Session SBI60 (2024)

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Multilateral Assessment

A compilation of questions to – and answers by – **Greece**

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Question by New Zealand at Thursday, 04 April 2024

Category: Progress towards the achievement of its quantified economy-wide emission reduction target

Type: Before 04 April

Title: Greece National Energy and Climate Plan

In its NC8 and BR5, Greece explained its recently adopted National Energy and Climate Plan (NECP) which sets out a number of energy and climate targets. Greece described the NECP's flagship goal of reducing and definitively ceasing lignite's share in power generation until 2028. Can Greece provide an update on progress towards this goal?

Answer by Greece

The goal remains to continuously reduce lignite production, with the aim of reducing it to zero after 2028. De-lignification is a deep cut in the national energy map and is also a huge opportunity for the country.

The use of lignite as an energy source is steadily declining. According to the most recent national energy balance, the electricity produced by lignite has been reduced by around 83% in 2022 compared to 2000 levels. As it can be seen in the attached figure, lignite has been substituted by natural gas-fired plants and RES (mainly Wind and solar PVs).

Attachment: Q1, figure.pdf

Question by United States of America at Friday, 29 March 2024

Category: All emissions and removals related to its quantified economy-wide emission reduction target

Type: Before 04 April

Title: Energy sources

Does Greece expect to use imported natural gas to generate electricity to replace imported electricity? If not, what energy source(s) are expected to be used?

Answer by Greece

Since October 2004, the Greek Transmission System has been operating in parallel with the interconnected European Transmission System under the general coordination of ENTSO-E (European Network of Transmission System Operators for Electricity). This parallel operation is achieved through transmission lines, mainly 400 kV, connecting Greece with Albania, Bulgaria, North Macedonia, and Turkey. Additionally, Greece is asynchronously connected to Italy via a 400 kV DC submarine cable.

In June 2023, a new interconnection between Greece and Bulgaria was inaugurated. This project involved the implementation of a second 400 kV overhead transmission line between the Greek and Bulgarian systems, linking the N. Santa substation in Greece with the Maritsa East 1 substation in Bulgaria. The line has a nominal transfer capacity of 2000 MVA and a total length of approximately 151 km, with around 30 km in Greece and 121 km in Bulgaria. This 400 kV Greece-Bulgaria interconnection is a significant European project of common interest, designated as PCI 3.7.1 since 2013, and included in the fourth list of Projects of Common Interest (PCI) by the EU under the NSI East Electricity corridor (North-South electricity interconnections in Central Eastern and South Eastern Europe).

The Greek interconnected electrical system is projected to meet the interconnectivity target of 15% by 2025, earlier than the 2030 target, following the completion of future interconnection projects with neighboring countries by the end of 2023. By 2030, the interconnectivity percentage is expected to reach 23.1% (please refer to Table 1).

To ensure the predicted interconnectivity percentage, and given that developing electrical interconnections with neighboring countries is a strategic priority, the Greek Transmission System Operator continues to enhance collaboration and joint actions with neighboring operators for planning and implementing future interconnections. The implementation timeline for these planned interconnections is set within the current decade, with most expected to be completed before 2030. Each new interconnection is estimated to significantly increase the net transfer capacity of the Greek electrical system, thereby raising the predicted interconnectivity percentage for 2030.

As regards the diversification of electricity imports, it is noteworthy that with the activation of the second electricity interconnector with Bulgaria (Nea Santa-Maritsa) launched in September 2023, Greece has already reached the 15 % interconnectivity target well ahead of the 2030 milestone. The new NECP also foresees that as a result of the increase in RES over the medium to long term (starting from 2030), the country will reduce its electricity imports and gradually become a net exporter of green electricity, as evidenced by the decrease in the share of electricity imports from 6.7 % of electricity consumption in 2021 to 4 % by 2030.

The government’s strategic objective is to promote Greece as a vital transit gateway for cheap green energy into the European market, the verbal production of which will be produced primarily by Greece but also by large potential exporting countries in North Africa, such as Egypt and the Middle East, such as Saudi Arabia, and the completion of the electricity interconnection between Greece, Cyprus and Israel, which will lift the energy

isolation of the Republic of Cyprus, the last isolated energy system of the European Union, is of strategic importance for the country.

At the same time, the government, in cooperation with ADMIE (Power Transmission Operator of Greece) and, where appropriate, private promoters are seeking the maturation of three new projects that will play a key role in achieving the above objective, as they will implement Greece's interconnections to the South (interconnection with Egypt and Saudi Arabia) and to the north (interconnection with Germany).

A key pillar of the NECP (National Energy and Climate Plan of Greece) is to achieve the rapid penetration of RES and thus the radical transformation of the electricity system and its operation.

The evolution of the electricity system up to 2030 is characterised by the penetration of RES and the withdrawal of lignite-fired power plants by the end of 2028, which is planned as part of the new national policy on the de-lignite-fuelling of the energy sector, as well as the reduction in installed capacity. Continuing in the same direction, Greece is committed to ensuring the transition to the new era, where energy comes mainly from renewable energy sources. Indigenous fossil energy production is experiencing a marked decline. By contrast, domestic energy production from renewable energy sources (RES) is growing rapidly.

In particular, in 2022, the domestic production of energy from RES has outweighed the production of energy from fossil fuels. This reflects the steady progress towards our CO2 reduction targets and for strengthening the country's energy independence (please refer to the attached table).

Attachment: Q2, table.pdf

Question by United States of America at Friday, 29 March 2024

Category: Assumptions, conditions and methodologies related to the attainment of its quantified economy-wide emission reduction target

Type: Before 04 April

Title: GHG emission trends

The report text states that "The GHG emissions trends (CO2, CH4, N2O, HFC, PFC and SF6) for the period 1990 – 2020 are presented in Tables 1.1a and 1.1b (in kt CO2 eq). While, emissions/removals per sector are presented in Table 1.2a and Table 1.2.b." However, Tables 1.2a and 1.2b appear to show only CO2 emissions by sector. Is it possible to show combined GHG emissions for all gases by sector (in units of CO2eq) in order to allow for more effective comparisons between sectors? Exclusion of emissions from other gases here

is a bit misleading as it omits a significant portion of emissions (26% in 2020), particularly for sectors where emissions are typically not dominated by CO2 (e.g. waste, fugitive emissions from the energy sector). Also in Table 1.2, energy (row 3) and fugitive emissions (row 10) have the same emissions values for the entire timeseries. Assuming these are the values for total energy emissions, what are the values for fugitive emissions?

Answer by Greece

Please refer to the attached file and the graphs which are also available in our presentation that provide information for the period 1990-2022 on emission trends by gas, CO2 emissions by sector, and methane emissions by sector.

In Table 1.2 and for the Energy the values of emissions don't correspond to the correct source category. The fugitive emissions (10th row) correspond to the values in the 9th row. Please refer to the Table 1 group of CTF Tables, where detailed disaggregation by sector, sub-sector, and gas is provided. For your information, also find in the attached file the graphs for the period 1990-2022, according to the latest NID not yet submitted to UNFCCC, regarding the CO2 emissions from the energy sector and the fugitive emissions from fuels.

Attachment: Q3, graphs.pdf

Question by United Kingdom of Great Britain and Northern Ireland at Thursday, 28 March 2024

Category: All emissions and removals related to its quantified economy-wide emission reduction target

Type: Before 04 April

Title: Question to Greece on their Vehicle Renewable Programme

Thank you, Greece, for the opportunity to comment on your 5th Biennial Report and 8th National Communication. We note that the Vehicle Renewable Programme involved replacing and renewing your bus fleets. Was this new fleet zero emission and how did the public receive these changes?

Answer by Greece

The National Energy and Climate Plan (NECP) emphasizes reducing CO2 emissions, particularly in urban transport, by adopting policies that replace traditional forms and

methods of mobility. The goal is to develop alternative modes of transportation such as micro-mobility (e.g., cycling) and active mobility, and to increase the use of public transportation. Public transport systems, in turn, should adopt low-carbon solutions, such as the electrification of bus fleets and the expansion of metro networks.

Beyond reducing CO2 emissions in urban centers, these measures aim to transform traffic-congested Greek cities into sustainable urban mobility cities. This means making cities less dependent on cars, promoting gentle traffic, and being human-oriented. A specific target under consideration is to reduce the share of private motorized vehicle use in favor of gentle and collective modes of transportation (walking, cycling, public transport) by, for example, 20%.

Public transportation remains the cornerstone of sustainable urban transport. In line with European and national regulatory frameworks, the objective is to incorporate electric vehicles into planning and progressively increase the number of low-emission vehicles for urban transportation. There is an integrated program of complete renewal and environmental upgrading of the fleet within three years. For the time being, electric buses, 140 in Athens and 110 in Thessaloniki have been put into circulation. The first data from the tests are completely satisfactory and there is a positive response from the public.

In addition, contracts have been signed for the supply of 300 natural gas buses in Athens, and it is estimated that they will be received by the end of 2025. Moreover, 500 new buses (EURO 6 technology) will be on the streets of Athens by 2025.

Specific goals for road transport in the Athens metropolitan area by 2030 include:

- Increasing the fleet of low-emission vehicles by 20% by 2025 compared to 2019.
- Increasing the fleet of low-emission vehicles by 40% by 2028 compared to 2019.
- Reducing the emission index of the fleet (CO2eq/km/passenger) by 8% compared to 2019.

Question by Australia at Thursday, 28 March 2024

Category: Progress towards the achievement of its quantified economy-wide emission reduction target

Type: Before 04 April

Title: Q2

Australia commends Greece's plan to transition away from lignite-based electricity by 2028 (pg. 114). **Which renewable technologies are expected to play the greatest role in Greece's transition away from lignite, and what policies are in place to support their uptake?**

Answer by Greece

With regard to RES technologies, the development of both onshore and offshore wind, as well as a balanced development of photovoltaic plants, should be ensured in order to diversify their production profile, with a view to addressing adequacy issues and avoiding an excessive increase in the storage needs of the system.

At the same time, a geographical spread of RES should be achieved in order to reduce as far as possible problems with the simultaneous loss of large amounts of generation capacity in the electricity system.

Additionally, the development of sufficient capacity and storage capacity is a prerequisite for the further penetration of RES into the electricity generation mix.

Electricity storage plants, as stand-alone storage plants, participating in the electricity markets, are expected to lead to a significant increase in the penetration rate of RES production in the country's energy mix, as they are expected to replace the operation of conventional power plants during peak load hours, using the off-take energy during the lunch hours when the production of photovoltaic plants is maximized.

For renewable energy technologies beyond wind, solar, and large hydropower stations, the levelized cost of production remains relatively high. The implementation of these projects is challenging and time-consuming, and significant competition has yet to develop. Therefore, the further development of these technologies is expected to depend heavily on state support.

Under the approved support scheme, these stations are eligible for operational support outside competitive bidding processes until 2025. The goal is to maintain this support scheme at least until 2030.

Considering both the new regulatory framework and recent investment interest in the exploration and exploitation of high-temperature geothermal fields, the prospects for geothermal energy's integration into the national energy mix are positive. This applies both to thermal energy production (85 MWth in 2021, mainly for primary sector needs) and electricity generation, where there are currently no operational units in Greece. Although geothermal energy is technologically and commercially mature worldwide, Greece has yet to exploit it for electricity production.

The goal by 2030 is to expand research into geothermal fields and achieve the development of at least 100 MWe of geothermal capacity.

Question by Australia at Thursday, 28 March 2024

Category: Progress towards the achievement of its quantified economy-wide emission reduction target

Type: Before 04 April

Title: Q1

Greece's National Energy and Climate Plan includes measures to accelerate the electricity interconnection of islands (pg. 115). **Can Greece elaborate on these measures, and comment on any lessons learnt through their implementation?**

Answer by Greece

Island Interconnection with the Mainland System: A Key Priority

A significant priority is the interconnection of the Aegean islands with the mainland system. These connections address the electrical isolation of the islands, increase supply reliability, and reduce the cost of generated energy, and utilize the high potential of Renewable Energy Sources (RES) on the Non-Interconnected Islands (NII). Additionally, ending the "electrical isolation" of the Aegean islands expands the country's electricity market.

Currently, all Ionian Islands are connected to the system via High Voltage (HV) lines. For the Aegean Islands, Andros, Syros, Paros, Mykonos, and Naxos are connected via HV lines. Meanwhile, under Medium Voltage (MV) connections, several islands are linked through other main islands: Antiparos, Ios, Sikinos, and Folegandros through Paros; Schoinousa, Iraklia, and Koufonisi through Naxos; and Delos through Mykonos. Additionally, many islands close to the coast (e.g., Sporades, Thasos, Samothraki, Kythera) are interconnected via MV lines. Several Aegean Islands (mainly those geographically close) are also interconnected via MV lines.

Recent Interconnection Projects

In the past three years, ADMIE (Power Transmission Operator of Greece) has completed the following planned island interconnection projects:

- Cyclades Interconnection Phases B and C: Andros, Tinos, Naxos, and reinforcement of Syros (Sept and Oct 2020)
- Phase I of Crete Interconnection: Crete-Peloponnese (early 2021)
- Skiathos Interconnection: July 2022
- Functional replacement of the Aktio-Preveza (April 2023) and Zakynthos-Kyllini (July 2023) interconnections

Ongoing Projects

Several projects are currently underway:

- Phase D of the Cyclades Interconnection: This project involves the interconnection of the Southwestern Cyclades, specifically the islands of Thira, Milos, Folegandros, and Serifos with the mainland system. Expected completion is by 2025.
- Phase II of the Crete Interconnection (Crete-Attica): This project will connect Crete with Attica through a 2 x 500 MW HVDC link with Voltage Source Converters (VSC). Implemented by ADMIE's subsidiary "ARIADNE INTERCONNECTION S.A.E.E.S.," the project is expected to be completed by 2024 and commercially operational by 2025. An important milestone was the connection of Crete to the Interconnected System with the completion of Phase 1 of the interconnection ('small interconnection') and the entry into operation of the Crete market as a Small Connected System from 1 November 2021. Full interconnection of Crete and integration into the electricity market (Q2 2025).

Future Interconnection Goals

Despite progress, several autonomous island systems remain in the Aegean. Today, 28 small and medium-scale autonomous electric island systems in the Aegean represent approximately 10% of the country's total energy consumption.

ADMIE's next focus areas for island interconnections are the Dodecanese and the islands of the Northeastern Aegean. The plans for these projects include:

- Interconnection of the Dodecanese with the Mainland System: This project involves the interconnection of the southeastern Aegean islands, including six autonomous electrical systems: Karpathos (Kasos via MV), Rhodes (Halki via MV), Symi, Kos-Kalymnos (Psérimos, Telendos, Nisyros, Tilos, Leros, Lipsi, Gyali via MV), Patmos, and Arkoi (Marathi via MV). The project will be completed in two phases, with an estimated completion by 2028.
- Interconnection of the Northeastern Aegean Islands with the Mainland System: This project will interconnect the northeastern Aegean islands, including eight autonomous electrical systems: Lemnos, Agios Efstratios, Skyros, Lesvos, Chios (Psara), Samos (Fournoi-Thymaena), Ikaria, and Agathonisi. This project follows the Dodecanese interconnection and will be executed in three phases, with an estimated completion by 2029.

Moreover, the "GR-eco Islands" Initiative aims at promoting sustainable development, green economy, energy autonomy, decarbonization and digital innovation in the Greek Islands by 2030. It constitutes an innovative policy approach. The program initially started from the islands of Tilos, Agios Efstratios, Astypalaia and Halki and will be expanded to 36 more small islands.

To address the challenges that are inter alia closely linked to unsustainable tourism patterns, there is an urgent need for a paradigm shift, at the local level, in energy consumption, energy production and mobility patterns, towards a more holistic approach for sustainable tourism as well as climate neutrality and resilience, in the Greek islands. Moreover, there is a need to urgently promote radically innovative approaches to water and waste management, turning islands into show cases and living labs of circular economy.

The “GR-eco Islands” Initiative aims to support Greece’s contribution to overall EU efforts to reduce greenhouse gas emissions by at least 55% by 2030. Related interventions will be funded from the EU decarbonization fund with more than 150 M Euros already secured.

The vision translates into a series of ambitions that are distinguished in 8 focus areas:

- Climate neutrality and adaptation to climate change impacts,
- energy transition,
- sustainable resource management,
- environmental protection,
- entrepreneurship and innovation,
- digital transformation,
- accessibility,
- human resource empowerment

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