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An Electricity Arc in the East Med

Introduction

Nicosia-based EuroAsia Interconnector has been making impressive progress over the last few months in realizing its main objective, which is the electricity interconnection of Cyprus with Greece and Israel. At the same time, work is in progress on the electric tie up between mainland Greece and the island of Crete, following completion in January of the first leg of the project and the laying of an AC electric cable, the longest subsea interconnector in the world.

On March 8, 2021, Cyprus, Israel and Greece signed a Memorandum of Understanding (MoU) on cooperation in relation to the EuroAsia Interconnector project **(1)**. The three countries signing MoU have come to the common understanding that they need to cooperate in facilitating the timely granting of permits and approvals needed for completing feasibility studies, as well as the discussions and coordination between national electricity regulatory authorities and Transmission System Operators. Moreover, the MoU should ensure adherence to appropriate environmental standards during all stages of the project's implementation, endeavour to harmonise technical standards and examine the ways and means of ensuring the safety, security, sustainability, resilience and reliability of the electricity interconnector cable.

About the Project

The EuroAsia Interconnector is the official EU project developer of the 2,000 MW electricity interconnector between Israel, Cyprus, Greece and Europe since 2017. The EuroAsia Interconnector is a leading European Project of Common Interest (PCI) labelled as an EU "electricity highway" connecting the national electricity grids of Israel, Cyprus and Greece through a 1,208 km subsea HVDC cable.

The EuroAsia Interconnector comprises the electricity interconnection between the grids of Israel, Cyprus, Greece through a subsea DC cable and with HVDC onshore converter stations at each connection point. In July 2020, Cyprus issued the final building permit for EuroAsia Interconnector between Israel, Cyprus and Greece (Crete). More specifically, the relevant permit provided the green light for the construction of the HVDC converter station in Cyprus. In March 2020, EuroAsia Interconnector Limited selected Siemens AG as the preferred bidder for the award of the contract for the construction of the VSC Converter Stations of EuroAsia Interconnector.

The project creates a reliable alternative route for the transfer of electricity to and from Europe. The EuroAsia Interconnector enjoys a high rating by the European Union, falls within the EU energy policy and helps achieve the following energy targets:

- Ends the energy isolation of Cyprus as an EU member state. Cyprus is the last member of the European Union, which remains fully isolated without any electricity or gas interconnections. Ending the energy isolation is an important EU objective.
- The EuroAsia Interconnector creates an electricity highway from Israel and Cyprus to Greece, through which the EU can securely be supplied with electricity produced by the gas reserves of Cyprus and Israel, as well as from the available Renewable Energy Sources (RES), contributing at the same time to the completion of the European internal market.
- The EuroAsia Interconnector ensures the security of energy supply of the three involved countries and the EU system altogether, through the integration of the isolated small systems of Cyprus and

Crete with the Israeli and European networks and the uninterrupted and multidirectional flow of energy.

- Promotes the substantial RES development and contributes to the reduction of CO_2 emissions.
- Offers significant economic and geopolitical benefits to the involved countries.
- Contributes to the EU target for 10% of electricity interconnection between Member States.
- Provides significant socio-economic benefits in the range of €10 billion.

The project is expected to be completed by 2024 and its first stage, which will allow the transfer of 1,000 MW between converter stations and the envisaged voltage level that will be ±500 kV, is anticipated to be operational within 2025, while the interconnector should satisfy the peak demand of Cyprus (1,000 MW) by 2030 **(2)**. It will cover three sections of the Mediterranean Sea: some 329 kilometers between Israel and Cyprus, about 879 kilometers between Cyprus and Crete, and about 310 additional kilometers between Crete and mainland Greece (Athens), as shown in Map 1.

Map 1 – EuroAsia Interconnector

Source: EuroAsia Interconnector

Greece's Independent Power Transmission Operator (IPTO) and more specifically its subsidiary Ariadne Interconnection is in charge of the mainland (Athens) to Crete electricity link, seen concluding by 2023, while EuroAsia Interconnector is developing the Crete-Cyprus-Israel one. And with EuroAsia Interconnector now moving into construction phase with the installation of a huge inverter station in Cyprus, the foundations have been laid for what will soon become a giant electric arc spanning across half the Mediterranean Sea.

For EuroAsia Interconnector, the whole project is a dream come true as the company first framed its ambitious plan back in 2012, at a time when very few people believed that such a project had any chance of materializing. Having carried out all the necessary pre-feasibility studies, EuroAsia Interconnector was successful in obtaining at an early stage much needed backing from the EU and thus managing to include the Interconnector in the PCI funded projects. EU backing was absolutely crucial in securing much needed

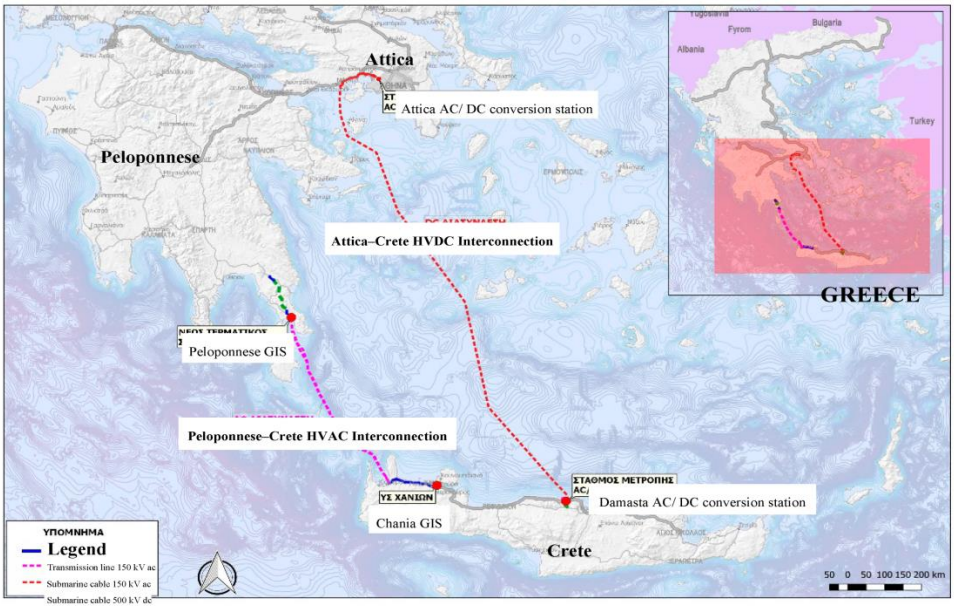
political support and in raising the necessary finance. Furthermore, the significance of the EuroAsia Interconnector project is illustrated by its inclusion in ENTSO's Ten Year Development Plan (TYNDP)[1].

With total costs for the Crete-Cyprus-Israel leg amounting to €2.5 billion and an extra €1.0 billion for the mainland Greece to Crete connection, this electrical link is one the most expensive single infrastructure projects currently being built in the region. The EuroAsia Interconnector is now regarded as a project of high strategic value for the three countries directly involved but also for the EU on account of its role in the strengthening of security of energy supply in the SE corner of Europe.

However, the project's financial eligibility was brought into doubt in October 2018, when Greece decided to proceed alone on the first phase — a power link between mainland Greece and Crete. Athens said that the negotiations with Cyprus to implement the EuroAsia Interconnector had "failed". Greece completed the AC power link between Peloponnese and Crete last year, after fast-tracking the project because Crete's oil-fired power plants — with greenhouse gas emissions exceeding those allowed under EU legislation — have to be decommissioned by the end of 2022. Then, the Greek and Cypriot governments revived their support for the full EuroAsia Interconnector project last June. EuroAsia's first phase will have 1 GW of capacity and is scheduled for commissioning by December 2023, while the second phase will bring capacity to 2 GW by 2025.

The EuroAsia Interconnector, together with Greece's two Crete-mainland interconnectors (see Map 2), will also provide a much needed boost to RES installations in Crete, as the island's autonomous (until now) grid allows only up to 30% of its capacity to run on renewables because of system (i.e. mainly lack of adequate base load capacity). Extending Crete's electricity interconnections both north and east will create a much more favourable operating environment, enhancing power generation from indigenous renewable energy resources.

Map 2 – Greece's Two Crete-mainland Electricity Interconnections



Source: IPTO

[1] https://euroasia-interconnector.com/at-glance/the-big-picture/inclusion-of-the-euroasia-interconnector-in-the-tyndp/

Discussion

The expansion of the interconnectivity of EU's electricity grid is necessary in order to facilitate RES growth as it will further facilitate cross border electricity transactions. This can be achieved through the implementation, among others, of the EuroAsia Interconnector. At the same time, this project is in line with the EU's goal to decarbonize its energy system as it is expected to enable further investments on RES technologies and increase their share considerably, enabling Cyprus to become a net exporter of electricity by 2030. Nonetheless, since the project is not yet developed, there is a degree of risk associated with potential dependence of decarbonisation efforts on a single such project.

In addition, the establishment of a competitive electricity market internally is important for the operation of a regional electricity market. Based on a conducted sensitivity analysis in the context of Cyprus's Integrated Energy and Climate Plan, the increased RES deployment corresponds mainly to solar PV and assumes that at times when generation will exceed domestic demand, the excess can be transmitted to Israel or Greece. Similarly, it is assumed that during periods of low PV output, electricity can be readily procured from these neighbouring systems. This assumes the existence of a framework, through which the involved systems can trade at cost-efficient prices and volumes, similar to the way Nord Pool is structured. A similar approach could be adopted for the development of an Eastern Mediterranean market in the future so as to facilitate integration of greater RES share in the region.

On a country by country analysis, Israel does not currently share an electricity interconnection with any of its neighboring countries. According to PV Magazine **(3)**, the Israeli government announced last year the goal of covering 30% of its electricity needs via renewables by 2030. Solar PV is expected to contribute most of it, corresponding to 26% of Israel's renewable electricity by 2030. In terms of solar PV capacity, this means Israel will need to install some 12 GW to 15 GW of new photovoltaic capacity by 2030. However, this does not look feasible given today's electricity grid architecture, which is largely congested. Therefore, Israel is currently aiming to develop a comprehensive energy storage regulatory framework and has also embarked on a series of solar PV-plus-storage tenders. The EuroAsia Interconnetor is an additional solution providing flexibility.

It should also be noted that Israel, through its parliament in 2018, introduced a new legal framework for its electricity market, aiming for full market liberalization; thus, putting an end to a long period of monopoly by the state electricity company. Today, independent private producers make up around 40% of Israel's largely fossil fuelled electricity market. Hence, the planned operation of EuroAsia Interconnector in three years' time will help further differentiate the electricity mix by introducing electricity imports, allowing for more transactions and contributing to the strengthening of the country's energy security. In this context and thanks to the source differentiation principles, this should be one of the rare occasions, when introducing electricity imports into the system, actually helps improve the energy security of a country.

Although Greece's position with regard to electricity interconnections differs considerably from the Israeli one, there are still serious interconnectivity issues which need to be addressed. Greece has electricity interconnections with all its neighbouring countries (i.e. Albania, Turkey, Italy, Bulgaria and North Macedonia), but it needs to expand its transnational grid infrastructure for two main reasons. Firstly, Greece implemented a new electricity market structure in November 2020, adopting the EU's so-called Target Model. However, interconnections are a key part of the new electricity market design, allowing for

transnational and dynamic bidding strategies that lead to lower electricity prices. Secondly, Greece's current energy policy has as a main goal the full decarbonization of its energy system by 2028 at the latest. According to Greece's National Energy and Climate Plan **(4)**, the RES penetration in gross final consumption of electricity is expected to reach 61% by 2030, with the utilisation of all commercially mature technologies. This means at least an additional 5 GW of new photovoltaic installations and 6GW of wind by 2030, while the country is preparing a comprehensive legal and regulatory framework for energy storage and has also embarked on building new electricity interconnections.

It is worth noting that a second electricity interconnection between Bulgaria and Greece is under development and is expected to become operational by 2023. This project is of great importance for the market coupling of both countries and is expected to increase considerably the interconnectivity of Greece.

Cyprus is the absolute laggard of the three countries. The country has not yet incorporated the EU's Target Model design in its electricity market, which remains largely a monopoly. Currently, Cyprus generates only about 10% of its electricity via RES, while the country aims to cover at least 20% of its total energy needs via RES by 2030. Cyprus's high solar irradiation means that the country could at least replace dirty diesel with a combination of solar-plus-energy-storage systems. However, the country does not yet have a phase-out plan for diesel and has not taken steps to develop a legal and regulatory framework for energy storage. In this context, the EuroAsia Interconnector is good news for Cyprus as it will speed up developments for higher electricity use and the introduction of storage. This is most relevant since Cyprus remains an energy island and the EU's last member state not sharing an electricity link to any other country. Moreover, the subsea power cable will embolden arguments in favour of further RES development.

Another aspect of this ambitious project is geopolitically related. On March 16, 2021, Turkey warned Greece - along with Israel and the European Union - to seek its consent to build the undersea electricity cable. More specifically, Turkey sent a diplomatic note to Greece and Israel claiming that the two countries must seek "its permission before assuming work on a proposed undersea power cable in eastern Mediterranean waters," said Turkey's state-run Anadolu News Agency **(5)**. Turkey's latest claim is that the 1,208-km EuroAsia Interconnector's projected plans show that it will pass through Turkey's continental shelf and more specifically through waters where last year's tensions between Turkey and Greece linked to Ankara's search for natural gas.

As if to add insult to injury, as seen from Turkey's angle, on March 18, 2021, the United States announced that they were "supportive of connecting distribution grids of mainland Europe to Cyprus and Israel via the EuroAsia Interconnector," a spokesperson for the State Department said. The US State Department's spokesman also reiterated that the US "supports all efforts to reduce tensions in the Eastern Mediterranean" and welcomes the resumption of exploratory talks between Greece and Turkey. **(6)**

Whatever the arguments and counter arguments of the two neighbouring countries, the emerging East Med Electricity Arc is a project of major significance which will only bring benefits to the entire region. It could indeed become the foundation for the development of several electricity interconnections between the countries of the region, ending years of energy isolation, while help increase trade and prosperity. The actual construction of the EuroAsia Interconnector through the laying of electricity cables on the seabed of the East Mediterranean (as per the route shown in Map 1) does not pose any serious navigational risks nor does it prevent the countries concerned (Greece, Turkey and Cyprus) in pursuing hydrocarbon exploration activities. However, in order to ensure safe passage and operation of the electricity cable to be laid on the seabed,

some form of technical discussion and briefings will need to be undertaken by the three countries. These should be carried out sooner rather than later.

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