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# **Annex 3: Justification of alternative configurations of the Bidding zone review region “South East Europe” which are to be considered in the bidding zone review process**

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Bidding Zone Review Region "SEE"

18 February 2020

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This document contains information to be provided by a BZRR for the explanatory note, which will be made for the BZ Review Methodology, in line with the [guidance](#) of the BZTF to the BZRR on how to select configurations and what information on the configurations has to be provided.

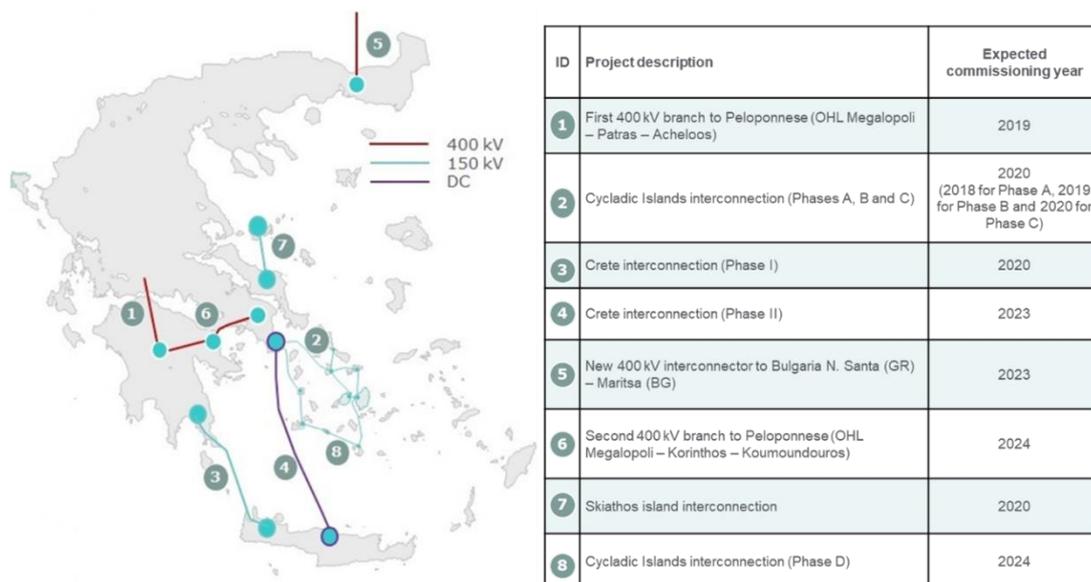
## 2. General justification for the set of configurations

The Greek interconnected system currently consists of the HV (150 kV) and EHV (400 kV) system in the Greek mainland and adjacent islands. In the past, until the beginning of 00’s, due to spatial allocation of generation and demand, internal congestion occurred between the North and South areas of the system. However, due to system expansion in addition to the construction of new generation units in the southern part of Greece, this phenomenon is no longer evident. Internal congestion is currently observed only in a specific part of the 150 kV system, the Peloponnese area. However, those congestion incidents are expected to be eliminated by the beginning of 2020, once a new 400 kV OHL between the mainland and the Peloponnese area is constructed (1). Therefore, according to the current status, if mainland Greece and adjacent islands are concerned, there is no need for examination of additional bidding zone configurations other than the GR BZ.

New transmission expansion projects apart from the aforementioned OHL to Peloponnese focus on connecting non-interconnected islands to the Greek mainland (2, 3, 4, 7, 8). Greece has almost 200 inhabited islands, most of which are planned to be connected to the mainland either directly through the HV system, or indirectly through the MV network.

The biggest interconnection project for IPTO is currently the interconnection of Crete, the largest Greek island. Crete, is going to be interconnected in two phases:

- Phase I: AC 150kV line connection of 2x200 MVA (3) with an expected NTC of 150-180 MW which is expected to be completed by the end of 2020.
- Phase II: DC 500 kV cable connection of 2x500 MVA (4) with an expected NTC of 800 MW, which is expected to be completed by the end of 2022.



IPTO analysis has shown that during Phase I of the interconnection, which is going to last two years, the 150 kV line will be congested almost 100% of the year, because generation cost in Crete is much higher than in the Greek mainland, while residual Crete demand to be covered by units other than Renewables is always above 180 MW. For this reason, the Greek NRA has asked IPTO to examine the possibility of creating a new BZ in Crete. However, past the completion of Phase II of the project, no congestion is foreseen between the Greek mainland (existing GR BZ) and Crete (proposed CR BZ). Therefore, for the purpose of this study, the examination of two configurations is proposed:

- Configuration 1: Bidding Zone GR (Status Quo Configuration)
- Configuration 2: Bidding Zones GR, CR (New Configuration)

### 3. Per configuration

#### Configuration 1 "Bidding Zone: GR" (Status Quo Configuration)

##### Description of the configuration

In this configuration it is assumed that no new Bidding Zones are considered in Greece until 2023, therefore the status quo configuration of a single GR BZ is taken into account.

As mentined above, the current internal congestion in the 150 kV system in the area of the Peloponnese will be alleviated by the beginning of 2020, due to the construction of a 400 kV line between the Acheloos EHVSS and the Patras and Megalopoli EHVSSs. The Peloponnese system will be further strengthened with the construction of a second 400 kV line connecting Megalopoli and Koumoundourou EHVSSs.

A new line between Nea Santa (GR) and Maritsa East (BG) is expected to be constructed within 2023. This line will impact on the NTC between GR and BG, however it will not produce any internal congestion within the GR BZ.

All other new system transmission expansions focus in the interconnection of further isolated Greek islandic systems with the mainland and cause no internal congestion within the GR BZ.

Finally, as already discussed, the island of Crete will be interconnected with the Greek mainland in two phases. During Phase I, internal congestion will occur between the Peloponnese and Crete (150 kV line between Molaoi and Chania HVSS). During this period, redispatching will be required and it is estimated that daily redispatch volume will be approximately 3,3 GWh, resulting in redispatching cost of approximately 240 M€ per year. However, this situation will be remediated by 2023, once the Phase II of the project will be completed (with the construction of the DC cable between Koumoundourou HVSS and Damasta HVSS) and no further internal congestion will be evident between the Greek mainland and the Crete system.

Since this phenomenon will occur only for two years and past the completion of Phase II of the interconnection a second BZ will not be required, the first configuration considered is a single Bidding Zone, which consists of the entire interconnected Greek system with all foreseen expansions until 2023 (status quo configuration).

Configuration 1 "Bidding Zone: GR" (Status Quo Configuration)									
Cty-CBk	Bidding Zone Border	TSO1	Station 1	TSO2	Station 2	Voltage level [kV]	Type	Network element Name	New/different compared to status quo?
GR	GR - BG	IPTO	a.Thessaloniki b. Nea Santa	ESO-EAD	a. Blageovgrad b. Maritsa East	400 kV 400 kV	AC AC		No
GR	GR-IT	IPTO	Arachthos	TERNA	Galatina	400 kV	DC		No

## Configuration 2 "Bidding Zones: GR, CR" (New Configuration)

### Description of the configuration

#### Justification for splits, mergers and different delineations compared to the status quo configuration.

In this configuration, it is assumed that starting from the date when the island of Crete is interconnected in year 2020 (Phase I), the Greek system will consist of two bidding zones compared to one zone, as in the status quo configuration. The first bidding zone will be mainland Greece and small interconnected islands (GR BZ) and the second bidding zone will be the island of Crete (CR BZ). The new bidding zone configuration is proposed due to the extension of the Greek system to the island of Crete, which was previously an autonomus system.

The two 150kV AC lines of Phase I of the interconnection have an estimated transfer capacity of 150MW-180MW and do not suffice to supply the total net load of Crete. Since the conventional generation units in Crete are mostly oil units, with much higher generation cost than the generation units operating in the mainland, it is expected that there will always be congestion in the interconnection in the direction of mainland Greece to Crete (GR towards CR). The annual redispatching costs are estimated around 240 M€. IPTO balancing market system has already provisioned the possibility for potential additional bidding zones and there is no significant additional cost for implementing the two proposed bidding zones in the market.

Therefore, in this configuration Bidding Zone is proposed for the Greek mainlan and adjacent small interconnected islands (GR) and an additional Bidding Zone for Crete (CR). It should be noted that this proposed new BZ is internal (within the Greek territory) and it does not affect any cross-border flows between the GR BZ and adjanent Bidding Zones, thus any other TSOs than IPTO.

Configuration 2 "Bidding Zones: GR, CR" (New Configuration)									
Cty-CBk	Bidding Zone Border	TSO1	Station 1	TSO2	Station 2	Voltage level [kV]	Type	Network element Name	New/different compared to status quo?
GR	GR - BG	IPTO	a.Thessaloniki b. Nea Santa	ESO-EAD	a. Blageovgrad b. Maritsa East	400 kV 400 kV	AC AC		No
GR	GR-CR	IPTO	a. Molaoi b. Koumoundourou	IPTO	a. Chania b. Damasta	150 kV 500 kV	AC DC		Yes
GR	GR-IT	IPTO	Arachthos	TERNA	Galatina	400 kV	DC		No