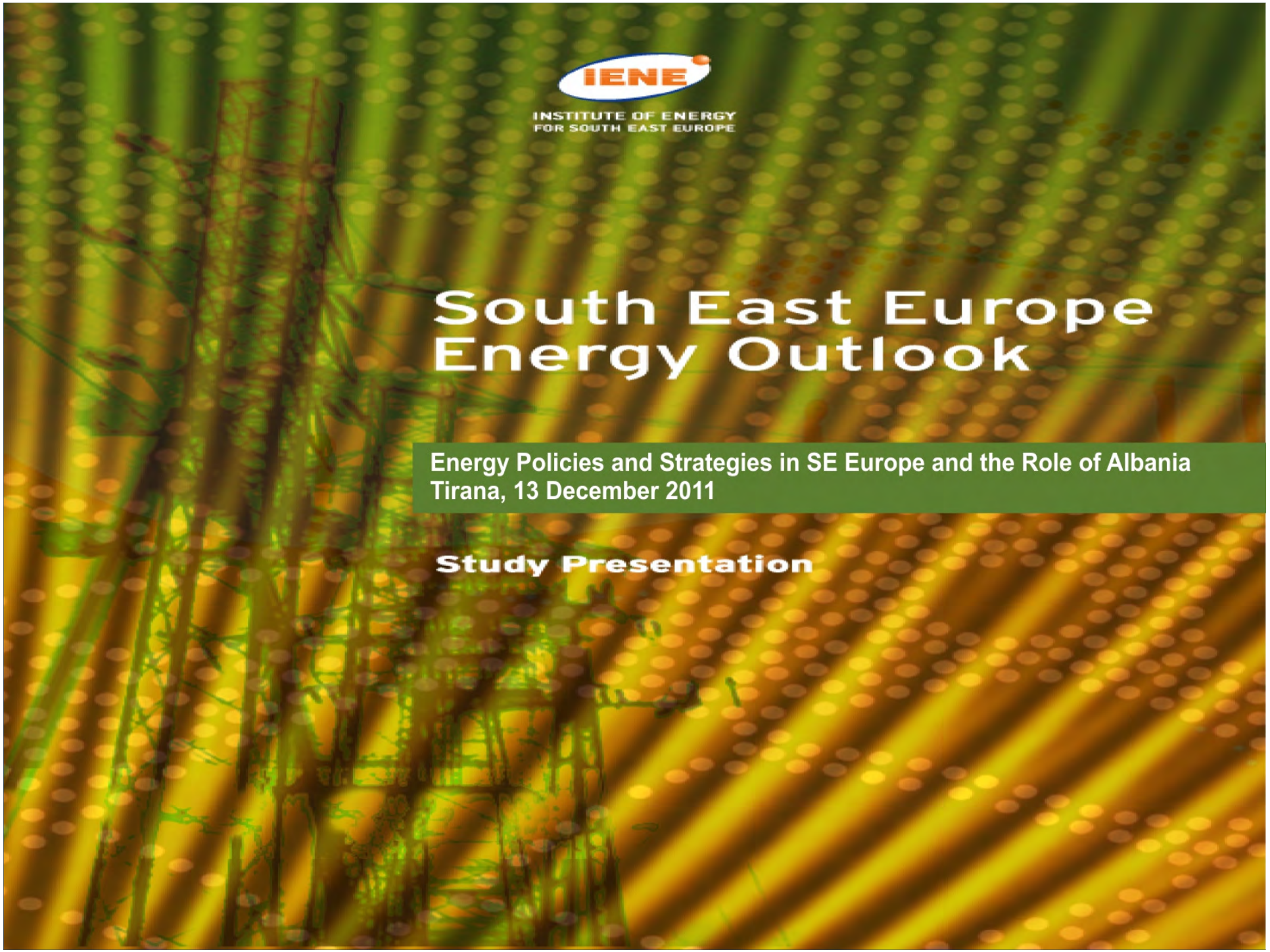

IENE
INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE
South East Europe
Energy Outlook
Energy Policies and Strategies in SE Europe and the Role of Albania
Tirana, 13 December 2011
Study Presentation

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 202

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 regio

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 Europe

SE Europe Basic Economic & Energy Parameters (2008)

- 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 (2008)

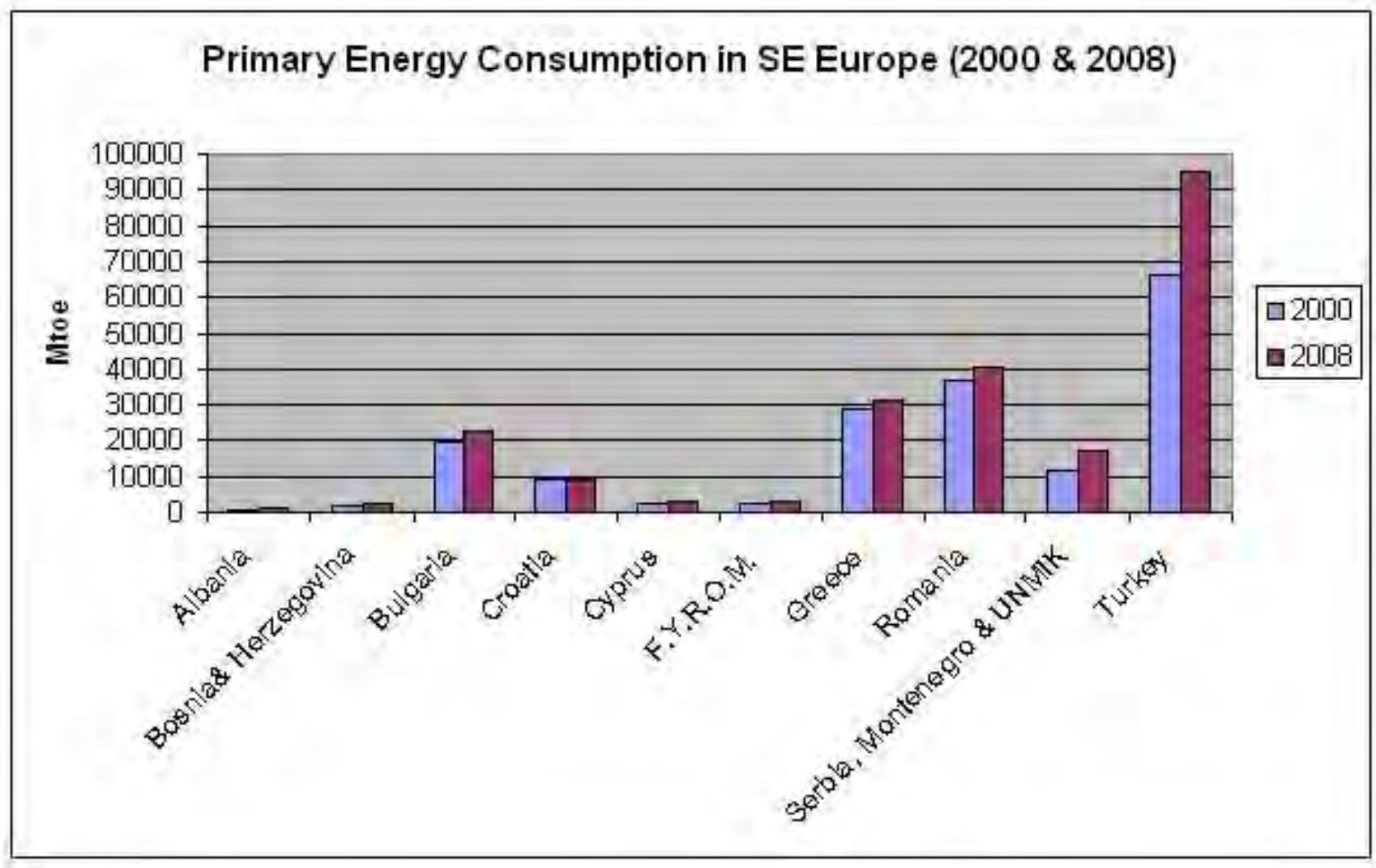
Country	Population (Million)	GDP (PPP) (USD Billion)	FDI (% of GDP)	Installed Electricity Capacity (MW)	Oil Consumption (bl/day)	Gas Consumption (bcm/year)
Albania	3.2	19.9	4.2	1.590	33,000	0,02
Bosnia & Herzegovina	4.6	28.2	5.48	4,341	27,500	0,31
Bulgaria	7.2	90.1	7.15	11.360	120,000	3,5
Croatia	4.4	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**

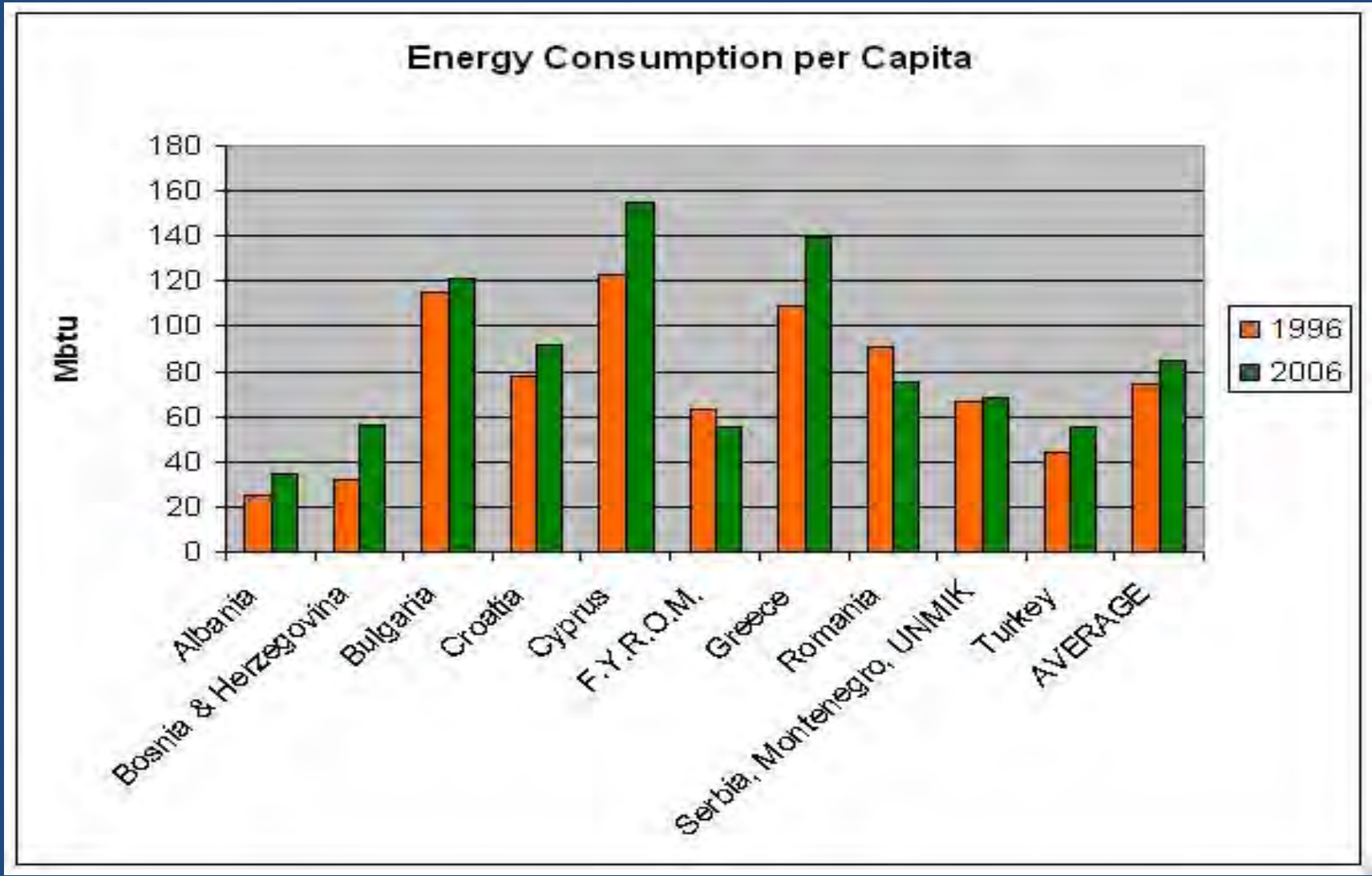
Primary Energy Consumption in SE Europe for 2008 (in thousand)

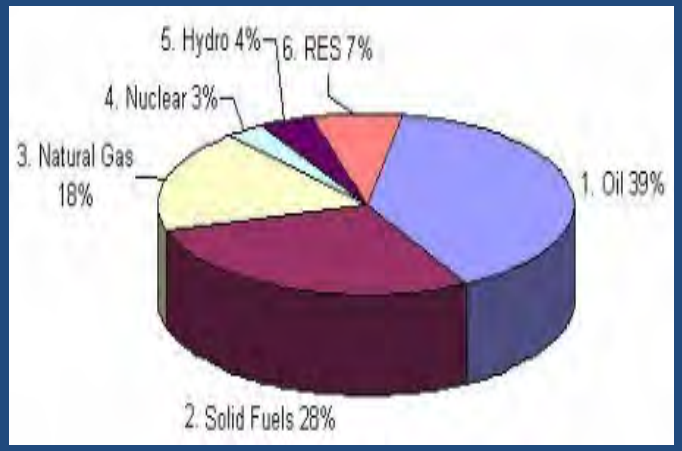
Countries	Oil	Coal	Natural Gas	Nuclear	Hydro	RES	TOTAL
Albania	565	8	9		510	72	1164
Bosnia& Herzegovina	1150	750	260		215	198	2573
Bulgaria	7245	7851	3010	3836	247	746	22935
Croatia	4284	824	2622		1100	340	9170
Cyprus	2690	14				95	2799
F.Y.R.O.M.	1150	1350	67		150	170	2887
Greece	16229	10255	3150		395	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 (2009)

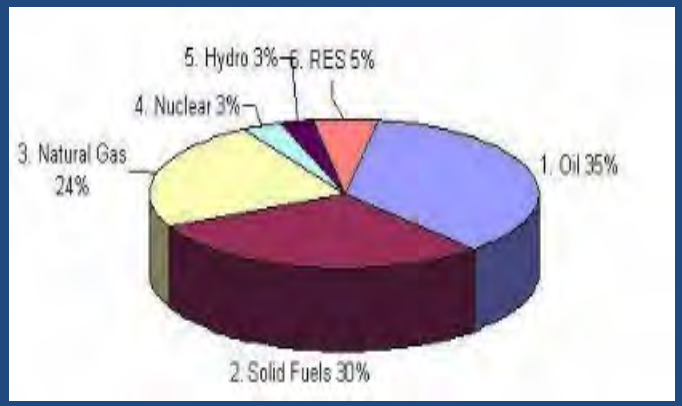
	Population million	GDP (in billion USD)	GDP (in PPP billion USD)	GDP (PPP) Per capita (USD)	Rate of GDP growth (%)	Unemployment
Albania	3.18	12.24	22.83	7.168	3.3%	13%
Bosnia & Herzegovina	3.90	17.04	29.80	7633	-3.2%	24%
Croatia	4.42	67.69	78.42	17.706	-5.8%	9%
FYR Macedonia	2.06	9.37	18.92	9.183	-0.5%	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)
Mtoe
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
2000
2008
Albania
Bosnia& Herzegovina
Bulgaria
Croatia
Cyprus
F.Y.R.O.M.
Greece
Romania
Serbia, Montenegro & UNMIK
Turkey


Energy Consumption per Capita
Mbtu
180
160
140
120
100
80
60
40
20
0
1996
2006
Albania
Bosnia & Herzegovina
Bulgaria
Croatia
Cyprus
F.Y.R.O.M.
Greece
Romania
Serbia, Montenegro, UNMIK
Turkey
AVERAGE

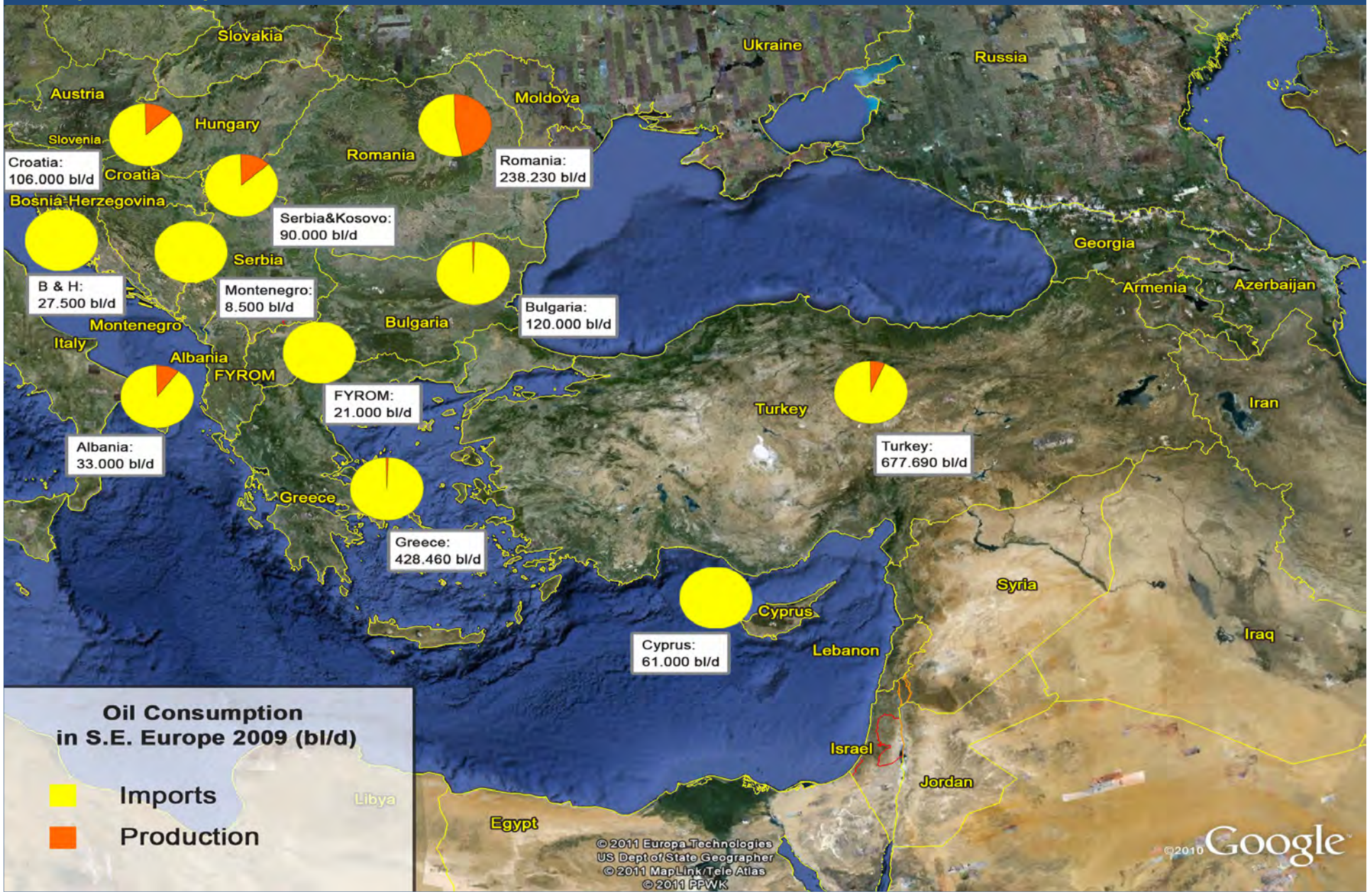


Total Primary Energy Consumption shares in SE Europe (2000)
180.469,00 mtoe TPEC



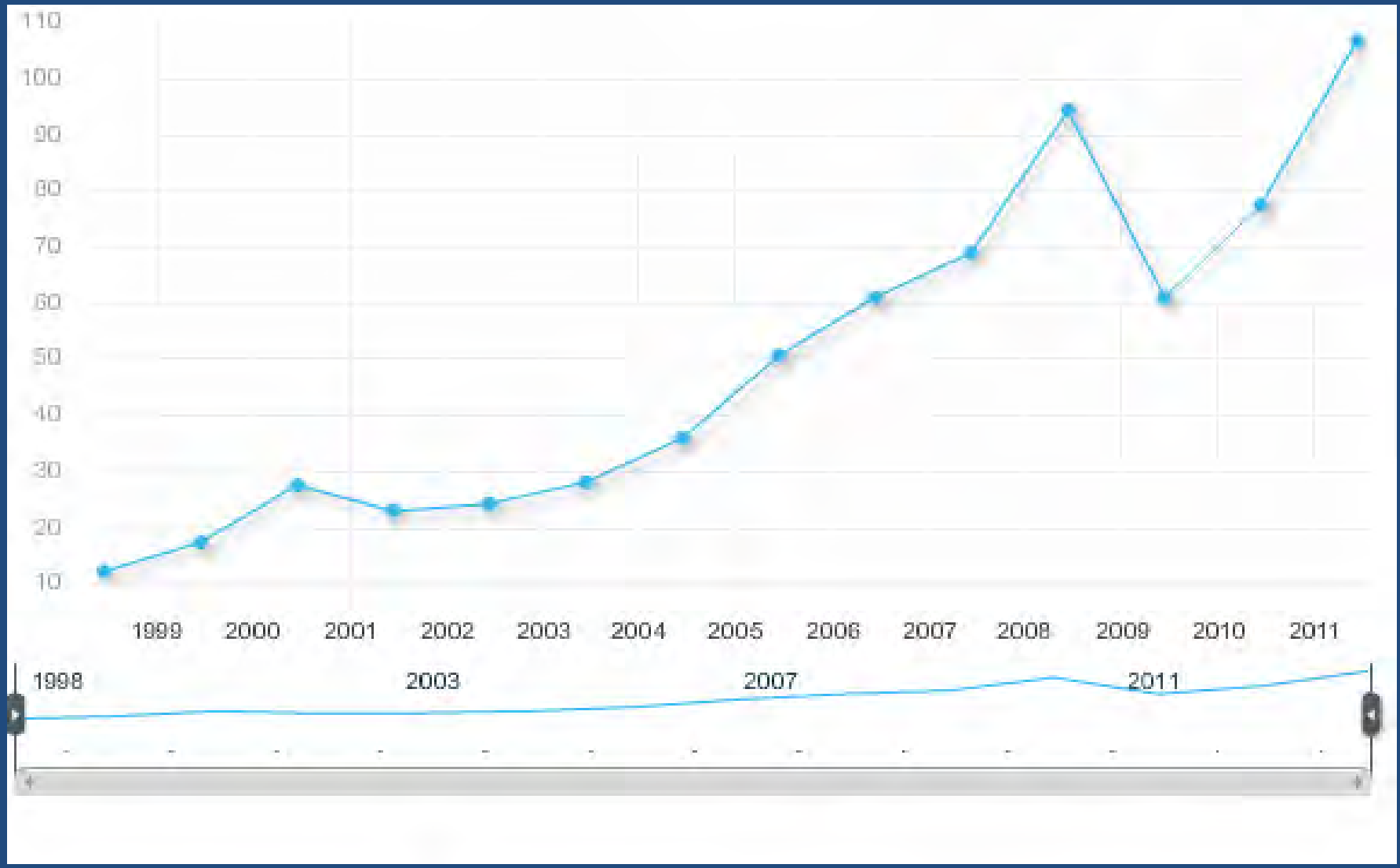
Total Primary Energy Consumption shares in SE Europe (2008)
225.386,00 mtoe TPEC

South-East Europe Net Oil Import Dependency (2009)



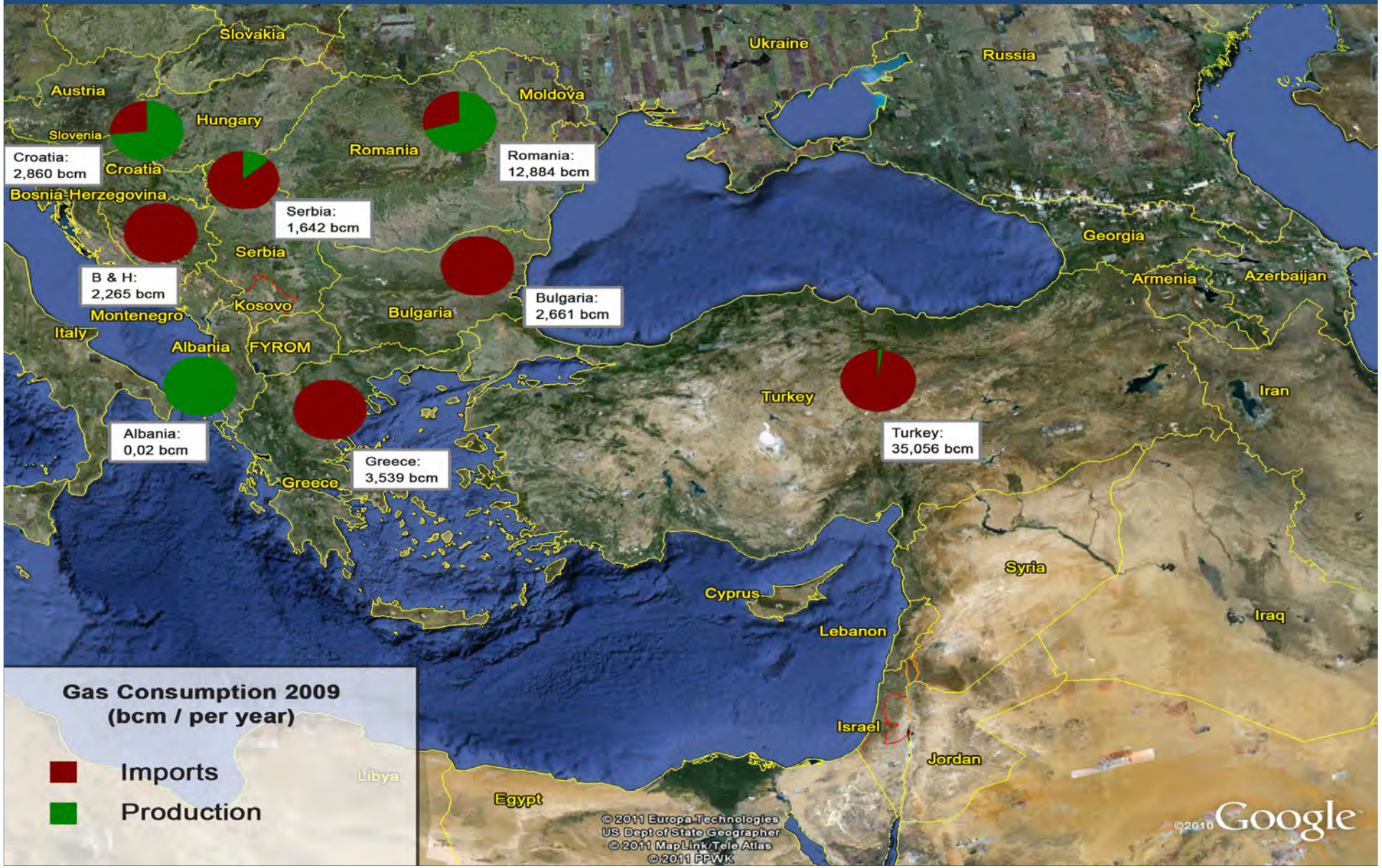
The Brent Oil Future Price at ICE (January 2011 – December 2011)

OPEC Basket Price



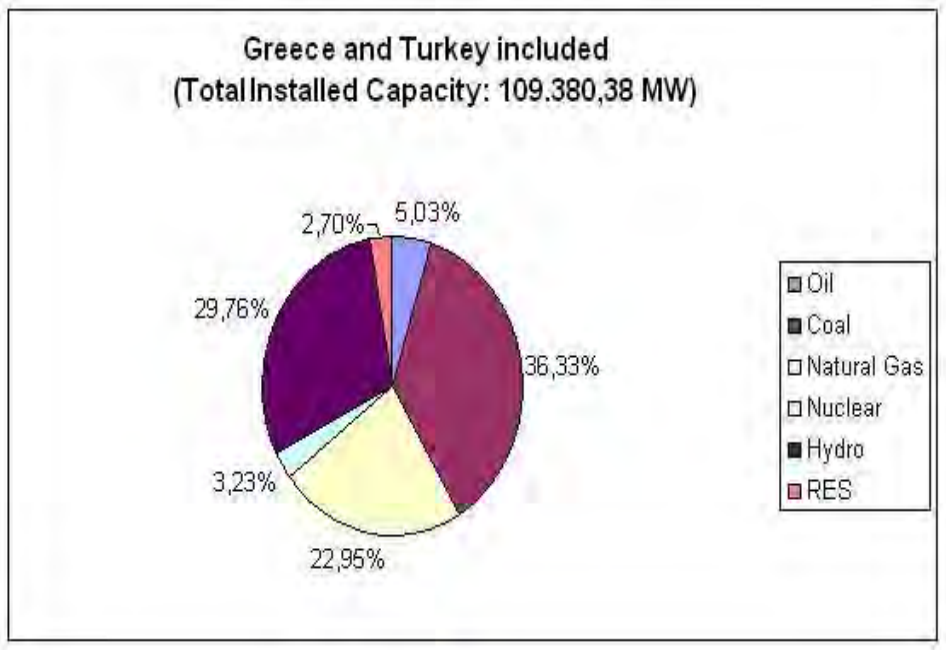
Refining Capacity in S.E. Europe (2009)

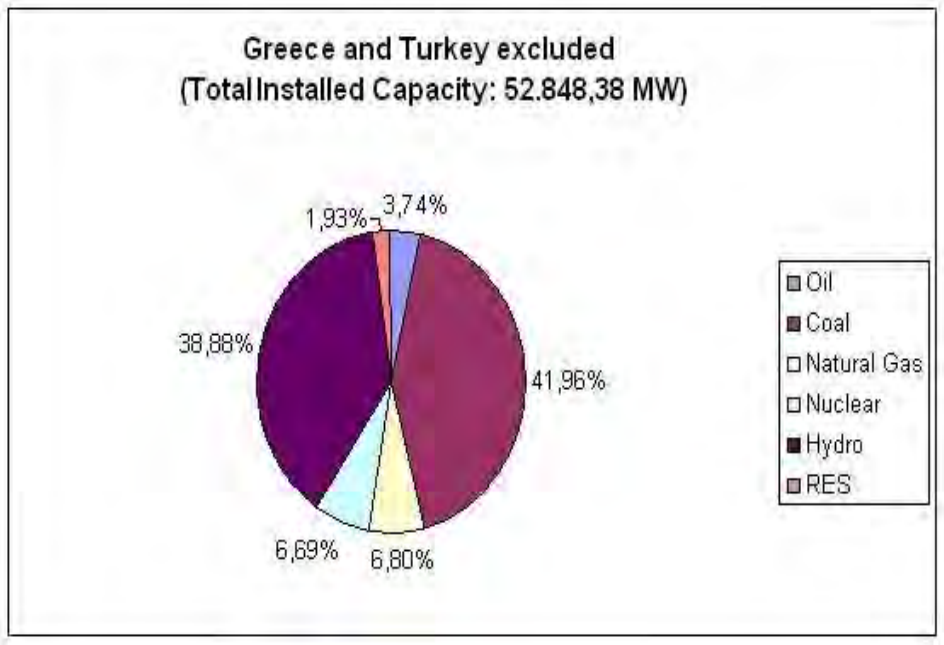
South-East Europe Natural Gas Import Dependency (2009)



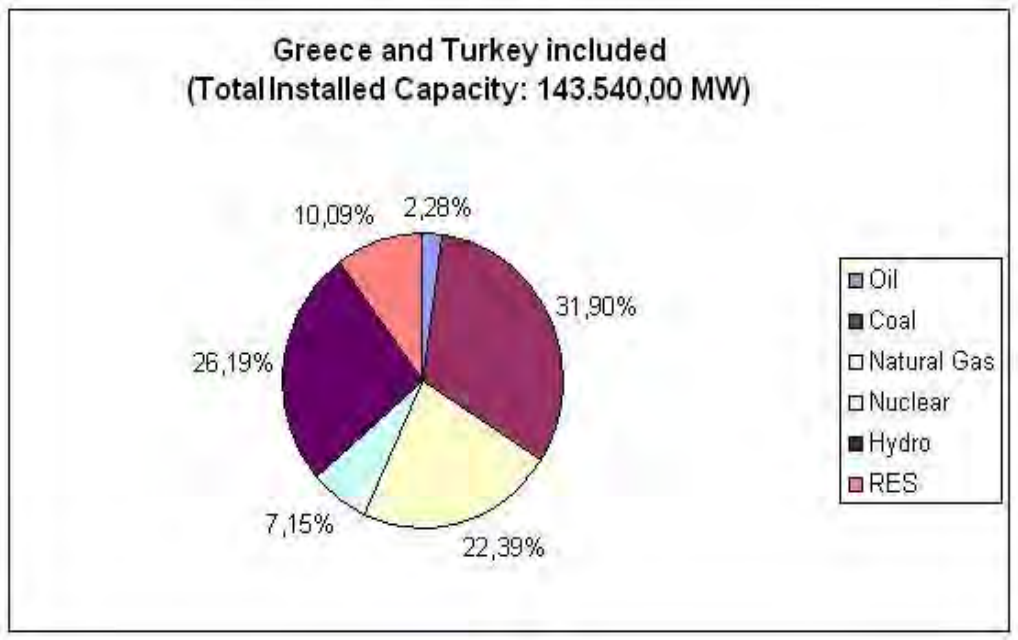
Installed Electricity Capacity (2009)

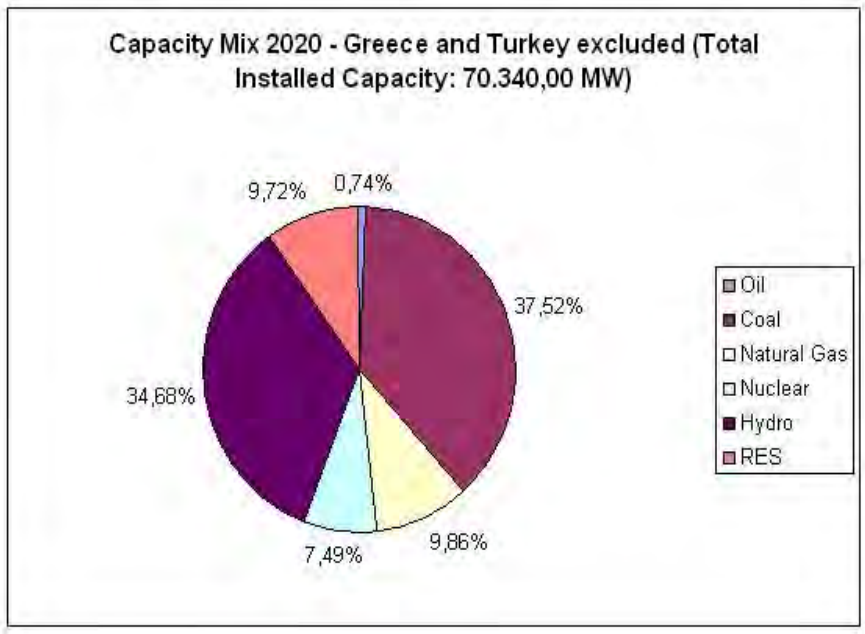
Capacity mix in S.E. Europe (2010)





Anticipated Capacity mix for 2020





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**

ALBANIA

(Republika e Shqipërisë)

Capital	Tirana
Official languages	Albanian
Government	Parliamentary Republic
President	Bamir Topi
Prime Minister	Sali Berisha
Area	28,748 km²
Population	3,195,000 [2010 est]
GDP (PPP)	
Total	$19.944 billion [2009 IMF est]
Per capita	$6,298 [2009 IMF est]
GDP (nominal)	
Total	$12.185 billion [2009 IMF est]
Per capita	$3,824 [2009 IMF est]
HDI (2007)	? 0.801 (high)
Currency	Lek (ALL)

ALBANIA Key Energy Figures (2008)** in Mtoe		
Total Primary Energy Supply (TPES)	2.09	
Total Final Consumption	1.82	
TPES Composition		
Oil	0.34 Crude oil , 0.96 Oil Products	
Gas	0.007	
Coal	0.02	
Electricity	0.21	
RES	0.33 Hydro , 0.21 Combustibles + waste	
Oil		
Production	0.58,	0.34 Mtons Refined (2008 IEA)
Consumption	1.22,	0.95 Mtons oil products (2008 IEA)
Imports	1.14 Oil Products ,	0.96 Mtons oil products (2008 IEA)
Exports	0.18 crude,	0.12 Mtons Aviation (2008 IEA)
Reserves	198 Mbls Proven (IEA), (Also, 2.0 Bbls Patos Marinza + 490 Mbls Kucova)	
Natural Gas		
Production	0.007	
Consumption	-----	
Imports	-----	
Reserves	1.5,	3.6 BCM Proven (IEA)
Coal		
Production	0.02	0.1 Mtons Lignite (Euracoal 2008)
Imports	0.003	0.1 Mtons Hard Coal (Euracoal 2008)
Exports	------	
Reserves		115 Mtons (IEA)
Electricity		
Generation	0.33 Hydro	3.79 TWh (Hydro 2008 IEA)
Consumption	0.349 TFC	4.0 TWh (2008 IEA)
Imports	0.209	2.43 TWh (2008 IEA)
Exports	------	
Total Installed Generation Capacity	1,530 MW,	1,440 MW (Hydro), 80 MW (thermal)
Installed RES Generation Capacity*	10 MW from 46 Small HPP	
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: 14.1 **COUNTRY ENERGY INVESTMENT INFORMATION**

ALBANIA

Contributor(s): *Prof. Stavri Dhima*

	Project Sector	Description	Investment Estimate in Million Euros
OIL	Upstream	Field Exploration	500
		Development of (existing) oil and gas wells	400
	Downstream	Refining (Rehabilitation)	240
		Loading Terminals (Final phase)	~ 5.0
		(Coastal) Storage facilities development	60 (in Porto Romano, Durres)
		Crude / Product Pipeline(s) (Proposal Project)	1300
GAS	Country Gas Network	Grid expansion	50
		Main regional gas pipelines projects crossing Albania	250
		Storage facilities	-
		LNG terminal(s) (Proposal project)	800
ELECTRICITY	Power Generation	Lignite	1100
		Coal	-
		Gas	-
		Nuclear	-
		Large Hydro	1500
	Electricity Grid	New H/V transmission lines	220
		Upgrading and expansion of existing grid	480
RES		Small Hydro	360
		Wind farms	1300
		Photovoltaics	30
		Concentrated Solar Power	-
		Biomass (including liquid biofuels)	145
		Geothermal	-
		Solar Water Heating	60
Total Estimated Investment by 2020			**8,800**

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**

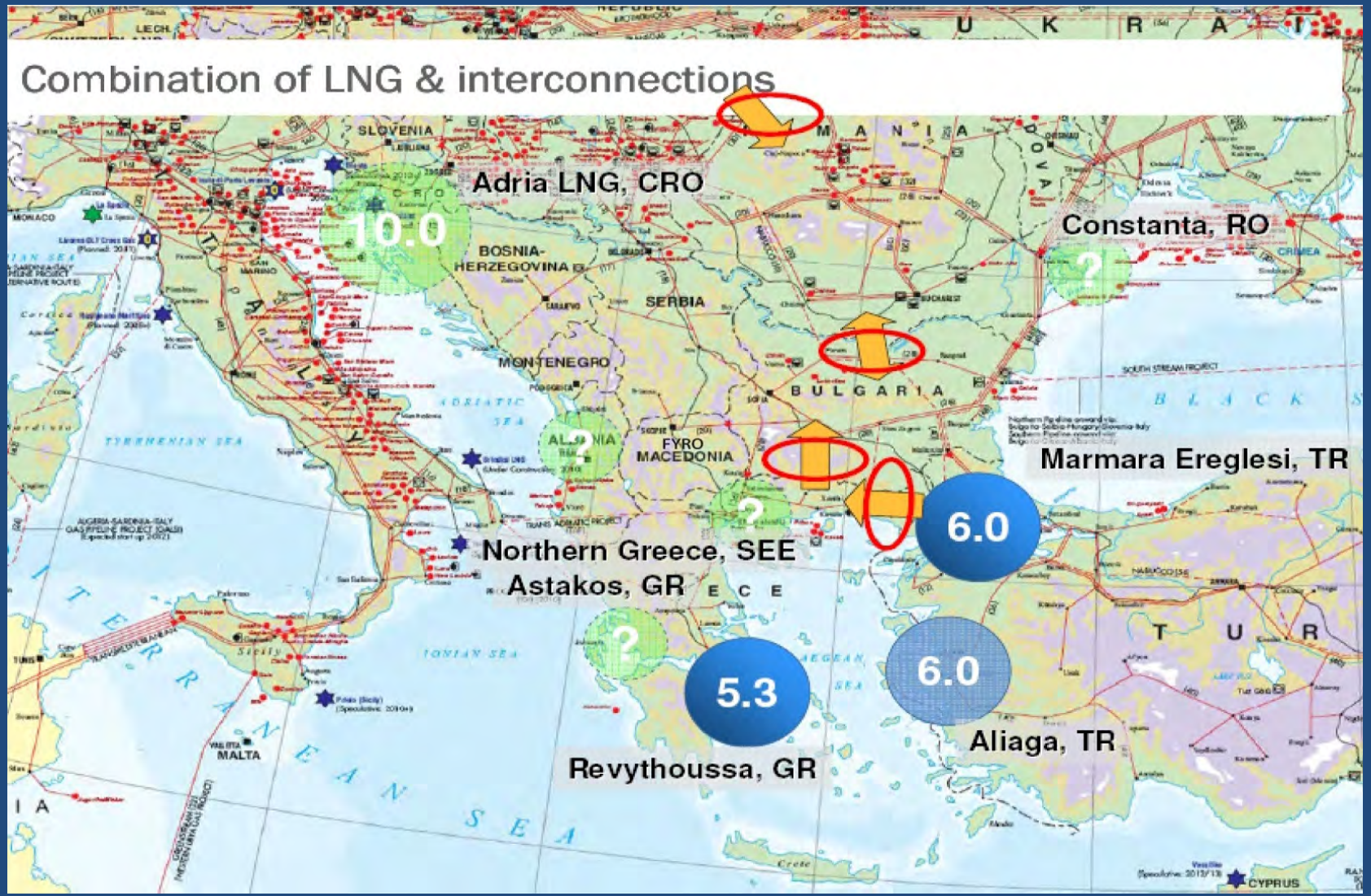
South Corridor Inter-Regional Pipeline Projects

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

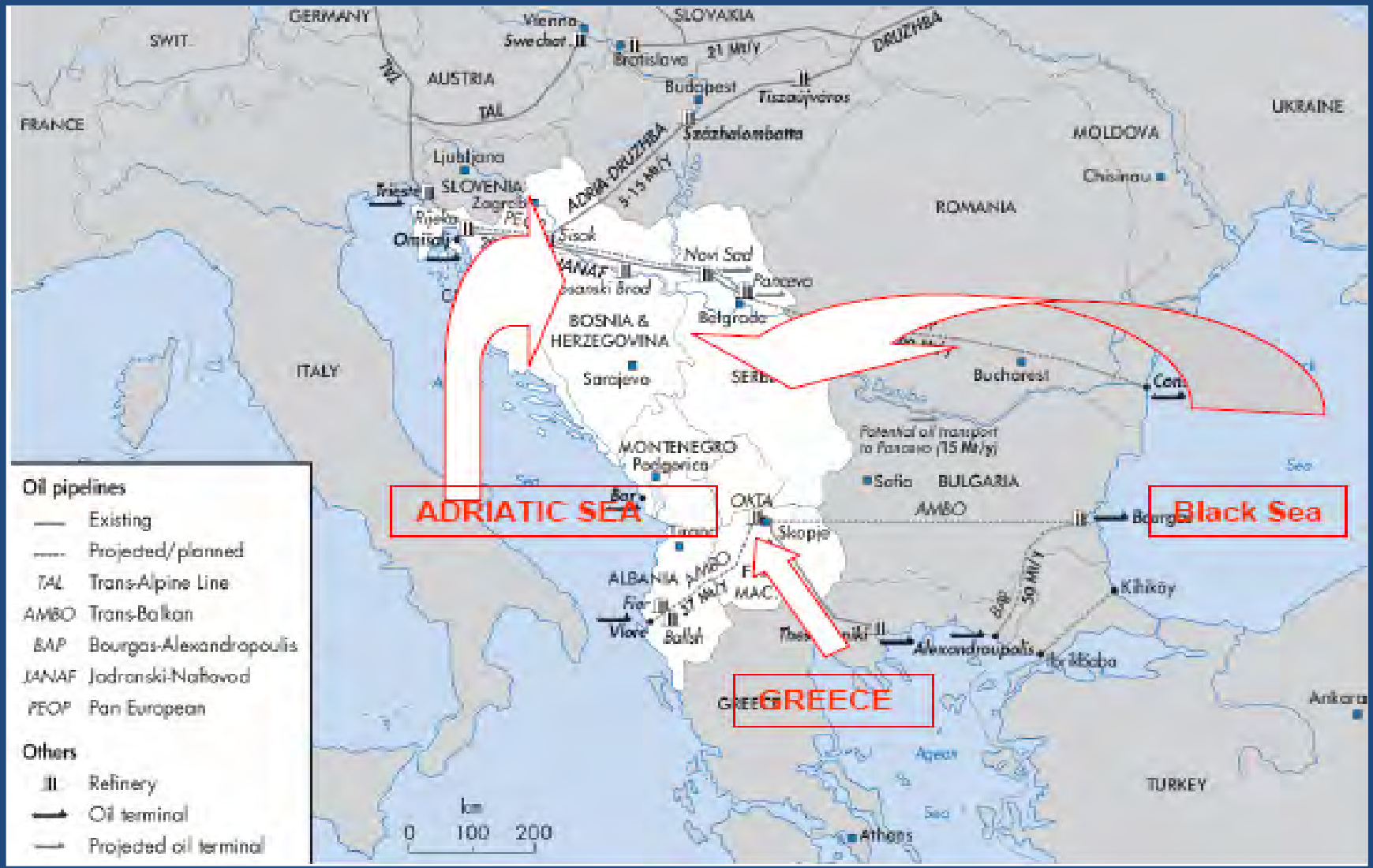


The ITGI and Gas Interconnectors in SE Europe

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

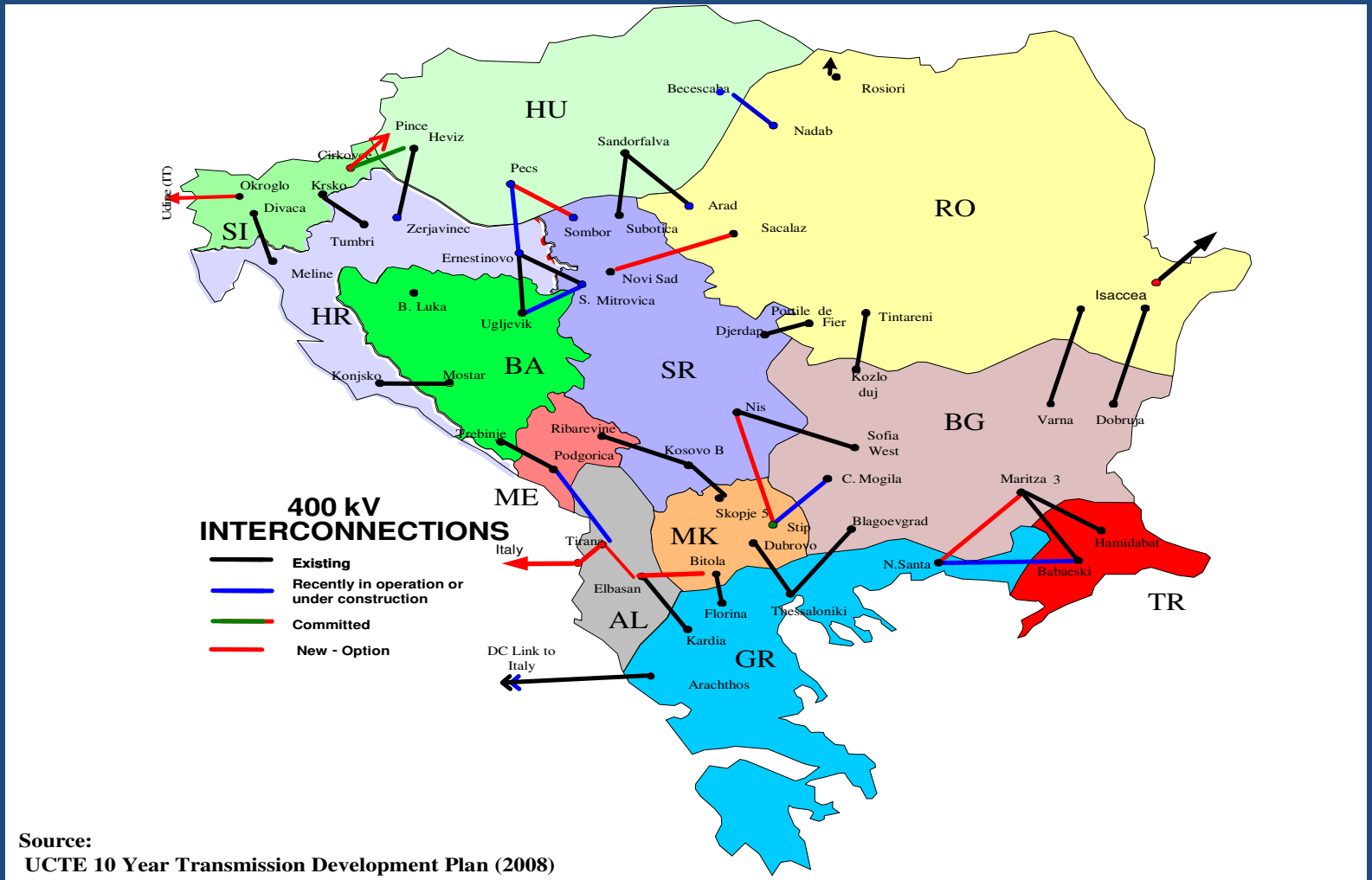


Energy Community Map

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, Creece, 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**

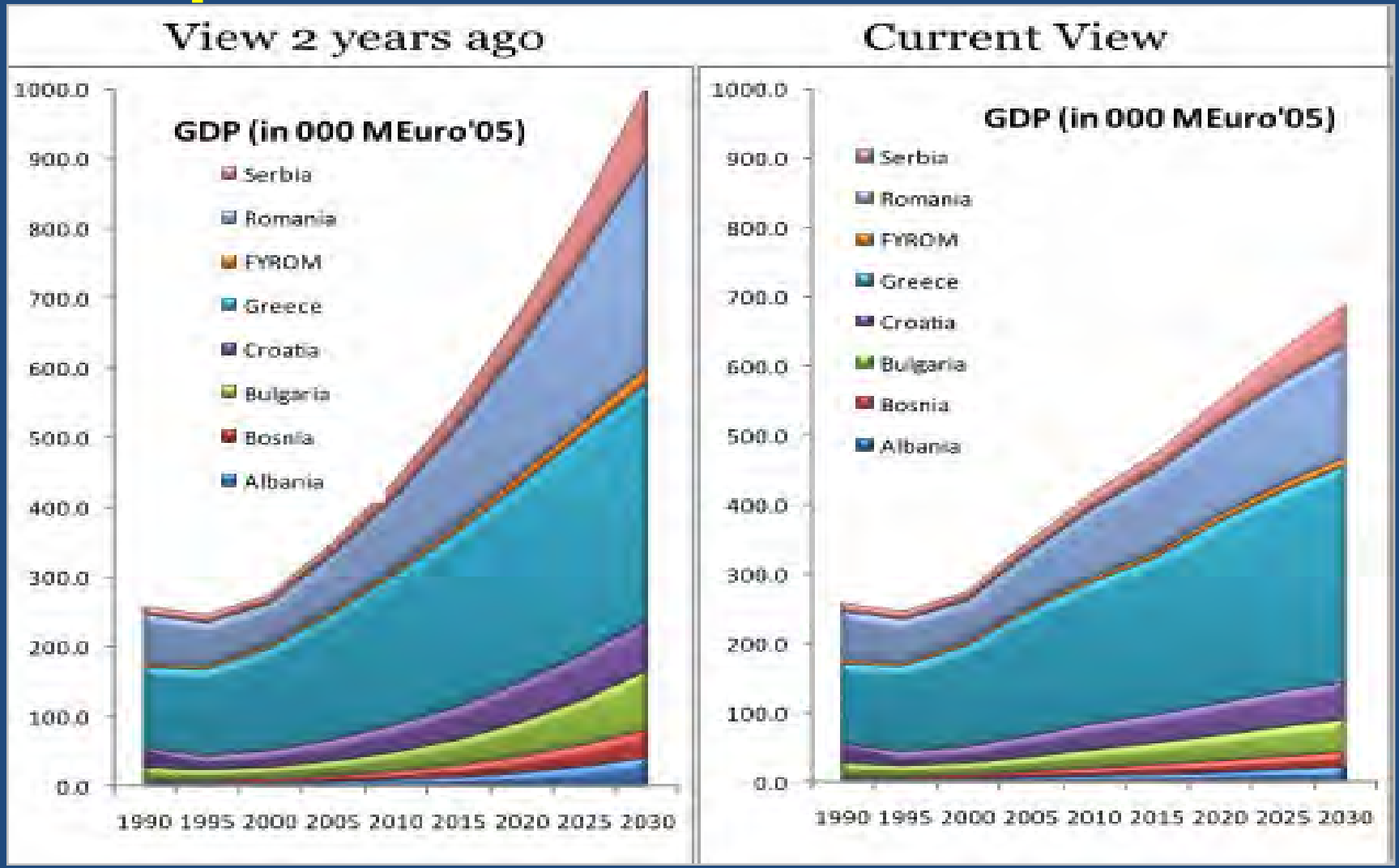
Renewable Energy Sources in SE Europe

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%

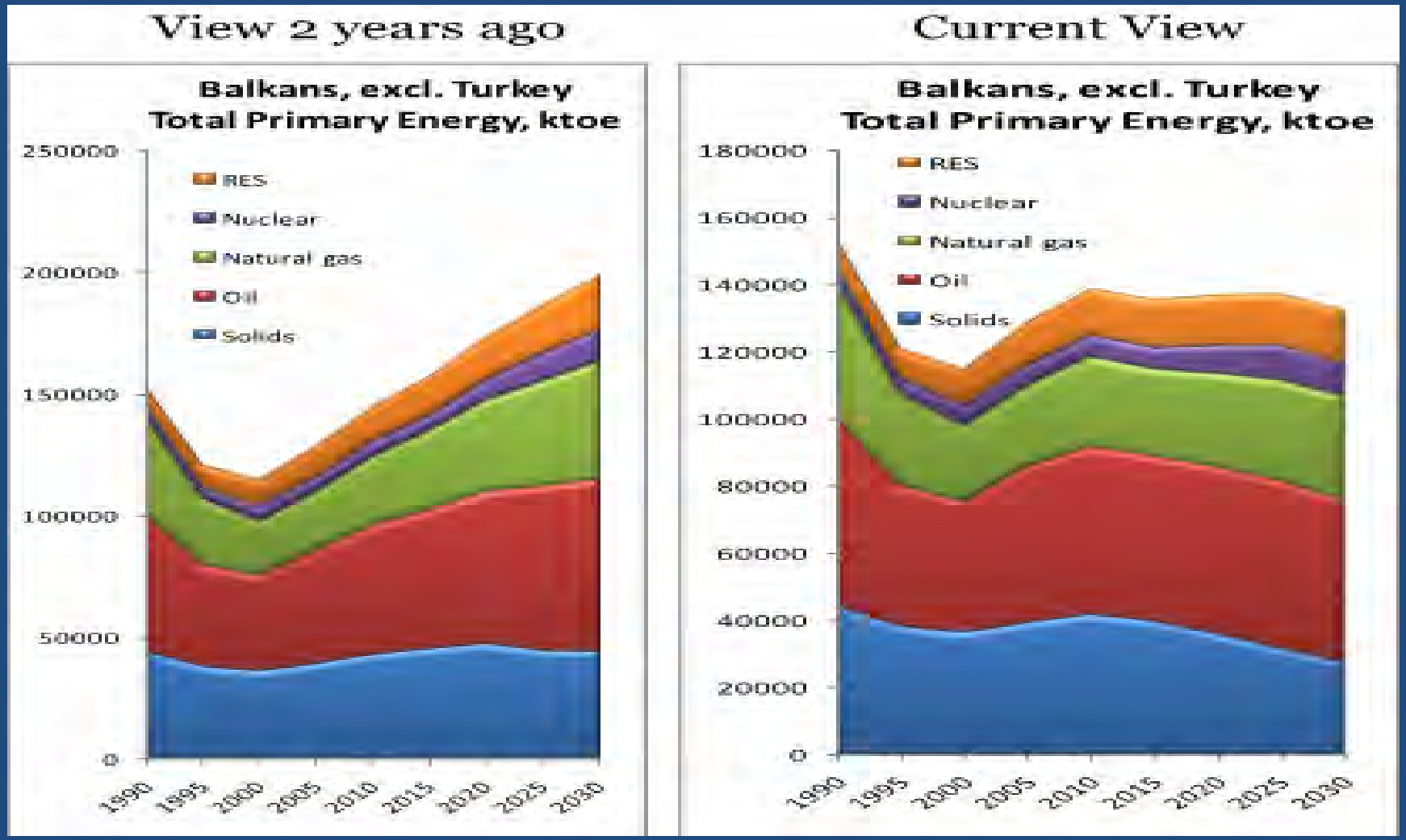
Source: EC3 Lab, NTUA

Macroeconomic Projections for S.E. Europe



Source: EC3 Lab, NTUA

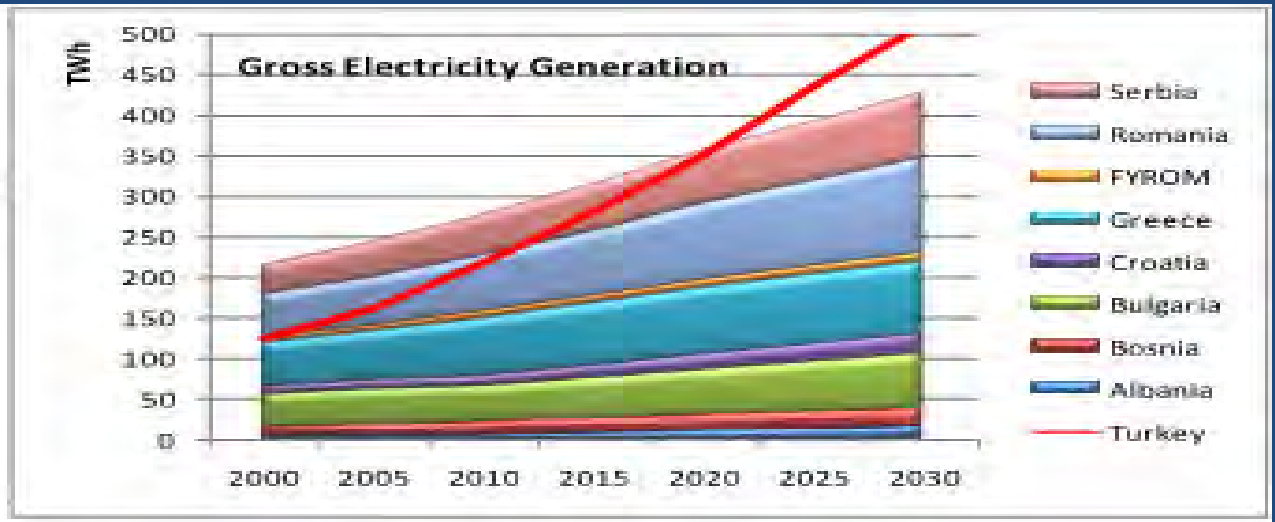
Primary Energy Consumption 1990-2030



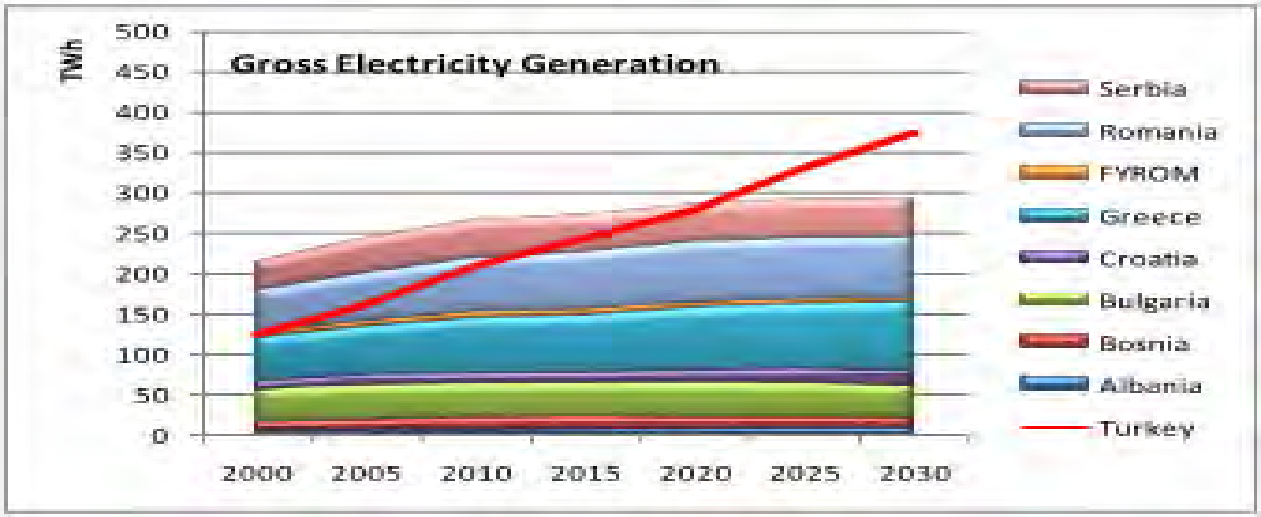
Source: EC3 Lab, NTUA

Electricity Generation in SE Europe (2000-2030)

View 2 years ago



Current View



Source: EC3 Lab, NTUA

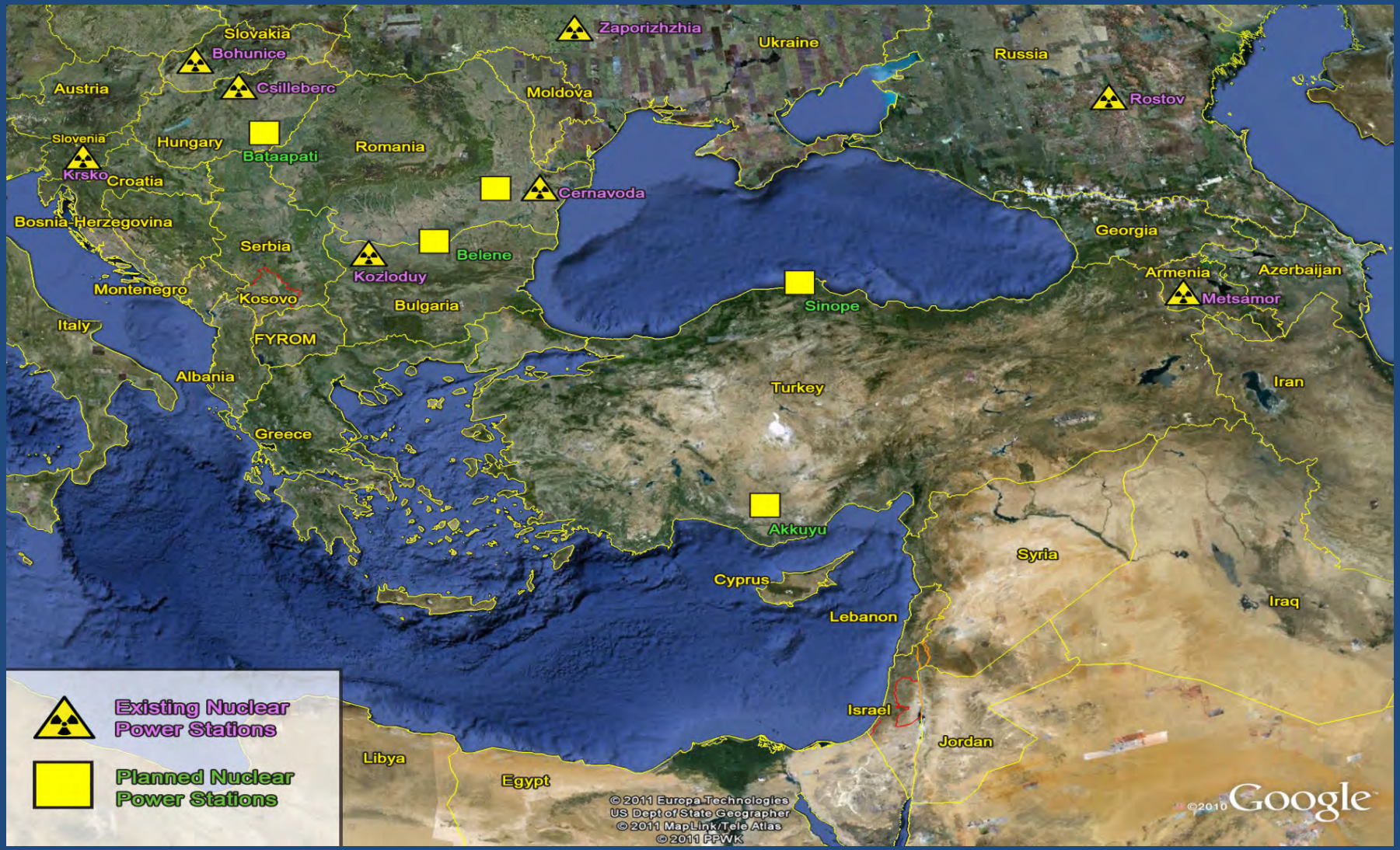
SE Europe Capacity Mix 2020,2030*

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 (±10%)

Total Energy Infrastructure Investments per Country

	(in million Euros)
✓ **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 *(Research, Exploration and Production)*	*33,820*
Oil Downstream/Midstream *(incl. liquid biofuels)*	*23,100*
Electricity ▪ Thermal Plants ▪ Nuclear Plants ▪ Lignite Mine Development ▪ Grids - Upgrade and Expansion *(incl. metering systems)* ▪ HV Transmission Lines	*89,692*
Gas ▪ Main and branch gas pipelines ▪ Gas Storage ▪ LNG Terminals and Liquefaction plants ▪ Town grids	*24,955*
RES *(Wind, PV, Biomass, Mini Hydro, Geothermal)*	*47,633*
Intraregional Mega Projects ▪ 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

Study Sponsors & Supporters

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Thank you for

your attention

and for your for patience!