Assessment of the Greek proposal to distinguish between energy activations for balancing and redispatch purposes

Authors

Alberto Pototschnig – Director, DFC Economics

alberto.pototschnig@dfc-economics.com

Guido Cervigni – Managing Director, DFC Economics

guido.cervigni@dfc-economics.com

ABOUT THE AUTHORS

Alberto Pototschnig

Alberto Pototschnig is Director at DFC Economics and Executive Deputy Director of the Florence School of Regulation at the European University Institute.

Alberto has more than 30 years of experience in the European energy sector, as a high-level civil servant, top manager and consultant. He was the first Director of the European Union Agency for the Cooperation of Energy Regulators (ACER), from 2010 to 2019. Under his term of office, ACER crucially contributed to the regulatory framework for the European internal energy market, including through the implementation of the Third Energy Package and the preparatory activities for the 2019 Clean Energy for All Europeans Package, that will govern the European energy sector transition towards decarbonisation. Previously, he served at the Italian energy regulator, where he was eventually Director of Electricity Regulation, and acted as adviser to the Italian Government on environmental and climate policy issues.

As CEO of GME S.p.A., Alberto led the design and implementation of the Italian power exchange, one the largest in Europe. As a consultant, he was practice director in two international consulting firms.

Alberto holds a Degree in Economics from Bocconi University in Milan and an MSc in Econometrics and Mathematical Economics from the London School of Economics, University of London.

Guido Cervigni

Dr Guido Cervigni is partner and Managing Director at DFC Economic and Gas Advisor at the Florence School of Regulation.

Guido is an economist and former regulator who provides qualitative and quantitative analyses on regulatory and competition-related issues, with a focus on energy markets and market design. Guido has advised regulators, system operators, exchanges and businesses across Europe on a wide range of regulatory issues in energy markets, including market design, regulatory frameworks supporting low-carbon technologies and price regulation.

As a member of System Operation Expert Group advising the European Regulators' Group for Electricity and Gas (ERGEG), he has been involved in the development of the EU framework guidelines on System Operations; Guido was also a member of ACER’s expert group on capacity remuneration systems.

Guido is former Director at AF-Mercados, Spain and Director at LECG Consulting in London as well as Head of LECG’s Italian office. Prior to joining LECG, he was Head of Economic Analysis and Regulatory Affairs at Enel S.p.A and Head of Market Development at the Italian Power Exchange, where he was responsible for the implementation of the clearing algorithm of the Italian power exchange.

Guido holds a PhD in economics from Bocconi University, Milan.

TABLE OF CONTENTS

INTRODUCTION AND EXECUTIVE SUMMARY

Introduction

We were asked by the Hellenic Association of Independent Power Producers to review the proposal for amendments to the Greek ancillary services market rules (hereafter: the New design) recently put forward by the Greek Regulatory Authority for Energy (RAE) in the consultation document on 'Basic design principles for the distinction between the balancing and redispatch energy and options for the corresponding clearing system'[1]. In particular, we were asked to assess the properties of the New design in terms of efficiency and compatibility with the European Union's 'Electricity Target Model' and the legal provisions implementing it.

Main results

In what follows, we summarise the main conclusions of our analysis.

'Central-dispatching' and marginal pricing applied to bids and offers selected 'in merit' are compliant with the European Union's "Electricity Target Model" and the provisions implementing it. The treatment of location-specific bids and offers selected 'out of merit' departs from the European model

The current design of the Greek ancillary services market is based on the following pillars: a 'central-dispatching' model and marginal pricing.

'Central-dispatching' refers to the simultaneous procurement of all system services (including congestion resolution services and the procurement of balancing energy and capacity, among the others) by the transmission system operator (TSO) in the context of an integrated scheduling process (ISP) that determines the generation and consumption schedules of each unit in the system.

The European regulatory framework allows for 'central-dispatching' to be implemented, although as an exception to the mainstream option based on 'self-dispatching'. In markets based on 'self-dispatching', generation and consumption schedules for each unit are determined by the scheduling agents of those units.

The choice of 'central-dispatching' thus makes the Greek design compatible with the European Union's 'Electricity Target Model'. The 'central-dispatching' model is currently used in Greece, Italy, Spain, Poland and in the island of Ireland.

The second pillar, marginal pricing, refers to the fact that all accepted buy-bids (hereafter referred to as: bids) and sell-offers (hereafter referred to as: offers) selected in the context of the ISP are settled at the ancillary services market clearing price, i.e., the price of the lowest-priced accepted bid or the highest-priced accepted offer. This rule is referred to as 'marginal' or 'pay-as-cleared' pricing. Its

1 Published on July 29th, 2021 and available at the following link: https://www.rae.gr/diavoulefseis/12302/

alternative is the 'pay-as-bid' pricing rule, where each accepted bid or offer respectively pays or gets paid its asking or offered price.

The European regulatory framework recognises that marginal pricing maximises the efficiency of the scheduling process and identifies it as the most suitable pricing rule for electricity markets, including for the future market design for an electricity sector characterised by an increasing penetration of variable renewables-based generation.

Therefore, marginal pricing is generally consistent with the European normative framework. In particular, under the current Greek design all bids and offers selected 'in merit' (i.e., at a price below or equal to the marginal price for offers, and at a price above or equal to the marginal price for bids) are settled at the marginal price, irrespective of their purpose. Finally, note that marginal pricing allows for a seamless integration of the current Greek design with the pan-European platforms for ancillary services procurement[2].

However, the current Greek design departs from the European normative framework with respect to bids and offers selected 'out-of-merit' for reasons related to the location of the associated resources – most notably to address internal congestions. The European normative framework requires that these bids and offers do not set the marginal price. Such a requirement is not complied with by the Greek design, in which all bids and offers contribute to the setting of, and are valued at the marginal price.

Systematic congestions may result in unwanted wealth transfers within the current Greek market design, but measures already taken by the Greek regulator have proved effective

The simultaneous selection of bids and offers obtained by the co-optimisation in the procurement of all ancillary services, together with the 'pay-as-cleared' remuneration rule aims at ensuring that:

- The minimum-cost set of resources necessary to run the system securely is selected by the ISP in the ancillary services market; and
- By submitting bids and offers based on the decremental and incremental cost of each resource[3], market participants receive the value delivered to the system by their resources, in their best use. In particular, marginal pricing makes it economically equivalent for a generator to provide balancing energy or reserve capacity. Furthermore, 'pay-as-cleared' pricing simplifies bidding and reduces risk, thus promoting participation particularly by smaller players and fostering competition.

These features of the Greek ancillary services market design provide the rationale for departing from the 'self-dispatching' model, selected as the reference model by the European regulation.

---

2 The so-called TERRE, MARI and PICASSO platforms introduced in the context of the Commission Regulation (EU) of 23 November 2017 establishing a guideline on electricity balancing 2017/2195

3 For simplicity, in the following we refer to the situation faced by a generator submitting bids and offers in the ancillary services market. The situation would be reversed for demand-side response units, for which decrease in consumption is equivalent to an increase in net injection, and *viceversa*

While this design is sound in a congestion-less system, however, the presence of systematic congestion may justify departing from the 'pay-as-cleared' remuneration rule – as also provided for by the European regulation. In fact, the Greek wholesale electricity market is cleared as if unlimited transmission capacity were available within Greece. In case the market outcome results in a flow pattern that the transmission network cannot support, redispatch is implemented in the context of the ancillary services market, via the ISP.

In such a case, the value for the system of bids and offers at different locations selected by the ISP might differ. When that happens, the application of the marginal pricing rule to all bids or offers may result in unwanted transfers of wealth from the TSO, and therefore the network users, to market participants. Furthermore, paradoxical market outcomes might occur where an offer (bid) is rejected by the ISP despite its price being lower (higher) than the marginal price.

Delays in the construction of a new 400 kV interconnection between Peloponnese and the rest of the Greek system might have resulted and still result in such price distortions. The problem is expected to be solved by 2023. RAE addressed the presence of systematic congestions by temporarily introducing a 0 €/MWh price floor to bids submitted by market participants. This measure appears to have been effective in reducing wealth transfers, but is at odds with the European policy framework.

The New design is inefficient

The main features of the New design are:

- The TSO labels bids and offers selected by the ISP depending on their purpose:
  - The 'balancing' label is attached to bids and offers selected for real-time balancing of the system's injections and withdrawals;
  - the 'redispatch', or 'non-balancing' label is attached to bids and offers selected for all other reasons.
- Different remuneration regimes apply depending on the purpose:
  - 'Balancing' bids and offers are remunerated according to the 'pay-as-cleared' rule;
  - 'Redispatch' bids and offers are remunerated according to the 'pay-as-bid' rule.
- The label of each selected bid and offer is determined at settlement time, i.e., the information is available to market participants only after the bid or offer has been submitted and selected by the ISP.

The New design would involve unnecessary risks for market participants, which would need to be incorporated in their bidding strategy. In fact, in formulating such a strategy, market participants would face two types of risks: (i) they would not know which remuneration rule will apply to their bids and offers, and (ii) to the extent that these bids and offers were to be activated for 'redispatch' purposes and, in that prospect, they bid above their incremental costs, that their offers and bids would not be accepted despite the fact that it would be efficient and convenient for them to be activated.

These risks and the market participants' behaviour that they would induce might result in the suboptimal selection of the resources providing ancillary services, which may cause prices to depart from the efficient levels and may lead to higher total procurement cost for ancillary services.

Furthermore, such mixed pricing rule may impair the participation of Greek resources in the platforms for pan-European procurement of ancillary services, such as PICASSO (automated FRR), MARI (manual FRR) and TERRE (replacement reserve).

Furthermore, under the New design most of the benefits justifying the 'central-dispatching' approach are lost and the case for departing from the mainstream 'self-dispatching' European model weakens.

The New design is not consistent with the European Union's provisions on the electricity market design

The normative basis for the New design is found by RAE in Decision No. 16/2020[4] of the European Union Agency for the Cooperation of Energy Regulators (ACER) and, in particular, in ACER's distinction between activations for balancing purposes and activations for system constraints purposes.

RAE's interpretation, however, is not consistent with the European Union's provisions on the electricity market design. In fact, ACER itself clarifies that "*the only reason for deviating from the marginal pricing principle is when the activation of bids does not respect the merit order*"[5], irrespective of the purpose for which the bids are activated.

More generally, the European Balancing Guideline mandates marginal pricing, i.e., the 'pay-as-cleared' remuneration, for frequency restoration and reserve replacement services. Only bids and offers activated for internal congestion are required to be paid according to a different remuneration method[6].

In this respect, ACER clarifies, in its Decision No 01/2020[7] that, in order to ensure an efficient design, "*bids activated on the merit order which can serve either balancing purpose or system constraint purpose* […] *should receive the same marginal price*".

For these reasons, the New design is inconsistent with the European framework and violates specific legal provisions, because:

- Contrary to the provisions of the European Balancing Guidelines, bids and offers selected for purposes other than internal congestions would be paid 'as-bid' and not at the marginal price. In particular, these would include bids and offers selected to procure services that are not location-specific such as balancing capacity (reserve); and

4 Decision No 16/2020 of the European Union Agency for the Cooperation of Energy Regulators of 15 July 2020 on the methodology for classifying the activation purposes of balancing energy bids. See. in particular, Article 3(1) in Annex I.

5 *Ibid.*, recital (45).

6 Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing, and, in particular, Article 30(1) and (2).

7 Decision No 01/2020 of the European Union Agency for the Cooperation of Energy Regulators of 24 January 2020 on the methodology to determine prices for the balancing energy that results from the activation of balancing energy bids.

- Contrary to ACER's provisions, bids and offers that *"can serve either balancing purposes or system constraint purpose"* would be paid differently depending on the label that they receive from the TSO, rather at the marginal price, as indicated by ACER.

Conclusion

Our analysis highlights that the New design entails a major change in the functioning of the Greek electricity market, while being inefficient and inconsistent with the European target model and the legal provisions implementing it. As the New design is inconsistent with the European legal framework, it is likely to be challenged in court and ruled against. The uncertainty of the resulting situation would add to the risks faced by market participants.

Furthermore, under the New design most of the benefits justifying the 'central-dispatching' approach are lost and the case for departing from the mainstream 'self-dispatching' European model weakens.

For these reasons we recommend reassessing the opportunity to introduce the New design, based on a detailed cost-benefit analysis, comparing the New design with alternative policy measures consistent with the European Target Model.

Structure of the document

The rest of this document is organised as follows. In Section 1, we review the design and performance of the Greek ancillary services market. In Section 2, we present and assess RAE's proposed New design. In Section 3 we present our conclusions.

1. THE GREEK BALANCING MARKET

1.1. Current design

Market design

The current design of the Greek ancillary services market (the Balancing Market) was introduced in November 2020. The Balancing Market is based on:

- A single market zone;
- Integrated co-optimisation of services procurement (i.e., a 'central-dispatching' model); and
- Marginal pricing ('pay-as-cleared' remuneration rule).

Participants in the balancing market submit energy offers and bids, specifying volumes in MWh and prices in €/MWh. The selection of bids and offers is performed by the Greek transmission system operator (TSO), ADMIE, via an Integrated Scheduling Process (ISP) algorithm.

For simplicity, through the entire document we refer to the situation faced by a generator submitting bids and offers in the ancillary services market, respectively to decrease and increase its power output. The situation would be reversed for demand-side response units, for which decrease in consumption is equivalent to an increase in net injection, and *viceversa*.

The ISP selects the cost-minimising set of bids and offers by solving a security-constrained optimal dispatch problem. In such a problem, reserve requirements, transmission network capacity, voltage limits and any other security requirement, as well as overall system's balance constraint, all appear as constraints to the cost-minimisation problem. This implies that the demand for each of the different ancillary services is not explicitly defined and, in general, it is impossible to relate a single accepted offer/bid to a specific 'purpose'. For example, it is generally impossible to determine whether a bid has been selected by the ISP to create headroom in the generator's capacity to meet the reserve requirements, or to address a congestion.

We remark that this is not a weakness of the 'central-dispatching' model, but just one of its distinguishing features, associated to its strengths. Indeed, designs in which different ancillary services (e.g., balancing capacity and balancing energy) are procured via separate and independent market sessions are – at least conceptually, but likely in practice – more prone to inefficiencies than the 'central-dispatching' model.

In the current system, settlement of the bids and offers accepted by the ISP is performed according the 'pay-as-cleared' remuneration rule:

- All accepted offers receive from the TSO the price of the highest-priced accepted offer; and
- All accepted bids pay to the TSO the price of the lowest-priced accepted bid.

The Peloponnese bottleneck

The Greek system appears to feature systematic congestion between Peloponnese and the rest of the Greek network, due to limited transmission

capacity of the existing 150 kV line connecting the two areas. More specifically, the congestion concerns the portion of the Greek network south of the Koumoundouros 400 kV substation (Attica region), and constrains the total output from the following generators located in the Peloponnese region during many hours of the year[8].

Unit Name	Fuel	Maximum power (MW)
Megalopoli 3	Lignite	255
Megalopoli 4	Lignite	256
Megalopoli 5	Gas (CCGT -2 GT + 1 ST)	811
Ladonas	Hydro	70
Korinthos Power	Gas (CCGT -1 GT + 1 ST)	433.5

Table 1 Power generators located in the Peloponnese region

A new 400 kV interconnection is planned to expand the interconnection capacity between Peloponnese and the rest of the Greek network; this is expected to provide a definitive solution of the 'Peloponnese bottleneck' issue. The interconnector was supposed to be in service by 2020; however due to delays caused by local opposition to the siting of the line, the interconnector is now expected to be completed sometime in 2023.

At least two policy measures aimed at addressing the 'Peloponnese bottleneck' issue have been recently implemented in Greece:

- From 2018 to 2020[9], a constraint was placed on the Megalopolis 5 unit, limiting its power output to 500 MW.
- As of February 13th, 2021, a 0 €/MWh price floor applies to bids submitted in the Balancing Market[10]. We remark that this is necessarily a temporary measure, as it goes against the European approach[11].

1.2. Performance

Figure 1 displays the volumes and average market clearing prices for offers and bids in the Balancing Market in the period November 2020 – October 2021[12]. Volumes procured in the Balancing Market in the period totalled around 8 TWh, or about 15.5% of total electricity demand[13].

[8] For additional information see RAE's decision 54/2021, section IIIA

[9] Law 4533/2018 and Law 4685/2020, article 104, paragraph 1

[10] This measure has been introduced by RAE's decision 54/2021 to address the congestion issue in the Peloponnese region and is expected to be removed once the new 400 kV transmission line is developed.

[11] Regulation (EU) 2019/943, Article 10(1) and (2).

[12] All data refer to mFRR (manual Frequency Restoration Reserve) activations

[13] Calculated over a total electricity demand in 2020 of 51.5 TWh (source: IEA)

Figure 2 displays the costs borne by ADMIE over the same period. The total cost over the entire 12-month window equals 491 M€, or approximately 9.5 € per MWh of electricity demand[13].

We remark that given the integrated nature of the system services procurement process performed by the ISP, no distinction is, or can be made, based on the purpose of the activations. This implies that the data displayed include offers and bids accepted for congestion resolution, voltage control, building reserve margins, balancing expected injections and withdrawals, as well as addressing any of the other system constraints encoded in the ISP.

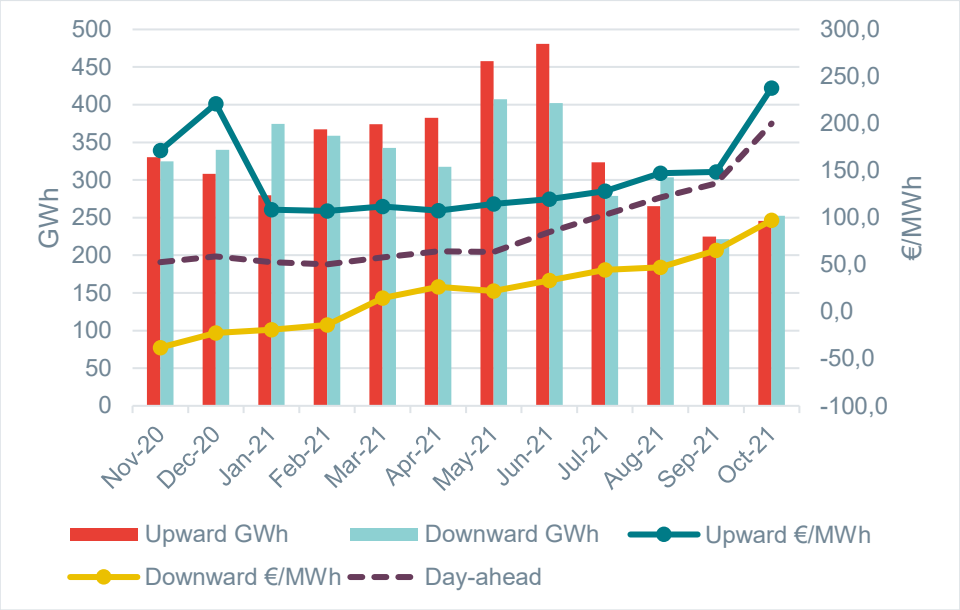

Figure 1 Activated balancing volumes (bars, in GWh, left scale), the corresponding market clearing prices (solid lines, in €/MWh, right scale) and the average day-ahead prices (dashed line, in €/MWh, right scale). Source: DFC analysis on ADMIE and EnEX data

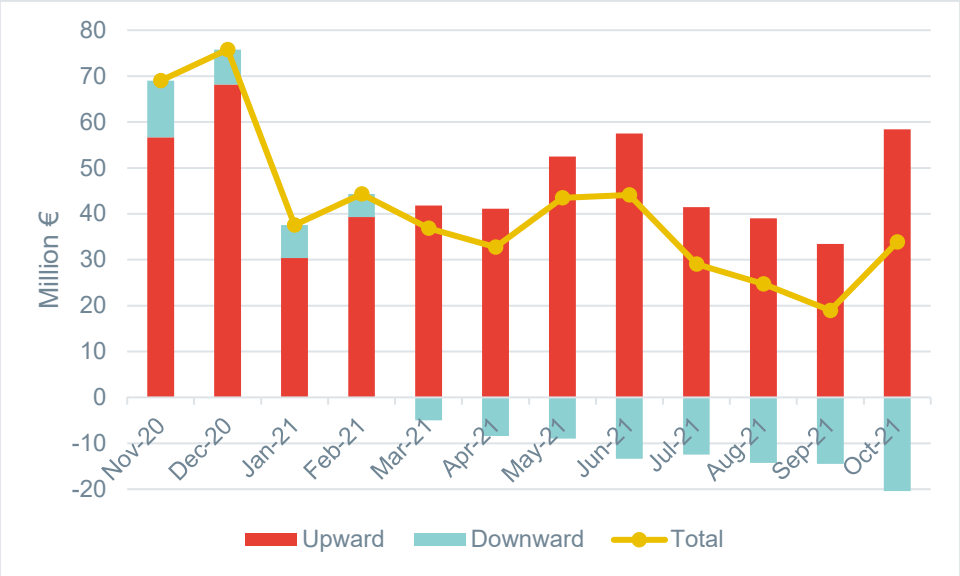

Figure 2 Balancing costs for upward and downward modulations since the institution of the Balancing Market in Greece. Source: DFC analysis on ADMIE data

Figure 1 shows that the average monthly price for downward activations (accepted bids) has been negative for the first four months (from November 2020 to February 2021) of operations of the Balancing Market, resulting in high cost to ADMIE. However, the price of downward activations steadily increased throughout the twelve months of market functioning, reducing, other things equal, ADMIE's balancing costs. We note incidentally that the introduction of the zero-price floor appears to have been effective in reducing costs for the TSO, as the price for downward activations turned positive in March 2021 (after the introduction of the zero-price floor in February 2021).

A decreasing trend in the total system services procurement costs can be observed from **Figure 2**. This trend is particularly relevant given the simultaneous increase in the electricity day-ahead price, driven by the sharp rise in natural gas prices (the TTF spot price increased from 13.9 €/MWh in November 2020 to 84.6 €/MWh in October 2021). This reduction in the ancillary services procurement costs appears to be also due to a material decrease in the (upward and downward) volumes procured by ADMIE starting from June 2021 (see **Figure 1**).

1.3. Assessment

1.3.1. Consistency with the European 'Electricity Target Model'

The current structure and design of the Greek Balancing Market is based on a 'central-dispatching' model, a feature that makes the Greek market model consistent with the European Target Model.

In particular, the European Balancing Guidelines allows for 'central-dispatching' models to be implemented, although as an exception to the mainstream 'self-

dispatching' European model[14]. As other markets in Europe (such as Italy, Spain, Poland and the Single Electricity Market in the island of Ireland), Greece departed from the standard 'self-dispatching' approach in favour of 'central-dispatching', presumably on the grounds of the latter's ability to minimise total supply cost.

While opting for central dispatching, Greece complies with the other pillar of the European Target Model, namely marginal pricing applied to all bids and offers selected 'in merit' (i.e., at a price below or equal to the marginal price for offers, and at a price above or equal to the marginal price for bids)[15]. However, the European Target Model specifies that location-specific bids and offers selected 'out-of-merit' should not contribute to the setting of the marginal price and should be remunerated 'as-bid'.

In this respect, the current Greek market model departs from the European Target Model as it applies marginal pricing to all selected bids and offers. Otherwise stated, location-specific bids and offers do contribute to the setting of the marginal price. This inconsistency with the European Target Model has an important implication in terms of soundness of the market design. While in the absence of internal congestions the current Greek design – based on marginal pricing for all selected bids and offers – is sound, because the value for the services procured by the TSO does not depend on the location of the resources providing them (see Section 1.3.2), in the presence of systematic congestion unwanted wealth transfers may occur between the network operator and market participants (see Section 1.3.3).

1.3.2. In the absence of congestion, the current Greek Balancing Market design is sound

The current design of the Greek Balancing Market has the following desirable features in procuring ancillary services that do not depend on the location of the resources providing them (e.g., balancing energy and capacity):

- It ensures least-cost selection of the resources necessary to meet all system security constraints; and
- The optimal bidding strategy for market participants is easy to identify and its implementation is easy to audit by public authorities. Market participants can submit bids and offers based on their decremental and incremental costs and receive the value delivered to the system by their resources in their best use.

These two benefits crucially derive from the simultaneous selection of all resources necessary to keep the system balanced and secure, as well as from the 'pay-as-cleared' pricing rule.

Under the current market design, market participants do not need to arbitrage the value of their resources for different purposes – since the pricing rule makes them indifferent, for example, between generating electricity and providing reserve

[14] Commission Regulation (EU) of 23 November 2017 establishing a guideline on electricity balancing 2017/2195. In particular, see article 14.2

[15] The fact that marginal cost pricing should be used to remunerate bids and offers for ancillary services has recently been confirmed by ACER in its Decision No 01/2020, after considering that "*the fundamental principle for pricing balancing energy bids activated through the platform is the merit order principle according to which all bids activated on the merit order should receive the same marginal price*".

capacity. In other words, in order to determine the optimal price to bid/offer for a service, they do not need to predict the market clearing price of the others, nor for which purpose the bid/offer will be accepted.

Therefore, under the current market design, in the absence of systematic congestion that may result in the value of bids and offers selected in different areas being different, when a bid or offer is selected by the ISP a generator does not risk selling some service at a price that turns out to be lower than the one it could have obtained by selling a different service. This reduces uncertainty and risk for market participants, thus promoting participation, especially of smaller players, and increasing competition. Symmetrically, the TSO does not risk paying more than the minimum possible cost, as a result of imperfect price predictions by market participants[16].

1.3.3. Systematic congestion may result in unwanted wealth transfers

Given the current design of the Greek energy markets (day-ahead and intraday), systematic congestion, such as the one between Peloponnese and the rest of the Greek network, may produce unwanted wealth transfers in the Balancing Market.

The following example illustrates how congestion may adversely affect the outcome of the Greek Balancing Market in the context of the current market design.

Figure 3 presents the net supply curve submitted by market participants within a fictitious market designed as the Greek one, where an ISP algorithm performs the selection of bids and offers. Let us suppose that, in this market, the outcome of the day-ahead market features (systematically) commercial flows from Area A to Area B greater than the available interconnection capacity between the two zones.

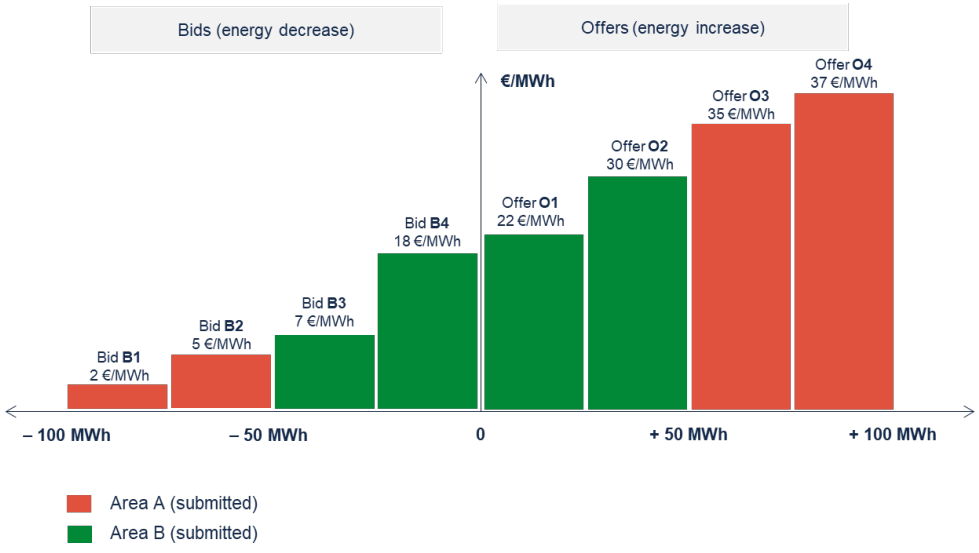

Figure 3 Net supply curve submitted by market participants in Area A and Area B

[16] Price predictions are an unavoidable feature of the market participants' strategy under a 'pay-as-bid' remuneration regime, since the optimal competitive bidding strategy consists in offering (bidding) a price just below (above) the expected marginal price for upward (downward) activations

First, consider the situation in which the only constraint that the ISP must address is the presence of the congestion. In this case, since the congestion is in the A→B direction, the ISP must reduce net injections in A and increase net injections in B to meet the system's balance constraint. The minimum-cost solution to reduce the A→B flow consists in accepting bid **B2** at 5 €/MWh in Area A and offer **O1** at 22 €/MWh in Area B, as displayed in **Figure 4**.

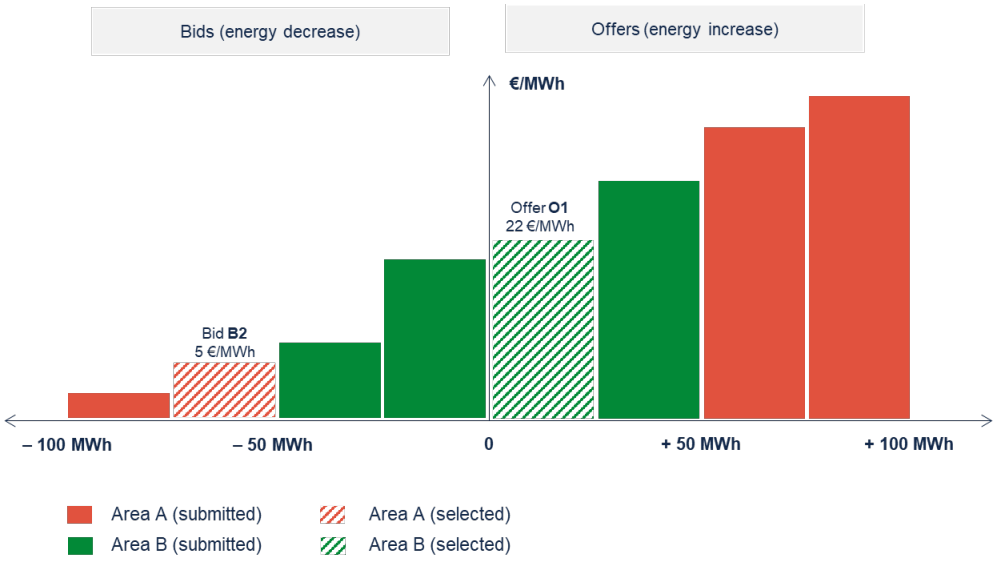

Figure 4 Least-cost selection of bids and offers to reduce the A→B flow

Consider now the situation in which the ISP must address an additional constraint, such that achieving the target level of spinning reserve in Area B requires reducing injections by some of the dispatched generators in Area B and activate an additional unit in Area B at the minimum level of operations to meet the system's balance constraint.

Looking at **Figure 3**, the minimum-cost solution to achieve this outcome consists in accepting bid **B4** at 20 €/MWh (the highest-price bid in Area B) and offer **O2** at 30 €/MWh (the lowest-price offer in Area B)[17], as displayed in **Figure 5**.

[17] For the purpose of this discussion, we do not need to focus on the selection process related to the offer necessary to meet the system balance constraint.

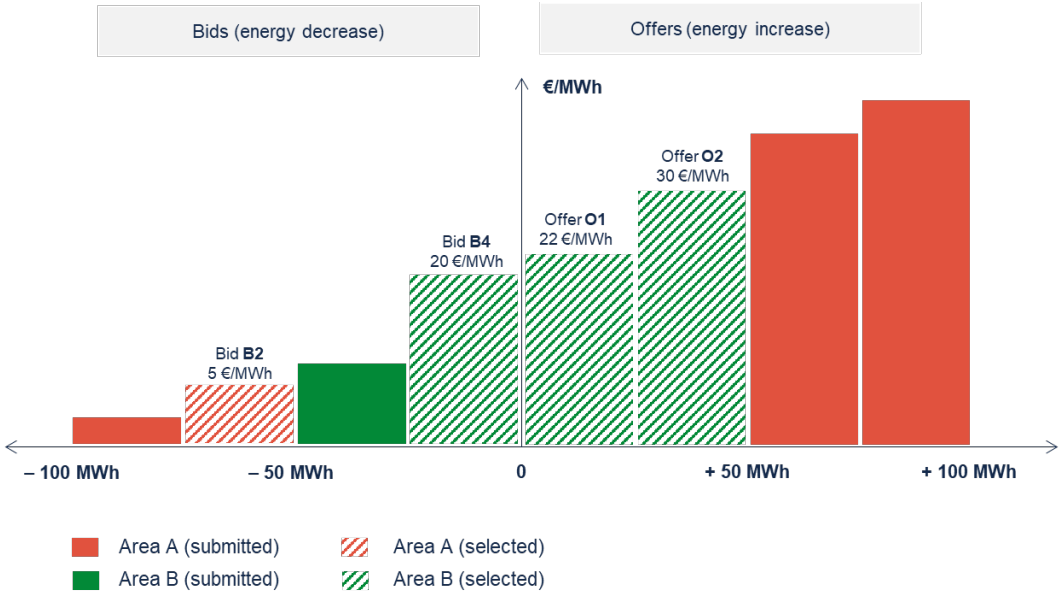

Figure 5 The final selection performed by the ISP

In this case both units reducing their injections pay 5 €/MWh, the marginal bid price associated to **B2** in Area A. Such a price, however, is not reflective of the value for the system of the accepted bid **B4** in Area B. As a result, the system operator is undercompensated for the electricity sold to units located in Area B.

Note that this adverse price effect does not require, nor entails, any exercise of market power by the generators, as in our example generators are assumed to bid their decremental costs, i.e., the cost-saving they obtain by reducing injections, in case their bids are accepted.

The effect described above may adversely affect imbalance prices, in case these are set based on the marginal prices paid or received by the TSO in the balancing market.

In its assessment of the Greek power market, RAE evokes conditions of locational market power[18]. In our example, this would be represented by a downward shift of the segments of the net-supply function corresponding to units located in Area A, as shown in **Figure 6**.

[18] See for example RAE Decision 54/2021, section IIIA (translated from Greek): *"[…] taking into account in particular the fact that the 400 kV Megalopolis - System GM has not been completed, the need for redispatching due to this constraint is exacerbated especially for the units in the Peloponnese region, creating the scope for strategic bidding by the Participants which contributes to the increase in the cost of the Balancing Market"*

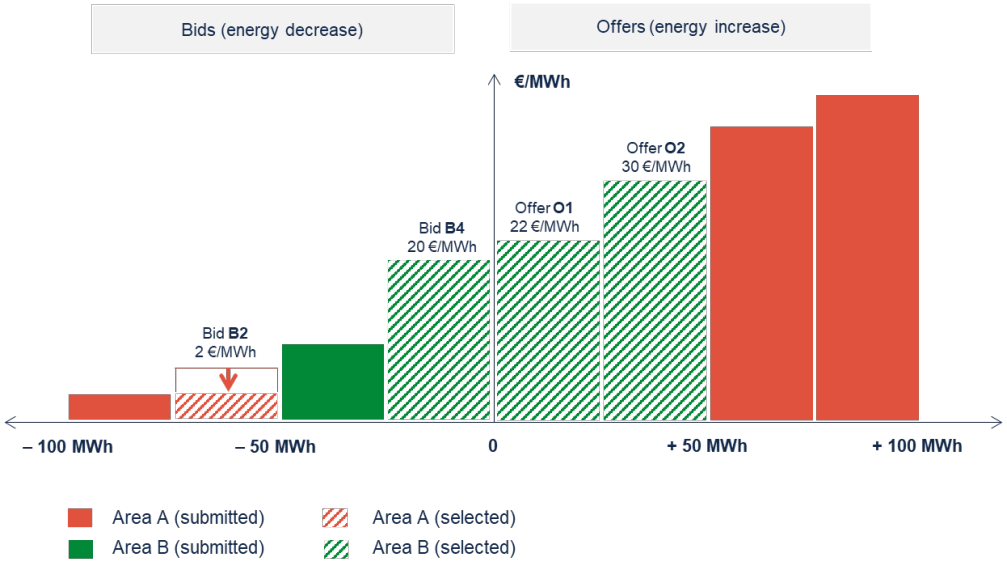

Figure 6 Locational market power would result in a downward shift of the net supply curve bid by market participants in the congested portion of the network (Area A in the example, see text)

In our setting, locational market power decreases the price of the bid accepted by the ISP in Area A: compared to the reference case shown in **Figure 5**, this has the following implications:

- It directly reduces the TSO's revenues generated by the accepted bids in Area A; and
- It exacerbates the effect described through the example in **Figures 3** to **5**, by reducing the TSO's revenues generated by the accepted bids in Area B.

The adverse effects of congestion on the market outcome of the Balancing Market may justify corrective measures to the standard 'pay-as-cleared' rule. The same holds if some generators enjoy significant market power. This is recognised by the European legal framework and reflected in the design of most European markets. However, as we discuss in the next sections, the New design, for various reasons, is not the appropriate remedy for any of those issues.

We finally note that RAE has not provided an assessment of the current impact of congestion and of the exercise of market power on the outcomes of the Greek Balancing Market or of the extent to which such impact was mitigated by the measures already taken by RAE.

2. RAE'S PROPOSAL FOR A REDESIGN OF THE GREEK BALANCING MARKET

2.1. Description of the New design

RAE's proposal of the New design is presented in the consultation document on 'Basic design principles for the distinction between the balancing and re-dispatching energy and options for the corresponding clearing system'[1], published in July 2021. The new market rules will enter into force as of January 2022, following a dry-run period during December 2021.

The core feature of the New design is the purpose-based remuneration of bids and offers accepted in the Balancing Market. In particular,

- Bids and offers deemed to have been accepted for 'balancing' purposes would be paid 'as-cleared', as in the current design; while
- All other accepted bids and offers would be labelled as 'for redispatch purposes' and paid 'as-bid'; i.e., they would respectively pay or receive their offered prices.

The labelling of activations depending on their purpose would be done by ADMIE at the settlement time, i.e., after the closure of the Balancing Market, through the following conventional process. ADMIE would execute two ISP algorithms:

- The first ISP execution[19] produces the binding schedules of the generators, accounting for all constraints in the system, including e.g., network constraints, reserve capacity requirements and the balancing requirement. This ISP instance is the one already used today to select bids and offers in the Balancing Market. In the following, we term this ISP run as the 'Consolidated ISP'.
- A second, *ex-post* ISP execution, which we term 'Redispatch ISP', is performed at the end of the delivery day. The 'Redispatch ISP' performs the same optimisation as the 'Consolidated ISP', but assumes that the outcome of the day-ahead and intraday markets is exactly equal to the real-time injection (withdrawals) of each unit.

The bids and offers that have been *i)* activated both in the Consolidated ISP and the Redispatch ISP, and *ii)* actually activated by ADMIE in the Balancing Market would be labelled 'for redispatch purposes' (and settled 'pay-as-bid'). The remaining bids and offers accepted in the Consolidated ISP would be regarded as for 'balancing' purposes and cleared at the marginal price.

The logic underlying this labelling methodology can be summarised as follows. The Redispatch ISP identifies all bids and offers that would be accepted in case all generators (consumers) had injected (withdrawn) exactly the volumes of electricity sold (purchased) in the market. This is equivalent to assuming that the Redispatch ISP identifies all bids and offers that would be accepted in case the system had no balancing needs. On that basis, all the remaining bids and offers that were actually

[19] In the Greek system, at least three executions of the ISP algorithm are performed for each delivery day, that are binding on different groups of delivery periods (ISP2 from 00:00 to 11:59; ISP3 from 12:00 to 23:59). In the text we refer as 'Consolidated ISP' as the final, consolidated outcome of all ISP executions

accepted are regarded as addressing the system's balancing needs. The remaining selected bids and offers are precisely the ones accepted by the Consolidated ISP, but not by the Redispatch ISP. This labelling logic is summarised in **Figure 7**.

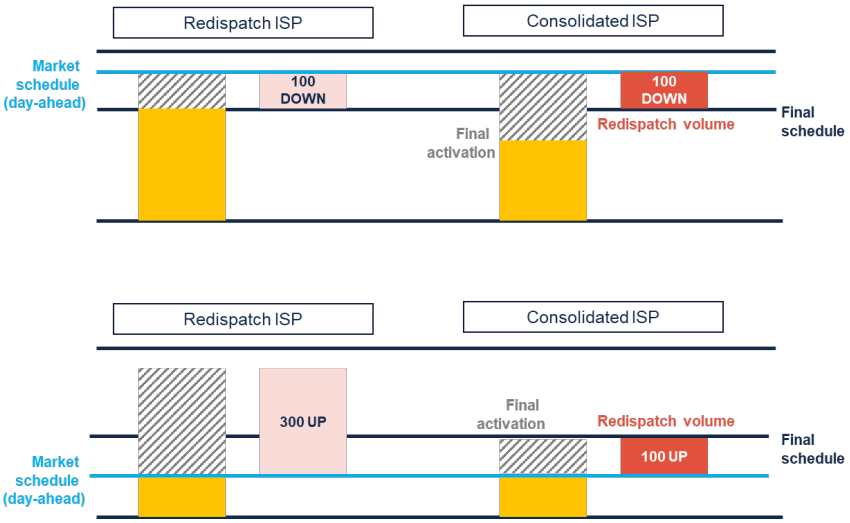

Figure 7 'Redispatch' volumes are identified as those that are selected by the Redispatch ISP and activated by the Conventional ISP (after the Balancing Market)

In case that this labelling process found that a bid or offer was accepted in part for redispatch purposes and in part for balancing purposes, the redispatch quota would be remunerated 'as-bid', while the balancing quota would be remunerated 'as-cleared'. As illustrated in **Figure 8**, in such a case the least economic bids and offers (from the TSO's perspective) would be used to determine the marginal price for 'balancing' bids and offers.

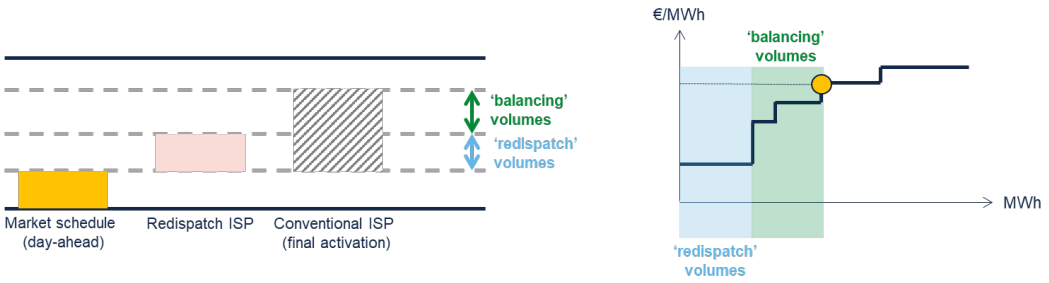

Figure 8 In case of balancing energy volumes activated for both 'redispatch' and 'balancing' purposes, the least economic bids and offers (from the TSO's perspective) in the merit order associated to balancing and set the marginal price for balancing energy

Finally, activations performed for 'redispatch' purposes would not enter the calculation of the imbalance price, since this is supposed to reflect only the cost to balance demand and supply in a congestion-free system, consistent with the design of the products traded in the day-ahead and intraday markets.

2.2. Properties of the New design

In this section, we assess the properties of the New design in terms of:

- Consistency with the European normative framework (Section 2.2.1)
- Efficiency of the Balancing Market outcome (Section 2.2.2)

2.2.1. (In-)Consistency with the European normative framework

As discussed in Section 1.3.1, the current Greek market design is broadly compatible and consistent with the European normative framework. In particular, the departure of the current Greek market design from 'self-dispatching', the mainstream approach according to the European legislation, can be justified based on the superior performance of 'central-dispatching' in optimising the use of resources and, therefore, in minimising total supply cost.

The 'pay-as-cleared' rule, currently implemented in the Greek balancing market, is also fully consistent with the European Balancing Guidelines[20]: *"all TSOs shall develop a proposal for a methodology to determine prices for the balancing energy that results from the activation of balancing energy bids for the frequency restoration process […] and the reserve replacement process […]. Such methodology shall be based on marginal pricing (pay-as-cleared) […]"*

The suitability of the 'pay-as-cleared' remuneration regime, including for the future market design for an electricity sector characterised by an increasing penetration of variable renewables-based generation, has been reaffirmed by the European Union Agency for the Cooperation of Energy Regulators (ACER) that, in a recent communication[21]:

- first recognised that:
  - "*the divergent breakdown of the costs incurred by generation technologies is one of the factors to be kept in mind when considering the appropriateness of the current market design vis-à-vis current high prices, and in particular the perception of 'unfair profits' possibly being made"*;
  - *"a common feature of most low-carbon technologies, including renewable generation, is that they have relatively low marginal cost but significant upfront capital investment cost"*;
  - *"the future electricity system is likely to remain inherently volatile, with prices varying significantly as a function of generation availability"* and that *"there is a need to incentivise those providers and technologies that can 'smooth' this volatility"*;
- and then concluded that *"any future market design needs to be able to (a) remunerate technologies above their marginal costs, sometimes quite significantly so, and (b) incentivise the alleviation or smoothing of volatility in the market. The 'pay-as-clear' model allows for both of these elements"*.

[20] Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing, article 30.1a

[21] European Union Agency for the Cooperation of Energy Regulators, High Energy Prices, October 2021. Excerpts are taken from pages 11 and 12.

The distinguishing feature of the New design consists in the fact that 'pay-as-bid' would apply to all bids and offers selected for 'redispatch', or 'non-balancing', purposes. This makes this design inconsistent with the European framework because:

- 'Non-balancing' bids and offers would include those selected to make available balancing capacity; and,
- Bids and offers selected 'in merit', although possibly for different purposes, would end up not being remunerated according to the same marginal price.

We discuss these two features below.

Bids and offers selected to make balancing capacity (reserve) available should be remunerated 'pay-as-cleared', rather than 'pay-as-bid'

Under RAE's New design, bids and offers selected with the purpose of procuring the balancing capacity (reserve margins) necessary to ensure system security would be labelled as 'redispatch', or 'non-balancing', and remunerated via the 'pay-as-bid' pricing rule.

However, the European Balancing Guidelines mandates 'pay-as-cleared' remuneration for balancing energy and capacity purposes, while only bids and offers accepted to address internal congestion are explicitly exempted from the 'pay-as-cleared' remuneration requirement. This follows from articles 30(1)(a) and (b) of the Electricity Balancing Guidelines, specifying that the pricing methodology for the activated balancing energy bids and offers for the frequency restoration process and the reserve replacement process shall: *"a) be based on marginal pricing (pay-as-cleared), and b) […] ensure that at least balancing energy bids* [and offers] *activated for internal congestion management shall not set the marginal price of balancing energy".* First of all, it is worth noting that, strictly speaking, the quoted provision does not prohibit the payment of bids and offers activated for internal congestion management purposes 'as cleared'; it only rules out the possibility that these bids and offers set the marginal price of balancing energy.

Moreover, even accepting that the European Balancing Guideline allows a different remuneration approach – the 'pay-as-bid' method – for bids and offers activated for internal congestion management purposes, it is not clear whether other activation purposes could also be exempted from the 'pay-as-cleared' method, or, more specifically, should not set the marginal price for balancing energy. In this context, it seems logical to include balancing energy and capacity in the same class of activations and remunerate them 'pay-as-cleared', since from the supplier's perspective, they are perfect substitutes in supply, and, from the system's perspective, there are perfect substitutes to ensure security. These substitutability relationships do not depend on the location of the generator.

The classification of bids and offers selected for balancing capacity as 'redispatch', or 'non-balancing', is instead justified by RAE by making reference to ACER Decision No. 16/2020[22]. However, ACER terminology cannot be interpreted in a way that contrasts with the European Balancing Guideline. Indeed, as discussed in more detail in the next paragraph ACER is not ambiguous in stating that "*the*

[22] Decision No 16/2020 of the European Union Agency for the Cooperation of Energy Regulators of 15 July 2020 on the methodology for classifying the activation purposes of balancing energy bids. In particular, see Article 3(1) in Annex I

only reason for deviating from the marginal pricing principle is when the activation of bids does not respect the merit order"[23].

On this basis, it is not surprising that ACER does not classify 'balancing capacity procurement' as a 'redispatch', or (in ACER's terminology) 'remedial' action. On the other hand, the 'remedial' actions listed by ACER include congestion resolution and voltage control – all actions that might require the activation of out-of-merit location-specific bids and offers, thus justifying that these bids and offers do not set the marginal price of balancing energy, and a remuneration regime different from 'pay-as-cleared'[24].

Bids and offers selected within the merit order are not remunerated according to the same marginal price

The Electricity Balancing Guideline does not clarify which remuneration regime shall apply to bids and offers which are activated solely or also for purposes other than for balancing energy and capacity, beyond those activated for internal congestion management purpose. This aspect is addressed by ACER, which, in its Decision No 01/2020[25], after considering that "*the fundamental principle for pricing balancing energy bids activated through the platform is the merit order principle according to which all bids activated on the merit order should receive the same marginal price*", noted that "*if the balancing platforms allow the activation of balancing energy bids for different purposes and if these activations are respecting the merit order, it is not possible to distinguish exactly which bids have been activated for which purpose*"[26]. On this basis, ACER concluded that "*bids activated on the merit order which can serve either balancing purpose or system constraint purpose* […] *should receive the same marginal price*"[27], while, in contrast, bids and offers at a specific location which are activated for congestion management purposes outside the merit order should not define the marginal price, but should rather be remunerated 'pay-as-bid'.

On this latter point, ACER noted that the Electricity Balancing Guideline is specific in excluding bids and offers activated for internal congestion purposes from the application of the 'pay-as-cleared' regime, but it is silent in the case of bids and offers activated for cross-zonal congestion management purposes. ACER takes this different treatment, in the Electricity Balancing Guidelines, of bids and offers activated for internal and cross-zonal congestion management purposes as confirming ACER's understanding that "*the only reason for deviating from the marginal pricing principle is when the activation of bids does not respect the merit order*"[28], irrespective of the purpose for which the bids are activated. In this context, the classification of the purposes for the activation of balancing energy bids and

[23] Decision of the European Union Agency for the Cooperation of Energy Regulators No 01/2020 of 24 January 2020 on the methodology to determine prices for the balancing energy that results from the activation of balancing energy bids. In particular, see recital (45)

[24] European Agency for the Cooperation of Energy Regulators, Market Monitoring Report 2021. In particular, see Annex I, Table 12

[25] Decision of the European Union Agency for the Cooperation of Energy Regulators No 01/2020 of 24 January 2020 on the methodology to determine prices for the balancing energy that results from the activation of balancing energy bids.

[26] *Ibid.*, recital (43).

[27] *Ibid.*, recital (44).

[28] *Ibid.*, recital (45).

offers, as provided in ACER Decision No. 16/2020[29], and, in particular, the distinction between bids and offers selected for balancing purposes and those selected for system constraints purposes[30], becomes almost irrelevant. All that matters is whether bids and offers are activated respecting the merit order – in which case they should be remunerated 'as-cleared', irrespective of the activation purpose – or are activated outside the merit order – in which case they should be remunerated 'as-bid'.

Looking at the example displayed in **Figure 10** in Section 2.2.2, it can be seen that RAE's New design explicitly violates this provision, since offers that are selected 'in merit' are paid less than the marginal price[31]. Under the European normative framework, instead, selected bids (offers) receive the minimum (maximum) between the submitted price and the marginal price.

2.2.2. (In-)Efficiency

The distinguishing feature of the New design is that accepted bids and offers are subject to different pricing rules depending on the purpose of their selection and, above all, that bids and offers selected 'in merit' for 'redispatch' purposes are not remunerated at the marginal price.

It is well known that the optimal competitive bidding strategies in 'pay-as-cleared' and 'pay-as-bid' auctions are materially different. Under the 'pay-as-cleared' regime, the competitive profit-maximising strategy consists in offering (bidding) a price equal to the incremental (decremental) cost. Instead, under a 'pay-as-bid' regime the profit-maximising competitive strategy consists in offering (bidding) a price equal to – or just below (above) – the expected market clearing price, provided the generator's incremental (decremental) cost is lower (greater) than the expected clearing price.

Where ISP is applied, market participants do not know in advance what will be the purpose of any given activation[32]. This information, however, is crucial in determining the optimal competitive bidding strategy. Under the New design, in fact, the purpose of an activation would determine the remuneration rule. If the bid or offer were activated for 'redispatch' purposes, it would pay the bid price or be paid the offer price; conversely, if it were accepted for 'balancing' purposes, it would pay or get paid the market clearing price.

The competitive optimal bidding strategy, under the New design, becomes complex to determine for the market participant, for it is based on the probability that the bid or offer will be accepted for one purpose or the other[33].

Note that the model defined by the Electricity Balancing Guideline also envisages a different remuneration approach for bids and offers activated 'in merit' and bids and offers activated 'out of merit'. However, the applied remuneration is always at

[29] Decision No 16/2020 of the European Union Agency for the Cooperation of Energy Regulators of 15 July 2020 on the methodology for classifying the activation purposes of balancing energy bids.

[30] *Ibid.*, Article 3(1) in Annex I.

[31] Symmetrically, bids selected 'in merit' would pay more than the marginal price

[32] Nor they can submit bids and offers contingent to applicable pricing rule, which would make the New design equivalent to separate markets for balancing services and for other services.

[33] From a game-theoretic perspective, an economic equilibrium is reached by means of so-called "mixed" strategies

least as convenient for the market participants, as under the 'pay-as-cleared' methods in the sense that the 'pay-as-bid' remuneration is only applied to accepted bids which are cheaper than the marginal price and accepted offers which are more expensive than the marginal price. In this case, the competitive profit-maximising strategy is the same as under a pure 'pay-as-cleared' remuneration regime and the outcome of the market shares the same efficiency properties.

Instead, the remuneration rule under the New design, and the bidding/offering strategies which it would induce, might and is likely to result in inefficient market outcomes, i.e., in the selection of the set of bids and offers different from the ones that can keep the system balanced and secure at minimum cost. Furthermore, the uncertainty introduced by the New design is likely to impact particularly smaller players and new entrants, thus reducing competition in the Greek market.

Furthermore, the resulting reduction of the generator's compensation, compared to the value for the system of the service they provide, is not only unfair, but it could lead to long-term inefficiency, in case it discourages investment.

Finally, we remark that the choice of 'central-dispatching', rather than the mainstream European 'self-dispatching' model, is presumably based on its virtues in terms of efficiency, deriving from the co-optimisation of all ancillary services and the marginal pricing rule. The fact that the New design is prone to inefficiencies, even under normal market conditions, makes the merit of departing from the 'self-dispatching' approach far from obvious.

The following examples illustrate these features of the New design.

Example 1: uncertainty on the pricing rule creates inefficiency in the bids and offers selection process

Consider the situation displayed in **Figure 9**, where there is a certain probability that a congestion arises after the day-ahead and intraday markets between two areas, Area A and Area B. We focus our attention on the bid submitted by unit U1 in Area A, assuming that units U2, U3 and U4 in Area A bid their decremental costs. Let us assume for simplicity that all bids are submitted for the same volume.

Unit U1 may alternatively:

a) If the expected outcome is that no congestions will arise, bid its decremental cost, **C1**. This is in fact the profit-maximising strategy in case the ISP selects bids in Area A for 'balancing' purposes. Or
b) If the expected outcome is that a congestion will arise, bid a price just above its best estimate of the 'zonal marginal (balancing) price' $\mathbf{P_A}$, i.e., the minimum price that will be accepted by the ISP to decrease production in Area A, given the competition of units U2, U3 and U4. Assuming that U1 knows with certainty that, in case of congestion, three out four bids will be selected by the ISP, the profit-maximising strategy for U1 consists in bidding just above the price of U4.

Option (a) is displayed in the left panel of **Figure 9**; option (b) is displayed in the right panel of **Figure 9**. As shown in the Figure, the position in the merit order of unit U1 is different in the two cases.

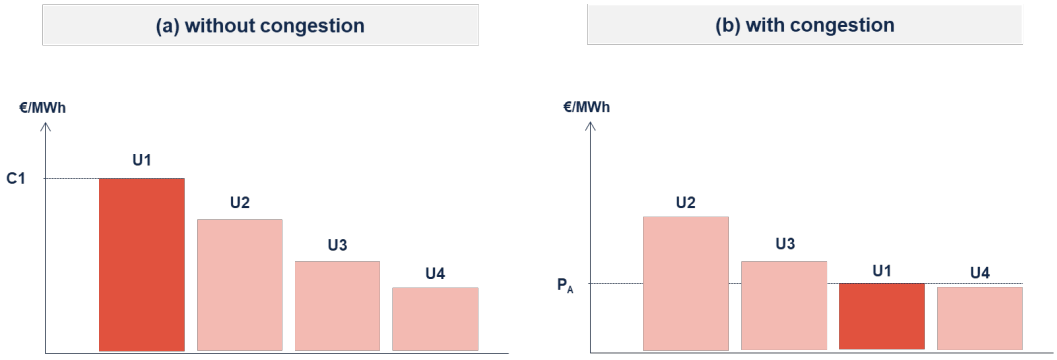

Figure 9 Under the New design, uncertainty on the pricing rule creates inefficiency in the bids and offers selection process

Let us now suppose that U1 expects that a congestion will arise and therefore follows strategy (b), bidding just above its estimate of the 'zonal marginal (balancing) price' $\mathbf{P_A}$ – i.e., just above the price bid by U4.

If the expectation of U1 is incorrect and no congestion arises, the selection of bids for 'balancing' purposes in Area A will be inefficient. For instance, suppose that the ISP requires two bids to balance injections and withdrawals: given the bid prices submitted by market participants displayed in the right panel of **Figure 9**, the most convenient selection consists in accepting bids from U2 and U3. The *ex-ante* optimal bidding strategy for U1 leads its bid to be rejected despite U1 being the generator that may provide the balancing service at the lowest cost for the system.

In conclusion, under the New design, the system cost is not minimised by the ISP. This follows directly from the fact that, in case U1 expects congestion, it will adapt its bid price to maximise profit. This inefficiency is avoided in the European normative framework, since all bids selected at a price above the marginal price would pay the same marginal price. In this case, U1 would receive the minimum between the bid price and the marginal price. This implies that a cost-based bidding strategy ensures profit maximisation for U1 (so that U1 can always follow the bidding strategy depicted in **Figure 9**a, and system costs are minimised).

Note incidentally that under the New system the competitive profit-maximising bidding strategy may lead to prices for balancing energy and balancing capacity that do not make generators indifferent between selling one or the other service. This follows from the fact that bids and offers selected to make balancing capacity available are labelled as for 'redispatch' purposes and remunerated 'as-bid', while balancing energy is remunerated 'as-cleared'.

Instead, avoiding any arbitrage between the provision of different ancillary services is one of the key desirable properties of the 'central-dispatching' model. Giving up such a feature questions the rationale for selecting 'central-dispatching' over the standard 'self-dispatching' model.

Finally, the following example illustrates another undesirable consequence of the New model in terms of incorrect pricing of resources, which, in the long run, may lead to underinvestment in capacity with balancing capability.

Example 2: wrong pricing of the procured services

Consider the case shown in **Figure 10,** where offers A, B, C and D are submitted for delivery at time *t*. In what follows, we assume that the prices offered (as

displayed in the Figure) correspond to the incremental costs of the corresponding generators, the profit-maximising strategy under a 'pay-as-cleared' regime.

Let us suppose that congestion arises in the system, so that at time T_1 offer A is selected by the ISP to resolve the congestion (hence for 'redispatch' purposes). At a later time $T_2 > T_1$, due to an increase in demand the ISP selects offers B, C and D to restore the balance between injections and withdrawals ('balancing' purposes).

Under the New design, offer A is remunerated 'pay-as-bid' at 30 €/MWh while offers B, C and D are remunerated at the clearing price for balancing services of 80 €/MWh. This outcome of the New model is questionable in terms of fairness, as offer A ends up supplying precisely the same service as offers B, C and D, while being paid a lower price. More importantly, though, under-remuneration of the generator's services in the Balancing Market may lead to underinvestment and, ultimately, to a shortage of flexibility in the system with adverse consequences on the system's security.

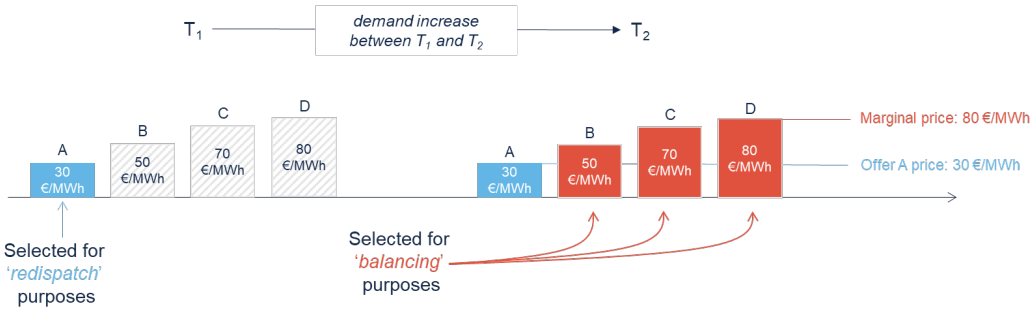

Figure 10 RAE's New design is questionable in terms of fairness and leads potentially to the wrong pricing of the procured services. In the example, offer A provides the same service as offers B, C and D but is remunerated at a lower price

3. CONCLUSIONS

RAE's New design entails a major change in the functioning of the Greek electricity market, introducing an *ex-post* conventional labelling methodology to distinguish bids and offers selected in the ancillary services market for 'balancing' purposes from those selected for 'redispatch' purposes and remunerating the bids and offers activated for the different purposed according to different approached: 'pay-as-cleared' and 'pay-as-bid' methods, respectively.

The market model introduced by the New design is inefficient and is not consistent with the European Target Model and the legal provisions implementing it. The inconsistency with the European framework might result in the New design being appealed and ruled against, thus creating additional uncertainty regarding the future functioning of the Greek balancing and ancillary services markets.

In addition, the fact that the New design leads to inefficient market outcomes makes the case for departing from the European mainstream 'self-dispatching' model weaker, since the (deemed) superiority of 'central-dispatching' approach when it comes to the efficient selection of the resources is lost.

For these reasons we recommend reassessing the opportunity to introduce the New design, based on a detailed cost-benefit analysis comparing the New design with alternative policy measures that are consistent with the European model.

ANNEX

Legal assessment of the proposed revision of the Greek ancillary market design

This memo provides a legal assessment of the proposed revision of the Greek ancillary market (the 'New design') under EU law. This legal assessment relies on the factual information contained in the DFC economics report, and in particular reviews and expands on its section 2.2.1.

***

1. LEGAL ASSESSMENT OF THE NEW MARKET DESIGN

The Greek ancillary market design is based on a central dispatch model where balancing, congestion management and reserve procurement are performed simultaneously by the TSO in an integrated process (the ISP). This notably allows the TSO to activate balancing energy bids not only for balancing purposes, but also for system constraints management purposes.

The TSO has to label the selected bids depending on the purpose for which they are activated. Pursuant to the EU methodology[1], the New design distinguishes between:

i. Bids that are activated for balancing purposes ('balancing bids') ; and

ii. Bids that are activated for other purposes ('non-balancing bids').

However, the New design goes beyond what is provided by the EU methodology by applying different pricing methods depending on the activation purpose:

i. Balancing bids are remunerated on a 'pay-as-cleared' basis ; and

ii. Non-balancing bids are paid on a 'pay-as-bid' basis.

Under the EU legislative framework, it is clear that bids activated for balancing purposes must be paid 'as-cleared'. However, the EU legislative framework does not explicitly provide whether - and when - bids activated for non-balancing purposes should be paid 'as-cleared' or 'as-bid'.

Nonetheless, applying a 'pay-as-bid' method to *all* bids activated for non-balancing purposes appears to be incompatible with EU law for several reasons:

- The ACER has clearly indicated that the EU legislative framework must be understood as imposing the 'pay-as-cleared' method to all balancing energy bids that are in the same merit order list, regardless of the purpose for which they are ultimately activated. Therefore, the New design is **incompatible with EU pricing rules** in that it provides that bids activated 'in merit' for non-balancing purposes shall be paid 'as-bid'.

- Subjecting bids that can be used for both balancing and non-balancing purposes to different pricing method depending on the TSO's *ex post* labelling **can be considered as discriminatory**.

- The fact that balancing market participants do not know - at the moment of submitting their bids - which pricing method will be applicable to each bid is **not compatible with the transparency requirements** applicable to balancing markets.

[1] Decision No 16/2020 of the European Union Agency for the Cooperation of Energy Regulators of 15 July 2020 on the methodology for classifying the activation purposes of balancing energy bids, Annex I.

- The New design appears to be **disproportionate**, in that its expected benefits are not commensurate with the disadvantages it causes, and the objectives it pursues could be achieved by equally effective and less damaging means.

2. Incompatibility of the New design with EU pricing rules

Article 6 (4) of the Electricity Regulation[3] provides that the "[t]*he settlement of balancing energy for standard balancing products and specific balancing products shall be based on marginal pricing (pay-as-cleared) unless all regulatory authorities approve an alternative pricing method on the basis of a joint proposal by all transmission system operators following an analysis demonstrating that that alternative pricing method is more efficient*". This means that 'pay-as-cleared' should be the rule for all balancing products, while 'pay-as-bid' is only permissible if and where it has been approved by ACER for reasons of system efficiency. It is not clear, however, whether this provision applies to all balancing energy bids regardless of their activation purpose, or only to balancing energy bids activated for balancing purposes.

Article 30 (1) of the Electricity Balancing Regulation[4] provides that the pricing methodology for the activation of balancing energy bids for the frequency restoration and the reserve replacement processes shall be based on marginal pricing ('pay-as-cleared'), and that balancing energy bids activated for internal congestion management purposes "*shall not set the marginal price of balancing energy"*. In other words, 'pay-as-cleared' remuneration is the rule for balancing energy and capacity purposes, while only bids activated for internal congestion purposes are explicitly exempted from the 'pay-as-cleared' requirement.

On the basis of Article 30 (1) of the Electricity Balancing Regulation, the ACER approved the EU methodology for pricing balancing energy[5]. This methodology provides that all balancing energy bids that are activated under the same merit order list should be remunerated 'as-cleared'.

The TSOs' proposal[6] suggested that balancing energy bids activated for system constraints purposes shall be paid 'as-bid' (exactly as it is now envisaged under the New design). However, this proposition was explicitly rejected by the ACER:

> "*The Agency* […] *removed from the Proposal the provisions providing for different pricing of balancing energy bids activated for system constraints. These provisions were replaced by a provision specifying that if the EU platforms are used for activations other than balancing and if these activations respect the merit order principle, one single cross-border marginal price shall be established for all activation purposes*"[7].

The ACER took the view that, since the Energy Balancing Regulation only explicitly excludes bids activated for internal congestion purposes from the application of the 'pay-as-cleared' regime, "*the only reason for deviating from the marginal pricing principle is when the activation of bids does not respect the merit order*"[8]. As a consequence, the purpose for which the bids are activated cannot be the reason why a different pricing regime is applied. The only relevant criterion for determining the applicable

---

[3] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity ("Electricity Regulation").
[4] Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing ("Electricity Balancing Regulation").
[5] Decision No 01/2020 of the European Union Agency for the Cooperation of Energy Regulators on the methodology to determine prices for the balancing energy that results from the activation of balancing energy bids, Annex I.
[6] ENTSO-E, *'All TSOs' proposal on methodologies for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process pursuant to Article 30(1) and Article 30(3) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* (available here).
[7] Decision No 01/2020, paragraph (46). Emphasis added.
[8] Decision No 01/2020, paragraph (45).

pricing regime is whether bids are activated respecting the merit order – in which case they should be remunerated 'as-cleared'– or are activated outside the merit order – in which case they should be remunerated 'as-bid'.

Therefore, it appears that the New design is incompatible with EU pricing rules in that it provides that balancing energy bids activated 'in merit' for system constraints purposes are not remunerated at the marginal price.

3. The New design leads to a discrimination between market players

Article 6 (1) of the Electricity Regulation provides that balancing market shall be organised in such a way as to ensure effective non-discrimination between market participants.

Article 3 (2) of the Electricity Balancing Regulation requires that Member States, relevant regulatory authorities and system operators apply the principle of non-discrimination when implementing the Regulation.

Despite these requirements, the New design creates a difference in treatment between market players insofar as 'in merit' bids that are selected for balancing purposes will be paid at the marginal price, while 'in-merit' bids that are selected for redispatching purposes will be paid 'as-bid', which can be less than the marginal price. There is however no valid reason for treating balancing energy bids differently if, from the system's perspective, they are perfect substitutes to ensure security.

In its Decision No 01/2020, the ACER had already underlined that applying the 'pay-as-bid' method to balancing energy bids selected for system constraint purposes would be "*completely arbitrary and without justification, since any bid activated on the merit order can serve either balancing purpose or system constraint purpose. In this context, different pricing of bids that are activated by respecting the same merit order (i.e. from the same pool of resources) would result in an unjustified discrimination of bids, because there is no fundamental difference between the bids activated for balancing purpose or system constraints*"[9].

Therefore, it appears that subjecting all non-balancing bids to a 'pay-as-bid' rule would not only be incompatible with the specific EU pricing rules, but it would also be incompatible with the general principle of non-discrimination applicable to the electricity ancillary services markets.

4. The New design hinders transparency on the balancing markets

Article 6 (1) b) of the Electricity Regulation provides that balancing markets shall be organised in such a way as to ensure that services are defined in a transparent and technologically neutral manner and are procured in a transparent, market-based manner.

Article 40 of the Electricity Directive[10] provides that TSOs shall procure balancing services subject to a transparent, non-discriminatory and market-based procedure.

Article 3 (2) of the Electricity Balancing Regulation requires Member States, relevant regulatory authorities and system operators to ensure transparency.

In contradiction with these transparency requirements, the New design renders the Greek balancing market more opaque by creating an uncertainty on how bids will be remunerated. Since market participants do not know in advance what pricing regime will apply to each bid submitted, they will have to factor in this uncertainty in their bidding strategy, which could lead to sub-optimal market outcomes. The bidding strategy also becomes more complex, which might disfavour smaller market players and new entrants.

---

[9] Decision No 01/2020, paragraph (44). Emphasis added.

[10] 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 ("Electricity Directive").

Conversely, when all 'in merit' bids are subject to the same marginal pricing rule, market participants do not risk receiving less money than the marginal price if their bid is selected. This reduces uncertainty and risk for market participants, thus promoting participation, especially of smaller players, and fosters competition.

5. The New design does not comply with the principle of proportionality

The principle of proportionality, which is enshrined in both EU and Greek law[11], requires that measures taken by public authorities do not exceed the limits of what is appropriate and necessary in order to attain the legitimate and well-defined objective they pursue.

5.1 The appropriateness and necessity of the New design to attain its objective

According to the principle of proportionality a measure must be, in order to be lawful, **appropriate** and **necessary** for meeting the objectives legitimately pursued by the measure in question. When there is a choice between several appropriate measures, the least onerous measure must be used and the charges imposed must **not be disproportionate to the aims pursued**[12].

The **objective of the New design** is to prevent (i) excessive costs for ancillary services procurement resulting from systematic congestion and (ii) locational market power issues from producing undesirable wealth transfers from the TSO to the power producers.

It would appear that the RAE did not provide a detailed assessment of the extent to which the congestion and market power issues affect the functioning of the Greek balancing market. This makes it difficult to assess the seriousness of the congestion and locational market power issues, and therefore necessity and appropriateness of the New design. However, the following reflections indicate that the New design does not comply with the principle of proportionality

- Appropriateness

While the New design might be appropriate to address the excessive costs for ancillary services procurement resulting from systematic congestion, it fails to address the issue of locational market power enjoyed by generators located in the Peloponnese region. Indeed, generators will continue to enjoy market power as long as new interconnection capacity is not commissioned, regardless of the applicable pricing regime. They will simply adapt their bidding strategy to strive for the same market outcome under the ‘pay-as-bid’ rule as the one currently obtained under the ‘pay-as-cleared’ rule.

- Necessity

By no means is the New design necessary for the achievement of the objective for the following reasons:

  - The issues it seeks to address (systematic congestions and locational market power) will most likely fade away with the commissioning in 2023 of the new 400 kV interconnection between Peloponnese and the Attica.

  - Alternative measures that are compatible with the EU law and less detrimental to the market players' interests could equally address the issues that the New design attempts to correct.

5.2 The drawbacks of the New design outweigh its potential benefits

While the problems that the New design aims to correct should gradually fade away or can be successfully addressed with some alternative measures that are less detrimental to market player's

[11] See among others Stylianos-Ioannis Koutnatzis, "The Proportionality Principle in Greek Judicial Practice", 16 *Diritto & Questioni Pubbliche* 205 (2016).

[12] ECJ, Case 265/87 [Schräder] ECR 1989, 2237.

interests, the disadvantages of the New design are numerous and outweigh its potential benefits which means that the New design is disproportionate to the aims pursued :

- The application of different pricing methods depending on the *ex post* labelling of bids creates an uncertainty that will likely impact smaller players and new entrants in particular, thus reducing competition in the Greek market. Indeed the potential reduction of the generators' compensation, compared to the value for the system of the service they provide, could discourage the new investments needed to ensure the security of the system.

- The increased complexity of bidding strategies may result in the suboptimal selection of generators providing ancillary services, which may cause higher total procurement cost for ancillary services.

- As underlined by ACER in a recent communication[13], marginal pricing is more conducive than 'pay-as-bid' to the penetration and deployment of renewable generation on the market. The New design could therefore be seen at odds with the decarbonisation objectives of the Greek electricity system.

- The New design may impair participation of Greek generators in the platforms for pan-European procurement of ancillary services such as PICASSO (automated FRR), MARI (manual FRR) and TERRE (replacement reserve), which would be contrary to the European objectives of convergence of balancing markets.

For all these reasons, it would appear that the New design imposes constraints on electricity producers that are disproportionate to its potential benefits.

All in all it appears that the New design is in breach of the principle of proportionality (i) because it is not appropriate to address the locational market power issues, (ii) because it is not necessary in order to overcome the identified problems, because alternative measures exist that are less detrimental to market player's interests, and (iii) because the constraints imposed by the New design are disproportionate to its potential benefits.

[13] European Union Agency for the Cooperation of Energy Regulators, *High Energy Prices*, October 2021.