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Master in Energy: Strategy, Law & Economics

Master Thesis

Power Exchange: Unification of the electricity markets, The Greek Model

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GLOSSARY

A
Article: Ar.

C
Central and western European markets: CWE
Cross-Border Intraday: XBID

D
Demand Side Response: DSR
Operator of Renewable Energy Sources and Warranties of Origin Société Anonym: DAPEEP S.A. (former LAGIE S.A.)

E
European Association of Regulators: ACER
Electricite de France: EDF
European Commission: EC / COM
European Commodity Clearing AG: ECC
European Energy Program for Recovery: EEPR
European Energy System Administrators: ENTSO
European Parliament: EP
European Union: EU

F
Flow – based Market Coupling

H
Hellenic Energy Exchange Société Anonym: HENEX S.A.

I
Interim Tight Volume Coupling: ITVC
Independent Power Transmission Operator S.A.: IPTO or ADMIE in Greek

L
Law: L
Operator of Electricity Market: LAGIE S.A. (renamed to DAPEEP S.A.)

M
Market Coupling Operator: MCO
Megawatt per hour: MWh

N
Nominated Energy Market Operator: NEMO

O
Over The Counter: OTC

Organized Trading Foundation: OTF

P
Price Coupling of Regions: PCR

R
Regulating Energy Administrator: RAE

S
Single European Act: SEA
Smart Cities and Communities: SCC
Small medium enterprises: SME
Société Anonym: SA

T
Ten Year Network Development Plan: TYNDP
Transmission System Operator: TSO
Treaty on the Functioning of European Union: TFEU
Trilateral Market Coupling: TLC

U
Union of European Energy System Administrators: ENTSO

W
Wholesale Energy Markets Integrity and Transparency: REMIT

i. INTRODUCTION

i.i. Aim of the Thesis

The aim of this thesis is to examine the causes that led European Union (from now on EU) to the unification of electricity markets and to the creation of one platform, which will be used towards the promotion of this goal. The key reason for this strategy derives from the liberalization of the markets in order to create a single one. That way, EU Member States will allow access to different sources of energy at lower costs, while minimizing production costs and therefore maximizing social surplus. The Target Model will serve as the model for the uniform restructuring of European energy markets in order to be able to 'merge' and become a single pan-European market which will achieve the essential objectives set out in Article 194 § 1 Treaty on the Functioning of European Union (from now on TFEU).

The changes that the implementation of the Target Model will bring to the energy markets will be promoted through the operation of the “Energy Exchanges”. Power or Energy Exchanges, in principle adhering to a common legislative framework, will provide jointly regulated markets with similar services for participants, thus expanding the free movement of cross-border transactions between Member States. These energy markets are about the electricity market, the gas market, the purchase of green certificates, white certificates, and certificates of origin, the purchase of lignite or other carbon, and the emission allowances. In this paper we will examine the structure, operation and legal framework of electricity power exchanges.

i.ii. Methodology – Structure – Contribution of the Thesis

The methodology used in this thesis is mainly the multi-source bibliographic study and the combination of literature, in order to produce conclusions based on data collected up to 2019. There are also references, notably to European Law packages, which include future forecasts.

The thesis is beginning with an introduction to the historical review of electricity market and its development in a local and in an international frame. It is continuing with the creation and the advancement of the legal framework on energy trading, until we get to the need of a single energy market creation, the energy stock market and its operation. In the nutshell, we examine the results of the creation of this one single energy market and how this has already affected and will affect in the future the States of the EU.

Through the study of this master thesis one can understand the origins of the energy stock market and the real causes that formed it. One can also be notified about the results of the energy exchange market as well as to have a comprehensive opinion on its use and on its benefits for the consumer from both a legal and an economical aspect.

CHAPTER 1: CHRONOLOGY OF THE ELECTRICITY MARKET

1.1. Introduction

Since the early 1980s, the most developed countries and also some emerging countries have started to liberalize their infrastructural sectors. In this chapter we will be able to observe the historical path of electricity's market liberalization in European and Greek level.

1.2. Chronology of Electricity Market in Europe

The energy liberalization is a result of Europe's general tendency to business liberalization and will of a freer industry environment from the state involvement. The presently European energy market liberalization process represents the world' s most in depth cross jurisdiction reform of the electricity sector comprising from integration of distinct state level or national electricity markets. Even though there are extended developments within the last twenty years, it's unfair to praise solely the works of the EU member countries. It may be acknowledged that the reform method of the EU is dependent on principally the actuation of the European Commission (EC). The EC has made great efforts to reform energy policy in many Member States, whereas without this contribution, the process would have been slower, less likely to succeed and far more affected by national interests. The EC's orientation was for the members to adopt a more united energy policy instead of continuously competing each other on who will adopt the trading arrangements of whose. The 1957 Treaty of Rome and the Single European Act (SEA) of 1987 set the base to a united energy market.

1.3. Chronology of Electricity Market in Greece

The usage of the electricity from the last quarter of the 19th century and since, has led to tremendous changes in the modern world. Until then, the main power sources in the manufacture used to be coal and lignite. The breakthrough of the electricity changed not only the industrial production but also the transportation, the lighting, the heating, the electrical appliances that have invaded everyday life, the telecommunication, and the audiovisual media up to modern electronic applications.

Such a powerful and important innovation it was only natural to needed to be legally frame worked, not only for the security of energy supply, but also for the decent living of the man (BVerfGE (1949), *Constitution of Germany*, Articles 66, 248, 258, Germany)

The production of large quantities of electricity in order to meet the ever-increasing demand and commercial exploitation of it appears internationally in the 1880s in both America and in Europe. In Greece the first power plant was founded in 1889. In the end of the 19th century, Greece used to be mostly an agricultural country, with a small manufacturing growth. According to Mr. Lytras S. Theodoros in his book "*The Liberalization of the electricity market and the supply agreement*" (2017), the first steps of Greece's electrification were naturally to be done in urban centers where due to the population density and the possibility of using electricity in means of transport (tramway, electric railway) there was an incentive to invest the necessary capital for the construction of production and network factories transmission / distribution of electricity.

1.4. The Technical Characteristics of Electricity

Initially, the electricity is a secondary form of energy, which means that electricity is produced from primary forms of energy such as coal, lignite, oil, natural gas, other combustible materials (eg biomass, refuse), water courses, wind or nuclear energy.

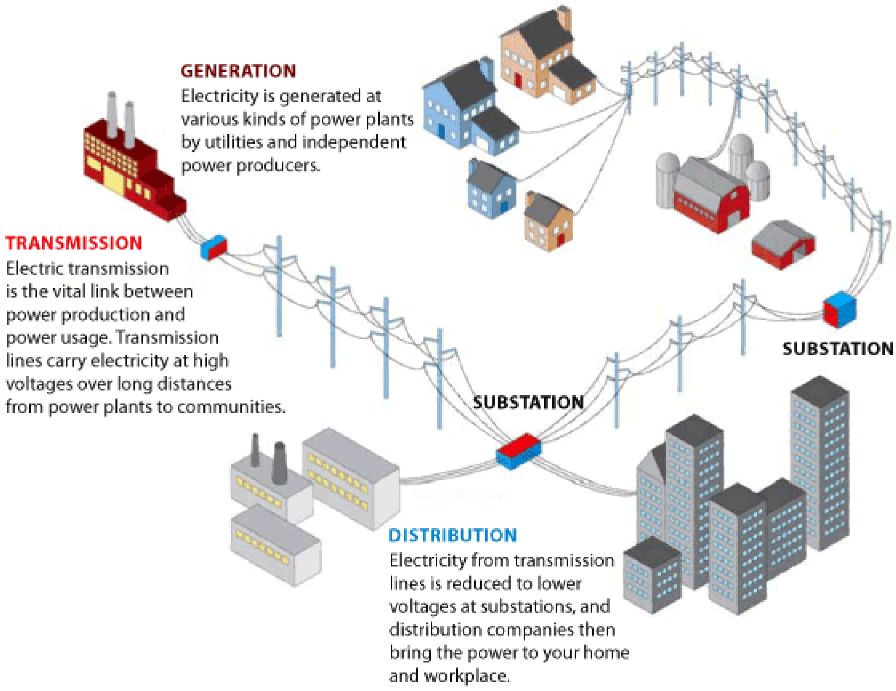
Secondly, the electricity is produced in order to be consumed, meaning that in order for the electricity produced to be exploitable by the end user, it must be transferred from the place of the central production to the place of final consumption, so the exploitation of electricity requires its transportation. To transfer the electricity produced from production to end users, a transmission and distribution pipeline network is necessary.

Thirdly, electricity cannot be stored. Electricity is produced, transferred, divided and being used in an eternal circle. This technically necessary flow is interwoven with the use of electricity. The specificity of the electricity transmission - distribution system lies in the fact that it must constantly receive as much electricity as it is pumped from it, otherwise it will either "overflow" or break the "deficit" flow. In order to be technically feasible to supply users with electricity, the balance of the transmission and distribution system must be ensured at all times.

As it is mentioned by Mr. Lytras S. Theodoros (2017) in the *Liberalization of the electricity market and the supply agreement,* in page 11, electricity is a homogenous commodity. The homogeneity of electricity as a commodity is a particular feature that has a significant impact on its economic exploitation, since its price is not based on qualitative characteristics but primarily on production, transport and distribution costs[1]. Thus, there are no reasons to differentiate the price of electricity according to "quality". The electricity was always offered to the users in exchange of money. From the first steps of electrification, it was a commodity of economic value, regardless of the existence of a free market or monopoly (Monopolkommisssion, Sondergutachten, Energie (2011): *Wettbewerbsentwicklung mit Licht und Schatten*, p. 52).

The Figure 1 is depicting clearly the main path followed by electricity from the generation to transmission and all way to distribution. As we can see from Figure 1 everything starts at the Generation station, where electricity is generated at various kinds of power plants by utilities and independent power producers. The next phase is the transmission. Electric transmission is the vital link between power production and power usage. Transmission lines carry electricity at high voltages over long distances from power plants to communities. On next stage the electricity from transmission lines is reduced to lower voltages at substations, and distribution companies then bring the power to our homes and workplaces.

Figure 1. The Electricity Power System



Source: thestatehousefile.com

1.5. Conclusion

In the nutshell, it is obvious from the above that from a very early stage the EU has endorsed the general approach of the market planning package, in particular the objectives of putting consumers at the center of the energy market, increasing electricity supply and strengthening regional cooperation. The corresponding adjustment of market rules and regulatory framework is an important step towards a stable supply of clean energy to all European consumers at the lowest possible prices. Nevertheless, there is still room for further improvement in some areas. In particular, more specific rules are required.

CHAPTER 2: THE ORIGINS OF THE ENERGY LEGAL FRAMEWORK

2.1. Introduction

In chapter 2 "*The origins of the energy legal framework*" we are going to examine the beginnings of the legal framework on which the international legislators have relied on, in order to create a fertile ground for the promotion of the liberation of the energy market and the unification of the electricity market.

2.2. Electricity Supply and Private Law

Since the first steps of electrification, there has been strong public interest in the generation and transmission of electricity in all countries. The power plants had to obtain administrative licenses as well as the installation of the transmission and distribution network. Soon enough electricity turned out to be so important for people and it became a social good precisely because of its importance for everyday life and economic activity in general. The specific legislation regulated not only the administrative aspects of electricity generation, transmission and distribution but also the way of supplying users.

The development of monopolies for the production and transportation of electricity left little room for private Law enforcement. Conventional freedom presupposes the free movement of goods and services, the existence of a free market where traders have a choice. Electricity supply has been an international example for examining so-called forced contracts where there have been significant constraints on all three forms of conventional freedom:

a) Generally, electricity producers could not deny contracting and supplying anyone with electricity. So, they did not have the freedom not to conclude a contract. Candidate counterparties could choose not to contract but not to supply electricity from the monopoly producer – supplier.

b) There was virtually no choice of counterparty, since the producer, usually identified with the electricity supplier, had to contract with anyone and the end user could only contract with the monopoly producer – supplier.

c) The content of electricity supply contracts was defined in almost every detail by the Law as electricity tariffs.

With the liberalization of the electricity market and the creation of competitive conditions in the production and supply of electricity, the way for the implementation of the tools of private Law and above all contractual freedom has been opened. However, it should be noted from the outset that the liberalized electricity market is an organized but regulated market. Conventional freedom is certainly applicable, but it would be misleading to disregard the fact that the scope of the specific regulatory provisions has a significant impact on the contracts concluded by the participants in the electricity market (*Electricity supply code to customers* (2013), Government's Gazette 832/09-04-2013 B', Athens, National State Printing).

2.3. The Liberalization of the Electricity Market

The liberalization and evolution of energy markets has been slow, in contrast to the evolution of the stock financial market at a pan-European level, as it has already been mentioned. Thus, the full liberalization of energy markets as well as the consolidation of a single pan-European market (Target Model) has so far been a key concern of the Union. However, it is important that the earlier maturing of the stock financial market benefited the development of the energy market as it became a model for the latter. More specifically, the course of liberalization of the energy market at European level was initiated in three sets of legislative measures as follows:

- The attempt to challenge the privileges of state-owned monopoly undertakings for the free movement of energy commodities has contributed substantially to the adoption of the first Directive 96/92 / EP, EU L 27/20, for the liberalization of the electricity market and follow-up to the First Gas Market Liberalization Directive (Directive 98/30 / EP, EU L 204/1).
- The second set of measures was subsequently adopted, namely Directives 2003/54 / EC (L 176/37) and 2003/55 / EC (L 176/57), which replaced the earlier ones, with the main aim of speeding up the liberalization process; and the creation of a truly functioning internal market in the electricity and gas sectors.
- Finally, following the first energy competition investigation carried out by the Commission's Competition Directorate-General for Energy, and identifying key

issues that hinder the smooth functioning of a single energy market in the EU, the third set of regulatory measures was deemed necessary in 2009 for the electricity and gas sectors, including Directives 2009/72 EC and 2009/73 EC and Regulations (EC) 713/2009, 714/2009 and 715/2009.

2.4. Timeline of European Union Energy and Climate Change Legislation

Here is the progress of the Energy and Climate Change Legislation step by step as it has been developing through the years.

1992	• Council directive 92/42/EC: On efficiency requirements for new hot water boilers fired with liquid or gaseous fuels
1997	• COM (1997) 599 final: Energy for the future - renewable sources of energy: White Paper
2000	• COM (2000) 247: Action Plan to improve energy efficiency in the European Community • COM (2000) 469 final: Towards a European strategy for the security of energy supply: Green Paper
2001	• Directive 2001/77/EC: On the promotion of electricity produced from renewable energy sources in the internal electricity market • Directive 2001/80/EC: On the limitation of emissions of certain pollutants into the air from large combustion plants
2003	• Decision No 1230/2003/EC: "Intelligent Energy - Europe" - adopting a multiannual program for action in the field of energy
2004	• Directive 2004/8/EC: On the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC • COM (2004) 366 final: The share of renewable energy in the EU
2005	• COM (2005) 265 final: Commission Green Paper, "Energy Efficiency - or Doing More with Less" • COM (2005) 627 final: The support of electricity from renewable energy sources
2006	• Directive 2006/32/EC: On energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC

	• COM (2006) 849 final: Report on progress in renewable electricity • COM (2006) 6817: Establishing harmonized efficiency reference values for separate production of electricity and heat • COM (2006) 545: Action Plan for Energy Efficiency: Realizing the Potential • COM (2006) 583: Mobilizing public and private finance towards global access to climate - friendly, affordable and secure energy services: The Global Energy Efficiency and Renewable Energy Fund • COM (2006) 849: Green Paper follow-up action Report on progress in renewable electricity • COM (2006) 1639: To establish Competitiveness and Innovation Framework Program (2007 to 2013) • COM (2006) 1005: Agreement between the Government of the United States of America and European Community on the coordination of energy - efficiency labeling programs for office equipment
2007	• COM (2007) 848 final: Road Map: "Renewable energies in the 21st century: building a more sustainable future" • Commission Staff Working Document: Impact assessment accompanying the implementation measures for the EU's objectives on climate change and renewable energy for 2020
2008	• Commission Decision (2008) 7294: Guidelines for the implementation and application of Annex II and the promotion of cogeneration based on a useful heat demand in the internal energy market • Regulation (2008) No 106 (p. 0001-0007): Establishing of rules for the Community energy efficiency labeling program for office equipment (herein after referred to as the "Energy Star Program") • COM (2008) 772: Communication from the Commission - Energy efficiency: delivering the 20% target • SEC (2008)57: The support of electricity from renewable energy sources
2009	• Commission Regulation (2009) No 245: With regard to eco-design requirements for fluorescent lamps without integrated

	ballast, for high intensity discharge lamps, and for ballasts and luminaries able to operate such lamps • 15265/1/09 REV: Decision to reduce target of 80-95% by 2050 compared to 1990 • Official Journal L 140, 05/06/2009 P. 0016-0062: Renewable Directive • Third Energy Package: Making the energy market fully effective and to create a single EU gas and electricity market in order to keep process as low as possible and increase security of supply • Directive (2009) 72: Concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC • Directive (2009) 28: Directive on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC • Regulation (2009) 713: Establishing an Agency for the Cooperation of Energy Regulators • European Energy Program for Recovery (EEPR): In order to advance projects in field of energy which, by providing a financial stimulus, contribute to economic recovery, the security of energy supply and the reduction of greenhouse gas emissions in the Community • Regulation (2009) 715: On conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005 • Commission Regulation (EC) No 641/2009: Requirements for glandless standalone and glandless circulators • Regulation (2009) 45: With regard to eco-design requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaries able to operate such lamps, and repealing Directive 2000/55/EC • Directive (2009) 125: Setting of eco-design requirements for energy - related products, implementation of measures on energy - related products, in order to improve its environmental performance
2010	• Regulation (2010) 1233: Update / amendment to Regulation (EC) No 663/2009 • Directive (2010) 30: Establishing a framework for the harmonization of national measures on end-user information,

	particularly by means of labeling and standard product information • Directive (2010) 31: Promotion of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness
2011	• Energy Efficiency Plan 2011: It aims at promoting an economy that respects the planet's resources; implementing a low carbon system; improving the EU's energy independence; strengthening security of energy supply • COM/2011/0202 final: Smart Grids - From Innovation to Deployment • Commission Delegated Regulation (EU) No 626/2011: Supplementing Directive 2010/30/EU with regard to energy labeling of air conditioners • COM (2011) 658 final: guidelines for trans-European energy infrastructure (Proposal): trans-European energy infrastructure; development and interoperability of energy networks, to ensure security of supply, promote energy efficiency, rules for cross - border allocation of costs (cost benefit analysis) • COM (2011) 885 final: Energy Roadmap 2050 - The "Energy Roadmap 2050" works as a long-term European framework, the EU commits itself to reduce greenhouse gas emission with certain goals, it ensures security of energy supply and competitiveness, factors like transport, heating and energy storage play an important role
2012	• Commission delegated regulation (EU) No 244/2012: Energy performance of buildings; comparative methodology framework for calculating cost optimal levels of levels of minimum energy performance requirements for buildings • COM (2012) 271 final: Renewable Energy - a major player in the European energy market • 10.7.2012 - European Commission launches the Smart Cities and Communities European Innovation Partnership (SCC) • Directive 2012/27/EU: Energy Efficiency Directive]
2013	• COM REGULATION (EU) No 543/2013 on submission and publication of data in electricity markets and amending Annex

	I to Regulation (EC) No 714/2009 of the European Parliament and of the Council • TEN-E Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure.
2014	• COM REGULATION 2014/0330 final: COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL European Energy Security Strategy
2015	• COM REGULATION (EU) 2015/1222 establishing a guideline on Capacity Allocation and Congestion Management is a key piece of legislation for the single market in electricity. It sets out minimum harmonized rules for single day-ahead and intraday market coupling, including methods to calculate the capacity on cross-border lines. Importantly, CACM provides the legal basis for the designation of nominated electricity market operators (NEMOs), outlines their tasks associated with market coupling and provides a framework for their cooperation with the TSOs.
2016	• COM REGULATION (EU) 2016/1447: establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules • COM REGULATION (EU) 2016/1388: establishing a Network Code on Demand Connection establishes harmonized requirements for grid connection applicable to any new demand connection to the transmission system, any new demand equipment which could provide Demand Side Response (DSR) and distribution systems. • COM REGULATION (EU) 2016/631: establishing a network code on requirements for grid connection of generators, establishes harmonized connection rules for power-generating modules. The code defines four categories or 'types' A-D of generators, which are based on the maximum capacity of the power generating module and its connection voltage level. • COM REGULATION (EU) 2016/1719: establishing a guideline on forward capacity allocation addresses the allocation of long-term transmission rights, necessary for the operation of long-term forward markets. These markets provide market participants with hedging opportunities to mitigate future price risk.
2017	• COM REGULATION (EU) 2017/2196: establishing a network code on electricity emergency and restoration, sets out rules for the management of the transmission system in case of

	emergency or blackout, as well as other different system critical states (defined in SO GL). Chapter IV addresses the suspension and restoration of market activities. • COM REGULATION (EU) 2017/1485: establishing a guideline on electricity transmission system operation sets harmonized rules for TSOs, DSOs and SGUs (significant grid users), in order to provide a legal framework for the operation of the interconnected transmission system (e.g. regional cooperation of TSOs, data exchange etc.) to maintain system security and to achieve other Union-wide objectives. • COM REGULATION (EU) 2017/2195 establishing a guideline on electricity balancing sets out EU-wide rules governing the functioning of the balancing mechanism. Balancing refers to the timeframe after the markets have closed (gate closure) whereby TSOs must ensure that demand matches supply as real-time approaches.
2018	• The TYNDP Package: The TYNDP is published every two years. The TYNDP 2018 package includes scenarios to 2025, 2030 and 2040, as well as regional investment plans; a system needs report and insight reports.
2019	• Risk Preparedness Regulation on risk-preparedness in the electricity sector (EU) 2019/941 • ACER Regulation establishing a European Union Agency for the Cooperation of Energy Regulators (EU) 2019/942 • Regulation (EU) 2019/943 on the internal market for electricity provides a framework for the further integration of renewable energy into the electricity market sets out new rules on bidding zones and cross-zonal capacity allocation and reinforces the role of the market in providing price signals for investment. The Regulation entered into force on 4 July 2019. • Directive (EU) 2019/944 on common rules for the internal market for electricity and amending Directive 2012/27/EU, notably provides consumers with more tools for active participation in the energy market, introduces measures to improve retail market competition and sets out principles to ensure that aggregators can fulfill their role as intermediaries between customers and the wholesale market.
2020	• Deadline for meeting the 20-20-20 EU - Target: near zero energy standard for all new buildings
2030	• Deadline for new 2030 targets - yet to be finished
2050	• Deadline for achieving 80-95% of emissions savings as decided in 2009

The data on the above table have been extracted from the European Commission's web page (2017), on the 15-02-2019, https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans and from the web site EUR-Lex, Access to European Union Law (2019), on the 15-02-2019, https://eur-lex.europa.eu/legal

2.5. The Historical path and types of energy exchange markets

Until the 1980s there were no wholesale markets and electricity transactions were in fact long-term invoiced clearing contracts. That is, all consumers bought energy from a vertically integrated company. In the context of market liberalization since 1990, markets have "opened up" and more than one can participate in both supply to consumers and electricity production. This gave the opportunity to conclude bilateral trade between the participants, but at the same time created the need for the creation of wholesale markets, which would allow trading between the participants in both the production and supply of electricity.

As mentioned in *Introduction to Energy Stock Markets. Analysis, trading and risks*, Athens, Greece's Stock Market, on p. 56 of Mr. Tsotsos R (2017) to address the problem of energy pricing, two models of wholesale regulated markets were created, namely: power exchanges where participation is optional and power pools where participation is optional, mandatory pool. The theory supports the view that these two regulated wholesale market models are two types of energy exchanges that differ in their purpose. Specifically, the former are called "merchant power exchanges" for the purpose of providing for-profit trading services through various financial subscriptions set up either by financial institutions or market participants, for example energy companies, or TSOs. Examples of this type of brokerage are APX (Netherlands), Belpex (Belgium), Pol PX (Poland), Powernext (France) etc.

Finally, it is also argued that power pools are the herald of energy exchange markets, so they are distinct from them and indeed their development. This view seems to be the predominant one. Pool markets have been created on public initiative and the price is mainly based on production cost criteria and other technical parameters.

Unlike energy exchange markets where the price is formed into hourly bids and supplemented with a public price index for transparency purposes, pools are considered to be more restricted than energy exchange markets where open market standards include large consumers, energy traders, energy distributors and financial intermediaries and others (COMMISSION DELEGATED REGULATION (EU) No 153/2013 (19 December 2012) *Supplementing Regulation (EU) No 648/2012 of the European Parliament and of the Council with regard to regulatory technical standards on requirements for central counterparties*, Brussels, Official Journal of COMMISSION).

2.6. Conclusion

Coal dependence is one of the strategic goals of the Energy Union and, therefore, the goal of supporting investments aimed at reducing coal use in the electricity market must be supported. However, the best way to promote this is equal and fair market conditions, beneficial to both consumers and the "green transition". Full integration of the external costs of conventional electricity generation, which includes climate change-related damage and damage to human health, is vital for efficient and effective coal-fired emissions. Appropriate taxation is the best approach to promoting investment in green electricity.

The EU strongly supports the statement that all consumers, including industry, businesses and private households, have the right to generate, store and sell energy themselves, and that local energy communities have the right to the right to support, develop or lease Community networks. However, more specific rules are needed to enable these rights to be pursued and to overcome existing barriers (network access, unjustified and abusive network charges, legal and administrative barriers, etc.).

CHAPTER 3: THE ELECTRICITY EXCHANGE MARKET

3.1. Introduction

In economic terms, as we have already examined in the previous chapters, electricity is a commodity capable of being bought, sold, and traded. In this chapter we are going to examine the electricity market as a system of enabling purchases, through bids to buy; sales, through offers to sell; and short-term trading, generally in the form of financial or obligation swaps. According to en.wikipedia.org (2019) "*Bids and offers use supply and demand principles to set the price. Long-term trades are contracts similar to power purchase agreements and generally considered private bi-lateral transactions between counterparties.*"

As it referred in the Criteria for economically efficient wholesale markets, retrieved from the Harvard's webpage and demonstrated in Wikipedia on August 2019: "*Wholesale transactions (bids and offers) in electricity are typically cleared and settled by the market operator or a special-purpose independent entity charged exclusively with that function. Market operators do not clear trades but often require knowledge of the trade in order to maintain generation and load balance. The commodities within an electric market generally consist of two types: power and energy. Power is the metered net electrical transfer rate at any given moment and is measured in megawatts (MW). Energy is electricity that flows through a metered point for a given period and is measured in megawatt hours (MWh).*

Markets for energy-related commodities trade net generation output for a number of intervals usually in increments of 5, 15 and 60 minutes. Markets for power-related commodities required and managed by (and paid for by) market operators to ensure reliability, are considered ancillary services and include such names as spinning reserve, non-spinning reserve, operating reserves, responsive reserve, regulation up, regulation down, and installed capacity.

In addition, for most major operators, there are markets for transmission congestion and electricity derivatives such as electricity futures and options, which are actively *traded. These markets developed as a result of the restructuring of electric power systems around the world. This process has often gone on in parallel with the restructuring of natural gas markets."*

3.2. The Energy Exchange Market as a Pricing Mechanism

Widespread participation in cross-border transactions between countries creates high levels of liquidity which, in combination with the transparency regime governing stock-exchange models, results in a representative price being found within the framework of equal and fair competition between the participants.

The price of energy commodities on energy exchanges is set as a representative reference price for products for the calculation of compensation, for the price of the commodity in the OTC market, as it is referred in the Indicative 487/2008 Greece's Supreme Court "*the loss which the payee is obliged to pay is objectively assessed and calculated separately on the basis of the value of the goods at the place and time at which they were accepted for carriage, according to the price of the stock market or the current price the market or the usual price of goods of the same kind and quality*". In combination with 767/2009 Piraeus Court of Appeal "*'shall re-establish the value found by proving the price of the stock market or, if there is no such price, the current market price or, if it does not exist, the usual price of the same kind and the same quality"* ».

The important thing about the functioning of each stock market is to study the trading rules so as to identify the stock market mechanism.

3.3. Energy Exchange Market Operation

The most popular electricity exchanges are the day-ahead, which organize every hour of the next day. In the role of auction organizer, the stock exchange accepts orders and then decides which will be accepted and at what price to settle the contracts. According to that decision, the question remains whether these orders reflect the actual costs or prices of their participants. The auction handler simply selects buyers and sellers respectively to hit high or low prices so that they can be combined into one price, which is the price of the last order that could be agreed.

3.4. Power Pools

Power pools have basic stock market characteristics, but they are also governed by other technical parameters, which may influence price formation, in addition to bidding by participants. In particular, they help converge between market rules and technical data and constraints in order to minimize costs.

The physical market based on the capital market has evolved into a stock market but has not been assimilated to it. Indeed, trading beyond commerce of products included negotiating, and indeed the contracts were standardized and implemented in the framework of an organized structure with free and large-scale participation. However, energy is still traded as a commodity, as a product and not as a financial instrument.

However, this stock market modeling of the energy market has also facilitated the input of financial instruments (energy producers) of energy having as their underlying energy value. Because of the above, various stock market transactions and trading of financial instruments in the energy derivatives market are governed by different regulations and directives as it is cleverly pointed out by Mr. Tendopoulos B. (2015), in the *Capital Law*, on p. 43-44.

3.5. The negotiation

Organized trading as a mechanism for finding the stock market price is a matter of institutional interest, as through a methodology that each energy exchange chooses, a “fair market” with “fair prices” should be reflected, serving large volumes of transactions rather than tight trading interests. The usual bargaining methodology used by the energy exchanges is that of the auction. The common feature of auctions is to achieve a single pricing for each accepted bid.

3.6. Big Auction

The spot market uses the big auction bid method (ie, offers to buy and sell the commodity) in order to form the market price. In particular, it assigns demand bids with the energy bids for each hour via an electronic platform and publishes an auction price or otherwise a Market Clearing Price (MCP).

Sales bids are ranked in ascending order and bids are ranked in descending order. Two curves, supply and demand are thus formed. The intersection of the curves determines the auction price / market clearing price. Sales bids accepted shall be those whose price is less than or equal to the price of the auction.

If the price they offer is greater than the auction price, they are not accepted. In addition, the price of the purchase offers is accepted if they are higher than or equal to the auction price, otherwise if they are cheaper than the auction price, they are rejected. It is worth mentioning that the auction price is the price at which the risk is calculated in the event of non-fulfillment of the obligations of the traders and the financial settlement of the tendered operations.

3.7. Continuous trading – Continuous automatic matching

As it is mentioned in Voulgaridou's I. (2016), *Power Exchange Market. Perspective of constitution in Greece Legal Magazine entitled "Business and Company Law" issue 2/2016*, p. 151: "*An on-demand energy stock exchange can offer trading mechanisms where electricity is delivered on the same day (intraday). Such mechanisms are based on continuous matching, ie the purchase and sale of electricity takes place very close to the time of delivery"*. This method achieves the continuous matching of tenders in a continuous time based on the priority criteria, value and time. Sales offers are fulfilled when their price is less than or equal to the best market price at the moment of their introduction. Bids are made if their price is equal to or higher than the best market price at the moment, they are imported into it. It is also worth mentioning that tenders submitted at the same price are made on the basis of their time priority. The difference between auctions and continuous matching is that in the second case no single purchase price is calculated (Dailaki Konstantina (2017), *Postgraduate Thesis SUBJECT: Legal Issues of Energy Exchanges The legislation governing the Energy Exchanges and the legal relations of the participating parties*, Piraeus, University of Piraeus, p. 15).

3.8. Submitting Tender Types

Sale or Purchase Biddings are submitting either as hourly bids or in standard bundles combining transaction price and volume at a predetermined time before the start of a certain period of time during which they interact according to the relevant stock market rules. Each bid of the participant is submitted anonymously and is not visible to other participants (anonymous bids). They are usually submitted until 12am of the day proceeding each delivery day according to Mr. Roggenkamp M. Boisseleau F. (2005) in *The Regulation of Power Exchanges in Europe*, Chapter 1. The liberalization of the EU electricity market and the role of power exchanges, Antwerpen-Oxford-New York: Intersentia, International Law Series, p. 23. Energy exchanges offer a trading platform for traders to bid for buying or selling energy. There are two main types of energy orders / bids that are found on energy exchanges:

3.8.1. Hourly Bids

This is the simplest type of bids that is found on most energy exchanges. In the United Kingdom, half the hour is also available. In fact, an hourly bid corresponds to a value-quantity pair, where a specific value is set for a given amount of energy and can be deposited for a specific time period of the next day (EPEX SPOT (2019), European Power Exchange, 15/04/2019, http://www.ukpx.com).

The hourly bids usually include as their main components the participant's name, the type of bid (sale - purchase), the amount of energy, the 24-hour cycle of the relevant day, the quantity to be delivered or received, and the price as pointed out by Mrs. Tarnanidou C. (2016), in *Contemporary Energy Markets, Institutional Framework and Greek Perspective*, Athens, Law Library, p. 168. In this way, the participants declare what amount of energy they are willing to sell or buy and at what price they want.

The Market Officer gathers hourly bids from producers and hourly cargo declarations from cargo representatives. Thus, by classifying the power offers from the producers in ascending order, the aggregate supply curve for the specific time and the specific control area of the Officer is created.

Correspondingly, according to Mr. Ioannis Boumis (2016) in his *Thesis: "Model of Integration of Pre-Daily Electricity Markets and Implementation in Greece, Fyrom, Bulgaria and Italy"*, Hellenic Technical University, Department of Electrical Engineering, p. 20, by classifying load statements in descending order, the aggregate demand curve for the next days' time and the specific control area (e.g., a country or a country region) is generated. This method serves TSOs for practical reasons as hourly bids are easier to manage and calculate.

3.8.2. Block Bids

These bids refer to mass energy production or energy consumption as they include a period of consecutive hours and not just one hour of the next day, such as hourly bids. They are more advantageous for producers who handle production units with high start-up and shutdown costs for each hour, such as producers of thermal power plants. For the latter, it is more cost effective to bid through bundled offers, which will take longer hours to prevent surprise situations and burden them with great costs.

As Mr. Ioannis Boumis (2016) continues in his thesis: "Model of Integration of Pre-Daily Electricity Markets and Implementation in Greece, Fyrom, Bulgaria and Italy", Hellenic Technical University, Department of Electrical Engineering, p. 28, block bids can be submitted either by the producers on the supply side or by the cargo representatives and the demand side. A block offer has the following characteristics: a) a fixed price in euro b) it extends over several periods (hours) c) a quantity for each period (hour), which may be different in each period d) acceptance, under which the block offer cannot be accepted. It is also noteworthy that these transactions must meet all the reported data otherwise they are not executed as they cannot be partially implemented. Finally, more complex forms of this type of transaction are included, which include additional elements such as the price of the package in relation to the clearing value during the reference period.

3.9. Conclusion

The main aim of the energy exchange market should be to enable European consumers to be fully involved in the whole electricity market and, consequently, in electricity trade and supply. Decentralized trading venues and commercial structures need to be developed that open up opportunities for direct trading, even of small power plants. While the decentralization of energy supply and energy marketing is a precondition for the full integration of consumers into the market, decentralization does not mean fragmentation of the European electricity market.

CHAPTER 4: OPERATION OF THE ENERGY EXCHANGE MARKET

4.1. Introduction

Before the 1990s, power management in France was centralized: a single public utility, EDF, oversaw electricity generation, transmission, distribution and sale to industrial and individual consumers. After the market was progressively opened to competition starting in 1996, a large number of players began operating on the market, which was expanded to encompass all of Europe. First come producers, the largest being EDF, Engie and E.ON. Then come suppliers – EDF and some sixty others1 – which offer consumers energy solutions. Two entities have become independent from EDF: RTE2, France's transmission system operator, which manages electricity transmission via high-voltage power lines, and Enedis (formerly ERDF), which provides local distribution. Electricity is also bought and sold on wholesale markets, giving rise to exchanges, such as EPEX Spot, and trading companies.

4.2. Negotiating & Trading

Trading interest focuses on the spot market, ie on the day-ahead market, with day-to-day physical transactions, the intraday market for correcting discrepancies and finally the balancing market where the technical constraints of the network and the units are taken into account in terms of purchase. The key negotiating and trading energy products have standardized features in the stock markets as otherwise they could not be widely protected and circulated.

In particular, as it is mentioned by Tarnanidou C. (2016), Contemporary Energy Markets, Institutional Framework and Greek Perspective, Athens, Law Library, p. 167, energy contracts are standardized as either *Day-ahead contracts* or *Fixed-term contracts* that last 5 years or *Forward contracts* which sometimes are non-financial and their operation is in essence complementary to day-ahead contracts.

The most common deals in the spot market are the hourly spot contracts. These are standard contracts as demanded by the stock market as they are widely traded and deal with either hourly bids or standard bundles, which combine price and volume of the transaction. They are submitted as detailed above in the auction procedure and are related to day-ahead market contracts.

The minimum allowable data defined by them is: the subject of the transaction (which is a high-voltage grid and usually the contract size is at least 0.1 to 1 MWh), the quantity, how the price is formed, the reference price during the negotiation process, the time and place of delivery of the energy, as determined by the responsible TSO (usually delivery on local networks). Apart from analyzing above, a stock market through the continuous matching mechanism can also provide intraday purchase contracts where electricity is delivered on the same day.

When the spot market reaches a certain level of prosperity, then the following step is to create a market, where the traders can buy and sell electricity derivatives. In particular, derivative energy markets have trading platforms for derivatives, dealing with electricity as “Financial instrument”. Derivative financial instruments are either forward contracts or option contracts or swaps that are traded in regulated markets, such as stock exchanges. This way, traders can deal with long term physical delivery energy contracts, which lead to high liquidity conditions for investors. Only price and quantity (E/MWh) are public in the energy stock market (*Over The Counter – OTC*). In the derivatives market there is no hourly schedule or corresponding hourly contracts but the breakdown of the day into: Base (24 hours a day), Peak (peak hours, usually 8:00 – 20:00), Off Peak (non peak hours, usually 20:00 – 8:00). Each derivative has a specific power interval. More specifically, these intervals refer to a day, a weekend, a week, a month, a quarter, a semester or even a year. Each contract is negotiated at 1 MWh for each hour of coverage.

Annex I of Regulation 714/2009/EU has recently been supplemented by Regulation 2015/1222 laying down guidelines for capacity allocation and congestion management for the purpose of urgently completing a functioning and interconnected energy market. In the light of the above regulatory framework, in particular with EU Directive 2009/72 EC, the Union supports the adoption of the 'Target Model' to achieve a single way of functioning of the individual electricity and gas markets in the EU, by the ultimate goal is to create a single European market whose operation will gradually bring about energy prices convergence in the individual Member States. The operation of such a market requires the establishment of common rules of trade, which is to say that all EU member states accept a common market model.

Interesting is the provision of the Target Model for the *Futures*, function which is a stock market widely used in the financial markets as a means of speculating or limiting the loss of traders. *Futures* are an agreement between two members to buy or sell a specific quantity, of an asset, at a specific price, under settlement, at an agreed future date. The value of *Futures* is secured on the stock exchange market with a maintenance margin. *Futures* are traded daily on the energy stock market and their value is constantly valued. When it is time to complete the physical delivery, a producer may consider the transaction unprofitable and may not complete the purchase by losing the amount by which he had insured the transaction. Thus, *Futures* are used as a relatively low risk indicator of how prices will change, concludes Mrs. Tarnanidou C. (2016), in the *Contemporary Energy Markets, Institutional Framework and Greek Perspective*, Athens, Law Library, p. 180.

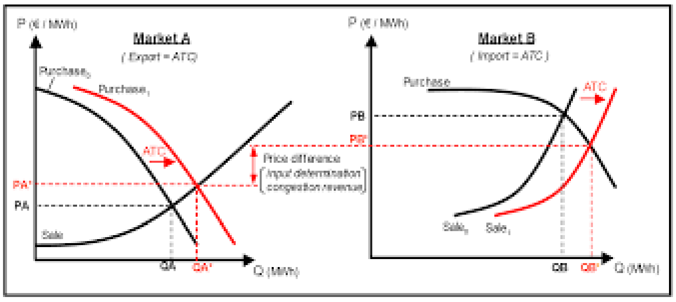
4.3. Market Coupling

As it is mentioned above and as it is depicting in figure 2, according to the Target Model, the EU's aim is homogeneity in the way individual European markets operate in order to create a single pan-European energy market. The specific issues that arise are regulated by the Coupling Regulation 2015/1222. The term market coupling refers to the aim to create associate degree interconnected (European) marketplace for electricity. Market coupling is meant to link management areas and market areas so as to harmonize totally different systems of electricity exchanges and, above all, to cut back price variations. This way, the electricity market is to some extent aligned with the physical reality of electricity flows, since neighbor electricity grids square measure in any case physically interconnected and electricity continuously takes the shortest route from producer to client - across market boundaries. Market coupling systems (PCR, FBMC and XBID) exist each in day-ahead market and in intraday markets. Price coupling is the method chosen to be the most effective for integrating the individual European wholesale electricity markets and takes into account two important parameters:

a. The prices from spot day-ahead markets formed individually in each Member State.

b. The maximum permissible load between two countries. Essentially the process allows the transfer of energy from a surplus (and therefore cheaper market) to a deficit (NEXT (08/2019), NEXT Virtual Power Plant Operator & Power Trader, 15/10/2019, https://www.next-kraftwerke.com/knowledge/market-coupling.

Figure 2. Market Coupling and Price Coordination between Power Exchanges



Source: Marek ADAMEC, Michaela INDRAKOVA, Pavel PAVLATKA (2009), Market Coupling and Price Coordination between Power Exchanges, Powernext

Theoretically, if there were no physical restrictions on the transfer of power from cross-border lines, then a low-cost country could export electricity to more expensive countries at a bargain price. If, in theory, these quantities were too large, price convergence and a single price would be achieved throughout the single market, just like it is pictured in Figure 2.

According to Target Model, EU has been divided in different zones in order to achieve market coupling. The electricity market coupling process is achieved on the following day's market through internal auctions (implicit auctions) and on the intraday market through intraday continuous cross-border trading.

4.3.1. The day ahead market coupling

The method chosen to achieve market coupling with Regulation 2015/1222 is that of the implicit auction. Implicit auction is the allocation of capacity to each interface simultaneously with the resolution of the pre-day market (*Regulation of the Energy Regulatory Authority* (2017), Government's Gazette B'/774/13-03-2017 in combination with the Market Coupling Regulation' s Introduction). According to this model, the sale and purchase of electricity's transmission rights are being done at the same time as the sale and purchase of the electricity itself. So, at the same time the producers are bidding their offers and the TSO is indicating the transport capability. Then, the Market Coupling Operator (MCO) receives the bids for electricity from the market participants and at the same time the capacity data of all interconnectors from the individual market segments. He then proceeds to clear the market, which determines which bids will be accepted, but also in accordance with the Zones Pricing shows the prices in each bidding area participating in the market. The market clearance prices therefore also include the congestion costs incurred for interconnections from the clearing of the pre-day market, in addition to the cost of the energy transferred. Thus, implicit auction of electricity transmission rights to market participants is carried out as a result of the acceptance of the tenders submitted (Decision C 239/2007 (2007), Court of European Union, 15/10/2019). In this way, two or more regions are coupling into a single market and the social surplus, which is consisting of producer surplus, consumer surplus and congestion costs, is maximized.

The congestion cost is reflected in the difference in clearance prices between adjacent areas - areas of the coupled market. If the capacity of the interconnection line between the two regions is sufficient and can meet the needs of the electricity transaction arising from the clearing of the market, then the congestion costs are zero and the prices of the two markets are identical. If the capacity of the interconnector is insufficient, a clearance price difference for the two areas results and the congestion cost is not zero. In this way, it is assured that energy flows will occur from low-cost areas to high-energy areas. Therefore, if there is a system of two countries in the context of market coupling, if the first country has a lower energy price; it will export to the second country, which has a higher energy price. However, there are also the explicit auctions, which according Article 64 of the Coupling Regulation 'provisions on direct allocation 1. When required by the regulatory authorities of the Member States of each relevant supply zone frontier, the relevant TSOs shall also provide direct allocation, in addition to indirect allocation, ie allocation of capacity separate from electricity transactions through the capacity management module at the border of supply zone.

4.3.2. Single intraday coupling

Through the continuous process of merging orders, the zonal capacity is distributed simultaneously for different supply zones in the intraday market. Specifically, and in accordance with the Regulation of the Energy Regulatory Authority Guidelines for the Reforming of the Electricity Market (Government's Gazette B '/ 774 / 13-03-2017): "*in the intra-day market, Participants may trade in order to minimize deviation of their equity resulting from transactions in all Markets, from the quantities sold and purchased in real time. Participation in this market is optional. 2. The evolution of the implementation of the Greek Intraday Market is as follows: a) In the first instance, the implementation of intra-day sessions with successive clearances in days D - 1 and D for the internal energy market and / or at regional level with neighboring markets. b) At a later stage, the implementation of continuous intraday trading in conjunction with or not with intraday auctions in the context of the coupling of European markets. 3. The Transmission System Operator shall send the available interconnection capability at any time.*"

4.4. Conclusion

Last but not least, the arrangements to ensure the stability of trading in the daily and intraday market settlement under the Regulation. In particular, pursuant to Ar. 47 § 5 of that Regulation: "*orders corresponding to a single market purchase the following day shall be deemed unchanged. 6. The SAA functions shall ensure the anonymity of the submitted orders. In addition, pursuant to Rule 59 § 6 of that Regulation, 'orders corresponding to a single intraday market coupling shall be considered unchanged. 7.*

SAA functions shall ensure the anonymity of orders submitted through the single bid book."

In addition, corresponding arrangements are in place to ensure the stability of cross-border capacity. In particular, according to Ar. 70 of the Regulation of the Energy Regulatory Authority (2017), Government's Gazette B'/774/13-03-2017: "*Before the next consolidation time of the next day, each coordinated capacity calculation body shall be allowed to adapt the zonal bandwidth and distribution restrictions transmitted to the relevant NEMOs. 2. After the next day's end time of consolidation, all of the zonal bandwidth and distribution constraints shall remain constant for the following day bandwidth allocation, unless the requirements of Article 46 (2) 30 are met, whereby both zonal bandwidth and distribution constraints are met. Remain stable as soon as they are transmitted to the relevant NEMO. 3. After the next day's end time of consolidation, unallocated zonal capacity may be adjusted for subsequent distributions*."

CHAPTER 5: THE LEGAL FRAMEWORK OF ENERGY EXCHANGE MARKETS

5.1. Introduction

The Target Model introduces, from a systemic perspective, the requirement of specific Rulebooks to be issued for each of the four markets, while prior to the introduction of the Target Model Law, the regulatory framework was organized, technically, with the adoption of Codes.

5.2. Target Model and Market Coupling Regulation

Annex I to Regulation 714/2009 / EU was recently supplemented by Regulation 1222/2015 / EU laying down guidelines on capacity allocation and congestion management for the purpose of urgently completing a functioning and interconnected energy market. On the basis of the above regulatory framework, in particular with EU Directive 2009/72 / EC, the Union supports the adoption of the “Target Model” to achieve a single mode of operation of the individual electricity and gas markets in the EU, with the ultimate objective of, to create a single European market whose operation will gradually bring energy prices closer to the individual member states. The operation of such a market requires the establishment of common rules of trade, which is to say that all EU member states accept a common market model.

In addition, there is a need to find guarantors (coverage providers) who will have the know-how and sufficient funds to guarantee the smooth running of transactions. These can only be large banks or some stock exchanges. In 2011, pursuant to Directive 2009/72 / EC, the European Commission set up two main mechanisms: the European Association of Regulators (ACER) and the Union of European Energy System Administrators (ENTSO), commissioning them to prepare its program for the single energy market with the code name Target Model.

The gradual integration through common rules at European level, in accordance with the guidelines established by ACER in cooperation with the ENTSO, concerns four (4) separate markets:

1. The Forward Market: mainly focuses on the granting of long-term interconnection rights, the development of which also signifies the long-term pricing of electricity.

2. The Day-ahead market: which establishes one connected market and a single price in Europe.

3. The Intra-Day Market, which adapts to real consumption conditions.

4. The Balancing market, which is a market that deals with unit failures and other events related to the technical issues of units and networks, as well as load variability.

The way in which the national energy market is organized is subject to the legislative initiative of each Member State of the Union. However, the Union, especially after the adoption of Regulation 1222/2015/EU on the implementation of the intended “market coupling”, recognizes that the means by which a fully integrated European energy market will be harmonized rules on cross-border trade between Member States and this will be achieved through the operation of energy exchange markets (Introduction Section 4, *Coupling Regulation 1222/2015* (2015), European Union, Commission Regulation).

Last but not least the Coupling Regulation is not subject to energy financial instruments but only to wholesale energy products.

5.3. REMIT Regulation

The REMIT (Wholesale Energy Markets Integrity and Transparency) Regulation No. 1227/2011 / EU, which entered into force in 2011, is the first common set of rules and regulations concerning the European energy wholesalers' primary energy products designed to prohibit abusive practices affecting energy wholesalers, and any form of market manipulation or attempted market manipulation already in the negotiation stage, parallel procedures for investigating suspicious behavior. REMIT shall be without prejudice to the application of European competition Law (*REMIT Regulation 1227/2011* (2011), European Union, Ar. 1-4).

A system of systematic cross-border surveillance of markets has also been set up, the confidentiality of trade information has been explicitly forbidden and it has been made public when it is no longer distorted by competition and is not sensitive commercial data. Market participants are required to register in the European register of participants.

The REMIT Regulation governs the principle of proportionality as the penalties are prescribed to be proportionate in the light of the gravity of the infringements and any damage caused. Penalties are to be adopted by the Member States but subject to general coordination by the Commission (*REMIT Regulation 1227/2011* (2011), European Union, Ar. 2 par. 7).

The REMIT Regulation acknowledges the coexistence and complementarities of the natural energy market and the market for financial instruments with an underlying energy value at the wholesale level. This becomes clear through many points of the Regulation. It is noteworthy that in addition to the innovative introduction of rules for the protection of bargains in the wholesale market for natural energy products, rules on the protection of transactions in financial energy products are also introduced, thus complementing the existing legislation on the protection of financial markets; namely 2003/6 / EC (MAD) and 2004/39 / EC (MIFID). In particular, section 5 of the Introduction's Regulation provides that "Wholesale energy markets cover both the commodity markets and the financial derivatives markets, which are vital for the energy and financial markets, and the shaping. Prices in the two sectors are interrelated. They include, inter alia, regulated markets, multilateral trading mechanisms and OTCs and bilateral contracts executed directly or through brokers."

Effective market surveillance requires participants to disclose their personal information to the competent national authority of the Member State in which they are established or reside or, if they are not established or reside in the Union, in a Member State in which they are active. The national regulatory authorities aggregate the above data to ACER for the creation of a central European registry where each participant will have a special register to obtain a unique identifier, and thus a unique identifier containing sufficient information, in order to identify the market participant.

The above data is collected by a web-based platform, called CEREMP and created by ACER, which operates it by itself. Such registration is the essential condition for the participation of each participant and the exercise by him of any trading activity on the market (*REMIT Regulation 1227/2011* (2011), European Union, Ar. 9).

5.4. MIFID II – MIFIR Regulation

Directive 2014/65 / EU (MIFID II) and Regulation No 600/2014 / EU (MIFIR) amend the existing Directive 2004/39 / EC on the markets for financial instruments (MIFID). This Directive has been in effect since January 2018. It has brought about significant changes in the financial markets with stricter and more specific regulations on brokerage and over-the-counter transactions. It is also critical that a new market structure of the OTF is introduced and arrangements are made for the operation of SME markets (Law 173/349 (12.6.2014), *REGULATION (EU) No 596/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on market abuse (market abuse regulation) and repealing Directive 2003/6/EC of the European Parliament and of the Council and Commission Directives 2003/124/EC, 2003/125/EC and 2004/72/EC*, Brussels, Official Journal of the European Union). Finally, the MIFIR Regulation provides for the importance of transparency in both pre-trading and post-trading transparency.

The financial instruments encountered in European energy exchanges are defined in MIFID II as follows:

1. <u>Energy financial instruments subject to cash settlement:</u> These are options, futures, exchange contracts (Swaps), futures contracts (forwards) and any other contract secondary legislation an instrument related to goods which must be by in liquid available or may be by in cash at the choice of a Contracting Party, but not because of a failure to pay or any other event, which results in the termination of the contract. Futures, which have been established as "brokerage contracts" is an agreement between two members to buy or sell a certain quantity, an asset (underlying title), at a specific price (under settlement), on an agreed future date. Corresponding function are the forwards, where they are established as over-the-counter futures contracts. In options whether or not they will undergo a liquidation with liquid assets will be chosen by their beneficiary, who, after taking account of all market conditions in order to derive the maximum profit (in-the-

money options), will liquidate the economic value of his right, according to Tarnanidou C. (2016), *Contemporary Energy Markets, Institutional Framework and Greek Perspective*, Athens, Law Library, p. 261-262.

2. Energy financial instruments subject to physical delivery: "*These are options, futures, swap contracts (swaps), futures contracts (forwards) and any other contract secondary legislation an instrument related to goods, which can be cleared by natural Delivery, unless otherwise specified in point 6 of this section and not intended for commercial purposes and having the characteristics of other derivative financial instruments.*", as stated in the Directive MIFD II of European Union, Introduction, section C7.

5.5. Operation of the NEMO as stock market model

National markets as stock exchanges will be able to operate in a compatible form under the rules for the coupling regulation and can therefore be defined as Nominated Energy Market Operator (NEMO). Therefore, the NEMO are introduced as energy exchanges, which function as central counterparties having as additional competence the liquidation of transactions. The mere act of appointing the NEMO is sufficient to provide an informal European passport in MIFID. In more detail, the appointment of NEMO by the Member State concerned in accordance with the terms and conditions of the regulation enables it for a pan-European presence without further authorization of any form of licensing of the competent authorities.

Unlike the regulation of the financial markets where supervision belongs to the home Member State, the supervision of the NEMOS is not necessarily taken by the Member State of the NEMO but by the state where the services are provided. It is also noteworthy that the NEMO who is to use this possibility must notify the competent authority of the Member State and two (2) months prior to the fact that he intends to provide a single next day coupling or intraday coupling to the Member State concerned. The procedure is simulated by the notification procedure of the financial market as defined in the MIFID II directive, as stated in Directive MIFD II of European Union, Ar. 53 par. 6.

Finally, the role of transmission system operators (TSOs) is particularly important as they undertake a multitude of obligations in relation to the settlement of cross-border energy transfers, risk management in relation to the punctual delivery the organization of the market coupling with capacity allocation requirements and congestion management. It is also necessary for TSOs to cooperate with ACER, national regulators and NEMO.

5.6. Conclusion

European Energy Regulators conclude that minimum standards for the regulatory oversight of energy spot exchanges are needed, which could be covered by the energy market integrity regulation or by new Commission proposal or guidelines.

According to the 2020 European Energy Regulators' Annual Report, which can be found on the internet website of the European Energy Regulators Council (CEER) https://www.ceer.eu/eer_publications/annual_reports *"Concerning the supervision of energy derivatives exchanges, European Energy Regulators will continue to contribute their knowledge and views in the further process of the MiFID review.*

Concerning energy spot exchanges, European Energy Regulators consider the definition of minimum standards for a supervisory framework for energy spot exchanges at European level essential for increasing market integrity and transparency in wholesale energy markets, but also a prerequisite for an effective Europe-wide market coupling. Each energy spot exchange should be subject to appropriate and effective exchange supervision by a competent exchange supervisory authority to increase market integrity through the supervision of e.g. the organisation of the exchange, admission of market participants, type of trading (e.g. auctions or continuous trading), publication of prices and transactions, overall governance and further transparency rules.

The issue of market coupling as such and potential consequences for regulation will be addressed in future governance comitology guidelines being developed by the Commission and therefore have not been assessed in more detail in this paper. European Energy Regulators have been contributing their input to the development of these guidelines.

The issue of oversight of energy exchanges will also be relevant for ACER under REMIT. According to Article 7(3) of REMIT, the Agency shall, in its annual reports, assess the operation and transparency of different categories of market places and ways of trading and may make recommendations to the Commission as regards market rules, standards, and procedures which could improve market integrity and the functioning of the internal market. It may also evaluate whether any minimum requirements for organized markets could contribute to enhance market transparency. This advice and its findings may therefore feed into the Agency's aforementioned assessment and evaluation.

In view of the MiFID review, it could be considered whether the newly created trading venue category of Organized Trading Facilities (OTF) should also be considered for spot trading venues in wholesale energy markets and a framework for the regulatory oversight of energy exchanges be extended to such new kind of trading venues."

CHAPTER 6: ENERGY EXCHANGE MARKET MODELS

6.1. Introduction

In this chapter we are going to observe some of the already existing energy exchange markets and how they operate in a European and local level. Moreover, we analyze the mode and basic features the electricity markets of the first 15 European countries participating in the consolidated market. The presentation is organized on the basis of energy exchanges that operate in Europe and the countries included in each of them. Its purpose presentation is to highlight the differences in the way markets operate challenges that are expected to arise from their integration.

Greece has initiated as from 2016 the process for the restructuring of its electricity market in order to conform with the rules for the energy market integration, based on the European Target Model for electricity. In particular, the enactment of Law 4512/2018 (which amended Law 4425/2016 – collectively the “Target Model Law”) introduced an evolution in the energy legislative sector by adopting decisive steps, including the establishment of the Hellenic Energy Exchange (“HENEX”), followed by the structural reformulation of the energy market. On such basis, the electricity transactions are currently designed to be carried out in four different wholesale markets, as follows:

- Day-ahead market (operated by HENEX);
- Intraday market (operated by HENEX);
- Balancing market (operated by ADMIE); and
- Derivatives market (operated by HENEX).

Transactions related to the energy financial instruments can either be concluded in the context of the derivatives market or through bilateral contracts, entered into directly between contractual parties, outside the operation of the HENEX market. The new framework provides access to new energy markets as well as to products that shall enhance the domestic competition, reduce entry barriers for new energy market participants and allow the effective participation of renewable energy producers in the electricity markets. HENEX shall furthermore support the regional integration by facilitating the energy market coupling with Greece's neighbouring countries (i.e. Italy and Bulgaria). The balancing market belongs to the responsibilities of IPTO, while the ERA will operate the first three. The liquidation of the spot markets will be done by the Transaction Clearing Company of the Energy Exchange (EnEx Clear), while the liquidation of the derivatives will be done by Athex Clear.

6.2. The European Energy Exchange Markets

The electricity stock market officially started its operation on November 26, 2001 under PowerNext SA. This was the first electronic energy market available in Europe (based entirely on the Internet). Initially it was decided to operate a "Daily Market" of hourly contracts. Participants could suggest a price and a quantity of electricity for each hour of distribution. On the first trading day, six members (Cargrill, EDF Trading, Electrabel, EndeSA, Iberdrola, Total Final Elf) submitted their bids. One year after the opening of the new market, Powernext already had 32 members, 25 of which showed active commercial activity. Usual daily trading volumes in the first day of operation of this market ranged between 10,000 MWh and 15,000 MWh. In June 2004, Powernext's Futures Market began operating. On 21 November 2006, the daily market fell into a clearing with the Belgian and Dutch counterparts, through the widespread 'Trilateral Market Coupling' (TLC). Subsequently, in July 2007 they started operating including the "Intraday market" and the "Continuous market" of Powernext. On December 31, 2008, the daily and intraday markets, as well as the activities of the TLC common stock, were transferred to EPEXSPOTSE, with Powernext holding a 50% stake in this new company. On April 1, 2009, Powernext transferred the clearing activities of the current market, namely Spotmarket, from LCHClearnet SA to ECC (European Commodity Clearing AG). It also transferred the purchase of futures to Power Derivatives GmbH, acquiring a 20% stake in the company. Finally, since November 2010, the TLC has been expanded to include Germany / Austria and Luxembourg, constituting the common framework for clearing central and western European markets (CWE). At the same time, we are launching a broader common clearance framework between the CWE regions and Scandinavia (Interim Tight Volume Coupling

- ITVC) (EUROPEX (2019), Association of European Energy Exchanges, 10/06/2019, https://www.europex.org/).

6.3. The Greek Energy Exchange Market

The first steps in Greece for the liberalization of the electricity market were made by Law 2244/1994, whereby independent producers and "autoproducers" were allowed to join the electricity production (especially in renewable energy sources). Subsequently, the European legislative ties for the liberalization of markets were introduced by Law 2773/1999, which extended the range of participation of 94 producers and Law 4001/2011, where it provided further assurance of a level playing field for electricity undertakings.

The Greek "Electricity Transmission System Operator" (DESMIE SA) was founded on the basis of Presidential Decree 328/2000 (Government Gazette 268 / 12-12-2000, Issue AD) by authorization of the provision of article 14 of Law 2773/1999. DESMIE SA was renamed "ELECTRICITY MARKET OPERATOR" (LAGIE SA) with Law 4001/11 (Government Gazette A ' 179 / 22.08.2011) after the secondment of the Transport Branch of DESMIE SA and his admission to IPTO SA. Finally, LAGIE SA was renamed "MANAGER OF RENEWABLE ENERGY SOURCES AND GUARANTEES OF ORIGIN SA" (DAPEEP SA) with Law 4512/2018 (Government Gazette A ' 5 / 17.01.2018).

The adoption of the Target model was a Memorandum obligation and one of the outstanding energy prerequisites, as part of the evaluation and has been voted by the Greek parliament by the Law 4425/2016.

The aforementioned Law provides for the reorganization of the Greek electricity market, in line with EU rules for the completion of the single European electricity market. According to the explanatory memorandum of the Law 4425/2016, *Urgent arrangements of the Ministries of Finance, Environment and Energy, Infrastructure, Transport and Networks and Labor, Social Security and Social Solidarity for the implementation of the Fiscal Objectives and Structural Reform Agreement and other provisions*, Government's Gazette, Athens, National State Printing, it is stated that "*the gradual maturation of the new regime will allow a next phase to create the* *appropriate environment and to establish the necessary arrangements for the transition to a status of the relevant EU and national rules* ".

For the first time in Greece, this unification specialized in the separation of markets and the introduction of: (a) Forward markets and the purchase of bilateral contracts; (b) Day-ahead markets, (c) Intraday markets and (d) Balancing markets. Furthermore, LAGIE SA (currently operating under name DAPEEP) was defined as the operator of the wholesale market for futures products, while also taking on the role of the next day market operator and the intraday electricity market, i.e. the role of the new operator, designated Nominated Electricity Market Operator (Ministerial Degree of Economics No 184866 (2015), *Approval of the Code of Transactions of Auctions of Future Electricity Products, according to par. 3 of article 117E of Law 4001/2011 (Government Gazette A '179 / 22.8.2011)*, Government's Gazette B/2678/2015, Athens, National State Printing).

At the same time, RAE maintained the right to enable, after the maturation of the electricity market, and to third parties other than LAGIE SA, to be appointed as operators of the wholesale market for futures products. Accordingly, The Independent Power Transmission Operator S.A. (IPTO or ADMIE S.A.) undertook the role of the balancing market operator, a corresponding role with the one currently in way of operating the market. Finally, in addition to the above, it should be noted that under this Law, the market operators are given the opportunity to take additional measures to cover transactions, in order to reduce the likelihood of deficits in the electricity market, while they may also propose a legal person to whom they may participate in defining it as a clearing, settlement and cover body.

In this case the Greek functionator of the energy natural Market DAPEEP SA signed a Memorandum of understanding with the Athens Exchange Market for the creation of the stock exchange, providing technical assistance from The European Commission. The implementation of the reforms has been undertaken by the European Commission's Research Institute JRC. Within the framework of this cooperation has already been agreed the creation of a new company for the assumption of responsibility for clearing, risk management and settlement of markets, as a central counterparty under the Law 4425/2016 and the creation of a joint new support company of LAGIE SA in information infrastructures and know-how, for the management and operation by the market DAPEEP SA under Law 4425/2016. The first will undertake the liquidation, settlement and management of the financial risk of the three markets (forward, pre-day and intraday). The second company will provide support to the DAPEEP SA with information systems and know-how of advanced financial products in order to respond to its role as an officer of the three markets.

6.4. The Independent Power Transmission Operator S.A. (IPTO or ADMIE S.A.)

The Independent Power Transmission Operator S.A. (IPTO) was established with Law 4001/2011 and was organized and operates as an Independent Transmission Operator in line with the provisions of EU Directive 2009/72/EC.

According to IPTO's welcoming webpage "*The Company has the responsibilities and performs the duties of Owner and Operator of the Hellenic Electricity Transmission System (HETS), in accordance with the provisions of Law 4001/2011 the requirements in the Grid Code and the HETS operation license.*

IPTO's compliance with the requirements applicable to the Independent Transmission Operator model was certified by the Regulatory Authority for Energy in December 2012."

IPTO's mission is the operation, control, maintenance and development of the Hellenic Electricity Transmission System, to ensure the country's supply with electricity in an adequate, safe, efficient and reliable manner, as well as the operation of the electricity market for transactions outside the Day Ahead Scheduling, pursuant to the principles of transparency, equality and free competition.

As claimed by the IPTO itself on its website "*Due to this critical role of the Company, all the necessary measures have been taken and all those necessary procedures have been set in place to ensure its independence, the strict adherence to the "equal treatment" principle for all System Users and Participants in the Electricity Market, transparency in its operation and respect of the confidentiality of the information* *which IPTO manages."*

It is a known fact that, IPTO, as of 20 June 2019, has been following the Ownership Unbundling model and is fully harmonized with Directive 2009/72/EC.

6.5. The main developments in the Greek electricity market

According to the National Report 2020, *Regulation and performance of the electricity market and the natural gas market in Greece, in 2019*, Athens, issued by RAE, the main developments in the Greek electricity market that have been noted in the recent couple of years, can be summed up as following:

• Target Model: In 2019, RAE proceeded with the implementation of the EU "Target Model" in the Greek wholesale electricity market. Law 4425/2016 (Gazette A' 185/30.09.2016) aimed to facilitate the transition of the Greek electricity market towards the single European electricity market. According to Law 4425/2016, electricity wholesale market for forward products, day-ahead market, intraday market and balancing market were created. Also, by virtue of Law 4512/2018 (Gazette A' 5/17-01-2018 and A' 8/23-01-2018) a Greek energy exchange (HENEX S.A.) was established through the split-off and the contribution of the relevant sector of LAGIE. S.A. which was renamed as DAPEEP S.A.

• HENEX S.A. as a NEMO: RAE, with Decision 1124/2019, appointed HENEX S.A. as Nominated Energy Market Operator (NEMO) for a period of 5 years according to Law 4425/2016 article 8 par.2. With this Decision, RAE certified that HENEX S.A. fulfills all necessary preconditions as provided by Laws 4001/2011 and 4425/2016 and the respective secondary legislation in order to meet the requirements of Article 6 of Regulation (EU) 2015/1222 for the fulfillment of NEMO's obligations.

• EnExClear S.A.: RAE, with Decision 1125/2019, approved the operation of EnExClear S.A. which is a 100% subsidiary company of HENEX S.A. as a Payment Clearing Entity for the Day Ahead and Intraday Markets according to Law 4425/2016, article 12, par. 4. RAE's Decision 1125A/2019 (Gazette B' 428/12.02.20) also approved the Regulation for the clearing of Day Ahead and Intraday Market payments.

• Energy Markets Operation: In 2019, based on the operation timelines submitted by HENEX S.A., ADMIE S.A. and the Ministry of Energy for the new energy markets, the start date of Day Ahead and Intraday Markets operation in decoupling mode («Go-Live date of Local DA & ID Markets) and the start date for the operation of the Balancing Market diverged from the previously agreed timeline. RAE, after taking into consideration the delayed completion of all necessary actions by HENEX S.A. and ADMIE S.A. for the operation of energy markets and the consequences this may entail for the achievement of the national goals related to the Target Model, published Decisions 664/2019 and 665/2019 with which RAE called HENEX S.A. and ADMIE S.A. respectively to implement their obligations for the start of the energy markets operation according to Law 4425/2016.

• Capacity Allocation and Congestion Management Guidelines: RAE, within the framework of the transition to an integrated electricity market and the implementation of Regulation 2015/1222 concerning capacity allocation and congestion management on interconnections, and Regulation 2016/1719 concerning future capacity allocation, approved a set of rules and methodologies for the Greek market. These rules and methodologies ensure a clear legal framework for an efficient capacity allocation and congestion management system that will facilitate electricity trade at EU level, and guarantee the more efficient use of the network and the enhancement of competition.

• NOME auctions: RAE, in the framework of the auctioning system of forward lignite and hydroelectric products (NOME), which served as a means to open the retail electricity market in favor of the national economy and final consumers, fulfilled its obligations in accordance with the legislation in place at the time for the proper execution of the auctions for 2019. However, during 2019, pursuant to article 1 of the Act of Legislative content of 30.09.2019 (Gazette A’ 145/30.09.2019) which was ratified by Law 4638/2019 (Gazette A’ 181/18.11.2019), NOME auctions were terminated.

• E-mobility: The development of charging stations for electric vehicles is a key element for the expansion of the electric vehicles market. RAE, in 2019, published

Opinion 7/27.2.2019 on the subject. RAE's Opinion includes the main aspects of the proposed development model of public charging infrastructure. To this end, an inter-ministerial Committee was established for the implementation of the "Promotion of e-mobility in Greece" in 21.10.2019 (YPEN/DAPEEK/95823/3190), aiming at devising a national business plan for the development of e-mobility in Greece until 30.06.2020.

• Market Monitoring: RAE, in 2019, intensified its effort to monitor the financial transactions of retail market participants in order to secure the smooth execution of transactions between Operators, Producers, Suppliers and Traders, putting emphasis on those participants who are active in the electricity sector (as the natural gas market was liberalized in the beginning of 2018) and their due fulfillment of their obligation to attribute Regulated Tariffs towards Operators. RAE, called several suppliers to oral hearings. This process was concluded in 2019 and RAE published (7) Decisions (292/2019 to 297/2019 and 662/2019).

• Automated Data Collection and Assessment of Retail Market: RAE continued the periodical collection and assessment of distribution and supply market data for electricity and natural gas, submitted by active suppliers and the relevant Operators. The constant increase of the number of Suppliers made evident that a flexible data collection and assessment framework for the better monitoring of retail market participants and the registration of their billing policies related to Annex II of Supply Code was necessary. In this regard, RAE, proceeded with automated procedures for collecting and assessing data provided by Suppliers through the implementation of a financial tool which was completed at the end of 2019.

• Non-Interconnected Islands Market: After the opening of the retail market in Non-Interconnected Islands at the beginning of 2018, 19 suppliers were active in 2019.

6.6. Fiscal Data of the Hellenic Energy Exchange S.A. (HENEX)

According to the Report on Actions of HENEX for the year 2018, as it has been published on June of 2019, HENEX prepared, in collaboration with IPTO, the operational and technical specifications for implementation of appropriate extensions to the Electricity Transaction Information System Energy Management System

(Market Management System - MMS) so that it can support the submission of zero price infusion bids by holders holding RES and High Efficiency Electricity-Heat Cogeneration units with an obligation to participate in Day-Ahead Scheduling(RES with sales contracts that expired) and / or by the Cumulative Agencies and participated in the relevant tests receipt of extensions. In addition, prepare relevant specifications regarding implementation of tie-break-rule of the quantities included in RES units with an obligation to participate in Daily Energy Planning. Appropriate settings were made in the system as well liquidation (MSS). Moreover, HENEX actively participated, in 2018, in the reorganization of the Greek electricity market action for the implementation of the European Regulatory Framework for the "Objective Model" (Target Model) for the completion of the Single Internal Market of Electricity and Natural Gas. As we have already mentioned above, in November 2018, a societe anonyme was established under the name Energy Exchange Clearing Company SA and with the distinctive title EnExClear, with sole shareholder the EXE. The purpose of EnExClear is to clear the transactions of the Next Day Market and the Intra-Day Market of the Day-Ahead Scheduling gas well as any other related activity in accordance with the in Regulation (EU) 2015/1222 and in law 4425/2016.

Subsequently, according to the Report on Actions of HENEX for the year 2019, HENEX continued the smooth operation of the Daily Electricity Market – until the beginning of the Next Day Market - and the smooth execution of the relevant procedures for keeping a Register of Participants, Clearing, Settlement and Management Financial Risk of the Day-Ahead Scheduling transactions, protecting the company from precarious positions of participants and improving its external image (strengthening on the one hand transparency in its payments and on the other hand informing its traders). In the context of the implementation of the priority integration function in the Day-Ahead Scheduling of the quantities that concern the RES units with the obligation to participate in the Day-Ahead Scheduling and upon temporary receipt by the relevant upgrade contractor, performed the relevant Site Acceptance Tests (SAT) and sent a list of comments and remarks. The entry in the Register of Participants has been completed holders of RES and High Efficiency Electricity-Heat Cogeneration units with an obligation to participate in EEP (RES with contracts expired) and Cumulative

Agencies and the provisions of law 4414/2016 and activated the relevant provisions for their participation in the daily energy planning.

Furthermore, HENEX completed the acceptance technical tests for the application of the alternative use measure fuel and the introduction of energy constraints and enabled the relevant feature in Market Management System (MMS). It also completed regulatory, functional and technical amendments that took place during the financial year 2018 for the Information System Electricity Transactions and activation of the measure to deal with situations crisis of the National Natural Gas System.

Last but not least, HENEX actively participated, during 2019, in the reorganization of the Greek electricity market for the implementation of the European Regulatory Framework for the Target Model for the completion of the Single Internal Market of Electricity and Natural Gas.

6.6.1. Detailed notes on the accounts of the Comprehensive Statement Income

The below data, as represented in the following tables, have been extracted from the Greek Energy Exchange Group's website on November of 2020.

- Day-Ahead Scheduling Clearance Charges

The value of the clearance of Day-Ahead Scheduling during the period 18/6/2018 until 31/12/2018 is analyzed as follows:

2018	**HENEX**
Day-Ahead Scheduling Commission value	1.881.514.982,66 €
Day-Ahead Scheduling export value	226.065.782,24 €
SUM	**2.107.580.764,90 €**

The value of the clearance of the Day-Ahead Scheduling during the twelve months of 2019 is analyzed as follows:

2019	HENEX	
	31.12.2019	**31.12.2018**
Day-Ahead Scheduling commission value	3.282.841.837 €	1.881.514.983 €
Day-Ahead Scheduling export value	186.994.284 €	226.065.782 €
SUM	**3.469.836.121 €**	**2.107.580.765 €**

The Day-Ahead Scheduling commission value refers to the value of the resulting quantities of energy from the Cargo Declarations that joined the Day-Ahead Scheduling for the representation of its Consumers Interconnected System and Network during the above-mentioned time period.

The Day-Ahead Scheduling export value refers to the value of the resulting quantities of energy from the Cargo Declarations submitted to the EPC for exports during the above-mentioned time period.

- Day-Ahead Scheduling Clearing Yields

The returns of Day-Ahead Scheduling made during it period 18/6/2018 until 31/12/2018 are analyzed below:

2018	HENEX
Day-Ahead Scheduling production value	1.486.983.366,52 €
Day-Ahead Scheduling import value	405.879.454,41 €
Prepaid quantity declaration	36.310.597,23 €
SUM	**1.929.173.418,16 €**

The returns of Day-Ahead Scheduling made during the twelve months of 2019 is analyzed as follows:

2019	HENEX	
Day-Ahead Scheduling production value	**31.12.2019**	**31.12.2018**
	2.451.535.031 €	1.486.983.367 €
Day-Ahead Scheduling import value	796.036.440 €	405.879.454 €
Prepaid quantity declaration of 3%	18.878.014 €	14.941.131 €
Transaction notification orders of 5%	40.433.825 €	21.369.466 €
SUM	**3.306.883.309 €**	**1.929.173.418 €**

The Day-Ahead Scheduling production value refers to the value of the resulting quantities of energy from the Infusion Offers that joined the Day-Ahead Scheduling from production units during the above reported time period.

The Day-Ahead Scheduling import value refers to the value of the resulting quantities of energy from the Infusion Bids submitted to the Day-Ahead Scheduling for imports during the above-mentioned time period.

For 2018 the reasonable profit approved by RAE for the Day-Ahead Scheduling amounts to € 40,000. At the level of consolidation, the reasonable profit is added to its result Energy Exchange Clearing Company S.A. which for 2018 amounted to a profit of € 3,034.95. So, the result before taxes in consolidated base amounted to €

43,034.95.

According to the empowering provision of paragraph 1 of Article 140 of Law 4389/2016, the Energy Exchange is responsible for the organization and conduct of auctions of electricity forward products with physical delivery (NOME auctions). In accordance with the provisions of Article 10 of the Exchange Code for Electricity Forward Auctions (SSDPPIE) (RAE Decision 510/2018, Government Gazette 2036B of 18/06/2018), in order to participate in the SSDPPIE, Eligible Suppliers pay to the Energy Exchange a Contribution Auction Fee calculated annually taking into account the annual cost of the Auctions and the Annual Quantity made available through the Auctions and approved by RAE following the recommendation of the Energy Exchange. Each Eligible Supplier pays an amount proportionate to the Quantity of Forward Products Dispatched to the Eligible Supplier in each Auction. In 2019 the Contribution Auction fee amounted to €195,631 vs. €154,939 in 2018.

6.7. Conclusion

The creation of a common European electricity market is designed to bring increased benefits from cross-border competition, lead to fair, transparent and competitive energy markets, enhance Europe's energy security and contribute to the international objective of reducing greenhouse gas emissions and the decarbonization of the European economy, benefits that are to be enjoyed not only by market participants but also by all European citizens. In this context, it is true that the process of electricity market coupling in Greece is progressing slowly, compared to other European countries. In conclusion, although the effort towards the operation of the electricity markets under their new structure is ongoing, from a regulatory point of view, we expect that the recent shift in focus both in Greece and the EU shall add pressure towards the completion of all pending issues for the final integration of the Target Model in the coming months.

CHAPTER 7: CONCLUSION

The transformation of the European energy markets into energy exchanges and the adoption of the target model for the creation of a pan-European market is a priority for the EU Member States and for our country. Electricity as a commodity can be traded at pan-European level through the exchange of energy either in the natural energy market or in the financial market for energy products. These two forms of energy market complete each other and are interconnected, but they receive divided protection. On the one hand the European regulations/directives MIFID (and MIFID II/MIFIR), EMIR, MD (and MAD II/MAR) regulate the financial markets. On the other hand, the REMIT regulation, which contains important regulations for the prohibition of abusive conduct, market manipulation and the protection of competition in general, concerns natural energy markets. With the recent adoption of the coupling regulation 1222/2015 there is a tendency to harmonize these two markets. The main mechanism of market coupling and the process of auctions of transport rights (implicit/explicit auctions) aim to achieve a single market across Europe. In this context, with specific provisions of these regulations, there is a tendency to facilitate the participation of players in the market and to mitigate stringent protective provisions. In particular, the existence of bilateral contracts between the participants and the abolition of the mandatory pool leads to further liberalization of the energy market. The energy priced based on its value under the forces of supply and demand.

The European Passport Institution, under the MIFID directive, introduces the possibility for managers to provide their services in other Member States without additional conditions. The mere act of appointing the NEMO is sufficient to provide an informal European passport to MIFID by enabling it to be a pan-European presence without further requiring some form of authorization from the competent authorities. The institution of "disintermediation", according to the MIFID directive, that is to say the transaction between the "professional" concerned and the market, without the existence of mediation services enables participants to participate in the financial Energy market without a mediator (broker). They are still discretions to the participants by avoiding the double reporting of their energy transactions (according to REMIT and MAD) to limit their costs and avoid unnecessary costs and administrative burdens.

In addition, according to the coupling regulation, NEMO are introduced as energy exchanges, which also function as central counterparties having as additional competence the liquidation of transactions. Therefore, the NEMO are forced to take the risk of the transaction against the manufacturer and the purchaser of the supplier concerned, to remove any dispute as previously set out. The existence of clearing houses which will either be the managers themselves or separate companies will ensure a stable financial system.

In Greece despite the difficult financial times, steps have been taken to achieve the objectives of the Target Model. Today, with the L. 4425/2016 and the Memorandum of Understanding between LAGIE (now under name DEPEEP) and the Athens Stock Exchange, an attempt is being made to transition to the new mode of operation of the market, which should be completed in the coming years.

In the final and next phase, the energy market by creating an energy exchange at European standards that has prestige, experience and know-how will offer the requested transparency in trade and a mechanism of permanent and effective pricing.

Transactions in the context of energy exchanges will facilitate and promote the conduct of trade and competition. Continuous negotiation with transparency in price formation (which is a benchmark for bilateral contracts), the liquidation of transactions, the counterparty risk coverage under which trade is protected and by extension the economy in general, are elements that will attract investment in the energy sector, as confidence in market efficiency will be established and the target for reduced energy prices to all consumers within the EU will now be feasible.

As it is stated in the 2019 financial report of HENEX, the Energy Exchange began operating its Energy Market on 26 March 2020 by carrying out the first trade for day ahead physical delivery, at an average marginal price of €46.357. In particular, the first trade (Base April 20) was between DEI (PPC) and Elpedison, and it also inaugurated PPC’s role as market maker. The first trade is an important step for the future, taking into consideration that it will take time for the Greek ecosystem to obtain experience and know-how. In addition, HENEX was certified by ACE as an RRM for the data reporting under REMIT. The rapid spread of the coronavirus (COVID-19) disease, finds the world financial system and business to a large degree unprepared. The world economy is entering a period of uncertainty and instability, the consequences of which are difficult to estimate based on the data so far. The economic impact will depend on the duration, the intensity and the spread of the disease in Greece and across the world. At the same time, the critical period that we are facing and the financial impact of the pandemic have brought about major changes in our work routine. Companies are now required to operate under complex and adverse conditions, while ensuring a safe and effective environment for both their staff as well as their clients and partners. In this context, the Hellenic Energy Exchange Group has implemented a series of preventive measures, supporting from the start the national initiative and following the recommendations of those responsible for taking specific measures to contain the spread of the virus. The Group continues to operate smoothly until the date of this report, as Management has taken the necessary measures to limit the extent of the financial impact of the COVID-19 pandemic to the extent that there is no material uncertainty regarding the continued operation of the Group in the short-term.

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