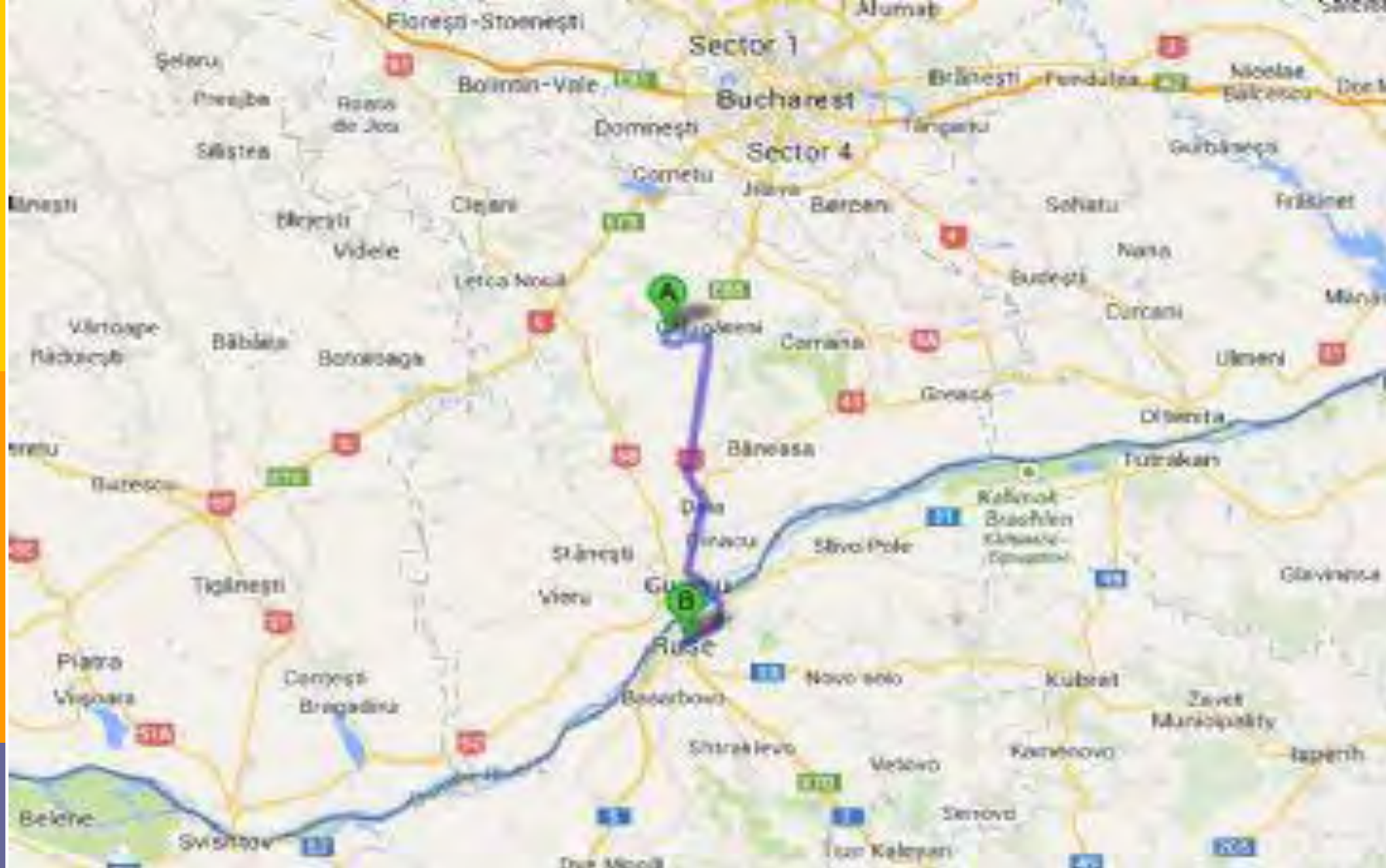
South Stream Pipeline



- South Stream construction plans finalized and in March 2014 South Stream Transport signed contract for laying the first string of South Stream's offshore section
- Bulgaria halted the construction of the South Stream gas pipeline project until it is made compliant with European law



- ❑ European Commission opposes South Stream construction on grounds of 3rd Energy Package infringements
- ❑ The European Union has demanded that Bulgaria suspends construction work on the South Stream natural-gas pipeline project until there is full compliance with EU law while it investigates the way contracts were awarded.



- Bulgaria's gas interconnector with Romania should be ready by end-June 2014 and it could deliver, in full capacity 1,5 bcm/y

East Med Gas Developments



- Tamar went on stream in March 2013 and it is already feeding the Israel market –
- The Tamar natural gas field licensees announced the signing of a letter of intent to sell 4.5 billion cubic meters (BCM) of gas a year to Spain's Union Fenosa SA which operates Egypt's natural gas export facility at Damietta.
- Possibility of also linking Leviathan gas to Egyptian LNG plants
- Australian company Woodside Petroleum has finally withdrawn its intention to buy 25% of the rights in the Leviathan gas field off Israel's coast for \$2.71 billion

The Electricity Sector



The main logo for SEE CAO is centered on the slide. It features the letters "SEE" in a large, blue, stylized font on the left, and "CAO" in the same font on the right. A decorative graphic of several parallel, curved lines connects the two words. Below "SEE" is the text "coordinated auction office" and below "CAO" is the text "in south east europe", both in a smaller, blue, sans-serif font.

SEE CAO

coordinated auction office in south east europe

- A Coordination Auction Office (CAO) for SE Europe was established in Podgorica, Montenegro on March 27, 2014

Turkey' nuclear plans are advancing but at a slower pace due to several delays

- In November 2013, Turkey and Japan signed a joint declaration on nuclear energy cooperation for the quarter-billion Sinop NPP which will be built by a joint venture consortium of Japanese Mitsubishi
- The CEO of Akkuyu NGS, the project company set up by Russia's Rosatom, said in October 2013 that the project was going to be operational by mid-2020, a delay of about 18 months from the initial start-up date.



Planning and construction of new major lignite/coal fired plant in SE Europe

- In Greece the fifth plant at Ptolemaida, known as Ptolemaida V, will have a generating capacity of 660 megawatts, and 60 percent of its funding will come from German investment bank KfW
- In Serbia construction of a new 350 MW unit at Kostolac would begin in 2015, with an estimated completion date of 2020
- In Montenegro three companies shortlisted for a new lignite plant with 220 MW installed capacity at Pljevlja (March 2014).
- Turkish power producer Odas Elektrik Uretim Sanayi Ticaret, or Odas Enerji, said on March 26 it has decided to build a 340 megawatt (MW) coal-fired thermal power plant in the northwestern Turkish province of Canakkale. Turkey Added Almost 7 GW of Power Capacity in 2013
- Bosnian state-controlled brown coal mine Banovici said on February 25 it is seeking a strategic partner to finance and build a 300 MW Banovici thermal power plant (TPP). The plant is planned to be completed in 2018 with an estimated cost of 584.2 million euro
- Bulgaria started talks with General Electric for the construction of two new units at the Maritsa Izток 2 coal-fired thermal power plant
- The Romanian Authority for Nuclear Activities, RAAN, plans to build a coal-fired power plant worth \$350 million (257.2 million euro) with an installed capacity of 270 and 290 MW.

New Electricity Interconnections

- ❑ **Serbia's EMS, Kosovo's KOSTT Signed Framework Cooperation Deal.** Serbian state-owned power grid operator Elektromreze Srbije (EMS) and its Kosovar counterpart KOSTT signed on December 10 a framework agreement on cooperation in transmission system operation
- ❑ **Kosovo and Albania Signed Deal to Build Major Power Line.** Kosovo and Albania have signed a deal to build a 400-kV transmission line linking their grids to help them cope with rising consumption and join Balkan and European networks.
- ❑ **Montenegro's CGES to Invest 20 Million Euro in Power Link to Italy in 2014.** The construction will begin in late 2014 and it will be operational in late 2015
- ❑ **High Voltage Transmission Line to Link Albania - FYROM**

Oil & Gas Upstream



Oil and Gas Production and Consumption in SE Europe (2013 oil statistics, 2012 gas statistics)

COUNTRY	GAS PRODUCTION (bcm/year) [2012]	GAS CONSUMPTION (bcm/year) [2012]	OIL PRODUCTION (thousand b/d) [2013]	OIL CONSUMPTION (thousand b/d) [2013]
ALBANIA	0.05	0.03	18.20	31
BOSNIA & HERZEGOVINA	0	0.20	0	29
BULGARIA	0.20	2.70	3.50	105
CROATIA	1.61	2.82	20.0	93
CYPRUS	0	0	0	61
F.Y.R.O.M.	0	0.10	0	19
GREECE	0	4.20	2.70	350.70
MONTENEGRO	0	0	0	4
ROMANIA	10.90	13.50	102.10	220
SERBIA & KOSOVO	0.50	2.40	19.5	81
TURKEY	0.80	46.30	44.76	655.40
TOTAL	14.06	72.25	210,76	1649,10



Oil and Gas Upstream (I)

- The Greek government on May 14 signed the concession agreements for hydrocarbon explorations in three separate areas in Western Greece, an investment that could exceed 700 million euros for surveys and the extraction/productions of deposits estimated at approximately 300 million barrels.
- Croatia Launched an Offshore Oil and Gas international round. Croatia's economy ministry invited bids on April 2 in a first licensing round for the exploration and production of hydrocarbons in the Adriatic Sea.
- Montenegro said on May 15, 20 it received three bids in a public tender to award concessions for offshore oil and gas exploration and production. The public tender was called on August 7, 2013.
- Albania plans to auction off 13 oil exploration blocks, including one offshore, to oil majors and other foreign companies after a significant discovery has attracted strong interest
- Romania to Tender Some 36 Oil Fields. The Romanian National Agency for Mineral Resources, ANRM, said in late 2013, it plans to launch tenders for around 36 oil fields.



Oil and Gas Upstream (II)

- Turkey enacted a new Petroleum Law in June to help attract international investment in its offshore oil and gas resources
- The discovery and development over the past four years of Tamar, which holds an estimated 10 trillion cubic feet of gas, and Leviathan, which holds almost twice as much, has provided Israel with enough fuel for both energy self-sufficiency and export. Tamar began delivering gas to the Israeli market last year, and distribution deals have been signed with the Palestinian Authority and Jordan.
- Cyprus continues with exploratory drilling in Aphrodite field. The ENI-KOGAS consortium, holder of licenses for blocks 2, 3 and 9 will also commence exploration activities later this year. Total, licensed to drill in Blocks 10 and 11, is expected to begin in 2015.
- Lebanon opened its first international tender for offshore gas exploration in 2013. Exxon Mobil, Chevron, and the National Iranian Drilling Corporation are among the 52 international energy companies submitting applications to participate in the first offshore gas round.

Developments in RES Sector



RES in SE Europe (I)

- First phase of major PV installation penetration is completed and governments in Greece and Bulgaria retracted on expensive FIT plans
- Greece Brings New Retroactive Measures, a so-called "new deal" aiming for cuts in FIT's in operating PV plants by 30%.
- In Bulgaria limitation of generation and 20% fee for PV and wind power plants from January 1st 2014

Renewable Energy Sources



Some Latest Important Developments

- ❑ Steep rise in RES installed capacity over last 3 years
- ❑ Solar PV in Greece and Bulgaria ~ 3.500 MW of total installed capacity
- ❑ Wind in Greece, Bulgaria, Romania, Turkey ~ 8.000 MW of total installed capacity
- ❑ Small Hydro – Albania, Montenegro, Croatia, Serbia, Romania, Greece, Turkey, Bosnia – Herzegovina ~1900 MW



Mega Projects in SE Europe and the East Mediterranean Region



Project	Capacity (bcm/y)	Distance (kms)	Estimated Project Cost (in Billion Euro)	Sponsors	Anticipated Start Up Date	Project Status
TAP	10 – 20	791	1.70	EGL, STATOIL, E.ON	2017	Selected by SDC on June 27, 2013
TANAP	16 - 24	2,000	8.0	SOCAR (80%) BOTAS (20%)	2018	Construction to start in 2014
South Stream	63	2,950	26.0	Gazprom, ENI, Wintershall, EDF	2016	Construction commenced December 2012
NPP in Sinope, Turkey	4 – 5 GW	-	17.0	AREVA, Mitsubishi Heavy Industries (MHI)	2023	Intergovernmental agreements signed
NPP in Akkuyu	4.8 GW	-	20.0	ROSATOM, Akkuyu NGS Elektrik Uretim Corp	2023	Engineering and survey work started at the site. Construction of the first unit to begin in 2014
Aphrodite Block (Cyprus)	5 Trillion Cubic Feet	-	2.0	Noble Energy, Delek Group	2018	Second confirmatory drilling Completed
Liquefaction Plant (Cyprus)	8 – 12 Bcm/y	-	7.5	Noble Energy, Avner, Delek Drilling	2020	MoU between Cypriot government and companies
EurAsia Interconnector (Submarine Cable)	2,000 MW	1,000 Km	1.5	PPC-Quantum Energy joint venture	2019	Intergovernmental agreement, feasibility studies completed
Tamar, Leviathan (Israel)	24 Trillion cubic feet	-	11.0	Noble Energy, Delek Group, Ratio, Woodside	2016	Tamar – On stream Leviathan – Under development

Total Anticipated Investments in SE Europe, 2010 – 2020*

Sector	Investments (€ Million)
Oil Upstream(Exploration and Production)	40,000
Oil Downstream/Midstream (incl. Liquid <u>biofuels</u>)	25,000
Electricity <ul style="list-style-type: none"> ▪ Thermal Plants ▪ Nuclear Plants ▪ Lignite Mine Development ▪ Grid-Upgrade & Expansion (incl. metering systems) 	90,000
Gas <ul style="list-style-type: none"> • Main and branch gas pipelines • Gas storage facilities • LNG Terminals & Liquefaction plants • Town grids 	30,000
•RES (Wind, PV, Biomass, Mini Hydro, Geothermal)	55,000
Intraregional Mega Projects <ul style="list-style-type: none"> • Oil Pipelines • Gas Interconnectors • Main gas pipelines • Electricity Interconnectors 	40,000
•Total	280,000

**Revised IENE figures (September 2013)*

Concluding Remarks

- The SE European region is undergoing a phase of significant transformation concerning its energy infrastructure
- Almost all areas of the energy sector are affected (electricity, natural gas, oil downstream and midstream, oil upstream, RES, energy efficiency, regulatory regime)
- The region remains politically sensitive as global developments tend to affect it disproportionately to its size
- The SE European region retains its sizeable indigenous energy potential and its capacity to attract further investment
- However, the governments and their agencies, in their effort to attract investments and develop their local energy resources need to:
 - (a) promote and retain their independent assessment capability for projects and policies in order to ensure maximum economic and social returns
 - (b) exercise maximum diligence and great caution
 - (c) Develop close cooperation at regional level and coordinate actions through formal and informal regional networks



INSTITUTE OF ENERGY
FOR SOUTH-EAST EUROPE

**Thank you for
your attention**

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