

INVESTMENT PROSPECTS IN THE GREEK ENERGY SECTOR

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INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE





Some Key Facts

- ❑ Greek Energy Sector corresponds to approx 4.0% the country's GNP
- ❑ Approximately 150,000 people are employed directly and indirectly in the sector : i.e. oil refining, oil marketing and bunkering, electricity production and distribution, electrical equipment manufacturing, natural gas marketing and installation, RES production and related manufacturing and installation and energy efficiency
- ❑ An oil dominated energy sector with 343 thousand barrels per day oil consumption (444 thousand in 2006)



Some Key Facts

- ❑ Oil imports exceeded 10.0 billion Euros in 2012 and 11.0 billion Euros in 2011
- ❑ Total installed electricity capacity ~ 12,000 MW (PPC) + 2700 MW (IPP's). These include lignite, natural gas and large hydro plants
- ❑ RES contributes only 5.0 % of primary energy production
- ❑ RES installed capacity ~ 4,200 MW (includes wind, PV, small hydro and biomass)
- ❑ Today, total installed electricity capacity in Greece exceeds 19,000MW

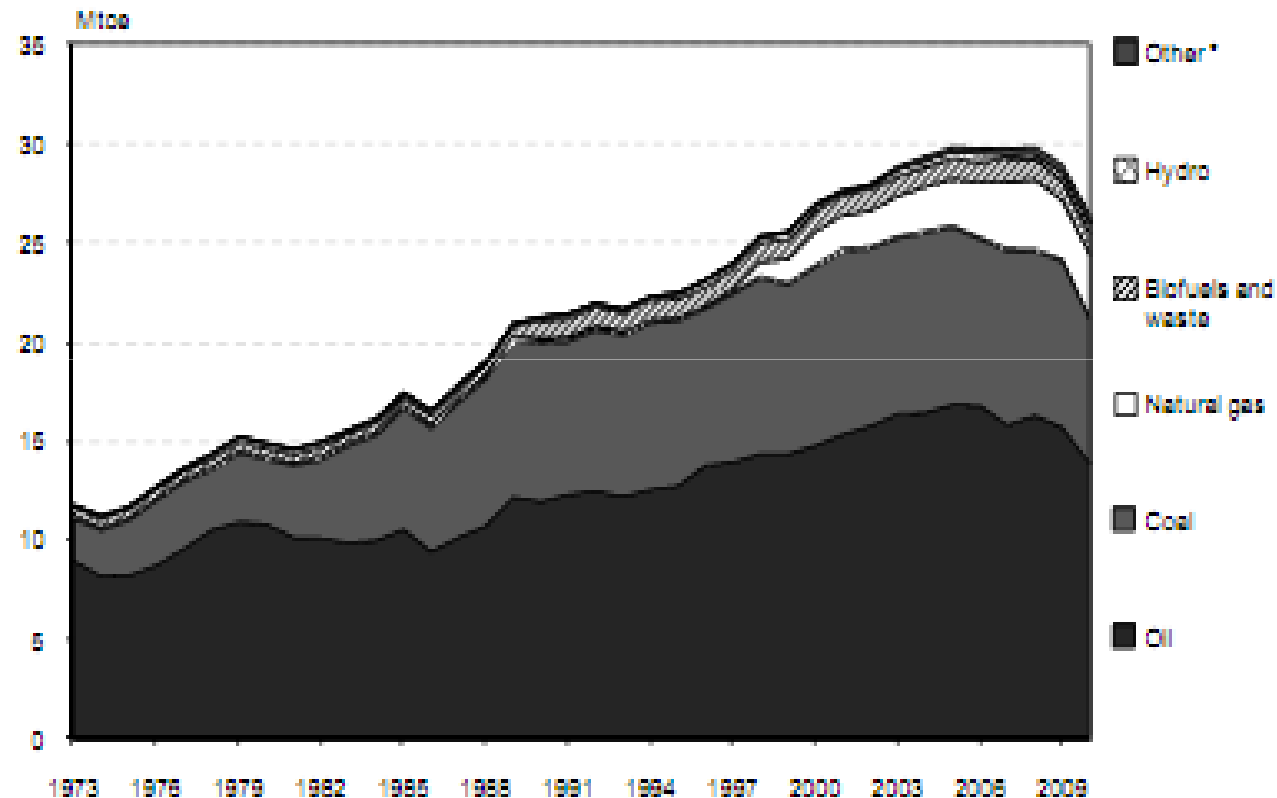
Greece's Energy Mix

Some Observations

- ❑ Oil still dominates energy use but at a diminishing rate. TPES declined from 77% in 1993 to 52% in 2010
- ❑ Lignite, is second largest energy source corresponding to 27% of TPES
- ❑ Natural gas, introduced in 1996 into the energy mix, corresponds to 12% of TPES
- ❑ Fossil fuels accounted to 91,0% of TPES, one of the highest shares in IEA countries
- ❑ Biofuels and waste account to 4% of TPES
- ❑ Hydropower (large and small plants), solar and wind account for only 5.0%

Basic Energy Facts on Greece

Total primary energy supply, 1973 to 2010



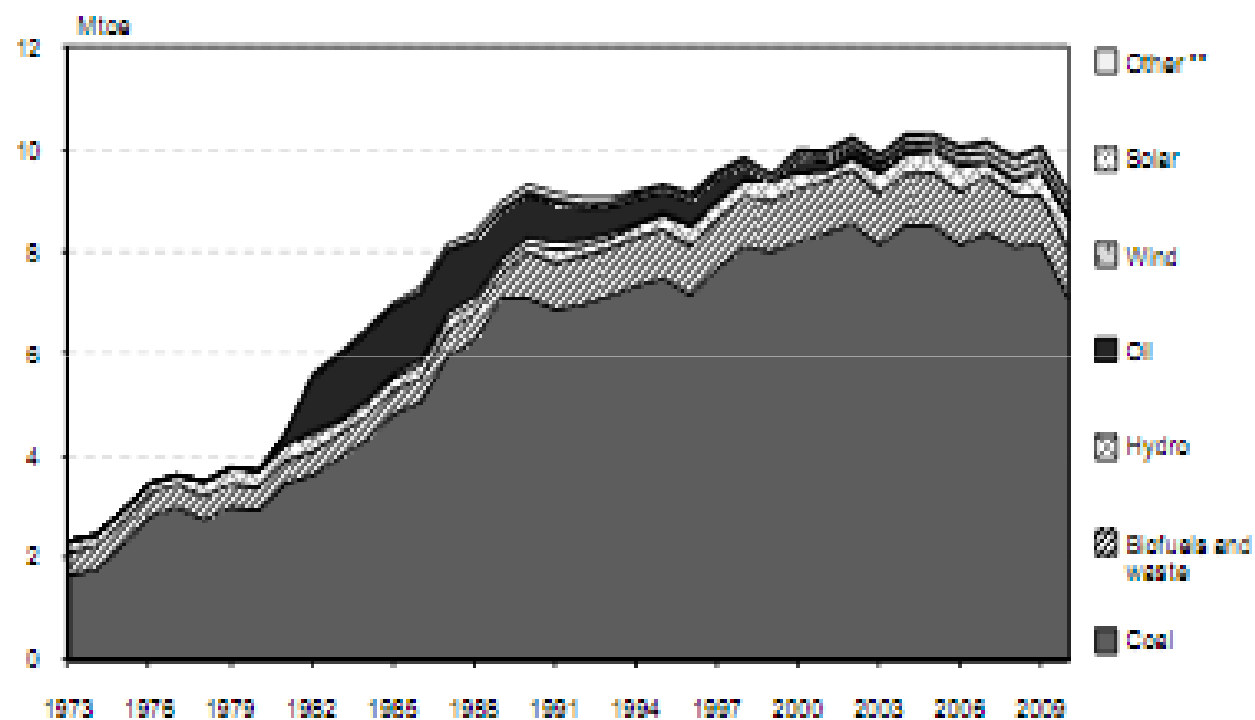
* Estimates for 2010.

** Other includes wind, solar, geothermal and ambient heat used in heat pumps.

Sources: *Energy Balances of OECD Countries*, IEA/OECD Paris, 2011.



Energy production by source, 1973 to 2010




* Estimates for 2010.

** Other includes natural gas, geothermal and ambient heat used in heat pumps (negligible).

Source: *Energy Balances of OECD Countries*, IEA/OECD Paris, 2011.

Energy Investment Outlook 2010-2020

- ❑ Out of 42.0 bl euro of anticipated investments some 5.0 bl euro have already been implemented (i.e. refineries, upstream, CCP, gas pipelines, RES)
- ❑ RES and electricity grids correspond to a significant portion of investment potential and is well defined
- ❑ Hydrocarbon upstream has considerable potential but ill defined government plans do not allow an accurate projection of investment potential

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- The further penetration of natural gas may hold some pleasant surprises as natural gas use gains momentum
 - Energy efficiency, focusing on buildings and commercial enterprises, is still difficult to estimate but based in 2010-2011 experience, linked to EU related programmes, lead to estimates of approx 4.0-8.0 bl investments over next 8 years



Oil Refining and Oil Storage

- A total of 2.8 bill Euro of investments are being implemented in refinery upgrade and expansion and new oil storage capacity



Oil & Gas Upstream

- Greece currently produces 2.000 bb/d
- However, more than 80% of Greece remains unexplored
- There is a small number of proven oil and gas deposits
- Non exclusive seismic surveys were completed in West Greece and South of Crete (2013)
- Open Door procedure in progress for exploration of 3 deposits in West Greece.



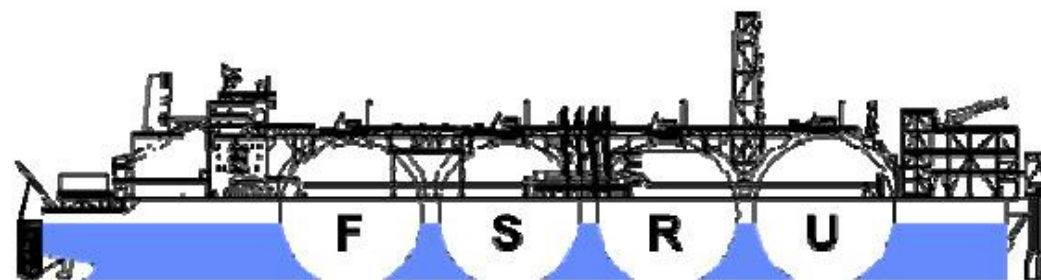
Natural Gas

- Current consumption ~ 4.0 BCM but outlook for 8.0 BCM by 2020
- Investments necessary for new LNG/FSRU terminal (s), trunk pipelines, expansion of existing Revithousa LNG terminal
- International interconnections and additional town distribution grids are being planned



ALEXANDROUPOLIS LNG INGS - A NEW ENERGY GATEWAY TO EUROPE





The Aegean LNG / IGB System



The Aegean LNG project will be located in Northern Greece

In conjunction with IGB provides opportunity to reach the growing SE European energy market offering possibilities for diversification of natural gas sources and further penetration of LNG in the area.



The Greece-Bulgaria Interconnector (IGB)

IGB acts as a gateway to SEE through Greece, creating synergies with smaller interconnectors in the region (eg. BG-RO), allowing access to the evolving SEE energy market .

- Capacity 3-5 bcma
- Construction to start within 2013
- The duration of construction / commissioning scheduled to last for 18 months.

IGB has a wider regional importance (ranked first among EU Projects of Common Interest (PCI))

First gas is expected to flow
in 2015.





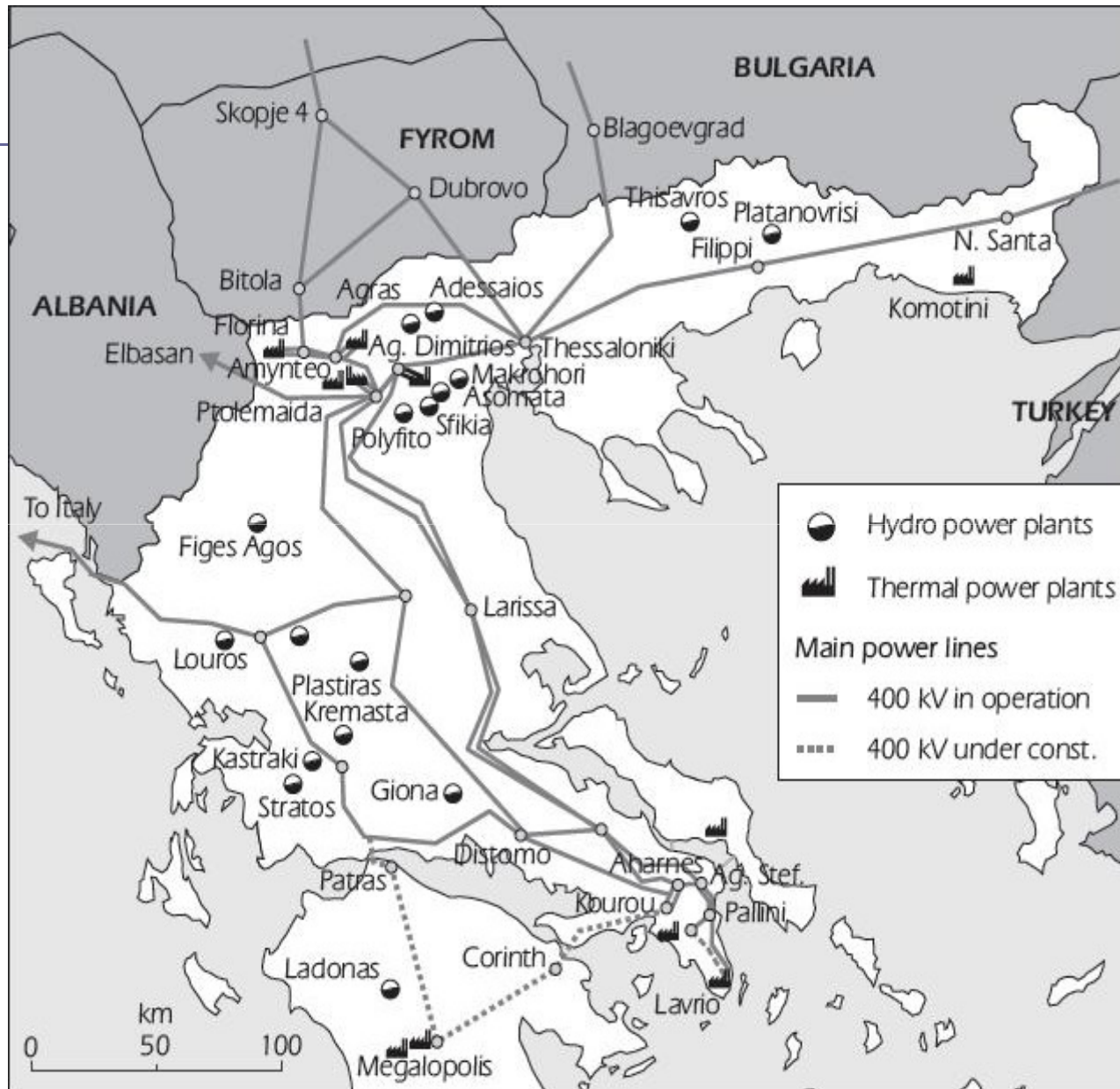
Power Generation Plants

- Approx. 5.000 MW of new capacity is foreseen for both lignite and Natural gas fired plants and cogeneration by 2020.



Wind

- 1.800 MW of wind installations so far but prospects for 6.000 MW by 2020 appear realistic
- Considerable investment necessary in new electricity grids and island interconnections.





Photovoltaics

Some 2.155MW of photovoltaic capacity already installed with prospects for 4.000 MW by 2020

Anticipated Energy Investments in Greece 2010 – 2020*



Sector	Installed Capacity	Investments (in billion Euros)
Electricity Thermal Plants (CCP, Lignite & Lignite field development)	5.000 MW	4.0
RES Wind + Solar	Wind = 7.000 MW Thermal & P/V = 4.000 MW	15.0
RES Small & Large Hydro Biomass, Waste, Geothermal	Small & Large Hydro = 1.200 MW Other = 800 MW	2.0
Hydrocarbon Exploration and Production	Target for 100,000 – 150,000 bb/d	5.0
Oil Midstream and Downstream	Refinery upgrades, and new oil storage facilities	2.8
Uranium Production	-	0.6
Electricity Grids	Upgrade and Expansion	7.7
N. Gas: Main Gas Pipelines & City Networks (EPA)	2.000 Kms	3.5
LNG Terminals and Gas Storage	Revithousa upgrade, FSRU and S. Kavala Gas Storage	1.4
Total Anticipated Investments		42.0

* (IENE estimates, May 2012)



Anticipated Total Energy Infrastructure Investment Per Sector in SE Europe (May 2011)

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



**Thank you for
your attention**