

*“S.E. Europe Energy Outlook -
Energy Policies and Strategies in SE Europe
and the role of West Balkans”*

Belgrade, March 7th , 2012

**A presentation by Costis Stambolis, AA. Dipl. Grad.
Deputy Chairman & Executive Director
Institute of Energy for S.E. Europe, Athens**

*at the “Opening Up the West Balkans Energy Market” Workshop,
Organized by IENE in Cooperation with AERS
Hyatt Hotel, Belgrade, Serbia*

Raison d'être

- The need to understand the geopolitical and geographical sphere within which IENE operates
- Identify and evaluate the major energy policy challenges of the region
- Identify key investment and business opportunities in the energy sector of SE Europe
- Quantify the required investment for energy infrastructure projects by 2020



The South East Region Defined



I. Study Goals and Objectives

- Present and analyze the economic and political background of the region
 - Describe the regional integration process and EU expansion impact on regional energy markets
- The Study's Two Pillars
- Energy analysis on a country by country basis
 - Energy analysis on a regional basis:
 - *Oil (upstream, midstream, downstream)*
 - *Natural Gas (upstream and downstream)*
 - *Power generation*
 - *Electricity transmission and distribution*
 - *Energy Efficiency*
 - *Renewable Energy Sources*
 - The role of interconnectors in electricity, natural gas and oil
 - Energy market liberalisation process
 - Environmental Climate Change and energy security considerations
 - Current and future investment potential of the region



II. Study Organization

- Study and Analysis Capability
- In-house study and analysis capability seriously expanded to accommodate study requirements

- Project Study Group
- Five people in-house core team
- 15 external contributors (various chapters, country profiles and country investment information)
- Cooperation with Prof. Pantelis Kapros of NTUA on energy demand forecasts for SE

III. Methodology

- Scope definition by Study Group
- Study guidelines agreed following initial research and consultations within the Institute
- Selection and briefing of contributors*
- Information gathering from:
 - Published sources
 - Visits to various countries
 - Meetings with selected companies and individuals active in the region
 - Series of IENE regional seminars (Tirana: Jan. 2009, Sofia: April 2009, Sofia: May 2010, Plovdiv: Feb. 2011)
 - Participation in regional Forums and Conferences (Energy Community, IEA, BBSPA)
 - Series of IENE's S.E. Europe Energy Dialogue Meetings (2007-2010)
- Analysis and synthesis by Study Group

**Study Contributors have come from: Greece, Albania, Croatia, Bosnia - Herzegovina, FYROM, Montenegro, Serbia, Bulgaria, and Turkey.*

Study Contents

- *The Political Context*
- *Regional Economic Outlook*
- *Energy Security Considerations*
- *The Regional Energy Overview: Common Challenges in Divergent National Contexts*
- *Energy Country Profiles*
- *Major Hydrocarbon Export and Transit Infrastructure Projects*
- *The Oil and Gas Sector in S.E. Europe*
- *Electricity Sector Analysis*
- *Energy Market Liberalization in South East Europe - Energy Community*
- *Renewable Energy Sources and Energy Efficiency*
- *Climate Change Considerations*
- *Energy Demand and Supply Projections for SE Europe*
- *Investment Potential and Business Opportunities in the Energy Sector of South East*

SE Europe Basic Economic & Energy Parameters (2009)

- **Population** **137.02 million**
- **GDP** **1.585.6 USD**
billion
- **Installed Electricity Capacity** **110.926 MW**
- **Oil Consumption** **1.759.050**
bbl/day
- **Oil Production** **168.650**
bbl/day



SE Europe Basic Economic and Energy Information (2009)

Country	Population (Million)	GDP (PPP) (USD Billion)	FDI (% of GDP)	Installed Electricity Capacity (MW)	Oil Consumption (bl/day)	Gas Consumption (bcm/year)
Albania	3.2	19.9	4.2	1.590	33,000	0,02
Bosnia & Herzegovina	4.6	28.2	5.48	4,341	27,500	0,31
Bulgaria	7.2	90.1	7.15	11.360	120,000	3,5
Croatia	4.4	76.5	6.94	4.460	106.000	3,1
Cyprus	0.75	17.2	9.0	1.240	61,000	0
FYROM	2.1	9.2	2.03	1.581	21,000	0,05
Greece	11.2	357.5	0.42	14.300	428,860	4,25
Montenegro	0.67	6.6	11.0	0,883	5,000	0
Romania	22.2	161.5	6.0	21.360	225,000	16,9
Serbia & UNMIK	9.2	89.5	10.0	9.854	90,000	1,92
Turkey	71.5	729.4	0.65	40.840	677,690	36,9
Total	137,02	1.585,6	5.6	110.926	1.759.050	69,95

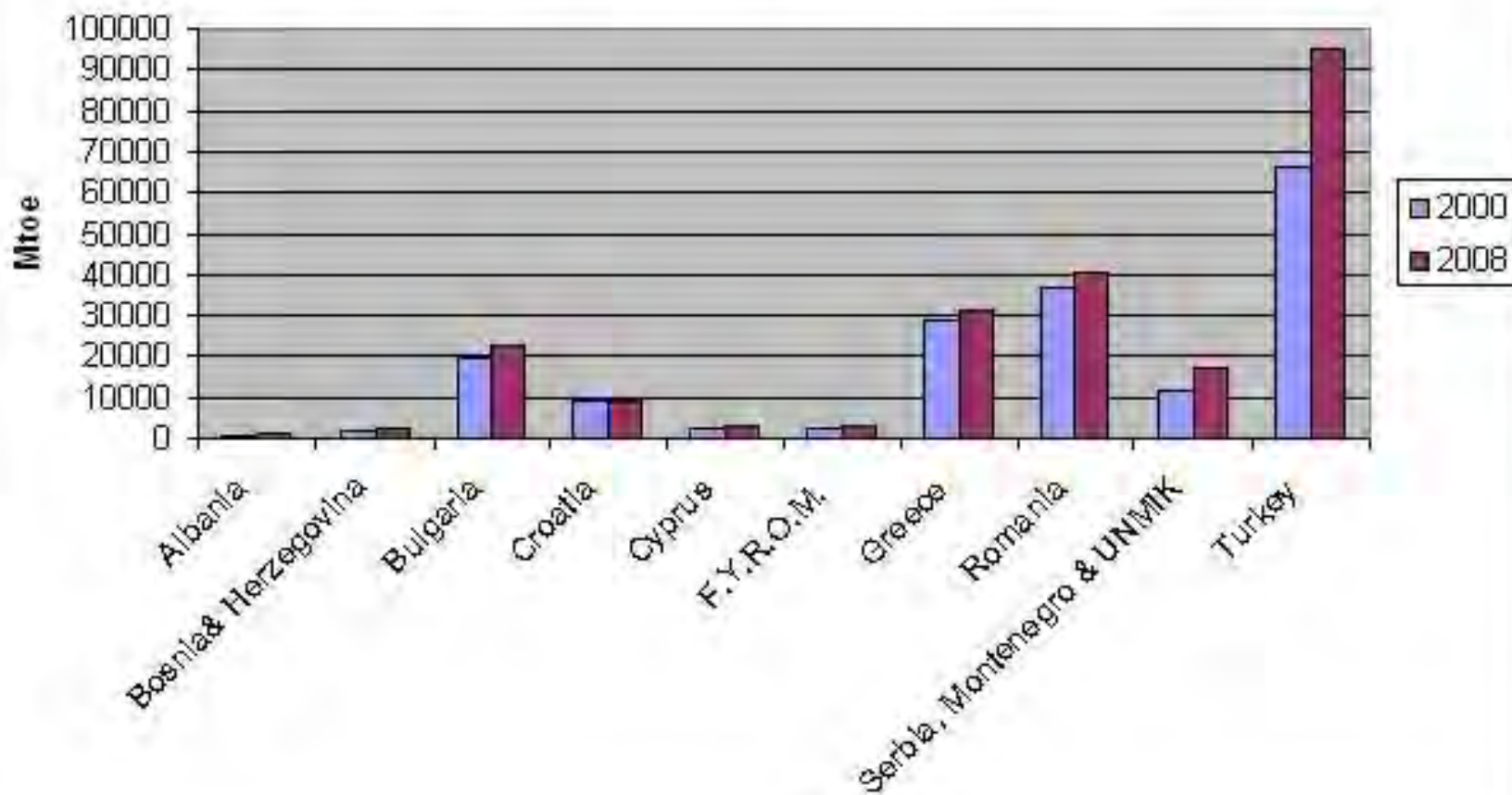
Primary Energy Consumption in SE Europe for 2009 (in thousand toe)

Countries	Oil	Coal	Natural Gas	Nuclear	Hydro	RES	TOTAL
Albania	565	8	9		510	72	1164
Bosnia & Herzegovina	1150	750	260		215	198	2573
Bulgaria	7245	7851	3010	3836	247	746	22935
Croatia	4284	824	2622		1100	340	9170
Cyprus	2690	14				95	2799
F.Y.R.O.M.	1150	1350	67		150	170	2887
Greece	16229	10255	3150		395	1370	31399
Romania	11200	9618	12978	2000	1373	3490	40659
Serbia & Montenegro	4420	9150	1765		1357	270	16962
Turkey	31677	25745	25980		3760	7676	94838
TOTAL	80610	65565	49841	5836	9107	14427	225386

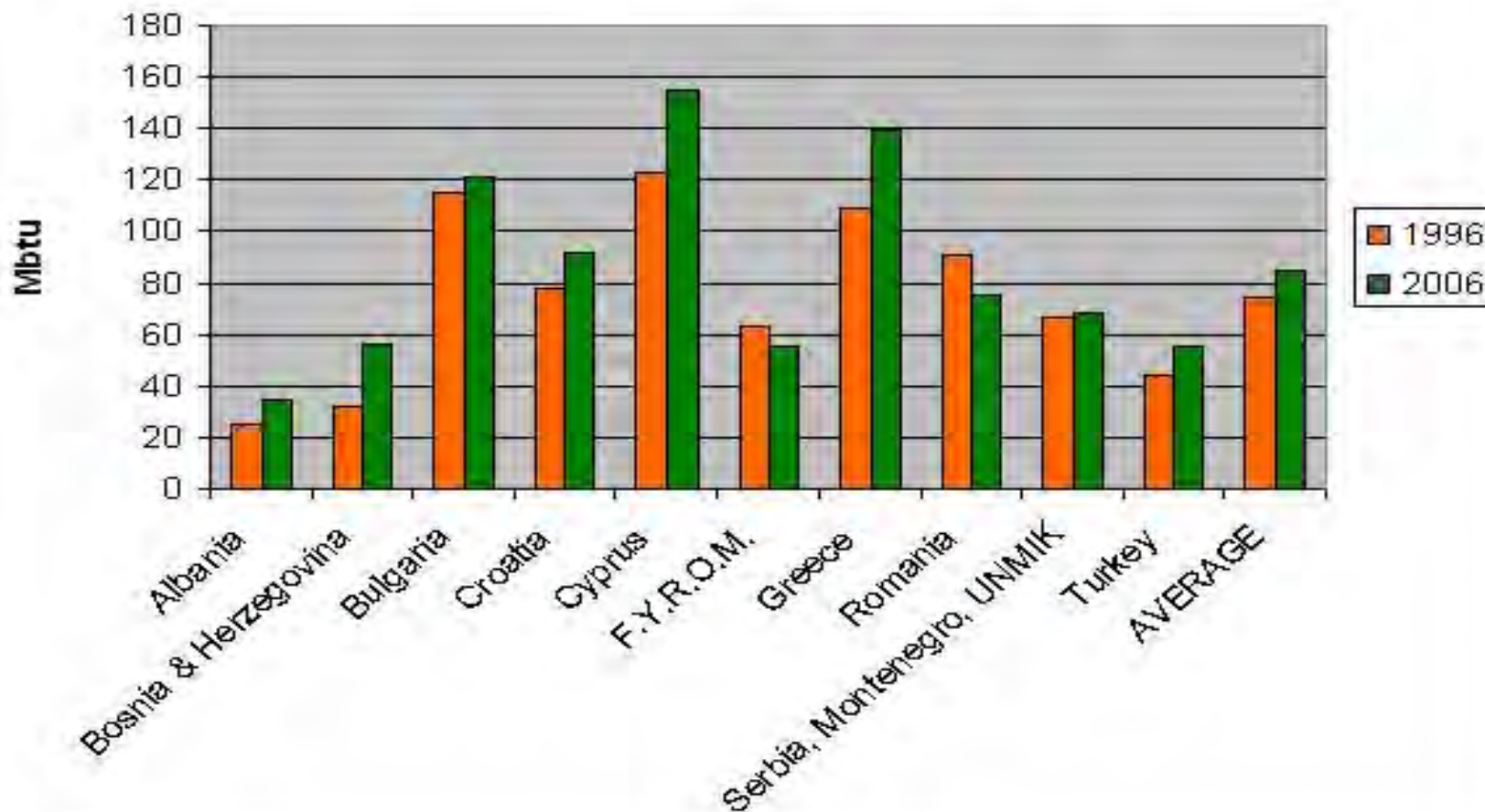
Main Economic Parameters across the SE European Region (2000)

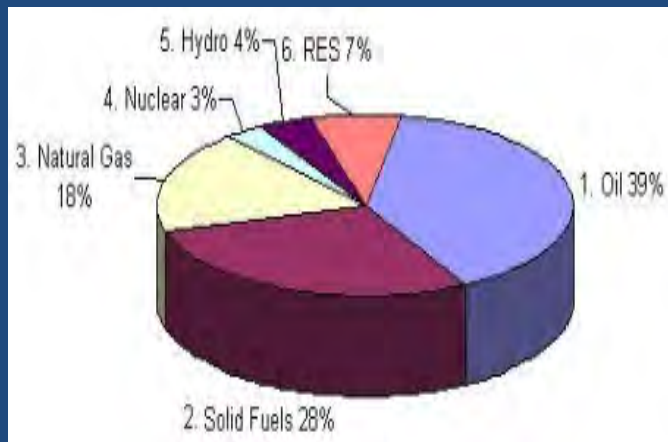
	Population million	GDP (in billion USD)	GDP (in PPP billion USD)	GDP (PPP) Per capita (USD)	Rate of GDP growth (%)	Unemployment
Albania	3.18	12.24	22.83	7.168	3.3%	13%
Bosnia & Herzegovina	3.90	17.04	29.80	7633	-3.2%	24%
Croatia	4.42	67.69	78.42	17.706	-5.8%	9%
FYR Macedonia	2.06	9.37	18.92	9.183	-0.5%	33%
Montenegro	-	4.15	6.59	10.527	-5.7%	11%
Serbia	7.38	42.96	78.07	10.576	-3.3%	17%
Kosovo	1.81	5.38	4.17	2.500	4.0%	17%
Bulgaria	7.56	47.10	89.94	11.883	-5%	7%
Cyprus	0.79	23.60	22.71	28.503	-1.7%	5%
Greece	11.16	330.78	333.06	29.839	-2%	9%
Romania	21.47	161.52	254.83	11.869	-7.1%	6%
Turkey	70.53	614.46	879.31	12.465	-4.7%	14%

Primary Energy Consumption in SE Europe (2000 & 2008)

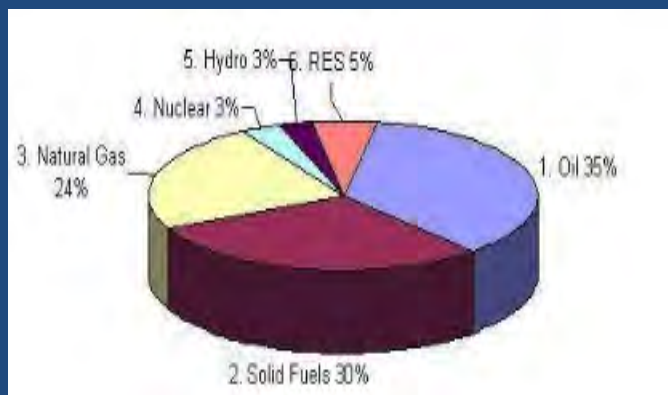


Energy Consumption per Capita





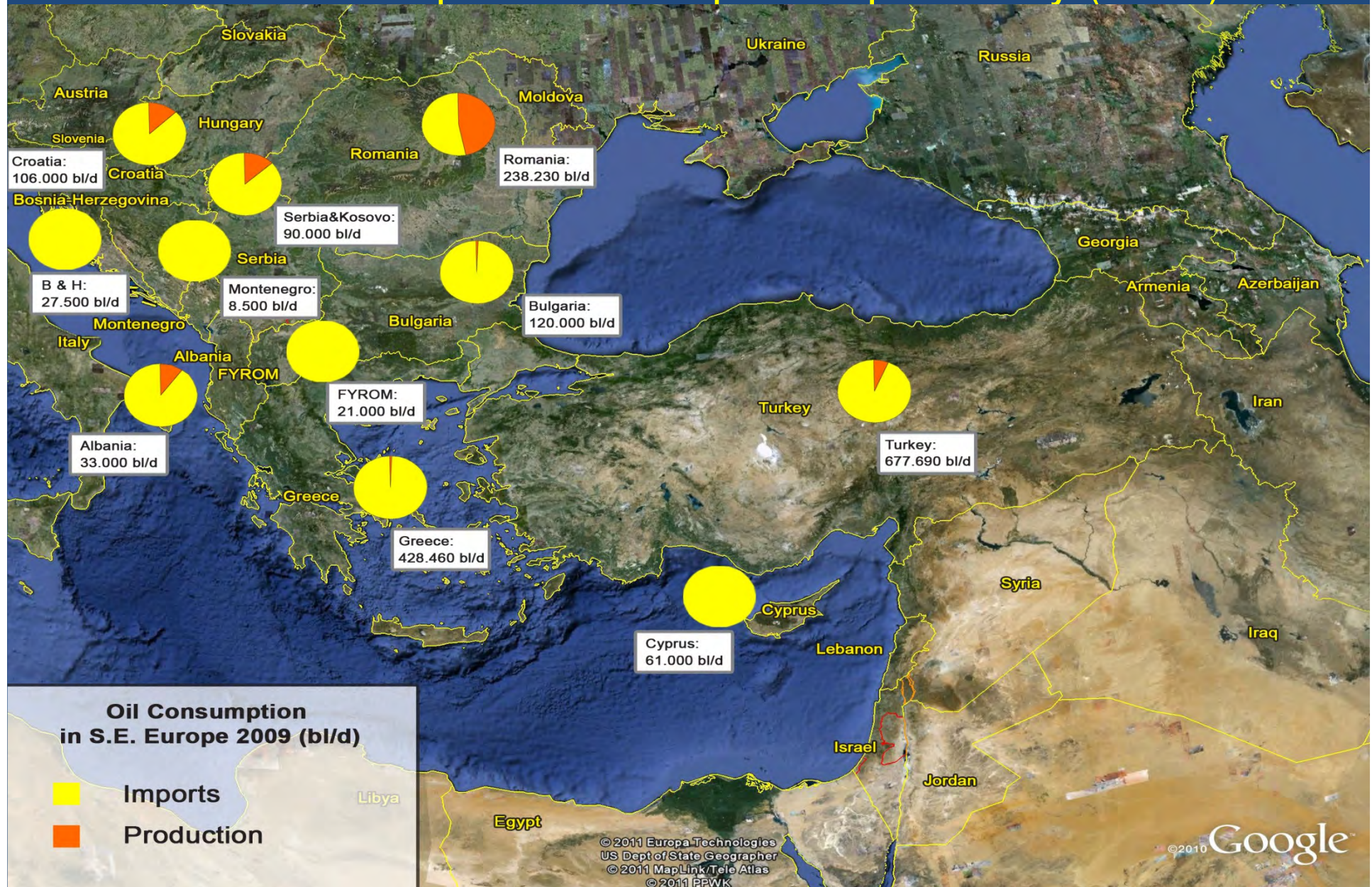
**Total Primary Energy
Consumption shares in SE Europe
(2000)**
180.469,00 mtoe TPEC



**Total Primary Energy Consumption
shares in SE Europe (2009)**
225.386,00 mtoe TPEC



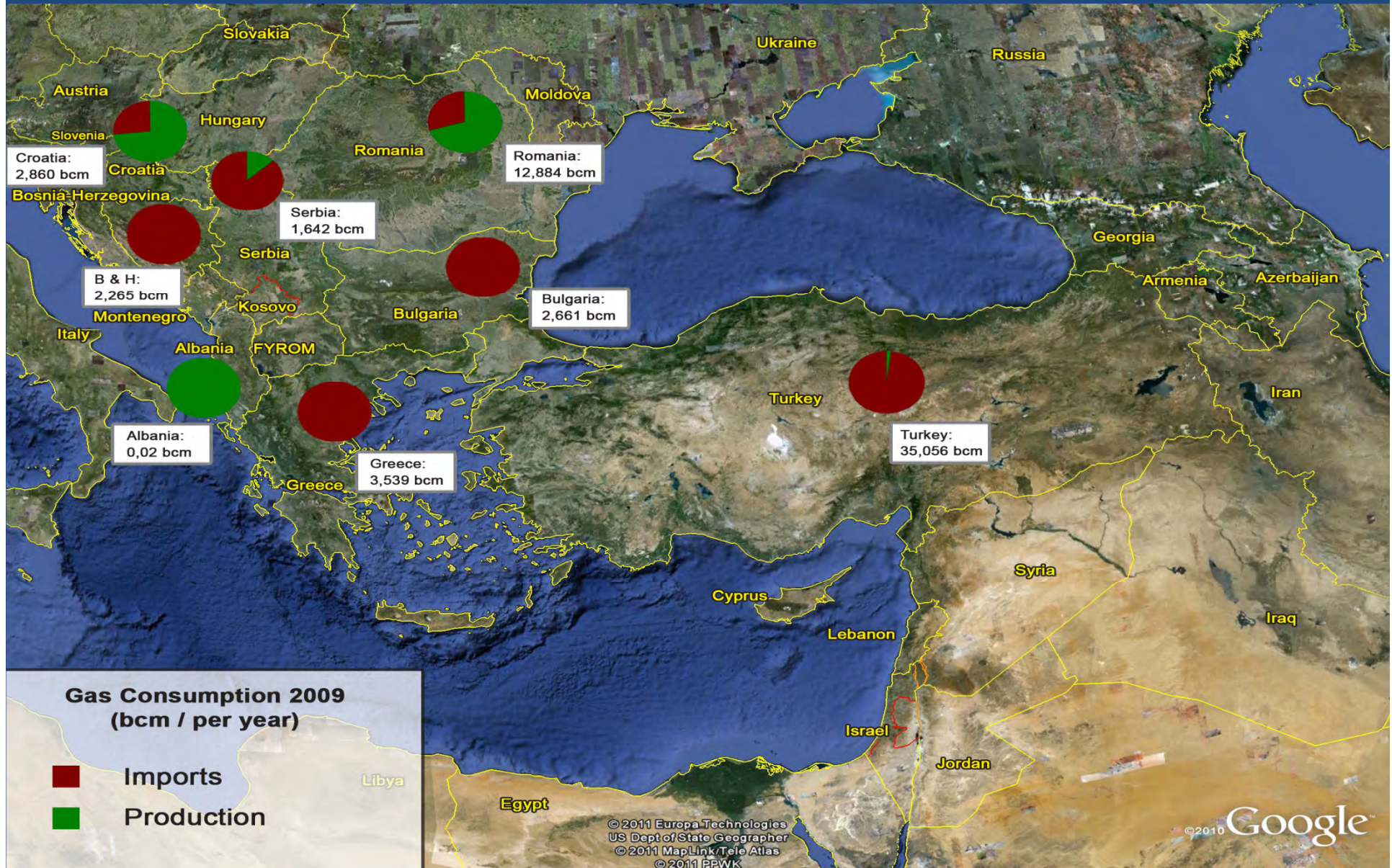
South-East Europe Net Oil Import Dependency (2009)



The Brent Oil Future Price at ICE (March 2011 – March 2012)



South-East Europe Natural Gas Import Dependency (2009)

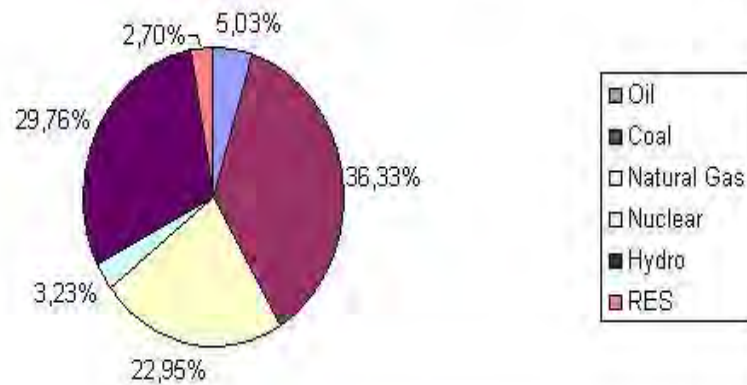


Installed Electricity Capacity (2009)

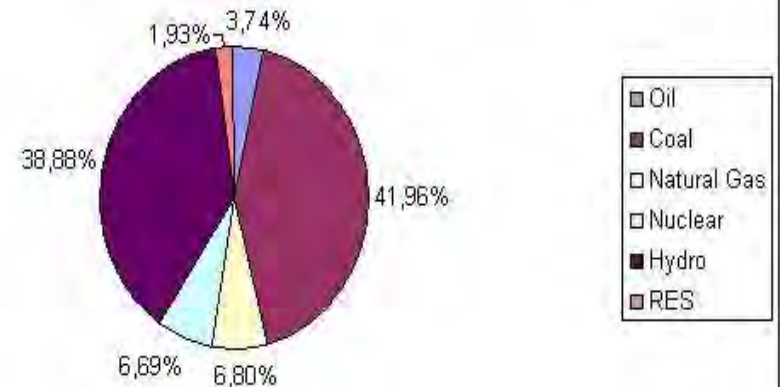


Capacity mix in S.E. Europe (2010)

Greece and Turkey included
(Total Installed Capacity: 109.380,38 MW)

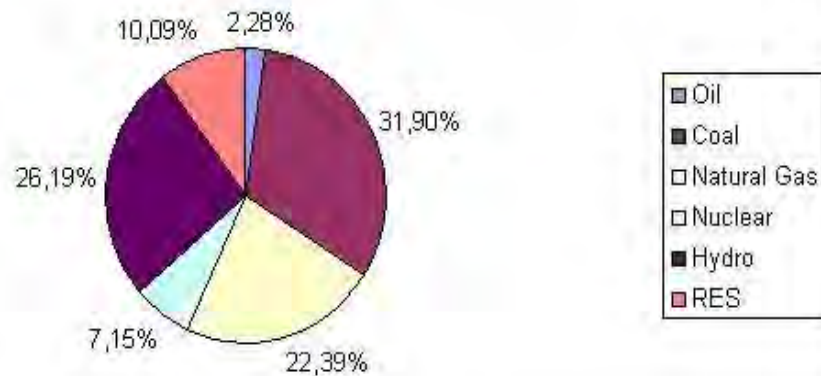


Greece and Turkey excluded
(Total Installed Capacity: 52.848,38 MW)

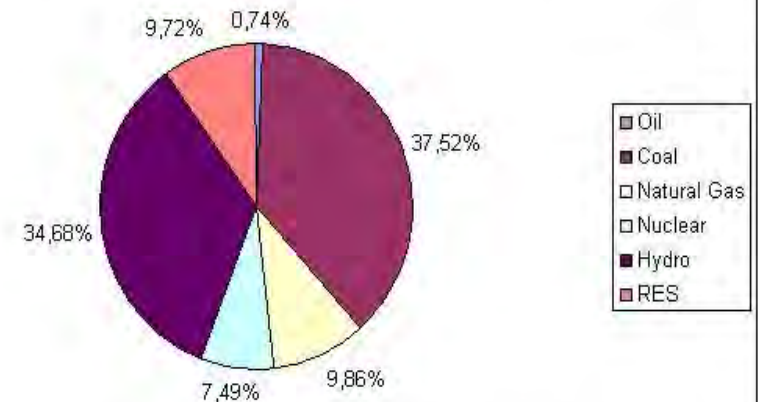


Anticipated Capacity mix for 2020

Greece and Turkey included
(Total Installed Capacity: 143.540,00 MW)



Capacity Mix 2020 - Greece and Turkey excluded (Total Installed Capacity: 70.340,00 MW)



SE Europe Capacity Mix 2009,2020

Installed Capacity in GW

	2009	2020	Additional Capacity
Oil	5,5	3,3	-2,2
Solid Fuels	39,7	45,8	+6,1
Nuclear	3,5	10,3	+6,8
N. Gas	25,1	32,1	+7,0
Hydro	32,5	37,6	+5,1
RES	4,1	14,5	+11,4
	110,4	143,6	36,4

Key Energy Challenges

- **Over dependence on petroleum and coal consumption**
- **High level of hydrocarbon import dependence**
- **Low level of import diversification, especially for natural gas**
- **Small RES penetration in overall energy mix**
- **Unsatisfactory level of energy efficiency, including high CO2 emission levels**
- **Limited oil and gas pipeline interconnections**



Country Energy Profiles

- . *Albania*
- . *Bosnia and*
- . *Bulgaria*
- . *Croatia*
- . *Cyprus*
- . *FYROM*
- . *Greece*
- . *Kosovo*
- . *Montenegro*
- . *Romania*
- . *Serbia*
- . *Turkey*



Country Profile Outline

- **Economic and Political Background**
- **Energy Demand and Supply**
- **Energy Policy**
- **Government Institutions and Regulatory Framework**
- **Legislation**
- **The Energy Sector**
 - *Oil and Petroleum Products (upstream)*
 - *Refining, Fuel Distribution and Storage*
 - *Solid Fuels (Coal and lignite)*
 - *Natural Gas (Production, Transmission, Distribution and Storage)*
 - *Electricity (Power Generation, Transmission and Distribution)*
 - *Renewables*
- **Discussion**



Republic of Serbia



Capital	Beograd
Official languages	Serbian
Government	Parliamentary republic
President	Boris Tadić
Prime Minister	Mirko Cvetković
Area	77,474 km ²
Population	7,379,339* [July 2009]
GDP (PPP)	
Total	\$84.207 billion* [2008]
Per capita	\$11,457* [2008]
GDP (nominal)	
Total	\$ 50.061 billion* [2008]
Per capita	\$ 6,811* [2008]
HDI	▲ 0.826* (high) [2007]
Currency	Dinar* (RSD)

SERBIA Key Energy Figures (2008)**

in Mtoe

Total Primary Energy Supply (TPES)	16.03	
Total Final Consumption	9.96	
TPES Composition		
<i>Oil</i>	3.25 Crude, 0.98 Oil Products	
<i>Gas</i>	2.0	
<i>Coal</i>	8.12	
<i>Electricity</i>	0.006	
<i>RES</i>	0.82 Hydro, 0.80 Combustibles + waste, 0.05 Geothermal + Solar	
Oil		
<i>Production</i>	0.66 crude,	3.38 Mtons Refined (2008 IEA)
<i>Consumption</i>	3.54 oil products,	2.9 Mtons oil products (2008 IEA)
<i>Imports</i>	2.66 crude, 1.28 oil products,	2.58 Mtons crude (2008 IEA) 1.09 Mtons oil products (2008 IEA)
<i>Exports</i>	0.24 oil products,	0.18 Mtons oil products (2008 IEA)
<i>Reserves</i>		
Natural Gas		
<i>Production</i>	0.21	(0.19 BCM, 2007)
<i>Consumption</i>	1.42, 0.49 (CHP + Heat plants)	(2.35 BCM, 2007)
<i>Imports</i>	1.79	(2.2 BCM, 2007)
Coal		
<i>Production</i>	7.37	36.4 Mtons lignite (Euracoal 2008)
<i>Imports</i>	0.94	1Mtons hard coal (Euracoal 2008)
<i>Exports</i>	0.06	
<i>Reserves</i>	13.4 Btons	
Electricity		
<i>Generation</i>	3.13	37.32 TWh (2008 IEA)
<i>Consumption</i>	2.34	27.26 TWh (2008 IEA)
<i>Imports</i>	0.76	8.87 TWh (2008 IEA)
<i>Exports</i>	0.76	8.80 TWh (2008 IEA)
Total Installed Generation Capacity	7,155 MW	
Installed RES Generation Capacity*	2,831 MW LHPP	
RES Potential	4.3 Mtoe (2.7 Mtoe Biomass, 0.6 Mtoe hydro, 0.2 Mtoe geothermal, 0.2 Mtoe Wind, 0.6 Mtoe solar)	
Energy Dependency %	N. A.	

RES includes: Hydro, Wind, Solar, Biomass, Geothermal

*** All data in Mtoe of 2008, source IEA, other data as designated in terms of units, year and source.*

Table: 14.11

COUNTRY ENERGY INVESTMENT INFORMATION

SERBIA

Contributor(s): Mr. Nenad Stefanovic

	Project Sector	Description	Investment Estimate in Million Euros
OIL	Upstream	▪ Field Exploration	-
		▪ Development of new oil and gas wells	-
	Downstream	▪ Refining	550 (NIS) 300 (Comico Oil)
		▪ Loading Terminals	-
		▪ Storage facilities	15 (Transnafta)
		▪ Crude / Product Pipeline(s)	175 (Transnafta-product pipeline)
			15 (Transnafta - pipe line extension from Pančevo to Smederevo)
GAS	Country Gas Network	▪ Grid expansion	325
		▪ Main intra country pipeline(s)	330
		▪ Storage facilities	65
		▪ LNG terminal(s)	-
ELECTRICITY	Power Generation	▪ Lignite	2,500 (new) 1,300 (rehabilitation)
		▪ Coal	-
		▪ Gas	320
		▪ Nuclear	-
		▪ Large Hydro	3,470 (new, including 2 cascade, 5X20 MW and 10X10 MW approximately)
	Electricity Grid	▪ New H/V transmission lines	400 rehabilitation
		▪ Upgrading and expansion of existing grid	91 (400 and 220 kV lines) 52 (110 kV lines) 107 (400 and 220 kV lines)
RES			50 (110 kV lines)
		▪ Small Hydro	200
		▪ Wind farms	200
		▪ Photovoltaics	100
		▪ Concentrated Solar Power	-
		▪ Biomass (including liquid biofuels)	-
		▪ Geothermal	50
▪ Solar Water Heating	50		
Total Estimated Investment by 2020			10.665

Table: 14.4

COUNTRY ENERGY INVESTMENT INFORMATION

CROATIA

Contributor(s): Mr. Vladimir Durovic and IENE Estimates

	Project Sector	Description	Investment Estimate in Million Euros
OIL	Upstream	* Field Exploration	250
		* Development of new oil and gas wells	350
		* Refining: Modernization of INA refineries in Sisak and Rijeka	500
	Downstream	* Loading Terminals	-
		* Storage facilities: <i>Oil stocks facilities – JANAF new capacities:</i>	185
		• Žitnjak 130 000 m ³	
• Lendava 80 000 m ³			
• Slavonski Brod 80 000 m ³			
• Omišalj 5x80 000 m ³ + 3x80 000 m ³			
<i>Oil products stock facilities:</i>			
• Terminal Birižine 100 000 m ³	30		
• Terminal Gaženica 50 000 m ³	15		
• Terminal Žitnjak 200 000 m ³	60		
* Crude / Product Pipeline(s)	-		
GAS	Country Gas Network	* Grid expansion:	
		• Gas transmission system	600
		• Gas distribution system od Lika and Dalmatia	100
		* Main intra country pipeline(s)	-
		* Storage facilities: <i>New peak storage UGS – Grubišno polje</i>	15
		• maximum operating capacity 25 mil m ³	
• minimum exit capacity 100 000 m ³ /h			
* LNG terminal(s)			
		ADRIA LNG terminal Omišalj(Krk)/15 bcm per year/ planned start up → not before 2017!?	800
		LNG RV receiving terminal	50
ELECTRICITY	Power Generation	* Lignite	-
		* Coal: TTP Plomin 500 MW	800
		* Gas :	
		TTP Sisak 230 MW (realization phase)	220
		TTP Slavonija? 400 MW	300
		* Nuclear	-
		* Large Hydro:	
		<i>HPP System Lika and Gacka:</i>	800
		• HPP Kosinj 52 MW	
		• HPP Sklope 27 MW	
		• HPP Senj 1 (revitalization) 240 MW	
		• HPP Senj 2 360 MW	
<i>HPP System and water regulation Sava:</i>	800		
• HPP Podsused 41 MW			
• HPP Prečko 23 MW			
• HPP Zagreb 19 MW			
• HPP Drenje 39 MW			
HPP Molve 1 and 2 100 MW	400		
HPP Dubrovnik (? 320 GWh)	180		
HPP Ombla 70 MW	125		
RES	Electricity Grid	* New H/V transmission lines	-
		* Upgrading and expansion of existing grid	70
	* Small Hydro	-	
	* Wind farms	50	
	* Photovoltaics	100	
	* Concentrated Solar Power	-	
	* Geothermal: Geothermal power plant system Kutnjak - Lunjkovec	100	
	* Solar Water Heating	100	
Total Estimated Investment by 2020			7,000

Table: 14.2

COUNTRY ENERGY INVESTMENT INFORMATION

BOSNIA & HERZEGOVINA
REPUBLIKA SRPSKA*Contributor(s): Mr. Ljubo Glamocic*

Project Sector		Description	Investment Estimate in Million Euros
OIL	Upstream	▪ Field Exploration	120
		▪ Development of new oil and gas wells	-
	Downstream	▪ Refining	530
		▪ Loading Terminals	-
		▪ Storage facilities	110
		▪ Crude / Product Pipeline(s)	-
GAS	Country Gas Network	▪ Grid expansion	180
		▪ Main intra country pipeline(s)	80
		▪ Storage facilities	-
		▪ LNG terminal(s)	-
ELECTRICITY	Power Generation	▪ Lignite	552
		▪ Coal	-
		▪ Gas	-
		▪ Nuclear	-
		▪ Large Hydro	1.735
	Electricity Grid	▪ New H/V transmission lines	8,0
▪ Upgrading and expansion of existing grid		17	
RES		▪ Small Hydro	320
		▪ Wind farms	150
		▪ Photovoltaics	20
		▪ Concentrated Solar Power	-
		▪ Biomass (including liquid biofuels)	20
		▪ Geothermal	13
		▪ Solar Water Heating	13,0
Total Estimated Investment by 2020			3,855

Table: 14.6

COUNTRY ENERGY INVESTMENT INFORMATION

FYRO MACEDONIA

Contributor(s): Mr. Simon Uzunov and Ms.Violeta Kogalniceanu

Project Sector		Description	Investment Estimate in Million Euros
OIL	Upstream	▪ Field Exploration	-
		▪ Development of new oil and gas wells	-
		▪ Refining	80
	Downstream	▪ Loading Terminals	-
		▪ Storage facilities	30
		▪ Crude / Product Pipeline(s)	-
GAS	Country Gas Network	▪ Grid expansion	50
		▪ Main intra country pipeline(s)	100
		▪ Storage facilities	-
		▪ LNG terminal(s)	-
ELECTRICITY	Power Generation	▪ Lignite	-
		▪ Coal	-
		▪ Gas	-
		▪ Nuclear	-
		Large Hydro: 1. HPP "Boskov Most" on Mala River Installed capacity 68,2 MW; - Medium annual generation 117,54 GWh (EBRD and MEPSO financing); preparation of FS and ESIA undergoing.	70
		2. HPP "Cebren" (with indicative total installed capacity of 333MW) and HPP "Galiste" (with indicative total installed capacity of 193,5MW) – private investors – tender on going. 3. 12 HPP's on the river Vardar; total installed capacity of the objects is envisaged to be 325MW, and the total annual generation of electricity 1050 GWh. These were tendered in 2009, but the investor(s) is not yet selected.	340 (The indicative investment value of the Cebren HPP) 200 (The indicative investment value of the Galiste HPP) 810 (The total estimate HPPs and the displacement of the railway)
RES	Electricity Grid	▪ New H/V transmission lines 1. 400 kV OHTL Interconnection Serbia/ Nis – FYRO Macedonia/Stip : 70 km on Macedonian side up to SS Stip and total length is 145 km on Serbian side; the line was completed on Serbian territory to the border, including substations and will start construction in 2011 on the FYRO Macedonia territory.	15 (For the line in the FYRO Macedonia)
		2. 400 kV OHTL interconnection FYRO Macedonia – Albania; the feasibility study and ESIA will be prepared in 2011, under the WBIF technical assistance.	40 (Investment cost estimate)
		▪ Upgrading and expansion of existing grid	Cost estimates not available; procurement through EBRD
		1. Rehabilitation of S/S 220/110/35 kV Skopje 1 with Supply and Installation of a new Control System on 110 kV level and replacement of the existing 110 kV protection system 2.Rehabilitation of S/S 400/110 kV Bitola 2 with Supply and Installation of the new Control System and replacement of the existing 400 kV and 110 kV protection systems	60
		▪ Small Hydro	-
		▪ Wind farms	-
		▪ Photovoltaics	25
		▪ Concentrated Solar Power	-
		▪ Biomass (including liquid biofuels)	5
		▪ Geothermal	-
		▪ Solar Water Heating	25
Total Estimated Investment by 2020			1,850

Table: 14.9

COUNTRY ENERGY INVESTMENT INFORMATION

MONTENEGRO

Contributor(s): Mr. Aleksandar Mijuskovic

Project Sector		Description	Investment Estimate in Million Euros
OIL	Upstream	▪ Field Exploration	200
		▪ Development of new oil and gas wells	-
	Downstream	▪ Refining	300
		▪ Loading Terminals	-
		▪ Storage facilities	50
	▪ Crude / Product Pipeline(s)	-	
GAS	Country Gas Network	▪ Grid expansion	-
		▪ Main intra country pipeline(s)	-
		▪ Storage facilities	-
		▪ LNG terminal(s)	-
ELECTRICITY	Power Generation	▪ Lignite	1,200 (TPP 500 MW + coal mine Maoce)
		▪ Coal	300 (TPP 110 MW + coal mine Berane)
		▪ Gas	-
		▪ Nuclear	-
		▪ Large Hydro - (HPP on Moraca river 238 MW – Andrijevo, Raslovici, Milunovici, Zlatica) - (HPP Komarnica 168 MW)	540 170
	Electricity Grid	▪ New H/V transmission lines	750 (AC/DC connection to Italy)
		▪ Upgrading and expansion of existing grid	50
		▪ Small Hydro - (concession given for 33 small hydro to be built, with approximate power of 95 MW)	140
RES	Wind farms		150 (Agreements signed, wind farms cca 100 MW)
		▪ Photovoltaics	80
	▪ Concentrated Solar Power	-	
	▪ Biomass (including liquid biofuels)	-	
	▪ Geothermal	10	
▪ Solar Water Heating	20		
Total Estimated Investment by 2020			3,960

The EU Angle: Energy Infrastructure Strategy for 2020

European Council Decision of 4 Feb 2011:

- Completing the internal market **by 2014** – cooperation of ACER, ENTSOs, Commission
- Infrastructure is key for achieving 20-20-20 targets **by 2020**
- Ending isolation of energy islands **by 2015**
- **Financing for infrastructure:** mainly market-based complemented by limited public funds, notably for security of supply/solidarity
- Streamlining and improving **authorization** procedures

The EU Angle: Impact of EU decisions on the region

- EU decisions and Directives will have an impact on SE Europe Energy developments by : 2014,2015, 2020 and will affect:
 - energy strategy, energy mix
 - energy infrastructure
 - energy demand



The EU Angle: The Importance of Gas

- Gas has a vital role to play in the energy future of Europe
- Value of gas with regards to CO2 emissions, flexibility, in storage and generation
- EU gas market is an attractive regional market that opens up to international gas trade
- Industry is the driver for investments
- Gas industry is responsible for the creation of a real flexible gas market in the EU
- EU acknowledges the key role of physical infrastructure and the access to diversified supplies

Linking the EU to new gas sources – Energy

Security for the EU and its neighbours

- Development of transit countries to **stable** economies and **rule of law**
- Aegean – Adriatic – Baltic – Black Sea (2A2B) Plan (North South Interconnections)
- Development of **Southern Eastern Europe's gas market**: Interconnections, Regulatory Work, Energy Community Gas Ring and establishment of gas hubs
- Good **investment** opportunities through solid **regulatory framework**
- Contribute to **Caspian and Middle-East** countries **development**
- Contribute to the development and implementation of an **EU external energy policy**

South Corridor Inter-Regional Pipeline Projects



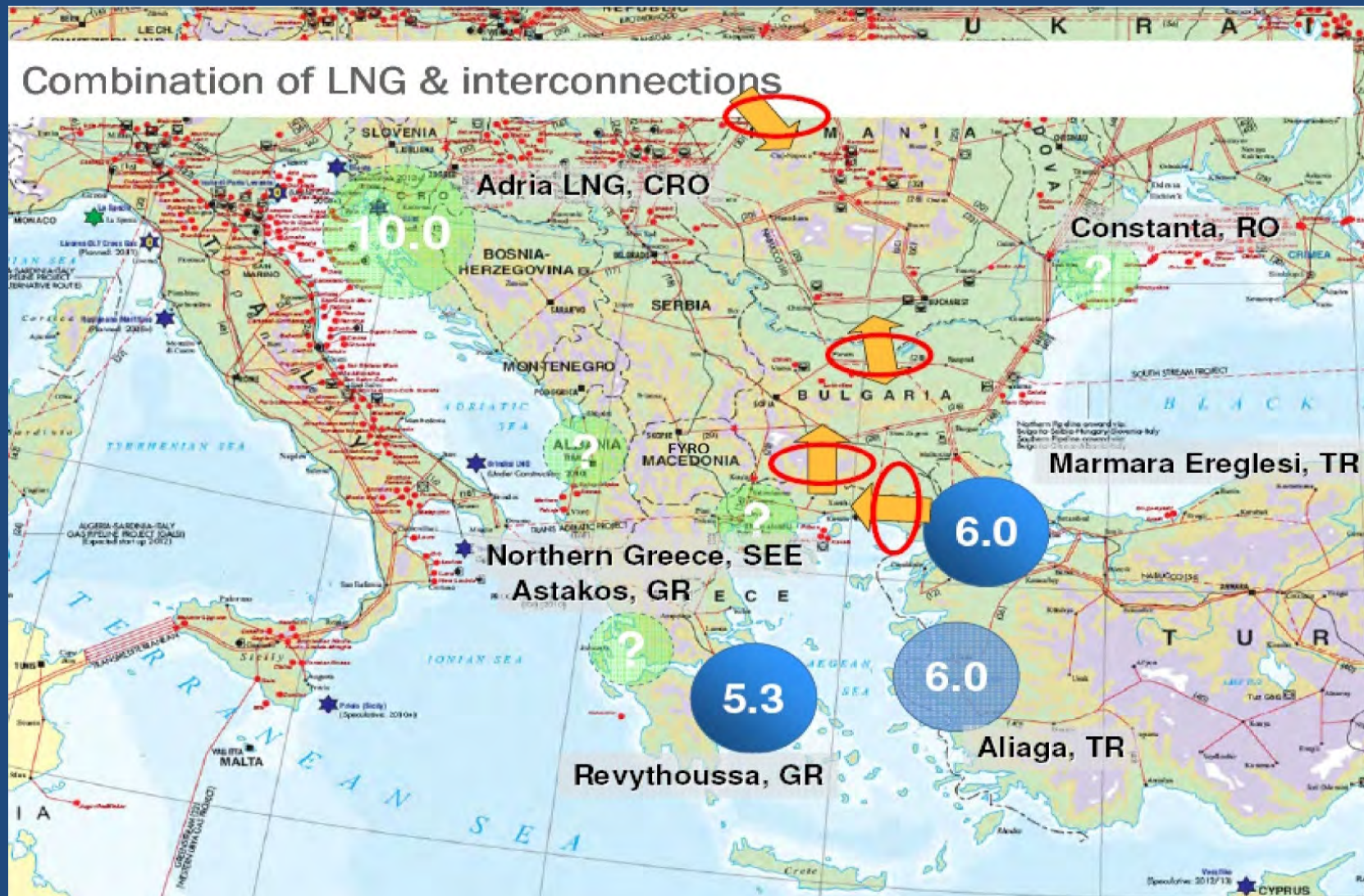
The South Corridor Gas Pipeline Projects

Project	Shareholders	Distance	Cost	Capacity	Secured Investment	Completion Date
Nabucco	BOTAS, BUGARGAZ, TRANSGAZ, MOL, OMV, RWE, each with a share of 16.67%	4.042 km	€7,9 bn to expand to €14 bn after Iraqi expansion	31 bcm/y	€ 200 million	2016-2017
ITGI / IGI Poseidon	DEPA (50%), Edison (50%)	807km of which 590 km Onshore, & 217km for IGI	€1,3-1,5 bn. due to expand to cover cost of upgrading Turkish NGTS	12 bcm/y	€ 100 million	2016-2017
TAP	EGL (42,5%), Statoil (42,5%) & E.ON (15%)	520km from Thessaloniki to Otranto but may have include a new line from Evros to Thessaloniki a distance of app. 340 km	€1,5 bn. according to EGL estimates but due to expand to cover cost of upgrading Turkish & Greek NGTS	10-20 bcm/y	0	2016-2017
South Stream	GAZPROM (50%), ENI (50%), of which 10% may go to EDF and up to 15% to BASF /Wintershall	2.500 km of which offshore 900km connecting Anapa to Baumgarten	€15,5 bn. of which 5,5 bn. for offshore	63 bcm/y	0	2015

The ITGI Gas Pipeline Project



South East Europe Gas Interconnectors and L.N.G. Projects



The ITGI and Gas Interconnectors in SE Europe



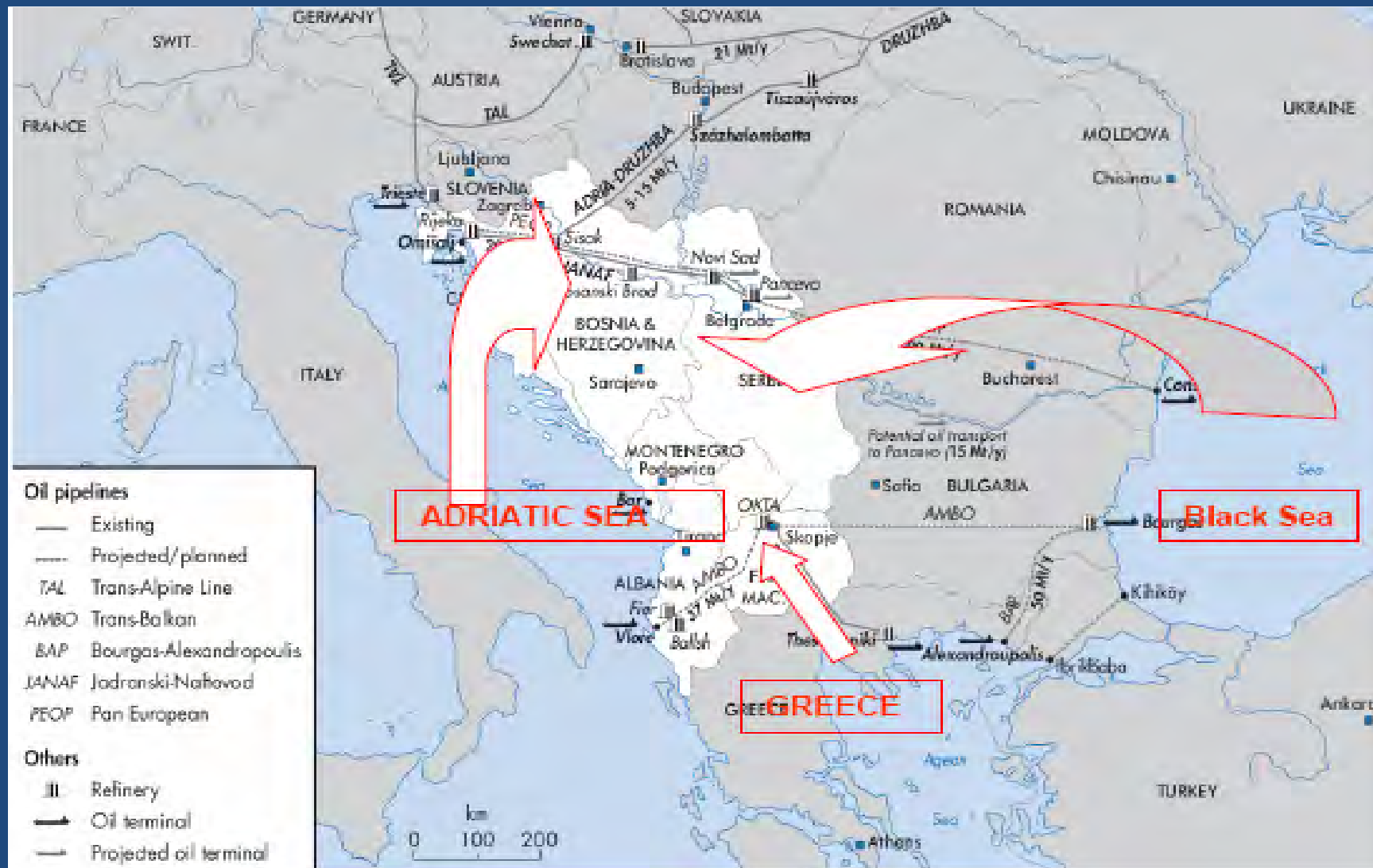
The Greece – Italy gas pipeline (IGI) and main gas interconnections in SE Europe



Oil Pipeline Projects in Black Sea and SE Europe



Western Balkans and S.E.E. Oil Pipeline Projects



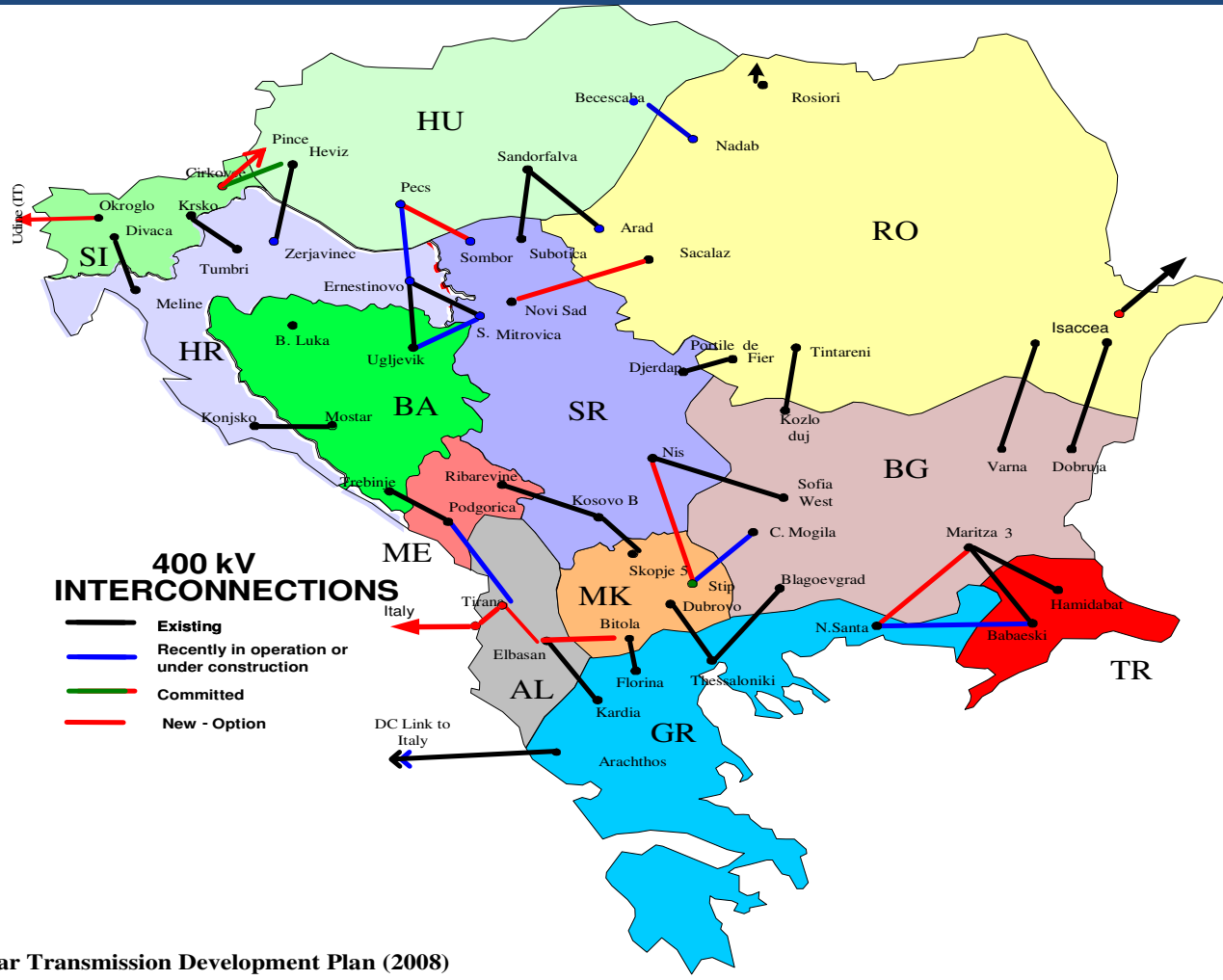
Energy Community Map



Energy Community

- Energy Community is the first common institutional project undertaken by the non- European Union countries of South East Europe.
- The scope of the Energy Community Treaty is the import of the EU energy policy into non- EU countries.
- October 2005. Treaty establishing the Energy Community was signed in Athens.
- The Contracting Parties have taken on a legally binding obligation:
- To implement the relevant *acquis communautaire*,
- To set up regulatory structures and,
- To liberalize their energy markets.
- **Contracting Parties (CPs):** Albania, Bosnia and Herzegovina, Croatia, F.Y.R.O.M, Moldova, Montenegro, Serbia and Kosovo
- **Observers:** Ukraine, Turkey, Georgia
- **Participants:** Austria, Bulgaria, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Italy, The Netherlands, Romania, Slovakia, Slovenia and United Kingdom

Electricity Interconnections



Source:
UCTE 10 Year Transmission Development Plan (2008)

Net Electricity Flows



Status of Renewable Energy Sources in S.E. Europe

- **Solar Thermal** *Well developed markets in Greece, Cyprus and Turkey*
- **Solar PV** *Approximately < 250 MW total PV installed, with Greece being the most developed market, followed by Bulgaria*
- **Wind** *Key players: Greece, Turkey, Bulgaria, Romania
Installed Capacity < 3.600 MW*
- **Mini Hydro** *Well developed in Western Balkans.
Considerable Potential in Greece and Turkey*
- **Biomass** *Embryonic market for power generation but extensively used for house heating*
- **Geothermal** *Large untapped potential in Greece, Turkey, Bulgaria, Romania, Serbia and Croatia*

S.E. Europe Renewables – Solar Thermal Market

Table 1: Installed capacity of solar collectors in 2008 and cumulative capacity

No	Countries	Installed capacity in 2008		Cumulative capacity, end 2008	
		in m ²	in MWth	in m ²	in MWth
1	Bulgaria	6,000	4.2	62,000	43
2	Cyprus	40,550	28	665,300	465
3	Greece	300,000	210	3,550,000	2,485
4	Romania	10,000	7	79,600	56
5	Turkey	NA	NA	12,000,000	8,400

Solar Photovoltaic Installed Capacity in SE Europe (2010)

Country	Installed Capacity (MW)
Bulgaria	10.0 (e)
Cyprus	6.0 (e)
Greece	205.0
Romania	2.0 (e)
Turkey	5.0 (e)
Total	228.0



Installed Wind Power Capacity in Europe



Wind power installed in SE Europe

Wind power in SE Europe (2009 - 2010)				
Capacity (MW)	Installed 2009	End 2009	Installed 2010	End 2010
Bulgaria	57	177	198	375
Cyprus	0	0	82	82
Greece	102	1,087	123	1,208
Romania	3	14	448	462
Croatia	10	28	61	89
Turkey	343	801	528	1,329
FYROM	0	0	0	0
Total	515	2107	1,440	3,545

Renewable Energy Sources in SE Europe

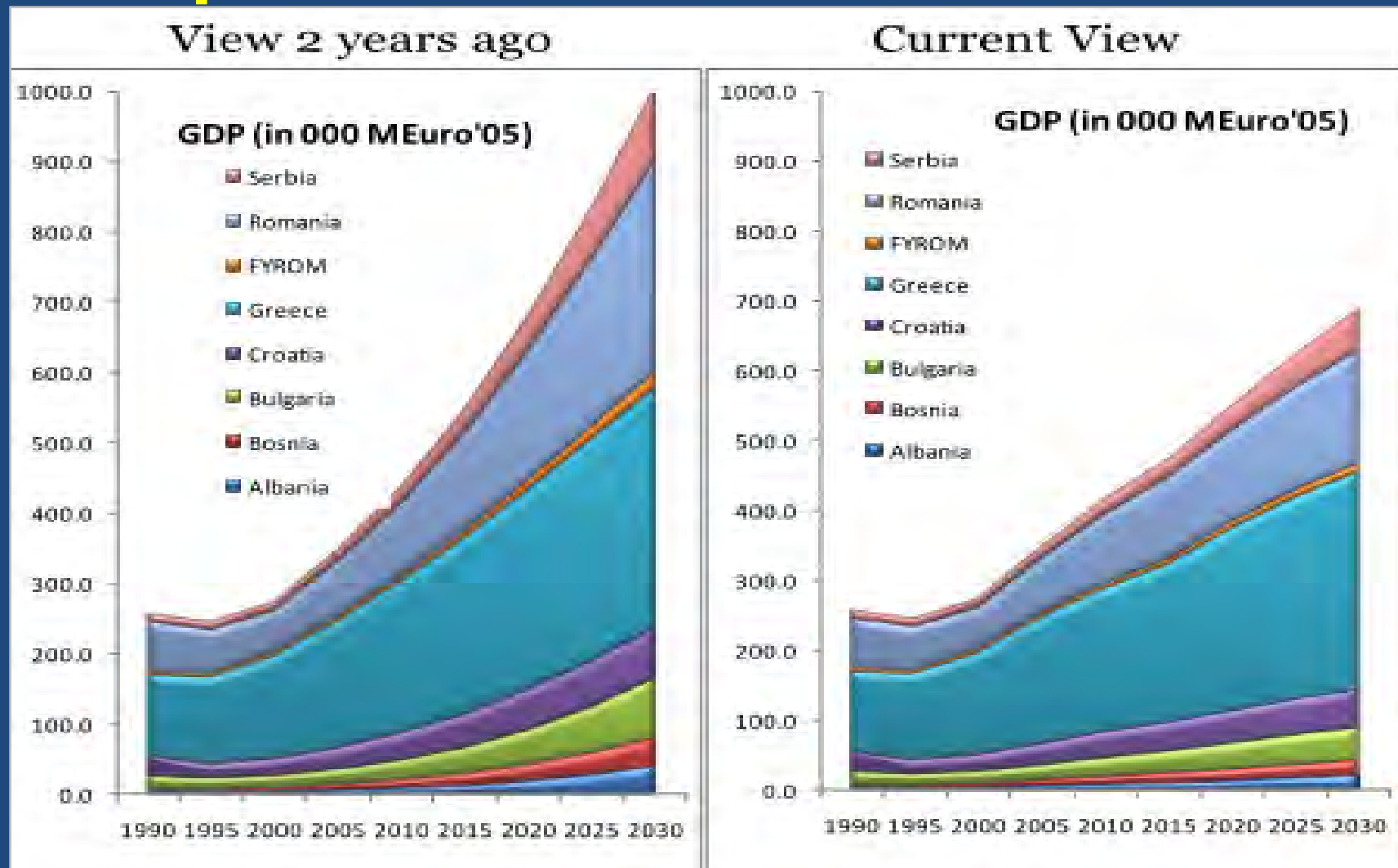


RES in S.E. Europe

RES in Gross Final Energy Consumption						Target
%	2005	2020	% diff	2030	% diff	2020
Albania	32.6	25.7	2.8	26.0	5.3	?
Bosnia	18.8	20.9	4.7	24.4	7.9	?
Bulgaria	11.1	23.5	12.2	34.3	18.1	16%
Croatia	13.6	16.3	2.9	18.7	5.2	?
Greece	7.6	17.8	7.1	22.5	10.1	20%
FYROM	15.7	22.8	5.8	25.6	10.6	?
Romania	18.9	25.8	6.8	29.0	8.2	24%
Serbia & Montenegro	18.9	19.5	4.3	18.7	5.1	?
Balkans excl. Turkey	14.9	21.4	6.5	24.8	8.9	
Turkey	15.5	13.3	3.7	14.6	5.4	?
All SEE	15.2	17.0	5.6	19.0	7.5	
EU27	8.6	20.0	5.2	22.2	3.8	20%

Source: EC3 Lab, NTUA

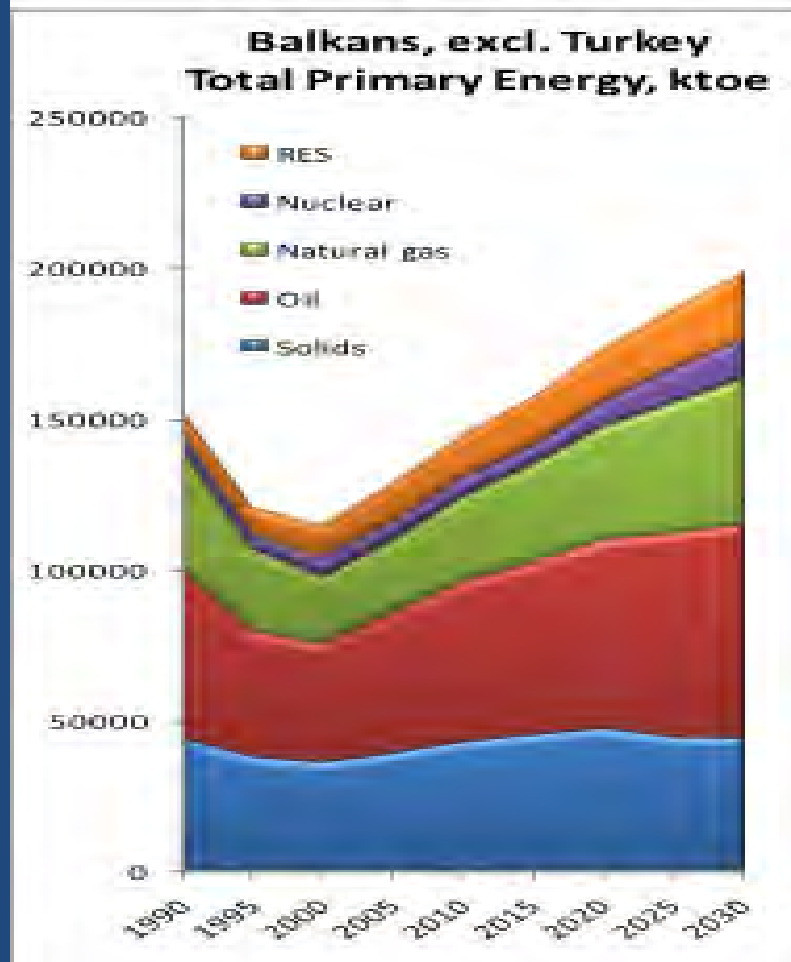
Macroeconomic Projections for S.E. Europe



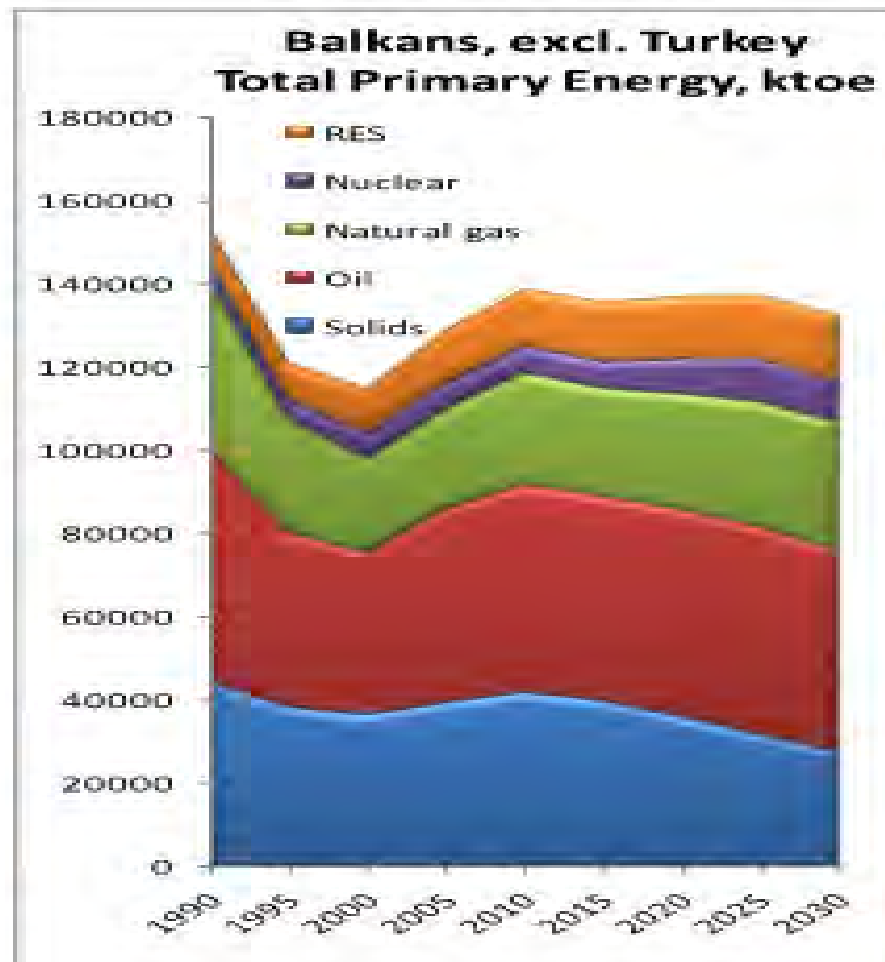
Source: EC3 Lab, NTUA

Primary Energy Consumption 1990-2030

View 2 years ago



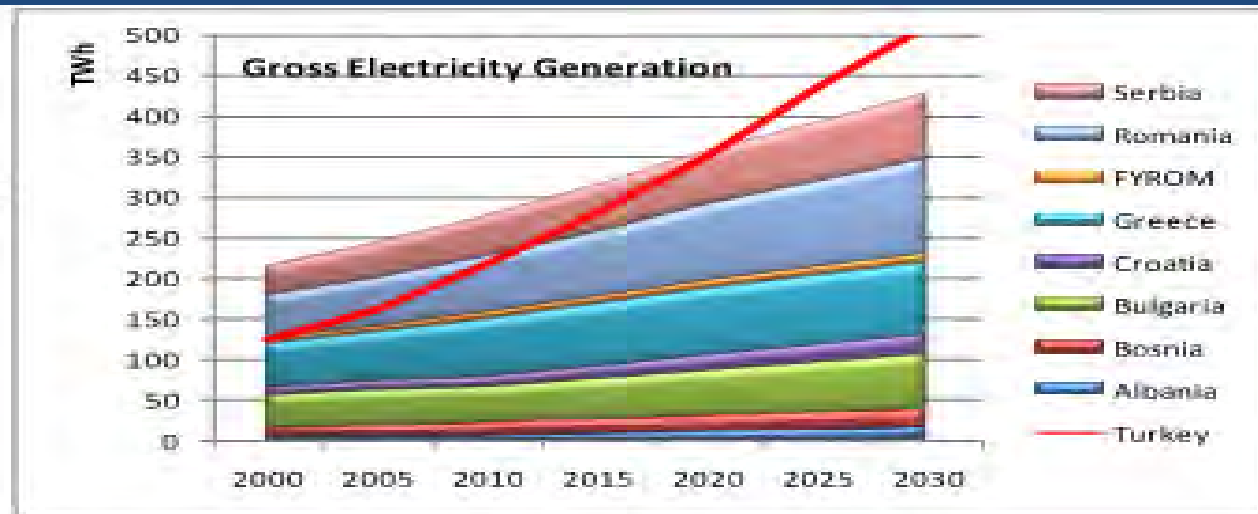
Current View



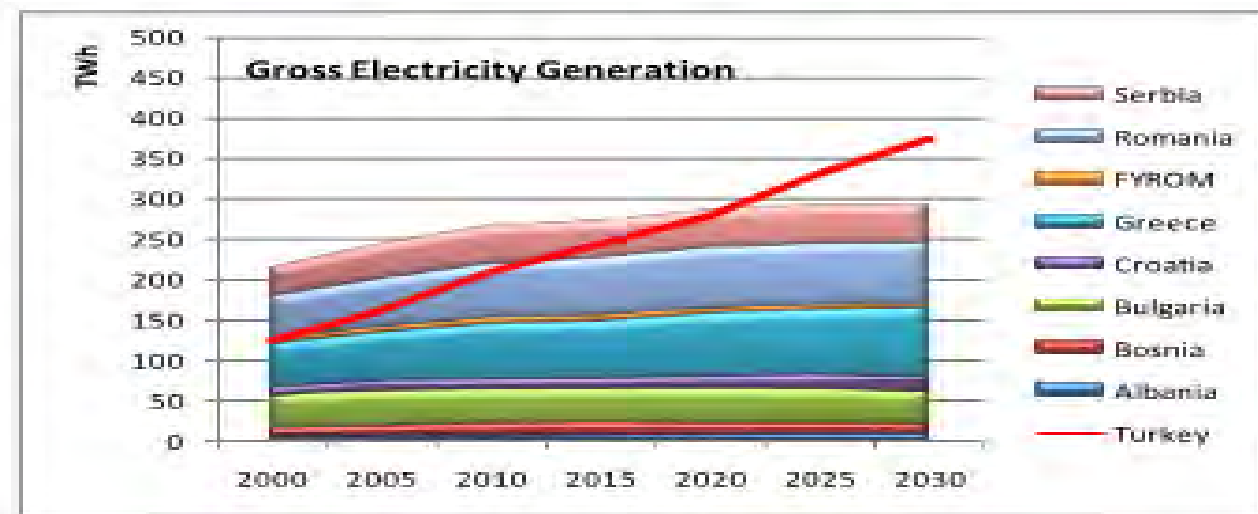
Source: EC3 Lab, NTUA

Electricity Generation in SE Europe (2000-2030)

View
2 years ago



Current
View



Source: EC3 Lab, NTUA

SE Europe Capacity Mix 2020,2030*

Installed Capacity in GW

	2020		2030	
	View 2009	View 2007	View 2009	View 2007
RES**	28,1	29,2	30,5	33,2
Gas	11,5	15,6	13,0	26,9
Oil	3,7	3,6	3,1	3,5
Solids	22,2	24,7	18,7	26,7
Nuclear	4,4	4,4	5,5	6,9
	69,9	77,5	70,80	97,2

* Excluding Turkey

**including large hydro

Operational and planned nuclear power plants in SE Europe



Significant Investment and Business Opportunities in SE Europe over the next decade:

- ✓ Oil and Gas (upstream)
- ✓ Oil (midstream, downstream)
- ✓ Natural Gas (transmission, distribution , storage)
- ✓ Power Generation (Thermal Plants, CCP, Nuclear, Large Hydro)
- ✓ Electricity Transmission and Distribution
- ✓ RES (SWH, Photovoltaic, Wind, Mini-Hydro, Biomass, Geothermal)

Estimated Total investment potential ~ Euro 240.0 billion ($\pm 10\%$)

Total Energy Infrastructure Investments per Country

	<i>(in million Euros)</i>
✓ Albania	8.800
✓ Bosnia & Herzegovina (Republic of Sroksa only)	3.855
✓ Bulgaria	17.150
✓ Croatia	7.000
✓ Cyprus	19.000
✓ FYROM	1.850
✓ Greece	35.300
✓ Kosovo	4.620
✓ Montenegro	3.960
✓ Romania	36.500
✓ Serbia	10.665
✓ Turkey	70.500
TOTAL	219.200

Anticipated Total Energy Infrastructure Investment Per Sector

Sector	Investments (€ Million)
Oil Upstream (<i>Research, Exploration and Production</i>)	33,820
Oil Downstream/Midstream (<i>incl. liquid biofuels</i>)	23,100
Electricity <ul style="list-style-type: none"> ▪ Thermal Plants ▪ Nuclear Plants ▪ Lignite Mine Development ▪ Grids - Upgrade and Expansion (<i>incl. metering systems</i>) ▪ HV Transmission Lines 	89,692
Gas <ul style="list-style-type: none"> ▪ Main and branch gas pipelines ▪ Gas Storage ▪ LNG Terminals and Liquefaction plants ▪ Town grids 	24,955
RES (<i>Wind, PV, Biomass, Mini Hydro, Geothermal</i>)	47,633
Intraregional Mega Projects <ul style="list-style-type: none"> ▪ Oil Pipelines ▪ Gas Interconnectors ▪ Main gas pipelines 	20,800
Total	240,000

SE Europe Energy Outlook Key Messages

- Rising energy demand over the next 10 years but at a much slower pace than previously forecasted
- Continuing strategic relevance of coal
- Urgent need to replace antiquated and low efficiency thermal electricity plants
- Inadequate progress in electricity and gas market liberalization
- Very high net hydrocarbon import dependence and unsatisfactory import diversification.
- Need to increase indigenous oil and gas output and explore for new fields

SE Europe Energy Outlook Key Messages (continued)

- Need to replace and upgrade old and outdated refinery complexes
- Present underdevelopment of R.E.S combined with newly introduced incentives will lead to massive investments and significant penetration by 2020/2030
- Low infrastructure inter- connectivity in oil & natural gas
- Need to complete main gas interconnectors in all SE European countries.
- Priority must be given to the construction of key inter-regional oil pipeline projects (i.e. BAP,

SE Europe Energy Outlook

Key Messages (continued)

- Plans for the construction of South Gas Corridor projects must be accelerated so that new gas pipelines are in place by 2020, in order to meet rising European gas demand and help with diversification of supplies
- Azerbaijan has key role to play as supplier and prospective hub for European gas supply
- Positive investment climate with East

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your attention
and for your for patience!**