Cross-border electricity trade

The case of Greece

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I hereby declare that the work submitted is mine and that where I have made use of another’s work, I have attributed the source(s) according to the Regulations set in the Student’s Handbook.

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ABSTRACT

This dissertation was written as part of the MSc in Energy Law, Business, Regulation and Policy at the International Hellenic University. Cross-border electricity trade between European Union’s Member-States has been developed significantly during the last decade and it has proven to be a significant part of the overall European energy strategy. The aim of my dissertation is to explore the regulatory framework of the Greek cross-border electricity trade and the prospects of Greek interconnections with neighboring countries from the perspective of the EU law. Firstly, it is explained why electricity transactions may have a positive effect on the electricity markets of the Member-States. Additionally, an overview of the European regulatory framework on electricity cross-border transactions with an emphasis on Regulation 714/2009/EC is provided. Afterward, an analysis of the Greek Regulatory framework takes place and the procedure of electricity imports and exports in the Greek borders is analyzed. In the end of my dissertation, it is concluded that the cross-border electricity trade in the Greek borders abstains significantly from what it is considered the ideal in the European regulatory framework. However, given that electricity market in Greece is in a transitional phase, these inconsistencies are expected to be minimized progressively in the long-term.

Keywords: electricity, trade, cross-border, EU, Greece

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INTRODUCTION

Since the times of the historical electricity-related discoveries of the 18th century, electric power has progressively gained a vital role in the function and the structure of modern societies and economies. Electricity is not anymore a luxury for the few but an important stone in the building of the socioeconomic system and as such, it tends to penetrate more and more in sectors such as trading markets. This penetration has become more intensive, especially after the liberalization process of the wholesale electricity market initiated in the USA with the Public Utilities Regulatory Policies Act of 1978⁵ and in Europe with the 1987 Single European Act². However, what consists a trend about electricity trade nowadays more than ever, it is the systematic effort in the European Union’s context to move from nationals or regionals electricity markets to a common electricity market characterized by continuous cross-border electricity transactions between Member-States (Internal Energy Market).

Despite the increased cross-border electricity transactions in EU (around 10% of gross production in 2011)³, electricity trade cannot be treated as a usual commodity due to its physical properties. Firstly, electricity cannot be stored in large volumes and thus, it must be consumed continuously, meaning that consumption must be equal to the demand at any given point in time. As it is normal, this physical property of electricity calls for a well-balanced electricity market and creates extremely volatile prices, while once inserted in the electricity power pool or transmission system, electricity produced by one generator is indistinguishable from the electricity produced by a different producer⁴. Another particularity of electricity consists the fact that for electricity deliveries to be realized, a developed transmission/distribution grid and

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interconnections are demanded so as not only electric power to be delivered from one point to another, but also technical grid problems and congestion constrains to be avoided.

From a legal point of view, electricity trade differs from the trade of other commodities because «international sales of electricity present unique problems that are different from those presented by the usual international sales of goods. For this reason, the CISG (Convention on the International Sale of Goods) does not apply to the sales of electricity»\textsuperscript{5}. Due to the fact that electricity consists an extraordinary commodity, there is a whole discussion in theory about the qualification of electricity as a good or as service. Since 1994 the European Court of Justice, in the case C-393/92 (Gemeente Almelo v. Energiebedrijf Ijsselmi) accepted that electricity is a good and, thus, the principle of the free movement of goods is applicable in the case of electricity trade. In the Greek Civil Code (article 947), electricity is also recognized as a commodity. On the other hand, the nature of electricity as a service and especially as Public Service Obligation (PSO) is indisputable. An interesting opinion which enlightens the ambiguous legal qualification of electricity is that claiming that electricity in electricity supply activities is qualified as a commodity, while electricity production, transmission and distribution are qualified as services\textsuperscript{6}.

Given the particularities of cross-border electricity trade in comparison to the international trade of other commodities, the present dissertation aims at featuring the most important aspects of European Union’s (EU) policies and legislation on cross-border electricity trade, while a case study of the legislative regulation of Greek electricity transactions with neighboring countries is provided too. Specifically, the document is divided into two parts. In the first part, the European legislative approach on electricity transactions between the Member-States and the idea of the Internal Energy Market (IEM) are explained and assessed. In the first chapter, the interrelation of the cross-border electricity trade concept with the three pillars of EU energy policy is analyzed and evaluated. In the same chapter, the prerequisites for effective electricity transactions between the Member-States are listed. Next, in another


chapter, the legislation concerning the software (legislation) and the hardware (interconnections) of electricity trade is analyzed. A great emphasis is given on the so-called Third Liberalization Package and the role of ACER and ENTSO-E. In the chapter that follows, the notion and the benefits of the Target Model are commented briefly. In the second part of this paper, the Greek case is explained. Firstly, the importance of electricity transactions for the Greek electricity market is analyzed. Afterward, an introduction to the Greek electricity wholesale market is provided. Next, the Greek legislation on cross-border electricity trade and the role of the Greek National Regulatory Authority (RAE), of the Transmission System Operator (TSO) and of Market Operator (LAGIE) are analyzed. In the next chapter, the existing Greek interconnections are presented and assessed. Following this evaluation, the prerequisites for participation in cross-border electricity transactions as a merchant in Greece are listed. In the final chapter of the document, a comparison of the Greek cross-border electricity transactions’ market and the EU electricity market vision is provided and some conclusions are presented.
1. CROSS-BORDER ELECTRICITY TRADE: AN IMPORTANT DIMENSION OF EU ENERGY STRATEGY

The implementation of a common procedure regarding cross-border electricity transactions consists an important dimension of EU’s energy strategy. Security of supply, decarbonization and competitiveness are the cornerstones of EU’s energy policy. What is under examination, it is the effect of the concept of an integrated energy market with increased cross-border electricity transactions on each of these pillars. The prerequisites for effective cross-border electricity trade must be investigated too.

1.1 The three pillars of EU energy policy & cross-border electricity trade

The adoption of common energy rules has been a key feature of the European Union’s policies from the very beginning, as the content of the two original Treaties reveals, namely the Treaty establishing the European Coal and Steel Community regulating the market of coal and steel and the Euratom Treaty about nuclear energy. Moving to the present, the vision of an Energy Union in EU with common priorities and targets has not been abandoned. On the contrary, it is further detailed in the Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, according to which: «The goal of a resilient Energy Union with an ambitious climate policy at its core is to give EU consumers - households and businesses - secure, sustainable, competitive and affordable energy»\(^7\). In order to achieve these goals an «integrated continent-wide energy system where energy flows freely across borders, based on competition and the best possible use of resource»\(^8\) must be considered a fundamental prerequisite. Thus, the effect of electricity transactions between Member-States on the vision of secure, sustainable and competitive electricity must be examined.

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\(^8\) See supra note 7, pp. 2.
1.1.1 Security of Supply
Establishing an Energy Union where continuous cross-border electricity trade takes place, is considered by the European Commission to be an important tool for achieving its energy-related objectives. Specifically for the case of energy security, historically, the first electricity interconnections were constructed in order to face situations of high electricity demand and decreased national electricity production (emergency situations). In situations like these, coordinated electricity exchanges with neighboring countries are vital, as the Italian blackout in 2003 has proved. Besides, access to a broader portfolio of electricity power plants strengthens the reliability of national electric systems by increasing the required production capacity in cases of national shortages. Additionally, as it is expected, electricity generation mix between neighboring countries differ and, thus, cross-border transactions provide access to a variety of generation mix, increasing the system’s reliability. A recent example of this policy took place in 2013 when Belgium imported electricity to face the temporary shutdown of its nuclear reactors. To sum up, cross-border electricity transactions increase national systems reliability by diversifying the energy portfolio geographically and by fuel type. However, it must be noted that electricity transactions between Member-States contribute in achieving security of electricity supply, but only under the condition that there are adequate interconnections and coordinated policies between the Member-States concerned. In every case, the concept of national security of supply and autonomy and the perception that a State should be the guarantor of its supply should not be totally overlooked.

1.1.2 Sustainability
Regarding the transition to a low carbon economy through the penetration of renewable energy (RE) in the energy mix and the increase in energy efficiency in the Union, cross-border electricity trade may be a valuable tool. First of all, the production of electricity from wind and solar is characterized by high intermittency and, thus, RE increases significantly the instability of national electricity systems. Access to a wider
portfolio of power plants, over a wider geographical area through cross-border electricity transactions would be a decisive response to the intermittency problem of RE. Other solutions to intermittency problem may be accompanied by important disadvantages, such as the capacity mechanisms, which not only distort the market but also contradict the objective of reducing the subsidies to fossil fuel power plants. In addition, given that solar and wind generation profiles in many cases can be complementary, cross-border electricity transactions «over large distances has the potential both to smooth output variability and reduce the forecasting errors associated with wind and solar power»\textsuperscript{11}. However, it must be noted that if cross-border electricity trade is not combined with coordinated environmental policies, electricity trade may give broader access to the consumption of cheap energy produced by pollutant fossil fuels such as by coal or even shale gas.

Furthermore, cross-border trade can have an important effect on the increase of energy efficiency. Specifically, seasonal variation in both demand and production between neighboring Member-States means that excess electricity produced in Northern Europe during summer can be used to cover summer peaks in Southern Europe due to air-conditioning (and vice versa) limiting the operation of extra power plants in Southern Europe. Accordingly, Member-States with a large amount of hydro capacity may have excess supplies available during spring, which can be used for exports reducing total required generation capacity in neighboring countries\textsuperscript{12}. According to International Energy Agency (IEA): «In European countries, synchronous peak demand was 5% lower in 2011 than peak demand of each country taken separately. This gives an order of magnitude of possible gains from a regional approach towards generation adequacy»\textsuperscript{13}.

1.1.3 Competitiveness
Competitiveness and affordability of electricity prices in Europe are claimed to be favored by cross-border electricity trade. To be more specific, according to a 2013

\begin{footnotesize}
\textsuperscript{11}See supra note 3, pp. 19.
\textsuperscript{12}See supra note 4, pp. 8.
\textsuperscript{13}See supra note 3, pp. 17.
\end{footnotesize}
report prepared for the European Commission’s Directorate-General for Energy, the estimated benefits of full electricity market integration are expected to reach between EUR 12.5 billion and EUR 40 billion per year\textsuperscript{14}. This can be explained not only by the fact that in a wider geographic area the scope for possible import and export transactions is multiplied, leading to favorable conditions for a competitive electricity market, but also because cheap energy from the generation plant with the lowest marginal costs in the interconnected system is used. Besides, as it was analyzed, electricity trade results in reducing the overall system costs by taking advantage of the complementarities in demand differences between electricity systems. Despite these arguments, there is a debate over the positive effect of electricity trade on electricity prices. The possibility to increase electricity prices in exporting countries due to exports explains the worries in jurisdictions with cheap electricity prices that electricity trade will raise national prices raising profitability for producers at the expense of their consumers. Similarly, in jurisdictions with cheap electricity for large electricity-intensive industries, there may be a reluctance to export electricity at the expense of the trade dislocation caused by a potential reduction in electricity-intensive manufacturing export\textsuperscript{15}.

Additionally to the interrelation between EU energy targets and cross-border electricity trade, it is to note that electricity transactions in the internal of EU include important benefits from a political point of view promoting tighter political relations between the Member-States and, thus, facilitating the implementation of speaking with one voice in external policy concept\textsuperscript{16}. Furthermore, from a financial perspective, extensive electricity transactions means that the market where the electricity is produced is enlarged and, thereby, the market risks are reduced favoring investments in large-size projects.


\textsuperscript{16}For more information on the concept see at: European Commission (2014) Energy security: Commission puts forward comprehensive strategy to strengthen security of supply. IP/14/606, Brussels, Belgium.
1.2 Prerequisites for effective cross-border electricity trade

As it has been analyzed in the previous section, cross-border electricity trade may have a major contribution in the realization of EU Energy Strategy. However, increased cross-border electricity transactions do not guarantee the positive results described. On the contrary, a lot of prerequisites must be full filled in order not only European energy targets to be achieved through electricity transactions, but also the volumes of electricity traded in the EU to be further increased. To start with, electricity is a commodity with special features. One of these features is that electricity trade is network-dependent meaning that for electricity imports/export not only interconnections are demanded (as electricity does not flow across pre-existing electrical boundaries), but also interconnections with adequate transmission capacity are demanded. Consequently, network infrastructure investments must be regularly realized to permit increased electricity transactions. According to a 2013 analysis, cost optimal trading within the EU would require to 76% more transmission capacity\textsuperscript{17}. This percentage occurs not only because transmission capacity facilitates cross-border trading, but also because loop flows hinder transactions by creating congestion, which may be internal to a country, meaning that cross-zonal capacity is affected by the capacity of the internal network. Thus, the existence of network infrastructure is fundamental for cross-border electricity trade to be developed.

Another important barrier to the further increase of cross-border electricity trade could be the reluctance of countries to import energy, in order to limit their dependence on their neighbors. The possible unwillingness of Member-States to abandon their energy-related competence and the discrimination between internal and cross-zonal exchanges can lead not only to limited investments in electricity network infrastructure, but also to the limited implementation of EU energy policies hindering the establishment of a strong Energy Union and the adoption of the solidarity clause\textsuperscript{18}. The case of the Swedish transmission system operator (TSO) who

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\textsuperscript{17} See supra note 15, pp. 4.

\textsuperscript{18} «Solidarity clause: The Member-States to reduce the dependence on single suppliers and fully rely on their neighbours, especially when confronted with energy supply disruptions» [European Commission (2015) Energy Union: secure, sustainable, competitive, affordable energy for every European. IP/15/4497 Press Release, 2015, p.1]
limited the interconnections capacities in order to avoid internal congestion is an example of such unwillingness\textsuperscript{19}. Thus, electricity trade between Member-States can be promoted only when the States involved are willing to respect and implement the policies of EU energy Strategy. However, despite the existence of adequate interconnectors and despite the willingness of neighboring States to be involved in extensive electricity transactions, the coordination of national legislations is the most fundamental prerequisite for efficient cross-border trade. The harmonization of inconsistent national rules would importantly facilitate imports/exports of electricity and make them more appealing to possible importers/exporters. Additionally, a common legislative framework would increase the efficiency of European transmission system. That is especially true for the case of cross-zonal capacity calculation-allocation rules and for congestion management rules, which if not coordinated between the involved States can lead to inefficient use of existing transmission networks. In ACER’s report, it is specifically mentioned that «the evolution of physical congestions ... may not be suitable to be resolved solely by investments... A framework is needed that allows the configuration of appropriate bidding zones to adapt to changes in the evolution of congestions».\textsuperscript{20} Except the coordination of technical rules, the coordination of reliability and security rules would increase visibility and investment incentives promoting electricity imports and exports. Competition policies between Member-States must be also coordinated. In the case that competition policy enforcement is weaker in a State than another, there are concerns that there may be distortions in electricity markets. However, concerning the EU, which has established a pan-European competition policy, such problems could be handled. On the contrary, a possible barrier to cross-border trade is the different level of electricity markets privatization between the States. It is suggested that privatization has the potential to facilitate higher cross-border trade. It is also shown

\textsuperscript{19}Commission Decision No. 39351/2010 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement, Case 39351- Swedish Interconnectors.

that the age of privatization has a positive impact on cross-border trade. Besides, the high concentration of market power in the hands of few utilities and insufficient unbundling may have an adverse effect on the access to networks and, thus, to electricity trade. Thus, regulatory issues are the reason why the full implementation of the so-called Third Liberalization Package in all Member-States is a prerequisite for the further development of cross-border trade.

Finally, the establishment of independent institutions supervising the imports/exports procedure may have a crucial contribution to the proper function of the electricity trade. According to IEA «Integrated markets require integrated institutions. Institutional design remains fundamental to developing and sustaining competitive electricity markets as the resulting neutrality and transparency support economic decision-making across the integrated market».

Consequently, the establishment of ACER and ENTSO-E are considered to be fundamental for the development of cross-border electricity trade in EU. Their role and their competencies are analyzed in the next Chapter.

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22 See supra note 3, pp. 34.
2. LEGAL ASPECTS OF EU CROSS-BORDER ELECTRICITY TRADE

The Treaty on the Functioning of the European Union, the Regulations and the Directives of the three Liberalization Packages consist the main legal texts regulating the electricity imports(exports in the internal of the Union. Their provisions are analyzed in this chapter. In the first section, the three Liberalization Packages and the basic legislation on cross-border electricity trade are briefly presented. A special emphasis is given on Regulation 714/2009 and on ACER’s and ENTSO-E’s role. In the second section, the electricity networks’ legislation and the notion of Projects of Common Interest are shortly analyzed.

2.1 Treaty provisions on energy markets

The Treaty of Lisbon, which was entered into force in 2009, extends, for the first time in EU history, the Union’s competence in matters of energy. Specifically, the article 194 of the Treaty on the Functioning of the European Union lists the objectives of European energy policy. The fourth of these objectives is the promotion of the interconnection of energy networks between Member-States «in the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment»

23. Thus, under Article 194 it was introduced a specific legal basis regarding the energy sector. Consequently, the energy sector is established as one of the shared competences between the EU and its Member-States subjected, however, to the principle of subsidiarity24. The extenuation of EU energy competencies by the Lisbon Treaty is of great importance for the establishment of a coherent legal approach to EU cross-border electricity trade, as early European legislators had to rely on a varying mix of legal bases for EU energy policy.

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24 Under the principle of subsidiarity, in areas which do not fall within its exclusive competence, the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level [Consolidated version of the Treaty on the Functioning of the European Union (2012), OJ C 326/47, art. 5 par.3].
The development of EU electricity trade is also importantly facilitated by European competition law, which strictly regulates the internal energy market and substitutes the lack of a common European energy regulator to control the markets and the Member-States. Due to competition law, the Commission has extensive competencies in promoting the competition in electricity markets and, consequently, the liquidity in EU electricity trade. Interventions to promote network access such as UK-France interconnectors’ case\textsuperscript{25} and antitrust action in the field of long-term supply contracts consist indicative examples of Commission’s contribution to the development of cross-border electricity trade.

### 2.2 The three Liberalization Packages

The most important step to the establishment of a common electricity market in EU, where the cross-border electricity transactions would be flourishing, include the adoption of three legislative packages, called Liberalization Packages, initiated in 1996. The first legislative package includes the First Electricity Directive (Council Directive 96/92/EC). The provisions of the Directive 96/92/EC having an effect on the function of cross-border electricity trade into the Union include the designation of independent Transmission System Operators (TSOs) responsible for the control, maintenance, system development and connection to other systems. Additionally, the Directive stipulates the imposition of accounting and functioning unbundling on vertically integrated electricity undertakings (VIU)\textsuperscript{26}. Another important provision is the guarantee of free access to the transmission network for electricity producers and supply undertakings (third-party access), based on competition law and particularly on the theory of essential facilities (essential facilities doctrine).

Some years later, in 2003, the First Electricity Directive was replaced by the Council Directive 2003/54/EC which imposed stricter requirements on Member-States to introduce competition in their markets. Specifically, the Second Electricity Directive

\textsuperscript{25}European Commission (2001) \textit{UK-French electricity interconnector opens up, increasing scope for competition.} IP/01/341, Brussels, Belgium.

\textsuperscript{26}For more information on the different concepts of unbundling see: Energy Charter Secretariat (2015) \textit{The role of the Energy Charter Treaty in fostering regional electricity market integration: Lessons learnt from the EU and implications for Northeast Asia.} Brussels, Belgium, pp. 60.
imposed the legal unbundling of VIU. Additionally, it strengthened the concept of TPA by withdrawing the negotiated access and the single buyer option, instituted in the Council Directive 96/92/EC. Furthermore, the Directive established the obligation to National Regulatory Authorities to be independent of their energy stakeholders' interests. It is to note that in the Second Liberalization Package it is also included the Council Regulation 1228/2003/EC regarding cross-border exchanges in electricity.

The third Electricity Directive (Council Directive 2009/72/EC) was adopted by the Commission in 2009 and introduced the concept of ownership unbundling. It also calls for the implementation of a system of TPA to the transmission and distribution systems based on published tariffs, applicable objectively and without discrimination to all system users. Additionally, the article 6 of the Council Directive 2009/72/EC promotes electricity trade by asking to Member-States and NRA to «facilitate the cooperation of transmission system operators at a regional level, including on cross-border issues» and specifically NRAs to coordinate in order to enable the optimal management of the network and to develop network codes and rules governing the management of congestion. Finally, the Directive establishes the obligation for NRAs to have their own resources and separate annual budget allocation.

TPA and TSOs’ unbundling consist basic prerequisites for the development of competition in electricity markets, which in turn permits the realization of extended cross-border electricity trade. Given that electricity trade is network-dependent, open access to infrastructure in a non-discriminatory and transparent way is a prerequisite for electricity imports/exports increase. Similarly, the requirement of unbundling of national TSOs consists a guarantee of the non-discriminatory treatment of the network users. Finally, the establishment of NRAs which are characterized by functional and accountable independence guarantees competition conditions of high quality and promotes electricity imports/exports.

2.3 Regulation 714/2009: The core of cross-border electricity trade legislation

2.3.1 Regulation´s main provisions & Network Codes

Even if the three electricity Directives created the preconditions for liberalized and competitive electricity markets and, thus, for extended cross-border transactions, it
was the adoption of Council Regulation 1228/2003/EC and Council Regulation 714/2009/EC which included provisions exclusively on cross-border electricity trade in the Union. The legal instrument chosen (Regulation) is the one that is directly applicable in Member-States, in contrast to Directive, implying the intention of Commission to limit the discretion of Member-States regarding the regulated key-areas. The regime is based on the competence of EU to adopt measures for the establishment of the Internal Market according to article 194 of the Treaty on the Function of the European Union.

The most recent Council Regulation 714/2009/EC repeals the previous regulation and aims at setting fair rules for cross-border exchanges in electricity and facilitating the emergence of a well-functioning and transparent common wholesale market. As the regulation repealed, Regulation 714/2009/EC introduces inter-TSO compensation mechanism to compensate for costs of hosting cross-border electricity flows on their networks. Secondly, it encourages charging for network access but prohibits discriminatory and distance-related charges. It imposes publicity obligations to TSOs and information and confidentiality obligations to Member-States and NRAs. Additionally, the Regulation adopts some general principles of congestion management such as the prohibition of discriminatory market-based solutions and transactions based methods, the imposition of transaction curtailment procedures only in emergency situations and the use of revenues resulting from the allocation of interconnection only for specifically defined purposes. The Regulation shall be without prejudice to the rights of Member States to adopt detailed provisions.

What must be highlighted regarding Council Regulation 714/2009/EC, it is the introduction of the concept of network codes which was not included in Council Regulation 1228/2003/EC and which consist a valuable tool for the harmonization of rules for cross-border electricity trade. According to the articles 6 and 8 of Council Regulation 714/2009/EC, the network codes, meaning the set of common rules for all national networks, are designed by ENTSO-E accordingly to non-binding framework guidelines summited by ACER and approved by the Commission. The network codes shall cover 12 areas of network operations and can be distinguished in connection, 27

27 For ENTSO-E and ACER concepts see below.
operational and market codes\textsuperscript{28}. Network codes once finalized and adopted will have the status of any other European Regulation and will govern all electricity markets. The contribution of coherent European codes concerns the elimination of inconsistencies at national level leading to market segmentation and the realization of EU’s long-term vision for energy, such as the creation of a pan-EU transmission network. However, the full implementation of each network code requires a series of steps to be taken (i.e. national decisions, regional arrangements), as their implementation will cause some friction to the existing national approaches and «is likely to be a long-term project the results of which will be cumulative and not be available for some time»\textsuperscript{29}.

2.3.2 The establishment of ENTSO-E
A key component of the Regulation 714/2009/EC consists the establishment of the European Network of Transmission System Operators for electricity (ENTSO-E). ENTSO-E currently represents 42 electricity TSOs from 35 countries across Europe. Its mission is «to promote the completion and functioning of the internal market in electricity and cross-border trade»\textsuperscript{30}. The establishment of ENTSO-E is of great importance for the realization of the IEM, as the increased co-operation of TSOs via ENTSO-E will increase the degree of market harmonization and lead to better network and operational reliability and, thus, to increased electricity exchanges. Except from drafting network codes, ENTSO-E’s main tasks include (1) the adoption of a non-binding Community-wide ten-year network development plan, which regulates hardware issues such as optimized network planning, (2) the drafting of annual reports, (3) the drafting of generation adequacy outlooks, (4) the coordination of technical cooperation and (5) the coordination of research and development plans between TSOs \textsuperscript{31}.

\textsuperscript{28}ENTSO-E (2014) An Introduction to Network Codes & the Links between Codes, Brussels, Belgium, pp. 6.


\textsuperscript{30}Council Regulation 714/2009/EC, article 4.

\textsuperscript{31}For more information on ENTSO-E’s tasks see ENTSO-E’s webpage. Available from: https://www.entsoe.eu/about-entso-e/Pages/default.aspx
2.3.3 Guidelines
It is to note that in Annex I of the Regulation it is included a set of Guidelines regarding the allocation of available transfer capacity of interconnectors. According to these Guidelines, the EU Member-States are grouped based on their location in regions, in each of which a common coordinated congestion management method and procedure for the allocation of interconnection’s capacity shall be applied (bottom-up approach). Totally, there are seven regions and the distinction is based on the idea of the Regional Initiatives which were set up in 2006 by the European Commission and NRAs to foster the integration of energy markets at regional level. Greece belongs to the third group which includes countries such as Italy, Austria and Slovenia. However, except for the Guidelines attached to the Regulation 714/2009/EC as Annex, the article 18 of the Regulation gives the power to the Commission to adopt guidelines on a range of issues such as tariff calculation methods and inter-TSO compensation mechanisms.

The choice of the specific legal tool (Guideline) indicates the coordination approach adopted by the European legislator for the creation of an integrated electricity market instead of the consolidation one. However, the adoption of «soft law» measures such as Guidelines do not affect the binding character of their provisions. In the case of different interpretation of Guidelines by TSOs, the Commission has the power to amend Guidelines, enabling it to compel TSOs to comply with the questioned texts. Thus, the Guidelines do not rely for their effectiveness on the States’ willingness to cooperate. In that sense, Guidelines are not soft law.\(^\text{32}\).

2.3.4 The role of ACER
To close up with, apart from the Electricity Regulation, the Third Liberalization Package includes the Council Regulation 713/2009/EC establishing the Agency for the Cooperation of Energy Regulators (ACER), which replaced ERGEG. According to the Regulation, ACER’s main purpose is to assist NRAs and, where necessary, to coordinate their action. Thus, ACER works towards the completion of the single EU energy market. Its legal status is governed by the standard rules which apply to Community regulatory

agencies and its competencies are advisory and decision-making. Its advisory competencies include the establishment of framework-guidelines on conditions for access to the network for cross-border exchanges in electricity, the monitor of regional cooperation of TSOs and the provision of opinions upon request from the Commission. Additionally, ACER adopts individual decisions on technical issues and has the authority to grant exemptions from TPA to new major electricity interconnectors. It is to note that ACER received additional tasks under Council Regulation 1227/2011/EC (REMIT) and under Council Regulation 347/2013/EC. However, speaking from a legal point of view, ACER is vested with a limited degree of discretionary power. That is explained by Meroni doctrine, according to which European institutions cannot confer on a delegate powers different from those that the delegating authority itself received under the Treaty. Moreover, such delegation must be limited to implement powers clearly defined and entirely supervised.  

2.4 Legislation & the hardware of electricity trade

Cross-border lines have been characterized as the backbone structure for the European wide Internal Energy Market. Specifically for the case of electricity, adequate transmission lines and interconnectors are a prerequisite for electrons to flow from one country to another and that is the reason why the regulation of new investments on transmission lines may have a huge effect on cross-border electricity transactions. Recognizing the benefits of better interconnections, the European Commission adopted the 10% Interconnection Target to Member-States by 2020 and the 15% Interconnection Target by 2030. The legal basis of the 10% Interconnection Target could be found on article 170 par.1 of Treaty on the Function of the European Union according to which «...the Union shall contribute to the establishment and development of trans-European networks in the areas of...energy infrastructures». The main EU legal instrument for trans-European energy networks (TEN-E) is the Council Regulation 347/2013/EC on guidelines for trans-European energy

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infrastructure. The Regulation repeals Decision 1364/2006/EC, which laid down the general rules for the granting of Community financial aid in the field of TEN-E and aims to address effectively the EU’s energy infrastructure needs. Specifically, the Regulation sets out guidelines for the development and interoperability of priority corridors and energy infrastructure at European level by establishing 12 strategic regional groups for the construction of energy infrastructure with a cross-border dimension.

In order to succeed in its targets, the Regulation 347/2013/EC defines a special regime for projects which contribute to the priority corridors called «Projects of Common Interest» (PCIs). A project to be identified as a PCI must fulfill some criteria: (1) to be necessary for at least one of the energy infrastructure priority corridors and areas, (2) its potential overall benefits assessed according to specific criteria to outweigh its costs, (3) to involve directly or indirectly at least two Member States, and (4) to contribute significantly to sustainability and/or security of supply and/or competition. For the qualification of a project as a PCI, a bottom-up process takes place and once qualified as such the project grants financial support and other advantages such as faster and more efficient permission processes and improved regulatory treatment. The selected PCI are included in a list established every two years. It is to note that PCIs should be listed either as stand-alone PCIs or as a part of a cluster of several PCI. To close up with, the concept of PCI is expected to have a major contribution to the completion of the IEM.

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35 Regulation 347/2013/EC, article 4.
36 For more information see at: Commission Delegated Regulation 2016/89/EC.
3. European Target Model

European Target Model consists a fundamental part of the EU energy policy and an important step towards the establishment of the Internal Energy Market. The idea of Target Model is based on two main principles and focuses on six key areas. Both the principles and the key areas are briefly analyzed in this Chapter.

3.1 Target Model & its basic principles

An Internal Energy Market (IEM) demands the free flow of energy across EU without any technical or regulatory barrier. Thus, the establishment of the IEM requires «a fundamental transformation of EU’s electric system, including the redesigned of European electricity market»\(^{37}\). A decisive initiative towards the establishment of IEM is the concept of the European Target Model (TM) for electricity wholesale market design which was decided to be developed in 2008, by the European Electricity Regulatory Forum (Florence Forum). According to ENTSO-E «the implementation of the target models in gas and electricity is equivalent to the completion of the IEM»\(^{38}\).

Target Model is based on two broad principles: energy only regional markets (instead of capacity markets) and market coupling\(^{39}\). The implementation of the model follows a bottom-up approach through regional market coupling projects, while the establishment of the model a top-down approach through ENTSO-E’s and ACER’s network codes. The adoption of the Third Energy Package enhanced importantly the implementation of the Target Model whose basic principles are included in the Capacity Allocation and Congestion Management Regulation (Regulation 1222/2015/EC) and the Regulation 1719/2016/EC establishing a guideline on forward capacity allocation.


As mentioned, TM is based on market coupling. Given that there are various models for market coupling, price coupling is the model chosen by European regulators, meaning simultaneously determination of volumes and prices in all relevant zones, based on the marginal pricing principle\(^{40}\). Market coupling aims at the efficient use and allocation of cross-border capacity by equalizing prices between adjacent countries and allowing the lowest priced bids to be accepted up to the point that congestion limits further trade. Thus, market coupling maximizes the total economic surplus for all participants using a central algorithm. Additionally, market coupling allows electricity transactions to be conducted implicitly between the Member States, meaning that electricity and capacity are not sold separately\(^{41}\).

### 3.2 The six key areas of Target Model

Generally, TM focuses on 6 key areas, which once harmonized can lead to a complete IEM. These areas cover: forward, day-ahead, intraday and balancing markets, capacity calculation and governance. Regarding the harmonization of capacity calculation and allocation methods, TM proposes a flow-based allocation method in highly-meshed networks and alternatively the Available Transfer Capacity Method (ATC)\(^{42}\). TM also foresees the creation of a single platform for long-term transmission rights allocation (Physical of Financial Transmission Rights) as a financial hedging instrument. Regarding day-ahead capacity allocation, as analyzed, TM establishes a single market coupling mechanism according to which cross-border supply and demand bids are matched with the available cross-border transmission capacity automatically (implicit auction) creating price convergence. Additionally, TM envisages the establishment of an intraday cross-border market characterized by continuous implicit trading with gate closures at harmonized, pre-determined times. Regarding the establishment of a common balancing market, it is going to be regulated by the Network Code on

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\(^{41}\)See supra note 26, pp. 47.

Electricity Balancing, which, however, has not been adopted at the time of writing of this document. Finally, for the more effective governance of IEM, each Member-State has the obligation to define one or more Nominated Electricity Market Operators (NEMOs) «to perform in cooperation with TSOs single day-ahead and intraday coupling»\(^{43}\).

Despite its complexity, TM and market coupling are expecting to bring important benefits to EU energy consumers. Specifically, market coupling is estimated to save customers from €2.5 to 4 billion a year or about €5 to €8 per capita per year\(^{44}\), which is «2.6% of the value of 2012 wholesale demand, but more than 100% of the current gains from trade over the interconnectors»\(^{45}\). If the full integration of EU’s electricity market is achieved, the benefits could range from €12.5 billion to €40 billion per year by 2030\(^{46}\). It is argued that market coupling delivers total benefits that should substantially exceed the costs of the required market design changes. However, despite the financial benefits that TM presents and despite the fact that the TM was initially scheduled to be implemented until the end of 2014, market integration has not been yet totally succeeded. For example, intra-day allocation and shared balancing is still work in progress while, even if the share of market coupling at the day-ahead market rose from 60% in 2010 to 84% in 2015\(^{47}\), in some Member-States, such as Greece, market coupling is not applicable yet.

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\(^{43}\) Regulation 1222/2015/EC, article 7.


\(^{46}\) See supra note 44, pp. 89.

4. The case of Greece

The Greek wholesale electricity market design has a major effect on the national electricity transactions with the neighbouring counties. In this chapter, it is explained the importance of electricity imports/exports for the Greek electricity market. Additionally, the basic features of this market and the role of the three key-regulatory players (RAE, ADMIE, LAGIE) on cross-border issues are analysed. Finally, the preconditions on the participation in the national electricity market and, thereby, in exports/imports procedures are briefly explained.

4.1 Greece: An import-dependent country?

Electricity is the second-largest energy source in Greece, with a final electricity consumption of 50.787 GWh and net electricity imports equal to 18.9% (9.608 GWh) of final consumption for 2015 (in contrast to 4.3% for 2013 and to 8% for 2006). As it turns out, imports are an important source of electricity supply for Greece and that is especially true not only for the last two years, but also for the last fifteen years, during which interconnection capacity with neighbouring countries increased significantly. Specifically, Greece has been a net importer of electricity for all of its interconnections since 2001, importing a net 1.784 GWh in 2012, a net 2.100 GWh in 2013, a net 8.819 GWh in 2014 and a net 9.608 GWh in 2015. The fluctuations in the volume of electricity imported, i.e. from 2013 to 2014, are explained by a number of factors such as the abolishment of 30% rule for the Injection Offers of thermal units affecting the price of national production, the excess of electricity supply in some countries of the Balkan region (i.e. Romania) and the progressively reduced production of lignite fire plants. It must be noted that especially the last three years, electricity imports are

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48 For the sake of precise, this amount must be decreased almost 10% which is equal to the electricity consumption in the non-interconnected system of the country [ADMIE (2014) Ten-Year Network Development Plan 2015-2024. Athens, Greece, pp. 124 (in Greek)]. Non-interconnected system is independent and does not participate in electricity imports/exports.


made for economic reasons since the price of imported energy is lower than the production cost of domestic oil and natural gas plants\textsuperscript{51}.

However, irrespectively of price-competitiveness reasons, electricity imports in Greece are expected to increase significantly in the next years due to inefficiencies in national electricity production capacities. More analytically, even if the prolonged economic crisis has limited considerably the electricity demand in Greece (total electricity demand in 2015 amounted to the levels that were observed in 2004), it is expected that it will start to increase again, especially after the year 2020. As a consequence, for the period 2020-2021, there may be an increased likelihood for the production system not to meet adequately the load peaks, while from 2022 onwards the adequacy of the system is expected to depend largely on imports. The main reason of system adequacy problems consist the large-scale decommissioning schedule of old lignite-fired units by 2020 (units of Kardia and Amydeo) for environmental reasons\textsuperscript{52}. Additionally, the high penetration of RES in the national system and the Greek target of 40% of gross electricity consumption to be generated by RES by 2020 increase the need for system’s stability and, thus, for extended electricity imports and exports in the next years.

To sum up, apart from price-related reasons, cross-border electricity transactions are expected to be the answer to the problem of national production inefficiencies in the future due to increase in electricity demand and the retirement of lignite-fired units. Increased electricity imports/exports would also enhance the reliability of the system, which is threatened by the high RES penetration. However, it must be noted that any forecasts beyond the year 2020 could be proven to be quite unreliable\textsuperscript{53}.

\subsection*{4.2 The key regulatory factors & cross-border electricity trade}

As a Member-State of the EU since 1981, Greece is obliged to comply with the EU legislation. For the case of electricity, with the exception of the part of community law which is directly enforceable, the Third Liberalization Package was implemented in August 2011 with the Law 4001/2011, which transposes into national law the Council

\textsuperscript{51}See supra note 50, pp. 25.
\textsuperscript{52}See supra note 50, pp. 38.
\textsuperscript{53}ENTSO-E (2016) \textit{Mid-term Adequacy Forecast}. Brussels, Belgium, pp. 79
Directive 2009/72/EC. The Greek Law 4001/2011 shapes the Greek electricity market and contains provisions regulating the powers of the NRA, the Greek TSO and the Operator of Electricity Market. More specific rules on the electricity market and electricity transactions are defined in the System Operation Code (SOC) and the Power Transactions Code (PTC), which are developed by RAE. The implementation of these codes is supervised by RAE, ADMIE and LAGIE, which have the most important competencies regarding cross-border electricity trade.

4.2.1 Regulatory Authority for Energy (RAE)
RAE, which was established in July 2000 by the virtue of Greek Law 2773/99 according to the provisions of Directive 96/92/EC, is an Independent Administrative Authority that monitors the operation of the liberalized energy market. Initially, its competencies were limited, but with the new regulatory regime established by the Law 4001/2011, the role of RAE has been importantly strengthened. RAE possesses extensive advisory and normative powers (designation of secondary legislation such as codes), the power to issue individual administrative acts and to impose penalties. RAE also acts as a dispute settlement authority with respect to complaints against ADMIE. The contribution of RAE to the function of the cross-border electricity trade in Greece is detrimental: guarantee of fair competition conditions and non-discriminatory access to the networks, granting of licenses to the electricity traders, modification of network development plans, issuing of rules for interconnections’ access and exchange of information with the NRAs of other Member-States, so as to «.... to enable an optimal management of the system, to promote joint electricity exchanges.....to ensure an adequate level of interconnection capacity, including new interconnections regionally and between regions...»\(^{54}\).

As long as the legal nature of RAE is concerned, it consists an Independent Administrative Authority with distinct legal personality and financial autonomy and its Members are personally and operationally independent. RAE’s independence concerns its relations not only with the State, but also with the ex-monopolistic utilities and the private parties participating in the electricity market. In contrast to the previous

\(^{54}\)Greek Law 4001/2011, article 25 par. 5.
legislative framework, RAE is subjected only to parliamentary scrutiny and its actions are subjected to review by the judiciary. It could be said that RAE consists an administrative body in a broad notion and, as such, its powers are exercised in full respect of the principles of administrative law, including inter alia transparency of administrative actions, impartiality and equal treatment of individuals. It is to note that the delegation of powers to RAE was awarded by the secondary European legislation which, however, left to the discretion of Member-States the determination of the organizational and functional details of NRAs55.

4.2.2 Independent Power Transmission Operator (IPTO or ADMIE) S.A.
ADMIE S.A. was certified as the Greek Transmission Operator S.A. with RAE´s final Decision 692A/2012 and after taking into consideration the Opinion of the European Commission. According to the requirements of the Third Liberalization Package regarding the legal and functional unbundling of the TSOs´ functions and the Greek Law 4001/2011, the market model applied in the Greek Transmission Operator is the ITO one. ADMIE S.A. was initially established as a 100% subsidiarity of the state-owned Public Power Corporation (PPC) with 51% of its assets belonging to the State and the rest to individuals. However, since 2014 a privatisation process has begun and 24% of ADMIE´s assets has been currently sold to private investors. ADMIE S.A. owns the electricity network transmission system and is responsible for its development, operation and maintenance.
ADMIE´s competencies include the conduction of the real-time dispatch, the clearing of the imbalance market, the calculation of the ex-post System Marginal Price (SMP) and the publishing on a daily basis of forecasts for electricity production and demand. Regarding cross–border trade, ADMIE S.A. has a fundamental role in electricity transactions: it determines the interconnections usage, publishes forecasts of interconnections capacities, maintains the necessary accounts pertaining to the collection of interconnection congestion charges and, under prejudice of other agreements, auctions on an annual, monthly and daily basis the interconnections´

capacity. Additiona,ly, ADMIE S.A. cooperates with other TSOs and is a member of ENTSO-E, of Joint Auction Office and of SEE Coordinated Auction Office.

Concerning the legal nature of ADMIE S.A., it consists, according to its funding law, Sociéité Anonyme governed in principle by the civil law. However, it may be inferred by the powers assigned to it, that ADMIE S.A. has the character of a «dual» legal person (governed by both private and public law depending on the case), which sometimes acts as an administrative authority, i.e. it has the power to deny access to the network and the power to curtail PTR’s, and sometimes acts as a private company, i.e. it has the power to provide technical advisory services on matters of competence of managers or owners of transport systems for a fee. It has been argued that the unilateral acts of ADMIE S.A. are administrative acts and that is reasoned by its monopolistic regime, by the high percentage of ADMIE’s assets belonging to the State and by the services of general interest it provides.

4.2.3 Operator of Electricity Market (LAGIE) S.A.

Another factor with an important role in the functioning of the electricity market is LAGIE S.A., which was established by virtue of Greek Law 4001/2011 and carries out the activities formerly carried out by the HTSO S.A., apart from the ones that according to article 99 of Law 4001/2011 are transferred to ADMIE S.A. Additionally, in December 2015, following the Decision 69976/8–9–2015 of the Minister of Environment and Energy, LAGIE S.A. was designated, as «Nominated Electricity Market Operator» (NEMO), to perform the single day-ahead and intraday coupling, in accordance with article 4 of Regulation 2015/1222/EC.

Specifically, LAGIE S.A. is responsible for conducting the Daily Energy Programming of the System and is responsible for the financial transactions between the corresponding parties. It cooperates with ADMIE S.A. regarding financial and technical issues and generally applies the provisions of the Electricity Market legislation such as solving the day-ahead market and conducting its clearing and receiving energy injection offers by

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56. Greek Law 4001/2011 article 94 par.2.ια and par. 5.

all power producers. Furthermore, LAGIE S.A. keeps a Register of electricity market participants in accordance with REMIT’s provisions and may participate in joint operations of TSOs and Power Exchanges to create regional markets and to facilitate the establishment of the single electricity market. Last but not least, according to the article 4 par. 5 of the Regulation 1222/2015, as a NEMO, LAGIE «shall have the right to offer day-ahead and intraday trading services with delivery in another Member-State. The trading rules in the latter Member-State shall apply without the need for designation as a NEMO in that Member State». However, it is to note that in Greece, LAGIE S.A. has been established as a national legal monopoly for day-ahead and intraday trading services\(^58\) and as such Greece «may refuse cross-border trading services offered by a NEMO designated in another Member State; however, the protection of existing power exchanges in that Member State from economic disadvantages through competition is not a valid reason for refusal»\(^59\).

Regarding the legal nature of LAGIE S.A., the same remarks as for ADMIE´s case are applicable. Specifically, LAGIE S.A. is a «dual» legal person, which according to the article 117 par. 1 of the Greek Law 4001/2011 «operates under the rules of private economy and is governed by the provisions of the Law 2190/1920», but according to the Decision 2406/2014 of Council of State (Special Solidarity Levy case), «even if LAGIE is a company in the form of Société Anonyme, it operates in the case of examination (issuance of informative/pay slips to the RES electricity producers) for the sake of the public interest, exercising public authority».

From the above analysis, it can be concluded that Energy Law is a branch of law that includes a mixture of rules belonging to both public and private law. Its main provisions lie in the public law (formation and regulation of the energy market), and specifically in the administrative law, due to the reason that energy sector is linked to the public interest and public services. Energy Law has its roots in community law, which is implemented directly or through national administrative law. Apart from the


\(^{59}\) Regulation 1222/2015/EC, article 5 par 1.
administrative law, energy law borrows provisions and enforcement mechanisms from other branches of law such as commercial and competition law.\textsuperscript{60}

\textbf{4.3 An introduction to the Greek wholesale electricity market design}

Greece’s liberalized electricity market design, with the exception of the retail market, may be divided into two separate markets\textsuperscript{61}: wholesale electricity market and long-term capacity market. The long-term capacity market includes the Long-Term Capacity Market in the Interconnections, which is analyzed in the next chapter, and the Capacity Assurance Market. Capacity Assurance Market remunerates the Producers for maintaining their units in operational readiness limiting their business risk and at the same time aims to ensure the electricity purchased by electricity Suppliers is backed up with the corresponding generation capacity. For this reason, Producers issue Capacity Availability Tickets (CATs) for their net capacity and Load Representatives purchase these CATs to cover their supply obligations plus a security margin.

For the organization of its wholesale electricity market, Greece has adopted a mandatory pool model, initially established by the Greek Law 3175/2003, aiming to maximize the social welfare of the electricity market. The Greek wholesale electricity market is divided into the following three sub-markets: (1) the Day-Ahead Market, (2) the Daily Ancillary Services Market and (3) the Imbalances Market. The Day-Ahead Market means that all the electricity produced, consumed and transferred the following day within Greece is traded through a mandatory pool. Producers and Importers are obliged to offer the entirety of their capacity (Injection Offers) to the pool and to the sole electricity off-taker in Greece, LAGIE, in order to receive the payments corresponding to the energy injected into the grid, which (the payments) are calculated on the basis of the so-called System Marginal Price.\textsuperscript{62} Correspondingly, Load

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\textsuperscript{60}See supra note 57, pp.8.

\textsuperscript{61}The analysis provided in this section concerns only the interconnected system of Greece and not the non-interconnected Islands which dispose local autonomous electricity systems and are do not participate in imports/exports activities.

\textsuperscript{62}The SMP is calculated as follows: total demand is determined by the crossing point between the demand curve of the market (aggregating supply curves of all buyers) and the supply curve of the market (aggregating demand curves of all sellers), after having given priority to some sellers (RE, mandatory hydro plants, mandatory imports)
Representatives and Exporters can buy electricity by submitting Load Declarations and be charged the SMP which is common for electricity sellers and buyers, under prejudice of inter-zonal constrains. Bilateral contracts for physical delivery between Producers and Load Representatives are not permitted. The settlement of the day-ahead market is based on the hourly power prediction for the specific day based on a «technical» algorithm, which co-optimizes energy and reserve at the Day-Ahead stage. In the Daily Ancillary Services Market, the necessary ancillary services and reserves are offered by the Producers and bought by Load Representatives. It is to note that energy and ancillary services are traded in the day-ahead market simultaneously. Given that Greece lacks a real-time market, Balancing Market is crucial for electricity transactions because the extraordinary transactions, that take place in real time in order to ensure the balance of the System on the Dispatch Day, are cleared in this market (charged or compensated, according to the Imbalance Price). To close up with, it is to note that in the Greek electricity market, the Public Power Corporation (PPC), the incumbent vertically integrated ex-monopoly utility, remains dominant in both the generation and retail sectors and holds exclusive rights on the exploitation of the great majority of lignite and hydropower sources. However, the establishment of NOME auctions is expected to minimize the negative effect of these exclusive rights to the competition.

4.4 Electricity Importers/Exporters’ participation in the wholesale electricity market

4.4.1 Licenses & registration with the Participants´ Register

Electricity imports and exports in Greece are organized by a set of rules which could be divided into «interregional» rules, meaning the common imports/exports rules applicable in the countries involved in joint electricity transactions, and national rules, meaning the rules applicable only in one of the interconnected countries. In this section, the national rules of Greece are analyzed. To begin with, electricity imports are permitted only to the users of the Greek transmission system which are the holders of a supply or trading license and those who are qualified as Auto Producers. Exports are permitted only to the holders of production, supply or trading licenses. The over other sellers (mainly thermal fossil fuel plants). The price of the market is then determined by the most expensive of the offers of supply retained.
supply, generation and trading licenses are issued by R.A.E. Trading and supply licenses are issued only to applicants which have the legal form of Société Anonyme or of Limited Liability Company (Ltd).

In order to participate in the wholesale electricity market, either to import or to export electricity, the entity concerned must register with the Participant Register kept by LAGIE. By registering with the Participant Register, Participants enter into (1) the «DAS Transactions Contract» with LAGIE and (2) the «System Operator Transactions Contract» with ADMIE⁶³, governed by PTC and SOC respectively. By virtue of the Contracts, Participants are granted the right to participate in the DAS Transactions System and in the System Operator Transactions System and, depending on the case, receive or make corresponding payments to LAGIE and ADMIE respectively. The Contracts under examination are not subjected to any other formality, besides registration with the Participant Register, which is realized by the approval of the applications submitted for conclusion of the (1) and (2) contracts by ADMIE and LAGIE.

According to the article 2 of PTC and SOC, applications must be accompanied by supporting documents such as the copy of production, trading or supply license and bank account number (Participant Account) that the applicant is obliged to keep in credit institution legally operating in Greece, to satisfy the obligations arising from the two Contracts. Finally, specifically, for electricity traders and suppliers, it is demanded a bank guarantee or a Deposit receipt.

4.4.2 Injection Offers & Load Declarations

Generally, it could be said that in the Greek electricity system imports are treated as generation and exports as demand. As such, in order to participate in the DAS market electricity importers are requested to submit Injection Offers a day before the Dispatch Day and into a specific timeline, which is defined from 12: 00 to 12: 30. The Injection Offers are submitted in the form of an XML file submitted on the DAS electronic information system. To upload their injections, Importers must insert to the system their user name, access code and a unique electronic security ID, provided by LAGIE S.A. Each Injection Offer must contain for each hour (dispatch period) of the

⁶³PTC, article 1 par.2 & SOC, article 1 par.2.
Dispatch Day and for each interconnector one stepwise function of price and quantity, each step of which consists of a pair of energy amount (MWh) and its price (€ / MWh). This function can include up to ten steps, under the provision energy prices for successive steps to be monotonically increasing. Prices at all levels must be non-negative and more than or equal to the Administratively Defined Minimum Injection Offer Price, which for imports and exports is equal to zero. Of course, Injection Offers for imports must be supported by equivalent Physical Transmission Rights (PTRs), but the capacity of inter-zonal flows is not auctioned separately. However, when capacity internal constraints occur, the Importers are remunerated by the day-ahead Zonal Marginal Price (ZMP) at the relevant interconnection, instead of the SMP. It must be highlighted that there is not charge for system use in order to import electricity, provided that the same applies to the country of origin (reciprocity principle) according to the article 281 of SOC. The results of the day-ahead market clearing are published at ADMIE’s electronic platform at 14:00, the day before the Dispatch Day.

Correspondingly, electricity exporters must submit Load Declarations in order to participate in the DAS market. The submission procedure, the type and the context of Load Declarations are similar to those of the Importers’ Injection Offers. However, as it is normal, Load Declarations must contain for each hour of the Dispatch Day and for each interconnection monotonically decreasing prices which must be less than or equal to the Administratively Defined Maximum Load Declaration Price. It is to note that in the case of electricity exports, Meter Representation Declaration are not required because each Interconnection’s Meter is represented by DAS Participants who submitted Load Declaration for export through the respective Interconnection Corridor. An additional prerequisite for the admissibility of Declaration is that Load Declaration must be accompanied by a certificate issued by the credit institution where the Load Representative maintains the Participant Account, certifying that there is sufficient balance in the Account to cover the financial obligations arising from the Load Declaration. Exporters are always charged the day-ahead SMP, irrespectively of inter-zonal constraint problems.

Another prerequisite for the participation in the DAS market is the obligation posed by the article 179 of SOC, which stipulates that each Participant must provide guarantees for the fulfillment of obligations arising from the System Operator Transactions.
Contract. The existence of these guarantees is a precondition for the participation in the DAS market. It is to note that in the case of inadequate national electricity production, ADMIE S.A. can submit Injection Offers in order to import electricity. These Offers are charged according to the procedure of article 121.Г. (1) of SOC. More details on DAS market participation are provided on PTC and on PTC’s Manual.
5. Cross-border electricity trade in Greece

Greece is interconnected with all of the neighboring countries in its Northern borders and, additionally, it is interconnected via sea cable with Italy. However, the interconnected markets to the Greek electricity system are characterized by significant differences in their maturity and liberalization level and that is the reason why different interconnections capacity allocation auction rules are applied in each case. In this chapter, the basic principles of these auction rules are listed and a brief analysis of each electricity market interconnected to the Greek system is provided.

5.1 Greek electricity interconnections

Despite the fact that during the last 13 years the Greek electricity system has been operating in parallel with the European System managed by ENTSO-E, «the relevant electricity market for Greece is, to a significant extent, the national market, as a regional market has not emerged yet»\(^64\). Greece is interconnected through overhead AC lines, mainly of 400 kV with Albania, Former Yugoslav Republic of Macedonia and Bulgaria in Northern Borders and through an HDVC cable with Italy in the North West. Additionally, a new interconnection overhead AC line with Turkey was activated in September 2010 and entered into commercial operation in April 2015\(^65\). It is notable, that Greece has reach the 10% interconnection target as its electricity interconnection capacity was equal to 11% in 2014 and with the scheduled PCI (especially, the AC 400 kV interconnection between Maritsa East 1 in Bulgaria and Nea Santa in Greece) the target of 15% for 2030 can be reached\(^66\).

Greece consists a net importing country with the amounts of energy imported to be significantly increased from 2013 to 2015 (from 2013 to 2014 overall imports increased by 101%). An indicative example consists the fact that imports used to be equal to 4%-6% of the country’s total consumption, but rose to 18% in 2014. In 2015, electricity imports represented 85% of the total electricity cross-border transactions (instead of

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36% for 2013), while exports only 4% (instead of 5% for 2013) and the rest of the traded electricity was transit\textsuperscript{67}. Bulgaria is the country with the largest share of exports to Greece representing more than the one-third of the total Greek imports. On the contrary, imports from Turkey correspond to the lower percentage of total imports. Regarding the most recent trends in imports/exports, it is indicatively mentioned that for the first semester of 2016, 31% of Greek Interconnections Transmission Rights Net Revenues came from imports from Bulgaria, 25% from imports from FYROM, 18% and 17% came from imports from Albania and Italy respectively. Additionally, 2% of total revenues came from exports to Italy and 2.3% from exports to Turkey\textsuperscript{68}.

According to the article 178 of SOC, ADMIE S.A. is responsible for the use of the revenues resulting from the allocation of interconnections and according to the article 16 of the Regulation 714/2009, these revenues can only be used for specific purposes, namely for network investments and for increase of capacity availability. However, there is the possibility the revenues to be used, under the condition of NRA’s prior approval, as income to reduce network tariffs. For the case of Greece, with the RAE’s Decision 425/2015, it was decided the interconnection revenues of the second semester of 2014 and of the first semester of 2015, to be used partially (60 millions) to decrease network tariffs and the rest (4.5 million) to be used for the construction of the new interconnection between Greece and Bulgaria, which was qualified as a PCI\textsuperscript{69}.

It is notable that the revenues of the second half of 2015 and the first half of 2016 are equal to 46 million €, that is to say 29% less than the revenues of the last period, due to imports decrease\textsuperscript{70}.

Irrespective of this current imports’ decrease, it was shown that the Greek import dependency is expected to increase in the future. For this reason and given that most of its neighboring countries are not Members of the EU and, thus, not subjected to EU


\textsuperscript{69}RAE Decision 425/2015 on Management of Interconnections Revenue for 2016 (in Greek).

electricity legislation, the development of common legislative bonds with these nations and the Balkan region, in general, is very important in order to facilitate Greek electricity exchanges. Consequently, the establishment of the Energy Community in 2005 between the EU and countries such as Albania, FYROM, Bulgaria and Romania (at that time not members of EU) and Turkey (as observer-country) was welcomed by Greece. Energy Community sets minimum requirements for the establishment of competitive electricity markets based on the adoption of the EU’s legislation, the so-called «acquis communautaire»\textsuperscript{71}. It is to note, that the guarantee of the uninterrupted operation of electricity transactions within all the Balkan region through the Energy Community is detrimental for the increase of electricity imports/exports in Greece, given that Bulgaria and Romania are significant exporters of electricity while Albania, FYROM are major importers (transit countries for imports to Greece) and thereby one of the main directions of electricity flow in Balkans is from north to south. Consequently, the establishment of a stable market regulatory framework in any of these countries may have a positive effect on the Greek electricity market.

5.1.1 Electricity market in Bulgaria
Bulgaria is a major electricity exporter to Greece and that is not only because Bulgaria has an enormous, in comparison to Greece, production capacity but also because its generation is largely based on domestic lignite sources and nuclear power, «resulting in low base load electricity generation costs, making the Bulgarian wholesale electricity market one of the cheapest in the EU»\textsuperscript{72}. Greece is interconnected with Bulgaria through a 400kW transmission line between Thessaloniki (EL) and Blagoevgrad (BG), while the interconnection of the two countries is going to be reinforced after the construction of a new transmission line between N. Santa (EL) and Maritsa East 1 (BG). The construction of the new transmission line has been labelled as a PCI by the


European Commission and is expected to «facilitate market integration by increasing the transfer capacity (and, thus, solve the problem of loaded transmission lines, especially during summer),...to increase the volume of exchanges between the Continental Europe synchronous area and Turkey and ... to contribute to the safe evacuation of the power from the wind farms and photovoltaic expected to be installed close to the borders of the two counties»73. The project is expected to be commissioned in 2021.

Regarding the Bulgarian internal electricity market, the country does not yet have enough mature market meeting the standards of western-European energy markets. A de facto single-buyer model is currently in place for the regulated sector of Bulgarian electricity market and it was only in January 2016 that the Independent Bulgarian Energy Exchange (IBEX) started its operation. Additionally, the State-owned Bulgarian energy incumbent, BEH, has been accused of abuse of its dominant position (i.e. supply contracts concluded between BEH and third parties imposing restrictions on where these third parties could resell the electricity bought from BEH74). Furthermore, Bulgarian TSO, called ESO, was unbundled by BEH in 2014 according to the ITO model, but until that moment, it was closely interconnected to BEH, provoking important distortions to cross-border trade. Such a distortion consist the imposition of electricity export tariff which raises significantly the price of the electricity exported. It must be highlighted that Bulgaria has been accused in the past of changing regularly the fixed electricity charges according to the prices prevailing in neighbouring countries75. From the above, it can be concluded that market liberalization in Bulgaria has not been achieved yet and the existing competition distortions may have a negative effect on the electricity transactions with Greece in the long-term. The ban on electrical power exports introduced in Bulgaria from 13th January to 7th February 2017(!) due to national imbalances reinforce these concerns.

5.1.2 Electricity market in Italy

Greece is interconnected with Italy through a submarine electricity cable with maximum transmission power of 500 megawatts and 160 km length. Electricity trade with Greece began in 2002 and has ranged from net imports of 2.3 TWh to net exports of 1.6 TWh\textsuperscript{76}. Despite the fact that for 2014 and 2015 Italy was a net exporter to Greece, generally, Italy is an electricity net importer with net imports of around 15% of national electricity consumption, a number explained by the high national electricity prices (higher than the average electricity price in EU). It must be noted that unscheduled technical faults have usually in the past put out of service the Italian-Greek interconnection and the most recent example is the service outage occurred in October 2016. These technical problems and the consequent curtailment of allocated PTRs, increase the uncertainty for Traders and they may be the reason of the large negative risk premia\textsuperscript{77} in Greek–Italian transactions, which make them inefficient\textsuperscript{78}.

Regarding the Italian electricity market, it consists the more liberalized and competitive electricity market in comparison to the other electricity markets interconnected to the Greek system. To begin with, the Italian wholesale electricity market consists of a day-ahead market and an intraday market. Both markets are managed by the electricity Market Operator (called GME). GME, additionally, manages the forward market. The Italian TSO is TERNA which was established as such in 2005. In 2013, TERNA was certified as TSO under the ownership unbundling regime. It is notable that Italy uses the Single Buyer model. The largest single supplier of electricity is Enel, but the relatively high liquidity and price performance of the wholesale market suggest that market power abuse is inexistent\textsuperscript{79}. In compliance with the Target Model prerequisites, Italy made an important step towards the IEM in 2015 and specifically in February 2015: it coupled its day-ahead electricity market with France, Austria and


\textsuperscript{77}Risk premium is equal to the difference between the TR price and the expected cash-flow from the electricity transaction [ACER/CEER (2015) Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2014. Ljubljana, Slovenia.]


\textsuperscript{79}See supra note 76, pp. 119.
Slovenia. «As a result, the now-coupled area is called Multi-Regional Coupling (MRC) and covers now 19 countries, standing for about 85% of European power consumption»\textsuperscript{80}. Unfortunately, Greece and Switzerland are the only neighboring countries to Italy which are not coupled to MRC yet.

5.1.3 Electricity market in Turkey  
Interconnection with Turkey is the most recent interconnection to the Greek electricity system. Although Turkey is not an ENTSO-E member (currently an Observer Member of ENTSO-E), its system is connected to the Continental Europe Synchronous Area (CESA) in parallel synchronous operation. The Greek electricity system has been interconnected to Turkish system since 2010 through a transmission line of 400 kV between N.Santa (EL) and Babaeski (TR). For 2014, the Greek electricity imports from Turkey represent the 70.8% of the total Turkish exports, while Greek electricity exports to Turkey only the 0.05% of the total Turkish imports\textsuperscript{81}. The Turkish system is further interconnected to Europe through the Bulgarian system. In September 2010, the launch of a pilot synchronous and parallel operation of the electrical system of Turkey with the European system through the Greek and Bulgarian transmission lines was held. In 2013, the ENTSO-E Regional Group Continental Europe (CE) increased the capacities available for commercial use between CE and Turkey to 550 MW for imports to Turkey and to 400 MW for imports to CE. Upon agreement, these capacities are divided by a ratio of 2/3 for the border with Bulgaria and 1/3 for the border with Greece\textsuperscript{82}.

As long as the Turkish electricity market is concerned, it is in the process of transformation into a competitive open market characterized by consisted liberalization and privatization policies. To begin with, generation activities are carried out by the state-owned generation company EÜAŞ, by private generators and by auto producers. In 2014, the total share of private companies in the market was around to 68%. After the completion of the privatization process, this share is expected to reach


\textsuperscript{82} See supra note 64, pp. 18.
at least 90% of the total installed capacity.\textsuperscript{83} Additionally, regarding distribution sector, the privatisation of the state-owned electricity distribution facilities has been completed since 2013 and currently, twenty-one distribution companies are all legally unbundled and privatised. On the other hand, TEIAS, the state-owned electricity transmission company, is the sole Transmission Operator, owning and operating all transmission assets of the country.\textsuperscript{84} Privatization of TEIAS is not planned in the short or medium term. What is notable is that a formal wholesale electricity market has been established in Turkey only in 2015, including a day-ahead and a continuous intraday market.

From the above, it is concluded that during the last years the Turkish electricity system has made significant steps towards the establishment of a competitive and well-developed electricity market. However, according to IEA’s 2016 Turkey Report, the country should continue down this path and reform its energy markets and special attention should be paid to the establishment of a more cost effective tariff system, in order to avoid competition distortions. However, even if the liberalization of Turkish electricity market is expected to have a positive effect on the exchanges with Greece, the recent political tensions over Aegean Islands between the two countries and given the obligation of prior approval by the Turkish Ministry of Energy and Natural Resources (MENR) of electricity imports/exports, the reliability of Turkey as an electricity counterparty of Greece may raise concerns for the future.

5.1.4 Electricity market in Albania

Greece is interconnected to Albania through a transmission line of 400 kV between Kardia (EL) and Zemblak (AL). Albania has been a member of SEE CAO since April 2015. Additionally, in 2015, Albanian TSO signed a Memorandum of Understanding on a regional security coordination initiative with the TSOs of several countries including Greece. The initiative aims at introducing a coordinated capacity calculation for day-ahead allocations. Albania is also a member of the Energy Community. It is to note that Albania is energy depended to its neighboring countries, as it is a net electricity

\textsuperscript{83}See supra note 81, pp. 162.

\textsuperscript{84}See supra note 81, pp. 137.
importer. The fact that hydropower dominates its electricity generation mix makes Albania electricity dependent during specific periods of the year. On the contrary, in the months of excess electricity generation, Albania consists a flexible electricity exporter. Concerning the Albanian electricity market, it is currently under significant regulatory reforms. More analytically, Albania has transposed the Third Energy Package into the national law, but secondary legislation and, thus detailed rules regulating the market, have not been yet developed, delaying the implementation of the Package. For example, the certification procedure of the Albanian TSO, called OST, opened in the summer of 2016, but the deadline for the completion of its ownership unbundling was set at the end of 2017. Additionally, an action plan for the establishment of a power exchange until the end of 2017 has been adopted. TPA and provisions on congestion management have already been transposed into the national law. Concerning DSO, the state-owned supply company has not been unbundled yet, while the wholesale market is dominated by the state-owned and controlled generation company called KESh. Furthermore, the established conditions for real-time balancing are not market-based or compliant with the communautaire acquis. Generally, the Albanian wholesale market is still overregulated. From the above, it is concluded that Albania has made steps towards the opening of its market to the competition, but further measures are required to permit the full liberalization of its market.

5.1.5 Electricity market in FYROM
Greece is interconnected to FYROM through two transmission lines of 400 kV: from Thessaloniki (EL) to Bubrovo (FYROM) the first and from Meliti (EL) to Bitola (FYROM) the second. As mentioned, FYROM is a transit country for electricity imports to Greece, given that FYROM is a net importer country. In June 2016, the TSO of FYROM, called MEPSO, became a shareholder of the regional capacity allocation body SEE CAO and begun to participate in regional allocation of interconnection capacity in November 2016, after it failed to comply with a 2008 decision of the Energy Community imposing the obligation to adopt a common coordinated congestion management method for allocation of capacity to the market.

As long as the electricity market in FYROM is concerned, it presents an extremely low level of compliance with the legislative obligations imposed by the Energy Community, to which FYROM is a member since 2005. Specifically, FYROM has missed the deadline for implementing the Third Energy Package by 1 January 2015: the state-owned TSO, which also performs the functions of a market operator, is only legally unbundled by the state-owned DSO utility. Additionally, eligibility of the households has been postponed until 1 July 2020 in violation of Energy Community’s Treaty. Furthermore, the procurement of ancillary and balancing services is still highly regulated creating obstacles to FYROM’s participation in regional initiatives. Finally, excessive price regulation, in particular, wholesale price, hinders the development of electricity market\(^{86}\). It is to note that on 13 May 2016, the Secretariat of Energy Community submitted a Reasoned Request to the Ministerial Council against FYROM for failure to transpose the Third Energy Package. To sum up, electricity market in FYROM is only partly liberalized and privatized. This fact limits competition and market integration with neighboring electricity markets.

5.2 Basic principles for access to cross-border infrastructure

As it has been analyzed, electricity is an infrastructure depended commodity and, thus, interconnections capacities have a significant effect on cross-border electricity trade. Commercial interconnections capacities are always less than the interconnections nominal thermal capacities, due to a number of factors (which however are beyond the scope of this paper) and to a minimum security margin (n-1 rule applied in all the Balkan region). The calculation of the commercial interconnections capacities is realized by the national TSOs and can be based on different methods\(^{87}\): according to the Target Model, TSOs need to apply a flow-based capacity calculation method (CACM Regulation). In the case of Greek interconnections, the so-called Net Transfer Capacity Method (NTC) is applied\(^{88}\).

\(^{86}\)See supra note 85, pp. 83-85.


After the nationals TSOs calculate the commercial transfer capacity of the interconnections and the available transfer capacity for imports/exports, they publish the relevant results on their sites and a procedure for the allocation of the capacity takes place. The so-called explicit auctions, a market-based method, constitute the method used in the Greek electricity market regarding the allocation of interconnections capacity allocation to the interested parties. According to this method, transmission capacity is auctioned to the market separately from the electricity, in the form of Physical Transmission Rights (PTRs). However, explicit auctions reduce transparency and can lead to inefficient use of interconnectors because traders are forced to reserve ex-ante cross-border capacities independently from the electricity price differentials in the interconnected markets. On the contrary, in implicit auctions, which constitute the method adopted by the Target Model, «the auctioning of transmission capacity is included in an electricity auction “implicitly”»⁸⁹, limiting the inefficient use of interconnectors.

In the Greek electricity market the interconnection capacity allocation auctions are performed either by ADMIE S.A. in collaboration with the interconnected TSO or by a third Auction Office. Specifically, at the Bulgarian border, the Bulgarian TSO performs the monthly auctions, while ADMIE S.A. performs the yearly and daily auctions and is responsible for the management of the secondary market. In these auctions, Common Capacity Allocation Rules are applied since 2011⁹⁰. Regarding Italy, since 2011, capacity auction rules were performed by the Capacity Allocation Service Company (CASC S.A.), which also provided capacity allocation services to the whole Central–South Europe (CSE) Region. In 2015, the CASC S.A. was succeeded by the Joint Allocation Office (JAO) and since 2016 PTR auctions have been performed by JAO. Concerning the borders of Albania and Turkey, capacity allocation auctions are realized by the South East Europe Coordinated Auction Office (SEE CAO). From November 2016 SEE CAO begun to perform the capacity auctions in the borders of FYROM. Before these dates, in Albanian, Turkish and FYROM borders the capacities allocation auctions had been

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performed according to independent rules, with the scheme of 50%50% management applied by ADMIE and each of the other three TSOs91.

According to the article 19 and to the Annex I of the Regulation 714/2009: «NRA when carrying out their responsibilities shall ensure compliance with this Regulation». «NRAs shall regularly evaluate the congestion management methods». Additionally, the article 19 of the Greek law 4001/2011 stipulates that RAE establishes, monitors and supervises the implementation of rules for access to the interconnections. Finally, according to the article 280 of the SOC, the System Operator has the obligation to submit to RAE every year a plan of terms and rules governing auctions for the transmission capacity allocation in interconnections. The auctions’ rules must be approved by RAE. From the above, it is concluded that capacity auction rules depend on RAE’s approval. This principle applies to the case that the auctions are performed by SEE CAO and JAO.

Regarding the competence of ADMIE S.A. to transfer to SEE CAO and JAO the authorization to realize capacity allocation auctions in Greek borders, it is to note, firstly, that according to the article 94 par.2 (ΙΒ) of the Law 4001/2011, ADMIE can participate in associations, organizations or companies, which aim at establishing common rules on the allocation of transmission rights and at managing those rights on behalf of the national TSOs. Besides, there is no legal national rule forbidding Greek TSO to sign a contract for services outsourcing parts of its Capacity Allocation tasks to an Auction Office. On the contrary, it is implicitly permitted under some conditions, such as the prior approval of auction rules by RAE92. Additionally, both SEE CAO and JAO specifically declare that they perform in their «own name but on behalf and for the account of the Participating TSOs explicit allocation of available transmission capacities on the borders between Participating TSOs»93 and that any payment collected by the auction offices through the Auction would be treated as the property of ADMIE S.A.

5.2.1 General principles for capacity allocation auctions

The Annex I of the Regulation 714/2009/EC provides some guidelines on the allocation of interconnections’ NTC between the national electricity systems. The rules included in the Guidelines are quite general and establish some principles which are applicable in the case of the Greek transactions:

I. **Open access to the interconnections through the auction process.** Access to the interconnection shall not be restricted and TSOs shall accept all commercial transactions under the prejudice of congestion (1.1-1.2 of Annex). From this principle deviates the rule of the Auction of the Maximum Capacity, meaning that the use of the interconnections is eliminated only by congestion and security-related reasons.

II. **Non-discrimination.** All possible market participants shall be permitted to participate in the allocation process without restriction and it shall not be discrimination between market participants wishing to use their rights to make use of bilateral supply contracts or to bid in Power Exchanges (2.7, 2.10 of Annex). Value is the only criterion for bids to be qualified as successful. Additionally, no transaction-based distinction shall be applied in congestion management (1.6 of Annex). Discrimination prohibition is, furthermore, applied in the case of discrimination in favor of national markets against the interconnected system. TSOs shall not limit interconnection capacity in order to eliminate congestion in the internal of their countries (1.7 of Annex).

III. **Transparency.** TSOs shall publish all relevant data related to network availability, network access and network use on the basis of the best possible forecast (when demanded). Information such as the congestion management procedures in use, the times and procedures for applying for capacity, the productions offered and the obligation and rights of both TSOs and capacity holders shall be described in detail and made available to all potential network users freely in a transparent and easily accessible manner (5.1, 5.3, 5.4 and 5.9 of Annex). Additionally, transparency obligations are applied in the cooperation between TSOs. TSOs shall exchange regularly set of data to enable load flow calculations in their relevant area (5.10 of Annex) Finally, NRAs shall be
transparent regarding the use of revenues resulting from ATC’s allocation (6.2 of Annex)

IV. **Cost-effectiveness.** Congestion-management methods shall be market-based (implicit and/or explicit auctions) to facilitate an efficient use of interconnections and cross-border trade. When defining appropriate network areas in which congestion management is to apply, TSOs shall be guided by the principle of cost-effectiveness. In the case of incompatibility of scheduled transactions with the security limits, TSOs shall alleviate congestion and ensure that any associated costs remain at an economically efficient level (2.1, 1.7 and 1.3 of Annex).

V. **Coordination.** Coordination between TSOs shall include all the steps from capacity calculation and optimization of allocation to secure operation of the network. Coordination includes the exchange of information between TSOs. In the case that electricity transactions between two countries (TSOs) have an effect on the flows in a third country (TSO), congestion-management methods shall be coordinated between all the TSOs (3.5, 3.6 and 3.1 of Annex).

Other principles established by the Guidelines may have a less general character: The rights allocated in the auctions are firm transmission rights of different time-frames (short-term and long-term rights) subjected to the use-it-or-sell-it or use-it-or-lose-it principles. Capacity rights to be firm must be nominated to the TSOs by a defined deadline. In the case that the TSO curtail the allocated transmission rights, it shall be liable to compensate the holders of the rights for their loss. Correspondingly, if participants do not fulfill their obligations, they pay a charge. Non-used transmission rights shall be freely tradable on a secondary basis. More details regarding this principles are provided in the next paragraphs.

5.2.2 Common principles for capacity allocation in the Greek borders

Interconnections capacity allocation auctions in all Greek borders are based on some common principles/provisions, namely:

i. **Auction process is performed in accordance with the principles of the Regulation 714/2009.**
ii. Cross-border capacity is allocated via Explicit Auction Process in the form of Physical Transmission Rights (PTR) only.

iii. All timings set in the Auction Rules make reference to the Central European Time (CET) and all financial information are expressed in Euro (€).

iv. Auction Processes are organized and executed electronically through the Auction Platforms.

v. Auctions are carried out on a Yearly, Monthly (Long-Term transmission rights) and Daily basis.

vi. Auction Processes provide only PTRs. Auction Participants can invoke no other right than PTR.

vii. Long-Term Transmission Rights are auctioned on a firm basis with the exception of Network Security reason or Force Majeure. In these cases, the Allocated PTRs can be curtailed.

viii. Long-Term Transmission Rights are curtailed on a «pro rata» basis.

ix. Daily PTRs are firm.

x. In the case of the Curtailment, each Auction Participant whose PTRs have been curtailed is entitled to reimbursement by the relevant TSO/Auction Office. After reimbursement, no further liabilities will arise.

xi. Long-term Transmission Rights are freely transferable/sold between participants on a secondary market, under the condition of TSOs/Auction Office`s approval.

xii. Auction’s rules and results are published on TSOs/Auction Offices’ website.

xiii. Participants’ bids are submitted anonymously (personal details are secured by means of encryption).

xiv. For each Product, the Bids are ranked in decreasing order based on its Prices. The Bids with the highest Bid Price are being selected until the entire Offered Capacity auctioned is exhausted.

xv. Auction’s participants have the right to contest the results of the auction process until deadline’s expiration.

xvi. Allocated Long-Term Transmission Rights are subject to the «Use it or Sell it principle», according to which allocated rights that have not been nominated by Program Exchanges in Scheduling Process to Participating TSOs are
automatically resold on the daily Auction Process, under financial remuneration.

xvii. TSOs/Auction Offices are entitled to process all data of the Auction Participants, but confidential information may not be disclosed to a third party without the other Party's prior and expressed consent.

It is to note that according to the Manual of the Power Transaction Code (page 61), regarding the use of PTRs in the Greek market and independently from the TSO that allocated the PTRs, procedures and deadlines for scheduling exchange programs for the energy imported into Greek territory (or exported from it) are regulated only by the Greek legal texts.

5.2.3 Auction process and PTRs nomination
In order to participate in electricity exports/imports in Greece, the interested parties must be equipped with the corresponding PTRs which are provided in cross-border capacities allocation auctions. In order to participate in these auctions, the parties must fulfill specific criteria, some of which are common in every auction and some are slightly different. Concerning the common prerequisites and according to the JAO, SEE CAO and GR-BG auction rules for 2017 all the participants must be enrolled to the Participant Register kept by LAGIE and conclude all relevant contracts with ADMIE and LAGIE. Additionally, interested parties must fill a Statement of Acceptance of auction conditions, where it is incorporated the declaration that no insolvency, bankruptcy or other similar legal proceeding have been commenced in relation to them. Finally, the interested parties must fulfill specific financial requirements (deposit contract with the relevant TSO/Auction Office or Bank Guarantee), which are used as risk management instruments.

Under the condition that the participants are judged «eligible» to participate in the auction process, the first can submit their bids in the time period between the Gate Opening and Gate Closure (the moments in which the Auction Process commence and finish) as determined by the published Auction Specifications. Each bid contains the year, month or day to which the Bid refers; the product specification, bid Quantity expressed in MW and price expressed in €/MWh. If a Bid Quantity exceeds the Offered Capacity announced in the Auction Specification, this Bid is rejected. Each submitted
bid consists an unconditional and irrevocable offer by the Auction Participant to reserve the PTR up to the Bid Quantity and at prices up to the Bid Price. Participant maximum number of bids submitted for a product may vary (usually from ten to twenty). The bids are submitted electronically by the use of specific codes which are provided by the administrator of the auction platform and reveal the Participant’s ID after the auction’ completion. After a short time from the gate closure, participants are informed of the auction’s results. It is notable that if the total Bid Quantity of all submitted valid Bids is equal to or lower than the relevant Offered Capacity, the Marginal Price is zero (0) €/MWh and if not, the Marginal Price is equal to the lowest Bid Price selected. Once PTRs are allocated to the beneficiaries, there is the possibility for the Long-Term transmission rights, to be transferred to a transferee through the secondary market (daily PTRs are not transferred) or to be returned to relevant TSOs for resale (Use it or Sell it principle) or to be used. These options are under the prejudice that the Auction Participant, who wants to transfer its Allocated PTRs has fulfilled its financial obligations towards TSOs/Auction Offices.

In order an allocated PTR to be used by its holder to export or import electricity from/in the Greek market, it must be nominated in the Scheduling process which is organized by the concerned Participating TSO (for the case of Greece by ADMIE). Specifically, Statements of PTRs’ Use must be submitted by the PTRs holder in a specific time frame: by 7:00 of the Day-Ahead for the Long-Term PTR and by 12:30 of the Day-Ahead for the Daily PTRs94. PTRs Holder must additionally designate its Counterparty in the interconnected energy market, who can be either himself, provided that he is a register market participant in the interconnected market (cross-nomination), or a different User (or more), who is registered as a market participant in the interconnected market. ADMIE confirms these Statements of PTRs use and delivers them to the interconnected TSO to confirm them. After this confirmation, PTRs are nominated and in combination with the submission of Injection Offers or Load Declarations they can lead to electricity imports or exports respectively. It is to note, that in DAS resolution, Long-Term PTRs have a priority towards Daily PTRS.

CONCLUSIONS

Cross-border electricity trade may have a major contribution in the accomplishment of European Union’s fundamental energy targets, namely: a secure, competitive and decarbonized electricity market. For the case of Greece, extensive cross-border electricity transactions have the same advantages as for the rest of the European Union and maybe even more. Specifically, according to the adequacy forecast of ENTSO-E and ADMIE, future electricity production in Greece after 2020 is possible not to meet the demand and thereby imports are expected to cover the production’s inefficiencies. Additionally, the ambitious targets for electricity production from RE and mainly solar power in Greece make electricity transactions with neighboring countries an effective response to the intermittency problem of RE. Finally, cross-border electricity trade in Greece may have a crucial contribution in achieving more affordable electricity prices due to the openness of the national market to competition. That is significantly important for the Greek people suffering from energy poverty during the last years because of the prolonged financial crisis.

However, despite its advantages, cross-border electricity trade in Greece is limited and not compatible with the European view of an IEM. To be more specific, as it has been shown, electricity market structure in Greece presents great differences from what the Target Model asks for: an important deficiency is the lack of an intraday electricity market which would allow participants to clear their positions closer to real-time, so to avoid penalties due to deviations in the purchased in real time quantities. Additionally, daily transmission rights in interconnections are allocated through explicitly auctions, while implicit auctions are the allocation method allowing both the more efficient use of interconnections (electricity flows to the right direction, meaning to the market with the lower electricity price and not the opposite) and the market coupling with other neighboring countries.

Another inconsistency of Greek electricity system with the European model is the fact that the cost of ancillary services is incorporated into the energy price, the so-called SMP, distorting electricity price and making it impossible to be compared with the electricity prices in other European countries. Furthermore, the national system lacks a market for forward contracts to hedge the price risks and lacks a balancing market to
balance the production and consumption of the system in real-time and to coordinate with the local balancing markets at a regional level. It is to note that the choice of a mandatory pool and the prohibition of bilateral contracts between market participants have a negative effect on competition in favor of PPC, the dominant in electricity generation and supply ex-monopolistic entity. Finally, the current almost exclusive rights of PPC on lignite and hydropower sources, that is to say on the «cheap» electricity, eliminate the national competition and, thus, the cross-border transactions. The so-called NOME auctions are expected to alleviate the problem, but only partially. Consequently, it is concluded that electricity market in Greece has to experience great reforms in order to create favorable conditions for cross-border electricity trade and to comply with the EU Target Model.

Of course, cross-border electricity trade is possible for Greece irrespectively from the compliance with the EU provisions and the Target Model. However, as it was shown, market coupling includes great advantages for the national electricity markets and more extensive and efficient cross-border transactions. Realizing that fact and with the aspiration to participate in the single European electricity market, Greek legislator has currently put the national electricity system in the process of reforming the wholesale market, in order to conform to the EU Target Model rules and to the Regulation 1222/2015/EC. The Greek Law 4425/2016 is the most decisive step towards this direction: it includes provisions for the establishment of a forward market which permits only for transactions with physical delivery of electricity, a day ahead market which is to be cleared through an algorithm called Euphemia and which adopts the implicit allocation method for the allocation of transmission rights in interconnections, an intra-day market with intraday sessions and in a second phase with continuous intra–day trading and a balancing market. It is notable that the Greek Law 4425/2016 is enforceable since September 2016, but as it contains general provisions the establishment of Codes regulating electricity market is necessary for its enforcement. The time frame for the operation of each Market will be defined by a Ministerial Decision after the establishment of the required codes.

RAE (2016) Draft of Guidelines and Instructions to the competent Market Operators for the establishment of Market Codes according to the par. 5 of the art.6 of the Law 4425/2016.
From the above analysis, it is concluded that electricity wholesale market in Greece and cross-border electricity trade rules are in a transitional phase. Important steps have been made and are going to be made in the near future in order to achieve the coupling of the national electricity market with the markets of the other European Member-States. However, due to the limited maturity of the electricity markets to the North borders of the country, market coupling is possible initially with the market of Italy which is already coupled with all of its neighbors except Switzerland and Greece. Thus, apart from the national reforms which are demanded to take place in order Greece to adopt the European rules on cross-border trade, market coupling with the North West Europe and the Balkan region depends on the readiness of neighboring markets to follow the same direction.
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• Consolidated version of the Treaty on the Functioning of the European Union (2012), OJ C 326/47.


• Greek Law 4001/2011 for the operation of the energy markets of Electricity and Natural Gas, for research, production and transmission networks of hydrocarbons and other arrangements, Official Gazette A’176/22.08.2011.


Websites

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