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**THE CURRENT OPERATING AID SCHEME IN THE  
RENEWABLE ENERGY SOURCES SECTOR OF GREECE AND  
ITS FUTURE PROSPECTS**

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*Dedicated to my parents, whose sacrifices and dedications made it possible for me  
to reach this stage of my studies.*

# **THE CURRENT OPERATING AID SCHEME IN THE RENEWABLE ENERGY SOURCES SECTOR OF GREECE AND ITS FUTURE PROSPECTS**

## **Abstract**

Renewable energy has become widespread globally and is expected to become the main power source in the decade to come, due to its beneficial environmental impact, the rapid decrease of the levelized cost of energy for renewable power units, the technological developments and the political will on facilitating de-commissioning of lignite units. Greece has a competitive advantage as far as the renewable energy is concerned due to the favorable wind and solar conditions. For this reason, renewable energy takes up a high percentage in the electricity generation mix of the Hellenic Republic. However, energy markets over the last two decades could not by themselves develop the renewable energy sector due to low profit margins even though the cost of the technology has been reduced significantly during this period. For this reason, the states, as well as various organizations, have promoted financial support schemes for renewables, adapted gradually to the technological and electro-production cost developments. This research aims to study the current operating aid scheme for renewable energy that was implemented by the Greek government in 2016 and to assess the prospects of future development of the Greek renewable energy sector.

**Keywords:** Renewable Energy, Support Schemes, Operating Aid, Greece, Auctions

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## Abbreviations & Acronyms

Abbreviations	Full description
<b>APG</b>	Average Monthly Unit Price of Natural Gas
<b>CCS</b>	Carbon Capture and Storage
<b>CDF</b>	Capital Discount Factor
<b>CEP</b>	Clean Energy Package
<b>CHP</b>	Combined Heat and Power Plant
<b>DAPEEP</b>	Operator of RES and Guarantees of Origin (Former LAGIE)
<b>DAS</b>	Day Ahead Electricity Schedule
<b>DSO</b>	Distribution System Operator
<b>EEA</b>	European Economic Area
<b>EEAG</b>	Guidelines on State aid for Environmental protection and Energy 2014-2020
<b>EEX</b>	European Energy Exchange
<b>EnC</b>	European Energy Community
<b>EU</b>	European Union
<b>EU ETS</b>	European Union Emission Trading System
<b>FEC</b>	Final Electricity Consumption
<b>FMARP</b>	Fixed price of Market Access Readiness Premium
<b>GCV</b>	Gross Calorific Value
<b>GHG</b>	Greenhouse Gas Emissions
<b>HEDNO</b>	Hellenic Electricity Distribution Network Operator
<b>HVEW</b>	Hourly Value of Electricity in the Wholesale electricity market
<b>IPTO</b>	Independent Power Transmission Operator
<b>LAGIE</b>	Operator of Electricity Market (Currently DAPEEP)
<b>LCOE</b>	Levelized Cost of Electricity
<b>MARP</b>	Market Access Readiness Premium
<b>NECP</b>	National Energy and Climate Plan
<b>NII</b>	Non-Interconnected Islands
<b>P.A.</b>	Price Mark-up
<b>PPA</b>	Power Purchasing Agreement
<b>PV</b>	Photovoltaic Power Station
<b>RAE</b>	Regulatory Authority for Energy
<b>REC</b>	Renewable Energy Community
<b>RED II</b>	Renewable Energy Directive II or Directive (EU) 2018/2001
<b>R.T.</b>	Reference Tariff
<b>RES</b>	Renewable Energy Sources
<b>RESC</b>	Renewable Energy Sources Capacity
<b>RPS</b>	Renewable Portfolio Standards
<b>sFiP</b>	Sliding Feed in Premium
<b>SMP</b>	System Marginal Price
<b>SpMP</b>	Special Market Price
<b>STHPP</b>	Solar Thermal Hybrid Power Plant
<b>TFEU</b>	Treaty on the Functioning of the European Union
<b>TSO</b>	Transmission System Operator



## Definition of terms

**Aggregator of Last Resort** - of the CHP and RES power plants undertakes the responsibility to represent the owner of a power plant in the electricity market in cases of a temporary impossibility of the owner to be represented by a normal licensed aggregator. DAPEEP S.A. is assigned to be the aggregator of the last resort up to 2022 in Greece.<sup>1</sup>

**Balancing Responsibility** - is the liability of market participants for any imbalances occurred to the electricity load between the planned physical deliveries of the load and the actual electricity generated by the electricity producing units.

**Connection Agreement** - After the power plant receives its Final Connection Offer, the owner shall submit a Connection Application to the Competent Operator after which the parties (HEDNO S.A. if the power plant is located in Non-Interconnected Islands or IPTO S.A. if the location of the power plant is in the mainland and the power plant owner) proceed to the conclusion of a Connection Agreement to connect the plant to the electricity grid.

**Operator of RES and Guarantees of Origin (DAPEEP S.A.)** - is responsible for the conclusion of operating aid contracts as provided under the Law No 4414/2016 with the RES and CHP power plant owners, the recovery of revenue from the contracting producers of RES and CHP power plants to cover its operating and investment costs, the submission bids for the amount of energy expected to be injected into the national electricity system by the Roof Photovoltaics network and the RES and CHP power plants under the provisions provided in the Article 12 of Law 3468/2006 and the Feed-in-Tariff operating aid contracts as provided by the article 10 of Law 4414/2016, as well as the management of the RES Special Account.

**DAPEEP code** - regulates the activities and responsibilities of the Operator of RES and Guarantees of Origin (DAPEEP S.A.).<sup>2</sup>

**Day-ahead Electricity Schedule (DAS)** - is the model used to organize the wholesale electricity market of Greece. The day-ahead electricity schedule allows the market participants to buy or sell wholesale electricity a day in advance. The schedule includes

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<sup>1</sup> Ορισμός του Φορέα Σωρευτικής Εκπροσώπησης Τελευταίου Καταφυγίου (Φο.Σ.Ε.Τε.Κ.) και καθορισμός των υποχρεώσεων, του πλαισίου λειτουργίας του και των χρεώσεων που επιβάλλει για την παροχή των υπηρεσιών του, σύμφωνα με την παρ. 5 του άρθρου 5 του ν. 4414/2016. [Appointment of the Aggregator of the Last Resort and definition of his responsibilities, its operating framework and the charges for his services, according to Article 5 (5) of law 4414/2016], Υα υπεν/δαπεεκ/25512/883 – φεκ β' 1020/2019, Ministry of Environment and Energy at 11716–21 (20/03/2019).

<sup>2</sup> DAPEEP code is available at the present moment at LAGIE website: <http://www.lagie.gr/rythmistiko-plaisio/kodikes-kanonismoj/>

all the electricity that is going to be generated, consumed and traded in Greece the following day.

**Energy Community** - is an international organization consisting of Albania, Bosnia and Herzegovina, Georgia, the Republic of North Macedonia, Kosovo, Moldova, Montenegro, Serbia Ukraine and the European Union, which is being represented by the European Commission. The main goal of the Energy Community is to extend the EU's internal energy market to the Black Sea region and southeastern Europe.<sup>3</sup>

**European Economic Area (EEA)** - consists of the Member States of the European Union and the following three states of the European Free Trade Association: Iceland, Liechtenstein and Norway. The Agreement on the EEA entered into force in 1994 and its goals are to promote the free movement of goods, people, capital and services.

**European Target Model for electricity markets** is a proposed model by the European Commission that will act as a basis for the development of the single energy market in Europe.

**European Union Emission Trading System (EU ETS)** - is a tool, created by the European Union in 2005, for trading Greenhouse Gas Emission (GHG) allowances. The EU ETS uses the "cap and trade" principle. Based on the principles of the market, the participants are required to have enough Greenhouse Gas Emission (GHG) allowances to cover their emissions for a period of a year, which they have to report, or they are faced with huge fines. The emitters can always buy more allowances to cover their GHG emissions or minimize their emissions to avoid the heavy fines.

**Feed-in-Premium contract (or Differential State Aid Support contract)** - is a contract signed between the owner of a RES or CHP power plant and DAPEEP S.A. which leads to the connection of the power plant to the electricity grid as well as its integration into the operating aid support scheme which is based on a premium on top of the market price of their electricity production.

**Feed-in-Tariff contract** - is a contract signed between the owner of a RES or CHP power plant and DAPEEP S.A. or HEDNO S.A., the latter being responsible for the Non-Interconnected Islands (NIIs), so it can be connected to the electricity grid of the mainland or the grid of the NIIs as well as to be included in the operating aid support scheme based on a fixed tariff.

**Final Connection Offer** - is granted to the power plant after it receives its approval of environmental terms by the relevant district authority. The power plant owner must receive a (preliminary) connection offer by the competent Operator to the electricity

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<sup>3</sup> "The Energy Community: Legal Framework," Energy Community, accessed January 25, 2020, [https://www.energy-community.org/dam/jcr:e7b7deec-5e9c-400b-87b9-6fcb717bfa46/ECS\\_LF4\\_2018.pdf](https://www.energy-community.org/dam/jcr:e7b7deec-5e9c-400b-87b9-6fcb717bfa46/ECS_LF4_2018.pdf).

network before applying for approval of the environmental terms. The preliminary connection offer is granted within 4 months after the power plant owner submits all the relevant documents required for the issuance of the offer.

**Hellenic Electricity Distribution Network Operator S.A. (HEDNO S.A.)** - was established in compliance with the EU Directive 2009/72/EC regarding the adoption of common rules in the organization of EU electricity markets by the separation of the distribution department from PPC S.A. (unbundling). HEDNO S.A. undertakes the role of Distribution System Operator (DSO) for electricity in Greece and is responsible for the operation, maintenance and development of the electricity distribution network in Greece as well as the impartial and transparent access of all consumers and stockholders to the electricity network.

**Independent Power Transmission Operator S.A. (IPTO S.A.)** - was established in compliance with the EU Directive 2009/72/EC regarding the adoption of common rules in the organization of EU electricity markets. IPTO undertakes the role of Transmission System Operator (TSO) for electricity in Greece and is responsible for the transmission grid maintenance and development, the security of electricity supply in a safe, reliable and efficient way. IPTO follows the model of Ownership Unbundling.

**Kyoto Protocol** - is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC). The Parties that signed the agreement committed to set internationally binding emission reduction targets. The Protocol was adopted in Kyoto (Japan) in 1997. The first commitment period to reduce the Greenhouse Gas Emissions ended in 2012 and it was further extended by the Doha Agreement for a second commitment period up to 2020.

**Letter of Guarantee** - is a type of contract issued by a credit institution on behalf of a customer, for a fee, who has concluded a contract to purchase goods or services with a supplier. The letter lets the supplier of those goods or services know that he will be paid. In the field of energy this Letter of Guarantee is used not only to guarantee that a power plant will be built but that it will be built and connected to the electricity grid within a specific time period and that it will have specific, pre-determined installed capacity. If the power plant will not comply with the pre-determined criteria, then it could lose the return of the amount of the guarantee at best or its licenses at worst.

**Levelized Costs of Producing Electricity (LCOE)** - in electrical energy production can be defined as the present value of the price of the produced electrical energy (usually expressed in units of cents per kilowatt hour), considering the economic life of the

plant and the costs incurred in the construction, operation and maintenance, and the fuel costs.<sup>4</sup>

**Market Readiness Premium** - is the additional fixed operating aid in €/MWh granted, per category or per technology of RES or CHP power plant, to the owner of the power station which is required to participate directly in the electricity market and is not selected to receive aid through competitive bidding procedures, as long as this is considered appropriate by the maturity of the market. The Premium is governed by special terms in accordance with the Transitory Mechanism for the Optimal Forecasting Accuracy.

**National Regulatory Authorities (NRAs) for Energy** - are independent regulatory authorities that, among other responsibilities, are tasked to oversee the domestic energy market, to ensure the protection of energy consumers, to monitor the security of supply, to grant licenses to power plants and to oversee the activities of the national transmission and distribution system operators. The NRAs usually can provide recommendations to the relevant state bodies and take measures to achieve the liberalisation and the wellbeing of the electricity and gas markets.

**Non-Interconnected Islands (NII)** - are islands that lack an electricity connection to the interconnected electricity network of the mainland and therefore are either powered by power plants that use fossil fuels to produce electricity supplied from the mainland or by RES power plants that are operating in those islands.

**Paris agreement** – is an agreement concluded on 12 December 2015 in Paris. Parties to the United Nations Framework Convention on Climate Change reached a landmark agreement to accelerate and intensify the actions and investments needed for a sustainable low carbon future and to combat climate change. The Paris Agreement's goal is to strengthen the international response to deal with climate change and keep the global temperature rise, in this century, below 2 degrees Celsius above pre-industrial levels and to make efforts to limit the temperature increase even further to 1.5 degrees Celsius.

**Power Exchange Code for Electricity** - specifies the economic and technical rules that govern the Day-Ahead electricity schedule as well as any transactions related to the electricity trading under the safe operation of the Hellenic Electricity Transmission System and the facilities connected to it. The Code also sets the conditions for the creation and operation of short-term and long-term electricity markets. The Code is drafted by the Market Operator and submitted to RAE, RAE after a public consultation

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<sup>4</sup> "Levelized Cost of Electricity - an Overview | ScienceDirect Topics," accessed January 25, 2020, <https://www.sciencedirect.com/topics/engineering/levelized-cost-of-electricity>.

with the users of the electricity system and the electricity market participants, approves with its Decision the Code making any necessary amendments.

**Reference Tariff (R.T.)** - is the price in €/MWh on the basis of which the Monthly operating aid is calculated, in the form of a Feed-in-Tariff or Feed-in-Premium for the support of RES or CHP power plants. The price is either determined per technology or per category of those power plants or per project if the R.T. results from the participation of the power plant in competitive tender procedures.

**Register of Market Participants** - is kept by the Market Operator and it includes all the parties that are eligible to participate in the day-ahead electricity market and / or in the forward market.

**Renewable Energy Community** - means a legal entity which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous and is effectively controlled by shareholders or members that are located in the proximity of renewable energy projects that are owned and developed by that legal entity. The shareholders or members of the REC are natural persons, SMEs or local authorities, including municipalities. The primary purpose of the REC is to provide environmental, economic or social community benefits for its shareholders or members for the local areas where it operates, rather than financial profits.

**Renewable Energy Sources Special Account (ELAPE)** - is used to reimburse the energy producers from RES. The RES Special Account is comprised of two sub-accounts: The RES sub-account of the Interconnected System and the RES sub-account of the Non-Interconnected Islands. DAPEEP is the manager of the RES sub-account of the Interconnected System and HEDNO S.A. is the manager of the RES sub-account of the Non-Interconnected Islands. The revenues of the account are mostly from ETMEAR, a RES levy charged in the electricity bills of the consumers, however there are also other revenue sources such as the market imbalance settlement, the fees that are submitted by the producers and the suppliers in the framework of the Day-ahead electricity schedule, the special lignite fee, CO<sub>2</sub> emission allowances and other revenue sources.

**Representation Agreement** - is a contract signed between the owner of a RES or CHP power plant and a licensed aggregator or the aggregator of the last resort. The agreement transfers the responsibilities of the power plant to the aggregator who takes the responsibility to represent the plant in the Greek energy market.

**Special Market Price (SpMP)** - is the weighted average value of electricity injected into the electricity grid in €/MWh per RES or CHP technology.

**System Operation Code** - regulates the technical issues related to the operation and use of the Electricity Transmission System. The Code ensures that the access and the usage of the System is made in the most economical, transparent and direct way,

without discriminatory practices among the different categories of the users of the System.<sup>5</sup>

**Technology Neutral Auction** – is an auction to allocate operating aid to RES or CHP power plants in which all the power plant generators could participate in a non-discriminatory basis, without considering the technology used to produce electricity by the power plant. The opposite of the Technology Neutral Auction is a Technology Specific Auction.

**Transitory Mechanism for the Optimal Forecasting Accuracy** - is the mechanism that calculates the charges, varying by the technology or the category of the power plants, that are imposed to RES and CHP plant owners who are required to participate directly in the electricity market. The calculation of these charges takes into account, inter alia, the standardized residuals of the electricity production of these stations from their forecast, a forecast error tolerance range and the additional cost of deviations that arise from the existing deviation clearing mechanism.

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<sup>5</sup> The System Operation Code is available at IPTO's website: <http://www.admie.gr/rythmistiko-plaisio/kodikos-egcheiridia/>

## Introduction

Renewable energy is not only a key aspect of combating climate change by the European Union (EU) but also an important factor in order to create a secure, sustainable and affordable energy sector. The EU has been focusing vigorously to create an Energy Union to achieve that goal by diversifying Europe's sources of energy and strengthening security of supply, creating a fully integrated internal energy market that will enable free flow of energy through the Member States with adequate infrastructure and will limited technical and regulatory barriers, improving energy efficiency and decreasing the energy dependence on energy imports.

The policy to promote renewable energy sources (RES) was largely a result of Kyoto Protocol where the EU committed to reduce its greenhouse gas (GHG) emissions by 8% during the first commitment period from 2008 to 2012 which was later extended by the Doha amendment and replaced by the Paris agreement in 2015 where the signatories committed to limit the global warming to well below 2 °C.<sup>6</sup>

To address these goals the EU had adopted various legislative packages such as the EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources and the revised Renewable Energy Directive (EU) 2018/2001. These Directives not only incorporate the basic goals that were set at Kyoto and Paris but also various provisions that concern the Renewable Energy financial support, intergovernmental cooperation between Member States and other neighboring countries, the use of biofuels, consumer rights for various groups that promote the use of renewable energy such as the "Renewable Energy Communities" (RECs), renewable energy self-consumers and many others. The EU Member States also had to adopt national renewable energy action plans which include the actions taken and planned to meet their 2020 renewables targets. These plans include targets for heating and cooling, electricity and transport; planned policy measures; the planned national renewable technologies energy mix and the use of intergovernmental cooperation schemes.

In this context, Member States were called to adopt the EU legislative measures and promote the use of renewable electricity. It is important to mention that even though the cost of the renewable technology has been reduced significantly during the past years, the energy markets still struggle to develop the renewable sector due to low profit margins. For this reason, the Member States had to implement various support schemes to promote the use of renewable energy without violating the state aid competition law set in the Treaty on the Functioning of the European Union (TFEU). In various instances, that presented a challenge for the Member States and the European Commission took action and provided specific guidelines which applied to

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<sup>6</sup> "Kyoto Protocol Reference Manual: On Accounting of Emissions and Assigned Amount," 2008, accessed January 25, 2020, [https://unfccc.int/resource/docs/publications/08\\_unfccc\\_kp\\_ref\\_manual.pdf](https://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf).

the state aid granted for environmental protection to achieve the above-mentioned energy goals in a number of sectors, such as transport, coal, agriculture, forestry, fisheries and aquaculture.<sup>7</sup>

The renewable energy sector of Greece is competitive. Specifically, in 2018 the renewable energy market showed signs of high activity, following the positive climate in the sector that began to emerge starting in 2017 with the introduction of the new RES support regime under Law 4414/2016 and the related approvals of that regime on behalf of the European Commission. More wind power generating facilities were installed and 2 years after participating in the pilot competitive tender process held by RAE in 2016, the photovoltaic (PV) stations that were successful in the bidding process were connected to the country's electricity system. At the same time, the integration of other new RES technologies took place, such as the installation of new biomass/biogas power plants. The installed capacity of RES units at the end of 2018 amounted to 5,828 MW, a 5.6% increase compared to the one recorded at the end of 2017 when the installed capacity was 5,521 MW. Although this increase is not very significant, there is a constant investment activity in these sectors with respect to 2015, 2016 and 2017, especially for biomass and wind farms, a trend that is expected to grow in the coming years due to the operating support provided to new PVs and wind farms through the competitive bidding tenders that were conducted in 2018 and 2019 but also because of the improved financial and investment climate in the country.<sup>8</sup> An important achievement for Greece is that the new installed capacity of wind farms that began their operations in 2019, amounted to 727.5 MW and the total wind farm installed capacity amounted to 3,576.4 MW, 25.4% higher than 2018.<sup>9</sup> The PV sector also witnessed a growth rate of 8.22%. Specifically, the installed capacity of PVs that began their operation in 2019,<sup>10</sup> amounted to 236.91 MW and the total PV installed capacity in December 2019 amounted to 2,881.72 MW, the total installed capacity of PV units was 2,644.81 in December 2018.<sup>11</sup>

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<sup>7</sup> "Communication from the Commission — Guidelines on State Aid for Environmental Protection and Energy 2014-2020: 2014/C 200/01," in, *Official Journal of the European Union*, 57.

<sup>8</sup> "National Report: Regulation and performance of the electricity market and the natural gas market in Greece, in 2018" (Regulatory Authority for Energy, Athens, 2019), [https://www.ceer.eu/documents/104400/6693346/C19\\_NR\\_Greece\\_EN/d9d979b6-52ef-02bb-5d4a-ba33ac6487ae](https://www.ceer.eu/documents/104400/6693346/C19_NR_Greece_EN/d9d979b6-52ef-02bb-5d4a-ba33ac6487ae).

<sup>9</sup> "HWEA Wind Energy Statistics – 2019" (Hellenic Wind Energy Association, Athens, 2020), <https://eletaen.gr/wp-content/uploads/2020/01/2020-1-30-hwea-statistics-greece.pdf>.

<sup>10</sup> The PV category includes both rooftop and ground-based PVs. The data for the months of November and December is not available at the time of this research thus any PVs that became operational or were shut down during these months are not included in the calculation of the installed capacity of 2019.

<sup>11</sup> "Μηνιαίο Δελτίο Ειδικού Λογαριασμού ΑΠΕ & ΣΗΘΥΑ [Monthly Bulletin of Special RES & CHP account]: Νοέμβριος – Δεκέμβριος 2019 [November - December 2019]" (Operator of RES and Guarantees of Origin (DAPEEP), Pireaus, 2019), [http://www.lagie.gr/fileadmin/groups/EDSHE/MiniaiaDeltiaEL/201912\\_07\\_NOV\\_\\_DEC\\_2019\\_DELTIO\\_ELAPE\\_v1.0\\_27.03.2020.pdf](http://www.lagie.gr/fileadmin/groups/EDSHE/MiniaiaDeltiaEL/201912_07_NOV__DEC_2019_DELTIO_ELAPE_v1.0_27.03.2020.pdf).



The research questions that this thesis aims to answer are: How did the EU legislative framework provide the basis for the current RES support scheme development and what are the main changes that were introduced in the renewable energy sources sector, specifically focusing on the RES operating aid framework introduced in 2016. In this context, it will provide the specifics of the EU legislative framework, focusing on the provisions that concern RES operating aid, that was the guideline in drafting the national legislation that regulates the support of renewable energy. In addition, it provides some details about the transposition of the above-mentioned EU legislation into national law and it presents the challenges that may arise from the transposition of the revised Renewable Energy Directive (EU) 2018/2001. Furthermore, it will analyze the key provisions introduced in the Law 4414/2016 that resulted in a major change in the RES support scheme that was implemented by Greece and a transition from an uncompetitive, Feed-in-Tariff (FiT) operating aid scheme to a more competitive, based on market mechanisms, scheme of Feed-in-Premium (FiP). However, the latter scheme introduces responsibility to renewable units' owners of participating in the wholesale market as well as balancing responsibilities, once the balancing market is established. Finally, it will examine various details about the procedure for participation, the bidding process and the conclusions of the competitive tender procedure used to grant operating aid to RES power generating facilities under the new scheme.

Financing RES projects, to make them economically viable, is a common phenomenon around the globe, even though the literature on financing renewable energy has shown that R & D has been given more attention compared to the downstream financing of the deployment and operation of the renewable energy power plants.<sup>12</sup> In this regard, states have played a major role in setting specific policies and objectives for renewable energy development, many of them provide tax exemptions, credits, grants, loans and production incentives, some of which may cover up to 30% of the total development costs.<sup>13</sup> Other types of support mechanisms include feed-in-tariffs or feed-in-premiums as well as green certificates.<sup>14</sup>

At a global level and specifically in the U.S., the federal government issues a Production Tax Credit (PTC) which offers to private owned renewable energy sources an inflation adjusted tax credit of 1.5 cents per kWh of electricity generated for the first ten years of its operation. The Investment Tax Credit (ITC) and Treasury grant gives a one-time tax break or grant, respectively, all based on the initial amount of

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<sup>12</sup> Mariana Mazzucato and Gregor Semieniuk, "Financing Renewable Energy: Who Is Financing What and Why It Matters," *Technological Forecasting and Social Change* 127 (2018), <https://doi.org/10.1016/j.techfore.2017.05.021>.

<sup>13</sup> Amy Tang, Nicola Chiara, and John E. Taylor, "Financing Renewable Energy Infrastructure: Formulation, Pricing and Impact of a Carbon Revenue Bond," *Energy Policy* 45 (2012), <https://doi.org/10.1016/j.enpol.2012.03.022>.

<sup>14</sup> Shahrouz Abolhosseini and Almas Heshmati, "The Main Support Mechanisms to Finance Renewable Energy Development," *Renewable and Sustainable Energy Reviews* 40 (2014), <https://doi.org/10.1016/j.rser.2014.08.013>.

project investment during the first year of operation. The U.S. also uses state Renewable Portfolio Standards (RPSs) to promote the development of the renewable energy market. The RPS policy, opposed to the FiT policy, is quantity-based. Specifically, it requires energy companies to increase their energy generated by renewable energy sources. This instrument obligates utility companies to generate a predetermined share of their electricity by renewable energy sources. In this way, they receive tradable green certificates for energy unit of renewable energy produced which can in turn sold to electricity supply companies for them to meet certain obligations (certificate trading system).<sup>15</sup> The RPS mechanism relies more on the private market for its implementation, and there is greater price competition across different types of RES technologies, unlike FiTs in which the government guarantees the purchase of electricity generated by renewable energy sources. This RPS mechanism is used in more than half of the U.S. states. In China, the government introduced a 50% value-added tax (VAT) rebate for solar power plant operators and implemented tax incentives for energy produced by hydro renewable energy sources.<sup>16</sup> This tax credit scheme helps to reduce the cost of investment/production and encourages the deployment of renewable energy projects. China also uses a financial scheme of loan guarantees to renewable energy companies to promote the use of renewable electricity. In India, banks and other financial institutions provide low-interest rate loans to renewable energy companies. There are approximately 15 commercial banks in the field of the renewable energy. The investment from local commercial banks reached 226 million dollars in 2008. Furthermore, a major institution that provides loans in the area and offers low-interest rate loans to wind farms and small hydro projects is India Renewable Energy Development Agency.<sup>17</sup> Brazil is deeply committed to boost its renewable energy sector. The country introduced the Alternative Sources Incentive Program (PROINFA) in 2002. Under that program, the state-owned electricity company Eletrobrás was committed to buy renewable electricity from the generators under a fixed tariff. Today, the Brazilian government also holds annual energy purchase and sale auctions which have included renewables. Some of the auctions are aimed to promote bioelectricity.<sup>18</sup> In South Africa, the main current policy to promote and finance renewable energy projects is

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<sup>15</sup> *World Energy Outlook 2016* (Organisation for Economic Co-operation and Development), 312.

<sup>16</sup> Md Hasanuzzaman and Nasrudin Abd Rahim, *Energy for Sustainable Development: Demand, Supply, Conversion and Management* / Md Hasanuzzaman, Nasrudin Abd Rahim (Amsterdam: Academic Press, 2019), 191.

<sup>17</sup> Shihong Zeng et al., "A Review of Renewable Energy Investment in the BRICS Countries: History, Models, Problems and Solutions," *Renewable and Sustainable Energy Reviews* 74 (2017), <https://doi.org/10.1016/j.rser.2017.03.016>.

<sup>18</sup> Amaro O. Pereira Jr. et al., "Strategies to Promote Renewable Energy in Brazil," *Renewable and Sustainable Energy Reviews* 15, no. 1 (2011), <https://ideas.repec.org/a/eee/rensus/v15y2011i1p681-688.html>.

based on competitive tenders and feed-in-tariffs.<sup>19</sup> Specifically, the first round of competitive auctions for RES projects started in 2011, before that there wasn't any organized scheme of financing renewable energy and the long-term promotion of renewable energy. The contracted capacity to receive operational aid based on feed-in-tariffs through competitive auctions amounted to 3,357 MW and 2,292 MW for wind power and ground-mounted PVs accordingly in the period 2011 - 2015. Furthermore, all the projects that were successful in the first auction of 2011 had commenced operation by 2016.<sup>20</sup> The Moroccan government developed two ambitious projects in order to promote Morocco's solar and wind development: The Moroccan Solar Plan, which is one of the world's largest solar energy projects, with an estimated cost of € 7.8 billion, that aims to reach 2 GW of installed solar power capacity by 2020 and 4.8 GW by 2030 and the Moroccan Integrated Wind Programme with a goal to achieve 2 GW of installed wind power capacity by 2020 and up to 5 GW by 2010.<sup>21</sup> The government regularly organizes tender procedures for the major RES projects which are granted direct funding. Moroccan energy efficiency projects, wind and solar programs have been greatly supported by the African Development Bank, the European Investment Bank and the World Bank.<sup>22</sup> A feed-in-tariff scheme is used to support renewable electricity in Philippines under the Renewable Energy Act of 2008.<sup>23</sup> The government has also approved a renewable portfolio standards scheme (RPS) in December 2017, that requires electricity suppliers and distributors to increase the renewable energy share in their energy mix by 10% from 2020 to 2035 with a minimum increase of 1% per year.<sup>24</sup> Argentina has been using feed-in-tariffs to

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<sup>19</sup> Louise Toit, "Promoting renewable energy in South Africa through the inclusion of market-based instruments in South Africa's legal and policy framework with particular reference to the feed-in tariff" (Dissertation, Department of Public Law, University of Cape Town, 2014), accessed January 26, 2020, <https://www.crses.sun.ac.za/files/research/completed-research/other/L%20du%20Toit%20-%20PhD.pdf>.

<sup>20</sup> Benjamin Bayer, Dominik Schäuble, and Michele Ferrari, "International Experiences with Tender Procedures for Renewable Energy – a Comparison of Current Developments in Brazil, France, Italy and South Africa," *Renewable and Sustainable Energy Reviews* 95, C (2018), <https://doi.org/10.1016/j.rser.2018.06.06>, <https://ideas.repec.org/a/eee/rensus/v95y2018icp305-327.html>.

<sup>21</sup> "UN development account project on promoting renewable energy investments for climate change mitigation and sustainable development: Case study on policy reforms to promote renewable energy in Morocco" (United Nations, Beirut, 2018), [http://cebcmena.com/wp-content/uploads/2018/03/policy-reforms-promote-renewable-energy-morocco-english\\_0.pdf](http://cebcmena.com/wp-content/uploads/2018/03/policy-reforms-promote-renewable-energy-morocco-english_0.pdf).

<sup>22</sup> Agnieszka imelyt et al., "Promotion of Renewable Energy in Morocco," *Entrepreneurship and Sustainability Issues* 3, no. 4 (2016), [https://doi.org/10.9770/jesi.2016.3.4\(2\)](https://doi.org/10.9770/jesi.2016.3.4(2)), <https://ideas.repec.org/a/ssi/jouesi/v3y2016i4p319-327.html>.

<sup>23</sup> Jose Barroco and Maria Herrera, "Clearing Barriers to Project Finance for Renewable Energy in Developing Countries: A Philippines Case Study," *Energy Policy* 135 (2019), <https://doi.org/10.1016/j.enpol.2019.111008>, <http://www.sciencedirect.com/science/article/pii/S0301421519305956>.

<sup>24</sup> Hugh Rudnick and Constantin Velasquez, "Learning from Developing Country Power Market Experiences: The Case of the Philippines," *Energy and Extractives Global Practice* (World Bank Group, Washington DC, 2019), <http://documents.worldbank.org/curated/en/428331548771494859/pdf/WPS8721.pdf>.

support renewable electricity from wind and solar energy since the late 1990s. This system, however, failed due to the low electricity prices after the severe crisis of 2001. The Renewable Generation Program of 2007, the goal of which was to create a market mechanism by setting a subsidized price for the purchase of a maximum amount of renewable energy also failed to meet its goals.<sup>25</sup>

In Europe most of the countries, especially Member States of the European Union and Member States of the Energy Community, are gradually discontinuing FiT support for large capacity projects in favour of competitive tenders and FiP. This change comes in order for the countries to be compliant with State Aid Guidelines for Environmental Protection and Energy (EEAG). Specifically, in Albania the RES electricity support scheme is based on FiTs, which depend on the technology and the installed capacity of the projects, projects with installed capacity higher than 2 MW shall receive operating aid in the form of FiPs.<sup>26</sup> In Portugal, FiTs have been the main policy used to enhance electricity generated by renewable energy sources.<sup>27</sup> In Croatia, there is a “new” RES operating aid scheme in place since 2017 which replaced the “old” scheme which was in place since 2007. Under the “new” scheme, power plants up to 500 kW may receive aid under the FiT standard and power plants above 500 kW could receive aid under the FiP standard.<sup>28</sup> Cyprus held its first FiT auction in 2013. The auction concerned PV projects of installed capacity of 1 – 10 MW and the total auctioned capacity amounted to 50 MW.<sup>29</sup> In 2019, only RES energy sold to Energy Authority of Cyprus by the feed-in tariff regime, is injected to the electricity system.<sup>30</sup> Spain, under the Royal Decree 413/2014, provides investment aid, named “investment remuneration term”, to renewable energy projects. In accordance with the Royal Decree, the aid for new RES generation plants must be granted by a tender process.

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<sup>25</sup> Erin C. Pischke et al., “From Kyoto to Paris: Measuring Renewable Energy Policy Regimes in Argentina, Brazil, Canada, Mexico and the United States,” *Energy Research & Social Science* 50 (2019), <https://doi.org/10.1016/j.erss.2018.11.010>, <http://www.sciencedirect.com/science/article/pii/S2214629618301245>.

<sup>26</sup> “Albania Renewable Energy Progress Reports 2016-2017” (Albanian Ministry of Infrastructure and Energy, 2017), [https://www.energy-community.org/dam/jcr:948f53f7-cb9d-47de-a8fc-acf0f89a0985/AL\\_RE\\_progress\\_2016.pdf](https://www.energy-community.org/dam/jcr:948f53f7-cb9d-47de-a8fc-acf0f89a0985/AL_RE_progress_2016.pdf).

<sup>27</sup> Abolhosseini and Heshmati, “The main support mechanisms to finance renewable energy development”

<sup>28</sup> Pedro Verdelho et al., “Analysis of auction mechanisms to promote RES” (Association of Mediterranean Energy Regulators, Milan, 2019), [http://www.medreg-regulators.org/Portals/\\_default/Skede/Allegati/Skeda4506-434-2019.12.3/Analysis%20of%20auction%20mechanisms%20to%20promote%20RES.pdf?IDUNI=ykkh4ksm3oohmwI0piy1rihf9164](http://www.medreg-regulators.org/Portals/_default/Skede/Allegati/Skeda4506-434-2019.12.3/Analysis%20of%20auction%20mechanisms%20to%20promote%20RES.pdf?IDUNI=ykkh4ksm3oohmwI0piy1rihf9164).

<sup>29</sup> Angeliki Kylili and Paris A. Fokaides, “Competitive Auction Mechanisms for the Promotion Renewable Energy Technologies: The Case of the 50MW Photovoltaics Projects in Cyprus,” *Renewable and Sustainable Energy Reviews* 42 (2015), <https://doi.org/10.1016/j.rser.2014.10.022>, <http://www.sciencedirect.com/science/article/pii/S1364032114008399>

<sup>30</sup> “2019 National Report to the European Commission for the year 2018” (Cyprus Energy Regulatory Authority, 2019), [https://www.ceer.eu/documents/104400/6693346/C19\\_NR\\_Cyprus\\_EN.pdf/5fc122bf-c652-c80f-1c6c-3641e3c1b38b](https://www.ceer.eu/documents/104400/6693346/C19_NR_Cyprus_EN.pdf/5fc122bf-c652-c80f-1c6c-3641e3c1b38b).

Hence, on the 14th of January 2016 the first RES auction took place, including volumes for wind and biomass technologies. Spain also holds technology neutral tenders to finance RES projects. The country has been using sliding Feed-in-Premium to finance RES projects since 2007.<sup>31</sup> In France, the mechanism to support renewable electricity varies according to the capacity of the installations.<sup>32</sup> Smaller installations receive operating aid based on the FiT scheme, medium-sized are selected through open window procedures whereas larger installations are forced to participate in competitive tenders to receive operating aid which is based on FiPs.<sup>33</sup> However, biofuels in France face high competition from diesel because it benefits from a reduced excise tax rate.<sup>34</sup> Germany had introduced a FiT like system to promote renewable energy in October 1990, the so-called Grid Feed-in Law. In 2014 Germany introduced pilot auctions for solar projects.<sup>35</sup> The first auctions begun in 2015 and the transition to the new scheme was completed in 2017. Today, most new power plants are required to participate in competitive tenders and are remunerated for the electricity they inject to the grid using a market premium.<sup>36</sup> United Kingdom has a renewable obligation (RO) scheme in place. Under the RO scheme, electricity suppliers are forced to source a specific proportion of the electricity they sell to customers from eligible renewable sources.<sup>37</sup> Even though some smaller renewable installations are still eligible to receive aid using FiTs, the main mechanism to promote renewable energy in UK are the Contracts for Difference (CfD), a Feed-in-Premium like operation

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<sup>31</sup> António C. Marques, José A. Fuinhas, and Daniela P. Macedo, "The Impact of Feed-in and Capacity Policies on Electricity Generation from Renewable Energy Sources in Spain," *Utilities Policy* 56 (2019), <https://doi.org/10.1016/j.jup.2019.01.001>, <http://www.sciencedirect.com/science/article/pii/S0957178718300079>.

<sup>32</sup> Ola Hanafi, "Promoting Renewable Energy Sources in the electricity sector: A focus on auction/tender mechanism in Europe and France" (Centre international de recherche sur l'environnement et le développement, 2016), [http://wdev.centre-cired.fr/IMG/pdf/promoting\\_rese\\_a\\_focus\\_on\\_auction\\_mechanism\\_in\\_europe\\_and\\_france\\_2016\\_.pdf](http://wdev.centre-cired.fr/IMG/pdf/promoting_rese_a_focus_on_auction_mechanism_in_europe_and_france_2016_.pdf).

<sup>33</sup> "Investing in renewable energy projects in Europe Dentons' Guide 2019" (Dentons Law Firm, 2019), <https://www.dentons.com/en/insights/guides-reports-and-whitepapers/2019/february/4/investing-in-renewable-energy-projects-in-europe-2019>.

<sup>34</sup> Virginie Doumax-Tagliavini and Cristina Sarasa, "Looking Towards Policies Supporting Biofuels and Technological Change: Evidence from France," *Renewable and Sustainable Energy Reviews* 94 (2018), <https://doi.org/10.1016/j.rser.2018.06.020>, <http://www.sciencedirect.com/science/article/pii/S1364032118304568>.

<sup>35</sup> Merethe D. Leiren and Inken Reimer, "Historical Institutional Perspective on the Shift from Feed-in Tariffs Towards Auctioning in German Renewable Energy Policy," *Energy Research & Social Science* 43 (2018), <https://doi.org/10.1016/j.erss.2018.05.022>, <http://www.sciencedirect.com/science/article/pii/S2214629618305152>.

<sup>36</sup> Jan Abrell, Mirjam Kosch, and Sebastian Rausch, "Carbon Abatement with Renewables: Evaluating Wind and Solar Subsidies in Germany and Spain," *Journal of Public Economics* 169 (2019), <https://doi.org/10.1016/j.jpubeco.2018.11.007>, <http://www.sciencedirect.com/science/article/pii/S0047272718302263>.

<sup>37</sup> John Aldersey-Williams, Ian D. Broadbent, and Peter A. Strachan, "Analysis of United Kingdom Offshore Wind Farm Performance Using Public Data: Improving the Evidence Base for Policymaking," *Utilities Policy* 62 (2020), <https://doi.org/10.1016/j.jup.2019.100985>, <http://www.sciencedirect.com/science/article/pii/S0957178719303388>.

aid scheme, which were introduced in 2013 under the Electricity Market Reform.<sup>38</sup> Ukraine has been using a “green tariff”, a FiT scheme, since 2008 which provides a highly attractive reimbursement for each MWh produced by solar and wind energy installations.<sup>39</sup> This scheme is going to be replaced with an auction-based FiT regime starting from 01 January 2020 due to high costs to the state budget.<sup>40</sup> Finally, Greece uses a sliding FiP mechanism to promote renewable electricity since 2015. Smaller installations are still eligible to receive aid under the FiT scheme<sup>41</sup>. The reference tariffs for the FiP contract are determined either by a competitive tender or by using the tariffs available under the law 4414/2016 which are updated depending on the results of the recent competitive auctions. It should be noted that there is a lack of literature, especially English literature, that covers the new promotion scheme of renewable energy in Greece.

For this reason, this thesis follows the basic principles of exploratory research methodology. Due to limited research in the field of the renewable energy of Greece, and in particular the renewable energy support schemes, this thesis tries to explore the influence of the current support scheme on the renewable energy sector of Greece and to predict its future development based on EU mandates. The bibliography of the research, in its major part, includes primary sources such as Greek and EU legislation, government documents, statistical data, press releases, annual reports and presentations made by government’s officials. The research lacks secondary sources, the few sources that exist, are for the most part, business reports.

The thesis is divided in three chapters. The first chapter covers the EU legislation that serves as a basis for the development of support schemes for renewable energy implemented by the Member States. In addition, the chapter covers the transposition of the new revised Renewable Energy Directive (EU) 2018/2001 and the potential challenges that may arise during the incorporation of the Directive into the Greek national law focusing on the provisions that cover RES support schemes. The second chapter presents the new operating aid scheme under Law 4414/2016 for renewable energy power stations. The chapter also covers the details of the first pilot competitive tender procedure for PVs held in 2016. There is also a subchapter that examines the results of the competitive tenders up to 2019 as well as the planned tenders for 2020. In the final chapter results of the study are presented.

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<sup>38</sup> Marijke Welisch and Rahmatallah Poudineh, “Auctions for Allocation of Offshore Wind Contracts for Difference in the UK,” *Renewable Energy* 147 (2020), <https://doi.org/10.1016/j.renene.2019.09.085>, <http://www.sciencedirect.com/science/article/pii/S0960148119314168>.

<sup>39</sup> “Renewables in Ukraine” (KPMG, 2019), [https://assets.kpmg/content/dam/kpmg/ua/pdf/2019/07/Renewables-in-Ukraine-Report\\_2019.pdf](https://assets.kpmg/content/dam/kpmg/ua/pdf/2019/07/Renewables-in-Ukraine-Report_2019.pdf).

<sup>40</sup> Nazar Chernyavsky, Maryna Hritsyshyna, and Bohdan Novyk, “For renewable projects in Ukraine: New scheme of support and new electricity market” (Sayenko Kharenko, Kyiv, ), <http://sk.ua/wp-content/uploads/2019/10/Energy-0.17-THE-LAST-FINAL.pdf>.

<sup>41</sup> Stelios Loumakis, Eugenia Giannini, and Zacharias Maroulis, “Renewable Energy Sources Penetration in Greece: Characteristics and Seasonal Variation of the Electricity Demand Share Covering,” *Energies* 12 (2019), <https://doi.org/10.3390/en12122441>.

## Chapter 1: The European Union's legislation as a basis for the development of the national legal framework for the RES support schemes

The biggest majority of EU environment legislation is in the form of Directives. Usually, Decisions and Regulations require simple actions because they do not need to be incorporated into national legislation. The EU Directives are thus designed to be implemented in ways which are adjusted to the unique circumstances of each Member State and the ultimate responsibility to take the binding measures which are in line with the EU environmental law, lies with the national government. In the case where the Directive is precise (e.g. environmental goals for GHG emission reductions, permitting requirements, minimum quality standards), the Member States must transpose into national law the precise requirements. Where the directive allows for member states scope for different actions at national level, as in the specifications of permitting procedures or public consultations, or in the designation of geographical areas which are going to be covered by the directive, then the countries have greater freedom in designing their legislature to be compatible with the EU law.

The drafting of EU law is done by the European Commission, after it assesses the potential economic, social and environmental consequences that it may have through "impact assessments". The European Parliament and the Council propose any amendments to those EU law draft proposals by the Commission. If those two institutions fail to agree upon amendments, then a second reading takes place. In the second reading the European Parliament and Council can again propose amendments and the Parliament has the power to block any proposed legislation in the scenario that it disagrees with the Council. If these two institutions agree on amendments, the legislation can be adopted, if they disagree, a conciliation committee tries to solve the problem.<sup>42</sup>

In this context, the legislation drafted and adopted at EU level provides the basis for the legislation adopted at national level by the Member States since they are obliged to transpose it. Specifically, for the environmental legislation, it is a result of intense negotiation at EU level, it provides the key points that needed to be incorporated into national law in order to fulfill EU's obligations that arise from international treaties such as the Kyoto Protocol and the Paris Agreement. The most important modern environmental EU legislation that resulted in the formulation of the RES support scheme as it is implemented in Greece as well as other EU Member States is the Renewable Energy Directive 2009/28/EC, the Guidelines on State aid for protection and energy 2014-2020 and the Renewable Energy Directive (EU)

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<sup>42</sup> Edward Best, *Understanding EU Decision-Making* (Switzerland: Springer, 2016), 37–59.

2018/2001 that amended the 2009/28/EC Directive as part of the Clean Energy Package.

## 1.1 Renewable Energy Directive 2009/28/EC of Climate and Energy Legislative package

In December 2008, the European Parliament took a decision on the EU's Climate and Energy package. This package aims to ensure that the EU will achieve its climate targets set for 2020. Specifically, a 20% reduction in greenhouse gas emissions, a 20% improvement in energy efficiency and a 20% share of renewable energy in the EU's total energy consumption.<sup>43</sup> All targets are based on the 1990 figures. The Climate and Energy Legislative package includes the Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources, the Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC on the improvement and extension of the greenhouse gas emission allowance trading scheme of the Community, the Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and the Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

The Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources was part of the package promoted by the European Commission in 2009 in order to address climate change. The Directive aimed to implement the European Union's international commitments and the mandates of the Kyoto Protocol, signed in 1997. The Directive amended and repealed Directives 2001/77/EC and 2003/30/EC with the aim to create a common legislative framework for the use of renewable energy in EU Member States so as to limit greenhouse gas emissions and promote cleaner transport. It set national binding targets for all EU Members with the overall goal to make renewable energy account for 20% of EU energy consumed and 10% specifically in the transport sector in terms of gross final energy consumption. These goals are central to the Europe 2020 development strategy as they contribute to industrial innovation, Europe's technological innovation, reduce GHG emissions, improve energy security and reduce the dependence of EU countries on energy imports. The Directive further called for simplifying RES administrative procedures and improving the access of RES to the electricity network. The Directive introduced an integrated sustainability system for

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<sup>43</sup> Juan I. Peña and Rosa Rodríguez, "Are EU's Climate and Energy Package 20-20-20 Targets Achievable and Compatible? Evidence from the Impact of Renewables on Electricity Prices," *Energy* 183 (2019), <https://doi.org/10.1016/j.energy.2019.06.138>.



biofuels and bioliquids, with mandatory monitoring and reporting requirements. All biofuels used in line with the 10% target for the share of biofuels in transport petrol and diesel consumption by 2020 and benefit from national support schemes must comply with this system.

EU Member States, under this Directive, had to create a national plan for 2020. The plan would set out the means on how to achieve the national target for renewables in gross final energy consumption as well as the 10% target for renewable energy sources in transport. In order to achieve targets in a cost-effective way, EU countries could exchange energy from renewable sources. EU Member States can also import renewable energy from third countries outside the EU, provided that the energy imported is consumed in the EU and it is produced by modern/efficient power generating installations. Each EU country had to be in position to guarantee the origin of electricity, heating and cooling produced from RES. Furthermore, the necessary infrastructure should be built by the EU member countries to use renewable energy sources in the transport sector.<sup>44</sup>

Specifically for the RES support schemes, the Renewable Energy Directive of 2009, didn't include any detailed provisions regarding their design but the Member States were allowed to apply support schemes to achieve their national binding RES target for 2020. However, in Article 3(3) of the Directive it is specified that:

*“Without prejudice to Articles 87 and 88 of the Treaty, Member States shall have the right to decide, in accordance with Articles 5 to 11 of this Directive, to which extent they support energy from renewable sources which is produced in a different Member State.”*

The above provision means that the Member States during the design of the RES support schemes, still had to respect Articles 87 and 88 of the “Treaty establishing the European Community”. Those articles contain general provisions that regulate state aid. In particular, Article 87 of the Treaty specifies that:

*“Any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favoring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the common market.”*

The European Commission, in cooperation with Member States, is responsible, pursuant to Article 88 of the Treaty, to keep track and review all systems of state aid in place by the Member States. If the Commission finds that the aid provided by Member States is not compatible with internal market rules or that it is being misused in a way that it distorts competition, then it shall decide that the State concerned shall abolish or alter such aid within a specific period of time that is determined by the

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<sup>44</sup> Evgenia Pavlovskaia, “Controlling the Fulfillment of the EU Sustainability Criteria for Transport Biofuels (On the Basis of Directive 2009/28/EC),” *Renewable Energy Law and Policy Review* 4, no. 4 (2013), [www.jstor.org/stable/24324569](http://www.jstor.org/stable/24324569).

Commission. The European Council could, acting unanimously, decide that the aid granted by the state is compatible with the common market, in derogation from the provisions laid down in Article 87.

Article 87(2) of the Treaty provides some exceptions to the above regime of state aid. Specifically, it stipulates that the aid that has a social character, granted indiscriminately, related to the origin of the products concerned, to individual consumers, aid to make good for damages caused by natural disasters or exceptional occurrences and aid granted to certain areas of Germany in order to compensate for the disadvantages caused by the division of the country prior to 1989 shall be compatible with the common market. These provisions are applied in very specific situations. Thus, it would be hard for Member States to justify state aid granted using RES support schemes under the above provisions of Article 87 of the Treaty.

To prevent any misuse of the legislative measures provided in the Renewable Energy Directive, in June 2014 the European Commission, introduced concrete provisions, that the Member States were required to follow in designing their national RES support schemes, in the context of the Guidelines on state aid for environmental protection and energy for the time period of 2014 through 2020 (EEAG).

## 1.2 Guidelines on State aid for protection and energy 2014-2020

The first Renewable Energy Directive 2009/28/EC gave a lot of freedom to EU Member States to decide for themselves on the structure of their RES-support schemes.<sup>45</sup> This resulted in a very diverse system of support with many instruments being purely national and usually not based on market mechanisms. In this regard, the “Guidelines on State aid for environmental protection and energy 2014-2020 (EEAG), that were submitted by the European Commission, are also relevant with the design of the RES-support schemes in order to be compatible with the internal energy market on the basis of Article 107(3) of the Treaty on the Functioning of the European Union (TFEU). The Guidelines replace the European Commission’s 2008 Guidelines on state aid for environmental protection<sup>46</sup> which contained rules on energy related matters that are closely linked to climate policy such as energy saving, RES and cogeneration and energy-efficient district heating. In addition, the EEAG contain provisions that deal with some other specific energy issues such as carbon capture and storage (CCS),

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<sup>45</sup> “Implications of Non-harmonised Renewable Support Schemes: A CEER Public Consultation Document” (CEER, Brussels, 2011), <https://www.ceer.eu/documents/104400/-/-/04549825-44ab-0b91-571d-2abecd425634>, 41.

<sup>46</sup> “Community Guidelines on State Aid for Environmental Protection: 2008/C 82/01,” in, *Official Journal of the European Union*.

energy infrastructure and generation adequacy.<sup>47</sup> The EEAG also regulate the extent to which energy-intensive industrial companies are exempted from the cost of support for RES-electricity.<sup>48</sup> The Guidelines' target is to promote a gradual transition to market-based support for RES and address any market distortions that result from state aid granted to power plants that generate renewable energy.

The EEAG do not completely question the need for RES-support schemes but they indicate that the GHG emissions costs are already internalized by the EU Emission Trading System (EU ETS) but also CO<sub>2</sub>-levies at national level. The compliance of the Member States with EEAG results in a greater convergence of the internal energy market and prevents the distortion of competition by the national RES-support schemes. The Guidelines ensure that support provided for RES-technologies will expire eventually and that the RES technologies will gradually become competitive between 2020 and 2030. In the future, the guaranteed feed-in-tariffs for RES-electricity will only support small-scale power plants or technologies that will be under development, all other RES-projects or installations will receive a premium in addition to the market price under which producers will sell their RES-electricity directly via the wholesale market but also be subject to balancing responsibilities.<sup>49</sup> The RES installations that receive operating aid will be subject to standard balancing responsibilities as other power plants. Starting from 2017, according to EEAG, the operating aid shall be granted by the Member States in a competitive bidding process which will be based on clear, non-discriminatory and transparent criteria. If the above-mentioned bidding tender will be open to all generators that produce electricity from RES on a non-discriminatory basis, then the Commission will presume that the aid is proportionate and doesn't distort the internal energy market competition.<sup>50</sup> In case, Member States demonstrate that only a limited number of projects are eligible to receive aid or that the bidding process would lead to higher support levels (avoid strategic bidding) or low project realization rates (avoid underbidding) then it is considered that the above-mentioned criteria are not fulfilled.<sup>51</sup> The competitive tender, according to EEAG, can be limited to specific technologies where the process

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<sup>47</sup> Ágnes Gajdics, "New Guidelines on Environmental and Energy State Aid for 2014–2020: Legal Analysis" (Justice and Environment, Údolní, 2014), [http://www.justiceandenvironment.org/\\_files/file/2014/New%20Energy%20State%20Aid%20Guidelines.pdf](http://www.justiceandenvironment.org/_files/file/2014/New%20Energy%20State%20Aid%20Guidelines.pdf), 5.

<sup>48</sup> Aid given to nuclear energy sources would be assessed case by case under the European Commission's general rules as the provisions, even though the Commission initially included specific rules in the EEAG permitting aid to nuclear energy under certain conditions, were left out of the Guidelines.

<sup>49</sup> Small-scale installations and demonstration projects may be exempted from the Feed-in-Premium mechanism. These projects could be eligible to receive operating aid in the form of Feed-in-Tariff.

<sup>50</sup> An important notice is that firms in difficulties may not be awarded environmental and energy aid as defined in the "Guidelines on State aid for rescue and restructuring undertakings in difficulty". Available online: [https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52014XC0731\(01\)](https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52014XC0731(01))

<sup>51</sup> "Communication from the Commission — Guidelines on State aid for environmental protection and energy 2014-2020," 57.

is open to all generators and would lead to a suboptimal result which cannot be addressed in the process of tender design. In particular, the Member States need to take into account: The long-term potential of a new and innovative technology, the need to achieve diversification, the network limitations and the stability of the grid, any system costs, as far the integration to the network of the power plants is concerned, and the need to avoid distortions on the raw material markets from biomass support. Member States shall inform the European Commission of any individual aid granted on the basis of an aid scheme pursuant to Article 108(3) of the TFEU, in the instance that the aid exceeds certain thresholds laid down in the EEAG guidelines and the aid is not granted through a competitive bidding process.<sup>52</sup> Certain measures that are considered state aid do not need to be notified, for example funding the cleaning of contaminated sites and the district heating promotion, as well as public loans that aim to improve energy efficiency in buildings. Measures that are block exempted by virtue of their minor importance are also exempted from the notification to the European Commission.<sup>53</sup>

**Table 1 Cases of state aid that need to be notified to European Commission**

Case	
1.	Investment aid exceeding € 15 million for one undertaking
2.	Operating aid for the generation of renewable electricity and/or combined production of renewable heat at power plants exceeding 250MW of installed capacity
3.	Operating aid to produce biofuels in installations that the biofuel production exceeds 150,000 tons per year
4.	Operating aid for a cogeneration power plant exceeding 300MW of installed capacity
5.	Energy infrastructure aid where the overall amount granted exceeds € 50 million for one undertaking, per investment project
6.	Aid for Carbon Capture and Storage (CCS) in the case that the overall amount granted exceeds € 50 million per investment project
7.	Aid in the form of a generation adequacy measure that exceeds € 15 million per project undertaking

The Guidelines have helped Member States to revise their national RES-support schemes. In Greece such this revision is incorporated in law No 4414/2016 which led to the transition from the Feed-in-Tariff to Feed-in-Premium, operating aid scheme. The aid received by RES power plants is now mostly determined by competitive tenders and these support schemes now contain more competitive elements for supporting RES technologies. The Guidelines provided the basis for the recast of the

<sup>52</sup> Ágnes Gajdics, “New Guidelines on Environmental and Energy State Aid for 2014–2020,” 7.

<sup>53</sup> The state aid shall not exceed € 200,000 per company over three years.

Renewable Energy Directive (RED II) and they are expected to be extended for two more years as they expire in 2020.<sup>54</sup>

**Table 2 Applicability of Guidelines on State aid for Environmental protection and Energy 2014-2020**

Case	Applicable
1. Aid for exceeding EU standards or increasing the level of environmental protection in the absence of EU standards	YES
2. Aid for early adaptation to future EU standards	YES
3. Investment and operating aid for energy from RES	YES
4. Aid for environmental studies	YES
5. Energy efficiency measures, including cogeneration and district heating and cooling	YES
6. Aid for resource efficiency and waste management	YES
7. Aid for the remediation of contaminated sites	YES
8. Aid for relocation of undertakings	YES
9. Aid in the form of tradable permits	YES
10. Aid for CO <sub>2</sub> capture, transport and storage (CCS)	YES
11. Operating aid in the form of reductions in or exemptions from environmental taxes	YES
12. Operating aid in the form of reductions in funding support for electricity from renewable sources	YES
13. Aid for energy infrastructure	YES
14. Aid for generation adequacy measures	YES
15. The design and manufacture of environmentally friendly products	NO
16. The financing of environmental protection measures relating to transport infrastructure	NO
17. Stranded costs <sup>55</sup>	NO
18. State aid for research, development and innovation <sup>56</sup>	NO
19. State aid for biodiversity measures <sup>57</sup>	NO

The EEAG do not provide a clear definition of which measures are considered state aid but they set out the criteria which will be used by the Commission in the assessment of environmental and energy aid measures which amount to state aid and have to be notified. The design of the measures to provide aid is free for the governments in such a way that those do not constitute state aid.

<sup>54</sup> European Commission, "State Aid: Commission to Prolong EU State Aid Rules and Launch Evaluation," news release, January 7, 2019, accessed January 25, 2020, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_19\\_182](https://ec.europa.eu/commission/presscorner/detail/en/IP_19_182).

<sup>55</sup> Stranded costs remain subject to the regime set out in the European Commission's Communication in 2001. Available online: [https://ec.europa.eu/competition/state\\_aid/legislation/stranded\\_costs\\_en.pdf](https://ec.europa.eu/competition/state_aid/legislation/stranded_costs_en.pdf)

<sup>56</sup> State aid for research, development and innovation is subject to the "Framework for State aid for research and development and innovation" Communication from the European Commission set out in 2014. Available online: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014XC0627\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014XC0627(01))

<sup>57</sup> Usually biodiversity falls within the scope of the regulatory framework set out for Services of General Economic Interest.

The EEAG outline the criteria, presented in **Table 3**, against which the European Commission assesses the compatibility of any environmental and energy State aid measure based on the Art 107(3) of the TFEU.

**Table 3 Criteria assessed by the European Commission in order to determine the compatibility of state aid with the Guidelines on State aid for Environmental protection and Energy**

Criteria assessed by EC:	
	The aid/measure:
1.	Contributes to a well-defined objective of common interest
2.	Is needed in order to remedy a well-defined market failure
3.	Is appropriate to address the objective of common interest
4.	Incentivizes market players to behave in a different way from how they would if the measure was not implemented
5.	Is proportionate in a way that the aid is limited to the minimum required to incentivize additional investment or activity in the area concerned
6.	Avoids great negative effects on international trade and competition
7.	Is transparent as to both its form and its implementation

The EEAG also include special provisions for energy from renewable sources other than electricity. The operating aid for those installations is compatible with the internal market if the aid per unit of energy is not exceeding the difference between the total levelized costs of producing energy (LCOE) of the specific technology in question and the market price of the form of energy concerned. The LCOE may include a normal return on capital,<sup>58</sup> and the production costs which should be updated regularly.<sup>59</sup> The aid is only granted until the power generating facility has been fully depreciated according to normal accounting rules in order to avoid that operating aid based on LCOE exceeds the declination of the investment.<sup>60</sup>

### 1.3 The Clean Energy for All Europeans Package

With the aim to tackle climate change, the EU was one of the first intergovernmental organisations that set ambitious climate and energy targets in 2009 for 2020. The

<sup>58</sup> Investment aid shall be deducted from the total investment amount in calculating the LCOE.

<sup>59</sup> At least once a year.

<sup>60</sup> Marcella Giacomarra and Filippa Bono, "European Union Commitment Towards RES Market Penetration: From the First Legislative Acts to the Publication of the Recent Guidelines on State Aid 2014/2020," *Renewable and Sustainable Energy Reviews* 47 (2015): 227, <https://doi.org/10.1016/j.rser.2015.03.006>.

Union of 2019 is on track to reach those 2020 objectives, a proof that it is possible for countries to achieve growth and simultaneously reduce their emissions.<sup>61</sup>

The Clean Energy for All Europeans package (CEP) was published by the European Commission in November 2016. It is a set of eight legislative measures, which have been formally adopted by the Council of the European Union and the European Parliament, partly by the end of 2018 and partly in the first half of 2019. In the meanwhile, energy from RES has become cheaper over the years. In addition, after the 2015 Paris Climate Agreement, the EU updated its 2030 targets and pledged to move further ahead and achieve at least a 40% reduction in GHG emissions compared to 1990. The European Commission proposed a set of new rules in 2016 called the “Clean Energy Package for all Europeans” in order to respond to this challenge to reach those 2030 targets. The package addressed all 5 dimensions of the Energy Union: Energy security, the internal energy market, energy efficiency, decarbonisation of the economy, research and competitiveness.

The CEP includes the following new or recast directives and regulations: “Regulation (EU) 2019/941 on risk-preparedness in the electricity sector”, “Regulation (EU) 2019/942 establishing a European Union Agency for the Cooperation of Energy Regulators”, “Regulation (EU) 2019/943 on the internal market for electricity”, “Regulation (EU) 2019/944 on common rules for the internal market for electricity”, “Directive (EU) 2018/1999 on the Governance of the Energy Union and Climate Actions”, “Directive (EU) 2018/2001 on the promotion of the use of Energy from Renewable Sources” and “Directive (EU) 2018/844 amending Directive 2012/27/EU on Energy Efficiency Directive and Directive 2010/31/EU on the Energy Performance in Buildings”.

They key points of those legislative measures are:

- Renewable Energy: a new ambitious target of at least 32% in renewable energy in the final energy consumption of the member states by 2030 which is going to be met by indicative national contributions. The member states cannot go below their RES share for 2020 and the European Commission will re-assess the 32% target by 2023. Additionally, there are specific provisions that regulate public and private investment in order for the Union to maintain its leadership on renewable energy.
- Energy efficiency: The Directive on energy efficiency sets a new, higher target of energy use for 2030 of at least 32.5% efficiency improvements. It is a non-binding goal which is going to be achieved through indicative national

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<sup>61</sup> “Clean Energy for All Europeans Package Completed: Good for Consumers, Good for Growth and Jobs, and Good for the Planet,” European Commission, accessed January 25, 2020, [https://ec.europa.eu/info/news/clean-energy-all-europeans-package-completed-good-consumers-good-growth-and-jobs-and-good-planet-2019-may-22\\_en](https://ec.europa.eu/info/news/clean-energy-all-europeans-package-completed-good-consumers-good-growth-and-jobs-and-good-planet-2019-may-22_en).

contributions reflecting final and primary energy consumption.<sup>62</sup> In case of substantial cost reductions or in order to meet international commitments, the target may be revised upwards by a proposal of the EU Commission. The new Directive on Energy performance of buildings increases the energy saving potential of smarter and emission-friendly buildings.

- Governance of the Energy Union improvement: New guidelines under which each Member State drafts its National Energy and Climate Plans (NECPs) for 2021-2030 setting out how to achieve their energy union national targets, particularly their 2030 renewable energy and efficiency targets.
- Empowerment of consumer rights: These new rules make it easier for individuals to produce, store or sell the energy they own and strengthen their consumer rights with increased transparency on energy bills and greater choice flexibility.
- A smarter and more efficient electricity market: The new legislative framework will increase the security of supply by assisting the integration of renewables into the electricity grid and manage risks, and by improving cross-border cooperation.

CEP legislature framework covers a vast amount of issues related to energy. To this end this research focuses only on the issues raised by Directive (EU) 2018/2001 which covers, among other matters, RES support schemes.

### 1.3.1 Renewable Energy Directive (EU) 2018/2001 (RED II)

The RED II has a purpose to promote energy from renewable sources by establishing a common European legislature framework. This recast Directive regulates RES-support in EU Member States between 2021 and 2030. It sets a binding target of at least 32% for the overall share of RES in the EU's gross final consumption of energy, a more ambitious target than the 27% ordinarily set by the European Council, this target is only binding at EU level,<sup>63</sup> meaning that the EU Member States will have to accomplish it collectively. Moreover, it lays down all relevant rules for financial support, regional cooperation between Member States or with third countries on guarantees of origin, self-consumption, on administrative procedures as

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<sup>62</sup> This is consistent with an upper limit of 1,273 Mtoe of EU primary energy consumption or 956 Mtoe of EU final energy consumption by 2030. Available online: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Energy\\_saving\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_saving_statistics)

<sup>63</sup> Moritz Bonn and Reichert Götz, "Renewable Energy in the EU: Status and outlook following the reform" (Centre for European Policy, Freiburg, 2019), [https://www.cep.eu/fileadmin/user\\_upload/cep.eu/Studien/cepInput\\_Erneuerbare\\_Energien\\_in\\_der\\_EU/cepInput\\_Renewable\\_Energy\\_in\\_the\\_EU.pdf](https://www.cep.eu/fileadmin/user_upload/cep.eu/Studien/cepInput_Erneuerbare_Energien_in_der_EU/cepInput_Renewable_Energy_in_the_EU.pdf), 4.



well as on training and information sharing. The RED II Directive shall be transposed to national legislation by 20 June 2021 by the Member States.

In the 2009/28/EC Directive, the Member States could apply support schemes as a measure to reach their bidding national RES targets for 2020, without specific specifications regarding their national design. This changed with EEAG when the European Commission introduced specific provisions regarding RES supports schemes. The RED II Directive takes over the EEAG legislative framework. The basic principles of support schemes to incentivize market integration of the RES and market-based mechanisms that were part of the EEAG now are incorporated into the new RED II framework. The Member States shall follow now specific rules when they design their national RES support schemes. Specifically, the financial support as direct price support must be provided in a form of a market premium. The RED II Directive puts a lot of emphasis on competitive tenders as a means to provide support to RES projects. In case that the state decides to provide support to RES projects through a competitive tender, that tender should be in principle technology neutral. Only under certain conditions, such as lack of competition that could lead to high support levels or the opposite, low realization rates where the competition is too high, tendering procedures can be technology-specific.<sup>64</sup> In that context, the Member States will be forced to implement tenders at least for some technologies while they will have to provide a solid justification why it might be possible for others. Any RES support should be granted by the Member States in an open, transparent, non-discriminatory, competitive and cost-effective manner. The Member States are also required to publish and establish non-discriminatory and transparent criteria to qualify for the tendering procedure and setting of clear dates and rules for the delivery of RES projects. The Directive, however, provides that small-scale installations may be exempted from the application of the market premium and the granting of support through a competitive tender. It does not stipulate any thresholds and makes room for the Member States to define small-scale installations. This definition is still subject to the restrictions of EEAG since Article 4 (9) refers explicitly to Articles 107 and 108 of the TFEU, though the thresholds that have been determined in 2014 are likely to be adapted with the revision of the EEAG in 2020, even before the deadline for the transposition of the RED II into the national legislation of the Member States. Still small-scale installations as well as demonstration projects can receive financial support through feed-in-tariffs and other alternatives to market premiums. The exemption from the participation in competitive tenders could indicate that the above-mentioned installations and projects could be granted financial support by following an administrative procedure.

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<sup>64</sup> The Member States must assess the long-term potential of a particular technology, the need to achieve diversification, grid integration costs, network constraints and grid stability and, in the case of biomass, the urgency to avoid distortions of raw material markets before limiting tendering procedures to specific technologies.

The RED II Directive also introduces the aspect of opening national support schemes to cross-border participation, for example in the context of financing the production of electricity from RES in a neighboring county. In this regard, the Member States may cooperate with other Members or third countries using various “cooperation mechanisms”. In this way, they can set off renewably sourced energy from other EU countries against their own national RES-development target (statistical transfers),<sup>65</sup> in return for a compensation payment. This is a major change compared to the RED 2009/28/EC Directive, that introduced a voluntary framework for setting up joint projects, including joint support schemes, between Member States or between Member States and other third countries. Article 5 of the RED II Directive sets the principles for cross-border RES supports schemes. Member States can decide to which extent they support electricity from renewable sources which is produced in another Member State. This opening of support schemes can be defined each year as an indicative share of newly supported capacity or of a budget. These indicative shares may, in each year, be amounted to at least 5% from 2023 to 2026 and at least 10% from 2027 to 2030 or even lower, depending on the level of the interconnectivity of the Member State concerned. The Directive encourages the Member States to hold pilot competitive tender procedures and where possible to open support to producers located in other Member States. In that case, the Member States should cooperate and agree on the principles of the participation of the producers, in the joint support-scheme tenders. These agreements must at least contain the details of allocation of the renewable electricity that is will be subject to cross-border support. Member States may also require proof that certifies the physical import of electricity from renewable sources. In such instance, the Member States could limit their RES support-schemes to producers located in Member States with whom there is a direct connection through electricity interconnectors. This doesn't mean that the Member States have the right to change or affect cross-zonal schedules and capacity allocations due to the producers participating in cross-border schemes. The cross-border electricity transfers shall be determined only by the outcome of capacity allocation which is subject to the Union law on the internal market in electricity. The European Commission may assist the relevant Member States, upon their request, in negotiating the agreement between them by providing information and a thorough analysis, which will include quantitative and qualitative data on the direct and indirect costs and benefits. In addition, the Commission could provide guidance and technical expertise as well as drawn templates for the cooperation agreements between the relevant Member States. The original proposal from the European Commission on the opening of national support for RES based electricity to producers located in other Member States mandated that this opening should be compulsory, after a political

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<sup>65</sup> Bonn and Reichert Götz, “Renewable Energy in the EU,” 5.

renegotiation process it was decided that it should be done in a voluntary basis.<sup>66</sup> However, Member States should seriously consider the option of opening their support schemes to cross-border participation as the Commission will be closely monitoring the implementation of this article and it may propose a mandatory partial opening of support-schemes at a later stage.

Article 6 of the Directive makes room for the creation of a predictable and stable investment environment that will have a positive impact on the financing costs for RES projects. The RED II introduces dedicated provisions that prevent Member States from retroactively revising the support level as well as the support conditions granted to RES projects. Specifically, the Member States have to ensure that the level of support and the conditions attached to it are not revised after being granted to RES projects in a way that it affects them in a negative way or undermines their economic viability. However, if foreseen in the original design of the scheme, the Member States may adjust the support level based on objective criteria. The States shall also publish a long-term schedule that will contain all the necessary details that concern the expected allocation of support and will cover at least the following five years and in the case of budgetary planning constraints, the following three years. Those schedules should include the indicative timing, the frequency of tendering procedures, the expected capacity and budget and the expected eligible technologies, if applicable. The schedules shall be updated on an annual basis and reflect recent market developments or the expected allocation of support. A regular assessment of the RES national support schemes, which will include their major effects on a variety of consumer groups and on investment, will be included in the relevant updates of the integrated national energy and climate plans and progress reports.

## 1.4 Transposition of the European legislation into national legislation of Greece

The Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources had to be transposed to national legislation by 5 December 2010 by the Member States. Greece failed to meet that deadline and transposed the Directive into national legislation with the law 4062/2012 in March 2012 and only after a Reasoned Opinion from the European Commission which called Greece, Poland and Finland to address this legal

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<sup>66</sup> Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast), Com(2016) 767 final/2, European Commission (23/02/2017), accessed January 27, 2020, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0767R%2801%29>.

obligation. If the Member States would fail to resolve this issue within two months, the Commission could refer them to the European Court of Justice.<sup>67</sup>

Greece put in major efforts to implement the EEAG even though compared to the Directive 2009/28/EC, their transposition into national law wasn't mandatory but it was important in order for the new RES support scheme to be approved by the European Commission and to be in line with the state aid rules provided in the Article 107 and 108 of the TFEU. Following the principles set in the Guidelines, Greece adopted law 4414/2016, which is the main legislative framework for RES support schemes until today. The law was also the basis for the transition from the Feed-in-Tariff to the Feed-in-Premium support scheme, for the settlement of competitive bidding processes and for the participation of the renewable energy generators into the wholesale electricity market.

The Renewable Energy Directive (EU) 2018/2001 will present some challenge in its transposition into the Greek national law. The provisions that concern the RES support schemes (Article 4) will not probably present a major challenge since Greece is already using competitive tenders to provide operating aid to RES projects, which are based on market mechanisms with the exception of small-scale installations. The opening of support schemes for electricity from renewable sources (Article 5) will also be easily transposed into national legislation, however as practice it will be particularly hard to be implemented and that is not because of regulatory limitations or technical restrictions in the electricity network but mainly due to political reasons. Greece will have to try to let its political differences aside with its neighbors in case that the European Commission will eventually propose a mandatory partial opening of the RES support schemes. The transposition of Article 6 about the Stability of financial support for RES will be demanding. Even though Greece has undertaken a vast number of reforms to improve its business environment, promote competition and simplify investment licensing and reduce excessive regulatory constraints, there is still much to be done since the business environment is still relatively unfavorable.<sup>68</sup> The prevention of retroactivity in the revision of the support level and the support conditions granted to RES projects will thus be challenging due to the general instability of the regulatory framework. Some other important provisions such as the organization and duration of the permit-granting process (Article 16), the renewable self-consumers (Article 21) and the renewable energy communities (Article 22) will be easier to be incorporated into national law since there were already some major steps

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<sup>67</sup> European Commission, "Renewable Energy: Finnish, Greek and Polish Legislation Still Not in Line with EU Rules," news release, March 22, 2012, accessed January 27, 2020, [https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip\\_12\\_278/IP\\_12\\_278\\_EN.pdf](https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_12_278/IP_12_278_EN.pdf).

<sup>68</sup> "Commission staff working document: Country Report Greece 2019 Including an In-Depth Review on the prevention and correction of macroeconomic imbalances" (European Commission, Brussels, 2019), [https://ec.europa.eu/info/sites/info/files/file\\_import/2019-european-semester-country-report-greece\\_en.pdf](https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-greece_en.pdf).

taken for their implementation. In particular, Greece adopted law 4513/2018 that set the basis for the development of Energy Communities, in this law there are specific provisions that grant exemptions from competitive tendering procedures and financial incentives concerning RECs. Renewable self-consumers are also regulated by the Greek legislation since 2013,<sup>69</sup> however their status differs in a legal way compared to other EU Member States because the Greek legislation defines those producers as “Self-Producers” (Αυτοπαραγωγοί) and not as self-consumers. Maybe it seems as a small legal technicality, but it will most probably create a setback in the convergence of EU legislation between the Member States. Furthermore, there is an ongoing attempt from RAE as well as the Ministry of Environment and Energy to simplify the RES permit granting process. Specifically, RAE held a public consultation in September 2019 and made its proposals publicly known in order to greatly simplify the process of obtaining a production license, in line with the current EU legislation framework.<sup>70</sup> Although it is a positive move, the stakeholders consider that RAE’s proposals have issues that still needed some improvement, such as the limited possibility of modifications to the production license and the deposition of the “Letter of Guarantee” in such an early stage.<sup>71</sup> In general, Greece is compliant with a lot of provisions set in the recast Renewable Energy Directive but still there is still room for improvement, convergence and successful transposition of the new EU legislative framework into the national law.

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<sup>69</sup> Ρυθμίσεις θεμάτων Ανανεώσιμων Πηγών Ενέργειας και άλλες διατάξεις [Regulatory Adjustments of Renewable Energy Sources], Φεκ α’ 4203/2013, Hellenic Parliament 3883 (01/11/2013).

<sup>70</sup> Regulatory Authority for Energy, “Public Consultation of Regulatory Authority for Energy on the Text of the Basic Principles on the Simplification of the Process of Issuing RES Licenses,” news release, September 19, 2019, accessed January 27, 2020, [http://www.rae.gr/site/categories\\_new/about\\_rae/factsheets/2019/gen/1909\\_7.csp](http://www.rae.gr/site/categories_new/about_rae/factsheets/2019/gen/1909_7.csp).

<sup>71</sup> Χρήστος Στεφάνου, “Απλοποίηση Αδειοδότησης ΑΠΕ: Ικανοποίηση Των Παραγωγών Από Τις Προτάσεις Της ΡΑΕ - Τι Παραπάνω Ζητούν [Simplification of the RES Licensing Procedure: Producers Are Satisfied with RAE’s Proposals - What Are Their Extra Demands],” *Energypress*, September 24, 2019, accessed January 27, 2020, <https://energypress.gr/news/aplopoiisi-adeiodotisis-ape-ikanopoiisi-ton-paragogen-apo-tis-protaseis-tis-rae-ti-parapano>.

## Chapter 2: The current support regime of RES in the Greek energy market (Law 4414/2016)

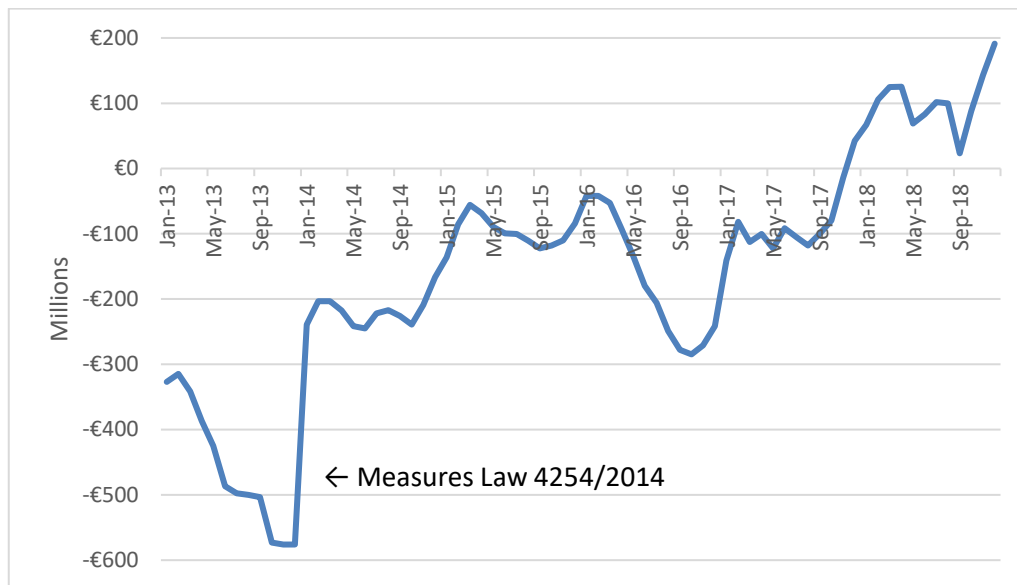
### 2.1 The scope and the aim of the Law 4414/2016

The current support regime of renewable energy by providing operating aid in a form of sliding Feed-in-Premium (sFiP) is part of a broader legislative framework of the common EU energy policy in an attempt to limit climate change and achieve the EU objective of 20% of RES participation in the final gross energy consumption by 2020.<sup>72</sup> The legal framework, introduced in 2016, allows for the development and implementation of the current RES support scheme in Greece and permits a stable transition from the old renewable energy support scheme of feed-in-tariffs to the new regime of feed-in-premiums and public competitive tenders. It also complies with the “Guidelines on State aid for environmental protection and energy 2014-2020” Communication from the European Commission. Its aim is to ensure the gradual integration and participation of RES and CHP power plants in the electricity market in the most cost-effective way for the society as well as the utilization of the Greek renewable power generation potential in order to protect the environment, the diversification of the energy mix, the improvement of the security of energy supply and the strengthening and development of the Greek economy. Furthermore, this legislation supports the operational status of CHP power plants in order to improve the energy efficiency and primary energy savings. The operating aid received by RES or CHP power plants is financed through a RES Special Account.

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<sup>72</sup> This objective was set in the Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

Figure 1 Renewable Energy Sources Special Account Progress (in millions of €)



Source: RAE National Report 2019

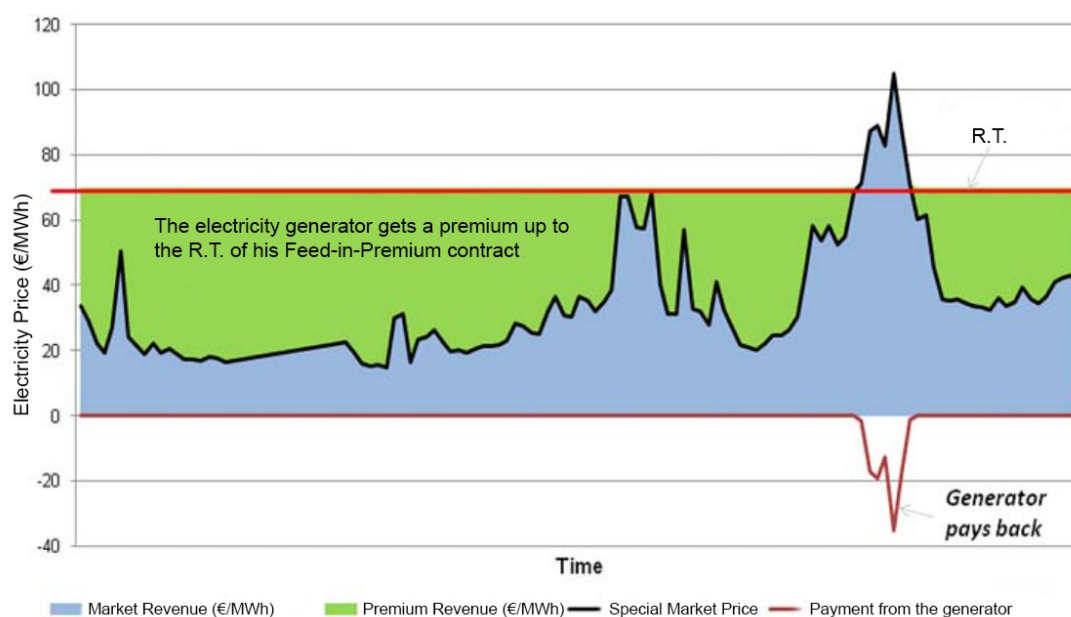
Starting from the 1<sup>st</sup> January of 2016, the power plants that start operating (either commissioning or commercial operation) and producing electricity from RES and CHP technologies in the interconnected system shall be included, under specific conditions, in a support scheme in the form of “Operating aid” on the basis of a sliding feed-in-premium (sFiP) for the energy that they produce and inject into the system. The sFiP is expressed in monetary value per unit of electricity injected into the interconnected system, while the pricing and the transactions that govern it, are settled on a monthly basis. In other words, the new regime is based in the development of a new mechanism that will provide operating aid<sup>73</sup> in a form of premium on the price of the electricity, as it is formed in the wholesale electricity market. This premium will be granted for a period of validity of the support of the RES and CHP power plants. The duration of the support is 20 years for RES and CHP plants and 25 years for solar-thermal renewable energy projects.<sup>74</sup>

<sup>73</sup> The CHP and RES power stations that have signed Differential State Aid Support contracts and are either registered in the Registry of Market Participants or represented by their aggregators in the day-ahead electricity schedule, may not receive operating Aid for the hours when the SMP, during the dispatch period, received a zero value for more than two consecutive distribution hours.

<sup>74</sup> Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], Φεκ α' 149/2016, Hellenic Parliament at 8276 (09/08/2016).

The calculation of the premium is done in a monthly basis in euro per MWh. It is calculated as the difference between the Special Market Price (SpMP) of the specific RES or CHP technology and the Reference Tariff (R.T.) that is part of the Contract for Differential State Aid Support of the produced electricity by RES or CHP power plants.<sup>75</sup>

Figure 2 The current support scheme in a snapshot



Source: RAE National Report 2019

## 2.2 Calculation of the Special Market Price (SpMP)

The methodology for the calculation of the SpMP differentiates between controlled (non-intermittent RES) and uncontrolled (intermittent RES) electricity generation of the RES power plants.

The SpMP for the RES power plants of uncontrolled generation is calculated per technology,<sup>76</sup> taking into account the hourly sum of the injected electricity in the interconnected system by the RES power plants of that specific technology during a specific dispatch period by the participation of those plants in the energy market. The

<sup>75</sup> The R.T. is either set by the participation of the power plant in RES competitive tenders or by using the tariffs available in **Table 4**.

<sup>76</sup> Currently the RES technologies of uncontrolled generation for which the SpMPs are calculated are: Wind farms, PVs, hydro, biomass and CHP. Those prices are available at DAPEEP (former Lagie) website and are updated in a monthly basis.



amount of the hourly injected electricity per RES technology of uncontrolled production is the result of the hourly injected electricity of all the power generating facilities of that technology for the monthly period that the SpMP is calculated.<sup>77</sup> The responsible parties for the measurement or the estimation, in case of a technical impossibility, are IPTO SA for high and medium voltage power plants and HEDNO SA for low voltage power plants. The data shall be transmitted to DAPEEP SA. The injected energy, which is originated from power plants that are connected to the low voltage grid, but which do not have certified analytical metric data for the specific dispatch period, is excluded in the calculation of the Special Market Price until that data become available. Moreover, in case there is a disability in the measurement of the injected energy into the interconnected network from any low voltage RES or CHP installation by HEDNO SA or IPTO SA, then that energy is not taken into account to calculate the SpMP. The same stands for the disability to measure injected energy by the power plants that are being operated by prosumers.

The Special Market Price is calculated on a monthly basis using the following formulas:

$$SpMP_{\substack{RES\ installations \\ (uncontrolled\ production)}} = \frac{\sum_{h=1}^n HVEW_h \times Q_{injected\ electricity, RES\ technology, h}}{\sum_{h=1}^n Q_{injected\ electricity, RES\ technology, h}}$$

Where:

$HVEW_h$ : The hourly value of electricity in the wholesale electricity market in €/MWh. It is equal to the hourly System Marginal Price ( $SMP_h$ ).<sup>78</sup>

$Q_{injected\ electricity, RES\ technology, h}$ : The total injected electricity onto the interconnected system by RES power plants' technology of uncontrolled electricity generation which was cleared by participating in the Electricity Market for the hourly dispatch period as it is determined and calculated in accordance with the Power Exchange Code for Electricity.

$n$ : The number of monthly hours, during which there was participation of the particular RES technology in the Day-Ahead electricity Schedule (DAS).

$h$ : The dispatch period during which the injection of electricity onto the interconnected system by the power plants of each RES technology was metered.

<sup>77</sup> Τροποποίηση της υπουργικής απόφασης με Α.Π. ΑΠΕΗΛ/Α/ΦΙ/οικ. 187480/7.12.2016 «Μεθοδολογία υπολογισμού της Ειδικής Τιμής Αγοράς τεχνολογιών Ανανεώσιμων Πηγών Ενέργειας και Συμπαράγωγής Ηλεκτρισμού [Amendment of the ministerial decision Α.Π. ΑΠΕΗΛ/Α/ΦΙ/οικ. 187480/7.12.2016 "Methodology for the calculation of the Special Market Price of RES and CHP technologies"], Για υπεν/δαπεεκ/48144/1581/2019 - φεκ β' 2076/2019, Ministry of Environment and Energy (28/05/2019), <https://diavgeia.gov.gr/doc/%CE%A9%CE%A42%CE%9F4653%CE%A08-97%CE%A1?inline=true>.

<sup>78</sup>  $HVEW_{RES\ Technology, h} = SMP_h$

where  $SMP_h$  is the hourly System Marginal Price. For more details see "[ΦΕΚ Β' 2076/2019](#)".

As far as the RES and CHP power plants of controlled electricity production are concerned, the Special Market Price is calculated on the basis of the monthly average System Marginal Price; same as the previous case of the uncontrolled generation power plants.

More specifically, the Special Market Price for RES and CHP power plants of controlled production is calculated using the following formula:

$$SpMP_{RES \text{ and } CHP \text{ installations}}^{(controlled \text{ production})} = \frac{\sum_{h=1}^n HVEW_h \times Q_{system \text{ load},h}}{\sum_{h=1}^n Q_{system \text{ load},h}}$$

Where:

$Q_{system \text{ load},h}$ : The system load that is being cleared in the electricity market for every hourly dispatch period, according to Power Exchange Code for Electricity.

n: The sum of the hourly dispatch periods, in a monthly time period, during which DAS is cleared.

h: The hourly dispatch period during which the injection of electricity onto the interconnected system by the power plants of each RES technology was metered.

## 2.3 Determination of the Reference Tariff (R.T.)

The Reference Tariffs that are being used to compensate RES and CHP power generating installations that hold differential state-aid contracts, on the basis of Feed-in-Premium, are either a result of the competitive tenders and are unique for each power station based on its successful bid, or are determined per category / technology used by those power plants that are exempted or are not obligated to participate in competitive tender procedures. **Table 4** presents the current Reference Tariffs per category of the RES and CHP power plants that produce electricity that are either exempted or not obligated from participating in competitive tenders:

**Table 4 Reference Tariffs (R.T.) for the calculation of amount of compensation of the RES and CHP power generating installations that hold Differential State Aid Support Contracts (non-participation in competitive tenders)**

	<b>Installation Category</b>	<b>R.T. (€/Mwh)</b>
<b>1a</b>	Wind energy that is produced by onshore power plants with installed capacity of 3 MW or more	98 / <b>70</b> <sup>79</sup>
<b>1b</b>	Wind energy that is produced by onshore power plants with installed capacity bigger than 60kW and less or equal of 3MW	98 / <b>79</b> <sup>79</sup>
<b>1c</b>	Wind energy that is produced by onshore power plants that fall under a special category and are included in the Table 3 of the decision 904/2011 as it is modified by decisions 155/2012 and 452/2015 of RAE	98 / <b>65</b> <sup>79</sup>
<b>2</b>	Wind energy that is produced by onshore power plants of installed capacity of 60 kW or more, up to 6 MW that are part of Energy Communities <sup>80</sup>	98 / <b>82</b> <sup>79</sup>
<b>3</b>	Hydro energy that is produced by small hydroelectric power plants of installed capacity of ≤3 MW <sub>e</sub>	100
<b>4</b>	Hydro energy that is produced by small hydroelectric power plants of installed capacity of 3 MW, up to 15 MW <sub>e</sub>	97
<b>5</b>	Biomass (or bioliquids) that is used to produce electricity through thermal conversion (combustion, pyrolysis) without using biomass gasification process by power plants of installed capacity of ≤ 1MW (with the exception of biodegradable fraction of municipal waste)	184
<b>6</b>	Biomass (or bioliquids) that is used to produce electricity by using biomass gasification process by power plants of installed capacity of ≤ 1MW (with the exception of biodegradable fraction of municipal waste)	193
<b>7</b>	Biomass (or bioliquids) that is used to produce electricity by using thermal conversion (combustion, pyrolysis and gasification) by power plants of installed capacity of 1 MW up to ≤5 MW (with the exception of biodegradable fraction of municipal waste)	162
<b>8</b>	Biomass (or bioliquids) that is used to produce electricity by using thermal conversion (combustion, pyrolysis and gasification) by power plants of installed capacity >5 MW (with the exception of biodegradable fraction of municipal waste)	140
<b>9</b>	Gases originating from landfills and sewage treatment plants and biogas that is captured from the anaerobic digestion of biodegradable fraction of wastes and the organic matter of biological treatment that are being utilized to produce electricity by power plants of installed capacity of ≤2 MW <sup>81</sup>	129

<sup>79</sup> The reference tariff **in Bold** for categories 1 and 2 will be valid starting from the 1st of January 2021 except for a) Wind farm complexes with installed capacity >150 MW, b) RES projects that are connected to the national interconnected system by a special submarine cable or other connection project whose construction requires a period exceeding the lifetime of that project's installation license c) Hybrid RES projects and solar-thermal power plants with installed capacity of ≥10 MW d) Large hydroelectric projects in which case this reference tariff will be valid starting from 1<sup>st</sup> of January 2022.

<sup>80</sup> The status of the Energy Communities is regulated by law 4513/2018.

<sup>81</sup> Those power plants may not receive operating Aid if their installed capacity exceeds 70MW

10	Gases originating from landfills and sewage treatment plants and biogas that is captured from the anaerobic digestion of biodegradable fraction of wastes and the organic matter of biological treatment that are utilized to produce electricity by power plants of installed capacity >2 MW <sup>81</sup>	106
11	Biogas that is captured from the anaerobic digestion of biomass and is utilized to produce electricity by power plants of installed capacity of ≤3 MW	225
12	Biogas that is captured from the anaerobic digestion of biomass and is utilized to produce electricity by power plants of installed capacity of > 3MW	204
13	Solar energy used to produce electricity by solar thermal power plants without a storage system <sup>82</sup>	257
14	Solar energy used to produce electricity by solar thermal power plants with a storage system that ensures at least 2 hours of operation at nominal load <sup>82</sup>	278
15	Geothermal energy that is used to produce electricity by power plants of installed capacity ≤ 5MW <sub>e</sub>	139
16	Geothermal energy that is used to produce electricity by power plants of installed capacity > 5MW <sub>e</sub>	108
17	Other RES power plants (including the power stations that produce electricity by biodegradable fraction of municipal waste that are not included in any of the categories of this table but comply with the standards of EU legislation)	90
18	CHP that utilizes natural gas of capacity of ≤ 1MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	88 + P.A.
19	CHP that utilizes natural gas of capacity of ≤ 1MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	92 + P.A.
20	CHP that utilizes natural gas of capacity of >1 MW and ≤5 MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	80 + P.A.
21	CHP that utilizes natural gas of capacity of >1 MW and ≤5 MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	84 + P.A.
22	CHP that utilizes natural gas of capacity of > 5MW and ≤10 MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	74 + P.A.
23	CHP that utilizes natural gas of capacity of >5 MW and ≤10 MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	78 + P.A.

<sup>82</sup> Biomass supported solar thermal hybrid power plants (STHPP) are compensated using the reference tariffs of the corresponding category of power stations that use bioliquids mentioned in this table.

<sup>83</sup> The corresponding technologies include: a) Backpressure steam turbine, b) Gas turbine with heat recovery steam generator, c) Reciprocating internal combustion engine, d) Micro-turbine, e) Stirling engine, f) Fuel cell, g) Steam engine, h) Rankine organic cycle, i) Any other type of technology or combination of that falls under the definition of cogeneration.

<b>24</b>	CHP that utilizes natural gas of capacity of >10 MW and ≤35 MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	68 + P.A.
<b>25</b>	CHP that utilizes natural gas of capacity of >10 MW and ≤35 MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	72 + P.A.
<b>26</b>	CHP that utilizes natural gas of capacity of >35 MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	61 + P.A.
<b>27</b>	CHP that utilizes natural gas of capacity of >35MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	65 + P.A.
<b>28</b>	Other CHP	85
<b>29</b>	Solar energy that is utilized by photovoltaic power stations with installed capacity <500kW	Weighted R.T. that is determined by the previous three before the last, competitive bidding procedures for the same technology increased by 5% <sup>84</sup>
<b>30</b>	Solar energy that is utilized by photovoltaic power stations that belong to Energy Communities with installed capacity of ≤1MW or to farmers with installed capacity of <500kW	Weighted R.T. that is determined by the previous three before the last, competitive bidding procedures for that technology, or if there weren't any procedures for that technology yet, for the same technology

<sup>84</sup> This reference tariff will be valid from 1.1.2020 and it is set at 70.30€/MWh for the stations that will become operational until the first competitive auction of 2020.

	increased by 10%
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Sources: Laws [4414/2016](#) & [4602/2019](#) and Ministerial Decisions [ΥΠΕΝ/ΔΑΠΕΕΚ/50234/1658](#),  
[ΥΠΕΝ/ΔΑΠΕΕΚ/25511/882](#) & [ΥΠΕΝ/ΔΑΠΕΕΚ/123422/4289](#)

## 2.4 Important clarifications and extra information on the Table 4: Reference Tariffs (R.T.) for the calculation of amount of compensation of the RES and CHP power generating installations that hold Differential State Aid Support Contracts

### 2.4.1 CHP power plants

For CHP power plants, the reference tariffs are formulated using a methodology that includes a fixed segment<sup>85</sup> per CHP project class and a price mark-up (P.A.), which is calculated based on the plant's standard performance ratings and the current market price of natural gas.<sup>86</sup> The P.A. covers the changes in the cost of gas so that the economic performance of the installations remains unchanged and it is calculated using the formula:

$$PA = (APG_t - 26) \times \frac{(1 - (n - n_e) / n_{th})}{n_e}$$

Where:

$n_e$ : The electrical efficiency of a cogeneration unit. The value of  $n_e$  is given by the formula  $n_e = \frac{E_c}{F_c}$  where  $E_c$  is the electricity produced and  $F_c$  is the sum of fuel energy that was consumed by the CHP plant to produce electricity.<sup>87</sup>

<sup>85</sup> The fixed segment is available in Table 4, categories 18 - 28.

<sup>86</sup> *Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαραγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8282–83.*

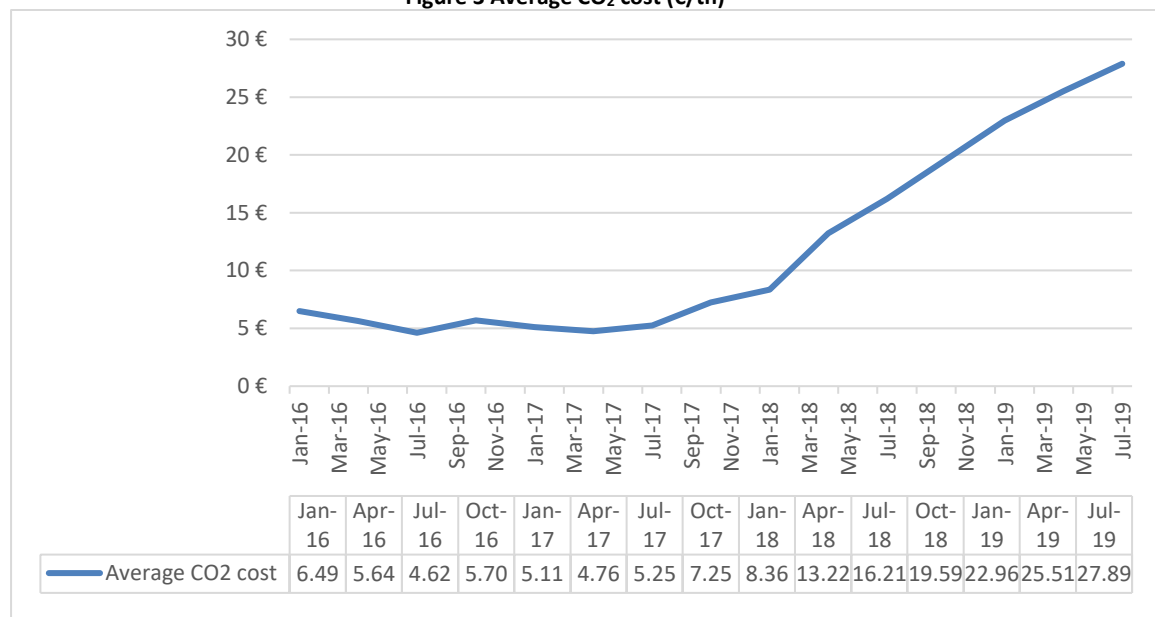
<sup>87</sup> Τροποποίηση και συμπλήρωση της απόφασης του Υπουργού Ανάπτυξης Δ5-ΗΛ/Γ/Φ1/οικ.15641 (ΦΕΚ Β' 1420/15.7.2009) περί καθορισμού των λεπτομερειών της μεθόδου υπολογισμού της ηλεκτρικής ενέργειας από συμπαραγωγή και της αποδοτικότητας συμπαραγωγής και ρύθμιση θεμάτων σχετικών με την αδειοδότηση των Μονάδων παραγωγής Ηλεκτρικής Ενέργειας από Συμπαραγωγή και Συμπαραγωγή Υψηλής Αποδοτικότητας και τη συμμετοχή τους στην Αγορά Ηλεκτρικής Ενέργειας και το Σύστημα Εγγυημένων Τιμών ΑΠΕ και ΣΗΘΥΑ καθώς και την αποζημίωση

$n_{th}$ : The thermal efficiency of a cogeneration unit (in Gross Calorific Value). The value of  $n_{th}$  is given by the formula  $n_{th} = \frac{H_{chp}}{E_c}$  where  $H_{chp}$  is the useful thermal energy produced by the CHP plant and  $E_c$  is the electricity produced.<sup>88</sup>

$n$ : The total efficiency of a cogeneration unit where  $n = n_e + n_{th}$ .

APG<sub>t</sub>: The average monthly gross unit price of natural gas (that is either APG<sub>n</sub> or APG<sub>p</sub>, see below) in €/MWh of Gross Calorific Value which includes the sell price that takes into account the transportation cost, the special consumption tax and the average CO<sub>2</sub> cost<sup>89</sup> corresponding to electricity production and any taxes or charges, excluding VAT, that apply per category (APG<sub>n</sub> or APG<sub>p</sub>).<sup>90</sup>

Figure 3 Average CO<sub>2</sub> cost (€/tn)



Source: DAPEEP (2019)

αυτών. [Amending and supplementing the decision of the Minister of Development Δ5 – ΕΛ / Γ / Φ1 / οικ.15641 (Government Gazette B 1420 / 15.7.2009) laying down the details of the calculation methodology of electricity from cogeneration and regulating issues related to the licensing of High Efficiency cogeneration Units and their participation in the Electricity Market and the RES and CHP Guaranteed Price System and their compensation.], Υα δ5-ηλ/γ/φ1/749/21.3.2012 φεκ β' 889/2012, Ministry of Environment and Energy (22/03/2012).

<sup>88</sup> Ibidem

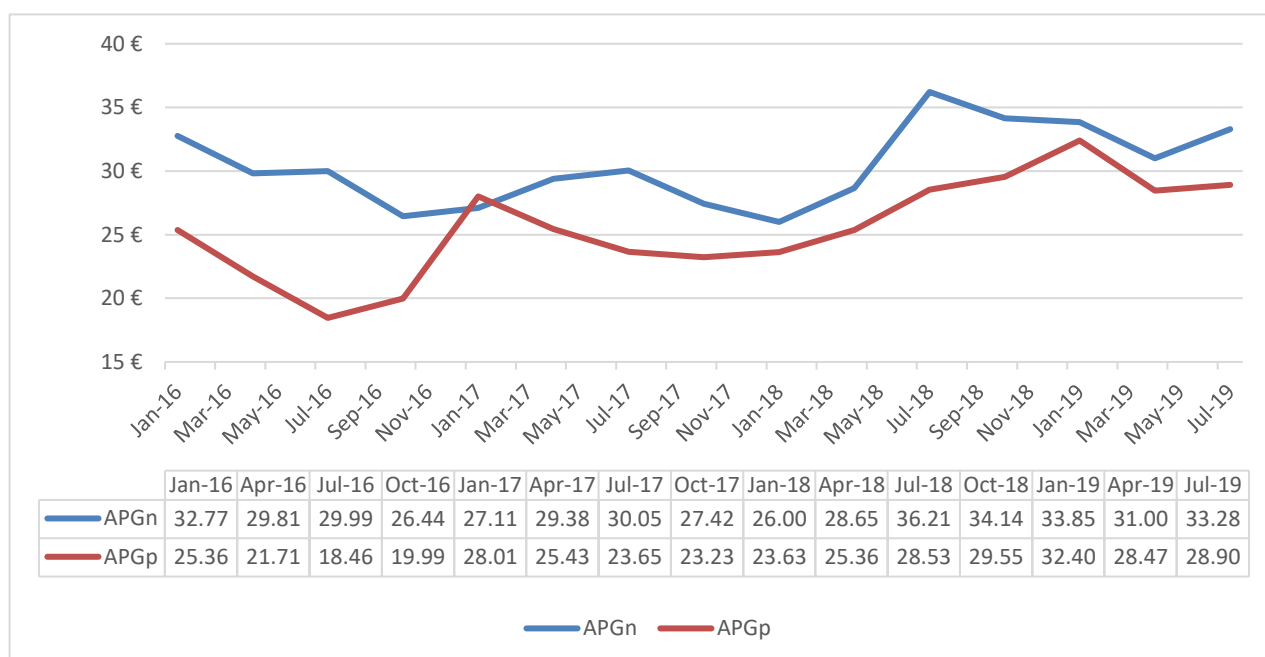
<sup>89</sup> Average CO<sub>2</sub> cost (€/MWh) = 0.37 \* Average price of CO<sub>2</sub> rights (€/tn) \*  $n_e$ . The average CO<sub>2</sub> cost is calculated by the Ministry of Environment and Energy, Directorate of Climate Change and Atmosphere Quality and is reported, in a monthly basis, to DAPEEP S.A.. The data for the calculation of Average price of CO<sub>2</sub> rights is taken from Energy Exchange (EEX).

<sup>90</sup> RAE (after an opinion issued by DAPEEP SA) is responsible to determine if the CHP plant is a client that use natural gas to produce electricity or not.

APG<sub>n</sub>: The average monthly unit price of natural gas for cogeneration in €/MWh of Gross Calorific Value that is being charged to the CHP power plants in Greece, with the exception of the clients that use the natural gas to produce electricity.<sup>91</sup>

APG<sub>p</sub>: The average monthly unit price of natural gas for cogeneration in €/MWh of Gross Calorific Value (GCV) that is being charged to CHP power plants in Greece that use the natural gas to produce electricity.<sup>91</sup>

Figure 4 Average monthly unit price of natural gas for cogeneration (€/MWh)



Source: DAPEEP (2019)

In the bellow table, we provide some of the electrical, thermal and total efficiencies of cogeneration categories:

Table 5 Indicative efficiencies (total, electrical and thermal) for various CHP technologies / categories

Installation category	Efficiencies
<b>1</b> CHP that utilizes natural gas of capacity of $\leq 1$ MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=72%, n <sub>e</sub> =33%, n <sub>th</sub> =81%
<b>2</b> CHP that utilizes natural gas of capacity of $\leq 1$ MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=67%, n <sub>e</sub> =33%, n <sub>th</sub> =81%
<b>3</b> CHP that utilizes natural gas of capacity of $> 1$ MW and $\leq 5$ MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=72%, n <sub>e</sub> =35%, n <sub>th</sub> =81%
<b>4</b> CHP that utilizes natural gas of capacity of $> 1$ MW and $\leq 5$ MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=67%, n <sub>e</sub> =35%, n <sub>th</sub> =81%

<sup>91</sup> This price is set by the Ministry of Environment and Energy, Directorate of Hydrocarbons and is reported, in a monthly basis, to DAPEEP S.A.



5	CHP that utilizes natural gas of capacity of >5MW and ≤10MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=72%, n <sub>e</sub> =35%, n <sub>th</sub> =81%
6	CHP that utilizes natural gas of capacity of >5MW and ≤10MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=67%, n <sub>e</sub> =35%, n <sub>th</sub> =81%
7	CHP that utilizes natural gas of capacity of >10MW and ≤35MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=72%, n <sub>e</sub> =35%, n <sub>th</sub> =81%
8	CHP that utilizes natural gas of capacity of >10MW and ≤35MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=67%, n <sub>e</sub> =35%, n <sub>th</sub> =81%
9	CHP that utilizes natural gas of capacity of >35MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=72%, n <sub>e</sub> =35%, n <sub>th</sub> =81%
10	CHP that utilizes natural gas of capacity of >35MW for plants that do not use <sup>83</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	n=67%, n <sub>e</sub> =35%, n <sub>th</sub> =81%

Source: Law 4414/2016

In case that the produced thermal energy by a CHP is used for the production of agricultural products which is the main activity of the producer, or it is injected into the city’s heating pipeline network, the fixed segment of the reference tariff, that is mentioned in the **Table 4** for CHP power plants, is increased by 15%.<sup>92</sup> In case that the CHP uses its exhaust gas for agricultural purposes, then the fixed reference tariff segment is increased by 20% and that increase is calculated in addition to any increase that may have occurred by the previous case.<sup>93</sup> RAE is responsible to detect the existence of any of the above-mentioned cases.

#### 2.4.2 Other information

Any information of the **Table 4** shall be amended by a decision (and an opinion by RAE) of the Minister of Environment and Energy which is issued within the first quarter of each calendar year and it comes into effect for the power stations that become operational, either commissioning or commercial operation), at the first day of the second following calendar year that the decision was issued. By exception, the

<sup>92</sup> Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8285.

<sup>93</sup> Ibidem

decision comes into effect for the solar power stations that become operational at the first day and after of the following calendar year that it was issued.

By exception, the decision comes into effect for the power plants that become operational, either commissioning or commercial operation), the first day of the third following year that it was issued, for: a) Wind farm complexes with installed capacity >150 MW, b) RES projects that are connected to the national interconnected system by a special submarine cable or other connection project whose construction requires a period exceeding the lifetime of that project's installation license c) Hybrid RES projects and solar-thermal power plants with installed capacity of  $\geq 10$  MW d) Large hydroelectric projects.<sup>94</sup>

The reference tariff for solar power plants with installed capacity less than 500 kW that become operational, either commissioning or commercial operation, between 1 January 2016 and 31 December 2019, are calculated using the formulas provided in **Table 6**.

**Table 6 Formulas for the calculation of the reference tariff for solar power generation units of less than 500 kW<sup>95</sup>**

Interconnected System	NNI	Interconnected System	NNI
>100kW	>100kW	$\leq 100$	$\leq 100$ kW
$1.1 \times aSMP_{n-1}$	$1.1 \times aSMP_{n-1}$	$1.2 \times aSMP_{n-1}$	$1.1 \times aSMP_{n-1}$

Where  $aSMP$  is the average system marginal price of the previous year  $n-1$ .<sup>96</sup>

Source: Υ.Α.Π.Ε./Φ1/1288/9011/30.04.2013

## 2.5 Participation of the power stations that have signed a Differential State Aid Support contract (Feed-in Premium) in the Greek Electricity Market

<sup>94</sup> Παραγωγή Ηλεκτρικής Ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης και λοιπές διατάξεις. [Electricity Generation from Renewable Energy Sources and Electricity and High Efficiency Combined Heat and Power Cogeneration and other provisions.], Φεκ α' 129/2006, Hellenic Parliament 1411 (27/06/2006).

<sup>95</sup> Note that it is usually more beneficial for PVs to participate in competitive tender procedures. For instance, a PV of installed capacity up to 100kW that became operational in 2018, was receiving operating aid under the reference tariff of 65.6€/MWh under the ministerial decision ΥΑΠΕ/Φ1/1288/9011/30.4.2013 ΦΕΚ Β 1103 (**Table 6**). On the other hand, the average weighted reference tariff that was the result of the July 2018 competitive tender process for the same category of PV stations (up to 100kW) was 78.42€/MWh, 19.54% higher than the reference tariff calculated using the methodology of **Table 6**.

<sup>96</sup> Τροποποίηση της υπ' αριθμ. Υ.Α.Π.Ε./Φ1/οικ.2262/ 31.01.2012 (Β' 97/31.01.2012) απόφασης του Υπουργού Περιβάλλοντος Ενέργειας και Κλιματικής Αλλαγής με θέμα «Τιμολόγηση ηλεκτρικής ενέργειας που παράγεται από φωτοβολταϊκούς σταθμούς» [Amendment of the Ministry of Environment and Climate Change Decision No. 1 / Φ1 / οικ.2262 / 31.01.2012 (B 97 / 31.01.2012) on "Electricity Generated by photovoltaic stations Pricing"], Υ.Α.Π.Ε./φ1/1288/9011/30.4.2013 φεκ β' 1103/2013, Ministry of Environment and Energy 18267 (02/05/2013).

Power stations after signing Differential State Aid Support contracts, apply to the Register of Market Participants that is kept by the Market Operator. In order to register, the power stations are asked to submit their applications to the Market Operator and to the Transmission System Operator and sign a Day-ahead Scheduling (DAS) Transactions Contract and a Power Transmission Operator Transactions Contract.<sup>97</sup> The contracts they sign are in accordance with the Power Exchange Code for Electricity, the System Operation Code as well as any provisions that are implemented in accordance with the European Target Model for the internal energy market. The power stations that have signed Feed-in Premium contracts have the ability to participate in the Transaction System of Day-ahead Scheduling (DAS) through aggregators with whom they sign a Representation Agreement and whom they report to the Market Operator and the TSO through a Representation Declaration. Upon the acceptance of the Representation Declaration, the rights and obligations<sup>98</sup> of the RES and CHP power stations, concerning their participation in DAS and the settlement of their transactions, are transferred to their aggregators. In case that a power station, which holds a Differential State Aid Support Contract and is registered in the Market Participants Registry of the Market operator choose to be represented by an aggregator, then its DAS Transactions Contract and its Power Transmission Operator Transactions Contract are terminated automatically when its contract with the aggregator comes into effect, at the same time the power station is deleted from the Registry of the Market Participants.

The aggregators are registered in the Register of Market Participants which is kept by the Market Operator. The process of the registration of the aggregators and the required documents are regulated by the Power Exchange Code for Electricity, the System Operation Code as well as any provisions that are implemented in accordance with the European Target Model for the internal energy market.

The CHP and RES power stations that have signed a Differential State Aid Support contract must be registered in the Register of Market Participants or have signed a Representation Agreement with aggregators which has to be reported to the Market Operator, the Hellenic Energy Exchange and the Transmission System Operator through a Representation Declaration in order for them to receive operating aid through their feed-in premium contracts.

In the occurrence that the RES and CHP power plants are unable to receive the requested services from any aggregator, then they may apply to the aggregator of the

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<sup>97</sup> *Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8286–88.*

<sup>98</sup> The two main obligations that the aggregators are called to assume are: the balancing responsibility and the responsibility to predict the produced and injected load into the system during the day-ahead schedule

last resort.<sup>99</sup> The charge imposed by the aggregator of the last resort to the RES and CHP power plants that use its services, depends on the nominal revenue from the equivalent participation of the power plant in the electricity market, this charge increases over the period of time so as the power stations will ultimately resort to normal aggregators. This is common practice in Europe where this model is applied since the goal for the aggregator of last resort is to act as the ultimum refugium for the power plants. The responsibilities of the RES and CHP power plants that are represented by the aggregator of the last resort are:

- To comply with the Power Exchange Code for Electricity, the Grid Control Code for Electricity and DAPEEP code
- To fulfill any payment obligations in time towards the Transmission System Operator and the Hellenic Energy Exchange

The aggregator of the last resort is obligated to represent the RES and CHP power plants in the DAS for each dispatch period, in line with the relevant energy codes until the European Energy Target Model becomes operational. When the Target Model becomes operational, the aggregator of the last resort will represent the RES and CHP power plants in the DAS, the intra-day market and the balancing market. The aggregator of the last resort is also responsible to calculate and to transfer the income amount for the participation of the RES and CHP power plants in the energy markets to the owner of those plants. The final obligation of the aggregator of the last resort is to calculate and charge the amount for his contracting services.

The power plants that have concluded Differential State Aid Support Contracts may participate in the market by themselves or by using aggregators without receiving operating aid. If four years elapse since the commissioning operation of the power plant and it is still choosing not to receive operating Aid, then its Differential State Aid Support Contract is annulled.<sup>100</sup>

## 2.6 Balancing Responsibility of the power stations that have signed Differential State Aid Support contracts

Until European Target-Model for electricity enters into force, the CHP and RES power plants which are either registered in the Register of Market Participants or are represented by aggregators are subject to discretionary obligations under the imbalance settlement procedure between production and demand on the basis of

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<sup>99</sup> Ministerial decision [ΥΠΕΝ/ΔΑΠΕΕΚ/25512/883/20.03.2019 ΦΕΚ Β 1020](#), appointed DAPEEP SA as the Aggregator of the last resort in Greece until 31.12.2022.

<sup>100</sup> Απελευθέρωση αγοράς ενέργειας, εκσυγχρονισμός της ΔΕΗ, ιδιωτικοποίηση της ΔΕΠΑ και στήριξη των Α.Π.Ε. και λοιπές διατάξεις. [Energy market liberalization, PPC modernization, DEPA privatization and RES support and other provisions.], Φεκ α' 193/2019, Hellenic Parliament at 5077 (03/12/2019).

monthly electricity settlement cycle. Those power plants have balancing obligations, under the general framework of applying European Union's electricity market Target-Model.<sup>101</sup> These obligations begin with the development and operation of the intra-day electricity market in which those stations have to participate either by themselves or by their aggregators. Furthermore, until the Target-Model becomes operational, the power stations that are registered in the Register of Market Participants or are represented by aggregators are subject to the obligation to forecast accurately the load that they are going to declare at day-ahead electricity schedule and inject into the interconnected system the next day, at the context of the Transitory Mechanism for the Optimal Forecasting Accuracy. The operation of the previous mechanism is evaluated by IPTO SA on a yearly basis.

With the implementation of the Target-Model and the operation of the balancing market, which is expected within 2020, the Transitory Mechanism for the Optimal Forecasting Accuracy will be replaced with a new mechanism<sup>102</sup> where the RES power plants will have the same (full) balancing responsibilities with the conventional power plants and will be subject to higher penalties for any imbalances they cause in the electricity network.<sup>103</sup> This change will further strengthen the role of the aggregators that will represent the RES power plants, taking up their responsibilities, in the wholesale electricity markets and since they will hold larger portfolios, they will be more capable to settle any imbalances caused in the network.

## 2.7 Market Access Readiness Premium

The CHP and RES power plants that have signed Differential State Aid Support contracts,<sup>104</sup> the power plants that are selected in the competitive tender procedures and the plants that are represented by the aggregator of the last resort, are granted a

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<sup>101</sup> Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8287–88.

<sup>102</sup> The details of the mechanism are expected to be determined by a Decision of RAE in the last quarter of 2021.

<sup>103</sup> Balancing Market Code, Independent Power Transmission Operator 91-92, 98 (01/02/2019), accessed February 2, 2020, [http://www.admie.gr/fileadmin/groups/EDRETH/BalancingMarket/KANONISMOS\\_AGORAS\\_EXISORR\\_OPISIS\\_v1.0.pdf](http://www.admie.gr/fileadmin/groups/EDRETH/BalancingMarket/KANONISMOS_AGORAS_EXISORR_OPISIS_v1.0.pdf).

<sup>104</sup> Power plants with installed capacity of >5MW that hold an operating aid contract based on Feed-in-Tariff aid scheme and wish to transition into a contract based on Feed-in-Premium (Differential state aid support contract) cannot receive Market Readiness Premium

transitional premium over the reference tariffs that were mentioned in **Table 4**.<sup>105</sup> This grant is named Market Access Readiness Premium, and it was set at 1€/MWh for the year 2019.<sup>106</sup> With the implementation of the Target Model, this Premium will no longer be granted to the power plants.

The formula to calculate the Market Access Readiness Premium that a power station is going to receive is the following:

$$MARP_{power\ plant} = FMARP \times Q_{injected\ electricity}$$

Where:

$MARP_{power\ plant}$ : The total sum of the premium that is going to be granted to a power station in a monthly basis

$FMARP$ : The fixed price of Market Access Readiness Premium in €/MWh

$Q_{injected\ electricity}$ : The total of the electricity that was injected onto the interconnected system by the power plant during a monthly dispatch cycle.

The granting of the Market Access Readiness Premium takes into account the operation of the power stations in the context of the Transitory Mechanism for the Optimal Forecasting Accuracy. The premium is paid to RES and CHP power stations from the Special Account for RES and CHP for the Transmission System (Subaccount of Support).

## 2.8 Competitive tender procedures for RES and CHP power plants

Starting from 1st January 2017, a new supporting scheme through competitive tender procedures, in the form of operating aid, for CHP and RES power plants was put into place.<sup>107</sup> The Minister of Environment and Energy is responsible, after an

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<sup>105</sup> Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8288.

<sup>106</sup> Τροποποίηση της υπουργικής απόφασης με Α.Π. ΑΠΕΗΛ/Α/ΦΙ/οικ. 187480/7.12.2016 «Μεθοδολογία υπολογισμού της Ειδικής Τιμής Αγοράς τεχνολογιών Ανανεώσιμων Πηγών Ενέργειας και Συμπαράγωγής Ηλεκτρισμού [Amendment of the ministerial decision Α.Π. ΑΠΕΗΛ/Α/ΦΙ/οικ. 187480/7.12.2016 "Methodology for the calculation of the Special Market Price of RES and CHP technologies"], 23567.

<sup>107</sup> Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού

opinion from RAE, to determine the auctioned capacity, the technologies or/and the category of power producing plants that could participate in the competitive tender procedures. The Minister also decides whatever those tender procedures are defined “technology neutral” or not, the methodology and the auctioned capacity that could be provided for the participation of RES power plants that are installed within the European Economic Area and wish to participate in the competitive tender, provided that those plants have an active Cross-border Trade in Energy and any other, related to the tender procedures, matters. After the opinion of RAE, the Minister decides on the minimum number of competitive tender procedures for the present and/or the following years as well as the maximum and/or minimum permissible bidding price for each tender.

The competitive tender<sup>108</sup> is announced by a decision of RAE. PAE is responsible for setting out the criteria for participation and evaluation, geographical or other spatial constraints, the timeframe for the construction and start of operation of the power plants that are selected through competitive tenders, the details of any letters of guarantee, any clauses and any reduction in the reference tariff that results from a competitive bidding procedure for a RES or CHP power generation facility in NNI after the connection of the island to the Interconnected system, as well as any other issues that are related to the conduction of the tender. The power stations that participate in the competitive bidding procedure are subject to the payment of a participation fee in favour of RAE. RAE may choose to allocate a percentage of this fee to the Special Account of RES.

In drafting its opinion, the Regulatory Authority for Energy considers the following parameters:

- 1) The RES and CHP power plant sector development objectives
- 2) The technical limitations of the electricity transmission and distribution networks
- 3) The cost of the necessary extension of the electricity transmission and distribution network for the development of the RES and CHP power plants
- 4) The need to avoid the distortion in the raw materials market by supporting power plants that use biomass to produce electricity
- 5) The contribution of the competitive tender procedures for the formulation of the reference tariffs and the impact on the total cost of the operating aid scheme in the achievement of the national RES and CHP

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*αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8289–91.*

<sup>108</sup> The tender is a variation of a Yankee auction. The bidders submit their bids and the participants with the lowest bids win the auction. Each successful bidder gets the Reference Tariff (R.T) that corresponds to its bid (pay-as-bid), there is no uniform pricing.

The CHP and RES power plants that are selected through competitive bidding process, are included in the support scheme in the form of operating aid and enter into Differential State Aid Support contract. The reference tariff to calculate the amount of operating aid is the result of the respective competitive tender procedure.

After the completion of each competitive tender process, RAE publishes on its website the results of the tender. The results include various details and the weighted average reference tariff per station category.

## 2.9 Limitations in concluding operating aid Feed-in-Premium contracts without participating in competitive tender procedures

Any natural or legal person that is directly or indirectly participating in the management, or is a shareholder or a partner with any holding percentage of a legal entity, is prohibited from signing operating aid contracts outside competitive tender procedures for more than two projects of the same technology, as long as these technologies can be supported with operating aid through competitive tender procedures.<sup>109</sup>

DAPEEP SA and HEDNO SA, the former being the operator of RES and CHP power plants the interconnected system and the later the operator in NII, verify if the above criterion is fulfilled, when they evaluate operating aid contract applications outside competitive tendering procedures. If they find that the applicant already has, directly or indirectly, concluded two operating aid contracts outside the competitive tendering procedures, they reject his (third) application.<sup>110</sup>

RAE is responsible to examine if the above-mentioned criterion is present during the assessment of the windfarm applications in order to grant or modify production licenses which on the basis of their (initial or new) installed capacity, fall under a support scheme in the form of operating aid without participating in competitive tender procedures. If it finds that the applicant has a direct or indirect holding of two production licenses for windfarms that are exempted from participating in competitive tender procedures and he applies for a third production license, then it issues a license which is subject to a compulsory participation in a competitive tendering procedure.

Energy Communities are prohibited from entering in a contract of operating aid outside competitive tender procedures if their total or maximum installed capacity is exceeding 18MW.

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<sup>109</sup> Photovoltaics that become operational between 1 January 2016 and 31 December 2019, of installed capacity of less than 500kW are exempted from this rule

<sup>110</sup> Due to a reduction of the production of electricity of the windfarms



## 2.10 Letters of Guarantee, Final Connection Offers and competitive tender procedures

Upon the acceptance of the final Connection Offer for a CHP or a RES power generation facility, a letter of guarantee is submitted to IPTO SA (interconnected system) or to HEDNO SA (NII), depending on location of the power station. The acceptance of the Final Connection Offer shall be made within two months of its issuance at the Offer. Failure to accept the Final Connection offer within that deadline shall lead to the expiration of the guarantee. The duration of the letter of guarantee shall be at least 2 years, it is compulsory to renew it before its expiration or until the power station begins to operate, either on a commissioning period or until its connection is activated (in the case that there is no commissioning period). Any projects that involve PV power generating facilities in buildings are exempted from this guarantee.<sup>111</sup>

The amount of the letter of guarantee shall be set, per unit of the nominal capacity of the power producing installation in €/kW as presented in **Table 7**.

**Table 7 Letter of guarantee fee (€/kW)**

Power plant's nominal capacity	€/kW
≤1MW	42
1 up to ≤ 10MW	21
10 up to ≤ 100MW	14
100<	7

Source: Law 4152/2013

The CHP and RES power plants that participate in the first, second and third consecutive competitive tender procedures after they have submitted the letter of guarantee to the competent Operator in order to accept the Final Connection Offer and they are not selected in the tender to receive operating aid, they are entitled to get a return of the guarantee upon filling a request to the Operator. This right may be exercised within two months after the final result of the competitive tender. In case that the RES and CHP power plants are entitled to participate in both technology-specific and technology neutral competitive procedures, then the later competitive procedures are not taken into account when calculating the number of competing

<sup>111</sup> ΝΟΜΟΣ ΥΠ' ΑΡΙΘ. 4152 Επείγοντα μέτρα εφαρμογής των νόμων 4046/2012, 4093/2012 και 4127/2013. [Law No. 4152 Urgent Implementation of Laws 4046/2012, 4093/2012 and 4127/2013.], Φεκ α' 107/2013, Hellenic Parliament 1609 (09/05/2013), <http://www.et.gr/idoscs-nph/search/pdfViewerForm.html?args=5C7QrtC22wEaosRGzKxO6XdtvSoClrL8yNwbRNbiFj15MXD0LzQTLWPU9yLzB8V68knBzLCmTXKaO6fpVZ6Lx9hLsJJUqeiQGfseVunO9uCYNE4oXOJTRswGa1TR3ELPkHXS95h4iuU>.

tenders to be carried out until the ability of the return of the guarantee to the power generating facility.<sup>112</sup>

The validity of the final connection offer and / or the installation license of the CHP and RES power plants that are selected to receive operating aid through competitive tender procedures are extended until the deadline for the activation of their connection (either commissioning or commercial operation).<sup>113</sup>

Photovoltaic power plants that are holders of final connection offers and are exempted from the obligation to obtain a production license, may apply to the competent Operator for the extension of the validity of their final connection offers if: a) Their validity expires after 1.1.2019, b) The request shall be submitted within the period when the final connection offer is still valid, c) they have participated in a competitive tender procedure which was conducted between the date when they received the final connection offer until the date of the submission of the request and they have not been chosen to receive operating aid.<sup>114</sup>

Should the station be selected in a competitive tender process which is carried out within the period of validity of the final connection offer and its extension time period, the final connection offer shall remain valid until the connection activation deadline, as it is prescribed by RAE in the notice of invitation, provided that the interested party submits a request for connection agreement with a complete dossier to the Competent Operator within two months of the final results of the competitive tender. Otherwise, the final connection offer ceases to be valid and the letter of guarantee to accept the final connection offer is forfeited.

The period of validity of the installation licenses of the CHP and RES power plants, which expire in 2019, is extended until the last competitive tender process of 2020 that correspond to the category of the power stations where the power plant belongs provided that the power plants have participated in at least one competitive bidding procedure conducted within the initial validity of the installation license.

## 2.11 RES and CHP power plants which are obligated to participate in competitive tenders to receive operating aid

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<sup>112</sup> In that case the production license, the installation license, the decision for approval of environmental terms and any other license or certification given to the power producing facility becomes invalid.

<sup>113</sup> RAE is the competent Authority for determining any details and the deadlines for the activation of the RES and CHP connection.

<sup>114</sup> The Requests to the Network Operator shall be submitted once and the final connection offers shall be extended for a period of up to two months after the final results of the first or the second competitive tender procedures that are carried out after the date the final connection offer is granted to each station.

At this time, the RES and CHP power producing facilities<sup>115</sup> which are obligated to participate in competitive tenders to receive operating aid through bidding are:

- 1) Wind Power Plants with a Maximum Generating Power greater than 3 MW. This threshold is 6 MW for onshore wind projects installed by Energy Communities.<sup>116</sup>
- 2) Photovoltaic power plants with installed capacity of 500 kW or more. This threshold is 1 MW for PV projects installed by Energy Communities.<sup>117</sup>

All other technologies / categories of RES and CHP power production plants and innovative and demonstration power stations<sup>118</sup> are receiving operating support in a form of a premium, without the need to participate in competitive tenders, using the reference tariffs of the **Table 4**.

Specifically for energy prosumers that own wind farms up to 3 MW of installed capacity or other RES or CHP installations of installed capacity of 500 kW or less, are eligible for support in the form of operating aid outside the competitive tender procedure using the reference tariffs provided in **Table 4**, for the surplus of their electricity that is injected into the Interconnected System.

There are two types of competitive tenders carried out in Greece. The first type refers to technology neutral auctions, in which both PV and Onshore wind projects are eligible to participate, and the second type refers to technology specific auctions where only PV or Onshore wind projects can take part. Specifically, PV projects with an installed capacity of more than 20 MW and Onshore wind projects with an installed capacity of more than 50 MW may participate in competitive technology neutral auctions. In addition, PV projects with an installed capacity up to 20 MW and onshore wind projects with an installed capacity of up to 50 MW may participate in competitive technology specific auctions.<sup>119</sup>

The RES and CHP power plants that wish to participate in a competitive tender process may participate in the auction for a part of or for the full of their installed capacity as it is provided in their production licenses and receive operating aid for it after their success in the auction.<sup>120</sup>

If the total annual maximum power output of a power plant category of **Table 4** exceeds the corresponding limit per year as it is provided in **Table 8**, and provided that

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<sup>115</sup> Interconnected system only. RES or CHP power stations, operating in NII receive operating aid in a form of FiT until the integration of the island into the interconnected system, in which case its FiT contract is converted in to FiP contract.

<sup>116</sup> Verdelho et al., "Analysis of auction mechanisms to promote RES," 25–27.

<sup>117</sup> Ibidem

<sup>118</sup> Such as those that are eligible for support under the European NER 300 and HORIZON 2020 funding initiatives.

<sup>119</sup> Verdelho et al., "Analysis of auction mechanisms to promote RES," 25–27.

<sup>120</sup> *Απελευθέρωση αγοράς ενέργειας, εκσυγχρονισμός της ΔΕΗ, ιδιωτικοποίηση της ΔΕΠΑ και στήριξη των Α.Π.Ε. και λοιπές διατάξεις. [Energy market liberalization, PPC modernization, DEPA privatization and RES support and other provisions.]*, 5077.

the number of stations of this category, which exceeds the threshold, is exceeding two stations, then the stations of this category shall participate in the competitive tender procedure and receive operating aid through the bidding process starting from the following year of crossing the threshold.<sup>121</sup>

**Table 8 Annual thresholds for RES and CHP power stations migration from Feed-in-Tariff Scheme based on the reference tariffs as they are listed in Table 4 to compulsory participation in bidding tenders for the determination of the reference tariffs for the granting of operating aid based on Feed-in-Tariff contracts**

Power Stations Category	Total Annual Maximum Power Generation Limit (MW)
Biomass (or bioliquids) that is used to produce electricity through thermal conversion (combustion, pyrolysis, gasification) by power plants of maximum power generation capacity of >1MW (with the exception of biodegradable fraction of municipal waste)	20
Biogas that is captured from the anaerobic digestion of biomass and is utilized to produce electricity by power plants of maximum production capacity of >1MW	20
Hydro energy that is produced by small hydroelectric power plants of installed capacity of >1MWe	20
Solar energy that is used to produce electricity by solar thermal power plants with a storage system that ensures at least 2 hours of operation at nominal load, with maximum production capacity of >1MW	20
CHP power plants that use natural gas to produce electricity with maximum production capacity of >1MW	20
Geothermal energy that is used to produce electricity by power plants of installed capacity >1MW	20

Source: ΑΠΕΕΚ/Α/Φ1/οικ.184573/13.12.2017 (ΦΕΚ Β' 4488)

<sup>121</sup> Καθορισμός τεχνολογιών ή και κατηγοριών σταθμών παραγωγής ηλεκτρικής ενέργειας από Α.Π.Ε. και Σ.Η.Θ.Υ.Α. που εντάσσονται σε καθεστώς στήριξης με τη μορφή Λειτουργικής Ενίσχυσης μέσω ανταγωνιστικής διαδικασίας υποβολής προσφορών, χαρακτηρισμός των ανταγωνιστικών διαδικασιών υποβολής προσφορών ως τεχνολογικά ουδέτερων ή μη και καθορισμός μεθοδολογίας και διαδικασίας επιμερισμού ισχύος για συμμετοχή, στις ανταγωνιστικές διαδικασίες υποβολής προσφορών, σταθμών παραγωγής ηλεκτρικής ενέργειας από Α.Π.Ε. και Σ.Η.Θ.Υ.Α. που εγκαθίστανται σε χώρες εντός του Ευρωπαϊκού Οικονομικού Χώρου υπό την προϋπόθεση ενεργού Διασυνοριακού Εμπορίου ενέργειας με αυτές, με βάση την παρ. 2 του άρθρου 7 του ν.4414/2016 [Determination of technologies and / or categories of RES and CHP power plants which receive Operational Aid through a competitive bidding process, the characterization of competing bidding processes as technologically neutral or technology specific and the definition of methodology and procedure for the allocation of capacity to participate in competitive bidding processes of RES and CHP power plants established in countries within the European Economic Area subject to active Cross-border Trade, in accordance with paragraph 2 of Article 7 of Law 4414/2016], ΑΠΕΕΚ/α/φ1/οικ. 184573/2017 φεκ β' 4488/2017, Ministry of Environment and Energy (19/12/2017).

Furthermore, if the total maximum power generation of a power plant category, which includes power plants that are operating under both commissioning or commercial operation and receive operating aid during the period from 1.1.2017 - 31.12.2020, exceeds the corresponding limit of the **Table 9** and provided that the number of stations in the category that this power station is part of, during the same period, is greater than six then starting from the following year, in which the limit is exceeded, the stations of this category shall participate in competitive tender procedures.

**Table 9** Thresholds for RES and CHP power stations migration from Feed-in-Tariff Scheme based on the reference tariffs as they are listed in *Table 4* to compulsory participation in bidding tenders for the determination of the reference tariffs for the granting of operating aid based on Feed-in-Tariff contracts

Power Stations Category	Total Maximum Power Generation (MW) limit during the period from 1.1.2017 to 31.12.2020
Biomass (or bioliquids) that is used to produce electricity through thermal conversion (combustion, pyrolysis, gasification) by power plants of maximum power generation capacity of >1MW (with the exception of biodegradable fraction of municipal waste)	40
Biogas that is captured from the anaerobic digestion of biomass and is utilized to produce electricity by power plants of maximum production capacity of >1MW	40
Hydro energy that is produced by small hydroelectric power plants of installed capacity of >1MWe	40
Solar energy that is used to produce electricity by solar thermal power plants with a storage system that ensures at least 2 hours of operation at nominal load, with maximum production capacity of >1MW	40
CHP power plants that use natural gas to produce electricity with maximum production capacity of >1MW	40
Geothermal energy that is used to produce electricity by power plants of installed capacity >1MW	40

Source: ΑΠΕΕΚ/Α/Φ1/οικ.184573/13.12.2017 (ΦΕΚ Β' 4488)

## 2.12 Power allocation methodology and procedure for the participation in competitive tenders of RES power plants that are established within the European Economic Area and are subject to active Cross-Border trade in energy

In order to determine the allocation of capacity in the competitive tender procedures for CHP and RES power plants that are established in the countries of the European Economic Area (EEA) and these countries are subject to active cross-border trade of energy with Greece, the following methodology is established.<sup>122</sup>

The capacity auctioned for RES and CHP electricity producing facilities that are established in countries within the EEA and can participate in competitive tender procedures, is defined as the product of the percentage of the imported RES and CHP energy, in domestic final electricity consumption, from EEA countries and Contracting Parties to the Energy Community Treaty with which cross-border electricity is traded, multiplied by the annual new installed capacity of RES and CHP power generating facilities in Greek territory.<sup>123</sup>

The Imported Energy produced by RES and CHP power generating facilities of any neighboring country that belongs to the EEA or is a Contracting Party of EnC is defined as the product of the amount of electricity imported from that country multiplied by the percentage of RES and CHP participation in its electricity generation power mix for the previous year or in the last year for which there is available official published data. The above rate of participation of RES and CHP power plants is calculated by reducing the amount of energy that corresponds to the production by the technology or class of RES and CHP power plants that do not receive operating aid in Greece.

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<sup>122</sup> RAE is the responsible party to calculate the capacity that is going to be auctioned in competitive tender procedures for RES and CHP power generating facilities of any neighboring country that belongs to the EEA or is a Contracting Party in the EnC.

<sup>123</sup> Καθορισμός τεχνολογιών ή και κατηγοριών σταθμών παραγωγής ηλεκτρικής ενέργειας από Α.Π.Ε. και Σ.Η.Θ.Υ.Α. που εντάσσονται σε καθεστώς στήριξης με τη μορφή Λειτουργικής Ενίσχυσης μέσω ανταγωνιστικής διαδικασίας υποβολής προσφορών, χαρακτηρισμός των ανταγωνιστικών διαδικασιών υποβολής προσφορών ως τεχνολογικά ουδέτερων ή μη και καθορισμός μεθοδολογίας και διαδικασίας επιμερισμού ισχύος για συμμετοχή, στις ανταγωνιστικές διαδικασίες υποβολής προσφορών, σταθμών παραγωγής ηλεκτρικής ενέργειας από Α.Π.Ε. και Σ.Η.Θ.Υ.Α. που εγκαθίστανται σε χώρες εντός του Ευρωπαϊκού Οικονομικού Χώρου υπό την προϋπόθεση ενεργού Διασυνοριακού Εμπορίου ενέργειας με αυτές, με βάση την παρ. 2 του άρθρου 7 του ν.4414/2016 [Determination of technologies and / or categories of RES and CHP power plants which receive Operational Aid through a competitive bidding process, the characterization of competing bidding processes as technologically neutral or technology specific and the definition of methodology and procedure for the allocation of capacity to participate in competitive bidding processes of RES and CHP power plants established in countries within the European Economic Area subject to active Cross-border Trade, in accordance with paragraph 2 of Article 7 of Law 4414/2016].

Specifically, for each neighboring country that belongs to EEA and for each EnC Contracting Party the corresponding RES and CHP capacity<sup>124</sup> which may be granted operating aid under a competitive tender procedure shall be calculated by the following equation:

$$RESC_{ref\_country} = \left( \frac{RES_{E_{imp\_country}}}{FEC_{Electricity\_GR}} \right) \times RESC_{GR\_NEW}$$

Where:

$RESC_{ref\_country}$ : The auctioned capacity available for bidding in a competitive tender for the RES and CHP power plants that are operating in a member state of EEA or an EnC Contracting Party, outside of Greek territory, that has an active cross-border trade with Greece.<sup>125</sup>

$FEC_{Electricity\_GR}$ : The Domestic final electricity consumption for the year preceding the auction, as it is provided by the officially published figures of Greek Electricity Market Operators.

$RESC_{GR\_NEW}$ : New domestic installed capacity of RES and CHP power plants for the year preceding the auction or for the last year for which official published data is available from the Greek Electricity Market Operators.

$RES_{E_{imp\_country}}$ : The imported electricity produced by CHP or RES power plants per EEA country or EnC Contracting Party for the year preceding the action. This electricity is calculated using the bellow formula:

$$RES_{E_{imp\_country}} = E_{imp\_country} \times \left( \frac{[RES_{E_{pr\_country}} - RES_{E_{non\_aid\_pr\_country}}]}{NP_{Electricity\_country}} \right)$$

Where:

<sup>124</sup> The stations corresponding to this installed capacity are located outside of Greek territory

<sup>125</sup> The sum of the individual  $RESC_{ref\_country}$  as they occur per EEA country or EnC Contracting Party for each reference year, constitute the final RES and CHP power capacity which is included as the capacity of auctioned power in a competitive tender process that takes place in the Greek territory in the year following the reference year and may concern CHP and RES power plants that are located outside of the Greek territory. The calculation of the capacities of  $RESC_{ref\_country}$  as they occur per EEA country or EnC Contracting Party start from the year 2016 with a reference year of 2015 or the year for which official published data are available in the EUROSTAT official website. Especially for the year 2018 the size of the auctioned capacity through a competitive bidding process that took place in the Greek territory and concerned RES and CHP power plants, located outside the Greek territory was calculated by taking into account the sum of  $RESC_{ref\_country}$  capacity values for both 2016 and 2017.

$E_{imp\_country}$ : The amount of electricity imports per EEA country or EnC Contracting Party during the year preceding the auction, according to the officially published figures of the Greek Electricity Market Operators.

$RES_{Epr\_country}$ : The amount of electricity generated by RES and CHP power installations per EEA country or EnC Contracting Party in the year before the action or the last year for which official published data is available from Eurostat website.

$RES_{E_{non\_aid\_pr\_country}}$ : The amount of electricity generated by RES and CHP power installations, that do not receive operating aid in Greece, per EEA country or EnC Contracting Party in the year before the action or the last year for which official published data is available from Eurostat.

$NP_{Electricity\_country}$ : The total net electricity generation per EEA country or EnC Contracting Party for the year preceding action or the last year for which official published data is available from Eurostat.

## 2.13 Pilot competitive tender procedure for the selection of photovoltaic power generating facilities to be included in the new operating aid scheme (12.12.2016)

The pilot competitive tender procedure for the selection of photovoltaic power generating facilities to be included in the new operating aid scheme was held on the basis of an obligation of the country to be compliant with the EU institutional framework, and specifically “*The Guidelines on State aid for environmental protection and energy 2014-2020 (EEAG)*”.<sup>126</sup> According to these guidelines, for 2015 and 2016 at least 5% of the new planned RES capacity had to be awarded operating aid through competitive tender procedures based on clear, transparent and non-discriminatory criteria. The successful outcome of the tender would mark the transition into a new, smooth operating aid regime for renewable energy in Greece.

### 2.13.1 Rules of the Auction and obligations of the participants

The total auctioned capacity was 40MW and it was divided into two categories of PV power generating facilities:

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<sup>126</sup> “Communication from the Commission — Guidelines on State aid for environmental protection and energy 2014-2020,” 57.



- Category I: PV installations that are excluded from obtaining production licenses with installed capacity of less than 1 MW
- Category II: PV installations that hold a production license for power generation with installed capacity of 1 MW and more.

For the first category, the capacity to be auctioned would be between 4 – 7 MW and for the second category it would be between 33 – 36 MW.<sup>127</sup> The exact auctioned capacity per category was finalized by a decision of RAE after the completion of the First Stage of the Pilot Competition Tender.

The maximum bid price that was permissible during the pilot tender process was set at 104€/MWh for the PVs that were exempted from holding a production license (Category I) and 94€/MWh for PVs with installed capacity of >1 MWh (Category II).

The existence of a Connection Agreement in force or a Final Connection offer provided that the letter of guarantee has been submitted to the correspondent Operator was required at the time when the application for the participation in the pilot tender process was submitted.

In order to participate in the tender, the PV power plants had to pay a € 500 fee (per PV facility) to RAE.

The PV power plants that were selected through the competitive tender, had to activate their connection, either commissioning or commercial operation, within a time limit of 18 months for the PVs with installed capacity of ≤1 MW (Category I) and 24 months for the PVs with installed capacity of >1 MW (Category II) after the final results of the tender were announced.<sup>128</sup> The PVs that failed to comply with the deadlines were removed from the operating aid scheme, their letters of guarantees that were submitted in order to ensure the proper execution of the project expired and were deposited in favor of RAE or the correspondent Network Operator and procedures to revoke their production license, Connection Agreement and / or Final Connection were initiated.

In order to achieve satisfactory competition and to succeed in this pilot tender process: The sum of the capacity that would be auctioned by the participants in each category had to exceed 40% of the capacity auctioned in the corresponding category (hereinafter rule of 40%). For example, if the auctioned capacity in the Category II would be 4 MW and the sum of the submitted capacity for the tender process would be less than 5.6 MW, then the tender for that category would be canceled.

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<sup>127</sup> “Πιλοτική Ανταγωνιστική Διαδικασία Υποβολής Προσφορών Για Την Επιλογή Φωτοβολταϊκών Εγκαταστάσεων Προς Ένταξη Σε Καθεστώς Στήριξης Με Τη Μορφή Λειτουργικής Ενίσχυσης (Άρθρο 7 Παρ. 8 Επ. Ν. 4414/2016) Συνολικής Δημοπρατούμενης Ισχύος 40MW [Pilot Competitive Bidding Procedure for the Selection of Photovoltaic Installations in the Form of Operating Aid (Article 7 (8) Law 4414/2016) Total Auctioned Capacity of 40MW],” Regulatory Authority for Energy, accessed January 30, 2020, [http://www.rae.gr/site/file/system/docs/consultations/04092015/071116\\_1, 4](http://www.rae.gr/site/file/system/docs/consultations/04092015/071116_1, 4).

<sup>128</sup> Those deadlines could be extended with a judicial order.

## 2.13.2 Stages of the pilot competitive tender process

The pilot competitive tender process took place in two stages:<sup>129</sup>

During the first stage of the tender process, the owners of the power plants had to register in the digital platform <https://www.cosmo-one.gr/register> and submit the necessary information in order to proceed to stage two. Some of the information requested was:

- The full name of the natural person or the full name of a legal entity
- The distinctive title of the legal entity
- Address of the natural person or the address of the headquarters of the legal entity
- The natural person's or the legal entity's Tax Number
- Phone and fax
- Email address
- CPV Code<sup>130</sup>

After checking the information submitted, the registrants received their username, company ID and their initial password. After their first login, they were asked to change their password.<sup>131</sup>

After the participants received their login details, they were requested to navigate to <https://www.marketsite.gr/> and enter the necessary information to access the "Electronic Tender Applications". In the platform they submitted the necessary documents in a digital form and chose the corresponding category in which they wished to participate. Within three working days, the participants had a strict deadline to submit hard copies of the relevant documents to RAE for validation.

RAE, after checking the documents for their validity and completeness, qualified the participants that met the relevant criteria to the next stage of the Pilot Tender Process. The Authority also compiled a Provisional List of Participants to each tender category as well as Provisional List of Excluded power plants, this information was available online. Those participants that had any legitimate interest could file an objection with RAE within two working days after the Provisional List of Participants and Provisional List of Excluded power plants were made public. RAE after examining

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<sup>129</sup> Regulatory Authority for Energy, "Πιλοτική ανταγωνιστική διαδικασία υποβολής προσφορών για την επιλογή φωτοβολταϊκών εγκαταστάσεων προς ένταξη σε καθεστώς στήριξης με τη μορφή λειτουργικής ενίσχυσης (άρθρου 7 παρ. 8 επ. Ν. 4414/2016) συνολικής δημοπρατούμενης ισχύος 40MW [Pilot competitive bidding procedure for the selection of photovoltaic installations in the form of operating aid (Article 7 (8) Law 4414/2016) total auctioned capacity of 40MW]," 15–20.

<sup>130</sup> Common Procurement Vocabulary Code

<sup>131</sup> Interested parties that wanted to participate in the competitive pilot tender process with more than one power plants, were provided with extra login details (one username per power plant)

any submitted objections, decided on the Final List of Participants and the Final List of Excluded power plants for each category.

Considering the rule of 40% and the Final List of Participants, RAE decided on the exact bidding capacity of the two categories. The total bidding capacity was determined to:

- 4.8 MW for the participants of the Category I
- 35.2 MW for the participants of the Category II

The sum of the total offered capacity amounted to 6.79 MW for participants of the Category I and 50.21 MW for participants of the Category II. As a result, the sum of the capacity that was offered by all the participants in the Final List of the Category I was greater by 41.57% of the auctioned capacity and the sum of the capacity offered by the participants in the Category II was greater by 42.64% of the auctioned capacity. The rule of 40% was followed and the auction went through with high competition.<sup>132</sup>

During the second stage, the power plants that were included in the Final List of the Participants were given access to a virtual competitive tender process tender platform in order to get familiar with the corresponding auction software.<sup>133</sup>

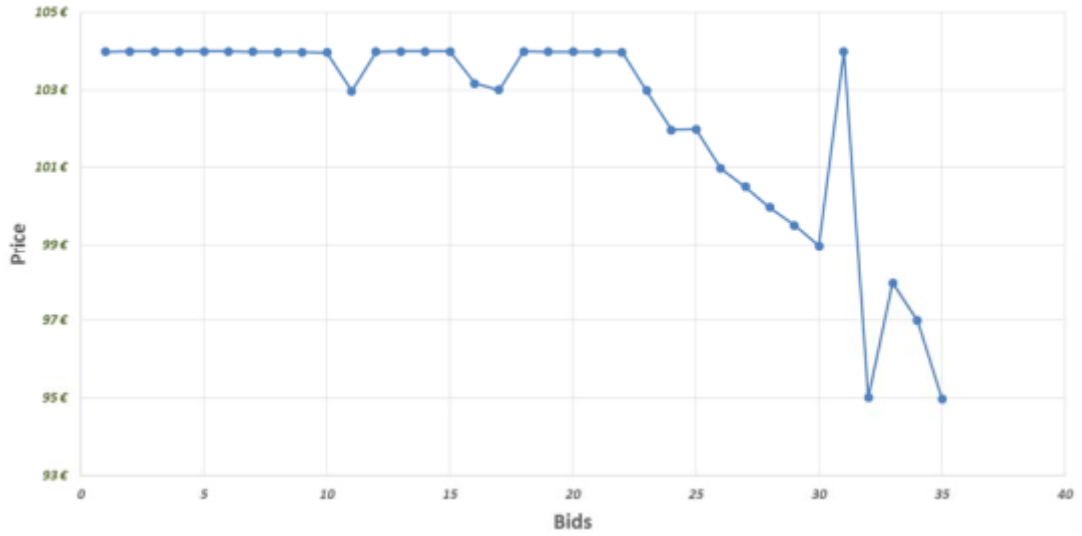
At 12.12.2016, the competitive tender process took place. The tender for the Category I took place at 10pm and for the Category II it took place at 12pm. The tender for each Category lasted 30 minutes and after the end of each bidding process, the participants were given 30 minutes to submit any objections towards the results of the tender.

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<sup>132</sup> Dionisios Papachristou, “Διαγωνισμοί ΑΠΕ [RES Auctions]” (Thessaloniki International Fair, Thessaloniki, September 11, 2019), [http://www.rae.gr/site/file/categories\\_new/about\\_rae/factsheets/2019/gen/12092019\\_2?p=file&i=1](http://www.rae.gr/site/file/categories_new/about_rae/factsheets/2019/gen/12092019_2?p=file&i=1).

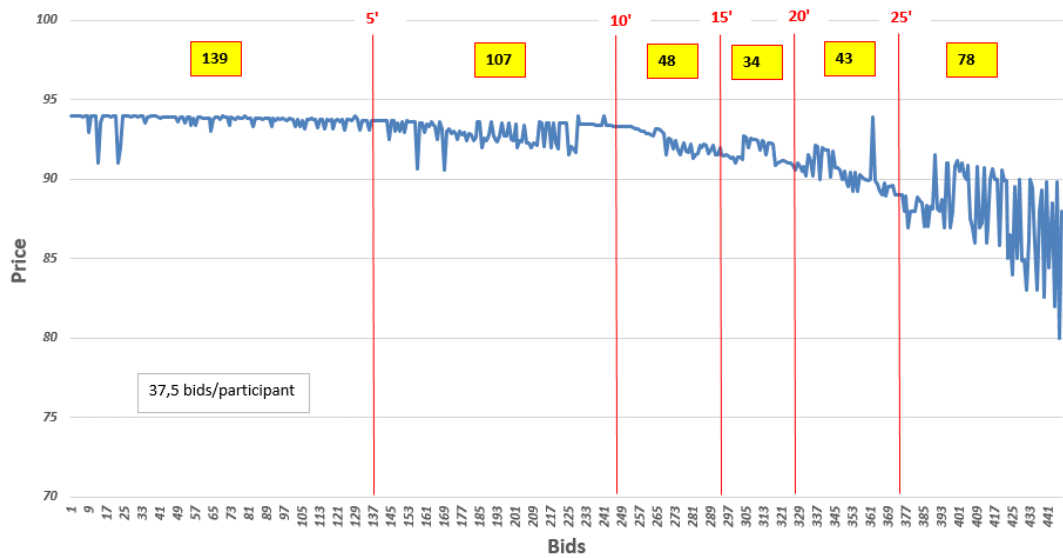
<sup>133</sup> The owner of the platform, cosmoONE, was responsible to answer any questions that were raised by the participants until the conduction of the competitive tender process

Figure 5 Bids during pilot competitive auction of 2016 (Category I)



Source: RAE's Activity Report 2016

Figure 6 Bids during pilot competitive auction of 2016 (Category II)



Source: RAE's Activity Report 2016

**Table 10 Results of the Pilot tender process for PVs as it took place in 12.12.16 for power stations of installed capacity ≤ 1MW (Category I)**

	Name of the company	Capacity (MW)	Location	Municipality	Reference Tariff (€/MWh)	Result
1	SOLAR FIELD SA	1.0	Industrial Area of Larisa	Tempi	94.97	Chosen
2	I&K MICHANIKI IL. SYSTIMATON Ltd	0.5	Parcel 624.628, Municipal community of Galateia	Eordaia	95	Chosen
3	FAETHON ALEXANDROS SA	1.0	Parcel 4239, Kopatsi	Argos - Orestiko	96.99	Chosen
4	ELPE ANANEOSIMES SA	0.99981	Industrial Area of Kavala	Chrysopolis – Nestos	99.50	Chosen
5	M.KOSTUDIS - K. BEZORGIANNIS (VEKO ENERGY) GENERAL PARTNERSHIP	0.09900	Polychrono	Kassandras	103.98	Chosen
6	ATHINA PARAGOI ENERGEIAS LIMITED PARTNERSHIP	0.49956	Parcel 270, Kassiteron Complex Area	Maroneia - Sapes	103.98	Chosen
7	TSIKRIKONAKI AIKATERINI & MELANTHIA STAVRAKAKI GENERAL PARTNERSHIP	0.49896	Spartokataracho	Ilida	103.99	Chosen
8	VASILEIOS LONTOS & SIA GENERAL PARTNERSHIP	0.09996	Ano Sesi Geliniatikon	Xylokastro- Evrostina	104	Chosen
9	E-GREEKSOLAR Ltd	0.09990	Parcel 171, Fanariou	Kilkis	104	Chosen
10	ANDROMEDA PARAGOI ENERGEIAS LIMITED PARTNERSHIP	0.49956	Mavrochoma, Parcel 607	Maroneia- Sapes	103.99	Not Chosen
11	ATHINA PARAGOI ENERGEIAS LIMITED PARTNERSHIP	0.49956	Parcel 135 - 136, Aetolofou	Maroneia- Sapes	104	Not Chosen
12	ANDROMEDA PARAGOI ENERGEIAS LIMITED PARTNERSHIP	0.49956	Piso ampelia, Parcel 889	Kastoria	104	Not Chosen
13	ANDROMEDA PARAGOI ENERGEIAS LIMITED PARTNERSHIP	0.49956	Mavrochoma, Parcel 584	Maroneia- Sapes	104	Not Chosen
<b>Total capacity allocated during the tender (MW):</b>				4.79719		
<b>Unallocated capacity during the tender (MW):</b>				0.00281		

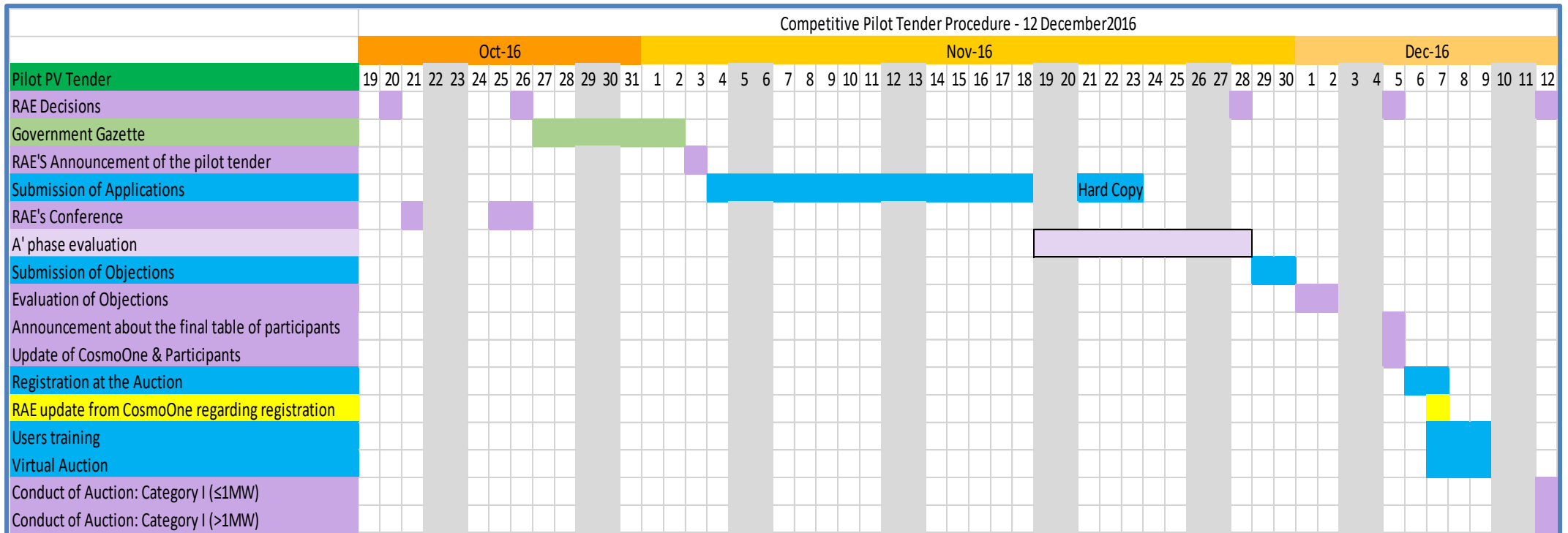
Source: RAE

**Table 11 Results of the Pilot tender process for PVs as it took place in 12.12.16 for power stations of installed capacity of >1MW (Category II)**

	Name of the company	Capacity (MW)	Location	Municipality	Reference Tariff (€/MWh)	Result
1	Lakon SA	2.9952	Tsilia	Evrota	79.97	Chosen
2	GIOUVI ELLAS ANANEOSIMES PIGES ENERGEIAS SA	4.99	Mesokomou farm	Lagkada	82	Chosen
3	ATEN ENERGEIAKI SA	8.99	Palioures	Sofadon	82.55	Chosen
4	ELPE ANANEOSIMES SA	3.6	Industrial Refinery Area	Aspropirgos	83	Chosen
5	Aktina Aigaiou SA	9	Xerodima	Eurota	84.45	Chosen
6	ELPE ANANEOSIMES SA	3.998	ELPE Thessaloniki Industrial Facilities	Kordeliou Evosmou	85	Chosen
7	PELOPONNISIAKOS ILIOS 2 SA	1.55	Agios Ioannis	Thiveon	88	Chosen
8	PRIME TECHNOLOGIA ENERGEIAS & PERIVALLONTOS SA	6.974	Kossos	Topeirou	85.90	Not Chosen
9	ILIOFANEIA ANONYMI TECHNIKI. EMPORIKI KAI VIOMICHANIKI ETAIREIA SA	2.6412	Mpitakos	Thebes	88	Not Chosen
10	ANDROMEDA PARAGOGI ENERGEIAS LIMITED PARTNERSHIP	2.49987	Taplan Pigadi Pentalofou	Orestiada	89.80	Not Chosen
11	ATHINA PARAGOGI ENERGEIAS LIMITED PARTNERSHIP	1.06	Parcel 784, Aetolofos region	Maroneia-Sapes	90	Not Chosen
12	TERNA ILIAKI ILIOKASTROU SA	1.91224	Loggarakia	Ermionida	93.94	Not Chosen
<b>Total capacity allocated during the tender (MW):</b>				35.1232		
<b>Capacity that wasn't allocated during the tender (MW):</b>				0.00768		

Source: RAE

**Table 12 Timetable of the pilot competitive auction procedure**



Source: RECG122017\_RAE

PRIME TECHNOLOGIA ENERGEIAS & PERIVALLONTOS SA was the only company to object the results of the tender.<sup>134</sup> In its decision 570/2016 RAE claimed that during the Online Bidding Process, the system shall temporarily reserve power capacities in favor of the participants, in order to be able to decide on their further participation and pricing strategy that they are going to follow for the rest of the tender on the basis of the indications. At the end of the online tender, the system finalizes the distribution of the available capacity based on the ranking of the last acceptable bids of each bidder. The best bid is considered to have the lowest reference tariff in €/MWh. The system temporarily commits to this bid the corresponding amount of installed capacity of the participants PV system and proceeds to the next best (ascending price) bid offered. Of the remaining quantity of the auctioned capacity, it temporarily blocks the proportion that is based on the installed capacity of the second bidder and proceeds to the next bid. If two bids have the same reference tariff, then the best bid is the one made by the bidder that owns the power plant with the least installed capacity. If the bids have the same reference tariff and the same installed capacity, then the best bid is the one that was made first chronologically. At the end of the auction, the temporary bids become final and a priority list is made based on the above parameters (R.T. > Installed Capacity > Time of bid). It should also be noted that in the sequential installed capacity reserve process, if the installed capacity of a bidder is greater than the remaining quantity then his bid is not considered at all and the system moves on to the next bid. For this reason, PRIME TECHNOLOGIA ENERGEIAS & PERIVALLONTOS SA was not chosen to receive operating aid at the competitive tender process.

In order to participate in the competitive tender, the participants were required to submit specific letters of guarantee. In detail, the power stations needed to submit a "Good Performance Letter of Guarantee" and a "Letter of Guarantee for Participation in the auction procedure".

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<sup>134</sup> Επί των οριστικών αποτελεσμάτων της Ηλεκτρονικής Δημοπρασίας της 12ης Δεκεμβρίου 2016, και επί της υπ' αριθμ. πρωτ. ΡΑΕ Ι-215192/12.12.2016 ένστασης της εταιρείας «PRIME ΤΕΧΝΟΛΟΓΙΑ ΕΝΕΡΓΕΙΑΣ ΚΑΙ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΑΝΩΝΥΜΗ ΕΤΑΙΡΕΙΑ» η οποία υποβλήθηκε σύμφωνα με την παρ. 14.3 του άρθρου 14 της υπ' αριθμ. 417/Απόφασης ΡΑΕ «Διενέργεια Πιλοτικής Ανταγωνιστικής Διαδικασίας υποβολής προσφορών για φωτοβολταϊκές εγκαταστάσεις σύμφωνα με τις διατάξεις του άρθρου 7 παρ. 8 του Ν. 4414/2016» [On the final results of the Online Auction of December 12, 2016, and on RAE No. I-215192 / 12.12.2016 objection of the company "PRIME ENERGY AND ENVIRONMENT TECHNOLOGY S.A." which was submitted according to Article 14 of RAE No. 417 / RAE Decision "Conducting a Pilot Competitive Bidding Process for Photovoltaic Facilities in accordance with the provisions of Article 7 (8) of Law 4414/2016.], Απόφαση ραε υπ' αριθμ. 570/2016, Regulatory Authority for Energy (12/12/2016), accessed January 30, 2020, [http://www.rae.gr/site/file/categories\\_new/about\\_rae/actions/decision/2016/570?p=files&i=0](http://www.rae.gr/site/file/categories_new/about_rae/actions/decision/2016/570?p=files&i=0).



### 2.13.3 Letters of guarantee and the pilot competitive tender procedure

The goal of the “Letter of Guarantee for Participation in the auction procedure” is to ensure the participation of the stakeholder in the auction and its proper and effective conduction.<sup>135</sup> The Letter was submitted to RAE along with the dossier of the required documents within 3 working days after the registration of the participants in the <https://www.marketsite.gr/> online platform.<sup>136</sup> The above Letter of Guarantee was amounted to 1% of the total investment done in the power plant that wished to participate in the tender. As a basis of the calculation of the above Guarantee, it is estimated that a typical Category I and II PV project needs an investment of € 1.000 per kW of installed capacity.<sup>137</sup> Meaning that the amount of the “Letter of Guarantee for Participation in the auction procedure” is calculated at 10€ per kW of the installed capacity of the PV power plant.<sup>138</sup> The duration of the “Letter of Guarantee for Participation in the auction procedure” is set to 21 months after the results of the auction for the Category I (installed capacity of <1MW) and 27 months after the results of the auction for the Category II (installed capacity of >1MW).<sup>139</sup> This letter is issued by credit institutions or other institutions, that have the right to issue such a letter under the existing Greek legislature, and are legally operating in Greece or in the states of the participants, that under their existing laws have such a right. In the case, that the participant choses a foreign institution to issue the “Letter of Guarantee for Participation in the auction procedure”, then it must be accompanied by an official Greek translation. This Guarantee is returned to the participant in the case that his power station is not chosen to receive operating aid in the competitive tender or, in case that this guarantee is not used to cover the amount of the “4% rule” of the “Good Performance Letter of Guarantee” (see below). However, if it is used to cover the “4% rule” then it will be returned to the participant after the connection of the power station to the electricity network and its start of operation.

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<sup>135</sup> Note that this chapter is written in reference to the pilot tender process held in 2016 and some details that concern the “Letter of Guarantee for Participation in the auction procedure” may have changed in future auctions. The information about the wind farms, available in the footnotes of this subchapter, is extracted from the July 2019 technology specific auction, the details of which are available [http://www.rae.gr/site/file/categories\\_new/about\\_rae/factsheets/2019/maj/2204?p=file&i=3](http://www.rae.gr/site/file/categories_new/about_rae/factsheets/2019/maj/2204?p=file&i=3) online at:

<sup>136</sup> Regulatory Authority for Energy, “Πιλοτική ανταγωνιστική διαδικασία υποβολής προσφορών για την επιλογή φωτοβολταϊκών εγκαταστάσεων προς ένταξη σε καθεστώς στήριξης με τη μορφή λειτουργικής ενίσχυσης (άρθρου 7 παρ. 8 επ. Ν. 4414/2016) συνολικής δημοπρατούμενης ισχύος 40MW [Pilot competitive bidding procedure for the selection of photovoltaic installations in the form of operating aid (Article 7 (8) Law 4414/2016) total auctioned capacity of 40MW],” 27–32.

<sup>137</sup> For wind farms the amount of investment is estimated at € 1,250 per kW

<sup>138</sup> For wind farms the amount of the “Letter of Guarantee for Participation in the auction procedure” is calculated at 12.5 € per kW

<sup>139</sup> This duration was set at 6 months for Wind Farms participating in July 2019 auction

The goal of the “Good Performance Letter of Guarantee” is to ensure the proper implementation of the project. In particular, the PV power station had to activate its connection (either commissioning or commercial operation), if it was selected through the competitive pilot tender, within 18 months for the power plants of the Category I (installed capacity of <1 MW) and 24 months for the power plants of the Category II (installed capacity of >1 MW) after the final results of the auction.<sup>140</sup> Good Performance Letter of Guarantee are valid for 21 months after the tender process for the power stations with installed capacity of <1 MW (Category I) and for 27 months for the power stations with installed capacity of >1 MW (Category II).<sup>141</sup> This Letter of Guarantee had to be submitted to RAE by the participants within 15 days of the announcement of the final results of the pilot competitive tender.<sup>142</sup> Such Letter of Guarantee may not be required in case the Participant had already submitted letters of guarantee for the specific power plant to the Competent Operator (for the acceptance of the Final Connection Offer) or to RAE (in the form of Letter of Guarantee for Participation in the auction procedure) which covered the amount required by the legislation. The amount of the “Good Performance Letter of Guarantee” had to cover at least 4% of the total investment made at the power plant. As a basis of the calculation of the above Guarantee, it is estimated that a typical Category I and II PV project needs an investment of € 1.000<sup>143</sup> per kW of installed capacity. Meaning that the amount of the “Letter of Guarantee for Participation” is calculated at 40€ per kW of installed capacity of the PV power plant. It was the responsibility of each power plant to ensure that this 4% rule was followed until its connection to the network within the timeframe stated in the tender notice.

In the event that the sum of the “Letter of Guarantee for Participation in the auction procedure” and the “Letter of Guarantee of Good Performance” was less than 4% of the total investment at the power plant, then it had to deposit a supplementary “Letter of Guarantee” to RAE, the amount of which had to be equal to the remaining sum which was needed to cover the gap up to the 4% of the total investment to the power plant.

In case that the Participant was selected to hold a “Connection Agreement” with the Competent Operator and the guarantee that he had prior submitted to the Operator had to be reduced then he was obligated to submit to RAE a supplementary “Letter of Guarantee” to cover the difference up to the 4% of the total investment to

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<sup>140</sup> Wind farms of power generation of  $P_{wind} \leq 10$  MW had to activate their connection within 24 months and wind farms of power generation of  $P_{wind} > 10$  MW within 36 months

<sup>141</sup> The validity period and the period to activate the connection to the electricity network was the same for wind farms participating in July 2019 auction

<sup>142</sup> For the wind farm technology specific auction of July 2019, this deadline was set at 90 days

<sup>143</sup> This amount is € 1.250 / kW for wind farms meaning that the amount for the Letter of Guarantee would be € 50 / kW

the power plant before signing the “Connection Agreement” in order to comply with the “4% rule”.<sup>144</sup>

If the power station reduces its installed capacity up to 50% compared to the capacity declared during its participation in the competitive tender, then the Guarantee suffers a deduction of an equal rate.<sup>145</sup> For example, if a power station participated in the tender with a capacity of 10MW and during the conduction of the “Connection Agreement” with the Competent Operator it had an installed capacity of 8MW which is 20% less than the amount with which it participated in the tender, then the amount of the guarantee that will be returned will be 20% less and it will be equal to:

$$\text{Returned Amount} = (10000kW \times 40\text{€}) \times (1 - 0.20) = 320.000\text{€}$$

If the power station reduces its installed capacity more than 50% compared to the one that he participated in the competitive tender, then the Guarantee shall not be returned to the participant when it’s going to sign a “Connection Agreement” with the Competent Operator.<sup>146</sup>

The “Letter of Guarantee of Good Performance” and any supplementary Letters of Guarantee are returned to the participants, upon their request, if the connection of the station is activated (either commissioning or commercial operation) within the 18 month (Category I) or 24 month (Category II) deadline.<sup>147</sup>

## 2.14 The results of past competitive auctions and future tender plans for renewable energy in Greece

Since the pilot competitive tender of 2016 for renewable energy sources, 10 more successful auctions took place, not including 1 auction for PV stations of  $1 \text{ MW} < P_{PV} \leq 20 \text{ MW}$  of December 2018, which was canceled by RAE’s decision due to low

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<sup>144</sup> If that the power station had already submitted a Letter of Guarantee to the competent operator that amounted equal or more than 4% of the total investment to the power station and had also submitted a Guarantee for Participation to RAE (equal to 1%) then the last Guarantee is returned to the participant after the final results of the tender.

<sup>145</sup> If the power station reduces its installed capacity more than 70% compared to the one that it participated in the auction, during the signing of the “Connection Agreement” with the Competent Operator, then it loses any right of implementation. For the July 2019 auction, the wind farms could participate again in the next competitive tender for their category, this provision was not implemented during the 2016 PV pilot tender.

<sup>146</sup> This rule was followed during the wind farm tender of July 2019.

<sup>147</sup> Wind farms of power generation of  $P_{wind} \leq 10 \text{ MW}$  had to activate their connection within 24 months and wind farms of power generation of  $P_{wind} > 10 \text{ MW}$  within 36 months to receive their Guarantees. Those deadlines may be extended by judicial order.

competition. Detailed information about each auction can be found in **Table 13** and **Table 14**.

For 2020 there are 4 competitive RES auctions planned. Specifically, one technology neutral auction will be held where PVs with installed capacity more than 20 MW and wind farms of 50 MW maximum power production capacity and more can participate.<sup>148</sup> The total auctioned capacity for the technology neutral auction is set at 500 MW. Furthermore, three technology specific auctions will be held. An auction for wind farm projects of maximum power generation of  $3 \text{ MW} < P_{\text{wind}} \leq 50 \text{ MW}$  and for wind farm projects that are operated by energy communities of maximum power generation of  $6 \text{ MW} < P_{\text{wind}} \leq 50 \text{ MW}$ . The total auctioned capacity for this auction is set at 300 MW plus the unallocated capacity for 2019. An auction for wind farms of installed capacity  $P_{\text{wind}} \leq 60 \text{ kW}$ . The total auctioned capacity is set at 20 MW and an auction for PVs power plants of installed capacity  $500 \leq P_{\text{pv}} \leq 20 \text{ MW}$ . The total auctioned capacity is set at 300 MW plus the unallocated capacity for 2019.<sup>149</sup>

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<sup>148</sup> Wind farm complexes of at least 2 wind farms that share a common connection to the electricity grid with total power production capacity higher than 50 MW can participate in the technology neutral auction, the same applies for PV complexes that also share a common connection to the grid and have an installed capacity higher than 20 MW. Complexes of at least 1 wind farm and 1 PV power plant that share a common connection to the grid and the total of their capacity exceeds 50 MW can also participate in the tender.

<sup>149</sup> Καθορισμός εγκατεστημένης ισχύος, ανά τεχνολογία ή/και κατηγορία σταθμών παραγωγής ηλεκτρικής ενέργειας από Α.Π.Ε. και Σ.Η.Θ.Υ.Α., δημοπρατούμενης μέσω ανταγωνιστικής διαδικασίας υποβολής προσφορών μέχρι και το 2020, ελάχιστου αριθμού ανταγωνιστικών διαδικασιών υποβολής προσφορών ανά έτος, ανώτατης επιτρεπόμενης τιμής προσφοράς για κάθε ανταγωνιστική διαδικασία υποβολής προσφορών και τέλους συμμετοχής σε ανταγωνιστική διαδικασία υποβολής προσφορών, με βάση τις παρ. 3 και 6 του άρθρου 7 του ν.4414/2016 [Determination of installed capacity, per technology and / or per category of RES power plants and CHP power plants, auctioned through competitive bidding procedure until 2020, the minimum number of competitive bidding procedures per year, the maximum bid price for each competitive bidding procedure and the participation fee, pursuant to article 7 (3) (6) of Law 4414/2016], Για υπεν/δαπεεκ/34495/1107 - φκεκ β' 1341/2019, Ministry of Environment and Energy (15/04/2019).

Table 13 Results of the Pilot tender process

1 <sup>st</sup> Pilot Auction, PV power stations (Technology Specific), December 2016 - Results													
Categories	Auctioned Capacity (max) (MW)	Final Auctioned Capacity (MW)	Project Applications (No/MW)						Auction				
			Applied		Approved		Granted		Bids	Celling price (€/MWh)	Highest Bid (€/MWh)	Lowest Bid (€/MWh)	Weighted average price (€/MWh)
<b>PV stations</b> <b>PV<sub>PV</sub> ≤ 1MW</b>	5	4.8	14	6.89	13	6.8	9	4.80	35	104	104	94.97	98.78
<b>PV stations</b> <b>1MW &lt; P<sub>PV</sub> ≤ 20</b>	35	35.2	13	53.17	12	50.21	7	35.12	446	94	88	79.97	83.3

Table 14 Results of competitive tender processes in 2018 and 2019

Source: RAE

1 <sup>st</sup> Cycle Auction, PV power stations & Wind Farms (Technology Specific), July 2018 - Results													
Categories	Auctioned Capacity (max) (MW)	Final Auctioned Capacity (MW)	Project Applications (No/MW)						Auction				
			Applied		Approved		Granted		Bids	Celling price (€/MWh)	Highest Bid (€/MWh)	Lowest Bid (€/MWh)	Weighted average price (€/MWh)
<b>PV stations</b> <b>PV<sub>PV</sub> ≤ 1MW</b>	70	53.52	177	105.54	155	94.07	83	53.48	1527	85	80	75.87	78.42
<b>PV stations</b> <b>1MW &lt; P<sub>PV</sub> ≤ 20</b>	230	53.40	34	197.21	13	93.44	8	52.92	280	80	71	62.97	63.81
<b>Wind stations</b> <b>3MW &lt; P<sub>wind</sub> ≤ 50MW</b>	300	176.39	14	308.68	14	308.68	7	170.93	336	90	71.93	68.18	69.53

Source: RAE

**2<sup>nd</sup> Cycle Auction, PV power stations & Wind Farms (Technology Specific), December 2018 - Results**

Categories	Auctioned Capacity (max) (MW)	Final Auctioned Capacity (MW)	Project Applications (No/MW)						Auction				
			Applied		Approved		Granted		Bids	Celling price (€/MWh)	Highest Bid (€/MWh)	Lowest Bid (€/MWh)	Weighted average price (€/MWh)
<b>PV stations</b> <b>PV<sub>PV</sub> ≤ 1MW</b>	90	61.95	204	114.62	192	108.40	95	61.94	3907	81.71	68.99	63	66.66
<b>PV stations</b> <b>1MW &lt; P<sub>PV</sub> ≤ 20</b> <b>(CANCELED)</b>	100	86.47	27	151.32	27	151.32	12	85.99	30	71.91	71.91	63	70.39
<b>Wind stations</b> <b>3MW &lt; P<sub>wind</sub> ≤ 50MW</b>	229	160.94	14	281.65	14	281.65	8	159.6	362	79.77	65.37	55	58.58

Source: RAE

**1<sup>st</sup> Cycle Auction, Technology Neutral, April 2019 - Results**

Categories	Auctioned Capacity (max) (MW)	Final Auctioned Capacity (MW)	Project Applications (No/MW)						Auction				
			Applied		Approved		Granted		Bids	Celling price (€/MWh)	Highest Bid (/€/MWh)	Lowest Bid (€/MWh)	Weighted average price (€/MWh)
<b>Technology Neutral</b>	600	455.56	8	637.78	8	637.78	7	437.78	56	64.72	64.72	53	57.03

Source: RAE

**2<sup>nd</sup> Cycle Auction, Technology Specific, July 2019 - Results**

Categories	Auctioned Capacity (max) (MW)	Final Auctioned Capacity (MW)	Project Applications (No/MW)						Auction				
			Applied		Approved		Granted		Bids	Celling price (€/MWh)	Highest Bid (€/MWh)	Lowest Bid (€/MWh)	Weighted average price (€/MWh)
<b>PV stations PV<sub>pv</sub> ≤ 20MW</b>	300	143.04	68	200.26	68	200.26	24	142.88	275	69.26	67.7	61.95	62.77
<b>Wind stations P<sub>wind</sub> ≤ 50</b>	300	186.96	12	261.75	12	261.75	9	179.55	37	69.18	69.18	59.09	67.31

Source: RAE

**3<sup>rd</sup> Cycle Auction, Technology Specific, December 2019 – Results**

Categories	Auctioned Capacity (max) (MW)	Final Auctioned Capacity (MW)	Project Applications (No/MW)						Auction				
			Applied		Approved		Granted		Bids	Celling price (€/MWh)	Highest Bid (€/MWh)	Lowest Bid (€/MWh)	Weighted average price (€/MWh)
<b>PV stations PV<sub>pv</sub> ≤ 20MW</b>	287.11	105.46	44	148.64	43	147.65	27	105.09	N/A	66.02	65.99	53.82	59.98
<b>Wind stations P<sub>wind</sub> ≤ 50</b>	225.45	225.45	16	491	16	491	7	224.00	N/A	68.25	61.94	55.77	57.74

Source: RAE

## 2.15 RES and CHP electricity producing facilities in Non-Interconnected Islands (NII)

Starting from 1<sup>st</sup> January 2016, the stations that begin their operation in NII, either commissioning or commercial operation, can be included in the operating aid scheme and are required to sign an operating aid contract with a fixed tariff (Feed-in-Tariff) with HEDNO SA which is the competent Operator for NII.<sup>150</sup> The operating aid that is received by the RES and CHP power plants that have signed an operating aid contract with a fixed tariff is calculated on the basis of a fixed tariff. This tariff is identical to the reference tariff of the corresponding power plant category of **Table 4**. This tariff can be determined also by the results of a competitive tender if the project participates in an auction.

Upon the completion of the necessary infrastructure and the full operation of the daily electricity markets in NNI, the CHP and RES power plants that are located in those islands and have signed operating aid contracts with fixed tariffs, are obligated to convert their contracts into contracts for “Differential State Aid in NNI” and participate directly in the electricity market.<sup>151</sup> The period of validity of the above contract is calculated by subtracting the duration of the operating aid contract with fixed tariff at the time of its termination from the normal duration of the Differential State Aid Support Contracts, which is 20 years for CHP and RES power plants excluding solar-thermal power plants and 25 years for solar-thermal power plants. The new contracts, either Differential State Aid Support contracts or Differential State Aid Support in NNI, have the same reference tariffs as the old operating aid contracts with a fixed tariff.<sup>152</sup> The Minister of Environment and Energy is responsible for the transition process of the above contracts, the participation of those power plants in the electricity market, the methodology for calculating the reference tariff as well as any other related matters, such as the modus operandi of the aggregators and the aggregator of the last resort.

In case of an interconnection of an electricity system of an island to the interconnected system, on the first day of the month after the interconnection, DAPEEP SA is replacing HEDNO SA as a party to the electricity PPAs with the power

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<sup>150</sup> These power plants will supply electricity based on Feed-in-Tariff.

<sup>151</sup> *Νέο καθεστώς στήριξης των σταθμών παραγωγής ηλεκτρικής ενέργειας από Ανανεώσιμες Πηγές Ενέργειας και Συμπαράγωγή Ηλεκτρισμού και Θερμότητας Υψηλής Απόδοσης - Διατάξεις για το νομικό και λειτουργικό διαχωρισμό των κλάδων προμήθειας και διανομής στην αγορά του φυσικού αερίου και άλλες διατάξεις. [New scheme to support Renewable Energy and High-efficiency Electricity and Heating Cogeneration power plants - Provisions on the legal and operational distinction of supply and distribution sectors in the gas market and other provisions.], 8291–93.*

<sup>152</sup> With the exception if the power station participates in a competitive tender procedure. In such case the reference tariff that results from the tender is used to determine the operating aid granted to the station.



plants operating in the island. The same incurs with the operating aid contracts of the CHP and RES power generating facilities. DAPEEP SA takes all the relevant contractual rights and obligations of the above-mentioned contracts without further extending their period of validity. With the interconnection of the island, the NII code ceases to apply and the provisions of the System Operation Code start to apply to the power plants of the island.

The interconnection and integration of an island into the Interconnected System is determined by a ministerial decision of the Minister of Environment and Energy, following a letter from the Transmission System Operator which specifies the relevant dates of execution of the interconnection and any other issues concerning the PPAs and operating aid contracts of the power plants of that island. RAE may regulate, issues of the market function by its decision, after a recommendation from the Interconnected System Operator and NII System Operator, the transitional period from the interconnection of the island to the interconnected system up to the issuance of the above-mentioned decision of the Minister.

The RES and CHP power generating facilities that operate in NII and have concluded an operating aid contract with a fixed tariff or a PPA, pursuant to Article 12 of Law 3468/2006 or a related PPA before 2006, and they continue to operate after the expiry of those contracts, holding all the necessary licenses and permits to do so, then they shall sign an operating aid contract with a fixed tariff with HEDNO SA as the System Operator of NII. The reference tariff of the contract is calculated on a monthly basis, based on the monthly average SMP of the Interconnected System and the SpMP of the corresponding technology. In the case that necessary infrastructure is completed and the daily electricity market becomes fully operational in the island then the above power stations are granted operating aid in the form of Feed-in-Premium and they are obligated to sign Differential State Aid in NII contracts with HEDNO SA as the System Operator of the NII.<sup>153</sup> The reference tariffs of the new contracts are calculated on a monthly basis, based on the average monthly SMP of the Interconnected System and the corresponding SpMP. The Minister of Environment and Energy may, by his decision, regulate any matter of participation in the electricity market, the methodology and procedure for the market settlement, the pricing and any other relevant matters to the operation of those power plants.<sup>154</sup>

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<sup>153</sup> With the exception of CHP and RES power plants with installed capacity of  $\leq 400\text{kW}$  (this capacity will become  $\leq 200\text{kW}$  starting from 2026), innovative projects installed by the Centre for Renewable Energy Sources and Saving, universities and research institutes receive operating Aid based on a Feed-in-Tariff that is the same with the reference tariffs in **Table 4** per technology or per project if the reference tariff is the result of a competitive tender process. The reference tariffs for PVs of less than  $500\text{kW}$  are calculated using the methodology of **Table 6**. PVs that participate in the “Special program of PV system development in building installations and in particular on the rooftops of buildings” are also exempted and are granted operating Aid based on the provisions of that program.

<sup>154</sup> *Απελευθέρωση αγοράς ενέργειας, εκσυγχρονισμός της ΔΕΗ, ιδιωτικοποίηση της ΔΕΠΑ και στήριξη των Α.Π.Ε. και λοιπές διατάξεις. [Energy market liberalization, PPC modernization, DEPA privatization and RES support and other provisions.]*, 8292–93.

**Table 15** presents the number of power plants, the installed capacity and the electricity generation per electric power system of the RES in NII for 2018. Apart from the data available in the table, there is one small-hydro power plant with installed capacity of 300 kW and 257,150 kWh of electricity generation. There also a biomass power plant with installed capacity of 999 kW and 3,611,880 kWh of electricity generation. In addition, one CHP power plant with installed capacity of 400 kW and 370,820.91 of electricity generation and 281 PVs that use net-metering.<sup>155</sup>

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<sup>155</sup> The data are available online at: <https://www.deddie.gr/el/themata-tou-diaxeiristi-mi-diasundedemenwn-nisiwn/agora-mdn/stoixeia-ekkathariseon-kai-minaion-deltion-mdn/statistika-stoixeia-ilektrikwn-sustimatwn-sta-mdn/paragogi-energeias-ape-mdn/>

Table 15 Statistical data on RES power plants located in Non-Interconnected Islands per electric power system (2018)

List of electrical systems in NII and the islands that belong to each system			Wind farm electricity production in NII in 2018 (kWh)			Fixed-tilt PV electricity production in NNI in 2018 (kWh)			Tracker PV electricity production in NNI in 2018 (kWh)			Rooftop PV electricity production in NNI in 2018 (kWh)			Total Installed capacity & electricity production in 2018 in NII	
			Power plants	Installed Capacity (kW)	Electricity Production (kWh)	Power plants	Installed Capacity (kW)	Electricity Production (kWh)	Power plants	Installed Capacity (kW)	Electricity Production (kWh)	Power plants	Installed Capacity (kW)	Electricity Production (kWh)	Total Installed Capacity of RES (kW)	Total electricity production (kWh)
	Electric Power System	Island														
1	Ag Efstratios	Ag Efstratios	1	20	0								0	20	0	
2	Agathonissi	Agathonissi														
3	Amorgos	Amorgos				3	294	445.800				3	15	23.565	308	469.365
4	Anafi	Anafi														
5	Antikythera	Antikythera														
6	Arkoi	Arkoi														
		Marathi														
7	Astypalaia	Astypalaia				4	319	518.585				6	30	46.766	349	565.351
8	Gavdos	Gavdos														
9	Donoussa	Donoussa														
10	Ereikoussa	Ereikoussa														
11	Thera	Thera				2	249	433.456				75	364	559.138	613	992.594
		Thirasia														
12	Ikaria	Ikaria	2	985	2.282.996	3	399	674.564				19	94	144.376	1.477	3.101.936
13	Karpathos	Karpathos	3	1.225	1.612.643	15	1.022	1.634.271	2	139	208.120	5	25	39.727	2.411	3.494.760
		Kasos														
14	Crete	Crete	39	200.290	512.715.128	582	43.440	66.958.195	465	34.853	67.901.909	1.945	17.386	26.207.290	295.969	673.782.522
15	Kythnos	Kythnos	2	665		3	238	399.297							903	399.297
16	Kos - Kalymnos	Kos	4	15.200	36.342.111	71	6.691	10.607.675	21	2.087	3.570.341	143	702	1.072.145	24.680	51.592.272
		Pserimos														
		Gyali														

		Kalymnos														
		Leros														
		Leipsoi														
		Telendos														
		Nisyros														
		Tilos														
17	Lesbos	Lesbos	5	13.950	28.381.920	108	7.094	10.970.859	25	1.744	3.169.143	41	194	271.089	22.982	42.793.011
		Megalonisi														
18	Lemnos	Lemnos	3	3.040	7.129.335	23	1.374	2.059.418	9	515	836.390	6	29	65.822	4.958	10.090.965
19	Megisti	Megisti														
20	Milos	Milos	3	2.650	5.830.260	5	499	830.760	2	119	188.959	15	74	109.028	3.342	6.959.007
		Kimolos														
21	Othonoi	Othonoi														
22	Patmos	Patmos	1	1.200	2.695.875	1	150	220.314				8	39	47.450	1.389	2.963.639
23	Rhodos	Rhodos	5	48.550	89.200.980	163	12.953	19.626.369	53	5.211	11.119.408	248	1.211	1.828.388	67.926	121.775.145
		Halki														
24	Samos	Samos	6	8.375	18.712.279	57	3.975	6.250.432	6	398	733.598	6	29	43.748	12.777	25.740.057
		Fournoi														
		Thymaina														
25	Serifos	Serifos				1	100	164.440				9	40	57.609	140	222.049
26	Sifnos	Sifnos				2	203	327.366				36	178	261.478	380	588.845
27	Skyros	Skyros				4	318	444.840				5	25	38.217	342	483.057
28	Symi	Symi				3	190	255.156							190	255.156
29	Chios	Chios	14	9.075	9.765.720	50	4.674	7.195.308	5	499	904.314	334	1.629	2.396.001	15.878	20.261.343
		Oinousses														
		Psara														
Total:			88	305.225	714.669.247	1.100	84.180	130.017.106	588	45.566	88.632.182	2.904	22.062	33.211.838	457.034	966.530.373

Source: HEDNO (2019)

## 2.16 Operating aid in the case of CHP and RES power generating facilities that receive investment aid

In the case that a RES or CHP power station receives investment aid or any other equivalent capital aid, the operating aid revenue that it receives in the form of Feed-in-Tariff or Feed-in-Premium is depreciated by an amount that is being calculated on the basis of a “Capital Discount Factor”.<sup>156</sup> The “Capital Discount Factor” applies to the amount of investment aid that is received by the RES or CHP power plant.<sup>157</sup> The annual return of capital, on the basis of which the operating aid is depreciated, is calculated by the following formula:

$$ADOA = CDF \times IA$$

Where:

ADOA: Annual Depreciation of operating aid (€)

CDF: Capital Discount Factor (%)

IA: Investment Aid (€)

The owner of the CHP or RES power plant that receives operating aid, has the obligation to declare to the Competent Market Operator the amount of investment aid that it received prior to the station’s start of operation, either commissioning or commercial operation. If the station is already operational then he has to submit the above-mentioned declaration before the next monthly period of settlement of the transactions and granting of operating aid to the station. If the station fails to declare the investment aid or makes an inaccurate declaration or fails to update the declaration in the case that amendments occur, then it would be subject to a three times larger depreciation of the operating aid that it receives in a monthly time period as it is calculated by the above equation. This penalty is granted for a time period equal to the period that the investment aid hasn’t been declared at all or declared inaccurately since the start of the operation of the station.<sup>158</sup>

The process of depreciation of the revenues from the operating aid is conducted by discounting the Annual Depreciation of operating aid on a monthly basis to the

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<sup>156</sup> This rule doesn’t apply to RES or CHP power generating facilities that have received investment aid in the framework of European funding programs.

<sup>157</sup> *Απελευθέρωση αγοράς ενέργειας, εκσυγχρονισμός της ΔΕΗ, ιδιωτικοποίηση της ΔΕΠΑ και στήριξη των Α.Π.Ε. και λοιπές διατάξεις. [Energy market liberalization, PPC modernization, DEPA privatization and RES support and other provisions.]*, 8276–77.

<sup>158</sup> *Ibidem*

corresponding clearing cycle of the operating aid contracts with a fixed tariff and the contracts for Differential State Aid Support if such is provided in those contracts. The Capital Discount Factor (CDF) is calculated for each CHP or RES power generating facility and for each Investment Aid that has been granted to those facilities using the formula:

$$CDF = \frac{r_{discount} \times (1 + r_{discount})^t}{(1 + r_{discount})^t - 1}$$

Where:

*r<sub>discount</sub>*: The discount rate (IRR) which is used to calculate the reference tariff of each category of RES and CHP power plant

t: The remaining annual duration of operating aid received by the power plant from the time of the payment of each investment aid.

The percentage of the discount rate that is used to calculate the Capital Discount Factor is the one that applies at the time of the payment of the investment aid.

**Table 13** provides the discount rates for various categories of power generating installations:

**Table 13 Indicative discount rates (%) that are used to calculate the Capital Discount Factor (CDF) for power plants that receive operating aid per category of installation**

Installation Category		<i>r<sub>discount</sub></i> (IRR)
<b>1a</b>	Wind energy that is produced by land-based power plants with installed capacity of 3MW or more, which are not eligible for operating aid through a competitive bidding process in accordance with the applicable legislation	7%
<b>1b</b>	Wind energy that is produced by land-based power plants with installed capacity bigger than 60kW and less or equal of 3MW	7,5%
<b>1c</b>	Wind energy that is produced by land-based power plants that fall into a special category and are included in the Table 3 of the decision 904/2011 as it is modified by decisions 155/2012 and 452/2015 of RAE	7%
<b>2</b>	Wind energy that is produced by land-based power plants of installed capacity of 60kW or more, up to 6MW that are part of Energy Communities <sup>159</sup>	8%
<b>3</b>	Hydro energy that is produced by small hydroelectric power plants of installed capacity of ≤3MW <sub>e</sub>	9%
<b>4</b>	Hydro energy that is produced by small hydroelectric power plants of installed capacity of 3MW, up to 15MW <sub>e</sub>	9%

<sup>159</sup> As defined in law 4513/2018

<b>5</b>	Biomass (or bioliquids) that is used to produce electricity through thermal conversion (combustion, pyrolysis) without using biomass gasification process by power plants of installed capacity of $\leq 1\text{MW}$ (with the exception of biodegradable fraction of municipal waste)	9%
<b>6</b>	Biomass (or bioliquids) that is used to produce electricity by using biomass gasification process by power plants of installed capacity of $\leq 1\text{MW}$ (with the exception of biodegradable fraction of municipal waste)	9%
<b>7</b>	Biomass (or bioliquids) that is used to produce electricity by using thermal conversion (combustion, pyrolysis and gasification) by power plants of installed capacity of $1\text{MW}$ up to $\leq 5\text{MW}$ (with the exception of biodegradable fraction of municipal waste)	9%
<b>8</b>	Biomass (or bioliquids) that is used to produce electricity by using thermal conversion (combustion, pyrolysis and gasification) by power plants of installed capacity $> 5\text{MW}$ (with the exception of biodegradable fraction of municipal waste)	9%
<b>9</b>	Gases originating from landfills and sewage treatment plants and biogas that is captured from the anaerobic digestion of biodegradable fraction of wastes and the organic matter of biological treatment that are being utilized to produce electricity by power plants of installed capacity of $\leq 2\text{MW}$	9%
<b>10</b>	Gases originating from landfills and sewage treatment plants and biogas that is captured from the anaerobic digestion of biodegradable fraction of wastes and the organic matter of biological treatment that are utilized to produce electricity by power plants of installed capacity $> 2\text{MW}$	9%
<b>11</b>	Biogas that is captured from the anaerobic digestion of biomass and is utilized to produce electricity by power plants of installed capacity of $\leq 3\text{MW}$	10%
<b>12</b>	Biogas that is captured from the anaerobic digestion of biomass and is utilized to produce electricity by power plants of installed capacity of $> 3\text{MW}$	9%
<b>13</b>	Solar energy that is used to produce electricity by solar thermal power plants without a storage system	9%
<b>14</b>	Solar energy that is used to produce electricity by solar thermal power plants with a storage system that ensures at least 2 hours of operation at nominal load	9%
<b>15</b>	Geothermal energy that is used to produce electricity by power plants of installed capacity $\leq 5\text{MW}_e$	10%
<b>16</b>	Geothermal energy that is used to produce electricity by power plants of installed capacity $> 5\text{MW}_e$	10%
<b>17</b>	Other RES power plants (including the power stations that produce electricity by biodegradable fraction of municipal waste that are not included in any of the categories of this table but comply with the standards of EU legislation)	10%
<b>18</b>	CHP that utilizes natural gas of capacity of $\leq 1\text{MW}$ for plants that use the "Combined cycle gas turbine with heat recovery" and "Steam condensing extraction turbine" technologies	10%

19	CHP that utilizes natural gas of capacity of $\leq 1$ MW for plants that do not use <sup>160</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
20	CHP that utilizes natural gas of capacity of $> 1$ MW and $\leq 5$ MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
21	CHP that utilizes natural gas of capacity of $> 1$ MW and $\leq 5$ MW for plants that do not use <sup>160</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
22	CHP that utilizes natural gas of capacity of $> 5$ MW and $\leq 10$ MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
23	CHP that utilizes natural gas of capacity of $> 5$ MW and $\leq 10$ MW for plants that do not use <sup>160</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
24	CHP that utilizes natural gas of capacity of $> 10$ MW and $\leq 35$ MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
25	CHP that utilizes natural gas of capacity of $> 10$ MW and $\leq 35$ MW for plants that do not use <sup>160</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
26	CHP that utilizes natural gas of capacity of $> 35$ MW for plants that use the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
27	CHP that utilizes natural gas of capacity of $> 35$ MW for plants that do not use <sup>160</sup> the “Combined cycle gas turbine with heat recovery” and “Steam condensing extraction turbine” technologies	10%
28	Other CHP	9%
29	Solar energy that is utilized by photovoltaic power stations with installed capacity $< 500$ kW	-
30	Solar energy that is utilized by photovoltaic power stations that belong to Energy Communities with installed capacity of $\leq 1$ MW or to farmers with installed capacity of $< 500$ kW	-

Source: Law 4414/2016 & Ministerial Decision ΥΠΕΝ/ΔΑΠΕΕΚ/25511/882

By a decision of the Minister of Environment and Energy the discount rates of the table may change. The Minister may also set the discount rates for new categories of

<sup>160</sup> a) Backpressure steam turbine, b) Gas turbine with heat recovery steam generator, c) Reciprocating internal combustion engine, d) Micro-turbine, e) Stirling engine, f) Fuel cell, g) Steam engine, h) Rankine organic cycle, i) Any other type of technology or combination of that falls under the definition of cogeneration



installations. By the same decision, the process of determination of the discount rates for the CHP and RES power plants that participate in competitive tenders, can be set.

## Chapter 3: Thesis conclusions

The aim of this thesis was to analyze the key provisions that regulate the state aid received by RES power plants in Greece. In this regard the first chapter of this research examined the key elements of EU regulation since it was the basis for the new operating aid scheme for RES, implemented by the EU Member States. Directive 2009/28/EC didn't include any detailed provisions regarding their design, but the Member States were allowed to apply RES support schemes with a lot of freedom in order to achieve their national binding RES target for 2020. However, these support schemes had to be compliant with Articles 87 and 88 of the Treaty Establishing the European Community on state aid. To prevent any misuse of the legislative measures provided in the Renewable Energy Directive, in June 2014 the European Commission, introduced concrete provisions, that the Member States were required to follow in designing their national RES support schemes. In principle, these provisions, the Guidelines on State aid for Environmental protection and Energy 2014-2020 (EEAG), ensure equal conditions of competition and a uniform application of state aid schemes throughout the EU. The chapter, among other issues, examined the cases where EEAG apply as well as the criteria used by the European Commission to determine if the state aid granted to RES projects is compliant with the Guidelines. In addition, the chapter studied the Renewable Energy Directive (EU) 2018/2001 which is part of the Clean Energy for All Europeans package. The Directive not only updated the EU climate targets for 2030 but also established new rules that concern the operating aid for RES such as the opening of the support schemes to cross-border cooperation, provisions that prevent retroactive changes to the support schemes for the stations that already receive operating aid and clear rules, based on the EEAG, that regulate the way that the operating aid is granted to the RES power plants. The plants that wish to receive operating aid must now participate in competitive tenders, any state aid granted to those stations is now based on market mechanisms, except for small-scale installations which can still receive operating aid based on Feed-in-Tariffs. The chapter concluded by analyzing the details of transposition of the Directive 2009/28/EC as well as the challenges that arise from the transposition of the Renewable Energy Directive (EU) 2018/2001 into Greek legislation.

In the second chapter, the research focused on specific articles of law 4414/2016, which is the main legislature framework that regulates the state operating aid granted to RES projects in Greece. In detail, it examined the methodology for the calculation of the operating aid received by the power plants that have concluded Differential State Aid Support Contracts under which they are granted operating aid based on a sliding Feed-in-Premium. It also studied the participation of those stations in the Greek Electricity Market, these stations can participate in the market either by themselves,

by being represented by aggregators or by the aggregator by the last resort. It also noted the two basic obligations of those power plants which are the accurate forecast of the load that they are going to declare in the day-ahead schedule and inject it in the electricity system the next day on the basis of the Transitory Mechanism for the Optimal Forecasting Accuracy as well as their balancing responsibilities through participation in the intraday electricity market. In the same chapter, the research examined the methodology for the calculation of the Market Access Premium, a transitional grant for the power stations that were successful during the competitive tender procedures. Furthermore, it analyzed the details of the participation of the RES power plants in the competitive tender procedures by using the pilot competitive tender for RES, that was held in 2016, as a case study. The second chapter concluded by recording the results of all the competitive auctions for RES since the pilot tender of 2016 and up to 2019 as well as demonstrate the plans for competitive tenders in Greece for 2020.

Taking everything into consideration, this thesis achieved its aim in answering its research questions, providing a deeper dive into the current operating aid Scheme for RES in Greece, as it was adopted in 2016, and highlighting the influence of the EU legislation that was the basis for the drafting of the national legislative framework that regulates the above-mentioned support scheme. The current scheme is expected to be the last operating aid scheme for Greece for the main renewable technologies (solar, wind), at least concerning electro-production and not capacity, as the rapid decrease of the levelized cost of energy of those renewable technologies, enable them to participate in the wholesale market without any subsidy. Renewable units are expected to have a crucial role in the portfolio of energy utilities, enrolled with full market participation and balancing responsibilities. However, the operating scheme, which is linked with capacity auctions, is expected to last for few years during the current decade. Therefore, this research may be found useful to investors, government actors, academics and other stakeholders that wish to play an active role in the RES sector of Greece.

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