

INVESTMENT PROSPECTS IN THE GREEK ENERGY SECTOR

5th Arab-Hellenic Economic Forum 2016

Athens, November 29-30, 2016

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INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE



Investment Opportunities in Greece's Energy Sector (I)

- As Greece is slowly coming out from the worst recession in its history the **energy sector is expected to play a key role in supporting a return to economic growth.**
- Apart from **providing much needed infrastructure for the use of different forms of energy** (i.e. oil, gas, RES, electricity, energy efficiency and CHP), the energy sector can **attract much needed investment for new projects**, but also for **marketing activities** following electricity and gas market deregulation and rising competition.
- The ongoing privatization programme of major state controlled enterprises in electricity and gas is attracting **investor interest** if we are to judge from the recent sale of 24% stake of the Electricity Grid Operator (ADMIE) to China's State Grid for €320 million.
- Furthermore, Greece is pursuing efforts to **exploit its considerable hydrocarbon resources** by moving ahead with the award of new concession type exploration licenses and the calling of a new international round.

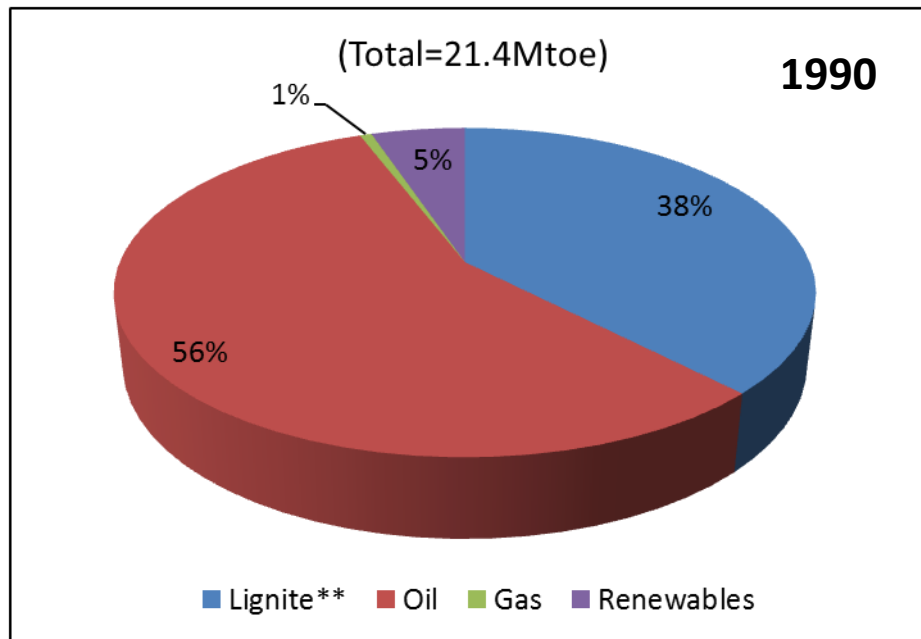
Investment Opportunities in Greece's Energy Sector (II)

- According to a latest analysis by IENE, a total of approx. **€20 billion of energy infrastructure projects** are to be implemented in Greece **from now until 2025**. These projects will cover:
 - the expansion and upgrading of the country's electricity grid focusing on much needed island-mainland interconnections,
 - the expansion of the gas transmission and distribution grid,
 - the construction of crucial gas interconnectors for electricity and LNG facilities,
 - the addition of new thermal power generation units and several Renewable Energy (RES) installations for electricity and heat generation (i.e. solar PV and solar thermal, wind farms, biomass, small hydro and geothermal).
- Further to the above energy related infrastructure business and investment opportunities are to be found in **Greece's fast changing electricity sector**. Thanks to EU's unbundling and liberalization policies this sector is now becoming more competitive with opportunities for **new entrants**.
- There are also considerable opportunities in the fast growing energy efficiency₃ business area.

Some Key Energy Facts in Greece

- ❑ The Greek energy sector corresponds to **approx. 5% of GDP**, compared to tourism's contribution of 7% to the country's GDP
- ❑ **Approximately 100,000 people are employed directly in the sector:** in 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 (IENE, 2014)
- ❑ An oil-dominated energy sector with **303 thousand barrels per day primary oil consumption in 2015** (444 thousand in 2006)
- ❑ **Oil production at 5 thousand barrels per day in 2015**

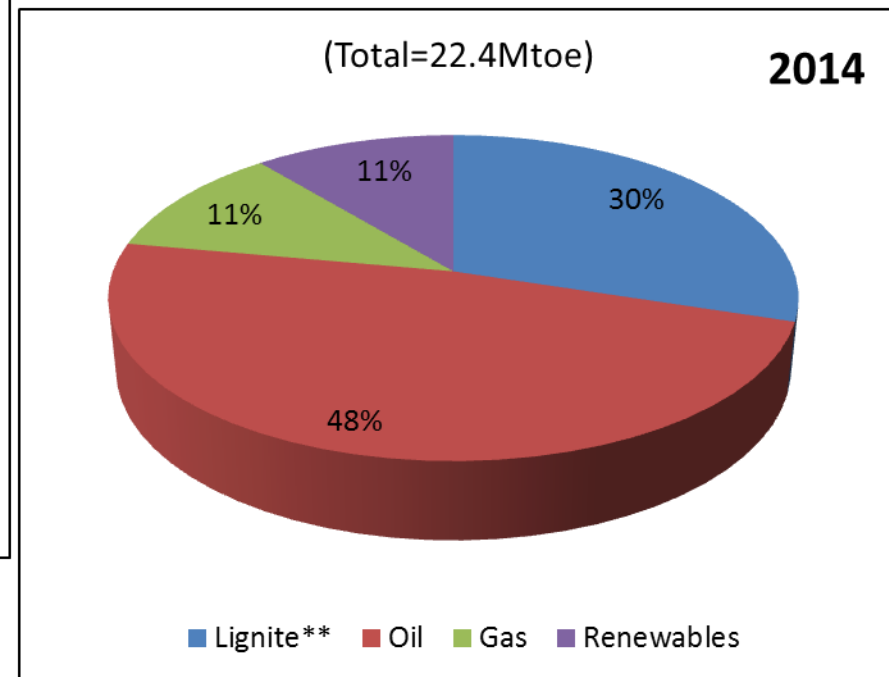
Total Primary Energy Supply* in Greece (1990 and 2014)



Notes:

*Excluding electricity trade

**Peat and oil shale are aggregated with lignite, when relevant

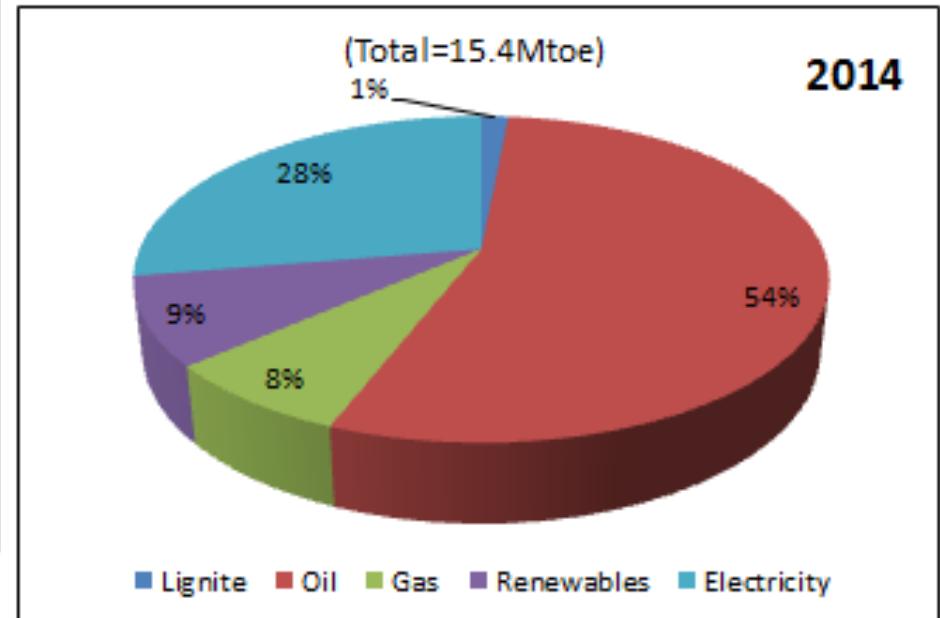
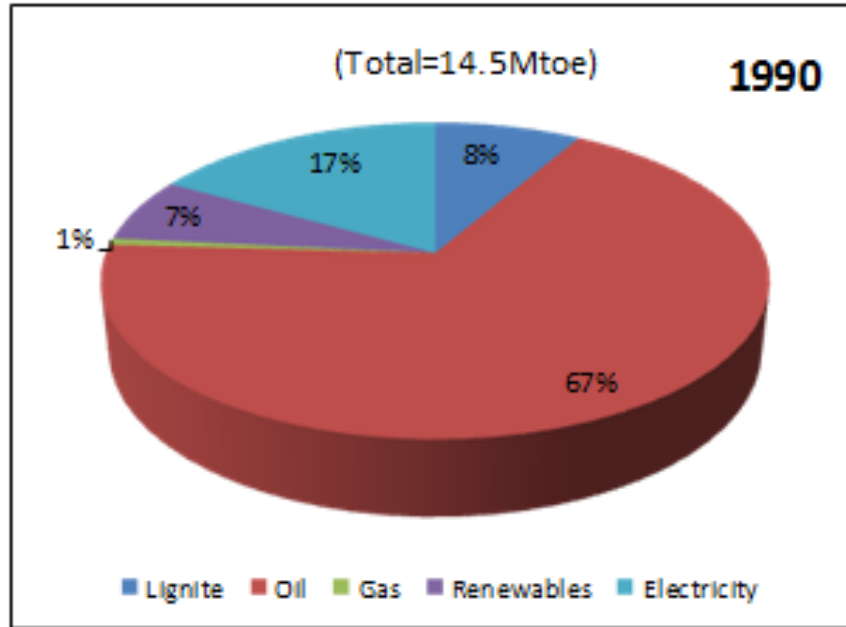


Notes:

*Excluding electricity trade

**Peat and oil shale are aggregated with lignite, when relevant

Total Final Consumption* in Greece (1990 and 2014)



Source: IEA

Greek Oil Market Fundamentals (2010-2015)

	2010	2011	2012	2013	2014	2015
Net oil imports- crude and products (in bill. €)	-8.60	-11.13	10.22	6.91	6.28	4.21
Refined oil product exports (in bill. €)	4.90	6.19	7.43	9.49	9.05	6.71
Total Oil imports (crude and products) (in bill. €)	13.50	17.31	17.65	16.40	15.33	10.92
Domestic consumption of oil products (in Mt per year)	9.40	8.55	7.40	6.12	6.20	6.56

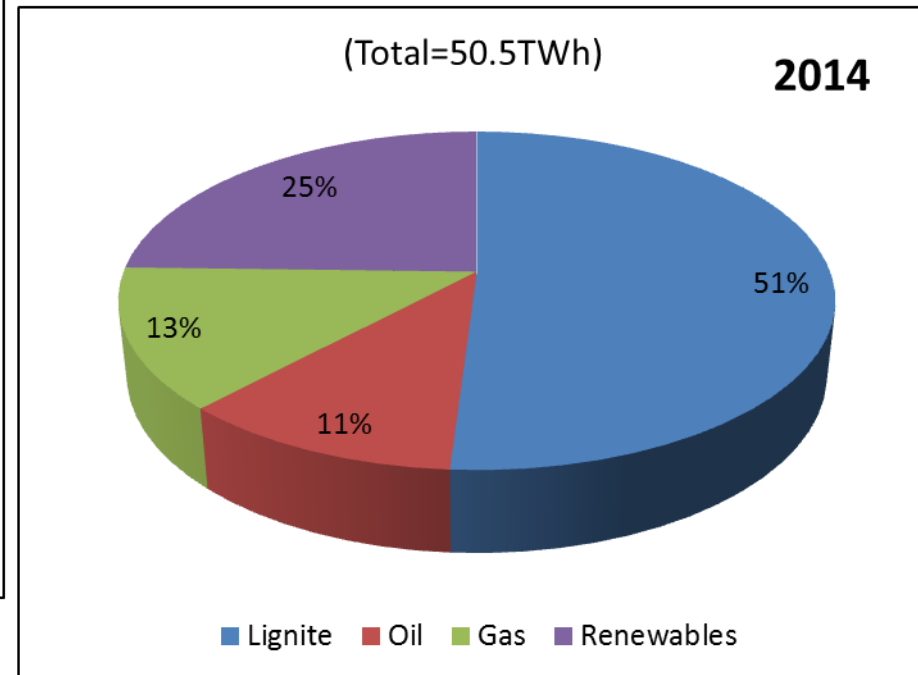
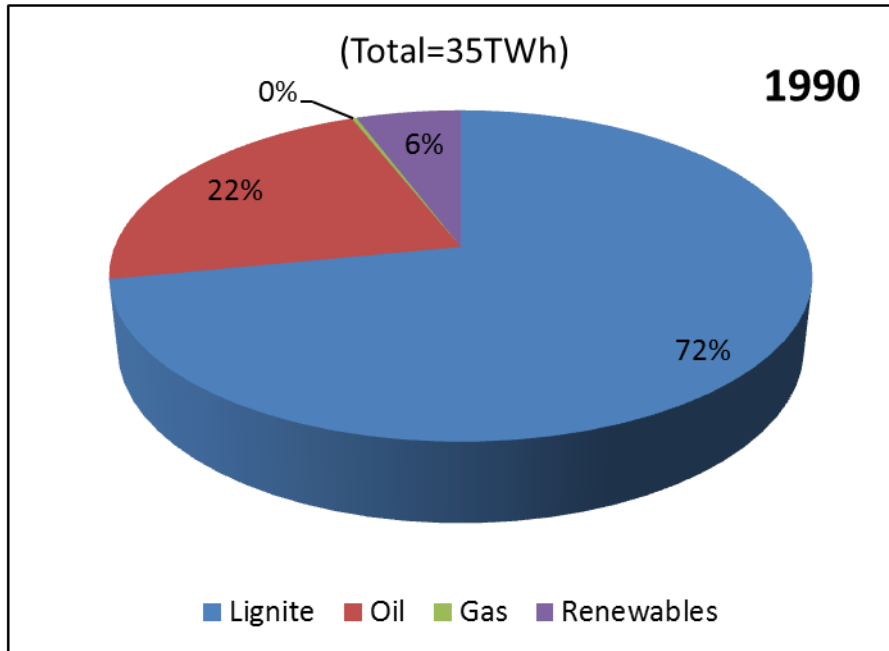
Sources: Bank of Greece, ELSTAT

Net and Total Oil Imports (Crude and Products) over 2010-2015



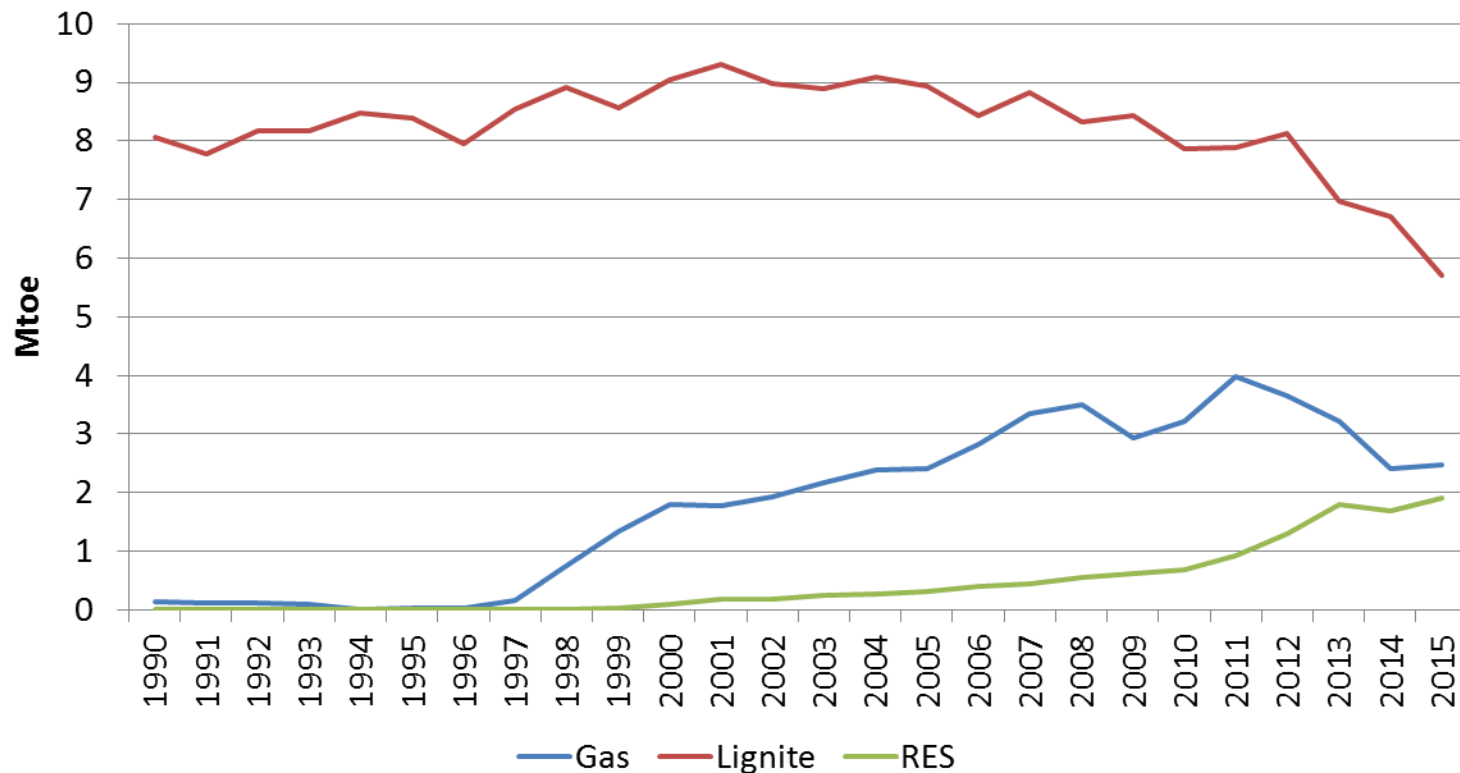
Sources: Bank of Greece, ELSTAT

Electricity Generation in Greece per Energy Source (1990 and 2014)



Source: IEA

Gas, Lignite and RES Consumption* in Greece over 1990-2015



*1 Excludes gas converted to liquid fuels but includes derivatives of coal as well as natural gas consumed in Gas-to-Liquids transformation

2 Based on gross generation from renewable sources including wind, geothermal, solar, biomass and waste, and not accounting for cross-border electricity supply. Converted on the basis of thermal equivalence assuming 38% conversion efficiency in a modern thermal power station.

Investing in Greece's Energy Sector (I)

- **Hydrocarbons**
 - Upstream, midstream, downstream

- **Natural Gas**
 - Gas trading (LNG, imports)
 - Gas transmission
 - Distribution and marketing
 - Small LNG (bunkering, regional markets)

- **Electricity**
 - Power generation
 - Electricity transmission and distribution
 - Retail market

Investing in Greece's Energy Sector (II)

☐ **Renewables**

- Solar thermal and PV, wind, biomass, geothermal, small hydro

☐ **Energy Efficiency**

- Energy performance of buildings
- Solar passive heating and cooling of buildings
- Solar water heaters
- Energy saving devices and automation
- Energy audits for buildings and businesses

Oil Refining and Storage



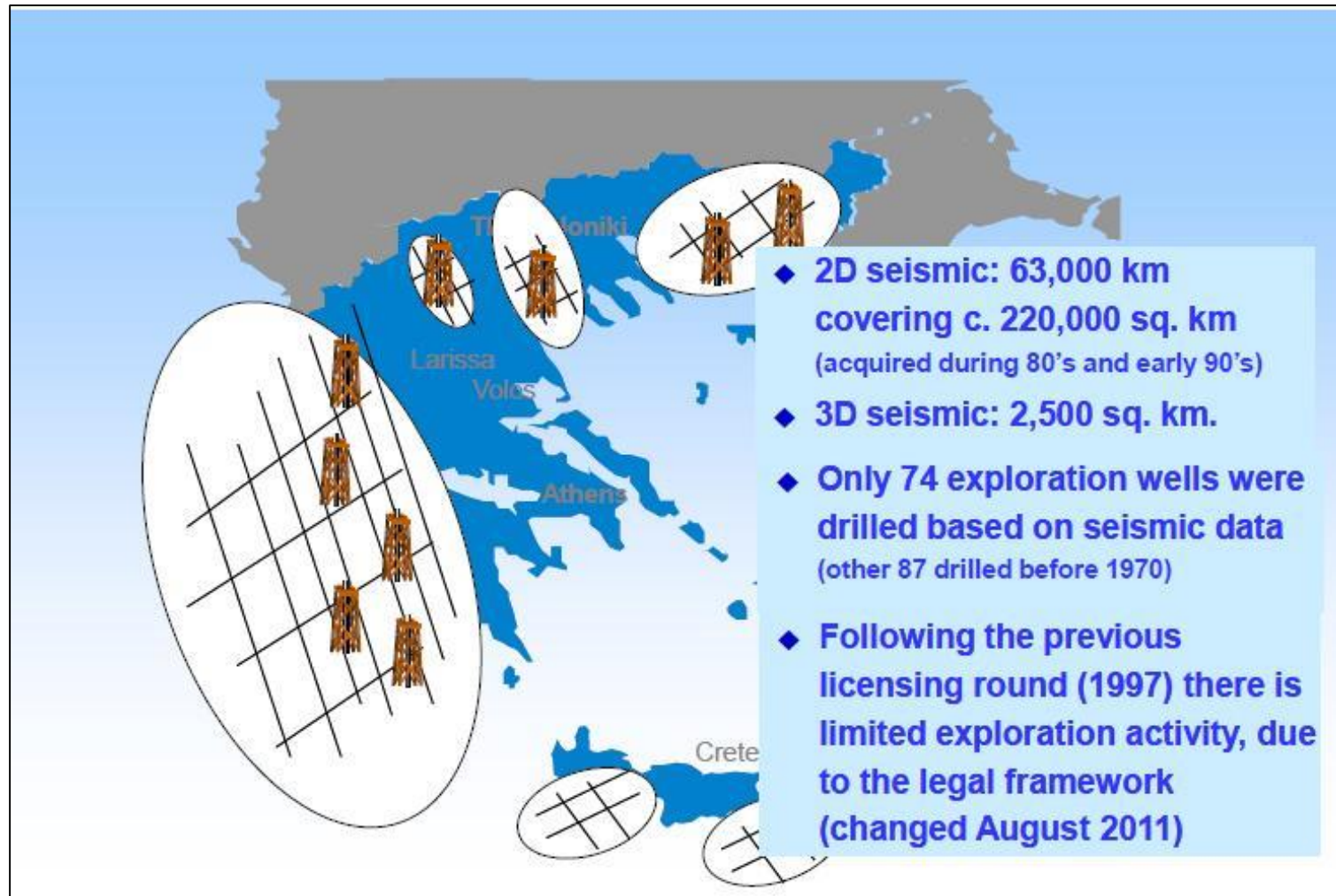
- A total of €4.0 billion of investments in refinery upgrade and expansion were implemented between 2010 and 2014
- A further €1.0 billion to be invested in downstream activities by 2025

Oil & Gas Upstream

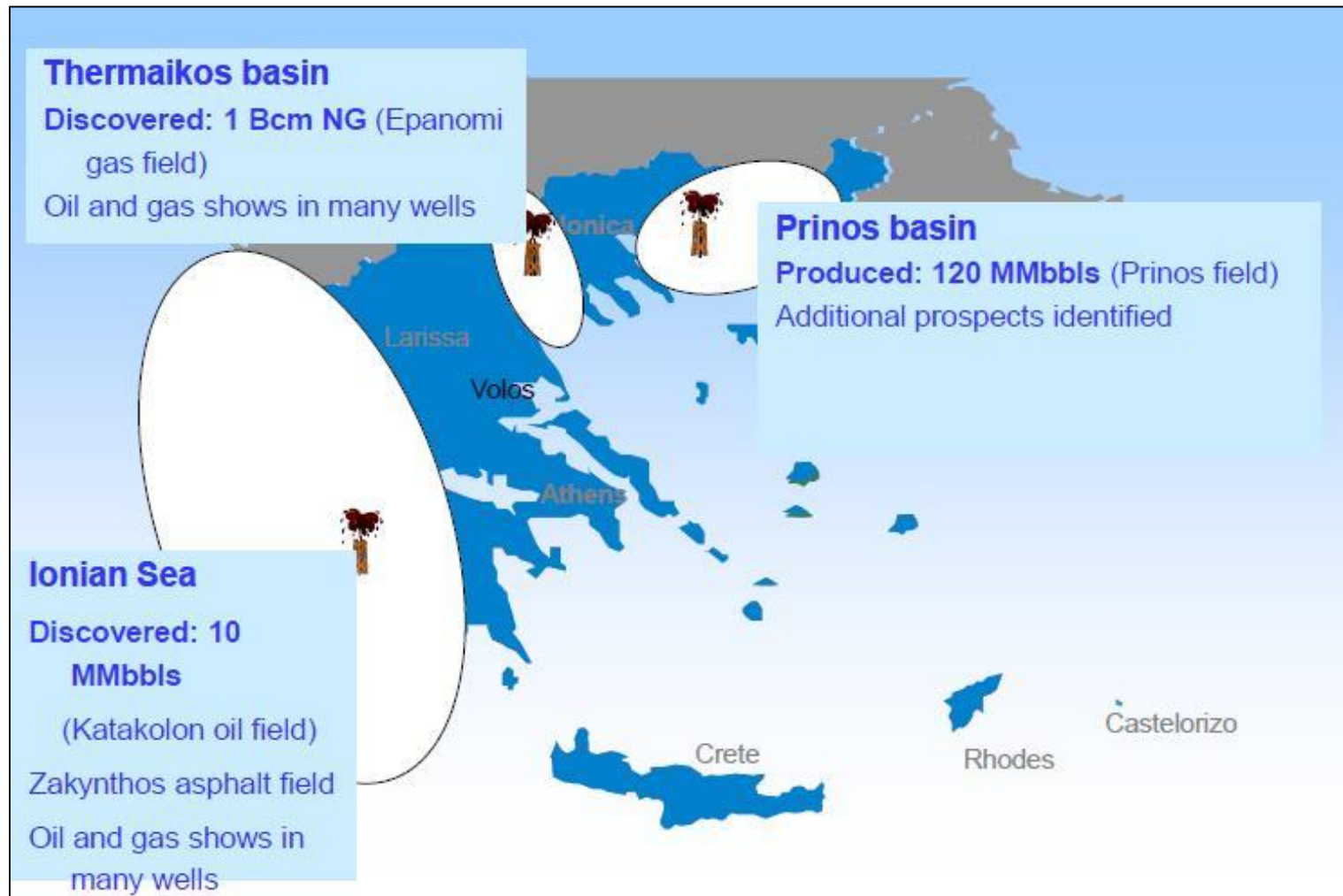


- Greece currently produces 5,000 bb/d
- However, more than 80% of Greece remains unexplored
- There is a small number of proven oil and gas deposits
- Extensive offshore and onshore seismic surveys have already been made in West Greece and South of Crete
- 3 offshore concessions from 1st International Round to be awarded in 1Q 2017
- 3 concessions in West Greece already awarded (Energean Oil & Gas and HELPE)
- 3 new concession areas in West Greece to be awarded in 1Q 2017

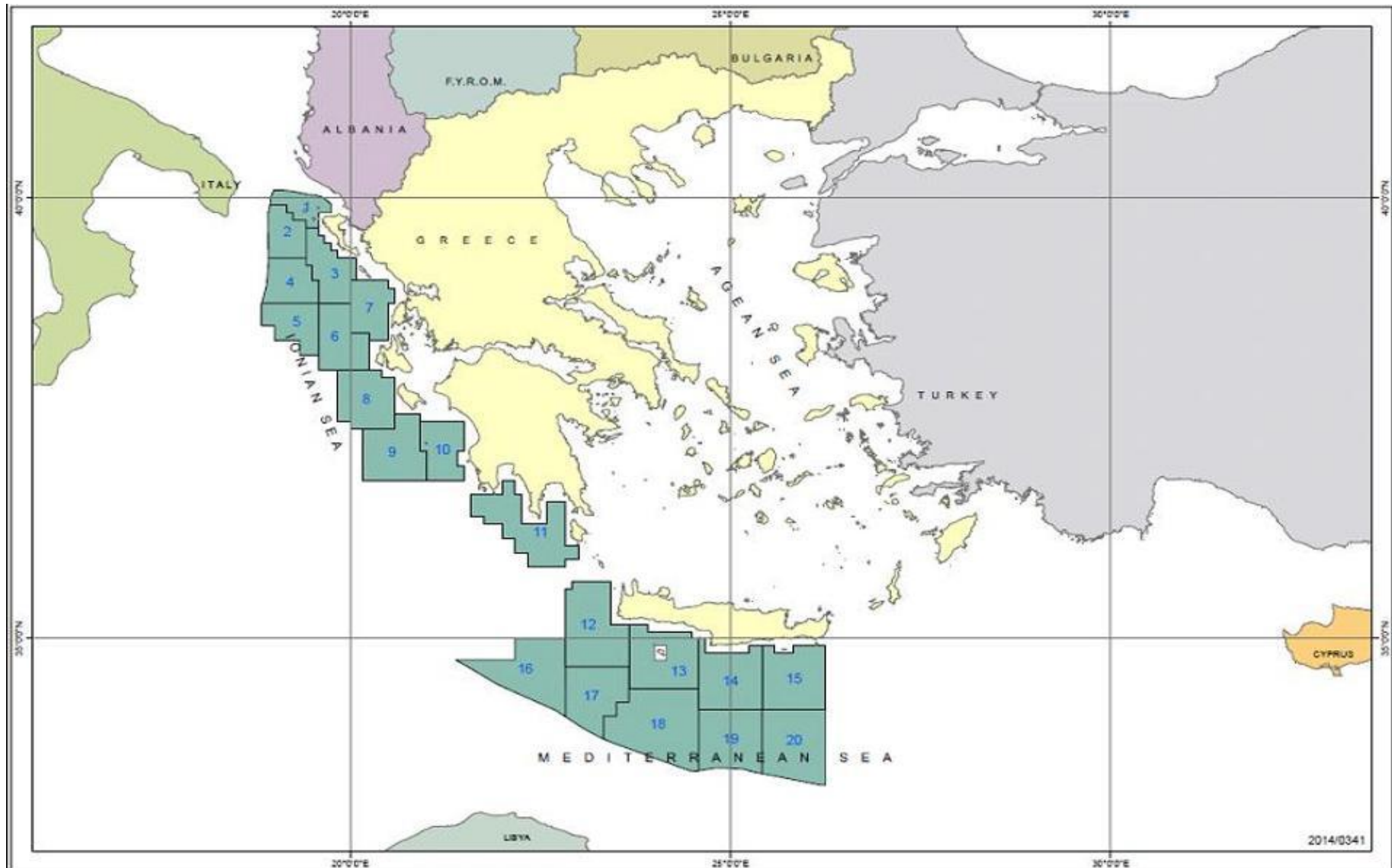
Past Exploration Activities in Greece



Discovered Oil and Gas Fields in Greece



1st International Licensing Round in Greece (2014)



Prinos Oil Field



Natural Gas



- Current consumption ~ 3.5 bcm per year (2015) and likely to rise to 6.0 bcm per year by 2025
- Investments necessary for new LNG terminal(s), trunk pipelines, international interconnections and additional town distribution grids



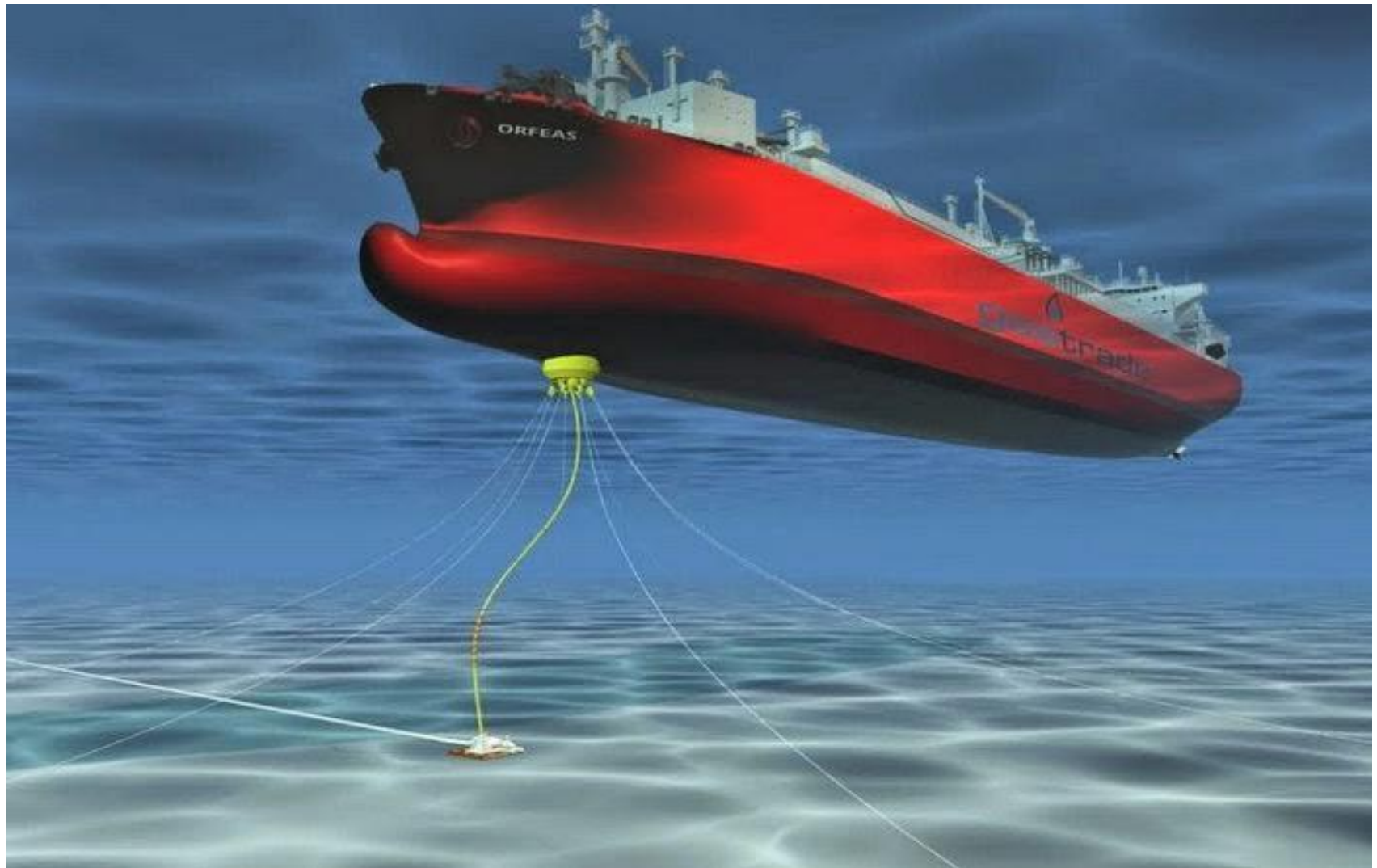
Revithoussa LNG Terminal



Alexandroupolis FSRU (I)



Alexandroupolis FSRU (II)



TAP and TANAP system



The proposed East Med Gas Pipeline



An Expanded South Gas Corridor

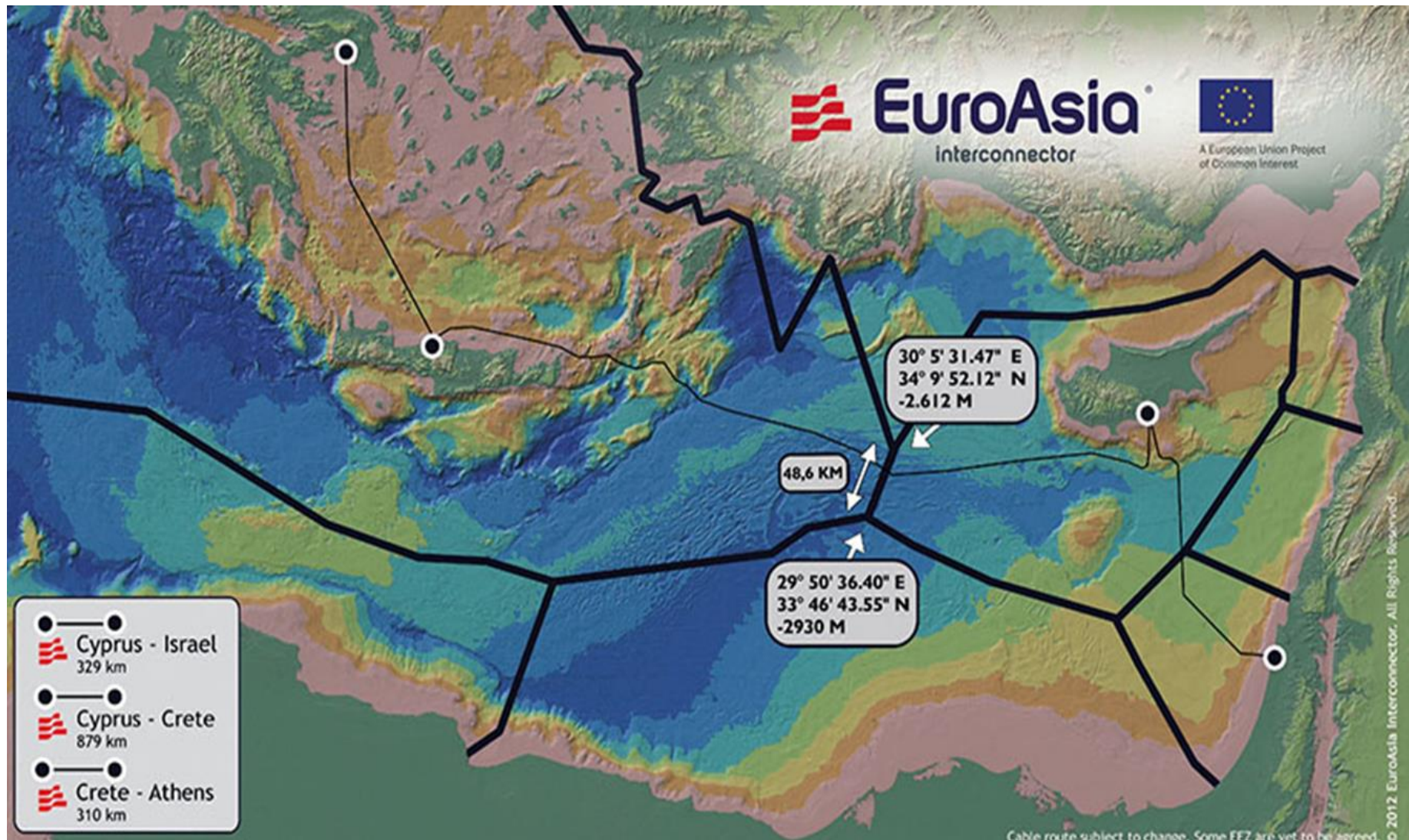


Power Generation Plants



- Currently, Greece's total power generation installed capacity, including RES, is 18 GW
- Approx. 3.5 GW of CCP plants installed by IPPs and PPC worth €2.5 billion between 2006 and 2014
- Approx. 2.5 GW of new installed capacity is foreseen for both lignite and CCP plants by 2025

EuroAsia Electricity Interconnector



Renewables – Wind



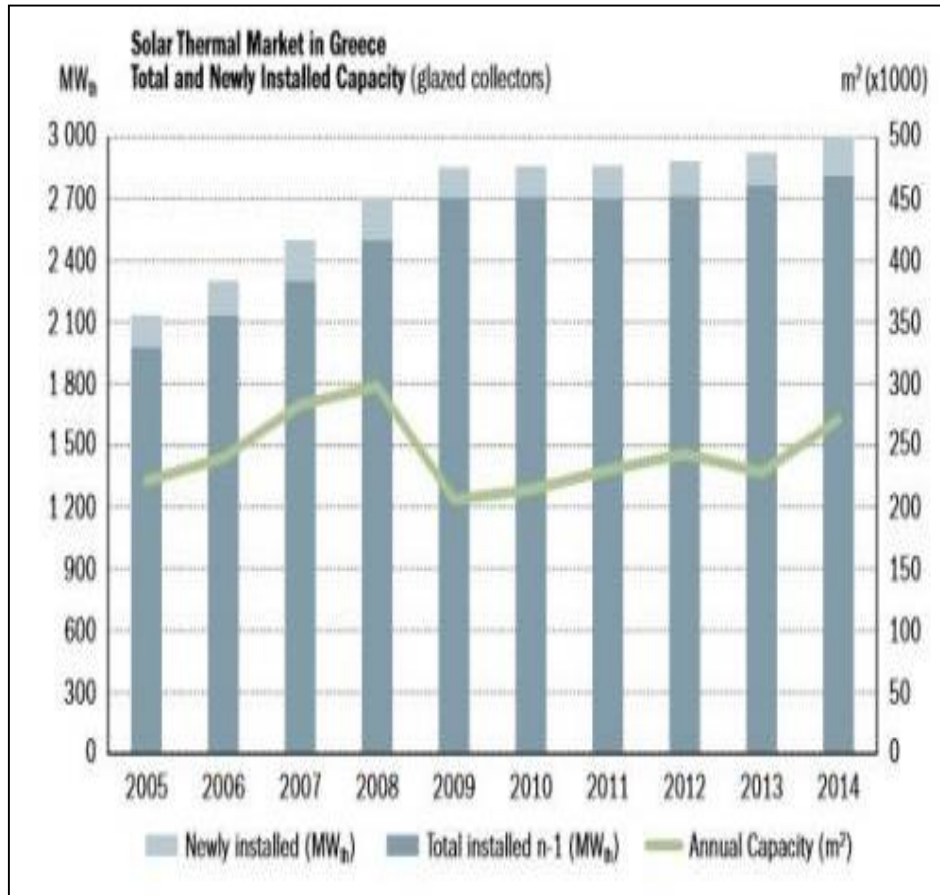
- 2,300 MW of wind installations so far but prospects for a total of 7,000 MW by 2025 appear realistic, corresponding to €5.5 billion investment
- Considerable investments necessary in new electricity grids and island interconnections, estimated at approx. €2.5 billion by 2025

Photovoltaics



Some 4,000 MW of photovoltaic plants already installed with prospects for 8,000 MW total by 2025, corresponding to approx. €3.0 billion CAPEX

Solar thermal



- Total installed capacity: 2.8 GW_{th} (2014)
- Most systems are **solar water heaters** that prevent the emission of 2 million tons of CO₂ each year
- The industry has an **annual turnover of about €300 million** and provide **3,500 full-time jobs**
- Greece's solar water heater manufacturers were able to increase both **domestic (+19%) and export (+16%) sales in 2014**
- The industry provides a high level of vertical integration and exports 50 % of its annual production volume

Summary of Anticipated Energy Sector Investment in Greece

	Million Euros
Hydrocarbons	
Upstream	1,800
Downstream	900
Natural Gas	
Trunk Pipeline and Grid Expansion	1,600
LNG and UGS	1,100
Electricity	
Power generation (thermal plants and large hydro)	4,100
Electricity Grid and island interconnections	3,000
Renewables	
Solar thermal and PV	9,500
Wind	
Mini hydro	
Energy Efficiency	
Energy upgrading of buildings	5,000
New solar thermal applications	
Total	27.000

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GREEK ENERGY DIRECTORY

2016

The Oil Sector



Natural Gas



The Electricity Sector



Renewable Energy Sources



Energy Efficiency & Co Generation



The Legal Framework



Research & Development
Directory



Business
Directory





**Thank you for
your attention**