



Deputy Minister  
for Environment and Energy

December 18, 2023

To:  
European Commission – DG Energy  
Directorate C – Green Transition and Energy System Intergration  
Director, Ms Catharina SIKOW - MAGNY

**Subject:** Derogation Request pursuant to Article 64 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the Internal Market of Electricity & Article 66 of Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the Internal Market of Electricity and amending Directive 2012/27/EU.

Dear Ms Sikow,

I am writing to address a matter of critical importance concerning the Greek island of Crete. This communication pertains to the request for an extension of the derogation granted under the provisions of Article 64 of Regulation (EU) 2019/943 and Article 66 of Directive (EU) 2019/944, as outlined in Commission Decision (EU) 2022/258 dated 21 February 2022.

The reasons for this extension request are outlined thoroughly in the following analysis and supporting documentation (Annexes), which have been diligently submitted by the relevant authorities. These submissions were made in consultation with the Regulatory Authority for Waste, Energy, and Water (hereinafter "RAEWW"), and the Independent Power Transmission Operator (hereinafter "IPTO").

## I. INTRODUCTION

The Greek island of Crete is identified as "*a small connected system*" within the meaning of art. 2 para. 43 of the EU Directive 2019/944, as documented herein: a) in the year 1996 it had a consumption of less than 3000 GWh, b) currently, more than 5% of annual consumption is obtained through interconnection with the Greek mainland system.

Recognizing the importance of ensuring a secure and reliable electricity supply for Crete, the Hellenic Republic has prioritized the island's interconnection as a Project of Major Importance. This commitment aligns with the directives 2010/75/EU ("IED") and 2015/2193 ("MCPD") concerning the existing thermal power plants and in view of the RES binding national targets towards 2030. The interconnection of Crete, as approved by the Regulatory Authority for Waste, Energy and Water (RAEWW) by virtue of its Decisions (No. 280/2016, 256/2018 and 1097/2019) concerning the Ten-Year Network Development



Plans, covering the periods 2017-2026, 2018-2027 and 2019 – 2028 respectively, shall be implemented, in two phases, as follows:

- **Phase I, which was electrified on July 3<sup>rd</sup> 2021 and commencing commercial operation on November 1<sup>st</sup> 2021**, concerns the interconnection of the western part of Crete (Chania Prefecture) to the Peloponnese peninsula by means of two circuits of HVAC 150kV, with an underwater length of 132 km. The two circuits have a Nominal Transfer Capacity of approximately 2 X 200 MVA, which means that Phase I only covers part of the island's needs in electricity.
- **Phase II**, refers to the interconnection of the central part of Crete (Heraklion Prefecture) to mainland Greece (Attica region) by means of two HVDC poles of +/-500kV. The two circuits will have a Nominal Transfer Capacity of approximately 2 X 500MW, as a result of which the electricity demand on the island shall be fully covered in the upcoming mid-long term period. The underwater length of the cables will reach a total length of 330km and a maximum depth of 1000m. Its technical challenges have delayed the completion of the project, as detailed in Section VI (a) and Annex 1.

Before the operation of Phase I, Crete was an autonomous power system, operated without any wholesale electricity market. Producers and suppliers did not submit any orders and all volumes were settled at an estimated price of energy. The units were dispatched mainly according to the minimum variable costs. The estimation was calculated on a monthly basis, based on the variable and total costs of the conventional power units, namely PPC's units, since PPC is the only conventional power producer (using heavy oil or diesel as a fuel). In addition, there are several RES power producers with a fixed tariff pursuant to a power purchase agreement (Law no 3468/2006) or a Fixed Tariff operating Aid Agreement (Law no 4414/2016) depending on the date of the start of operation of each station.

The completion of Phase I of the island's interconnection can only partially meet the increased demand in Crete. For the years 2023-2025, the projected electricity demand is approximately 3100 – 3200 GWh, with an estimated peak of around 800MW during extreme heat wave conditions in 2024. Even with the maximum utilization of the interconnection line (i.e., 150 MW \* 8760 h = 1314 GWh), it will only partially cover the island's demand. Therefore, in the interim period (after the commissioning of the Crete/Peloponnese line and before the completion of Phase II – Crete/Attica line), the interconnector could roughly meet approximately 41% of the demand, effectively rendering the island a "small connected system".

For the operation of the electricity market during the interim period between the commercial operation of Phase I and that of Phase II, the Commission granted the Greek State a derogation from the provisions of Directive (EU) 2019/944 and Regulation (EU) 2019/943 (Commission Decision (EU) 2022/258 of 21 February 2022, OJ L 42/92-101, 23.2.2022), allowing it to operate under a hybrid model detailed by Greece (Section III). The derogation was granted until December 31st, 2023, or until the completion of Phase II of the interconnection between Crete and mainland Greece, whichever comes

first, as the System Operator had estimated that Phase II would have been completed before the end of 2023.

The Hellenic Republic formally requests an extension of the Derogation until **December 31st, 2025, or until the completion of Phase II of the interconnection**, whichever occurs first. This request is made under the same rules and conditions, substantiated by the updated information and documentation provided in this communication.

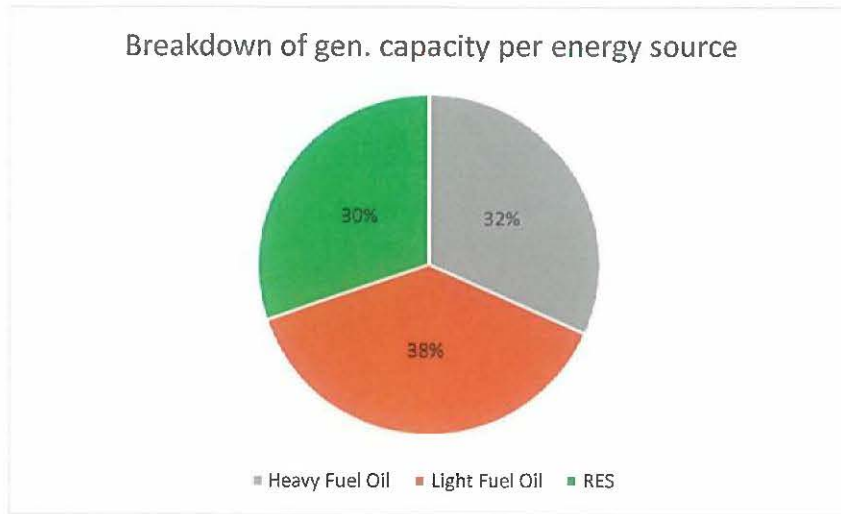
## II. CURRENT STATUS

### a. Electricity Consumption and generation mix

The graph below illustrates the Single Line diagram of the existing and planned (until 2031) Electricity Network of Crete, as well as the location of the conventional generation plants. The Phase I HVAC interconnection line is represented by the blue line on the left, and the light blue line at the center signifies the ongoing construction of the HVDC line in Phase II.



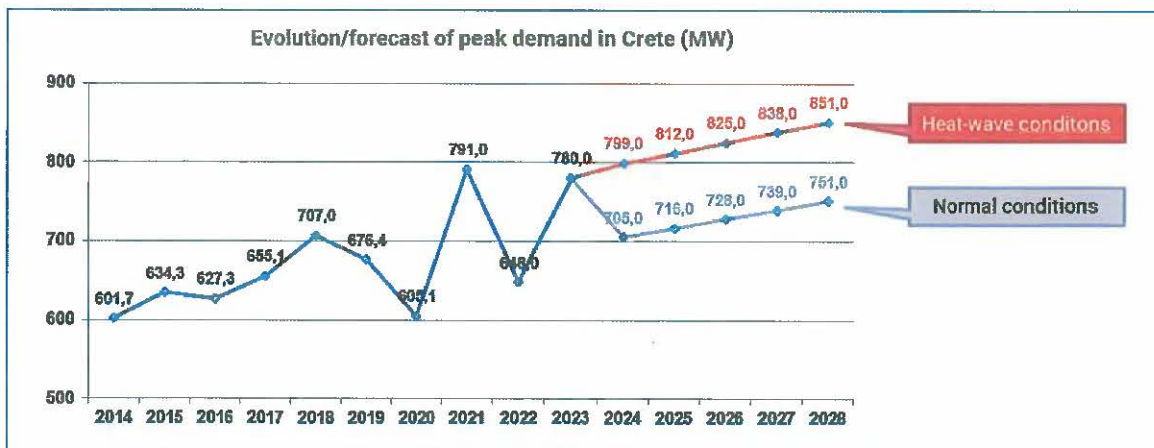
The current conventional generation mix encompasses primarily steam, gas, and a singular combined cycle unit, employing heavy- or light-fuel oil. The net capacity of the existing conventional generation mix totals 652 MW, with a peak generating capability of 600 MW under extreme heat conditions. In parallel, renewable generation holds an installed capacity of 283 MW, dominated by wind power (203 MW) and photovoltaics (78 MW). The distribution of the existing generating capacity across different energy sources is visually depicted in the following graph.



It is essential to highlight that the company Public Power Corporation (hereinafter “PPC”) remains the sole conventional power producer in Crete. While two additional companies have received production licenses for thermal plants in Crete, no power plant construction has developed to date. PPC has temporarily installed non-permanent units within existing power stations, primarily catering to summer peak demand. Additionally, Crete has been declared as congested; therefore, no new RES license has been issued since 2007 (with the exception of RES that commit to construct their own interconnection). The congestion will be lifted upon the operation of the second interconnection (see Section VII (c)).

In terms of energy generation, please refer to Section VII below.

The graph below illustrates the historical evolution of peak demand on the island of Crete since 2014. It also includes a forecast by the IPTO for its evolution over the next five years under both normal conditions and the stress conditions of a heat wave.



It is evident that, upon full interconnection, the island needs can be entirely met by the two interconnections and RES production, even under stress conditions (refer to Annex IV, page 14, of the TSO TYNDP 2023-2032 as submitted to the NRA and subjected to public consultation).



Concerning the retail market, it is clarified that it is open to all suppliers, with approximately fifteen (15) suppliers currently active in Crete. Recognizing that generation costs in the non-interconnected island of Crete are higher than those in the Interconnected System, the Hellenic Republic, driven by social cohesion considerations, has chosen to implement a single tariff for each customer category across the entire territory of Greece. The additional cost incurred is offset through a Public Service Obligation tariff (please refer to the EC Decision related to the case SA 32060).

The supply cost of electricity in Crete remains much higher than that in the interconnected system, as PPC's conventional power units are still required to meet demand, albeit within reduced timeframes (Section IV).

#### b. Derogation pursuant to Commission Decision (EU) 2022/258 of 21 February 2022

On 3 June 2021, the Hellenic Republic submitted to the Commission a request for derogation for the island of Crete in accordance with Article 64 Regulation (EU) 2019/943 and Article 66 of Directive (EU) 2019/944 for derogation from Articles 6, 7(1), 8(1), 8(4), 9, 10, 11 and 13 of Regulation (EU) 2019/943, and from Article 40(4) to (7) of Directive (EU) 2019/944, for a limited period of time, namely until 31 December 2023.

On 21 February 2022, the Commission granted to the Hellenic Republic pursuant to Commission Decision (EU) 2022/258 of 21 February 2022 (OJ L 42/92-101, 23.2.2022) (hereinafter the 'Commission Decision (EU) 2022/258') a derogation from the provisions of Articles 6, 7(1), 8(1) and (4), 9, 10 and 11 of Regulation (EU) 2019/943 and from the provisions of Article 40(4) to (7) of Directive (EU) 2019/944, as regards Crete, **for a period until December 31<sup>st</sup>, 2023** or until the completion of Phase II of the interconnection between Crete and mainland Greece, whichever comes first (the transitional period).

During the transitional period, starting from the successful commissioning of Phase I, which according to the Commission Decision (EU) 2022/258 was expected in the second quarter of 2021 and took place on November 1<sup>st</sup> 2021, until the commissioning of Phase II which was expected to commence by the end of 2023, a hybrid model for the operation of the electricity market of Crete (hereinafter the "**Hybrid Model**") was approved.

Pursuant to point 64 of the Commission Decision (EU) 2022/258 any delay beyond the above transitional period provided by the above Commission Decision to the operation of the interconnector between Crete and the Greek continental system, together with the appropriate metering infrastructure enabling Crete to become part of the Greek wholesale electricity markets, would require a new derogation request.

#### c. National legal framework for the operation of the Hybrid Model

Following the adoption of the Commission Decision (EU) 2022/258, Greece has undertaken the following legal arrangements for the operation of the Hybrid Model, through the enactment of legislative and normative acts by the Hellenic Parliament and RAEWW, namely:



- By Article 107 of Law 4821/2021 (OJ A' 134/31.07.2021) new Articles 108B and 108C was added to Law 4001/2011 (OJ A' 179/22.8.2011) stipulating the operation of the electricity Market of Crete for the transitional period between Phase I and Phase II, as described in Section III. According to the provisions of para 2 of article 108C, November 1<sup>st</sup>, 2021, is considered as the formal date for the completion of the Phase I of the interconnection of Crete to the Greek continental electricity system following which Crete is considered as "Small Connected System" ('hereinafter 'SCS').
- By Article 108 of Law 4821/2021 (OJ A' 134/31.07.2021) a new Article 108D was added to Law 4001/2011 (OJ A' 179/22.8.2011) according to which the high voltage electricity network of Crete, which was owned by PPC and operated by the Hellenic Electricity Distribution Network Operator (hereinafter 'HEDNO') was transferred to the IPTO. HEDNO is no longer operating the high voltage network of Crete but is still operating the low and medium voltage networks. This transfer took place on August 1<sup>st</sup>, 2021, before the start of the commercial operation of the Phase I of the interconnection.
- By Decisions No 755/2021 and 807/2021 of RAE (OJ B'4982/2021 and 5025/2021) the Balancing Market Rulebook, the HEnEx<sup>1</sup> Spot Trading Rulebook, the Non-Interconnected Islands Code, the Hellenic Transmission System (Grid) Code and the Code of the Operator of Renewable Energy Sources and Guarantees of Origin (DAPEEP) were amended to incorporate technical and economic specifications for the operation of the SCS.
- By Article 105 of Law 4821/2021 a new Article 58B was added to Law 4001/2011 stipulating that the pricing of Crete's electricity generated by local thermal units/stations during the period until the completion of Phase II falls within the framework of the public service obligations for the non-interconnected islands.

### III. DESCRIPTION OF THE HYBRID MODEL

Following the successful completion of the Phase I of the interconnection of Crete to the Greek continental electricity system which took place on November 1<sup>st</sup> 2021, a Hybrid Model is operating in Crete as approved by the Commission Decision (EU) 2022/258 and described hereinafter.

The interconnection line is considered – from the "*small connected system*" perspective- as a virtual Balance Responsible Entity (vBRE) (acting as a virtual power plant most of the time). From the Hellenic Electricity Transmission System (HETS) perspective, the interconnection line could be perceived, also, as a vBRE, acting as a virtual load unit. It should be clarified that, in specific circumstances (low demand, high RES output), the cable injects power to HETS. The vBRE of Crete is linked to the HETS on the HV side

---

<sup>1</sup> Hellenic Energy Exchange (HEnEx) is the NEMO for the Greek market.



of the Chania substation and as a result, its withdrawn/injected energy to the HETS is recorded by the Registered Meters of the HV Chania substation.

In the operation of the Hybrid Model, HEnEx submits Orders for the entire local load and thermal generation of Crete, representing the energy schedules determined by IPTO based on the simplified Dispatch Schedule, to both the Day Ahead Market (DAM) and the Intraday Market (IDM). These submissions are made on behalf of all Load Representatives and thermal generators in Crete. Furthermore, all RES contracts have been transferred to DAPEEP (by a Ministerial Decision) and during the transitional period, all metering data for existing and new RES in Crete are provided to DAPEEP by HEDNO. Simultaneously, DAPEEP submits Orders for the RES generation of Crete. The total demand, as forecasted by IPTO, is allocated to Load Representatives in accordance with their supply percentage ratio calculated ex-ante on a monthly basis by HEDNO. Through this process, the complete load and generation profile of Crete are "virtually" introduced into the DAM and IDM of the mainland interconnected system.

The operation of the interconnection follows the economic signals of the price formation in the Interconnected System markets vis-à-vis the Cretan Market. Given the considerably higher costs of the Cretan thermal generation as expected, for reasons of economic efficiency, the Phase I interconnection (vBRE) mostly imports energy to Crete. Note that, given the amount of RES penetration in Crete and the need to also keep thermal plants running at their technical minimum limits, it is expected that at periods of low load and high-RES output, the flow on the cable reverses in order to avoid RES curtailment and allow the maximization of the utilization of RES units in Crete. In such few cases when the cable is exporting to the Interconnected System, all generation exported from Crete to the mainland via the Phase I cable is considered to come from RES generation and therefore all thermal generation in Crete is considered to serve the local load.

The technical description and procedural framework of the Hybrid Model have been comprehensively outlined in the initial derogation request submitted by the Hellenic Republic, aligning with the approval granted by the Commission through (EU) 2022/258.

#### **IV. EVALUATION OF THE HYBRID MODEL**

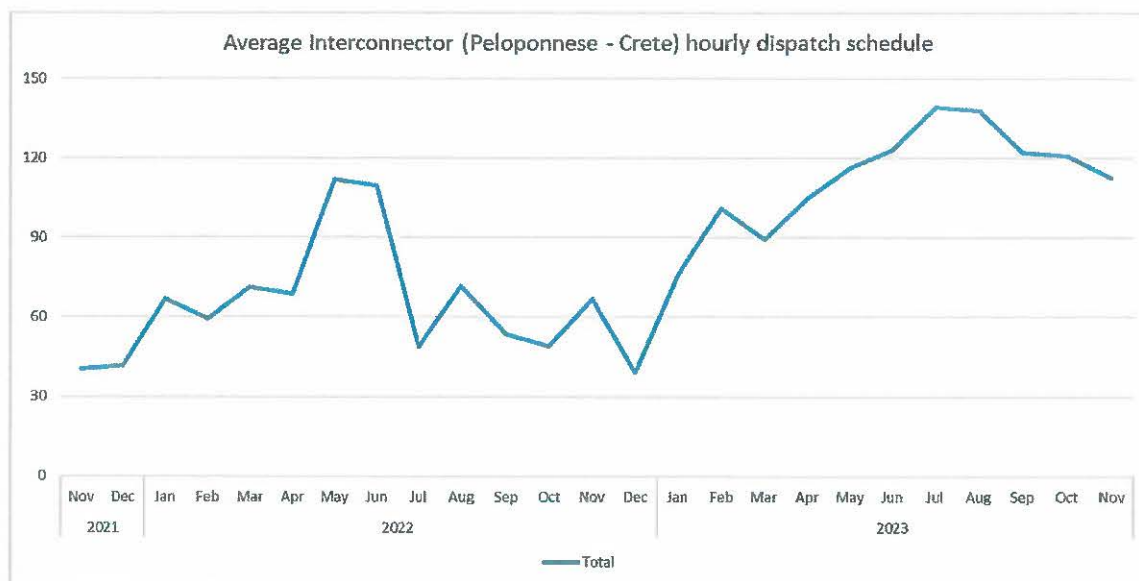
Data from the actual operation of the Crete hybrid model (for the period from 01.11.2021 to 30.11.2023) the hourly average dispatch schedule of the interconnection was 75.23 MW/hour on baseload basis with direction from the IS to the Small Connected System. This schedule leads to 50.15% utilization rate of the interconnection, as the HVAC 150 kV interconnection was fully operational during the whole period. In the following table, the dispatch schedules of each year are depicted both for baseload and peakload and separately for the period of summer of each year (from May to September when the number of visitors is high).

Period	Baseload Dispatch Schedule (MW)	Baseload Utilization Rate (%)	Peakload Dispatch Schedule (MW)	Peakload Utilization Rate (%)
Year 2021*	43	28.67%	55.8	37.20%
Year 2022	73.33	48.89%	87.9	58.60%
Summer 2022	87.35	58.23%	98.87	65.91%
Year 2023**	114.19	76.13%	130.42	86.95%
Summer 2023	127.99	85.33%	143.23	95.49%

\* For Year 2021 only November and December are available, as the hybrid model started on 01.11.2021.

\*\* For Year 2023 the data shown in the table are until 30.11.2023

Additionally, the graph below illustrates the Average Interconnector (Peloponnese - Crete) hourly dispatch schedule. It is evident from the graph that the utilization of the interconnection is increasing, corresponding to the rise in demand on the island.



The interconnection schedule (injection from IS to SCS) exceeded or matched 140 MW for 4864 hours out of a total of 14912 hours. Over 4068 hours, constituting approximately 27% of the total, the schedule consistently met the interconnection capacity of 150 MW, primarily during the summer period. This indicates that the interconnection capacity was nearly fully utilized for a significant portion of the time.

Conversely, there were 519 hours, equivalent to 3.5% of the total hours, where the interconnection schedule had an opposite direction (from SCS to IS). This reverse schedule predominantly occurred during non-summer months and particularly on days with high RES production. Other contributing factors included compliance with Crete Dispatch Schedule requirements, such as technical restrictions





on thermal units (minimum up-time, minimum down-time, etc.), reserves requirements, and considerations related to residual load.

The application of the hybrid model has proven to be the most suitable, efficient, and effective solution for the market during the transitional period.

From an economic efficiency standpoint, the separate execution of the simplified Dispatch Schedule, the "virtual" participation of Cretan load and generation in the Day Ahead Market (DAM) and Intraday Market (IDM) of the Interconnected System (IS), and the implicit calculation of the Interconnector's Market Schedule have resulted in significant cost savings. The Cretan market has benefited from the reduction of inefficient oil plants' production, partially replaced by the interconnector, while avoiding excessive redispatching costs associated with mandatory Balancing Market operation. This is notwithstanding the latter's incorporation into the Balancing Market of the IS or its distinct operation following the creation of a new bidding zone. Consequently, the total cost of electricity supplied in Crete, expected to be compensated by a PSO charge, was lower than the cost that would arise with an alternative approach (single bidding zone or two bidding zones). Additionally, the Greek wholesale markets have gained from the injection of low-cost Renewable Energy Sources (RES) energy via the interconnection, especially amid the current energy crisis related to high gas prices.

Furthermore, the environmental impact of the hybrid model is significant: the more polluting units of the Cretan System were replaced by the interconnector, which injected energy produced by the environmentally friendlier units of the Interconnected System (IS). Moreover, the utilization of Renewable Energy Sources (RES) units in Crete was maximized, and RES curtailment events were restricted through the injection of Cretan RES energy into the IS markets.

Additionally, the participation of the virtual Balance Responsible Entity (vBRE) in the wholesale markets and the Cretan market enhances competition. Considering that all Cretan thermal plants are owned by PPC, the operation of the interconnector reduces PPC's share of power and creates room for competition.

Therefore, the hybrid model has promoted social benefits and served the public interest.

## V. APPLICATION TO THE EUROPEAN COMMISSION FOR NEW DEROGATION

### a. Scope of the Derogation

As mentioned above, the current request constitutes an extension of the currently granted derogation that expires on December 31<sup>st</sup>, 2023. For reasons of completeness, the scope and extent of the derogation, as well as relevant justification, are presented in the following sections.

According to article 66 para 1 of Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (the "Electricity Directive"): *"Member States which can demonstrate that there are substantial problems for the operation of their small connected systems and small isolated systems, may*



*apply to the Commission for derogations from the relevant provisions of Articles 7 and 8 and of Chapters IV, V and VI.”*

According to article 64 para 1 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (the “Electricity Regulation”): *“Member States may apply for derogations from the relevant provisions of Articles 3 and 6, Article 7(1), Article 8(1) and (4), Articles 9, 10 and 11, Articles 14 to 17, Articles 19 to 27, Articles 35 to 47 and Article 51 provided that: (a) the Member State can demonstrate that there are substantial problems for the operation of small isolated systems and small connected systems;...*

*In the situation referred to in point (a) of the first subparagraph, the derogation shall be limited in time and shall subject to conditions aiming to increase competition and integration with the internal market for electricity”.*

Given that Phase II for the interconnection of Crete to the continental national transmission system (full interconnection) has not been completed yet for the reasons described in detail in Section VI (a) and thus the necessity to prolong the operation of the Hybrid Model for the island of Crete, as described in detail Section III for a transitional period until the end of 2025 (hereinafter the “Transitional Period”), the Hellenic Republic submits a (new) Derogation Request from the provisions of articles 6, 7 par 1, 8 par. 1 & 4, and 9-11 of the Electricity Regulation and the provisions of article 40 par. 4-7 of the Electricity Directive, respectively. More specifically:

#### **A. Derogation according to article 64 of the Electricity Regulation**

The Hellenic Republic takes the view that the hybrid nature of the Cretan market status still observes the General Principles governing the operation of the electricity markets, as provided by article 3. For this reason, the derogation request is not extended to include article 3.

##### **i. Derogation from article 6**

Considering that article 6 refers to the balancing market and given the description and operation of the Hybrid Model which does not include a balancing market.

##### **ii. Derogation from article 7 par. 1**

Considering that article 7 par. 1 refers to day-ahead and intraday markets and given that the description and operation of the Hybrid Model does not include day-ahead and intraday markets.

##### **iii. Derogation from article 8, par. 1 and par. 4**

Considering that article 8 refers to the trade on day-ahead and intraday markets and given that the description and operation of the Hybrid Model does not include trades on day-ahead and intraday markets.



iv. Derogation from article 9

Considering that article 9 refers to forward markets and given that the description and operation of the Hybrid Model does not include forward markets.

v. Derogation from article 10

Considering that article 10 refers to technical bidding limits and given that the description and operation of the Hybrid Model does not include technical price limits until the island of Crete will be fully interconnected with HETS.

vi. Derogation from article 11

Taking into account the fact that the region of Crete will not be incorporated into the IS bidding zone but will be operated on the basis of a hybrid model, which resembles to a distinct “*quasi*” bidding zone, a single estimate of the value of lost load is not considered as reasonable. RAE shall have the discretion to determine the value of lost load in Crete in a nuanced way.

**B. Derogation according to article 66 of the Electricity Directive**

Considering that article 40 paragraphs (4) to (7) set out the principles for procuring ancillary services, including non-frequency ancillary services, and given the absence of operation of a balancing market and a market-based procurement of non-frequency ancillary services in Crete, Greece requests a derogation from article 40, paragraphs (4) to (7) for the TSO tasks applicable to Crete.

## **VI. REASONS FOR THE DEROGATION REQUEST**

**a. Delay in the construction of the Phase II Interconnection**

The Derogation that has been granted to the Hellenic Republic via Commission Decision (EU) 258/2022 is in effect until December 31<sup>st</sup>, 2023, or until the completion of Phase II of the interconnection between Crete and mainland Greece, whichever comes first, based on the commitment of the IPTO to complete Phase II before the end of 2023.

However, this has not been possible due mainly to three reasons, as explained in detail in the relevant note by IPTO in **Annex I**:

1. Technical challenges of the project. During the preparation of its Technical Specifications in 2019, the Attica – Crete link was among the two island interconnections with the greatest capacity but also among the top three deepest interconnections, worldwide. These factors dictated the usage of VSC (Voltage Source Converter) technology for the Converter Stations in a bipolar configuration, which places this interconnection in a short list of projects exploiting similar advanced technical features. Therefore, careful steps had to be taken throughout its detailed design and implementation, with unexpected setbacks along the way.



2. The Covid-19 pandemic, although pre-existed the first derogation request, has created an aftermath of delays to the project. As it is widely known, after the end of the pandemic, procurement of materials and services exhibits – in some cases – substantial delays. As is usually the case in large projects, there are steps that are prerequisites for the continuation of the entire process, a delay in which hinders its construction.
3. Unexpected delays in permitting of the on-shore installations, with more typical example the discovery of important antiquities on site, as well as during the construction phase of these installations, for example the finding of karstic cavities in the underground area of the Damasta Converter Station, which jeopardized the stability of the future constructions.

The updated timeline for the completion of the project per sub-project, as provided by IPTO, is outlined in Annex 2. It is essential to note that some of the network upgrade works on the island (Cluster 19.4 in IPTO's Ten-Year Network Development Plan) will be gradually finished by the end of 2028. IPTO has confirmed that this will neither impact the operation of Phase II interconnection nor create new congestion points.

#### b. Challenges in the operation of the system

Several data, assumptions, and scenarios were considered in formulating the proposal for the hybrid model, regarding the operation of the market in Crete within the Bidding Zone of the mainland interconnected system (IS) or as a distinct bidding zone (two-zones approach). These considerations address a spectrum of concerns ranging from technical and system security to economic efficiency.

Primarily, in line with the bidding zone review process, which has been initiated in 2019 on an EU level in accordance with article 14(5) of Regulation 2019/943 the Greek TSO, IPTO, at that time, incorporated two options for the operation of the market in Crete, that is Crete being part of the mainland Greece zone and constituting a second bidding zone. The TSO also provided evidence as to whether according to the provisions of article 33 of CACM the operation of Crete as a separate bidding zone until the operation of Phase II is not recommended. The conclusions from the assessment of (a) the incorporation of the Cretan Market and (b) the second bidding zone approach remain valid.

##### (a) Incorporation in the mainland Greece zone Option

It is essential to emphasize that a fundamental prerequisite for the inclusion of the Crete market in the mainland IS bidding zone—allowing market participants in Crete to directly engage in the Day Ahead, Intra-day, and Balancing markets, which commenced operation on the mainland Greece on the 1st of November 2020—was the completion of all required technical infrastructure on the island. However, as of now, these infrastructure works are still in progress.

The installation of the necessary meters, with specifications in line with those of the interconnected system has not been completed yet for the three main conventional power units in Crete (Chania, Linoperamata and Atherinolakos), thereby restricting their direct participation to the wholesale market of mainland Greece. In addition, the measurement units of the RES installations currently have the specifications of those units installed in distribution networks. In addition, the measurements units

connecting HV with MV network, on the 30 busbars of the island, do not have adequate measurement units to create a clear separation between the HV and MV network.

The installment and the upgrade of the necessary infrastructure will be ready until Q1 2024 according to the IPTO timeline.

Therefore, the lack of the necessary infrastructure cancels out the possibility for the electricity market in Crete to be incorporated in the Bidding Zone of mainland Greece.

In any scenario where the Crete market operates as part of a single bidding zone, and taking into account the existing congestion at the interconnection, a notably high redispatching cost is anticipated during the period between Phase I and Phase II of the interconnection. Specifically, due to the transmission capacity limitation of the Phase I interconnection being less than the residual load (the variance between local load and local RES production) of the island, congestion is expected to persist for extended durations. Consequently, there will be a systematic necessity for the compulsory dispatch of local thermal units in Crete until the completion of Phase II.

In this context, both the units of the Small Connected System (SCS) and those of the Interconnected System (IS) will undergo systematic redispatching in the Integrated Scheduling Process (ISP). This process considers the interconnection's transmission capacity limit and other technical restrictions, leading to an overall increase in the cost of the Greek electricity market. Specifically, the total demand, inclusive of Crete's load in the Day Ahead Market, coupled with the participation of Crete units offering priced bids (Block and Hybrid Orders) rather than Priority Price Taking Sell Orders, is expected to elevate the clearing price of the Day Ahead Market. It is important to note that the existing generating units in the SCS, utilizing heavy-fuel and light-fuel oil, possess higher variable costs than the Combined Cycle Gas Turbine Units of the IS. Consequently, their bids may not be selected by the Day Ahead Market Coupling Algorithm (EUPHEMIA). Considering these assumptions:

1. The injected energy from local generation corresponding to the upward redispatch would be compensated based on the full cost of the local units,
2. The downward redispatch of the units in the IS would be cleared based on the downward mFRR clearing price (this is a good scenario. The owners of the IS units will be aware that it is needed to be downward redispatched and therefore they will decrease their bids, i.e. smaller mFRR clearing price leading to higher redispatching cost), and
3. Day-Ahead Market clearing price would increase by about 2%,

Based on the aforementioned assumptions, the estimated total cost of electricity, including Crete in the Greek bidding zone, is higher by **approximately €190 million** compared to the actual calculated cost of the hybrid model applied during the period of January-September 2023.

#### (b) Creation of a second bidding zone Option

The establishment of a second bidding zone in Crete would necessitate additional infrastructure investments to mitigate technical congestion. However, in 2021, it was determined that Crete would be



considered part of the IS bidding zone upon the completion of Phase II of the interconnection. Consequently, making new investments, specifically for the interim period until the completion of Phase II, would result in stranded costs. Therefore, creating a second bidding zone for the remaining short timeframe is deemed an inefficient solution. Additionally, considering that the procedures for establishing a second bidding zone, following European practice, could take up to 15 months, its utilization would be exceedingly limited.

In any case, the disproportionate, ineffective and infeasible aspects of the creation of a second bidding zone, considering the criteria outlined in article 33 of CACM, were analyzed in pages 18-21 of the initial request for derogation (submitted on 3.6.2021). The rationale presented in the initial request remains valid and is repeated herein for for the sake of comprehensiveness, with the necessary adjustments.

In accordance with article 33 of CACM, there are three criteria that need to be examined when deciding on a new zone: a) network security, b) overall market efficiency and c) stability and robustness of the bidding zones.

With regards to issues related to **network security**, the proposed operational hybrid model does not make any practical difference compared to the operation of the market in Crete as part of the Bidding Zone mainland IS or as a separate bidding zone. The HV network and the MV/LV network in Crete are operated by IPTO and HEDNO, respectively, according to all required standards in whichever model of operation of the market. However, all the necessary investments of upgrade of the network need to be completed both by IPTO and HEDNO, before the completion of Phase II to allow for the direct participation of market participants on the island of Crete to the wholesale market of the mainland.

Related to **market efficiency issues**, under the current regulatory framework, if there are two bidding zones, the price differentials between the two zones lead to different electricity supply costs for the participating suppliers in the Day-Ahead & Intra-Day markets and the Balancing Market. With the adoption of a distinct bidding zone in Crete, production in this zone would be cleared based on a single price, while under the hybrid model, production is cleared based on the full cost for each unit. The single price in the zone would be determined by the bid of the most expensive unit dispatched in each time period of the day. Therefore, during periods when light oil (diesel) fueled units would enter the market, the cheaper fuel oil units would be paid the bid price of the more expensive diesel-fuelled units. Under the conservative assumption that the units in Crete would submit bids at a price corresponding exactly to their full cost and not higher (as would be possible given that PPC is the only producer with conventional units in Crete and there is no actual competition), the cost of production in the Crete zone, in the case of the adoption of two bidding zones, is estimated to increase, compared to the actual calculated cost of the hybrid model applied for the period January-September 2023, **by approximately €217 million**.

Furthermore, according to the current regulatory framework, in the event that there are two bidding zones, the price difference between the two zones leads to different electricity supply costs for the participating Suppliers. Even if the difference in supply costs is recovered through a regulated process, such as that of the Public Service Obligations (PSOs) currently in place, the cost to be recovered, due to the marginal pricing of the day-ahead market and the intraday market, will always be higher in Crete.



This will result in an additional burden on Greek consumers, which is not in line with the economic purpose of the Crete interconnection, i.e., the reduction of the energy costs for the end-consumers.

Furthermore, the operation of the electricity market in Crete as a separate bidding zone is anticipated to be inefficient, primarily due to the substantial market share held by PPC in both conventional generation and supply. Additionally, there is a lack of sufficient energy differentiation, and the interconnection level with the mainland during Phase I will be relatively low, given that PPC is the sole producer with conventional generation units and the primary supplier in the retail market. Despite the anticipated increase in RES production following the interconnection implementation, along with the curtailment of some existing local conventional generation units, PPC's market dominance is expected to persist, resulting in **limited liquidity** within the potential bidding zone.

The stability and resilience of the bidding zones between Phases I and Phase II of the interconnection are subject to complete foreseen congestion. The congestion will persist until the Attica-Crete interconnection (Phase II) is finalized, as the remaining load of Crete (load – RES – local must-run thermal production) generally exceeds 150MW, the capacity limit of the Phase I interconnection. However, upon the completion of the extensive interconnection (Phase II), congestion is anticipated to cease entirely, becoming an exceptional occurrence, primarily in cases of partial or total unavailability of the DC interconnection. Consequently, the bidding zone of Crete cannot be deemed sufficient and robust over time, as the potential congestion ceases to be structural, i.e., clearly defined, predictable, geographically stable, and frequently recurring under normal system operation.

Finally, it should be noted that the examination of the alternative of the formation of an offer zone for Crete was included in the control process for the revision of the European offer zones organized by ACER. As a result of this process, ACER issued decision 11/2022, in which, based on the indicators analyzed, Greece was not identified among the areas of the Network where alternative configurations should be studied in priority.

## **VII. CONDITIONS OF ART. 66 PAR. 2 OF DIRECTIVE (EU) 2019/944**

### **a. Derogation limited in time**

The derogation request is envisaged as limited in time based on the operation and connection of the island with mainland with the completion of Phase II of the interconnection, expected in May 2025 and in any case no later than the end of 2025.

### **b. Impact assessment of the derogation for the suppliers of Crete as well as of those of the IS**

As the Hybrid Model has demonstrated lower total costs to the system compared to alternatives such as a 2nd bidding zone or a single bidding zone with substantial redispatching costs (as discussed in section IV above), this is perceived as a benefit to suppliers across the board.



Irrespective of the chosen model (i.e., not directly linked to the derogation), the interconnection encompass reduced costs for providing guarantees for participation. This is due to more frequent settlements occurring on the IS compared to the NII, and the supplementary settlement conducted by HEDNO on Crete being applied to a lower transaction amount (in €).

Interconnection will also impact the total market and consumers as follows:

- **Transmission Use of System Charges:** Given that the cost of the interconnector will be included in the IPTO allowed revenue, tariffs are expected to increase, although the participation of the demand in Crete in covering these costs will alleviate the increase.
- **Distribution Use of System Charges:** We do not expect a change in the level of charges but there will be a change in the procedure for the calculation and collection of these charges from the suppliers on Crete given that HEDNO follows different procedures on the IS and NII.
- **PSO charges:** These are expected to decrease (see analysis in Annex 1) reducing the charges to final consumers but also improving cashflow and reducing guarantee costs for suppliers across the board.
- **RES Levy:** RES account inflows for the energy produced in Crete will be reduced as RES production will be compensated at market prices of the IS and not on the Average Variable Cost of thermal generation on Crete.

Suppliers are relatively neutral to these changes as these charges are pass through, although it may have a small effect on cashflows and cost of guarantees.

With regards to the specific impact of the Hybrid Model on suppliers, the model has been received positively given that it is simpler in its implementation and creates less additional market costs overall. The Market Participants of Crete (suppliers, DAPEEP and PPC as thermal producer) have also been excluded from “on behalf of trading” fees (OBOT fees) of HEnEx.

### **c. Renewables and Storage Integration**

The entry into service of the Crete - Peloponnese interconnection has partly relieved the technical limitations of the autonomous operation of the electricity system of Crete, during which the penetration of RES had been limited to percentages below 25% of the load, on the grounds of security and stability of the operation of the Cretan system and the technical limitations in operation related to the renewable generation volatility and the technical characteristics of the local conventional production plants.

#### **i. Effects of the limitations on existing RES**

As shown in the table below, renewable energy sources (RES) production, comprising both wind parks and photovoltaics, constitutes an average of twenty-two percent (22%) of the total electricity



production in Crete over the period 2017-2020. This amounts to approximately 676,000 MWh/year, with wind parks contributing seventy-five percent (75%) of the total RES production, equivalent to around 510,000 MWh/year.

Year	RES Production (MWh)	Conventional Units Production (MWh)	Total Production (MWh)	Imports (MWh)	% of RES to total production
2017	680.828,85	2.372.736,78	3.053.565,62		22%
2018	677.651,55	2.404.160,02	3.081.811,57		22%
2019	670.576,16	2.438.384,33	3.108.960,49		22%
2020	676.909,82	2.134.452,99	2.811.362,81		24%
2021	720.837,20	2.058.899,00	2.779.736,20	221.376,10	26%
2022	794.652,70	1.923.975,80	2.718.628,50	360.842,00	29%

Before the commissioning of Phase I interconnection, HEDNO estimated that around 10% more energy from wind parks could have been produced if not for the technical limitations of the system in Crete. In the year 2020, due to lower consumption on the island, this unrealized production amounted to approximately 12-15%. On average, the energy not generated from wind parks was approximately 56,000 MWh per year.

The operational launch of the Crete-Peloponnese interconnection facilitated the flow of this energy into the interconnected system, particularly during periods of low load and high RES production. This eliminated RES curtailment and maximized the utilization of RES units. In fact, during 2021 and especially 2022, which marked the first year of full interconnection operation, the increase in RES production surpassed the previously estimated unrealized amount.

#### **ii. RES and storage capacity after Phase II of the interconnection**

The long lead time required for the development of Renewable Energy Source (RES) projects necessitates early preparations in Greece for the installation of new RES capacities following the completion of Phase II of the Interconnection. Consequently, the derogation for the continued operation under the hybrid model will not slow down the ongoing development of RES on the island.

In order to better plan RES licensing, the Regulator has already conducted studies regarding the technically feasible limits of the grid to integrate RES capacity on the island of Crete. More specifically, based on two studies performed by the IPTO and by the University of Crete, RAEWW has concluded (Decision 88/2023, OJ B' 1400/9.3.2023) that after the completion of the interconnection, Crete will accommodate at least 2150MW of RES, a number which may be increased with the installation of storage units, up to the limit of 2500MW, according to the following formula:

$$RES_{total\ margin} = RES_{margin} + 1,5 * \sum_i A_{STORAGE}(i)$$

with  $RES_{total\ margin} \leq RES_{cap}$

where:

- $RES_{margin}$ : has the value of 2150 MW
- $A_{STORAGE}(i)$  of a storage unit (i) is, as the case may be:
  - the maximum absorption capacity of a pure electricity storage station (including pumped storage)<sup>2</sup>
  - the installed storage (absorption/pumping) capacity of a hybrid plantwhich is taken into account by the TSO when granting connection terms.

and

- $RES_{cap}$ : is the maximum value, which cannot exceed 2500 MW. This value should be reconsidered three years after the commercial operation of the interconnection of Phase II.

### iii. RES participation in the market

Following the completion of Phase I, the Hellenic Republic will fully observe EC reasoning in SA 44666 “New operating aid scheme for the production of electricity from RES and HECHP”. More specifically, as provided in par. 40-42 and 61 of EC Decision, «all RES and HECHP installations receiving support under the new scheme and exceeding the relevant technological capacity thresholds (i.e. 3 MW for wind and 500kW for other technologies) will be obliged to switch to the type of operating aid support that applies to the equivalent installations on the mainland (i.e. feed-in premiums)».

By virtue of Decision SA 44666, “New operating aid scheme for the production of electricity from RES and HECHP”, Hellenic Republic was granted approval by the Commission for the new support regime for RES stations. Additionally, Decision SA 48143 outlined the tendering procedures for electricity production from renewable energy sources and highly efficient combined heat and power installations. Furthermore, as per Decision SA 60064, specifically addressing the Crete island tender scheme for 2021-2025, tenders for photovoltaic (PV) and wind projects in Crete can be organized by the Regulatory Authority for Waste, Energy, and Water (RAEWW).

According to the aforementioned Commission decisions, RES stations undergo a competitive bidding process led by RAEWW to determine a Reference Price. The auctions primarily target non-mature projects in earlier licensing stages, subject to specific conditions for the awarding and final granting of operating aid. As a result, the Reference Value assigned to a project, secured through participation in a competitive process, remains unaffected by electricity market prices.

Considering the time required for licensing and activating a RES station, spanning 2 to 6 years

---

<sup>2</sup> E.g., a hybrid station has been licensed that includes two wind farms of two wind farms with total capacity of 78MW and a pumped-controlled production system at the water dam of Amari.



depending on technology, it is not anticipated that any new RES station will commence operations within the next 2 years; especially given the complete interconnection of the island to the mainland.

**d. Electromobility and demand response**

Article 64 of the Electricity Regulation provides that the derogation does not obstruct the potential for flexibility or energy storage. Indeed, the hybrid model has no impact to the further development of electromobility and demand response resources.

Sincerely,

Alexandra Sdoukou



Deputy Minister of Environment & Energy

**ANNEXES**

Annex 1. Note by the IPTO regarding the reasons for the delay in the construction of Phase II interconnection.

Annex 2. Estimated timeline for the completion of Phase II of the interconnection.