

Redefining SE Europe's Energy Map

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INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE



The South East Region Defined



SE Europe Basic Economic & Energy Parameters (2009)



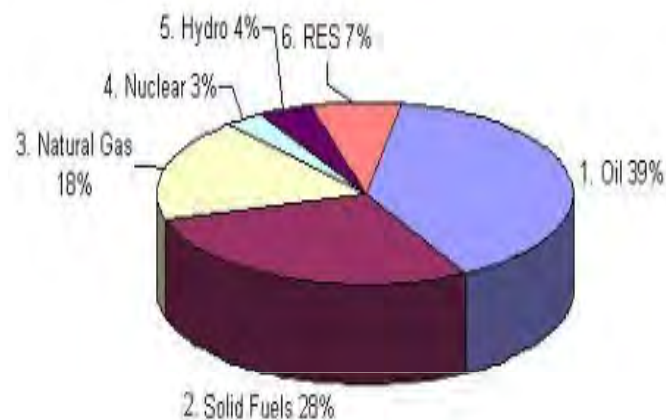
■ Population	137.02 million
■ GDP	1.585.6 USD billion
■ Installed Electricity Capacity	110.926 MW
■ Oil Consumption	1.759.050 bbl/day
■ Oil Production	168.650 bbl/day
■ Gas Consumption	69.95 BCMs
■ Gas Production	14.84 BCMs



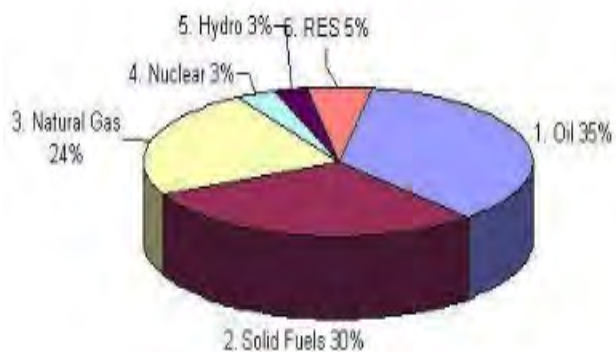
SE Europe Basic Economic & Energy Information (2009)

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

Total Primary Energy Consumption in SE Europe



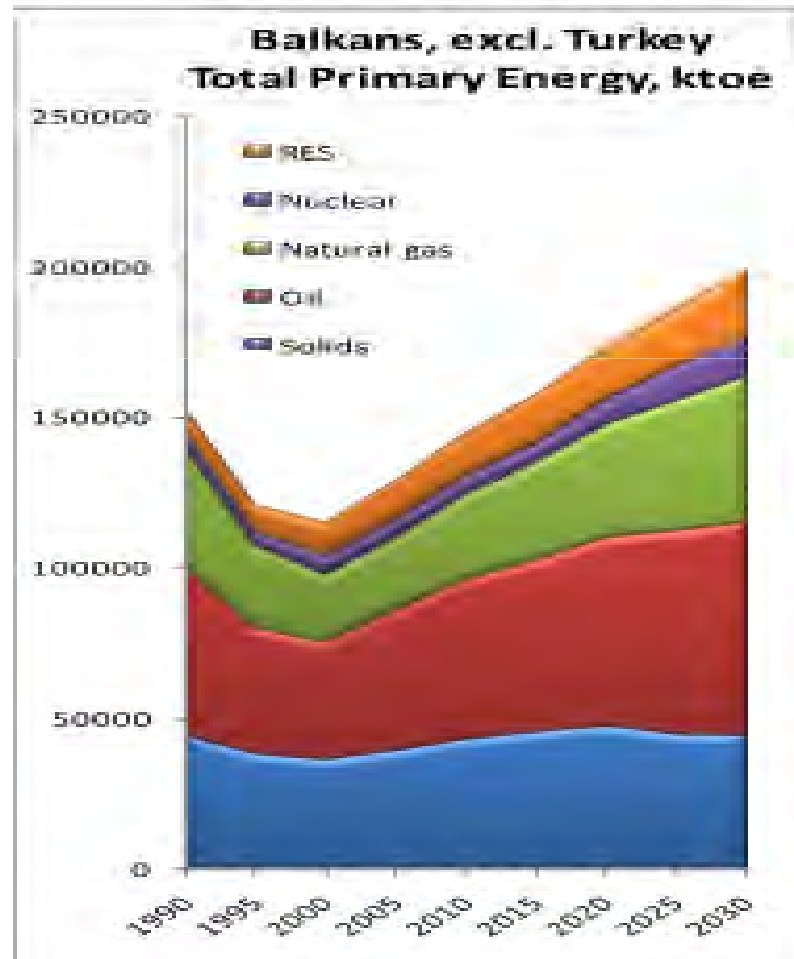
Total Primary Energy consumption shares in SE Europe (2000)
180.469,00 mtoe



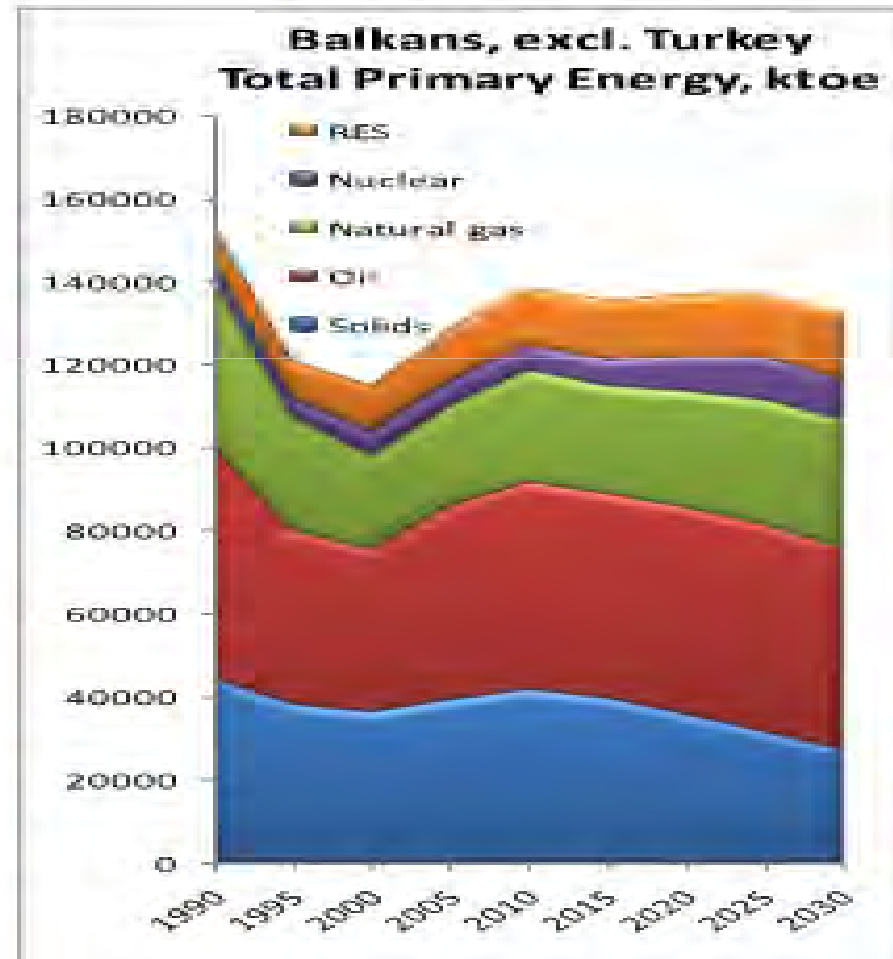
Total Primary Energy consumption shares in SE Europe (2009)
225.386,00 mtoe

Primary Energy Consumption 1990-2030

View 2 years ago (2008)



Current View (2010)

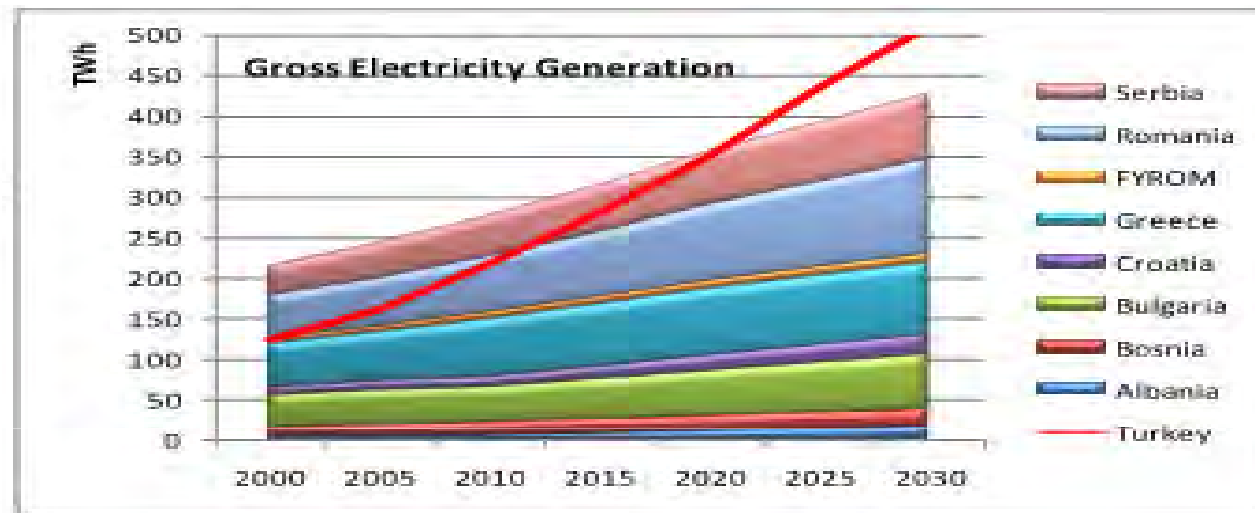


Source: EC3 Lab, NTUA

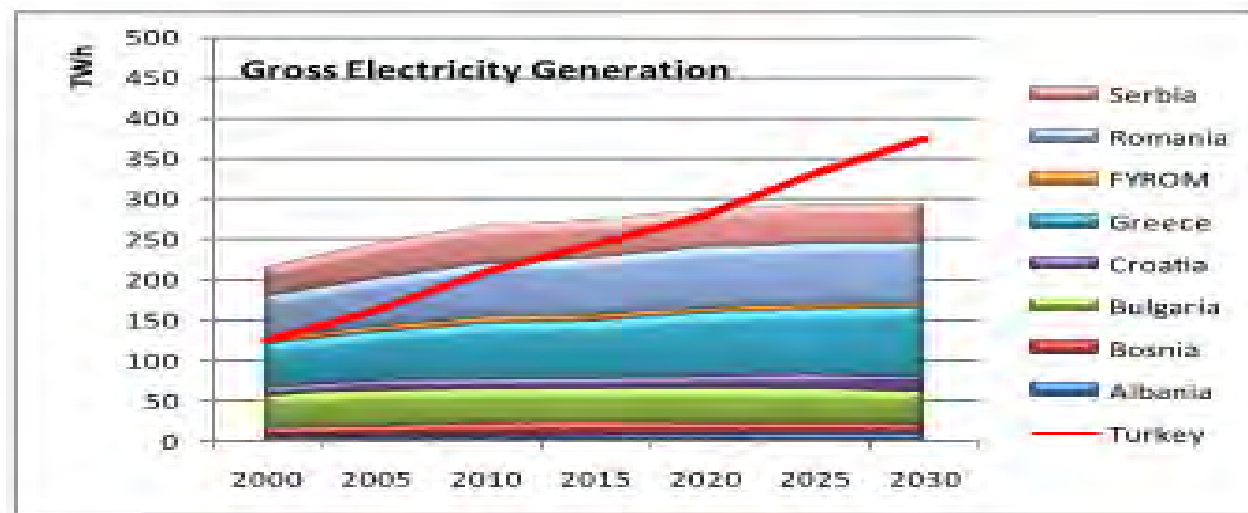
Electricity Generation in SE Europe (2000-2030)



View
2 years ago
(2008)



Current
View
(2010)



Source: EC3 Lab, NTUA



SE Europe Capacity Mix 2009,2020

Installed Capacity in GW

	2009	2020 (IENE estimate)	Additional Capacity (GW)
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



Redefining SE Europe's Energy Map

- A number of significant developments in terms of policy and infrastructure are currently taking place in SE Europe which when completed, by the end of this decade, will have helped reshape the energy landscape of the region.
- These developments concern both “market operation” and “energy production/ transmission” capabilities.
- There appears to be some important policy implications



I. Market Operation

- Integration of the electricity market and its full liberalization are goals which can and should be achieved by 2020
- In electricity although a de jure liberalization exists in almost all countries a de facto market opening is not in evidence
- In electricity market the ultimate goals remain:
 - (i) The removal of regulated electricity prices
 - (ii) The substantial easing of network congestion
 - (iii) Barrier free cross border exchanges of energy
- In gas, substantial investments are required in transmission and storage infrastructure in order to improve market liquidity
- Investment in infrastructure is key to achieving market competition for both electricity and gas
- Development of freely accessible energy trading/ auctioning platforms is necessary in order to enhance market competition



II. Energy Infrastructure

- The realization of a number of key energy infrastructure projects is of vital importance and will lead to the transformation of the region's energy landscape. These include:
 1. Gas interconnectors (IGI, IGB, Turkey – Bulgaria, Bulgaria – Romania etc)
 2. Extended electricity grid interconnections between all countries of the region
 3. Construction of the Trans – Anadolou gas pipeline
 4. South Corridor Pipelines (TAP, SEEP – Nabucco West, South Stream)
 5. Introduction of nuclear power in Turkey
 6. Large scale exploration of Romanian gas deposits and broader Black Sea hydrocarbon development in the Black Sea.



Energy Infrastructure

7. Exploitation of large Natural Gas deposits in the Israel – Cyprus axis
8. Increase of indigenous oil and gas production by almost all countries of the region
9. Addition of significant new and upgraded refining capacity in Greece, Turkey and Bulgaria
10. Construction of underwater electricity transmission cables (i.e. Israel – Cyprus, Greece, Greece – Italy, Aegean islands – Greek mainland, Turkey – Cyprus)
11. Addition of significant new coal/lignite power generation capacity in whole region
12. Large scale RES utilization (i.e. PV in Greece and Bulgaria, Wind in Greece, Romania, Turkey and Hydro in Albania, Montenegro, Croatia etc)

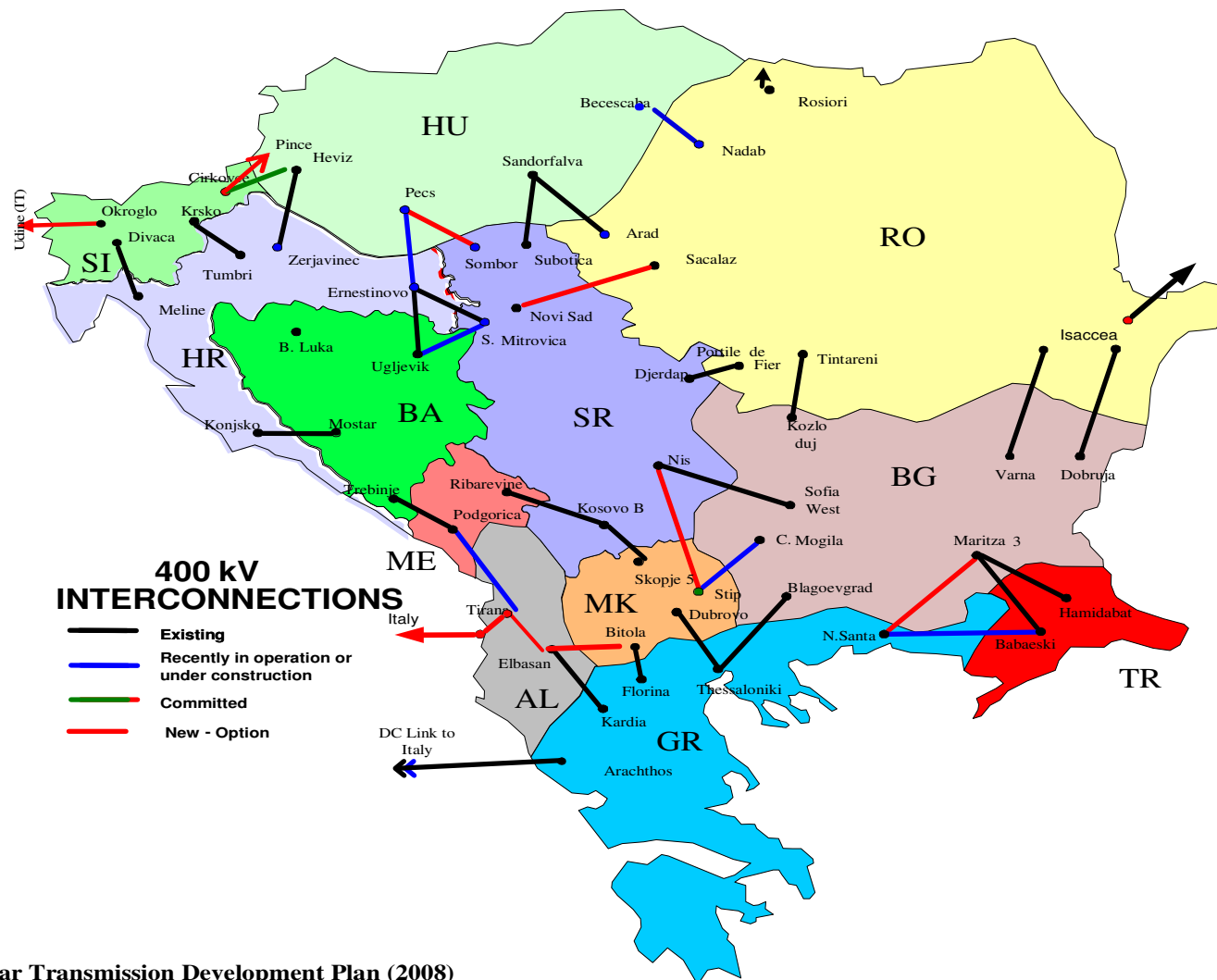
Substantial new Electricity Infrastructure is Foreseen in SE Europe by 2020 for all 12 Countries of the Region

- ❖ **Anticipated new power generating capacity:**
 - Thermal/ nuclear (excl. Turkey) ~ 20.0 GW
 - Renewables Low scenario ~ 15.0 GW
 High scenario ~ 25.0 GW

- ❖ **Anticipated investments in:**
 - Thermal/ Nuclear plants, lignite/ coal mine development, electricity grids, HV Transmission lines ~90.0 Billion Euros
 - RES (Solar Thermal, Solar PV, Wind, Biomass, Geothermal, Min Hydro) ~35 – 50 Billion Euros



Electricity Interconnections in SE Europe



Source:
UCTE 10 Year Transmission Development Plan (2008)

Turkey' Nuclear Plans Are Advancing

- Sinop station – 5.000 MW by 2023
- Akkuyu station - 4.800 MW by 2025 (?)



Cyprus – Israel Natural Gas Deposits

□ Major New Natural Gas Discoveries:

- Cyprus, Block 12
Gross mean estimate: 7.0 – 9.0 TCF
- Israel, Tamar deposit ~ 9.0 TCF
- Israel, Dalit deposit ~ 3.0 TCF
- Israel, Leviathan deposit ~ 15.0 TCF
- 2nd Cyprus Round just completed





Romania - Black Sea

- New major offshore gas finds promise significant production opportunities
- Ana, Doina and Domino fields are vital for opening up Black Sea exploration in Romania sector
- Estimates for 600 Bcm offshore natural gas resource base
- Anticipated capital investment of \$ 30.0 billion over next 15 years



Ana and Doina Development

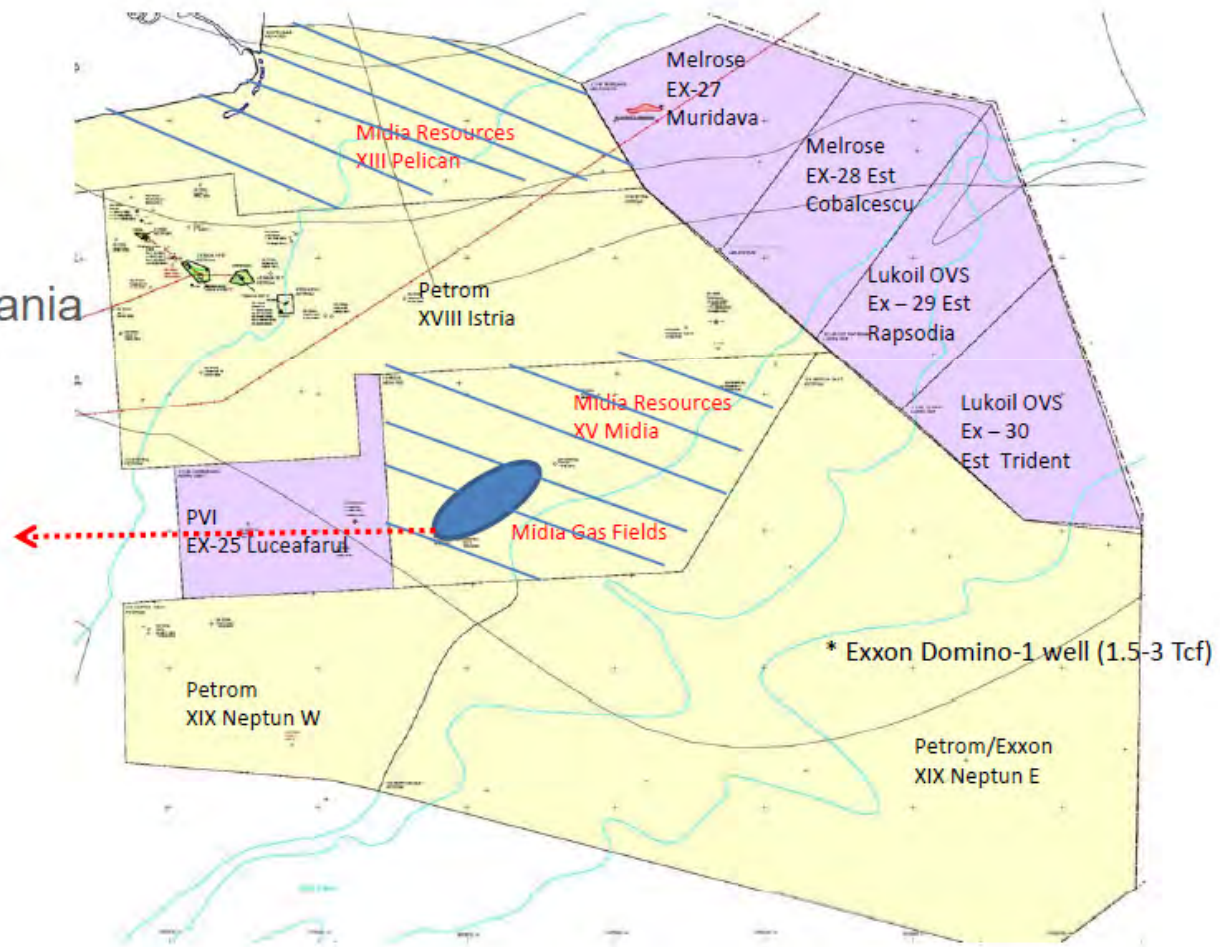


Ana and Doina are the next (and currently only) fields to be developed offshore Romania

Strategic Location of Ana and Doina

Ana and Doina are vital for opening up the Black Sea in Romania for other producers

Proposed Export route to shore





Major Oil Refining Projects under Development in SE Europe (2010-2020)

New refining capacity, revamping, upgrades and expansion, including addition of new storage capacity, oil terminals and crude/ product pipelines and biofuel plants

- Greece, Cyprus, Turkey, Bulgaria and Romania - 19.0 Billion Euros
- Albania, FYROM, Montenegro, Bosnia - Herzegovina, Croatia and Serbia - 4.0 Billion Euros





South Corridor Gas Pipelines

- ❖ Trans – Anadolou
- ❖ ITGI – IGB
- ❖ TAP
- ❖ SEEP – West Nabucco
- ❖ South Stream



South Corridor Gas Pipeline Projects



Some Latest Important Developments



Renewable Energy Sources

- Step rise in RES installed capacity over last 3 years
- Solar PV in Greece and Bulgaria ~ 900 MW of total installed capacity (May 2012)
- Wind in Greece, Bulgaria, Romania, Turkey ~ 5.200 MW of total installed capacity (May 2012)
- Small Hydro – Albania, Montenegro, Croatia, Serbia, Romania, Greece, Turkey, Bosnia – Herzegovina ~1700 MW



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



	<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 in SE Europe



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

III. Energy Policy Implications

(a) Energy Policy in SE Europe is dominated by EU decisions



- Energy policies in SE Europe and the Balkans are directly affected by decisions and policies taken at EU level
- Serious implications for Natural Gas, RES and Energy Efficiency
- Policies and decisions affect targets and infrastructure investment
- The 20-20-20 policy is already affecting RES penetration, grid interconnections and energy efficiency

(b) The EU Angle: Impact of EU decisions on the region.



- EU decisions and Directives will have an impact on SE Europe Energy developments corresponding to certain key dates in 2014, 2015, 2020 and will affect:
 - energy mix
 - energy strategy
 - energy infrastructure
 - energy demand

(c) 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



III. Key Strategic Energy Challenges

- Rising energy demand over the next 10 years but at a much slower pace than previously forecasted (i.e. before 2008)
- 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.
- Hence, need to increase indigenous oil and gas output and explore for new fields.



III. Key Strategic Energy Challenges

- 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.
- The construction of key inter-regional oil pipeline projects must be pursued (i.e. BAP, TAPCO)



III. Key Strategic Energy Challenges

- 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 Balkans and Turkey far ahead of Western Balkans in terms of actual investments and potential.



**Thank you for
your attention**
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