

“Greece’s Energy Expertise and Investment Prospects”

4th Iraqi-European Business and Investment Forum

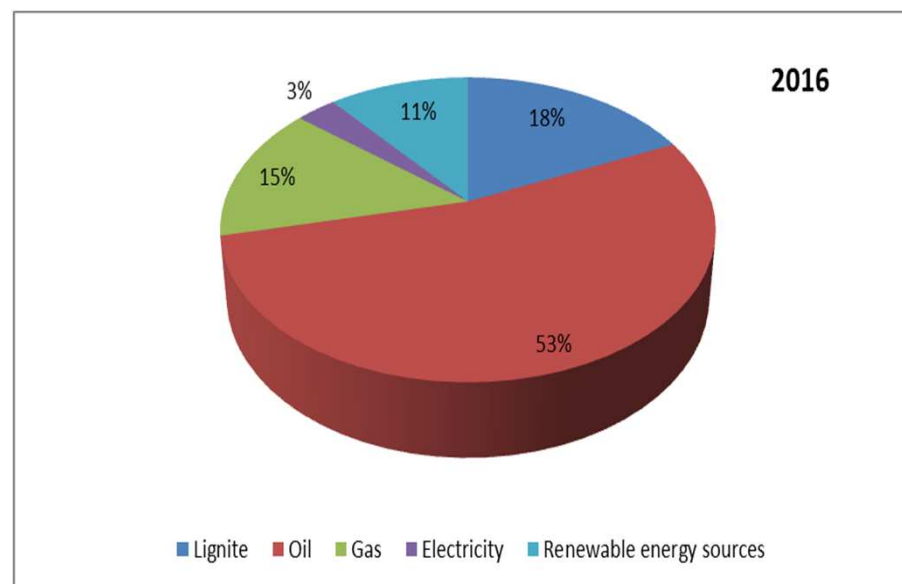
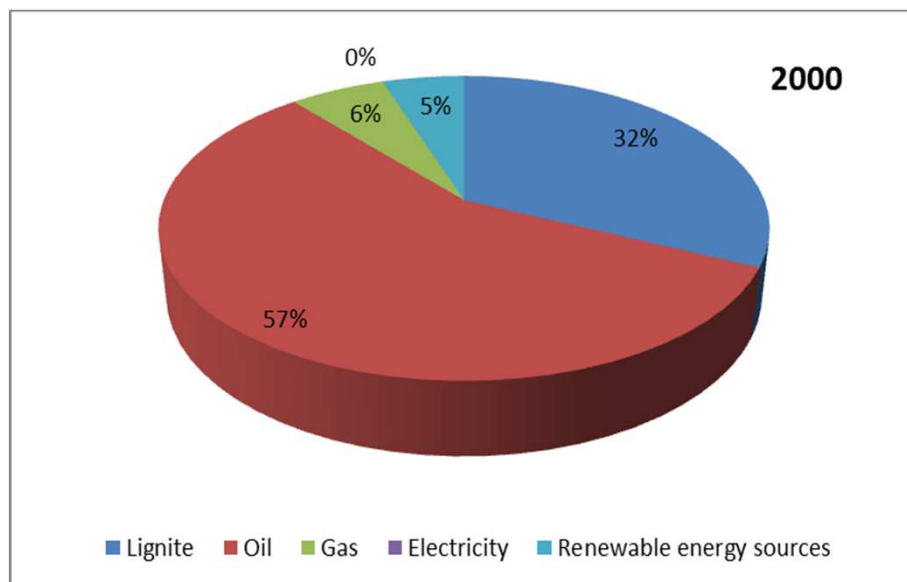
Athens, July 10-11, 2019

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INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE



Gross Inland Consumption in Greece (2000 and 2016)



Greece's Energy Balance, 2017

FUEL	NET IMPORTS*	IMPORT/EXPORT COUNTRY
Crude Oil	26.8 Mt	Iraq (37%)
(import dependency: 98.9%)		Russian Federation (29.2%)
Oil Products	-11.6 Mt	Saudi Arabia (14.9%)
		Egypt (12.4%)
Natural gas	3.2 bcm	Russian Federation (61.6%)
(import dependency: 99.9%)		Turkey (19.4%)
Coal	0.3 Mt	Russia (64.2%)
(import dependency: -3.8%)		Ukraine (18.7%)
ELECTRICITY		
Imports	11.1 TWh	Bulgaria (32%)
Exports	1.5 TWh	Albania (54.7%)

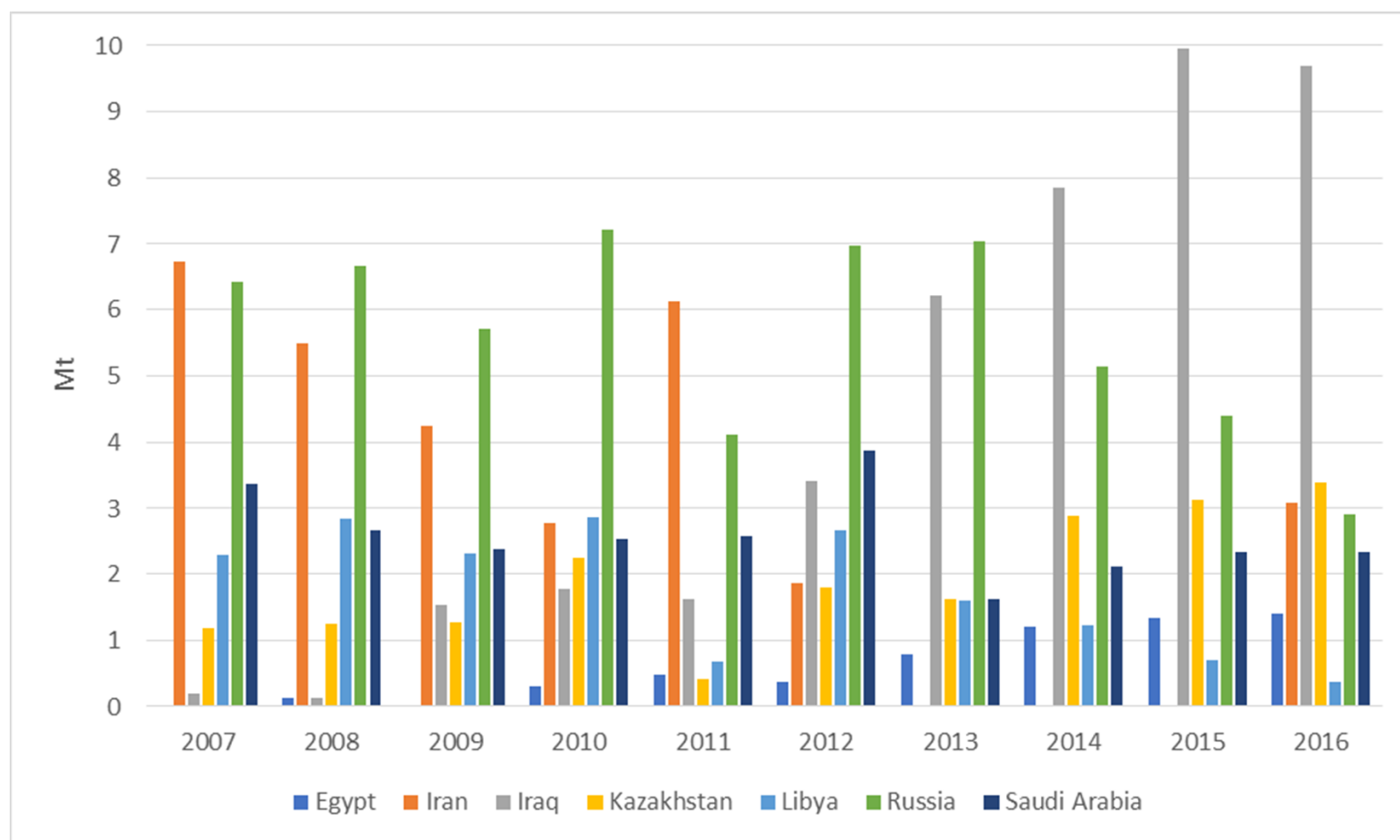
*negative numbers mean net exports

Source: IEA

Current Overview of Greece's Oil Sector

- ❑ **In Greece's energy sector, approx. 150,000 people are employed directly and indirectly:** in oil refining, oil marketing and bunkering, electricity production and distribution, electrical equipment manufacturing, natural gas marketing and installation, RES, etc.
- ❑ **An oil-dominated energy sector with total oil consumption (including refining) amounted to 323 thousand barrels per day in 2018,** according to BP Statistical Review 2019.
- ❑ **Indigenous oil production stands at approx. 5,000 barrels per day in 2018.**
- ❑ **Greece imports almost all its crude oil with Arab countries playing a major role.**
- ❑ **Greece is pursuing efforts to exploit considerable domestic hydrocarbon resources.**

Greece's Crude Oil Imports by Country, 2007-2016



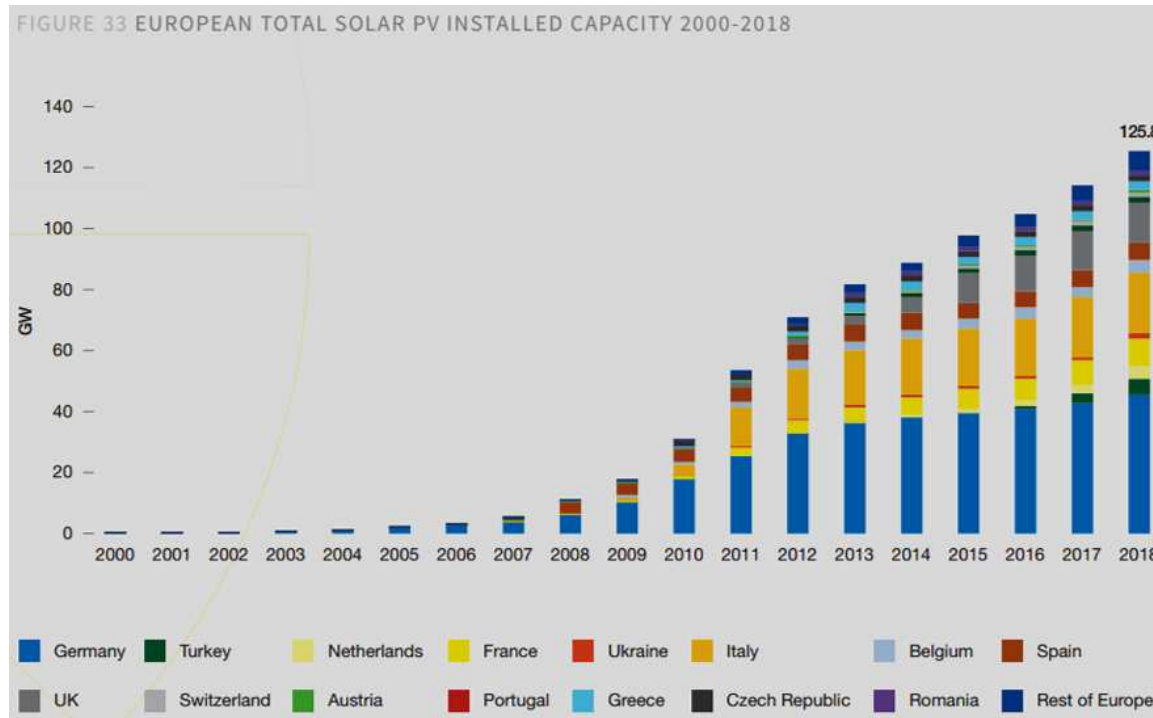
Sources: Greece's Energy Ministry, IENE

Energy Technologies Developed in Greece

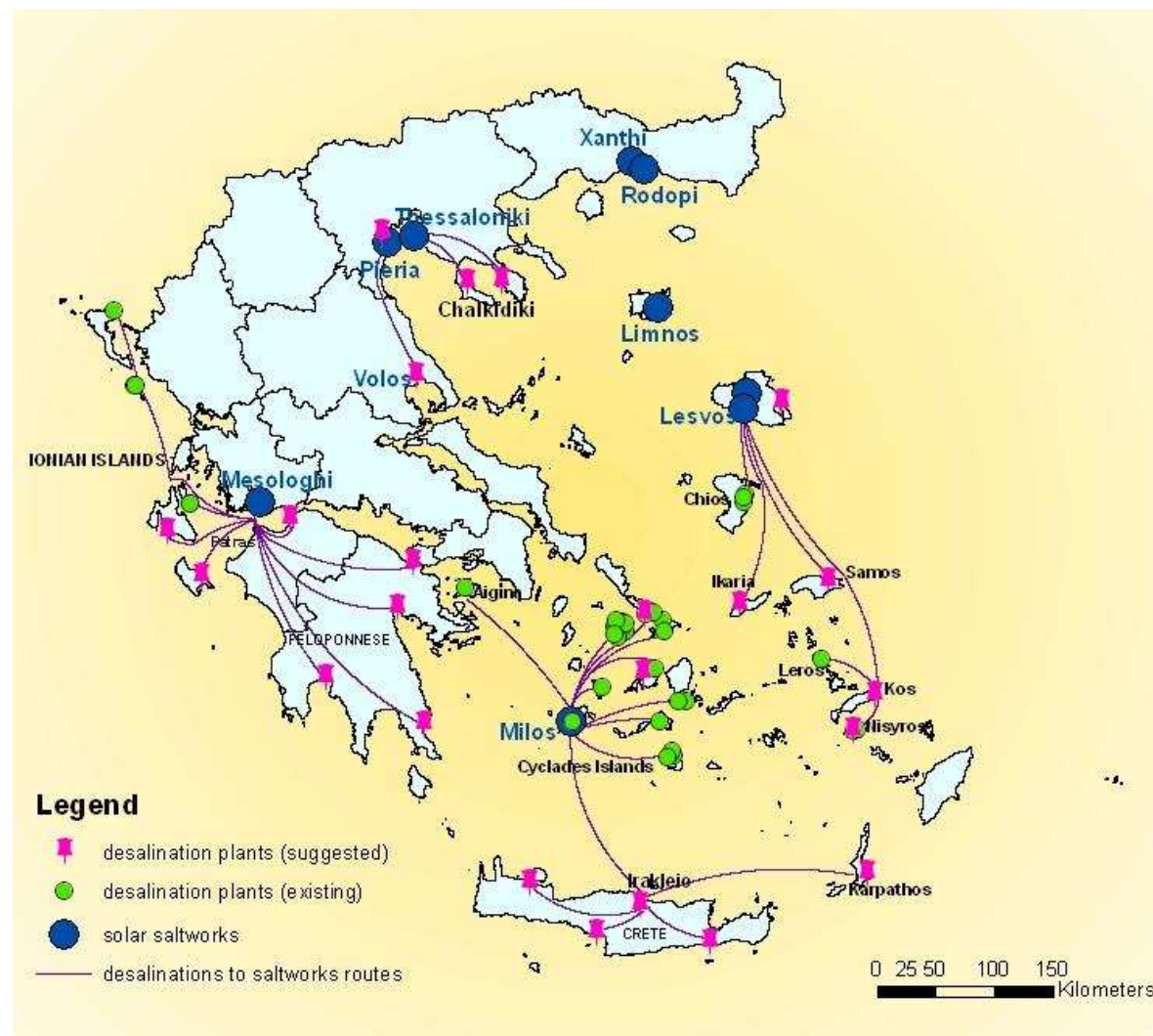
- ❑ Over the last 50 years or so, several energy technologies and products have been developed in Greece:
 - ❖ Refined oil products
 - ❖ Solar thermal collectors
 - ❖ Bioclimatic building applications including “Solar Passive Systems”
 - ❖ Thermal insulation
 - ❖ Space heating and cooling systems
 - ❖ PV applications
 - ❖ Wind farm development
 - ❖ Manufacturing of electric cables
 - ❖ Manufacturing of oil and gas pipelines
 - ❖ Manufacturing of electricity and gas meters
 - ❖ Desalination plants

Solar Thermal in Greece

- Most systems in Greece 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**
- The industry provides a high level of vertical integration and exports 50% of its annual production volume

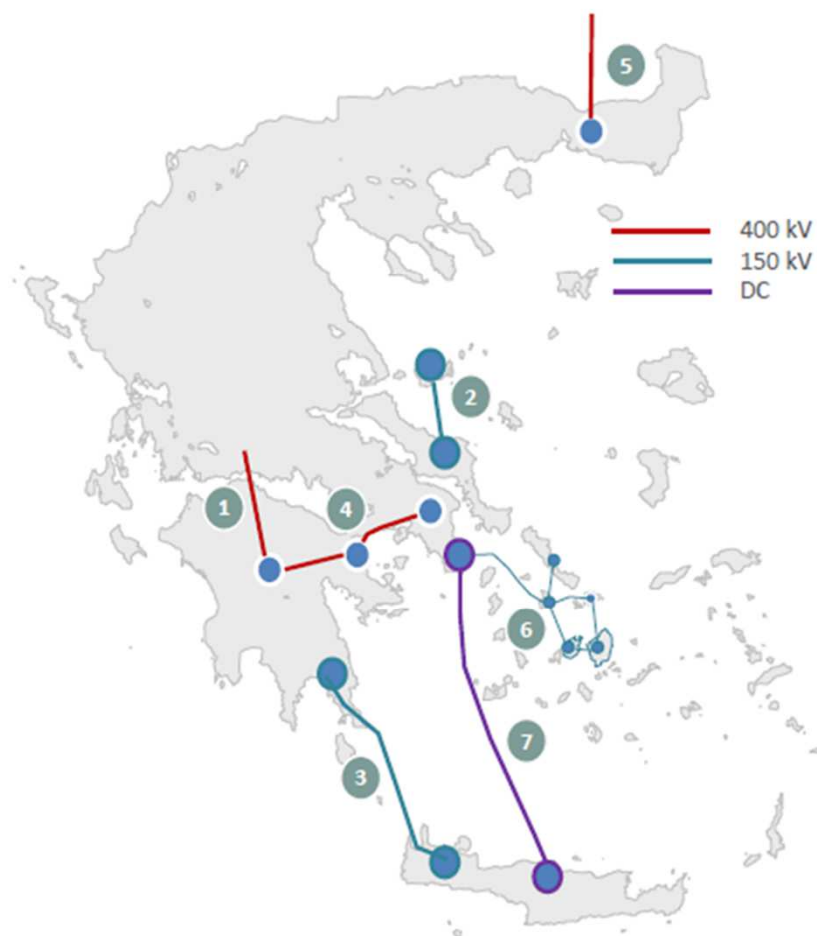


Greece's Experience on Desalination Plants, Solar Saltworks and Transportation of Brine



Greece's Experience on Electricity Interconnections

Major Project Locations

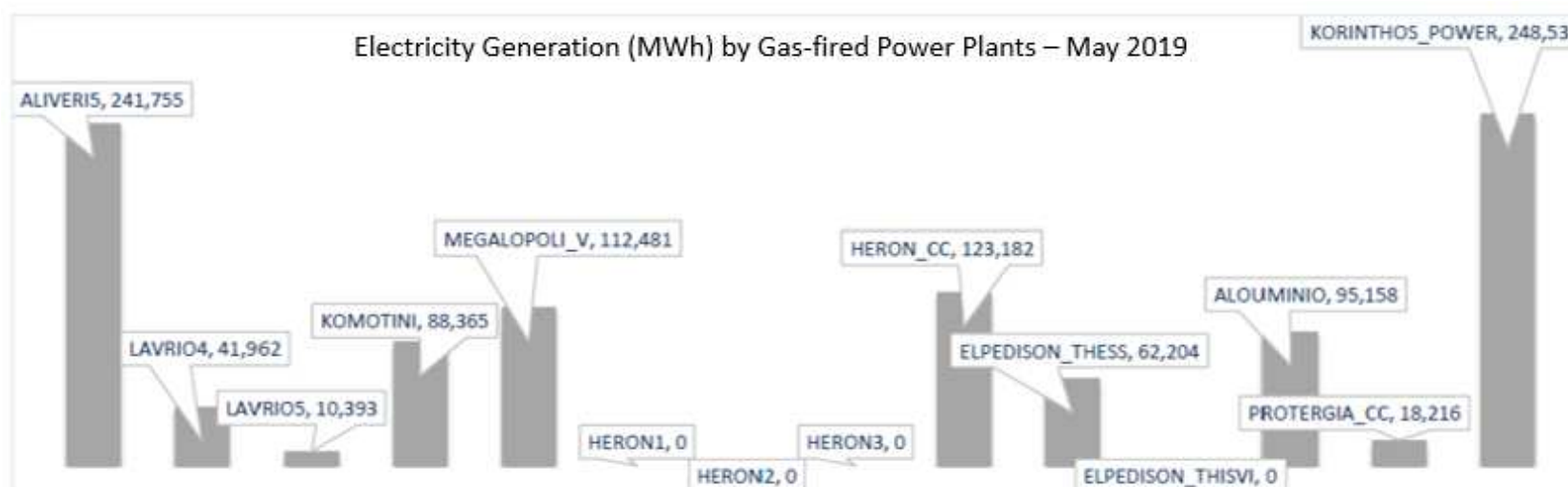
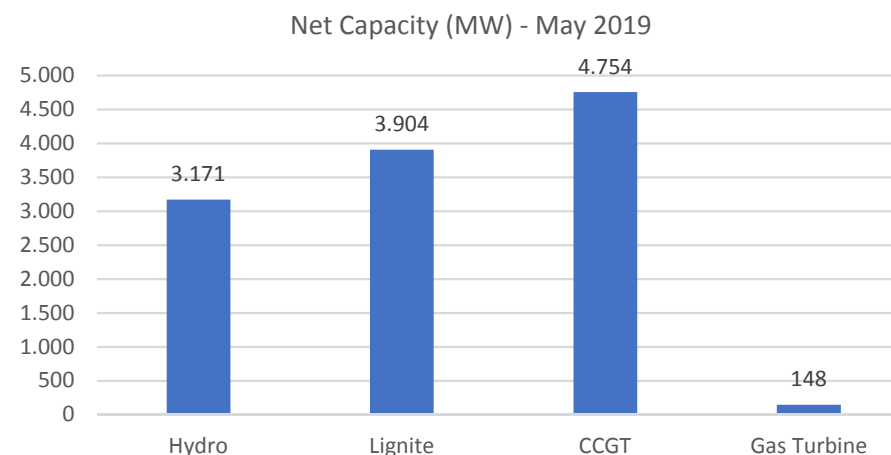


Key Projects – Beginning of Works Before the End of 2021

ID	Project description	Expected commissioning year	Total project cost 2019-2028 (€mn)
1	First 400 kV branch to Peloponnese (OHL Megalopoli – Patras – Acheloos)	2019	83.1
2	Skiathos island interconnection	2020	38.0
3	Crete interconnection (Phase I)	2020	324.1
4	Second 400 kV branch to Peloponnese (OHL Megalopoli – Korinthos – Koumoundouros)	2024	111.6
5	New 400 kV interconnector to Bulgaria N. Santa (GR) – Maritsa (BG)	2023	7.5
6	Cycladic Islands interconnection (Phases A, B and C)	2022 (2018 for Phase A and 2020 for Phase B)	175.4
7	Crete interconnection (Phase II)	2023	713.3

Greece's Expertise in EPC Contractors for Thermal Power Plants Using Gas

- The following graphs show the net capacity of the operating combined cycle gas turbine (CCGT) plants as well as the electricity produced by them in Greece as of May 2019.



Sources: ADMIE and IENE

Greece's Expertise in Electricity Dispatching Systems

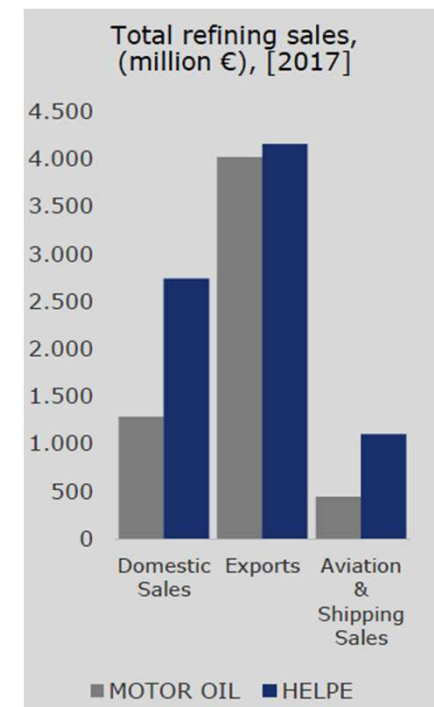
Greece's **National Energy Control Center** has its headquarters in Agios Stefanos and is connected electronically with the power stations, high-voltage cables and substations across the national interconnected system via three regional energy control centers:

1. The **North** in the Ptolemaida region.
2. The **South** in the area of Agios Stefanos and
3. The **Thessaloniki energy control center**



Greece's Energy Export Activities (I)

- On the export side, Greek companies are becoming increasingly active in the export of oil products to a **small group of countries in the region (i.e. Lebanon, Egypt, Libya)** and the **provision of integrated engineering services**, as EPC contractors, **for the construction of major power generation plants with latest projects in Iraq, Syria and Libya.**
 - These are natural gas fired combined cycle plants in the range of 300-500 MW of installed capacity each but lately also involve photovoltaic parks, stand alone or grid connected.
- The development of main electricity interconnection projects between North Africa and Europe, via Greece, is also under consideration.



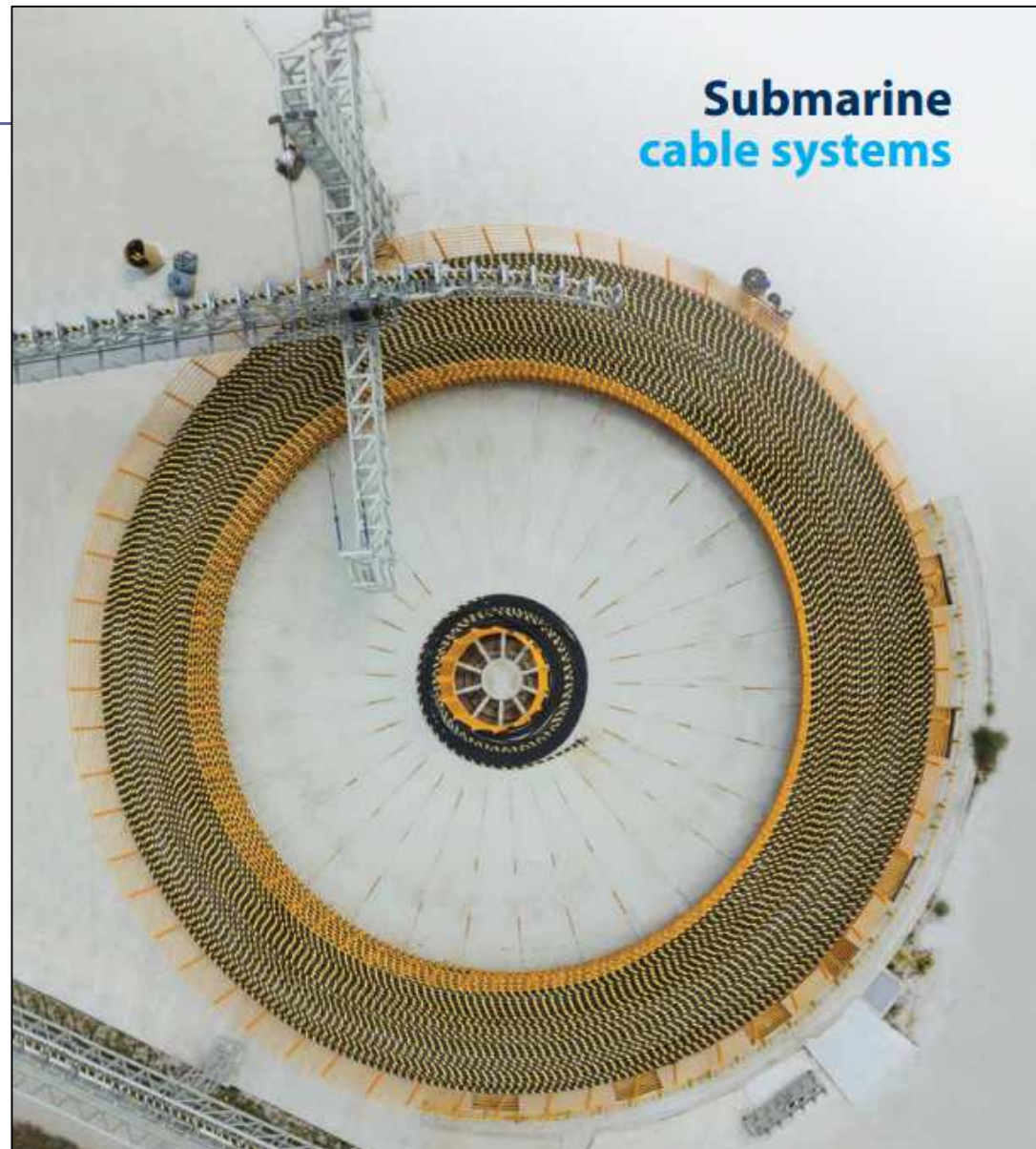
Greece's Energy Export Activities (II)

- Greece maintains export activities in the following energy sectors:
 - **Oil products** in the East Mediterranean and Balkan regions
 - **Electricity:** According to IENE's data, **Greece's average electricity exports in May 2019 were 210,524 MWh** and were distributed per interconnection as follows:
 - **Italy:** 126,531 MWh (60%)
 - **North Macedonia:** 48,779 MWh (23%)
 - **Albania:** 34,346 MWh (16%)
 - **Bulgaria:** 759 MWh (1%)
 - **Turkey:** 110 MWh (0%)
 - **Building materials for insulation** (e.g. aluminum)
 - **Solar thermal systems** (e.g. solar and water heaters)
 - **Electricity storage** (e.g. batteries for RES systems – Systems Sunlight SA)
 - **Cables:** Use of them in electricity transmission and distribution networks, RES, interconnections of islands with the continental system as well as offshore wind farms (e.g. Hellenic Cables SA, a subsidiary of Cenergy Holdings, exports underwater and overhead high- and ultra-high voltage cables)
 - **Electronic meters for industrial and commercial applications** (e.g. Corinth-based Landis + Gyr SA exports meters in France and other French-speaking markets around the world)
 - **Oil and gas pipelines** (e.g. Thisvi-based Corinth Pipeworks SA)
 - **Energy advisory services**

Greece's Systems Sunlight



Greece's Hellenic Cables



Source: Cable Hellenic Cables

Greece's Landis + Gyr



Source: Landis + Gyr

Greece's TERN Energy

	In operation (MW)	Under construction or ready to build (MW)	Pipeline (MW)
 Pumped Storage Projects >	-	-	3100
 Biogas Projects & Waste Management >	3	2.4	19



Source: TERN Energy

Potential of Greece's Energy Exports

- Greece's exports are expected to increase significantly over the next decade in the following energy sectors:
 - **Oil products** in the East Mediterranean and Balkan regions
 - **Design, procurement, installation, maintenance and supervision of RES systems and increase of number of engineers and energy inspectors**
 - **Solar thermal systems and PV installations**
 - **Electricity storage** (e.g. batteries for RES systems)
 - **Cables:** Use of them in electricity transmission and distribution networks, RES, interconnections of islands with the continental system as well as offshore wind farms

- Greece's energy exports have the potential to reach €10-12 billion by 2025, balancing imports or even creating a surplus of exports.

Key Energy Investment Prospects in Greece, 2018-2027

E&P of hydrocarbons



RES projects



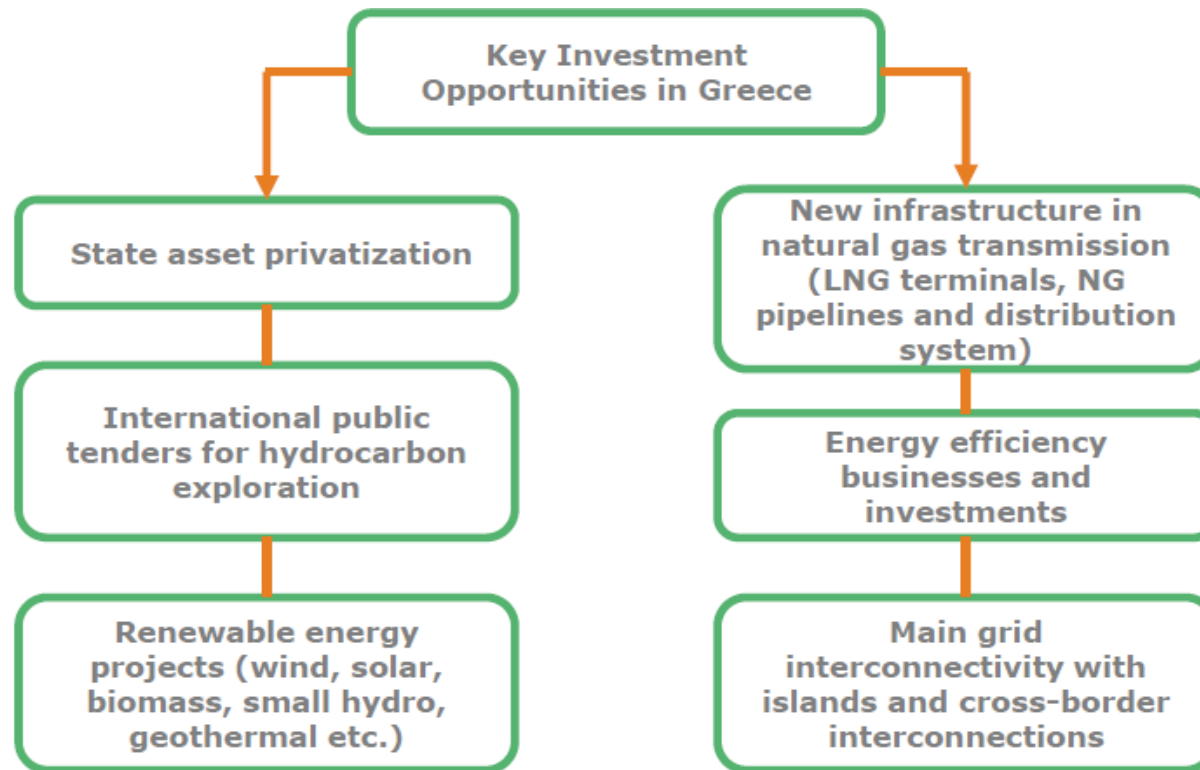
Gas and electricity infrastructure projects



Energy efficiency projects



Major Energy Investment Opportunities in Greece



Total Anticipated Energy Investments in Greece, 2018-2027

Sector - Fuel	Activities	Total Anticipated Energy Investments, in € million
Oil	Exploration and Production (E&P) activities (Upstream)	5,000
	Refining and marketing activities (Downstream)	2,000
Gas	Gas network	3,300
Electricity	Electricity generation (new power plants)	3,000
	Electricity grid	5,600
	RES	15,100
Energy Efficiency	Energy efficiency	11,000
Research and Development	Research and Development	500
	Total Anticipated Energy Investments by 2027	45,500

Note: Include gas pipelines of TAP, IGB and IGI Poseidon. Do not include East Med gas pipeline. They also include central autoproducer units, PV installations in the roofs and electricity storage systems.



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**Thank you for
your attention**

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