Subject: State aid n° SA.50152 (2018/N) - Greece
New Transitory electricity Flexibility Remuneration Mechanism (TFRM)

Sir,

1 Procedure

(1) On 15 January 2018 the Hellenic Republic pre-notified the above mentioned scheme. The Hellenic Republic provided additional information on 19 March, 24 May, 5 June and 11 June 2018.

(2) On 29 June 2018 the Hellenic Republic notified, pursuant to Article 108(3) of the Treaty on the Functioning of the European Union (‘TFEU’), the above-mentioned scheme. The Hellenic Republic provided additional information on 4 July 2018.

(3) Due to the urgent need to adopt and notify a Decision relating to the State aid case SA. 50152 (2018/N) the Greek government agrees exceptionally to waive its rights deriving from Art. 342 TFEU in conjunction with Art. 3 of the EC Regulation 1/1958 and to have the planned Decision adopted and notified pursuant to Article 297 of the Treaty in English by letter dated 13 July 2018.

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2 DESCRIPTION

2.1 Background

2.1.1 The Greek electricity market

2.1.1.1 Description of the market

(4) The Greek wholesale electricity market is based on a mandatory "pool" mechanism. Each day, all sellers of electricity (i.e. generators, auto-producers and importers) must state an offer price for each hour of the following day for their available capacity to supply electricity to the system. Currently, a cap of EUR 300/MWh applies to all generators’ offers. At the same time, all buyers of electricity (i.e. retailers, exporters, pumped storage hydro and self-supplied consumers) must submit demand declarations for each hour of the following day (i.e. they do not submit price-based offers). The day-ahead market clears on an hourly basis according to a system marginal price ('SMP'), corresponding to the economic offer of the block lastly accepted in the economic merit order to meet demand.

(5) ADMIE (the Greek electricity Transmission System Operator, or 'TSO') runs at day-ahead and in real time the Dispatch Schedule i.e. an algorithm which co-optimises energy provision and ancillary services and runs taking into consideration the technical characteristics of the units such as ramping. To address the load fluctuations the algorithm suggests calling upon fast ramping generation. These plants are obliged to operate in order to provide flexibility services to the TSO (e.g. remaining on standby at their minimum stable level, rapidly increasing or decreasing generation) and are therefore called to operate as "must-run" plants.

(6) On several occasions in the morning hours the fast ramping plants operate to provide the required reserves to the system and they are remunerated according to the SMP of the wholesale market set by the lignite generation bid and not by them. On the other hand in the night peak hours, when demand is increased, they often define the SMP and thus, they are remunerated accordingly. However, with the way the service is being required these plants are viewed technically not as purely meeting electricity demand, but rather as discharging a specific service. In other words, the SMP is determined as if the market had no ramping constrained.

(7) The TSO also procures ancillary services, which, as currently defined by the Grid Code, are of a different nature than flexibility services, mainly due to the duration and technical requirements of the service as well as the different time granularity. Remuneration under such services is subject to a EUR 10 per MW price cap for primary and secondary reserves, soon to be increased to EUR 50 per MW, while tertiary reserves are procured free of charge. Prices for ancillary services are however generally much lower than the price cap. For example, statistics for the

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1 Regarding the remuneration for spinning tertiary reserve, LAGIE conducted a feasibility assessment (delivered on I-229861/14.12.2017) and ADMIE submitted an Impact Assessment analysis (I - 222068/31.05.2017). In this context, RAE conducted three public consultations (March 2017, June 2017 and February 2018). Thus, RAE is currently drafting the necessary amendments of the Grid Code and the Market Code and the framework for the remuneration of the tertiary reserve service will be completed.
year 2017 provided by the Greek authorities show that the annual average price of the primary reserve is equal to 0.012€/MWh, the annual average price for the secondary reserve is equal to 0.248€/MWh (for upward services) and 0.253€/MWh (for downward services).

(8) The Greek electricity market is marked by the strong position of the incumbent Public Power Corporation (PPC). In 2017, PPC’s average retail market share in Greece was 86.7%. PPC’s electricity generation and imports covered 56.7% of total demand in Greece in 2017, while PPC’s market share in electricity generation, as a percentage of the total load of the interconnected system was 50.2%2.

2.1.1.2 The interruptibility scheme

(9) On 7 February 2018, the Commission adopted a decision approving the prolongation of the interruptibility scheme for the Greek electricity system3. Under the measure, the TSO contracts large energy consumers to be available to reduce their consumption at times of system stress, also referred to as demand response.

(10) In exchange for being available to be disconnected, the beneficiaries are remunerated with a fixed payment which is determined by means of three-monthly auctions. Beneficiaries can bid to provide two different services, summarised in Table 1 below. In order to be eligible for participation in the tenders for the interruptibility scheme, the minimum threshold is a capacity of 3 MW. The installations must moreover be connected to the transmission grid or the medium voltage network.

Table 1: Different types of interruptibility services, offered by the TSO, depending on the notice time, duration of each load shedding and maximum duration of the load shedding per year4

<table>
<thead>
<tr>
<th>Product type</th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notice time</td>
<td>5 min</td>
<td>5 min</td>
</tr>
<tr>
<td>Duration of each power reduction order</td>
<td>48 hours</td>
<td>1 hour</td>
</tr>
<tr>
<td>Maximum number of power reduction orders per month</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Maximum duration of load shedding per year</td>
<td>288 hours</td>
<td>24 hours</td>
</tr>
<tr>
<td>Minimum period between two consecutive power reduction Orders</td>
<td>1 day</td>
<td>5 days</td>
</tr>
</tbody>
</table>

(11) The implementation of the interruptibility scheme will contribute to reducing peaks during system stressing times and emergency situations. However, participants in the interruptibility scheme cannot offer the typical flexibility services (in particular ramp-down services) needed to address load fluctuations in

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Greece, as the load shedding is a one-off measure. Moreover, the capacity is not able to participate for example on a daily basis in the balancing of the grid but only in emergency situations i.e. no more than 3 (type 1) or 4 (type 2) times per month.

2.1.2 The introduction of Target Model in Greece

In line with its commitment undertaken in the European Stability Mechanism (ESM) stability support programme, the Greek authorities will launch the Target Model by April 2019. The Target Model includes the day-ahead, intraday, forward and balancing markets. At the time the Target Model will be launched, the Greek authorities will also remove any bidding restrictions such as maximum and minimum bidding and clearing prices and the variable cost-recovery mechanism in order to be fully compliant with EU legislation.

2.1.3 The previous Transitory Flexibility Remuneration Mechanism TFRM

On 31 March 2016, the Commission adopted a non-objections decision for the first Transitory Flexibility Remuneration Mechanism (TFRM). This measure consisted of a mechanism which aimed at compensating certain electricity generators in the Greek interconnected electricity system for the provision of "flexibility services" to the TSO. In particular, on instruction from the TSO and subject to a specified notice period, beneficiaries increased or decreased the amount of electricity injected into the electricity system at a specified minimum rate on a multi-hour time-scale.

The scheme was approved for a maximum period of 12 months from its adoption, during which time the level of remuneration defined by the Greek energy regulator, RAE (the 'Regulator') was 45 €/kW/year. In 2016, 28 beneficiaries received administrative payments of EUR 160 million: around 53% of the payments were made to IPPs and 47% to PPC.

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6 According to the Regulator’s Decision 369/2018 for the high Level guidance for the market Rulebooks as published in Government Gazette (ΦΕΚ Β 1880/2018), the Greek authorities confirmed that the removal of bidding restrictions also includes the removal of the floors on bidding prices of hydro units.
7 This is without prejudice to the maximum and minimum technical limits set in accordance with Article 30(2) of Reg. 2017/2195.
8 See p. 52 of RAE National Report 2017: "A cost-recovery mechanism ensures that generators dispatched by the TSO, beyond the day-ahead schedule, are remunerated based on their declared minimum variable costs plus a margin. This margin had been set previously to 10%, but it was abolished in July 2013, being considered a market distortion, as generators used the mechanism to get dispatched over prolonged time intervals, exhibiting stable profiles (of limited sensitivity to the demand level), but imposing unnecessary costs on the system. After this distortion was corrected, the mechanism better expressed its objective as a safety net that averts producers' losses when dispatched due to reserve requirements (not necessarily energy balance requirements) and inter-temporal technical constrains. Nevertheless, the mechanism was removed on 01.07.2014. In 2015 however, RAE evaluated the implications of the mechanism abolition and with its Decision 392/2015, (re)introduced a more stringent version of the cost recovery mechanism. ". Available at: http://www.rae.gr/site/file/system/docs/ActionReports/national_2017.
2.2 The planned Transitory Flexibility Remuneration Mechanism (TFRM)

In line with its commitments undertaken in the ESM stability support programme, the Greek authorities pre-notified\(^{10}\) and subsequently notified\(^{11}\) a capacity mechanism in the form of a TFRM.

2.2.1 Adequacy assessment and flexibility needs

In Greece, the profile of electricity demand (net of variable renewable generation) has become increasingly variable over the past few years following the increased deployment of variable renewable (RES) electricity, mainly from solar and wind (Figure 1 below). These changes are expected to intensify in the future as Greece has to meet its national target of 18% of national final gross energy consumption from RES by 2020 in order to contribute to the achievement of the target of 20% of the EU overall gross energy consumption from RES by 2020 set by the Renewables Directive\(^{12}\).

Figure 1 - Evolution of the installed RES capacity and respective power generation in the Greek System between the years 2010 and 2016

Source: Notification

Figure 2 below shows the forecasted total installed capacity per RES category during years 2017-2027.

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\(^{11}\) See p. 28 of the Draft Supplemental Memorandum of Understanding, Fourth Review of the ESM Programme, 20 June 2018.

The Greek authorities submitted a study conducted by a consultant for the TSO\textsuperscript{13} assessing the System long-term capacity adequacy. This study explored and evaluated the long-term flexibility adequacy of the Greek power system for the years 2017-2027 (hereafter "the flexibility study"). The flexibility study highlighted the system’s needs in flexible capacity i.e. “the requirement for sufficient (upward and downward) system ramping capability provided by eligible resources in order to follow the increased net load variations under high penetration levels of variable and uncertain RES generation”. Maximum flexibility needs are in the order of 4-5GW for the short-term horizon (years 2018-2019) and increase up to 6GW in the mid-term horizon.

According to the Greek authorities, the aforementioned ramping needs are generally provided through the appropriate scheduling and dispatching of flexible generation units that are able to adjust their production in short time, namely Combined Cycle Gas Turbine (CCGT), Open Cycle Gas Turbine (OCGT) and flexible Hydro Power (HP) plants. The total net capacity of these power generation categories/technologies in the Greek power system is presented in Figure 3 below.

## Figure 3 - Net capacity of different power generation technologies in the Greek Power System in 2018

<table>
<thead>
<tr>
<th>Power generation technology</th>
<th>Net capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCGT</td>
<td>4,254&lt;sup&gt;14&lt;/sup&gt;</td>
</tr>
<tr>
<td>OCGT</td>
<td>148</td>
</tr>
<tr>
<td>HP</td>
<td>3,171&lt;sup&gt;15&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total</td>
<td>7,573</td>
</tr>
</tbody>
</table>

*Source: Notification; own calculations.*

(20) However, the actual availability of the generation capacity on a continuous basis is reduced due to planned and un-planned outages. Moreover, the availability of the HP plants is further restricted by the actual resource availability and operational constraints connected with water resource management for reasons other than power production (e.g. irrigation, environmental protection, safety etc.).

(21) The Greek authorities explained that actually the available flexible capacity is significantly lower than the maximum net one, due to the reduced availability of HPs, reaching, thus, in total about 5 GW.

(22) It should be noted that, for the moment, there is no legal framework in Greece allowing for participation of demand response<sup>16</sup>, which therefore currently cannot contribute to manage the system variability.

(23) According to the flexibility study, the key factor to determine the flexibility needs of the system is the maximum net system load ramp that is observed within each month. In order to account for the worst system conditions, the maximum capacity between the most severe single contingency<sup>17</sup> and a specific percentage of the expected peak load<sup>18</sup> are also added to the net system load ramp in order to calculate the *upward* flexibility needs. In the calculation of the *downward* flexibility needs, the above-mentioned term is not taken into account.

(24) The flexibility study considered three distinct ramping products, i.e. 15-min, 1-hour and 3-h ramping. The study finds that net system load ramps in both directions (upwards and downwards) and for the ramping intervals of 1-h and 3-h, exhibit an increasing trend over the years. This is due to the increased net load variation in the Greek power system, as a result of the increasing system load in

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<sup>14</sup> Megalopolis V power plant is not incorporated in the Table as for now it is under trial operation and expected to be registered until end of 2018. Therefore it will be eligible to participate in the proposed scheme, at an estimated maximum capacity of 500 MW. After the completion of the first High Voltage corridor in the High Voltage grid of Peloponnes, which is expected to occur in 2019, it will be eligible to participate in the proposed scheme at full capacity (811 MW).

<sup>15</sup> HPP Ilarionas has been registered in the Units’ Register of ADMIE, at a net capacity of 153 MW and therefore is eligible to participate in the TFRM.

<sup>16</sup> Under the ongoing market reforms towards the Target Model the participation of demand response through aggregation is foreseen.

<sup>17</sup> The possible outage of the largest on-line thermal unit in the time interval where the maximum net system load ramp appears.

<sup>18</sup> To account for system load forecast errors.
combination with the increasing variable RES injections, mainly produced by wind and PV plants. In quantitative terms, the maximum 1-h upward and downward net load ramps are much lower (about 30-40%) than the respective 3-h ramps. This is why the 3-h ramping needs were considered instead of the 1-h. As regards the technical capacity to provide 3-h ramping, only the CCGTs, OCGTs and flexible HP plants can ramp-up within 3-h even when they are initially off-line\(^\text{19}\).

(25) The load curve that is covered by conventional power plants and hydro power stations (Load minus RES production minus Net Imports) has changed significantly in the last years due to the increase in variable RES. The volatility of this load curve is expected to increase further in the next years due to the expected further increase of installation of variable RES power plants, as explained in recital (16). As presented in Figure 4 below, the variable RES production (and in particular photovoltaic production) leads to the appearance of the “duck effect” with a significant reduction in the load to be covered by conventional and hydro power plants during the noon hours and a sharp increase in load during the sunset period, enhancing the need for flexible units that have to increase sharply their production. Furthermore, during the noon hours (when the PV solar injections are at maximum), RES may produce so much electricity that conventional power plants have to be ramped down to ensure system balance.

**Figure 4 - Load profile from 2010 to 2020 considering RES penetration**

![Load profile from 2010 to 2020 considering RES penetration](image)

Source: Notification

(26) Consequently, there will be a need for more 3-h upward and downward flexibility in the coming years as shown in Figure 5 and Figure 6 below. This is due to the significant increase in both the total system load (also due to the gradual

\(^{19}\) According to the flexibility study, highly flexible generating units, such as OCGT and hydro units can efficiently contribute to all ramping products either being initially on-line or off-line, since their technical characteristics allow them to synchronize and ramp-up very quickly (in less than 15 min). CCGT units, which usually present a synchronization time of around 1 hour can contribute in 15-min and 1-hour ramping only when they are on-line, while they can contribute to the 3-hour ramping product even when they are initially off-line. On the other hand, lignite units can contribute to whichever ramping product only when they are online, since their operational characteristics do not allow them to synchronize and ramp-up within three hours.
interconnection of Crete, partially in 2020 and fully in 2023) and the simultaneous increase in RES generation.

(27) The flexibility study details the needs for upward and downward flexibility. The 3-h maximum upward ramps are usually larger than the respective 3-h maximum downward ramps (during almost all the years from 2018 to 2027 and all different scenarios). According to the flexibility study, this is due to the fact that the 3-h net load increases are generally steeper than the net load decreases, especially during the evening peak load hours (this is when the highest ramping values are usually observed). Figure 5 and Figure 6 show the respective results for the 3-h upward and downward ramps.

**Figure 5 - Average 3-h Upward Ramping System Need (S.1-S.8)**

![Figure 5 - Average 3-h Upward Ramping System Need (S.1-S.8)](image)

*Source: Notification*

**Figure 6 - Average 3-h Downward Ramping System Need (S.1-S.8)**

![Figure 6 - Average 3-h Downward Ramping System Need (S.1-S.8)](image)

*Source: Notification*
In the short-term, the maximum flexibility needs for 2018 are expected to reach 4263 MW (3-h ramp) while for 2019 are expected to reach respectively 4754 MW (3-h ramp).

2.2.2 Market failures

As explained in recital (4) above, the Greek electricity market is based on a day-ahead wholesale market (“mandatory pool”). Today, the TSO requests flexibility services for system security reasons, but there is no provision for remunerating the costs entailed by the flexibility service providers. They are remunerated for the provision of electricity at the SMP, like all the other electricity providers. Thus, there is no incentive for private entities to offer flexibility services on a voluntary basis, as these services should receive additional remuneration to compensate for the additional costs incurred with the provision of flexibility services.

The Greek authorities have identified market failures and inefficiencies in the current market structure that prevent the market from providing the necessary incentives to provide the necessary flexibility needs. More specifically the current design of the market is characterised by (a) the absence of a real-time balancing market and (b) the impossibility for gas plants to recover fixed costs, including the ones occurring from the provision of flexibility services, through the day-ahead system marginal prices.

(a) Absence of a real-time market for balancing services

The absence of real-time short-term markets, which would address the flexibility system requirements, is the primary reason for the need of a flexibility mechanism. Ancillary services, as currently defined by the Grid Code, do not include the ramping services. Therefore, since the expiration of the FRM in April 2017, the TSO requests the notified flexibility service and the flexible units are obliged to provide this service without remuneration.

The following table provided by the Greek authorities presents the low revenues earned in the ancillary services.

**Figure 7 - Reserves price data for the period 01 January 2017 - 31 December 2017**

<table>
<thead>
<tr>
<th></th>
<th>Average (€/MW)</th>
<th>Min (€/MW)</th>
<th>Max* (€/MW)</th>
<th>σ (€/MW)</th>
<th>Cap periods** (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary reserve price</td>
<td>0.94</td>
<td>0.001</td>
<td>10</td>
<td>2.86</td>
<td>526</td>
</tr>
<tr>
<td>Secondary up reserve price</td>
<td>0.51</td>
<td>0.001</td>
<td>10</td>
<td>1.99</td>
<td>137</td>
</tr>
<tr>
<td>Secondary down reserve price</td>
<td>0.18</td>
<td>0.001</td>
<td>10</td>
<td>0.96</td>
<td>26</td>
</tr>
</tbody>
</table>

* The Greek authorities confirmed that the Board of RAE has decided the increase of the cap from 10 €/MW to 50 €/MW and this decision is expected to be in effect after amending the relevant Code.

** Number of hours during which the price reached the cap of 10 €/MW.

Source: Notification (figures rounded)
11

(33) The Greek authorities consider the prices of the primary and secondary reserve far too low from providing any sufficient revenue stream for flexible resources so as to cover fixed and capital costs.

(b) Structural failure for remuneration of flexibility services

(34) The wholesale market in Greece and in particular the day-ahead market is cleared by taking into account the electricity offers that are submitted by the producers day-ahead and the flexibility needs of the System that have to be met considering the technical characteristics of units. The gas plants providing short-term flexibility services do not have sufficient opportunities from their participation in the day-ahead market to earn higher prices valuing their flexibility.

(35) Specifically, the current wholesale energy market determines the plant scheduling having as a main goal the co-optimisation of energy system costs and the costs of meeting ancillary requirements set by the TSO. The market rules evaluate the technical operation features of the plants considered as constraints that the optimal plant scheduling has to respect. Gas-fired power plants are dispatched in a way to operate at their technical minimum several hours prior to peak hours before providing to the system the necessary flexibility services. During this period, Gas-fired power plants are not price makers but price takers and therefore cannot recover fixed or capital costs. Moreover, during the peak hours of the midday, gas plants usually have to shut down because of RES penetration and the technical characteristics of lignite units that do not allow them to operate below a certain minimum production. Similarly, later in the night, after a quick ramping down, CCGTs are usually ordered to shut down, to keep the system in balance, thus accommodating the minimum stable generation power levels of lignite plants and avoiding RES curtailments.

(36) As shown in Figure 8 below, in the morning hours the natural gas units, that operate to provide the required reserves to the system, are price takers as they are remunerated according to the SMP set by the lignite units. Day-to-day gas plants face frequent start-ups and shut-downs, but also an obligation to show significant ramping rates, which is expected to become more demanding in the coming years due to increased RES penetration.

(37) The participation of gas units in demand coverage, especially in the afternoon hours due to the decrease of photovoltaic production, is increased. Gas-fired power plants units have to switch on and off several times during the day to meet demand and flexibility needs of the system and are required to stay long hours of the day at their technical minimum until they increase their production at peak times when they define the SMP.
As mentioned above, the absence of short-term markets does not allow flexible power plants to earn the real value of flexible capacity. Consequently, these plants are required to cover all fixed and capital costs through the day-ahead market. At the same time, their operation with frequent shutdowns and start-ups and with high ramping rates lead to additional operating and maintenance (O&M) costs and further gas supply costs.

According to the Greek authorities, these additional costs are about EUR 16.3/kW and are associated with increased inspections to check the remaining life of critical components and increased self-consumption of electricity. The fixed O&M costs associated with normal plant operation of EUR 21/kW are those of an efficient CCGT plant of 400 MW which exclude insurance and administration costs. As detailed in recital (48) of the Commission Decision on the previous TRFM, the additional fixed costs corresponding to gas purchases are around 9.1 €/kW.

Moreover based on estimations the capital costs of a typical CCGT plant on an annual basis are equal to EUR 65.6/kW/year. This is based on an investment cost of EUR 700/kW, a Weighted Average Cost of Capital (WACC) of 8% and a project lifetime of 25 years.
Figure 9 - Estimated total revenues and losses of gas-fired power plants that provided flexibility services when no TFRM was in place (1 May 2017-31 Jan 2018)

<table>
<thead>
<tr>
<th>Operation for the CCGT-OCGT plants</th>
<th>1/5/2017-31/01/2018</th>
<th>EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Revenues from the wholesale market and the system</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>Estimated Operation Costs</td>
<td>EUR</td>
<td></td>
</tr>
<tr>
<td>Fuel costs</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>ETS payments (estimations considering average emissions factor of 0.4 tnCO₂/MWh)</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>Fuel costs and ETS payments</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>Non fuel variable costs – Fixed O&amp;M costs (estimation considering also Table 3)</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>Total Operation Costs</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>Profits or Losses before taxes for period 1/5/2017-31/01/2018</td>
<td>[...]</td>
<td></td>
</tr>
<tr>
<td>Capital costs</td>
<td>-[...] €/MW/year</td>
<td></td>
</tr>
</tbody>
</table>

Source: Notification

(41) This notified measure aims at addressing the market failures identified above and ensuring the provision of adequate flexible capacity as required by the flexibility study which highlights the great system needs in flexible capacity for the years 2017-2027 and revealed that in order the ramping requirements to be met, especially in peak hours, all flexible units are necessary in the market.

(42) According to the Greek authorities, public intervention is thus justified to create a market that remunerates this necessary service. Thanks to the notified measure the said market failure would be addressed, i.e. the economic value of flexibility is defined and remunerated accordingly. Moreover, it is prevented that plant owners would revert to technical constraints and defensive declaration of technical parameters and bidding.

(43) In addition, according to the actual data, gas power plants contributed to a significant extent to the coverage of the flexibility needs of the system. Figure 10 below shows the amount of hours in 2017 during which gas plants were required to provide ramping services and the ramping rates (MW/min) provided by gas plants during critical hours in 2017, based on data provided by the TSO.
2.2.3 Market reforms to improve flexibility of the system

(44) The above mentioned market inefficiencies obstructing the remuneration of flexibility services are expected to be resolved after the implementation of the Target Model, by April 2019. Moreover, by that time, demand response and storage will be able to participate in the market and hence will increase the overall flexibility of the system (see Section 2.1.2).
2.3 Description of the measure

(45) The notified TRFM is based on the remuneration of the availability of eligible flexible generation capacity necessary to provide the identified flexibility needs detailed in Section 2.2.1 above. To remunerate such availability, the mechanism will provide compensation in €/MW. The TSO will procure the flexible capacity centrally and the level of the remuneration will be set through an auction.

(46) Actual remuneration will be calculated on the basis of the participants’ offers (pay-as-bid pricing algorithm). The auction price will be capped at 39.000€/MWh.

(47) Successful participants will receive remuneration based on predefined eligibility and availability criteria for the delivery period. Appropriate monitoring of the actual availability of the flexible capacity, including firm fuel availability, as well as compliance with the technical prequalification (eligibility criteria), will be conducted by the TSO according to the actual performance of the participating generation units. The TRFM includes penalties in case of non-availability (as explained in Section 2.6 below).

(48) The product offered in the auction consists of blocks of capacity (expressed in MW). Each block has a capacity of minimum 1 MW. Each unit can submit up to 10 blocks of capacity.

(49) In exchange for the remuneration, participants have to bid at all times in the market. Therefore, the aid is related only to the remuneration for the availability of the plant to provide the service. Furthermore, capacity participating in the mechanism will also earn the market price when called upon by the TSO.

(50) The maximum volume of the mechanism is 4500 MW. The Greek authorities determined this maximum volume based on the flexibility requirement identified in the flexibility study for 2018 (4263 MW) and the flexibility requirement identified for 2019 (4754 MW). The TSO may adjust downward the capacity it procures on the basis of the offer it expects, so as to ensure that any auction it organizes will be truly competitive.

(51) The notified scheme will be in effect from the adoption of the decision until 31 December 2019, when the balancing market will be mature enough in order to substitute the TFRM mechanism. The Greek authorities will continue using the mechanism also after the introduction of the target model for the period from April 2019 to December 2019 to allow market participants to get familiar with the new market structure. To take into account the change that will occur in the market once the Target model is in place, the Greek authorities will organise two different auction periods and delivery periods. The first auction will have a delivery period covering the period starting from the implementation of the mechanism until 31 March 2019. A second auction will be organised with a different design as it will run in parallel with the Target Model markets from April 2019 to December 2019. The Greek authorities have indicated that they may divide the two periods before and after the introduction of the target model.

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20 The eligibility criteria are described in detail in Section 2.5 below.
21 First the SMP, then the Intraday or the Balancing Market once the Target model will be implemented.
into shorter delivery periods; correspondingly they may organise also more than two auctions.

(52) In particular, once the Target model is in place, the Greek authorities expect higher market revenues for flexible capacity. To avoid any overcompensation, the second auction will be followed by an ex-post monitoring mechanism to avoid over-compensation if market revenues from the new short-term markets are higher than expected.

(53) Since settlements will be performed ex post monthly for both the TFRM and the Balancing Market, a claw-back mechanism is intended to be implemented as follows:

For a given month \(m\):

- \(R_{\text{TFRM},m}\): Revenues from the Transitory Flexibility Remuneration Mechanism
- \(R_{\text{BCM},m}\): Revenues from the Balancing Capacity Market
- \(R_{T,m}\): Total Revenues for flexibility and balancing capacity market

If \(R_{\text{TFRM},m} \leq R_{\text{BCM},m}\), then \(R_{T,m} = R_{\text{BCM},m}\), else \(R_{T,m} = R_{\text{TFRM},m}\).

(54) Moreover, in this second auction, demand response and storage will be eligible to the mechanism, as explained by the Greek authorities in recital (44).

(55) In this respect, the notified mechanism is considered as a temporary measure and will no longer be needed once the Target Model is fully operational.

2.4 Legal basis

(56) The Legal Basis of the mechanism will be defined in the amended Greek Law 4001/2011 (‘Energy Law’) which will establish the legal framework for the operation of the notified measure.

2.5 Beneficiaries

(57) Only power plants which have the ability of ramping fast, at least 8 MW/min for at least three hours, will be eligible to participate in the TFRM. The ramping rate requirement is also based on the fact that during critical times for ramping services in previous years, a typical provider of these services (such as gas-fired plants), delivered it at a ramping rate higher than up 8 MW/min. The beneficiaries of the measure are in the first period until end of March 2019 CCGTs, OCGTs, CHP plants and hydro units. In the second period, demand response operators and storage units are also eligible. Lignite plants are not eligible because they do not ramp up sufficiently fast. According to the Greek authorities, the number of eligible units to participate in the tenders is expected to be 29 (30 considering Megalopoli V which is still in the testing phase). Those units are owned by 5 Independent Power Producers (IPPs) and PPC.

(58) The requirement to be available for three hours is justified by the fact that the "sunset effect" with the highest ramping requirements lasts around three hours.

\[ \text{http://www.admie.gr/leitoyrgia-dedomena/mitroa/mitroo-monadon/monades-sto-mitroo-monadon/} \]
Flexible units of fossil fuel technology have to confirm their availability to provide the required service on a day-to-day basis. More specifically, they have to comply with the terms of their license regarding firm fuel availability. The Greek regulator RAE will specify the availability criteria and will examine compliance with the availability requirements. Any plant, existing or new, which meets the criteria can participate in the TFRM auctions.

Concerning hydropower, units are typically fast ramping resources that can contribute to the supply of flexibility services. However, their actual availability is conditional upon the availability of water resources. In addition, nominal capacity for the participation in the TFRM will need to be adjusted in order to take into account the mandatory generation, namely hydroelectricity generation which is dispatched due to day-ahead market management or for irrigation purposes and other uses of water and which takes the form of non-priced bids. From a system security perspective, it is imperative to take into account the reduced availability of hydro so as to reflect actual capacity in order not to overestimate flexibility resources. More particularly, water reserves present a specific seasonal pattern as illustrated in Figure 11.

![Figure 11 - Water reserves level](image)

Source: Notification

To ensure that the hydro capacity to be offered in the mechanism will be available, the Greek authorities have "derated" the capacity based on a specific methodology and historical data of the year 2016 and 2017. The eligible capacity of HPs will be lowered to 775 MW. To be compared with a nominal capacity of above ~3000 MW.

During the overlap period of the Target Model and the TFRM, demand response, if technically capable, will have the possibility to participate to the flexibility mechanism according to the eligibility characteristics (eg. > 8MW/min ramps etc) which are necessary for the stability of the system. Demand response will have the possibility to participate in the interruptibility mechanism or in the TFRM under the condition that it cannot participate in the same period to more than one mechanism, and cannot be overcompensated in case they also participate directly in the Balancing Market.
2.6 Penalties

(63) If providers are unavailable, penalties are applied as follows:

a. The measured historical available capacity is reduced, which reduces revenues for the future.

b. Through the ex-post Imbalance Settlement mechanism, the power plant is obliged to pay the non-produced energy at the imbalance price, which is higher than the received ex-ante spot price (by 10%-20%).

c. Additional administratively defined Non-Compliance Charges apply for failing to follow the instructions set by the TSO for energy production and ancillary service provision, or in case of deviations from declared availability and techno-economic data, based on articles 18, 22, 61, 117, 168 of the Greek Grid Code.

2.7 Financing of the measure and payment flows

(64) The measure will be financed by a special charge, imposed on electricity consumers, as required by the System Operating Code. This obligation is monitored by the TSO. The obligation imposed on each Load Representative relates to their maximum electricity demand measured during hours with increased loss of load probability (LOLP).

(65) The TSO will be responsible for (a) calculating the payments awarded under the measure, (b) issuing the settlements and (c) performing the respective invoicing. The TSO shall invoice the Load Representatives to collect the funds for the payments in question in the context of a special account, and correspondingly will be invoiced by the eligible generators under the notified measure based on the settlements issued to them.

2.8 Budget

(66) The costs associated with the TFRM will depend on the results of the auctions. Moreover, the claw-back mechanism put in place in the second auction (see recitals (52) and (53)) may lower the payment previously determined in the auction. Therefore, the actual cost can only be known ex-post, at the end of the delivery period. However, the annual maximum budget equals EUR 175.5 million corresponding to the price cap 39,000 EUR/MW times the maximum capacity of 4,500 MW.

2.9 Duration

(67) The Commission authorises the aid scheme until 31 December 2019. However, the Commission notes that the delivery period of the second auction described in Section 2.3 can only start once the Target model is in place. The delivery period of the first auction will necessarily end at the end of March 2019.

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24 For the notified TFRM, the special charge imposed on electricity consumers will not be determined in proportion to their obligation to hold certificates for flexibility, like in the previous TFRM.
3 ASSESSMENT OF THE MEASURE

3.1 Existence of aid

(68) A measure constitutes State aid within the meaning of Article 107(1) TFEU if the following conditions are cumulatively fulfilled: the measure (a) confers an economic advantage to the beneficiary; (b) is granted by the State or through State resources; (c) is selective; (d) has an impact on intra-EU trade and is liable to distort competition within the EU.

3.1.1 Imputability and State resources

(69) On the basis of standing case law, subsidies financed through parafiscal charges or contributions imposed by the State and managed and apportioned in accordance with the provisions of the legislation imply a transfer of State resources, when administered by entities designated by the State.

"The Court has held that funds financed through compulsory charges imposed by the legislation of the Member State, managed and apportioned in accordance with the provisions of that legislation, may be regarded as State resources within the meaning of Article 107(1) TFEU even if they are managed by entities separate from the public authorities (see, to that effect, Case 173/73 Italy v Commission [1974] ECR 709, paragraph 35)."

(70) In the present case, the State has established, through the System Operating Code, a special levy in order to finance compensation to flexibility providers. The measure is therefore imputable to the State. Furthermore, the State has entrusted the TSO with the tasks of centralising and administering all financial flows related to flexibility service compensation and the special levy and of monitoring the obligation on Load Representatives to hold certificates for flexibility. The level of the levy will be determined by the Regulator, a public body. For these reasons, the measure is financed from State resources.

3.1.2 Economic advantage conferred on certain undertakings or the production of certain goods (selective advantage)

(71) An advantage, within the meaning of Article 107(1) TFEU, is any economic benefit which an undertaking would not have obtained under normal market conditions, i.e. in the absence of State intervention. The notified measure will allow beneficiaries to receive an additional compensation (described in Section 2.3) which they would otherwise not obtain in the Greek electricity market. The notified measure will confer an advantage on certain undertakings in one sector of the economy (electricity production). Those undertakings are the flexible capacity installations identified by the TSO as being able to provide the flexibility service.

(72) The notified measure will thus confer an economic advantage to undertakings that are in a comparable factual and legal situation to other electricity producers that are not eligible to participate in the TFRM in the sense that the latter will not be paid in exchange for offering their availability to the TSO.

Moreover, the measure confers an advantage also to only certain undertakings within the flexible capacity installations. As explained at recitals (62) above, during the first period of the mechanism, before the implementation of the target model, some flexible capacity, such as demand response and storage will be de facto excluded from the mechanism. Foreign capacity is also excluded from the mechanism. Additionally, demand response participating in the interruptibility scheme is not eligible to the mechanism.

Therefore this advantage is selective.

3.1.3 Impact on competition and trade

The notified measure risks distorting competition and affecting trade within the internal market. Electricity generation as well as electricity wholesale and retail markets are activities open to competition throughout the EU. Therefore it would normally be assumed that any advantage from State resources to any undertaking in that sector has the potential to affect intra-Union trade and to distort competition. In the present case, the selective advantage that is granted only to domestic flexible generation capacity risks distorting competition relative to other capacity providers in the electricity markets in Greece and in the wider internal electricity market.

3.1.4 Conclusion on the existence of aid

In the light of the above assessment, the measure constitutes State aid within the meaning of Article 107(1) TFEU.

3.2 Lawfulness of the aid

By notifying the scheme before its implementation, the Greek authorities have fulfilled their obligation according to Article 108(3) TFEU.

3.3 Compatibility with the internal market

Article 107(1) TFEU lays down the principle that State aid which distorts or threatens to distort competition, in so far as it affects trade between Member States, is prohibited. In certain cases, however, State aid may be compatible with the internal market under Articles 107(2) and (3) TFEU.

On the basis of Article 107(3)(c) TFEU, the Commission may consider compatible with the internal market State aid to facilitate the development of certain economic activities within the European Union, where such aid does not adversely affect trading conditions to an extent contrary to the common interest.

Section 1.2 EEAG contains a list of the types of aid measures for energy and environment that may be considered compatible with the internal market under Article 107(3)(c) TFEU. The list includes measures to ensure generation adequacy and security of electricity supply. Section 3.9 of the EEAG lays down the compatibility criteria for such measures.
To assess whether the capacity mechanism can be considered compatible with the internal market, the Commission assesses whether the design of the measure meets the following criteria listed in the EEAG:

(a) contribution to a clearly defined objective of common interest (Section 3.3.1 below);
(b) need for State intervention (Section 3.3.2 below);
(c) appropriateness (Section 3.3.3 below);
(d) incentive effect (Section 3.3.4 below);
(e) proportionality (Section 3.3.5 below);
(f) avoidance of undue negative effects on competition and trade (Section 3.3.6 below);
(g) transparency of the aid (Section 3.3.7 below).

### 3.3.1 Objective of common interest

As stated in recital (30) EEAG, the primary objective of aid in the energy sector is to ensure a competitive, sustainable and secure energy system in a well-functioning Union energy market. Paragraphs (219) to (221) EEAG define more specific criteria on how Member States should define the common interest objective for measures in the field of generation adequacy.

Paragraph (219) EEAG determines that measures for generation adequacy can be designed in a variety of ways and can be aimed to address both short term flexibility concerns and long term concerns about the ability to meet a generation adequacy target.

The notified measure is a targeted capacity mechanism aiming at ensuring that flexible capacity is available to provide the level of flexibility needed in the Greek electric system. It addresses a short-term adequacy concern caused by the lack of revenue earned by the flexible capacity in the Greek market. This market deficiency may prevent the flexible capacity to stay available while the need for flexibility increases in Greece due to an increasing penetration of RES energy. The mechanism will ensure that eligible flexible units will be remunerated at a level so as to remain available and provide the necessary ramping requirements to the system.

Paragraph (220) EEAG explains that aid for generation adequacy may contradict the objective of phasing out environmentally harmful subsidies and that alternative ways for achieving generation adequacy without these negative environmental impacts should be considered primarily. It suggests that alternative ways could be the facilitation of demand side management and the increase of interconnection capacity.

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26 See in particular paragraph (27) and Sections 3.9.1 to 3.9.6 EEAG.
Given the technical parameters of the flexibility service, only gas fired plants CHP and flexible hydro units are considered eligible providers, as further explained in Section 2.5. In contrast, high carbon intensity generation lignite plants are excluded from this measure due to their technical features. The first auction with the delivery period prior to the implementation of the Target model will not include demand response. This is due to the absence of a legal framework enabling demand response to participate in the Greek market at present. The necessary regulatory framework will be implemented together with the Target model. Thus, from the go-live of the balancing market, demand response will, in principle, be allowed to participate in the TFRM.

Paragraph (221) EEAG underlines the need to clearly define the objective at which the measure is aimed, including when and where the adequacy problems are expected to arise. It also requires the conclusions of the generation adequacy assessment to be in line with the analysis carried out periodically by ENTSO-E.

In the case of Greece, the market is in principle characterised by overcapacity. However, a new reliability issue emerges, mainly due to the rapid development and increased penetration of variable RES. The non-dispatchable renewable generation is variable and to an extent unpredictable. This results in increased ramping requirements in order to effectively respond to the net system load variations and keep the power system balanced and secure. In this context, the concept of system resource adequacy is further extended to the determination and assessment of the system flexibility needs. Flexibility is defined in the flexibility study of the Greek TSO as “the requirement for sufficient (upward and downward) system ramping capability provided by eligible resources, in order to follow the increased net load variations under high penetration levels of variable and uncertain RES generation”.

The need to extend the concept of resource adequacy and evaluate the system flexibility needs, as it is mentioned in the flexibility study of the Greek TSO, is consistent with the analysis conducted by ENTSO-E. In the Mid-term Adequacy Forecast (MAF) 2017, it is stated that: “Due to developments in the energy generation mix – more fluctuating renewables and less conventional fossil generation – the need of a more sophisticated assessment is necessary. With increase of renewables in the system the most critical situations may occur in future at times other than peak demand, for instance when the load is low and the in-feed of renewables is high. In addition to the assessment of whether the generation meets the demand, downward regulation and the need for more flexibility in the system share the centre of attention”.

Additionally, in the MAF 2017 it is written that “Adequacy is not only related to the total amount of capacities being installed in the system, but also to these capacities’ ability to adjust flexibly to the ever increasing dynamics of dispatch situations in Europe (mainly driven by increasing amounts of variable renewable energies)”. Hence, it is important to identify how often the system is not balanced and to evaluate the impact of the potential lack of flexible resources on power system operation.

27 RAE, National report 2017, p.86.
The Greek authorities have provided data showing the increasing needs for flexibility in their system (see Figure 4 in particular). They presented a study conducted by the TSO identifying and quantifying the necessary level of flexibility to ensure security of the system. The flexibility study of the Greek TSO (see Section 2.2.1) determines the system flexibility needs for each month of the year. Both upward and downward flexibility needs are calculated for 1-h and 3-h ramping intervals. On this basis they determined the appropriate level of capacity to be contracted in the mechanism.

On this basis, it can be concluded that the capacity mechanism contributes to a well-defined objective of common interest.

3.3.2 Need for State intervention

As a general principle, in order to demonstrate the need for State intervention it needs to be established that a market failure exists that prevents market forces from achieving generation adequacy and thus risks undermining the objective of security of supply. Paragraphs (222) to (224) EEAG define more specific criteria of how Member States should demonstrate the need for State intervention.

Paragraph (222) EEAG requires a proper analysis and quantification of the generation adequacy problem, while paragraph (223) EEAG requires a demonstration of the reasons why the market cannot be expected to deliver adequate capacity.

The Greek authorities demonstrated the impact of the increasing share of variable generation on the Greek electricity system and in particular the greater need for flexible capacity (see recitals (16) to (18)) that demonstrate the need to take additional measures to ensure security of supply (see recitals (88) and following).

The flexibility study presented by the TSO shows that flexibility in power generation is necessary for the system security and operational reliability, due to the increasing penetration of variable RES and the evolution of consumption profiles. Moreover, the study is in line with ENTSO-E’s conclusion on the growing necessity of flexibility services for the security of the system (see section 2.2.1 and recital (88) and following).

The increased penetration of non-dispatchable RES, mainly PV and wind power installations, causes variability to the system’s load profile. The electricity load profile during the evening hours due to solar generation and the increased demand reveal the so-called "sunset effect" and a “duck curve” is formed. Considering that the share of variable RES generation is expected to increase further in the next years to meet Greece's 2020 RES target, the Greek authorities have shown that there is an increasing need for flexible units combined with high ramping capabilities i.e. cycle gas turbines and hydro units in order to compensate for the increased load variations (see recital (25) and following).

In particular concerning gas plants, the provision of flexibility services entails significant fixed operation and maintenance costs because these gas plants need to operate in an enhanced cycling scheme involving fast ramping, short minimum-up times and frequent shut-downs. These fixed costs occur for three reasons: the stressing of the plant components implying higher maintenance costs, the unpredictable and fluctuating operation schedule of the plants implying higher
costs for gas procurement and the system-driven forcing to operate at levels below maximum capacity so that the system maintains sufficient ramping reserve. Figure 12 and Figure 13 below provided by the Greek authorities show an estimation of the additional costs incurred to a CCGT plant due to stressed cyclical operation.

**Figure 12 - Estimated fixed costs incurred by typical gas generator under the notified measure**

<table>
<thead>
<tr>
<th>Item</th>
<th>Fixed costs in EUR/kW per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default annual fixed O&amp;M costs for smooth-normal cycling operation of a CCGT plant</td>
<td>21</td>
</tr>
<tr>
<td>Additional annual O&amp;M costs due to stressed cyclical operation of a CCGT plant in the discharging of flexibility services</td>
<td>16.3</td>
</tr>
<tr>
<td>Additional annual operation costs due to gas procurement and transportation of a CCGT plant discharging flexibility services</td>
<td>9.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46.4</strong></td>
</tr>
</tbody>
</table>

*Source: Notification*
At the same time, the current Greek electricity market design displays significant inefficiencies not rewarding flexibility. As explain in Section 2.1.1.1, several price caps apply in the Greek electricity market for the moment. These price caps are relatively low compared to other European electricity markets and cause the "missing money" problem. The concept has been identified and described by the Commission in its Sector Inquiry on capacity mechanisms. The problem arises when the electricity wholesale markets are not designed to generate sufficient investment incentives to ensure adequate capacity. In this scenario, the market proves unable to incentivise investment in capacity because investors fear future revenues will not cover their fixed costs and will not appropriately remunerate their investment.

The increase of intermittent renewables in the Greek market has created both more uncertainty in the day-ahead market and more volatility during the day. It

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29 For comparison, the French, Belgium and Italian day ahead markets are capped at 3,000 EUR/MWh.
has therefore become more important to improve short-term markets to enable balancing responsible parties to balance their portfolios on the shorter term intraday and balancing markets, but also to foster the development of ancillary services that can respond in ever shorter timeframes to system disturbances. Flexibility services are typically offered in balancing markets. A fully functioning balancing market should reflect the full costs of balancing and ensure sufficient revenue for the capacity offered\(^3\).

(101) However, as explained in section 2.1.1.1, the Greek electricity market does not have a functioning balancing market at the moment. In the current market design, as explained above in section 2.1.1.1, power plants or blocks of plants, which are submitted to a mandatory bidding rule as a result of the technical constraints included in the co-optimisation algorithm, are driven by the constraints which reflect the necessity to provide ramping and ancillary services and, thus, cannot be price makers (do not determine system marginal prices) unless included in the economic merit order.

(102) This means that since they are called to operate practically as must-run plants to provide the flexibility services, and in case they are not selected by the economic merit order, they have no participation in the price-making process of the day-ahead market.

(103) As a result, the costs occurring by the provision of flexibility services (see recital (98) above) cannot be remunerated by the system marginal price. Additionally, due to the market inefficiencies as analysed above, the remuneration for ancillary services is also not able to cover the costs entailed by the provision of flexibility services.

(104) The following figure (Figure 14) shows energy production from different energy sources after the TFRM expired and in the absence of a flexibility mechanism. It is noteworthy that despite the low participation of lignite units compared to previous years the SMP price remained low, with the exception of November and early December 2017 when the production of natural gas units increased due to limited imports and low hydro production. The price in the ancillary services market has also remained very low (see Figure 7 - Reserves price data for the period 01 January 2017 - 31 December 2017.

\(^3\) See in particular the Report from the Commission, Final report on the sector inquiry on capacity mechanisms, (SWD (2016 385 final) p. 40.
Even if there are possibilities for gas-fired power plants to cover fixed O&M and capital costs (during peak hours when they are usually dispatched as price makers), the rare occurrence of such cases render the earnings extremely uncertain and raises the concern about whether the plants owners will continue the provision of the current ramping and cyclical operation services in view of the uncertainty and the inadequacy of fixed and capital cost recovery.

Moreover, the gas-fired power plants lack market incentives to perform enhanced load following and ramping operations unless they are remunerated for the additional costs incurred if specifying their cycling parameters more aggressively in order to enhance their cycling operation. If plants owners are not properly remunerated for the provision of flexible services, they may leave the market due to economic reasons and the system risks being short of flexible resources.

During the period when no flexibility mechanism was in place, the gas-fired power plants continued their operation without changing their operation pattern because the current legislation penalises any deviation from the TSO instructions. As shown in Figure 9, gas-fired power plants incurred economic losses during this period due to the fact that, as mentioned in recitals (101) to (103), and they did not recover fixed capital costs of their plants from their participation in the wholesale electricity market. However, the Greek authorities estimate that the plants continued to provide flexibility services because they expected a fair remuneration of their flexibility services either through a new TRFM or through the implementation of the Target model (see recital (99) above).

Paragraph (224) EEAG requires the Commission to take account of various assessments to be provided by the Member State, relating to the impact of variable generation, demand side participation, interconnection and any other element causing or exacerbating the generation adequacy problem.

On demand response, the Greek authorities explained that for the moment, there is no possibility for demand response to participate regularly to the market (see
recital (22)). Demand response can only participate in the interruptibility scheme described in section 2.1.1.2 above. While it can in principle contribute to ease peak periods, the interruptibility scheme lacks currently the technical ability to receive and respond to regular flexibility requirements. Until the go-live of the balancing market and other preconditions explained in recital (86), in the framework of the Target model, it will in practice not be possible for demand response to provide flexibility. However, as explained in recital (62) above, once the Target is in place, demand response will be eligible to the mechanism. To take into account these regulatory changes, the mechanism will be organised in two auctions (see recital (51)). During the period when the Target Model and the TFRM will overlap, demand response operators will have the possibility to participate in the flexibility mechanism if fulfilling the technical criteria.

(110) For these reasons, the Commission takes the view that the State needs to intervene to correct the current deficiencies of the Greek electricity market in order to ensure the flexibility needs and the security of supply of the Greek electricity system until the short-term markets, in particular the balancing market, will be fully functioning.

3.3.3 Appropriateness of the aid

(111) Generation adequacy concerns should first and foremost be addressed by reforming the electricity market so as to provide the incentives for capacity providers to become or remain active on the energy-only market and deliver security of supply at lowest possible costs.

(112) The implementation of the intraday and, especially, the balancing market, amongst other pillars of the Target Model, will gradually substitute the need for public intervention to ensure adequate flexible capacity, as it is expected to rectify those failures which currently require the introduction of an interim/“bridge” mechanism.

(113) Furthermore, as explained in Section 2.1.2, the Greek authorities have committed to remove all price caps and bidding limits. This will allow the market to deliver sufficiently high prices during period of scarcity and to reflect the true value of flexibility services to the security of the system.

(114) While Greece is preparing these market reforms and will implement them in 2019, the planned TFRM is an appropriate means to ensure the transition from today's market design without sufficient flexibility incentives to a market-based regulatory framework.

(115) In particular, in order to be found appropriate in accordance with Section 3.9.3 EEAG, the measure should meet several conditions: i) the aid must only compensate the service of availability of capacity; ii) the measure should be open and provide adequate incentives to both existing and future generators and to operators using substitutable technologies, and iii) take into account the extent to which interconnected capacity can contribute to remedy the generation adequacy concerns.

(116) As explained in recital (49) above, the mechanism will only remunerate the service of availability of flexible capacity.
Because the measure is targeted at solving flexibility issues in the Greek electricity system identified in Section 2.2.1, only flexible capacity are allowed to participate in the mechanism. As explained in Section 2.5, the Greek authorities have identified that gas-fired power plants, CHP, flexible hydro and demand response can provide this service. It should be noted that the measure is open to all these operators using substitutable technologies as well as to new and existing generators. One new gas-fired power plant (Megalopoli no. V) and one new hydro plant (Ilarionas) will be also eligible.

As explained in recital (22) for the moment, there is no possibility for demand response to participate in the market because of a lack of the necessary regulatory framework. However, once the Target model will be in place, demand response will be eligible for the mechanism, in the second auction (see recital (62) above).

On interconnection, the Greek authorities explained that the participation of foreign generators would require a fully coordinated unit commitment on a broad area that relies on strong inter-TSO co-ordination, operation market coupling and flow-based allocation of sufficiently sized interconnectors. These conditions are not fulfilled at present. However, it should be pointed out that Greece commits to the full implementation of market coupling in the context of the national Target Model. This being said, this does not guarantee the full cooperation of the neighbouring countries. The development of such cooperation will require time and may not be achievable in the case of the TFRM which will expire at the end of 2019.

For these reasons, the Commission considers that the measure is appropriate as required by Section 3.9.3 EEAG.

3.3.4 Incentive effect

A State aid measure has an incentive effect if it changes the behaviour of the undertakings concerned in such a way that they engage in activities which they would not carry out without the aid or which they would carry out in a restricted or different manner. The EEAG has laid down more specific guidance as to the interpretation of this criterion in Section 3.2.4, namely that the measure should induce the beneficiary of the aid to change its behaviour to improve the functioning of a secure, affordable and sustainable energy market, a change in behaviour which it would not undertake without the aid.

As explained above (see Section 2.2.2), ordinary market revenues did not allow gas-fired power plants to cover their fixed operating costs and, in some cases not even variable costs. Yet, because they can provide the flexibility services identified by the TSO, they are deemed necessary for a secure energy market. It follows that in the absence of the measure, there is a high risk that some gas-fired plants might exit the market and impede the stability of the system. The flexibility mechanism is also expected to have positive effect on the operators of hydro plants which will be confronted with a financial incentive and disincentive (penalty) to ensure exactly the flexibility services as required by the TRFM.

See commitments for including cross-border capacity in decision SA.42011 2017/N (recital 168) and decision SA.39621 2015/C (recital 125).
With respect to the second auction period, the Target model will no longer require capacity providers to always bid in the market. By ensuring that the participants in the TFRM continue to bid at all times (see recital (49)) even when the Target model will be in place, the measure ensures that sufficient flexible capacity will be at the disposal of the TSO.

In addition, the presence of penalties (see Section 2.6) ensures the required service is actually delivered.

Thus, the measure has an incentive effect as required by Section 3.9.4 EEAG.

3.3.5 Proportionality

The aid amount is proportionate if it is limited to the minimum needed to achieve the objective pursued. The EEAG specifies this requirement for generation adequacy measures in paragraphs (228) to (231). Paragraphs (228) and (230) provide that beneficiaries should earn a rate of return that is reasonable and that windfall profits should be prevented. Paragraph (229) states that this can be ensured by a competitive bidding process based on clear, transparent and non-discriminatory rules. According to paragraph (231), the price paid for availability shall automatically tend to zero when the level of capacity supplied is expected to be adequate to the level of capacity demanded.

An auction process is applied to select the capacity providers of the mechanism. The mechanism is transparent and based on clear rules available to all participants in advance of the auction. In particular, the Greek authorities explained that the auction process will be transparent to all potential bidders:

i. the allocation rules will be known beforehand
ii. the auction rules will be provided
iii. the volumes to be procured are established in advance by the TSO
iv. the bidders will be informed of the volumes to be procured
v. the bidders will be informed on the price caps
vi. the product is already known to bidders
vii. the duration of the obligation will be clearly established
viii. penalties for non-compliance will be clearly established and will be known to bidders.

The maximum volume of capacity that can participate in the mechanism has been defined according to the system needs as explained in recital (50). The volume of capacity that is eligible for the mechanism is greater than the maximum volume of capacity to be selected. Therefore not all bidders can receive aid. This appears to ensure competitive tension in the bidding process and can be expected to lead to a market-based remuneration of the flexibility services.

In the previous TFRM, the compensation for flexibility services was around 46,4 €/kW/year. The Greek authorities have submitted new data showing that these costs which were based on gas-fired power plants have not significantly changed.

The Greek authorities have set in the auction a price cap of EUR 39,000/MW to avoid any risk of over-compensation. This price cap is still below the former administrative payment that was deemed cost-reflective and considered proportionate by the Commission.
The cost of procuring flexibility services from hydro power plants cannot be estimated in the same way as for gas-fired plants, given that their ability to provide the service depends on weather conditions. Therefore, the total opportunity costs for the system are not estimated by reference to the costs of hydro and CHP plants. However, when available, these plants contribute in the same way as natural gas plants to ensure system adequacy.

The proposed TFRM will run in parallel with the Target Model markets from April 2019 to December 2019, where flexible capacity revenue is expected to increase. In order to avoid overcompensation, the mechanism will be divided in two delivery periods, with at least two separate auctions. For the period running as of April 2019, an ex-post claw-back mechanism will be established as explained in recital (53). The Commission takes the view that this claw-back mechanism will avoid any risk of overcompensation when the Target model will be in place. Furthermore, no price floor is provided and flexible capacity providers may submit zero priced offers.

The notified measure also includes measures to ensure compliance with cumulation rules. In particular, for the CHP unit of “Aluminion of Greece” it is established that only the capacity which exceeds the capacity under the FiT scheme will be considered as “eligible capacity” for the means of the TFRM.

The remuneration received by the selected capacity providers can therefore be considered proportionate.

3.3.6 Avoidance of negative effects on competition and trade

According to Section 3.9.6 EEAG, the measure should not result in undue distortion of competition and trade. In particular, the measure must meet the following conditions: i) when technically and physically possible, be open to all capacity providers subject to meeting the proportionality principle; ii) avoid negative effects on the internal market, for example due to export restrictions, wholesale price caps or bidding restrictions; iii) not reduce the incentives to invest in interconnectors and not undermine market coupling; iv) not undermine investment decisions that preceded the introduction of the measure; v) not unduly strengthen market dominance and vi) give preference to low-carbon technologies in case of equivalent technical and economic parameters.

Paragraph (232) (a) to (c) EEAG underlines the importance of ensuring competitive pressure in selecting the capacities through a sufficiently broad participation and wide eligibility criteria.

First, as explained in Section 2.5, all the flexible capacity is eligible for the mechanism. Starting on 1\textsuperscript{st} April 2019, demand response will also be able to participate in the scheme. As explained in recital (119), the exclusion of cross-border capacity is considered justify for this bridge mechanism.

\[\text{FiT for CHP power plants are defined in Law 4414/2016 on a new support scheme for renewable energy sources and high-efficiency combined heat and power installations, published on 9 August 2016. The Commission approved the scheme on 16 November 2016 under State aid case SA.44666 – New operating aid scheme for the production of electricity from RES and HECHP, OJ C 83, 17.3.2017.}\]
Second, as provided in recital (101) of the decision on the previous TFRM, Greece removed the components of uplift charges on electricity exports that are not intrinsic to the production costs of energy. As mentioned in recital (12), the Greek authorities will also remove any bidding restrictions (such as maximum and minimum bidding and clearing prices) and committed to remove the variable cost-recovery mechanism once the Target Model is in place.

Third, the measure does not undermine investments in existing gas and eligible hydro generation since these are eligible to participate in the measure. The measure does not affect the return on investments in RES, which are determined by the levels of other support measures. For lignite and the remainder of hydro capacity, considering that the measure will only remunerate availability as explained in Section 2.3, the mechanism will not reduce the SMP, from which these generators derive their revenues. Hence, investment decisions in lignite and hydro will not be undermined.

Fourth, the measure does not unduly strengthen market dominance. As provided in recital (14), in 2016 the IPPs received 53% of the payments under the previous TFRM, while PPC received 47% of the payments, less than its market share in generation (see recital (8)). A largely comparable outcome of the tender process may be expected in the future auctions.

Fifth, the service can currently be provided only by CCGTs, OCGTs and eligible hydro capacity. Hydro-based and gas-fired power generation emit less carbon than lignite-fired generation which represents the predominant energy source in the Greek electricity market. In the second auction, demand response and storage will be also eligible to the mechanism, following the implementation of the target model.

For these reasons, the Commission considers that the measure does not result in undue distortion of competition and trade.

### 3.3.7 Transparency

The Greek authorities commit to observe the transparency requirements, set out in paragraphs 104-106 EEAG. The full text of the European Commission decision granting authorization and RAE’s decision implementing the new flexibility scheme will be published on RAE’s website as soon as the relevant decisions are issued. In addition, within 6 months, further information will be published regarding the identity of the individual beneficiaries, the form and amount of aid granted to each beneficiary, the date of granting, the type of undertaking, the region in which the beneficiary is located (at NUTS level II) and the principal economic sector in which the beneficiary has its activities (at NACE group level). Such information will be kept for 10 years and will be available to the general public without restrictions.

### 3.3.8 Compliance with Article 30 and 110 TFEU

As explained in Section 2.7 above, the payments will be financed by a levy imposed on electricity suppliers. In the field of energy, any levy that has the aim of financing a State aid measure needs to comply in particular with Articles 30 and 110 TFEU.
3.3.9 Conclusion on compatibility with EEAG

(145) The Commission therefore finds that the aid scheme is compatible with the criteria set out in the EEAG.

4 CONCLUSION

The Commission has accordingly decided not to raise objections to the implementation of the new transitory electricity flexibility remuneration mechanism on the grounds that it is compatible with the internal market pursuant to Article 107(3) (c) of the Treaty on the Functioning of the European Union.

Due to the urgent need to adopt and notify a Decision relating to the State aid case SA. 50152 (2018/N) the Greek government agrees exceptionally to waive its rights deriving from Art. 342 TFEU in conjunction with Art. 3 of the EC Regulation 1/1958 and to have the planned Decision adopted and notified pursuant to Article 297 of the Treaty in English by letter dated 13 July 2018.

If this letter contains confidential information which should not be disclosed to third parties, please inform the Commission within fifteen working days of the date of receipt. If the Commission does not receive a reasoned request by that deadline, you will be deemed to agree to the disclosure to third parties and to the publication of the full text of the letter in the authentic language on the Internet site: http://ec.europa.eu/competition/elojade/iseff/index.cfm.

Your request should be sent electronically to the following address:

European Commission,
Directorate-General Competition
State Aid Greffe
B-1049 Brussels
Stateaidgreffe@ec.europa.eu

Yours faithfully
For the Commission

Margrethe VESTAGER
Member of the Commission