PARIS REINFORCE

Issue #02 | May 2021

Policy Brief

The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead

Key Takeaways

- Lignite production and use in Greece has been dropping in the last decade, marking a sharp decline during COVID-19.
- According to the country's National Energy and Climate Plan (NECP), lignite must be completely phased out by 2028.
- Delignitisation, irrespective of the speed in which it is attempted, is found beneficial for the wider economy in the long run—i.e., by the middle of the century.
- Depending on the pace of delivering on the envisaged transition, phasing out lignite may have adverse effects in the near and medium term (2040), which need to be addressed to achieve social cohesion and achieve a just transition.

The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

Policy Challenge

Lignite has been exploited for electricity generation in Greece since the early 1950s and has been a major socioeconomic growth driver for decades since. Especially after the oil crisis of the 1970s[1], and due to lignite's abundant domestic availability, low extraction costs and price stability, Greece became one of the largest lignite producers in the EU[2]. In addition, due to its scale, power generation from lignite provided thousands of jobs to several rural areas of Greece, contributing significantly to the national economic development of the country.

In 2009, lignite-fired power generation covered a massive 58% of electricity demand in the country's mainland interconnected system. A decade later, lignite covered a modest 20%. Indeed, delignitisation of energy production in Greece kicked off in the early 2010s accelerating in the latter half of the decade: in 2020, due to the pandemic and respective decrease in demand, lignite production was reduced by approximately 45% compared to 2019[3].

This bold reduction can be attributed to two main drivers. First, the ageing lignite plants, as reflected in the low calorific value (1,000-1,300 kcal/kg) of the Megalopolis and Ptolemaida fields and the high stripping ratio (which increased from 2.68 m^3/tonne in 1991 to 4.59-6.36 m^3/tonne in 2016-17) of the remaining lignite fields[4]. Second, the gradual price increase of the European Allowances (EUA) to emit greenhouse gases since late 2017, which averaged 5.84 €/tonne in 2017 and almost 43 €/tonne, on the 18th of March 2021.

In parallel with the decrease of lignite's share in gross final energy consumption, which in 2020 reached almost 50% compared to 2015, the share of Renewable Energy Sources (RES) increased by almost 30% over the same period[3].

Greece submitted its *final* National Energy and Climate Plan (NECP)[5], in December 2019. The document set higher penetration targets for RES compared to its *draft* version submitted one year earlier, also projecting higher energy efficiency and, notably, zero lignite use in power generation by 2028. Based on this and despite social challenges to further diffusing renewables in the country[6], the Greek government aspires to accelerate lignite phase-out, shutting down its lignite-fired power plants by 2023—except for Ptolemaida V by 2028. Natural gas, of lower emission intensity, is planned to "bridge the gap" in the intermediate period to meet time- and cost-related constraints before the country transits to a carbon-neutral energy system[5,7].

It must be noted that the *final* NECP is not in fact final, since it is expected to require an update, to consider the impact of the pandemic as well as the more ambitious EU objectives for 2030, which will upgrade the -40% emissions target compared to 1990 to -55%.

Although the long-term macroeconomic impact of decarbonisation has been found beneficial for countries that, like Greece, base their energy production on coal[8], thoroughly examining its social, economic, and energy security impacts in the near-term becomes critical, especially when this transition is drastic.

This background constituted our motivation to base our analysis on an integrative modelling approach[9], by soft-linking the energy models originally used for preparing the NECPs[5] with an open-source macroeconomic model, GTAP[10], as well as an agent-based model[11] to evaluate macroeconomic impacts.

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The bumpy road to net-zero and the impact of pace

When studying the long-term impacts of a less drastic decarbonisation target[11], we had found that in 2050 the Greek economy would be 1.8% larger in the increased RES scenario than in the business-as-usual scenario. That was, despite a temporary decrease in GDP and labour productivity, the size and duration of which would largely depend on the size of investments required for RES projects. Evidently, wide-scale deployment of RES coupled with a flexible framework promoting self-consumption would involve lower requirements for the consumption of coal and increased demand for investment goods. Since not all miners losing their jobs will immediately be able to switch to construction or manufacturing sectors, and as the supply curve of goods required for investment is relatively inelastic in the short run, RES investments would lead to an increase in the price of investment goods and, consequently, slow down capital accumulation in other economic sectors, resulting in a temporary decrease in labour productivity.

Now, taking into account the updated targets, as reflected in the country's NECP, we set out to capture the macroeconomic impact of a rapid delignitisation, as reflected in the *final* NECP, as opposed to a milder transition, originally implied in the *draft* NECP[10].

Considering the medium-term impact, in the case of rapid decarbonisation, phasing out lignite is anticipated to boost the Greek economy and improve the living standard of Greek citizens in the next decade, with GDP and household income being higher in the order of 1% and 7%, respectively, in 2030 compared to a milder delignitisation scenario (see Fig. below).

Employment opportunities are also key considerations in planning for low-carbon economic growth. If we look at the global picture, renewables accounted for an estimated 11.5 million jobs worldwide in 2019, up by half a million since 2018, led by solar photovoltaics with some 3.8 million jobs—or a third of total RES employment. It is also estimated that 42 million renewable energy jobs will be created by 2050, based on the most recent IRENA's Outlook[12]. This increasing trend clearly illustrates why many governments have prioritised renewable energy development, first and foremost to reduce emissions and meet international climate goals, but also in pursuit of broader socioeconomic benefits.

Clean energy jobs have also been more inclusive and gender-balanced than fossil fuels—according to IRENA, women hold 32 % of total RES jobs, as opposed to 21 % in fossil fuels sectors. Expectedly, they are also "better" in terms of health and safety than in the extraction and processing of conventional fuels.

Specifically for Greece, about 25,000 jobs are estimated to be lost by 2023. However, the overall medium-term employment impact of the transition is projected to be positive until 2030: approximately 60,000 jobs are expected to be created in total, 37,000 in RES projects and 23,000 jobs in energy-saving projects. However, the need to build the necessary skills base for the envisaged transition from lignite to clean energy needs to be underlined: more vocational training, stronger curricula, more teacher training, as well as expanded use of information and communications technologies for remote learning are needed to reach these numbers.

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The observed repercussions in the medium term include increased inflation (CPI: +4.4% in 2030), greater import dependence (+3.7% in 2030 imports), as well as decline of international competitiveness of the Greek economy (-10% in 2030 exports).

Investment assumptions

The key assumption for these results is that Greece increases the green investments channelled into its economy by about 2% of GDP annually over 2020-2030. And this amount of money must be particularly devoted to the lignite-intensive regions, to support a just transition pathway at the local level. This is an important precondition; unless met, the social repercussions are significant, and the transition speed will need to slow down. This underlines the World Energy Council Secretary General and CEO Dr Angela Wilkinson's recent message on the need to establish an affordable human pace in the so-called 'race to zero'[13].

The EU context

Similar funding needs are found for other countries of the European Union, including Cyprus (+2.2% of GDP in the period 2020-2030), France (+2.4%), Latvia (+2.6%) and Spain (+1.8%). Capital investments depend on the target scenarios and underlying challenges. The simulated macroeconomic impacts (2050) for these countries are in line with our outcomes in terms of GDP, ranging from slightly positive (+0.25% for the case of Cyprus) to more pronounced benefits (+2.1% for the case of Spain).

Note also that the 2019 study conducted by the European Commission[13], regarding the macroeconomic impacts of policies at the EU level that are compatible with the Paris Agreement, drew similar conclusions the Community, indicating an increase of EU GDP by 1.1% by 2030, compared to the assumed baseline.

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The policy brief was adapted from the article originally published in the Future of Work:
*Doukas, H., & Nikas, A. (2021). The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead. **The Future of Work**. Available at: https://republic.gr/futureofwork/the-delignitisation-roller-coaster-in-greece-an-old-car-and-a-steep-slope-ahead/*

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The Project in a nutshell

PARIS REINFORCE is developing a novel, demand-driven, IAM-oriented assessment framework for effectively supporting the design and assessment of climate policies in the European Union as well as in other major emitters and selected less emitting countries, in respect to the Paris Agreement. By engaging policymakers and scientists/modellers, PARIS REINFORCE has created the open-access and transparent data exchange platform I²AM PARIS, in order to support the effective implementation of Nationally Determined Contributions (NDCs), the preparation of future action pledges, the development of 2050 decarbonisation strategies, and the reinforcement of the 2023 Global Stocktake. Finally, PARIS REINFORCE has introduced innovative integrative processes, in which IAMs are further coupled with well-established methodological frameworks, to improve the robustness of modelling outcomes against different types of uncertainties.

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