

Sustainable and Socially Just Transition to a Post-Lignite Era in Greece: a Multi-Level Perspective

LANDSCAPE

Lignite Resources

The abundance of lignite resources minimised the necessity for fossil fuel imports which proved very important for the economical growth of post-war Greece.

The abundance of lignite resources mainly in Western Macedonia has also been the main pillar of the formation of the mainland power grid.

Energy Security

Greece has no resources regarding natural gas and oil. Therefore, natural gas and oil plants operation is completely dependent on imports which can be affected by diplomatic ties etc.

Social Protest

There were several communities in Greece that strongly opposed the installation of wind plants, claiming wind turbines create a visual nuisance and deteriorate the natural beauty of the landscape, further coupled with concerns over ecosystem disturbance and overall interventions. Mainly present on the second period.

Climate Change

From the beginning of the 21st century climate change was prioritised as one of the main problems that societies have to face.

This is also evident on the electricity generation mix since the use of lignite started to significantly reduce in 2006.

Political Agenda

The common alternation of power between parties of different ideological orientation featured varying ideological orientation regarding the energy sector, climate change aspects and diplomatic ties with neighboring countries, with different implications for energy security.

This issue is not so effective on the second period.

Platform on Coal Regions in Transition

In 2017 established by the EU, this initiative aims to assist lignite-dependent countries to shut down their lignite plants without creating turbulence to local economies relying on lignite mining and exploitation.

Western Macedonia and Megalopolis are the regions concerned by this initiative in Greece.

Financial Crisis (2007-2008) and Economic Recession (2009)

The global financial crisis in 2007 and 2008 led to the recession of the Greek economy in 2009, lasting for several years. One of its consequences was an important reduction on electricity consumption. The financial crisis also affected the Greek energy sector since some of the terms and conditions of the 3 MoUs signed by the Greek government included austerity and regulatory measures related to the electricity market.

Liberalisation of the energy market, national plan for GHG reduction, FITs and FIPs, the division of the PPC in various entities and other legislation

In 1999 the liberalisation of the energy market led to the penetration of natural gas power plants, mainly constructed by private companies. This law also led to the construction of numerous RES power plants. The national plan for GHG emission reduction set a target of a 20% RES penetration by 2010, according to the Kyoto Agreement. On the second period, the introduction of FITs led to a tremendous increase of PV power plants in 2011, halted by the FIPs in 2015. The division of the PPC in combination with the prior liberalisation of the energy market led to a higher penetration of private entities to the energy market.

EU Legislation affecting Greece since being a member-state (e.g. Energy planning and EU ETS)

In accordance with EU's targets to its emissions, Greece had to submit its National Renewable Energy Action Plan in 2009. Moreover, Greece as a member-state of the EU was affected by the EU ETS and specifically by its 3rd phase that significantly increased emissions prices, mainly affecting lignite plants that produce high amounts of polluting emissions.

Landscape affecting the penetration of niche technologies

Landscape affecting the penetration of niche technologies

Window of opportunity: Liberalisation of the market

Window of opportunity: Historically low RES electricity generation prices

REGIME

First Period (1990-2008)

		1990	2008
Lignite	Lignite was the main electricity generation source in Greece due to the abundant lignite resources in Western Macedonia. The exploitation of these resources started in the 1950s increasing the energy security of Greece.	72%	Reduced to 52%
Oil	Oil is an important energy source for electricity generation in the Greek islands that are not interconnected to the mainland power grid. There were also few oil power plants in the mainland grid.	22%	Reduced to 16%
Hydro & RES	In 1990 only big hydro plants were installed. In 1999 an important increase in RES (mainly due to wind farms) was observed that continued on the following years.	6%	Increased to 10%
Natural gas	The first plant was installed in 1996 and since 2008 9 plants were installed, mainly from private companies.	0%	Increased to 22%

Second Period (2009-2017)

		2009	2017
Lignite	This further decrease resulted from the increased penetration of RES and the high emissions prices. 8 lignite plants shut down and no new ones were constructed.	52%	Further reduced to 34%
Oil	This fall was led by the installation of RES power plants and the interconnection of some islands with the mainland grid. Moreover, the few oil plants operating in the mainland grid shut down.	16%	Further reduced to 10%
Hydro & RES	Hydro comprises 10% of Greece's electricity generation in 2017. The remaining 15% results from the significant increase of wind and solar power plants.	10%	Further increased 25%
Natural gas	More natural gas plants were constructed replacing the reduced lignite electricity production.	22%	Further increased to 31%

Nowadays (not thoroughly examined in the MLP)

		2017	2020
Lignite	According to the NECP's target for complete delignitisation by 2028, many lignite plants have already been shut down with the rest being shut down by 2022, except the new Ptoleimada V plant that will be converted to a natural gas plant by 2028).	34%	Significantly decreased to 12%
Oil	Still many islands are not interconnected with the mainland grid.	10%	almost steady at 10%, slightly decreased
Hydro & RES	Hydro comprises 7% of total energy generation. RES are accountable for 32% of electricity generation, mainly due to the historically low prices. Moreover, the reduction of lignite usage is also contributing to the rise of RES energy generation.	25%	Significantly increased to 39%
Natural gas	More natural gas plants were constructed substituting for the reduced lignite electricity production.	31%	Further increased to 39%

PPC divided into various entities responsible for the production, transmission and distribution of electricity

2020 NECP, aiming on total delignitisation by 2028

Niches trying to penetrate into the regime

Niches penetrating even further to the regime

NICHES

Solar

- Solar-thermal energy for water heating (already very popular)
- PV power plants (increased penetration in the second period)
- CSP plants (not common)

Wind

- On-shore wind farms (becoming increasingly popular from the first period, booming in the second one)
- Off-shore wind farms (not common at all)

Hydro

- Big hydro plants (quite common even before 1990)
- Small hydro plants (increased popularity in the second period)
- Pump Energy storage (hybrid) plants (slowly penetrating during the second period)

Biomass

Mainly based on the combustion of agricultural residue (not very common)

Other

- CCS technology for natural gas and lignite plants (not applied yet)
- Ocean Energy (not applied yet)
- Hydrogen exploitation (not applied yet)