

MASTER THESIS

Energy Markets' Liberalization in Greece:

Dynamics in the domestic energy markets and the barriers that delay the integration to the single EU market

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EXECUTIVE SUMMARY

The Electricity and Gas Directives issued by the European Commission have set the objective of integrating the regional Member States into a single market, in order to ensure energy efficiency, security of supply and competitiveness. Greece has been driving efforts for liberalizing its national electricity and gas markets, opening them to competition. Although since July 2007, officially all eligible customers can choose their electricity supplier, the actual market opening is limited. The natural gas sector is an emergent market, and the focus is on developing the infrastructure and facilitating its penetration in the urban regions, before even considering real liberalization.

The objective of this study is to indicate the factors that influence the restructuring of Greece's energy markets and its market structure. By examining the way which the EU's Directives are implemented in the country's legislation, assessing the obstacles that impede competition and addressing security of supply issues, the strong points and the challenges of the domestic energy markets are presented. For the research question to be answered, the initial conceptual model is formed, based on literature review and European Commission and national documents. Subsequently, data is collected from interviews with the key players of the Greek energy setting, mainly with the incumbent companies, the operators of the networks and the regulatory authorities. The additional drivers that impact the status quo of the electricity and natural gas markets through the eyes of the interviewees shape the advanced conceptual model.

After analyzing and comparing the findings, the paper concludes that the deregulation of the conventional energy markets lags behind. The domestic markets remain rigidly national, with energy monopolies and limited new participants.

PREFACE

By this research my MSc in Economics and Business with concentration in Financial Economics is being completed. Along with it, an inspiring era of academic quest comes to an end. Within the context of my thesis, I had the opportunity to meet and interview remarkable executives. Their views were enlightening and value-adding for my paper, offering me insight for general energy related issues, and country-specific matters. I would like to thank all of them for their will and time to contribute to my research. Special thanks go out to my supervisor Mr. Ronald Huisman for his constructive comments and his cooperation that significantly contributed to the success of this thesis.

DECLARATION OF THE AUTHOR

The author declares that the text and work presented in this thesis is original and that no sources other than those mentioned in the text and its references have been used in creating the thesis. The copyright of this thesis rests with the author. The author is responsible for its contents and the Erasmus University of Rotterdam is only responsible for the educational coaching and beyond that cannot be held responsible for the content of this thesis. For more information, or suggestions, please contact the author: asteroulamichou@gmail.com

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ABBREVIATIONS

CEER: Council of European Energy Regulators
DEPA: Public Gas Corporation
D.E.S.M.I.E.: Hellenic Transmission System Operator S.A. (H.T.S.O.)
DESFA: Hellenic Gas Transmission System Operator S.A
DS: Distribution System
DSO: Distribution System Operator
ECSEE: Energy Community of South East Europe
EDA: Gas Distribution Company
EPA: Gas Supply Company
EPC: Engineering, Procurement and Construction
ERGEC: European Regulators' Group for Electricity and Gas
ETS: Emission Trading System
FEED: Front End Engineering Design
GHG: Greenhouse Gas
H.C.C.: Hellenic Competition Committee
IEA: International Energy Agency
ITGI: International Italy-Turkey-Greece Natural Gas Pipeline
LNG: Liquefied Natural Gas
NNGS: National Natural Gas System
PPC: Public Power Corporation S.A.
PSO: Public Service Obligations
RAE: Regulatory Authority for Energy
RES: Renewable Energy Sources
SMP: System Marginal Price
TPA: Third Party Access
TPA: Trans Adriatic Pipeline
TS: Transmission System
TSO: Transmission System Operator

1. INTRODUCTION

The environmental deterioration and the energy insecurity are two of the most crucial issues that countries worldwide face today. Policies that assist in tackling the climate change and securing the energy supply are the focus of the national energy strategies around the globe. Since 90s, the energy markets' liberalization is pursued in both sides of the Atlantic. In Europe, with the exemption of Spain, energy utilities were primarily state-owned, having concentrated market power over expanded regions; whereas in USA the energy utilities were private monopolies, licensed and excessively regulated by the state. Seen as a natural monopoly, the energy sector was in the core of national politics in both continents, and it was considered too important to be left to market forces and competition. By then the mechanisms of political influence and regulation were considered as adequate for ensuring efficiency and low prices.

Within Europe, the two countries that served as paradigms for the energy markets' transformation were the UK and Norway. UK having espoused from the 80s the neoliberal economic thought was the first OECD country to deregulate its power market, reaching full liberalization in 1999. Norway, following a different way, without privatizing the national energy utilities, integrated the Nordic market into the financial market of the 'Nord pool', constituting the first multi-national power market.

The European Union, with the objective of uniting all EU Members to a single integrated market, aligns the practices of the Member States towards the common goal through the issuance of Electricity and Natural Gas Directives. Greece accordingly has been transposing the European mandates to its national framework, deregulating the domestic electricity and natural gas markets. Unbundling the activities of the incumbent public company, along with setting competition conditions for new players' entry, contributes to the liberalization of the national electricity market. The country's strategic goal to serve as a natural gas hub in the southeastern Europe is pursued by developing the pipeline and liquefied natural gas infrastructure, and providing a level playing field for all interested parties.

According to the EU's Directives, the European energy market formally would be free to competition since July 1, 2007. Although the European Commission provides the overall

framework, the structural differences and the market regime of the individual Member countries determine the practical implementation of the Directives. Most EU countries' energy markets remain national and the competitive single European market has not been yet established. Greece has taken slow but regular steps in liberalizing and deregulating the national electricity and gas markets. As far as the electricity is concerned, the Public Power Corporation (PPC) is still a vertically-integrated company, owning the transmission and distribution networks and being the exclusive supplier for customers. The operation of the transmission grids has been granted to the Hellenic Transmission System Operator, and further unbundling plans include assigning the operation of the distribution channels to a distinct entity. On the other hand, natural gas was initially introduced in the domestic market in 1996, and the opening of the market is still in its infancy. Public Gas Corporation (DEPA) is a partially state monopoly, controlling the imports and supplying large consumers. According to the EU-required restructuring principles, DEPA has proceeded in legal separation of its activities. The Hellenic Gas Transmission System Operator (DESFA) is responsible for managing and expanding the high-pressure network, while the regional supply companies (EPAs) are responsible for the low-pressure pipelines and the distribution to low consumption customers.

1.1 PROBLEM DEFINITION AND RESEARCH QUESTION

The emphasis of this paper is put on the conventional energy markets of Greece, and the focus is on answering the following hypothesis:

The barriers that prevent Greek energy markets from integrating to the EU single market are such that timely liberalization can be achieved.

In order to answer the research hypothesis the following will be analyzed:

- The implementation of EU directives into the country's regulation
- The obstacles that hinder the market integration of Greece to the integral European market
- The steps that will promote Greece to a regional energy hub

1.2 SCOPE

In the light of the EU Commission's provisions for the individual Member States, the status quo of Greek energy market is being addressed, concerning the deregulation and the legislative framework. This paper discusses the energy sector reforms that have already taken place in Greece's electricity and gas markets, after the Directives were issued by the European Commission.

The focus of this qualitative study is around the two poles of the domestic liberalization: the European Union, which is the prompter of the developments in the EU-wide energy landscape, and the key stakeholders of the Greek electricity and natural gas markets. Both sides have been explored, in order to gain a holistic view of the situation and the future developments. The research concentrates on the European Energy Policy and the legislation that supports the objectives of competitive, secure and sustainable energy for all European citizens. The European approach on energy issues is cited mainly the literature parts of the study, whereas the results of the research are derived from the For the better understanding of the status quo of the conventional energy markets, and due to proximity reasons, entities active in the Greek setting where contacted. As the main players are entities in which the State actively participates, and private companies have limited presence, the focus of the research is on the public, semi-public and recently privatized participants. They are considered as having the most practical affinity with the energy sector and being able to display concrete and insightful views.

1.3 OVERVIEW OF THE MASTER THESIS

In the following section (*Chapter 2*), the theoretical context of the restructuring and the liberalization process is presented, focusing on literature that is related to deregulation and unbundling issues. Next, the European impetus is introduced, and the measures suggested by the EU's legislative packages are analyzed. The current situation in European electricity and gas markets is assessed, in the light of the sector inquiry conducted for the energy sector. Subsequently the situation in Greece is analyzed. Greece's position in the geopolitical landscape is being assessed, while the main players in the domestic energy landscape are

presented. The electricity and gas infrastructure is analyzed, in order to gain better insight about the individualities Greece faces, as the country serves as a corridor from the East to the West. The section concludes, by presenting the implementation of EU mandates to the Greek regulatory.

In *Chapter 3*, the methodology that covers this study is presented, and the initial conceptual framework is introduced. The strengths and the hindering factors that prevent the country from realizing its full potential in the energy market liberalization are displayed, and the sample subject to interview is described.

Chapter 4 represents the data description, as it introduces the players that are active in the electricity and natural gas sectors, and from which representatives accepted the proposal for interview. In two distinct chapters, one for each market, insight is offered for the specific role these key organizations play in the respective markets.

Chapter 5 includes the thorough analysis conducted for the Greek energy markets. In order to illuminate the domestic electricity and gas markets, through exploratory research, the information gathered during the open-ended meetings is analyzed, concerning the developments in the fields of regulation, market structure and security of supply. Through the view of the interviewees country-specific challenges are addressed as well.

In *Chapter 6*, the advanced conceptual models for the two markets are addressed. The initial conceptual models are complemented by the data analysis and the findings during the interviews, and the factors that have not been mentioned in the existing literature are demonstrated.

Finally, in *Chapter 7*, the conclusions of this study are presented. The suggestions of the interviewees concerning the next steps of the restructuring process are discussed, and the research question is being addressed. The paper concludes with the assessment of the validity of the hypothesis, and thus whether timely liberalization for the domestic energy markets can be achieved.

2. THEORETICAL BACKGROUND

2.1 REFORMS IN THE ENERGY SECTOR

The energy industry displays some unique features, compared to other public utility services (telecommunications, airlines, railroads). Electricity is a commodity that cannot be stockpiled, and keeping capacity reserves is necessary in order to guarantee that spare capacity will meet the altering load. Supply should be meeting demand at every time node, as demand levels are seasonal and also changing within a single day. As a product, electricity is homogenous, since without depending on the producer has the same quality features. Electricity does not have a close substitute and the outage cost is enormous for the economy, for the public health and the national security.

In the electricity industry, the power utilities are capital-intensive entities. Before the liberalization process, they were vertically-integrated companies constituting of the generation, transmission, distribution and retail supply divisions. End-users paid one bundled price, which was not distinguished to each of the above provided services.

Gas itself has limited capacity to be stored. It is transported through pipelines, where specific pressure needs to be kept constant, in order end-users to extract gas from the network. Alternative to pipeline gas is the liquefied natural gas (LNG), a cost-effective form of natural gas, transported with sea containers and tankers, to regions without pipeline infrastructure. Reaching the liquefaction station, it is regasified and distributed through the networks. The natural gas sector consists of the import or production, the transportation and the supply segments. Europe mainly imports natural gas, through pipelines from Russia and countries in the Caspian Sea region, and liquefied natural gas (LNG) from Algeria.

Deregulation imposes that new entrants can gain access in the energy generation marketplace (liberalization), while the vertically integrated transmission and distribution companies should unbundle (restructuring). Subject to market reform are the production and retail segments: unhampered entrance to new players in the generation and supply field should be provided, along with non-discriminatory access to the transmission networks. The goal is consumers to have the choice of switching suppliers at no cost. Fostering competition to the energy market is a process that in the long-term will provide benefits to all stakeholders. The end-users will

appreciate low prices, and efficiency in the energy markets will be realized, as the generation capacity will reach the optimal level.

Reforms are targeted in the regulatory field as well, in order competition, through unbundling to be complemented. “*Re-regulation*” - as it is often mentioned in the literature- is required for operation of the transmission and distribution grids, since by nature are natural monopolies and the liberalization process must be framed around this distinctiveness. The substantial infrastructure investment requires the costs to be recovered; otherwise the unbundled transmission companies will be on a dire financial position, still having to repay their debts. Restructuring will ensure that new market players will not be in an inferior position compared to incumbent companies. According to the European Directive, each Member State can choose whether to have a *regulated* third party access, or a *negotiated* one, although the regulated system is considered as more transparent and thus is promoted. In the regulated regime, customers can have access to transmission and distribution networks, ‘on the basis of published tariffs’ (EU, Directive 96/92/EC, Article 17.4), while under a negotiated system, the tariffs are settled between the generator and the supplier.

2.2 ENERGY POLICY OF EU

The cornerstone of the Energy Policy of EU as stated in its Treaties and Directives is the establishment of a single integrated market. The internal market will conceptualize the objective of “an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured.”(*EU Single Europe Act Luxembourg, 2/1987*)

When full integration is implemented and the pan-European energy market is established, customers in the EU Member States will have diverse choices and experience competitive energy prices. The role of the European energy companies will be strengthened in the global setting, having substantial bargain power. The cooperation of the national states will be increased and since EU Member States heavily rely on oil and natural gas imports, the dependence on external sources will be limited.

The first Electricity and Gas Directives were issued in 1996 and 1998 respectively, laying the foundations for the unbundling of the competitive sectors of the energy industry from the networks (Directive 96/92/EC concerning the common rules for the internal market in

electricity, and Directive 98/30/EC concerning the common rules for the internal market in natural gas). According to their provisions, “since July 2007 all EU consumers, with a few exceptions, will have the right to choose freely their energy supplier in the European-wide spectrum”.

According to Electricity Directive 96/92/EC (Preamble 4), and the common rules for the internal market in electricity, *“establishment of the internal market in electricity is particularly important in order to achieve efficiency in the production, transmission and distribution of this product, while reinforcing security of supply and the competitiveness of the European economy and respecting environmental protection.”*

As clearly stated, the energy policy goals include enhancing efficiency, improving security of supply, boosting competitiveness, and ensuring environmental protection. Efficiency can be achieved both internally (generation process) and externally (market efficiency). Companies that are active in the generation sector will not have to reserve capacity, in order to cope with unpredicted demand, since subsidiarity and market efficiency will ensure that customers reaping the benefits of liberalization will cover their energy needs. Efficient energy policy is a prerequisite for the infusion of long-term investment. Additionally the common operational framework of the power and gas European-wide market offers the platform for investments in infrastructure.

In a world of energy insecurity, security of supply is of paramount importance, whether countries have to face sudden shortages or energy crises. Member States are interdependent on energy supply, pending highly on gas and oil imports, both from inside the European Economic Area (Norway) and outside (mainly Algeria, Russia). The single European market will grease the wheels for European countries to diversify the routes of imported energy, ensuring low costs. Overcapacity will not be necessary in order supply to be secure, resulting in optimization of resources' use.

According to the Internal Energy Market Communication (2007), “energy accounts for 80% of all greenhouse gas (GHG) emissions, being at the root of climate change and most air pollution”. Having environmental enhancement as a goal, apart from the apparent benefits of tackling climate change, innovation will be motivated, and companies will focus on finding

ways to decrease the use of conventional fossil fuels, shifting their R&D activities to discover environmental-friendly solutions.

Increased competitiveness will ensure that end-users will experience low prices, and as companies will try to acquire competitive advantage, they will innovate, invest in alternative and thus clean energy solutions, measures that will benefit the whole economy. Economic growth will be achieved, as inefficient companies will be replaced by productive and successful ones. Common regulation rules will ensure transparency, equal access to the network, and customer protection, substituting excessive national regulation. The big incumbent electricity and gas companies will not be the dominant players, new entrants will be active, third party access will be facilitated, and the utilities sector will promote economic optimization rather than political goals.

2.3 IMPLEMENTATION OF EU DIRECTIVES IN THE EUROPEAN NATIONAL MARKETS

Energy industry has proved to be a very complex level playing field. After the First Directives, 96/92/EC and 98/30/EC for electricity and natural gas respectively, which set the platform for the creation of the single market, the Second Electricity and Gas Directives (Directive 2003/54 for electricity and Directive 2003/55 for natural gas) were issued in 2003, requiring the functional unbundling and suggesting the timetable for the complete market opening. As the process of integration was slow and the national markets remained fragmented, a sector inquiry was launched by the European Commission in 2005 with its findings being published in 2007, in order the level of competition in electricity and gas markets to be assessed and the slow process of deregulation to EU Member States to be explained. The challenges and obstacles that prevent the coherence in the pan-European energy market were stated, resulting to the proposal of a Third Energy Package, which contains Directives that should be transposed to the national legislations by March 2011. Rules for the common EU electricity and gas market, provisions for tuning cross-border trade issues, and the foundation of an Authority for the Cooperation among National Energy Regulators are included.

2.3.1 The Second Energy Package

In the electricity field, the directive **2003/54/EC** concerning common rules for the internal market in electricity, repeals the 96/92/EC Directive. All non-domestic customers should be open to competition by July 2004 and all customers by July 2007. The Member States must assign Transmission and Distribution System Operators (TSOs, DSOs), which will manage the networks, provide non-discriminatory access to the market players and ensure energy efficiency and security of supply. Being independent from the vertically-integrated companies, and not participating in any of the competitive functions of the electricity industry, TSOs and DSOs should keep transparent unbundled accounts for their activities, and be effectively monitored by the national regulatory authorities, in order distorted incentives to be avoided.

The Directive **2003/55/EC** concerning the common rules for the natural gas market and repealing the 98/30/EC Directive, is the revised version of creating the conditions for the integrated EU-wide market. The rules for fair and transparent competition are set, as the objective is to grant free access to every supplying company that wants to be active in an EU Member State, and free choice to customers who wish to switch their supplier. New market entrants are granted the right to have equal and non-discriminatory access to the high and low pressure networks and to LNG terminals. The System Operators in the EU Member States undertake the operation and the further development of the national transmission and distribution channels, while being responsible for storage capacity and the liquefied natural gas (LNG) terminals. They are required to have legally unbundled activities from the import and supply companies. Independent national regulatory bodies monitor the practical application of the laws and assess the level of competition. The establishment of ERGEC, the European Regulators' Group for Electricity and Gas, and the voluntary participation of the national regulators align the efforts towards of the Member States to reach the common goal of the single market.

2.3.2 The Sector Inquiry in the Electricity and Gas Markets

According to the sector inquiry, the overall EU situation was deemed as inadequate to promote the goal of the single internal market. As a sole energy regulator in European-wide level does not exist, and the various organizations have advisory role, some Member countries

have encompassed the EU framework in their national laws, while others have fallen short of incorporating the minimum requirements. National regulators are not proven to be effective and for some countries their independence and their competences are questioned.

As far as the competition field is concerned, prices remained rigid in many national markets in an environment of market concentration, where the entrance of new players was prevented and the dominant incumbents were favored through long-term contracts. Transparency was still missing and the market pricing was unavailable. As a result, cross border competition is being hindered and the objective of low end-users prices cannot be realized.

Furthermore the insufficient unbundling of transmission and distribution networks and the promotion of national interests rather than developing equal access to third party, leads to distorted incentives, delaying investment decisions in infrastructure. National Transmission System Operators do not provide the same level of information on public service obligations to the EU regulatory authorities and confusion exists in mechanisms such as congestion management, dispatch and balancing rules.

Apart from common legislation, in order third party access (TPA) to national grids not to be compromised, common technical standards to facilitate competition are a prerequisite as well. The physical connectivity will ensure the development of a real physical European power and gas market. Apart from the existing interlinks, additional physical capacity will be required for a single European network to exist. EU has a yearly budget for bankrolling Trans European Energy Networks, in order to assist investment in energy infrastructure.

Energy supply has also an inherent social aspect. It is a public service, and for that reason its transformation from a state-owned, heavily regulated, and government subsidized industry, to a market-oriented one is not simple and without impediments. Taking into account the results from the sector inquiry, in 2007 EU proceeded in a third energy market legislative package, in order to boost the national efforts towards the single market.

2.3.3 The Third Energy Package

As the Member States began to transpose the EU Directives in their national legislation, the European Commission started publishing annual reports on their relevant progress. In 2009

the regional initiatives for fostering competition in electricity market were deemed as encouraging. Increased trading activity further promoted the integrated wholesale market. Investing in infrastructure projects is expected to facilitate cross-border trade, enhancing the interconnection capacity, as today the markets remain highly fragmented. In the natural gas market, increase in the prices was observed in the first half of 2008, while in most markets prices are not set by competition principles. Member States are encouraged to abolish price regulation, invest in interconnection projects and promote effective unbundling.

As the existing regulatory framework was considered as not adequate in order EU Member states to fully reap the benefits of a genuinely competitive market, new measures included in the Third Energy Package were put forward. Especially the unbundling procedure has proved to be a burdensome task that needs to be resolved. The two alternative routes the Member States can choose are either ownership separation of activities or introduction of an independent ‘System Operator’ that is responsible for maintaining and developing the networks and compensates the vertically integrated company for operating the networks. Detailed regulation in the second alternative is of crucial importance in order non-discrimination not to exist. The collaboration between the national regulatory authorities and Community authorities will ensure the mitigation of differences in the national regulations, enhancing harmonization in the market structure across the different EU countries. The monitoring of progress will be facilitated as provisions include altering ERGEC (the European Regulators Group for Electricity and Gas) into a European Network of Independent Regulators (ERGEC +), or establishing a new European authority.

2.4 GREEK ENERGY MARKETS

Greece, being in the south-eastern part of Europe is of special geographical structure, with wide mountainous areas, parts that are barely inhabited and urban regions heavily concentrated. Not having physical interconnections with Central or Western Europe, the country is connected only to the neighboring countries of Albania, Bulgaria and Turkey by land and to Italy by undersea.

According to the national electricity policy, connecting islands to the main network, when it is technically possible, is a priority. Prices in the electricity wholesale market are set by the market, as generators and suppliers compete in the mandatory pool. Prices for the access in the networks and end-user prices are fixed by the state, taking into account the advice of RAE. Electricity prices are considered to be between the lowest among the EU Member States. Although consumers in non-interconnected regions would have to face higher tariffs, due to increased generation cost in these regions, electricity prices are kept uniform across the country dispersing the cost burden to all consumers. Discounted prices apply to the economically weaker part of the population and the agricultural households. When eligible customers do not have bilateral agreements with generators, the regulated tariffs of PPC apply.

In the natural gas sector the grid runs the continental part of the country from the North up to the region of Attiki. The entry points are in the Greek-Bulgarian and Greek-Turkish borders for pipeline gas, and in Revythoussa Island, close to Attiki, for the liquefied natural gas (LNG). Wholesale market does not exist, and the gas transportation is conducted through bilateral contracts. Prices are regulated and set by the supply companies according to the national regulator's standards.

The electricity liberalization process was formally initiated from 1999 by the introduction of Law 2773/99, which was the first law to transpose the 92/96 EU Directive. Additional laws and ministerial decrees were enacted the next years, as EU-wide developments and domestic barriers were taken into account. The natural gas liberalization is described in the 3175/2003 and 3428/2005 Laws. EU, taking under consideration the particular features of its Member States, offered to Greece derogation from its Directives, and granted additional time to fully apply the EU Directives in the national natural gas environment.

The national efforts to abide by the stipulations of the EU Directives are presented in the following chapters. Firstly the main players in the electricity and gas playing field and secondly the existing electricity and gas infrastructure of the country are presented. Finally national laws and ministerial decrees that implement the EU Directives in the Greek reality are examined in order a clear view of the domestic legislative environment to be gained.

2.4.1 The key players in the energy field

In the **electricity** setting, the main actors are the incumbent Public Power Corporation (PPC), the Hellenic Transmission System Operator (HTSO), and the Regulatory Authority of Energy (RAE) which provides advisory services to the main regulator, the Environment, Energy and Climate Change Ministry (previously Ministry of Development).

The **Public Power Corporation** (PPC) is the incumbent electricity company, with lignite mining activities, and generation power facilities fired by lignite, natural gas and renewable means. Having transferred the operation and development of the transmission system to the Hellenic Transmission System Operator (HTSO), retains the ownership of the transmission and distribution grids, and operates the distribution channels. PPC performs the bundled activities of generation, transmission, distribution and supplying for the end-users in the non-interconnected islands.

The **Hellenic Transmission System Operator** (HTSO) is the market operator of the national transmission system. HTSO provides network access to interested parties, ensuring that at each time node the balance between production and consumption is met and the electricity is provided in a secure and qualitative to the end-users. Among its competencies is planning of the transmission system's flows, setting the System Marginal Price (SMP), dispatching load to the existing production facilities, and clearing the electricity transactions. Additionally it undertakes purchase and sale contracts when it is necessary for ancillary services, and long term contracts in order to ensure the unimpeded function of the system and the national security of supply. Competencies in the operation of the distribution channels will be granted to HTSO, according to article 17 of the EU Electricity Directive 2003/54, while the distribution license issued by the Ministry of Environment, Energy and Climate Change is anticipated.

The **Regulatory Authority for Energy** (RAE) is the entity with regulatory competences in electricity, oil, natural gas, and renewable sources markets. It was established according to the provisions of Law 2773/99, as an independent authority, with advisory and monitoring activities. RAE, in the electricity sector, is involved in generation licensing procedures, publishes generation adequacy studies, and indicates the price charged for the network access. Additionally it offers opinion for the regulated prices, ensures the customers' protection, and

in cases of law and code violation, can impose fines. Being in collaboration with the Hellenic Competition Commission, regulatory bodies in other EU Member States, and international organizations, RAE coordinates each stakeholder's function in the energy national setting towards the complete liberalization. Among its latest initiatives are the active involvement in the foundation of Energy Community of South East Europe (ECSEE), and the participation in the Council of European Energy Regulators (CEER) and the Regulators' Group for Electricity and Gas (ERGEC).

The domestic natural gas sector is less developed compared to electricity, since its introduction to the Greek market was only in the 1996. The country's reserves are not significant, and the imports are mainly from Russia followed by liquefied natural gas (LNG) from Algeria. The storage capacity is short-term and physical interconnections with the rest of Europe are under-developed. The key stakeholders are the Public Gas Corporation (DEPA) with importing and large customers' supplying activities, the System Operator (DESFA) operating the national network and the Supply companies (EPAs) which cover the energy needs of individual end-users.

The **Public Gas Corporation** (DEPA) imports the natural gas quantities consumed in the domestic market, supplies large non-household customers with annual consumption more than 10 million cubic meters and sells natural gas to the Gas Supply companies. The company's objectives are setting Greece as the energy corridor, which connects the East to the West, and dynamically take part in the interconnection infrastructure projects in the Southeastern region. Aiming at securing supply for future demand, through diversification of the natural gas routes, DEPA is in cooperation with the Italian company Edison and the Turkish Botas. Additionally, intergovernmental agreements have been signed with Bulgaria, Azerbaijan and Egypt, in order to strengthen the ties. The Public Gas Corporation is active also in gas-related commercial activities, by supplying gas-powered vehicles. It has two refueling stations in the region of Attiki, which are among the largest in Europe.

The **Hellenic Gas Transmission System Operator** (DESFA) is the subsidiary company of the Public Gas Corporation, which has the responsibility and the exclusive right to manage and develop the National Natural Gas System (NNGS). Founded in 2007, according to 3428/05 Law, its establishment transposes the EU Directive's requirement for legal unbundling in the domestic natural gas environment. Providing regulated third party access

sets the pricing principles for using the Greek pipeline network and the LNG terminal facilities. DESFA is among the founding members of the ‘European Network of Transmission System Operators for Gas’ (ENTSOG). As indicated by the 3rd Energy Package, since December 2009 DESFA has undertaken the initiative of participating in the creation of the harmonized regulatory framework for third party access to the Member States’ networks.

The three **Gas Supply companies** (EPAs) that operate in Greece are in charge of the medium and low pressure networks’ maintenance and development. Additionally, they supply with gas the commercial consumers and households in the city networks they operate. Having the bundled functions of a regional Distribution System Operator and sole Supplier, according to the ministerial decree 18887/06.11.2001, they are granted rights to provide gas to end-users for 30 years. Their monopolistic nature allows them to decide on the prices they charge their end-users based on the revenue cap methodology. The tariffs are subject to change every year depending on the inflation and are bundled without distinguishing the distribution, supply of company’s profit segments. EPAs make public the final-user prices and the regulatory body has only ex-post competences concerning the price formation. EPA Attiki is responsible for the urban center of Athens and the surrounding regions, EPA Thessaloniki for the urban region of Thessaloniki in the northern part of Greece and EPA of Thessaly for the city networks of Larissa and Volos in Central Greece.

EPAs’ shares are allocated in a 51% percentage to the Gas Distribution Company (EDA), which is a fully-owned subsidiary of DEPA and in the remaining 49% to individual investors who have assumed the management. The 49% of EPA Attiki belongs to the consortium of Duke Energy-Shell Gas. The 49% of the market shares of EPA Thessaloniki and Thessaly belong to the Italian energy company ENI. Under international tender process is the establishment of three new Supply Companies, in Central Greece, Central Macedonia (without Thessaloniki) and Eastern Macedonia and Thrace.

2.4.2 Electricity and Gas Physical Infrastructure

The national electricity grid is comprised of the interconnected and non-interconnected parts. The interconnected system consists of the continental territory and some of the biggest islands in the Ionian Sea and the Cyclades complex. Most of the islands, which cover the 20% of the

Greek ground, are non-interconnected, having autonomous power stations. The interconnected system has 11.200 km high-voltage transmission lines, and the medium and low voltage distribution channels reach 202.000 km. The country is interconnected with the four neighboring countries of Italy, Albania, Former Yugoslav Republic of Macedonia and Bulgaria.

The particular characteristic of the national infrastructure is the imbalance between supply and demand. Most of the electricity generation facilities are located in the northern part of the country, whereas demand is mainly in the central and southern region, where the urban center of Athens is situated.

On the demand side, distinctions exist among the different categories of the clients. The big industrial clients' electricity consumption is stable during the weekdays and falls during the weekend. The small industrial customers have lower demand, and big variation during the day. This demand diversification increases the negotiation power of the big clients, which ensure better prices than smaller clients. In mature markets that are characterized by liquidity and competition environment the big clients have higher elasticity of demand as they can more easily switch supplier.

PPC is the biggest Generation and Supply Company in the Greek territory. With installed capacity of 12.138 MW and according to the latest data, PPC has 6.83 million low-voltage and 718.000 medium and high-voltage customers.

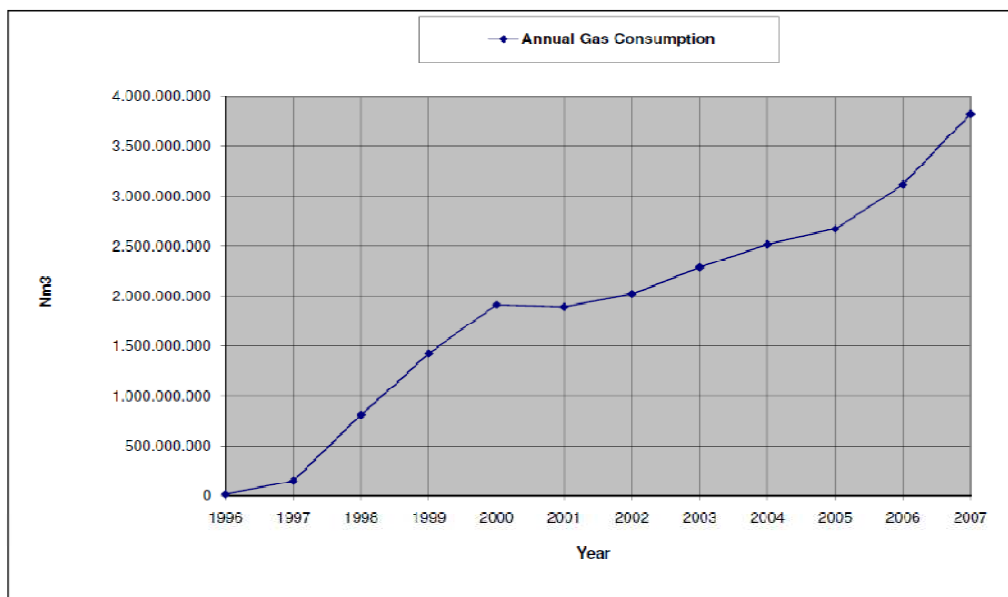
The national natural gas system runs the continental Greece, from the north to the central region of Attiki. The country's geopolitical position is of paramount importance, since it serves as the energy corridor for the European countries, transporting natural gas from Russia, North Africa and Asia. The national natural gas reserves are insignificant and Greece is heavily dependent on imports mainly from Russia and to a lesser degree from Algeria.

The introduction of natural gas in the domestic energy mix begun no sooner than 1987-1988 with the establishment of the Public Gas Corporation and the signing of the first agreements with the main gas exporters, (Russia- Sojuzgazexport and Algeria- Sonatrach), followed by contracts with Turkey. In 1995 DEPA begun the construction of the distribution grids in

Attiki, Thessaloniki, Larisa and Volos and established the Gas Distribution Companies (EDAs) of Attiki, Thessaloniki and Thessaly.

The national natural gas system consists of the main pipeline that connects Bulgaria to Athens, the regional high-medium-low pressure pipelines which supply 15 cities in northern and central Greece, and the liquefied natural gas station in Revythoussa. Additional infrastructure is included in various areas for border metering stations, control and dispatching services.

The national transmission system has three import points: The first is situated in Promahonas at the Greek-Bulgarian borders, and facilitates the natural gas transmission from Russia. The second point is in Evros, at the Greek-Turkish borders, transporting natural gas from Asia. The third is the Revythoussa Liquefied Natural Gas Terminal located close to the area of Attiki, and serves as a passageway of LNG from Algeria. The load coming in tankers from Algeria is liquefied, and is reserved in the two containers of the island in order to be further proceeded and gasified before it enters the national network.



Source: DEPA

Figure 1: Evolution of domestic NG market

As natural gas demand is projected to increase in the following years, the need to diversify natural gas sources is becoming intensive. Three major pipeline projects in the National Gas

System are under construction or under design, and a third tank of LNG is planned for Revythoussa.

The International **Turkey-Greece-Italy (ITGI) Natural Gas Pipeline** is of major significance for the South Eastern European region since it supplies European markets natural gas from the Caspian Sea and the Middle East. The Turkey-Greece part was completed in 2007, enhancing the energy relations between the two countries. Its operation, apart from offering diversification to the natural gas sources, renders Greece as the energy corridor, connecting the East to the western European markets, provided that the necessary infrastructure is developed. The Greece-Italy Interconnector consists of an onshore part connecting Komotini in northern Greece with the west coastline of Greece and an undersea 220 km pipeline, with the name Poseidon connecting the western part of Greece at Ipeiros and the Italian coast at Otranto. The onshore project that is located in the Greek territory will be realized by DESFA. The offshore project is commissioned by IGI Poseidon S.A. a joint venture of the Greek Public Gas Corporation DEPA and the Italian energy operator company Edison. The company is responsible for designing and building the pipeline and subsequently operating it, as it is projected to be complete in 2014.

The **Trans Adriatic Pipeline (TAP)** is a natural gas project that the joint venture of the Norwegian company Statoil and the Swiss EGL will construct and operate. In 2008 the consortium applied to the Ministry of Development for the license to develop an Independent Natural Gas System. It also requested from DESFA capacity in the national system, since TAP project using existing interconnections in Turkey and Greece will provide natural gas from the Middle East. Beginning from Nea Mesimbria, close to the region of Thessaloniki, it is planned to cross Albania, Adriatic Sea and reach Italy close to Brindisi. TAP aspires to form the Southern Gas Corridor. The option also to construct a storage tank in Albania is under consideration.

In 2008 the construction for the **South Stream Pipeline** in the Greek territory was agreed between Russia and Greece. It is a joint venture with the equivalent participation of DESFA and the Russian energy giant, Gazprom. The entry point to Greece will be at the Greek-Bulgarian borders, crossing northern Greece and the possible exit routes can be the Greek-Albanian borders or the Adriatic Sea.

Complementary projects involve the **Burgas-Alexandroupolis Oil Pipeline**, which will connect Burgas port and the Greek city of Alexandroupolis, which is located in the Greek-Turkish borders. Although technical and financial difficulties have delayed the project that was signed by Greece, Bulgaria and Russia in 1997, developments in diplomatic communication among the three countries after 2005, are projected to accelerate the progress of the project.

According to the estimations of the International Energy Agency (IEA) the demand for LNG will be double in 2015 compared to the demand in 2007. New LNG facilities are planned to be built in global scale, in order the energy needs of the future to be met. The gasification capacity has been recently increased by three times in the LNG terminal in Revythoussa. Building a third tank and increasing the storage capacity of the station, is the next scheduled project. Thus Greece has undertaken a pivotal role in strengthening cross-border interlinks, fostering energy collaboration with its neighboring countries. Being at the same pace as most European countries seeking alternative routes for their natural gas needs, ensuring security of supply, and mitigating dependency on imports from Russia, salutes new pipeline projects from countries such as Qatar, Iran and Azerbaijan.

2.4.3 Application of the EU provisions in the Greek legal environment

Greece following the mandates of the European commission had to render the EU Directives in the domestic legislative framework according to a specific time schedule. Directive 96/92 should have been incorporated in the Greek set by February 2001 and the latter 2003/54 EC Directive by July 2004.

The official opening of the Greek electricity market to competition started with the transposition of EC directive 96/92 into the national **Law 2773/1999**. Serving as the cornerstone of the liberalization in the Greek market, it granted the right to large customers to choose their supplier. In addition, it contained provisions for the sector restructuring, through the establishment of two entities, the Regulatory Authority for Energy (RAE) and the Hellenic Transmission System Operator (HTSO).

Inter alia, RAE was created as an independent administrative authority, having the role to monitor the energy sector, in order competition and consumer protection to be guaranteed. Having an advisory role to the Ministry of Development, which is the main regulatory body,

for particular issues its opinion is binding. RAE is in cooperation with regulatory authorities of other Member States and reports to the EU Commission every two years on the progress of energy sector liberalization in Greece.

Furthermore, the vertical dismantling of the incumbent national monopoly PPC was initiated through the foundation of the Hellenic Transmission System Operator (HTSO), which undertook the transmission activities. HTSO as a *societe anonyme* is operating the national transmission network and is responsible for its maintenance and upgrading, while allocating the capacity and ensuring the non-discriminatory access to the grids. The Hellenic State owns 51% of the shares, and PPC owns the rest 49%.

PPC remains the exclusive owner of the transmission and distribution grids, and continues operating the distribution network. Separating the customers into eligible and non-eligible with the last being the customers who are not connected in the voltage network of the mainland of Greece, PPC “is the exclusive wholesale supplier and buyer for the non-interconnected islands” (Article 11 par. 3), as well as the “the last resort supplier for the eligible customers, if they have not switched supplier” (Article 26 par: 1-2).

Although the first steps towards liberalization were encouraging, competition in the production and supply was not fostered, so the new law **3175/2003** was imposed. Altering to a certain degree the previous law, while including the conditions of the second EC Directive 2003/54, a single authorization license is granted to PPC in order to restore old power plants. When the renovation procedure is completed, HTSO will be in charge of using them for ancillary services (reserve capacity). Tendering procedures are set for power contracts with the new producers in order to facilitate their entry in the Greek market. Suppliers can also become active, without being obliged to possess production capacity within the Greek territory. The liberalization process is hastened by granting the right to co-generation power generators licensees to choose their natural gas supplier. The day-ahead market is established as well, as the relevant code regulates all the details.

On the demand side, the law foresees that from July 2004 all non-household customers which are connected in the main grid and estimated to be 70% of the total consumption, are regarded as eligible having the right to switch supplier. There is no similar provision for customers in the non-interconnected islands and the Greek State has requested the non-interconnected system to be excluded due to the particular circumstances that would jeopardize meeting the

security of supply and public service requirements. From July 2007 all consumers, excluding the non-interconnected, are appointed as eligible customers.

Following the former Grid Code which was introduced in 2001 and formed the fundamentals of the wholesale electricity market, *the 2005 Grid Control and Power Exchange Code for Electricity* was issued. After broad public dialogue with all the stakeholders while incorporating the provisions of the two laws 2773/99 and 3175/03, the blind spots of the previous code are adjusted and the basis of real competition is created. Considering a 2-year time framework for full enactment, institutes the power exchange that will operate the electricity market from then on. The trading platform is composed of a mandatory pool, where producers and suppliers bid, substituting the bilateral agreements that were the main tools. The day-ahead market consists of scheduling next day's supply and demand for every hour, while provisions for the imbalances settlement are granted as well. The real time dispatch procedure is promoted, while a capacity assurance mechanism is inserted. In the spirit of the EU law 1228/2003, which deals with cross-border issues, the 2005 Code contains terms for the congestion management, giving the right to the market players to export electricity power through the interconnection channels of the country.

The later *Law 3426/2005* fully transposes the 2003/54 EU Directive and amends certain issues of the previous statute that proved to be hindering transparency and the electricity market opening. The ownership status of the national transmission and distribution system does not change and PPC is the sole owner. Changing the authorization process, PPC will have to request for individual authorization licenses for the power generation plants that will construct in the future. Licenses to generation and supply power units, other than PPC are granted for the interconnected system, whereas for the non-interconnected network generation licenses are granted as well, as long as the local network transmits more than 500 GWh per year. For remote smaller networks, exclusive supplier remains PPC ensuring their security of supply. Further unbundling of the activities of the energy giant PPC is promoted, in order the generation and supply segments to have operational independence while the concept of a Hellenic Transmission and Distribution System Operator (HTDSO) is brought forward. The already existent HTSO will be incorporated in the entity that will manage the both networks, as PPC will relinquish the operation of the distribution grids. PPC's activities in the non-interconnected regions will have to become functionally independent, as the status of PPC's ownership and operation cannot change.

In the natural gas sector the EU's Second Package of Directives containing the 55/2003 Directive, substituted the previous 30/98/EC, taking into account the current EU-wide conditions and completing the regulatory gaps of the First Package of Directives. According to its provisions, the EU Members' national natural gas markets should be liberalized for non-household end-users until July 2004, while all customers, industrial and households, should be able to choose their supplier by July 2007. Inter alia, the legal unbundling of the transmission networks, the enhancement of the role of the national regulatory authorities and suggestions for ensuring the security of supply are included.

The legal act that initiated the liberalization process in the Greek **natural gas sector** was the *Law 3175/2003* based on the 2003/55 EU Directive. Law 3175/2003 stipulated that sale, import and export of natural gas can be freely exercised under the liberalization regime, whereas the supply of natural gas in the domestic market requires a license. Eligible customers, open to competition from July 2005, were regarded the co-generation and gas-fired plants. Theoretically 60% of the domestic market was under regime of competition.

Because the introduction of natural gas in the domestic environment was done at a later stage compared to other Member States, Greece was considered as an emerging market, and was granted the right to derogate from the dates imposed by the stipulations of EU. The later *Law 3428/2005* took into account these deviations from the EU framework and incorporated them in the national legislation. Legally dismantling DEPA's activities, the managing of the transmission networks was granted to the Hellenic Gas Transmission System Operator (DESFA SA), and the supply of domestic and industrial customers to the Gas Supply Companies (EPAs). Detailed regulations and codes (Network, Supply and License Code) were to be issued, concerning pricing, TPA and licensing issues.

Today the national legislative framework in both electricity and natural gas markets is complete, with secondary legislation and ministerial decrees regulating issues that occur as the liberalization process further develops.

3. METHODOLOGY

3.1 RESEARCH DESIGN

The methodological strategy employed for this paper, in order to assess the regulatory and market reforms in the energy markets of Greece is qualitative research. Being a relatively under-researched topic concerning the Greek environment, this study sheds light in the positive and negative factors that influence the liberalization process of the conventional energy markets in Greece.

The hypothesis of whether *the barriers that prevent Greek energy markets from integrating to the EU single market are such that timely liberalization can be achieved* is tested. A conceptual framework was synthesized in order to present the elements that impact the liberalization process of the country. The initial conceptual model is based on the relevant literature review, European Commission's documents and Greek official archives. At the next stage of the exploratory research, interviews with the dominant players in the Greek electricity and natural gas markets were conducted, in order to better assess the research question and amplify the initial conceptual model. The objective is to pinpoint -additional to the current literature review- factors that affect the Greek markets' evolution, and thus be able to concisely validate the main hypothesis.

According to Yin (1994), evidence sources for exploratory studies can include documents, archival records, interviews, direct observation, participant-observation, or physical artifacts. The interviews method was chosen, since the views and the argumentation of the people who have a practical affinity with the Greek regulatory framework and competitive field can be value adding. Due to the explorative nature of this study, the interviewees were asked through open-ended, in-depth questions for their positions concerning issues of regulation, competition, and security of supply. Furthermore they were requested to answer about country-specific issues that, to their opinion, affect the liberalization process. Taking into consideration the individual role that each entity plays and asking relevant questions, the progress so far achieved and the future steps were revealed.

3.2 SAMPLE SELECTION

Although differences in the operation regime, in the regulatory framework and the degree of competition exist between the markets of electricity and natural gas, exploring their development in combination is significant for this study. The use of natural gas in the conventional power generation plants is mandated by the Energy Policy of European Union. The movements in the oil prices are closely related to the price pattern that natural gas follows, and the changes in natural gas prices affect subsequently the electricity prices.

As the domestic energy markets are substantially in the beginning of the liberalization process, the small number of participants can be observed. The below mentioned entities and organizations were approached, and representatives which had the background and the knowledge were contacted.

For the electricity market assessment, interviews with representatives from the Public Power Corporation (PPC) and the Hellenic Transmission System Operator (HTSO) were pursued. Smaller private companies are also becoming active in the generation and supply field, as the regulatory framework becomes more transparent and the conditions for competition assist their penetration in the domestic market. METKA S.A., the biggest EPC contractor in the Greek territory offered its expertise on the developments in the thermal power generation sector. The Hellenic Competition Committee provided insight for the competition and market structure related topics. Additionally RAE, as the consulting, regulatory and monitoring statutory body, put forward for consideration many issues, concerning the power and natural gas markets.

In order to evaluate the natural gas market development, the Public Gas Corporation (DEPA), which is the sole importer and supplier of big clients today, and the Hellenic Gas Transmission System Operator (DESFA) that operates and expands the high-pressure grids, were contacted. RAE's views on the progress of the NG market were employed as well.

3.3 INITIAL CONCEPTUAL MODELS

In this section the preliminary conceptual models for the domestic markets of electricity and natural gas are presented. They are based on the existing literature review and they include the strong points and the barriers that have been identified through *Chapter 2*. Put in clusters, the aim is to show schematically the potential of the national energy markets, along with the elements that impede competition and result in limited market opening and customer switching choice. Figure 2 presents the dynamics and barriers affecting the domestic electricity market.

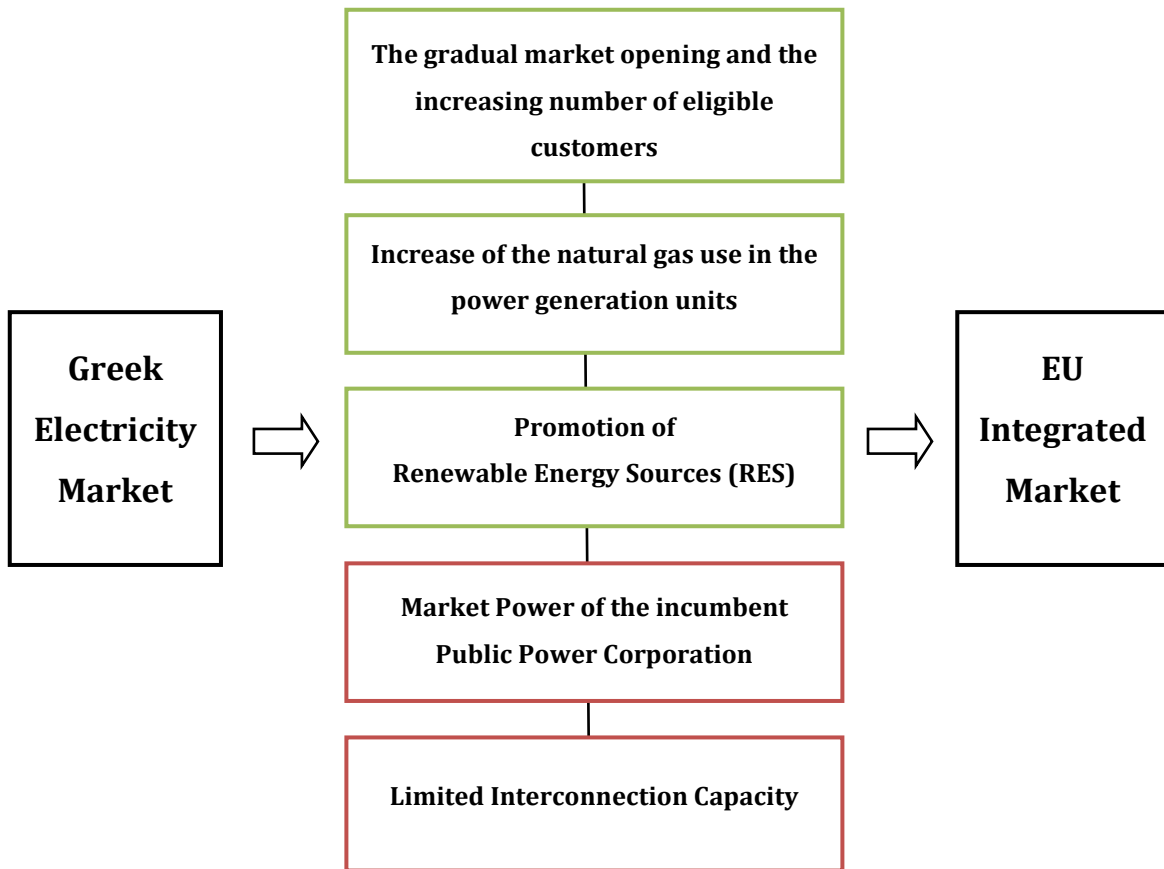


Figure 2: Dynamics and Barriers of the integration process to the single EU Market (Initial Conceptual Model for the domestic electricity market)*

**The Dynamics are presented in the green text boxes, while the Barriers in the red text boxes.*

As far as the domestic electricity market is concerned, its attributes are spotted in gradual opening at competition since 1999. Today eligible customers are 2/3 of the Greek industrial and domestic end-users. The turn to more environmental-friendly resources for the electricity generation has resulted in the promotion of natural gas-fired power plants and RES. On the other hand, the Public Power Company remains the biggest generator and supplier company, whereas the limited capacity in the interconnections restrains the imports and exports from the Greek territory.

Figure 3 presents the determinants and the barriers concerning the natural gas market of the country.

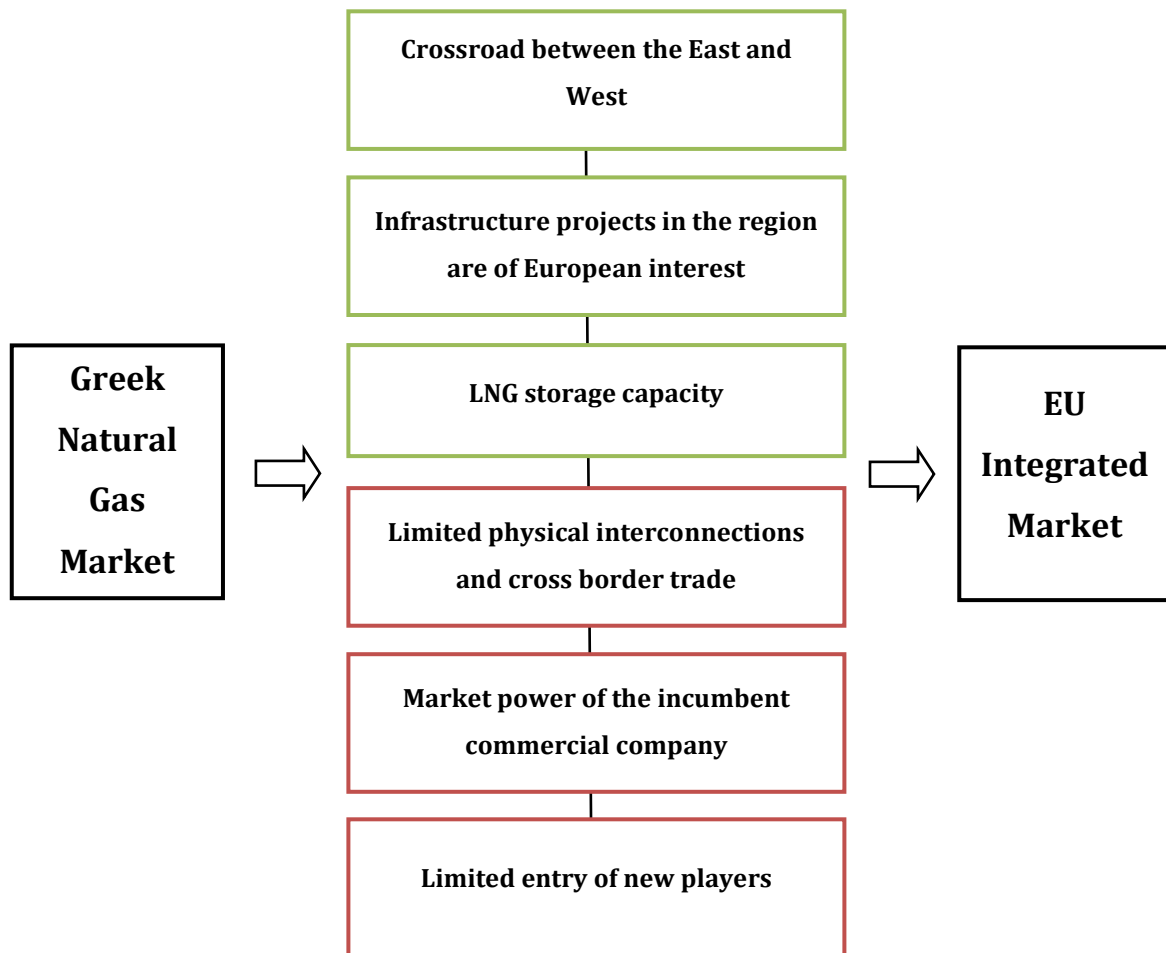


Figure 3: Dynamics and Barriers* of the integration process to the single EU Market (Initial Conceptual Model for the domestic natural gas market)

**The Dynamics are presented in the green text boxes, while the Barriers in the red text boxes.*

For the natural gas market, the strategic position of the country is the advantage that sets Greece in the focal point of priority infrastructure projects, funded by the European Union. The LNG facilities offer diversity of resources, as the pipeline interconnections are limited. As natural gas is a newly introduced fuel in the Greek market, not many stakeholders are active and the incumbent commercial company has a dominant position.

4. DATA DESCRIPTION

In this chapter, the seven interview cases conducted with the main participants in the electricity and natural gas market are presented. By providing a description of each organization, referring to the interviewees and presenting their relevant opinions, the role of the entities in the regulatory and competitive field, as well as the general conditions in the Greek energy market are assessed.

4.1 THE ENERGY REGULATOR

Entity Name:	RAE – Regulatory Authority for Energy
Date of Establishment:	2000
Interviewee:	Miltos Aslanoglou
Role of the Interviewee:	Director of the Markets and Competition Unit

Entity Description

The **Regulatory Authority for Energy** is an independent body set up according to the provisions of the law 2773/99. Established in 2000, its board consists of seven members with the president and vice-president being chosen by the Greek state and the members designated for five years. The main tasks include administrative, regulatory, advisory and monitoring functions for the national energy markets.

In its infancy, RAE had foremost administrative and consultative services, but through the enactment of the domestic legal acts in the following years its role was enhanced and its responsibilities amplified. In particular cases the opinion of RAE is binding, for instance has to provide a consenting opinion about the PPC imposed tariffs, as long as PPC possesses 70% of the market share. RAE also scrutinizes the operation of the market participants and the way they function concerning their public services obligations. RAE is active in the energy markets' operation. Being in close collaboration with the Hellenic Competition Authority, focuses on aligning the practices of the domestic players towards a successful liberalization process.

Entity's Role

The advisory services include the granting of opinion to the main regulator, the Ministry of Development, for legislative actions that will promote competition and will ensure the protection of end-users. Recommendatory services are offered for imposing secondary legislation and for the issuing and expansion of generation capacity licenses. According to the Grid Code, RAE approves various elements of the cost base of the tariffs, such as the annual cost of the System, including the annual barter owed by HTSO to PPC SA, the annual operating cost of the System, and also the calculation of the use of the system charges. The official confirmation of the network tariffs is a jurisdiction of the Ministry of Development, following the opinion of RAE.

Having financial and operational independence, RAE's monitoring activities apply to electricity, oil, natural gas, and renewable sources markets. Every year RAE issues a report providing data about the year's actions and once every two years time RAE issues a publication about security of supply issues. In addition RAE publishes adequacy studies in order to forecast whether HTSO should initiate tenders for new generating capacity. RAE is monitoring the Power Exchange around which the national electricity system is built, and the market players that participate in it.

RAE is also active the European setting, by cooperating with other Member States' authorities and EU organizations, such as the Council of European Energy Regulators (CEER), and the European Regulator ERGEC. RAE has a dynamic role in the creation of the Energy Community of South East Europe (ECSEE), cooperating with the neighboring countries and the relevant working groups.

Regulation Issues

RAE today has mostly supplementary role to the main regulator, the Ministry of Environment, Energy and Climate Change. According to Mr. Aslanoglou, the common denominator of the latest issued Directives is granting increased competencies to the national regulators. As a European-wide Regulatory Body does not exist, the national regulators are called through ensuring their independence to enhance their role in their national markets. Thus, they should guarantee that the market participants function according to the Public Service Obligations (PSO) and the safety standards, offering reliable information to their clients. Mr. Aslanoglou mentioned that RAE's objective is to safeguard the customers' interests, and among its latest activities are the methodology proposal for separation of electricity prices to its elements, studies on the quality of the networks, measures to cover peak demand, and projections for additional future capacity based on scenarios for the demand. Mr. Aslanoglou added that in the natural gas sector, RAE has recently offered its opinion for one case where the access from a third party to the LNG terminal in Revythoussa was hindered. In addition, RAE closely cooperates with the stakeholders in NG market in authorization and tendering processes.

Competition Issues

As the most prominent feature of the Greek market is the almost 100% presence of PPC in the generation and retail sectors, Mr. Aslanoglou argues that it is so, due to the low production cost and the low end-user tariff structure. PPC's resources are not estimated with cost principles and its plants have already been depreciated. Every new entrant has to compete with an incumbent company, which does not face credit risk. The company's charges are according to its average cost and not to the marginal, and the prices are still regulated, equal to all customers.

The cross-shareholdings between the electricity and natural gas companies are not considered by Mr. Aslanoglou as affecting market liquidity or creating conflict of interests. In the natural gas market, competition issues such as TPA, transportation agreements and congestion management practices are dealt with the recently issued Network Code creating a transparent level field.

Security of Supply

Concerning both markets, Mr. Aslanoglou believes that Greece should invest in strategic infrastructure, in order to have in the future an energy hub role in the region of Balkans and

Southeastern Europe. The security of supply is more relevant to the regulatory framework and the market rules than to the adequacy of domestic electricity resources. However, as the existing lignite reserves will not be adequate enough and the CO₂ related costs are projected to increase over the following years, the use of lignite should be eliminated and replaced from Renewable Energy Sources.

Creating many channels from where natural gas can flow towards Europe, as stated by Mr. Aslanoglou can offer Greece a better bargaining position in the future. As the supply contracts will gradually start expiring after 2017, the level of liquidity in the natural gas market will be taken into account: The alternative entry points, which will have been constructed by that time, will determine as well the type of contracts to be used. A combination of long-term and spot agreements is most likely to be used. Through the strategic choice of developing LNG infrastructure providing the country with liquidity and since the maritime industry in Greece is well developed, Greece has the potential to be an energy hub.

According to Mr. Aslanoglou's perspective, the global circumstances are not the most favorable seen from the crisis perspective, but the macroeconomic variables are not affected. The planning of infrastructure projects is not based on the level of domestic consumption, which could be argued that is relatively small, but on the fact that through Greece the rest of Europe can have access to natural gas sources from Africa and Asia.

4.2 THE DOMESTIC ELECTRICITY MARKET

In this section, the interview results of the key-players of the electricity market are presented.

4.2.1 PPC – Public Power Corporation S.A.

Company Name:	DEI (PPC) – Public Power Corporation S.A.
Date of Establishment:	1950
Interviewee:	Sofia Politopoulou
Role of the Interviewee:	Assistant Director Corporate Development Department

Entity Description

The **Public Power Corporation** was established in 1950 and until the end of 90s monopolized the national electricity field. Being the sole generator, transmitter, distributor and supplier of the country's industrial and domestic customers for fifty years, the new century finds the vertically-integrated company amidst the process of restructuring and activities unbundling. With activities concentrated within the national market, the Greek energy giant is the main actor in the lignite mining field. PPC has the exclusive right of producing lignite at a percentage of 94% of the total deposits in the Greek territory. It owns 8 mines, with Ptolemaida (northern Greece) and Megalopolis (southern part of the country), being the largest Greek ones.

PPC is the biggest Greek company regarding assets, owning 34 geothermal and hydro-electric units, 3 aeolic plant installations in the interconnected system, and 61 additional power stations in the non-interconnected islands. The company's power generation comes from mainly from lignite, and to a lesser degree from oil, hydroelectric resources, natural gas and renewable means. PPC is the sole owner of the high-medium and low voltage network, manager of the distribution grids and of the system in the non-interconnected regions. The operating of the transmission networks has been handed over to the Hellenic Transmission System Operator (HTSO), and PPC pays an annual fee to HTSO in order to gain access to the grid.

PPC is active in the telecommunications market, providing telephony, multimedia and Internet services through its subsidiary PPC Telecommunications S.A. and thus is the mother company of two entities that will construct generation plants in the islands of Rhodes and Crete.

Regulatory Issues

Following the EU mandates, in January 1, 2001 PPC was transformed to a societe anonyme and one year later it was listed in the stock exchanges of Athens and London. According to Law 2773/1999 (Article 43, par.3) the Hellenic Republic is the biggest shareholder and cannot own less than 51% of the shares. Today the rest 45% is owned by investors and the remaining 4% by the pension fund of the company.

According to Mrs. Politopoulou, the gradual regulatory steps for the accounts unbundling have been significant, beginning with the partial privatization of PPC in 2001, the TS operation transfer and market clearance to HTSO. The liberalization process only lags behind

concerning the assigning of the DS operation to a distinct entity, due to lack of detailed secondary regulations. As far as the electricity prices are concerned, Mrs. Politopoulou mentions that the partial charges which constitute the bundled price are made known to the end-users. In the bills customers receive can distinguish what they pay for each of the electricity segments. Mrs. Politopoulou points out that PPC is alert for the liberalization development, having issued proposals for the restructuring of the company and the tariff policy. As PPC is the biggest investor in the energy sector, according to its 2010-2014 business plan, will invest 2 billion euro for the development of the domestic infrastructure.

Competition Issues

Although demand competition has been introduced into the legislative field, actual competition does not exist and PPC with a market share of 97%, supplies according to the company's official website 7.5 million end-users.

As Mrs. Politopoulou was asked to evaluate the reasons for the limited entries in the electricity generation field, she replied that there is a combination of facts: the non-reflecting-cost prices along with the volatile System Marginal price (SMP) are the main suspending factors. In the question of which are the next steps of the company in order to be successful under the new liberalized regime, the interviewee mentions PPC's that the company's economic results have been susceptible to exogenous factors, such as the fluctuation of the price of oil, the decline in electricity demand and increased System Marginal Price (SMP), while the end-users prices remained unchanged, resulting to the dire financial position of the company.

Searching for the necessary endogenous changes, Mrs. Politopoulou believes that PPC should decrease controllable costs with structural measures: PPC is an old state-owned company, recently transformed to a *societe anonyme*. The company should modernize its *modus operandi*, resembling to the way private companies function. The focus should be on the vocational training of its work force, along with substituting the old, lignite environmental damaging plants.

4.2.2 HTSO – Hellenic Transmission System Operator

Company Name:	DESMIE (HTSO) – Hellenic Transmission System Operator S.A.
Date of Establishment:	12-12-2000
Interviewee:	Nikolaos Adraktas
Role of the Interviewee:	Operational Division of Electricity Transactions

Entity Description

The **Hellenic Transmission System Operator (HTSO)** is the market operator, being established according to the provisions of Law 2773/1999. The Greek State is in ownership of 51% of the company's shares while PPC owns the remaining 49%, having the authority to appoint two out of the seven board directors of the entity. The System Operator undertook the role of PPC in the physical networks functioning, while at the same time resembles a clearing house, balancing the financial energy market.

Entity's Role

HTSO being in charge of the operation of the transmission system is responsible to maintain and develop the physical standards of the transmission network. Having as an overriding goal to guarantee security of supply settles the amount of reserves while being in charge for the dispatch procedure. HTSO estimates the System Marginal Price (SMP), in relation to the information provided concerning the variable cost by the generation companies, in order supply and demand to be met. In addition HTSO is responsible for the third party access, allocating capacity in a non-discriminatory way, and decides for congestion issues as well.

According to the System and Power Exchange Code, the fee for the access to the network that HTSO charges is uniform for the demand load while it differentiates in the generation and import side, depending on the geographical position of the generation facilities and import route. The total charge is allotted to the generation and import side with a percentage of 15%, and to the demand side with the remaining 85%. As a result of the 'two zonal' approach, power plants in the northern parts of the country are being charged more than generators in the central and southern parts. These tariffs are estimated as the sum of the stranded cost that HTSO has to pay to PPC and the expenses for maintaining and upgrading the networks. It is based on recovering the capital cost within 30 years combined with an annual rate of return of 8%.

Regulatory Issues

According Mr. Adraktas, transparency on behalf of HTSO is very important for the unimpeded function of the physical and financial electricity market. As a result HTSO regularly publishes forecasts about future demand, adequacy of the system and also makes public, information about the spot market and the decisions concerning congestion management. Mr. Adraktas further stresses that indeed there is delay in the separation of the DS operation from the incumbent company, and that the plan is HTSO to be renamed to HTDSO and be responsible for the transmission grids as well. The reasons for such delay lay mainly upon the political will. HTSO does not have any authorities on how fast the unbundling process will be realized.

Competition Issues

Concerning the safeguarding of non-discriminatory access to the transmission system by third parties, ex-ante data is provided to the market players about the interconnection capacity, the condition of the transmission grids, the imports-exports frame and whether outages or other emergent situations are forecasted to happen. Ex-post data is offered concerning the actual activity deviations from the forecasted, the producers and suppliers dispatch plan.

Mr. Adraktas remarks that the way the liberalization process in the Greek territory was designed, does not allow the decrease of PPC's market share. Today the new entrants in the generation segment are counting on the demand increase, in order to attract new clients, as the existing PPC customers revel low prices. The best alternative would have been the horizontal dismantlement of the incumbent company, combined with offering incentives to RES-use in the electricity production.

4.2.3 HCC – Hellenic Competition Committee

Company Name:	Hellenic Competition Commission H.C.C.
Date of Establishment:	1977
Interviewee:	Name not disclosed
Role of the Interviewee:	Role not disclosed

Entity Description

The **Hellenic Competition Commission** is an independent authority, which has been assigned the monitoring of the monopolies and oligopolies in all sectors of economic activity in the domestic territory. The entity is responsible for creating or maintaining the environment for effective competition. Its objectives are to act according to the interests of consumers and contribute to the national economic growth. By combating practices that distort competition, and entry barriers to new players, HCC ensures the unimpeded function of the market. Cooperating with European Competition Authorities and the European Commission, actively participates in the EU competition legislations enactment.

Competition Issues

According to the interviewee, the authority's competencies mainly lie on monitoring the practical implementation of the Law 703/1977, which sets the rules for "the control of monopolies and oligopolies and on the protection of free competition". The later Law 2996/95 ensures the administrative and economic independence of the entity.

In general, the Hellenic Competition Commission (HCC) is responsible for monitoring how the existence of cartels affects competition, and whether joining of forces enhances the dominant position of certain companies in the market, eliminates competition and harms the consumers. The commission may conduct pre-emptive investigations, at its own initiative, when it is deemed potential market manipulation. Additionally an investigation process may be initiated upon request of the interested parties, of a regulatory body, or any stakeholder who has legitimate interest upon a case. When it is proved that companies' practices affected the competition, the Commission has the competency to impose fine, that can be up to 15% of the annual revenue of the company, for infringing the 703/1977 Law. However, HCC does not have control over unfair competition, as it is among the jurisdictions of the civil courts.

According to the interviewee, HCC's relationship to the energy sector is limited to examine certain cases that are may distort competition, and so far only two cases concerning the electricity industry have been investigated. The market exploitation of PPC by granting privileges to high-voltage consumers, in order not to change supplier was the first case, and PPC was reckoned as impeding competition. The second investigation was the consortium of PPC with the steel company Xalivourgiki S.A., which was judged as not hampering the

competitive environment. Concerning the natural gas sector, there are no files for investigation.

4.2.4 METKA – Member of Mytilineos Holdings S.A.

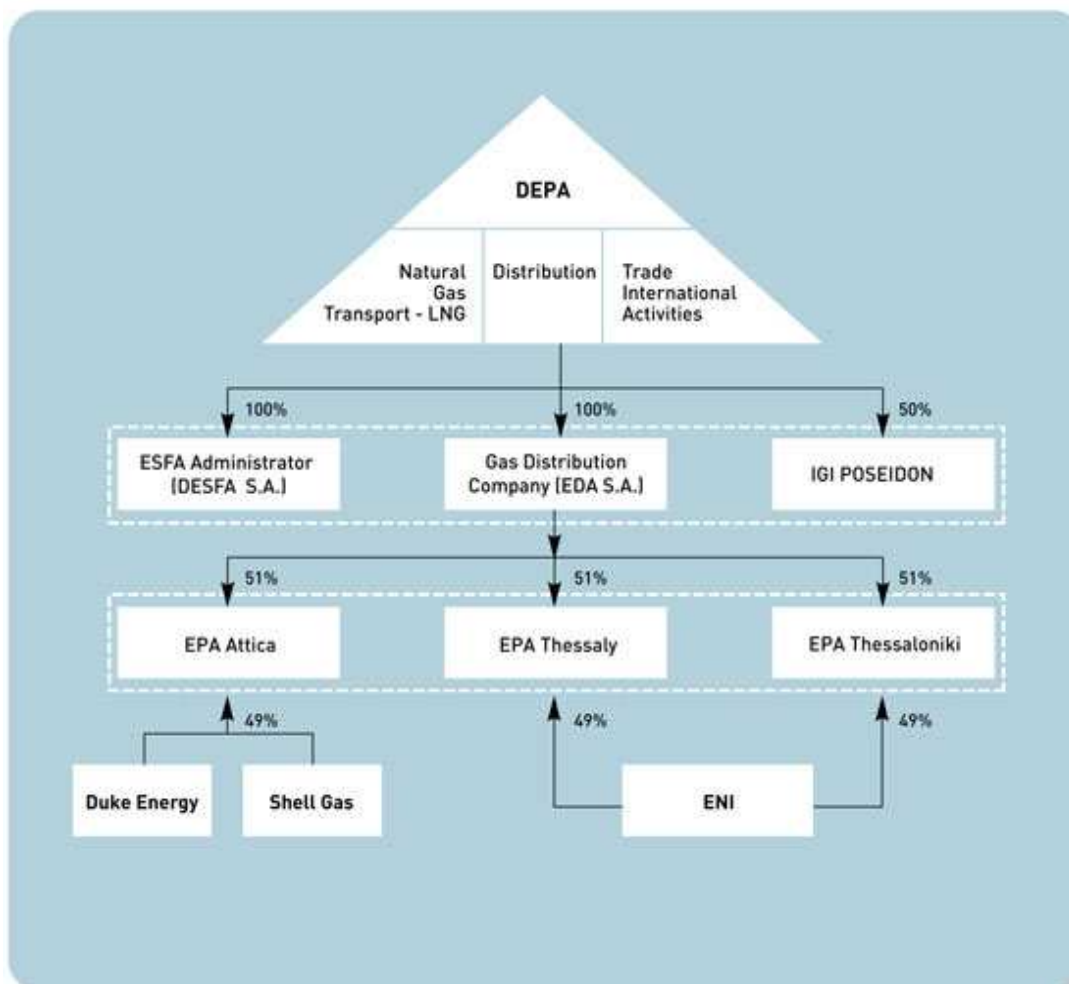
Company Name:	METKA S.A
Date of Establishment:	1962
Interviewee:	Christos Pantzikas
Role of the Interviewee:	General Manager Sales and Development

Entity Description

METKA S.A. is active in the Energy, Infrastructure and Defence industries. Undertaken infrastructure projects include roads, port facilities, mining and petrochemical installations, while the company is active in the defense material as well. Being one of the biggest Engineering, Procurement and Construction (EPC) contractors in Greece, its expertise lies in manufacturing thermal and hydro-electric power plants. Constructing lignite-based, combined cycle and open cycle gas power plants, METKA also replaces older power generation facilities to more environmental-friendly ones. Currently the company is focused on developing technology for natural gas-fired power plants.

METKA is part of the Mitilineos Group S.A., a group of companies mainly active in the Greek territory, which comprises of two more companies, active in the electricity generation sector (Endessa Hellas and Korinthos Power). The total installed capacity of the Group is 1200 MW. 330MW are already in operation, through a co-generation plant, 430MW additional are anticipated until the end of this year (power plant of Ag. Nikolaos), and 420MW until the end of next year (through the consortium with Korinthos Power).

4.3 THE DOMESTIC NATURAL GAS MARKET



Source: www.depa.gr

Figure 4: Overview of the natural gas stakeholders

4.3.1 DEPA – Public Gas Corporation S.A.

Company Name:	DEPA – Public Gas Corporation S.A.
Date of Establishment:	September 1988
Interviewee:	Evangelos Kosmas
Role of the Interviewee:	Director New Subsidiaries Development

Entity Description

DEPA was founded in 1988, as a subsidiary of the Public Petroleum Corporation with the bundled activities of natural gas importing, transporting and supplying the customers located in the Greek territory. Today 65% of the company's shares belong to the Greek state, and the remaining 35% to Hellenic Petroleum. The company has the exclusive right of importing gas and has long-term contracts with Russia and with Algeria for liquefied natural gas (LNG).

DEPA has granted the operation of the transmission grids to a fully-owned company, and through its subsidiary company Gas Distribution Company (EDA) owns 51% of the shares of the Gas Supply Companies (EPAs). The three Gas Supply companies (EPAs) of Attiki, Thessaloniki, and Thessaly were founded in 2001 and are responsible for the planning, construction and operation of the networks in the geographical region they were active and the supply of consumers with annual consumption less than 100 GWh.

DEPA apart from the commercial activities operates two compressed natural gas (CNG) vehicle-refueling terminals, where daily urban buses are being refueled.

Regulatory Issues

DEPA, according to the 2005 liberalization law for the natural gas market proceeded to a legal separation, granting the transportation of natural gas and maintenance of the network to its subsidiary Hellenic Gas Transmission System Operator (DESFA S.A.). Today being the major gas supplier for big industrial customers, its biggest consumer is the electricity company PPC which also has the option to buy 30% of the company's shares. DEPA, owning the 51% of their share capital, is the exclusive supplier of EPAs as well.

Mr. Kosmas believes that the dismantling of operation activities to a different entity (DESFA) is an adequate measure to ensure liberalized market conditions and non-discriminatory access to third parties, given the fact that Greece is an emergent player in the natural gas field. As

priority is the infrastructure development, the three new supply companies that will soon be tendered, will also have a license of 30 years, in order their operation to be economically profitable. According to the interviewee regulatory barriers do not exist, and the latest issued (March 2010) Network Code, concerning the National Natural Gas Transmission System regulates in detail potential contradictions.

Competition Issues

According to the Supply and Network Codes, companies which desire to import gas and supply the country, have the right to use the existing network to transport gas. Although the domestic market is theoretically free to competition since 2007, today DEPA remains the main incumbent.

In the question of whether the fact that PPC has the option to buy DEPA's 30% shares, while PPC being the major client of DEPA with a supply contract until 2016 distorts competition, Mr. Kosmas states that although the incumbent company is closely related to electricity and oil companies through cross shareholdings, the transparency of the market is not influenced by that.

In quest of the potential reasons, which hinder the market opening and result in limited number of market players, Mr. Kosmas argues that the market opening is sufficient, concerning the fact that Greece now constructs its infrastructure and creates liberalized conditions at the same time.

Security of Supply Issues

According to Mr. Kosmas the decline in global natural gas demand (the International Energy Agency estimates it 3, 1% for 2009) and the subsequent fall in the revenue due to low prices for the production countries, may postpone their investment in developing infrastructure. However Europe's long-term need to cover the increasing natural gas demand requires additional quantities of gas and diversification of routes.

Towards that direction, the memorandum signed with Bulgaria in April 2009, and the cooperation of DEPA with Bulgargaz for the construction of the interconnection pipeline are deemed from Mr. Kosmas as steps enhancing the national security of supply. Furthermore the discussions with SOCAR, the public gas company of Azerbaijan, will further diversify the NG routes, as soon as Turkey will agree on the interconnection terms.

4.3.2 DESFA – Hellenic Gas Transmission System Operator S.A.

Company Name:	DESFA – Hellenic Gas Transmission System Operator S.A.
Date of Establishment:	February 2007
Interviewee:	Nikolaos Katsis
Role of the Interviewee:	Director of Regulatory Issues and Strategic Planning

Entity Description

The Hellenic Gas Transmission System Operator (DESFA), being founded in 2007, is a subsidiary of the Public Gas Corporation. It is founded as the independent operator of the country and is responsible for the transportation of natural gas. Having the ownership of the National Natural Gas System (ESFA), which consists of the high pressure pipelines, the liquefied natural gas (LNG) station in Revythoussa and the related infrastructure is in charge of maintaining and developing the existing links and thus designing the new networks. Additionally, DESFA is the entity responsible for providing third party access (TPA) to the market players that choose to transport gas through the domestic networks. DESFA offers balancing services, and according to the balancing plan that RAE approves, the operator can sign balancing contracts with the users that are interested in.

Regulatory Issues

DESFA is a legally unbundled entity 100% owned by DEPA and under the monitoring of the Regulatory Authority for Energy (RAE) and the Environment, Energy and Climate Change Ministry. According to the regulatory framework, the Greek State designates the members of the board until 2017. The Transmission System Operator is required to publish the Development Plan of the National Natural Gas System (NNGS) that will be executed over the following five years. The scheduling and the projected costs for the upgrading of the existing pipelines, the new interconnections to be built and the LNG storage improvements are included in this plan.

As also Mr. Katsis mentioned, DESFA is currently implementing the investments already included in its initial Development Plan and incorporated into the existing network tariffs. These concern, besides the already operational new interconnection with Turkey and the

increase of the sent out capacity of the LNG Terminal at Revythoussa, the construction of a compressor station and high pressure branches to new consumers (mainly power plants). The model for unbundling chosen for the domestic natural gas market is the one of 'The Independent Transmission Operator', with DESFA owning and independently operating the national grid. Mr. Katsis's opinion on effective unbundling and real liberalization is that the next step should be the ownership unbundling. Such provision, though, should be initiated by the State as the government of Greece has the final decision on it.

Concerning the secondary regulation, Mr. Katsis considers a significant progress step the publishing of the Grid Code for the Transmission System, as a Ministerial Decree on March 2010. The next legal acts that are anticipated are the Licensing Regulation, which has been sent to the Ministry of Environment, Energy, and Climate Change, and the Supply Code, which is currently being prepared by RAE.

Competition Issues

As DESFA is the manager of the national network, is a natural monopoly that cannot be open to competition. Additionally DESFA as the sole operator of the System issues a Crisis Management Schedule, followed by the consenting opinion of RAE and the approval of the Environment, Energy and Climate Change Ministry. Having prepared an interruption plan, the company prioritizes the disruption of supply to the users of the network.

Mr. Katsis agrees that the number of third parties, requesting admission in the NNGS is restricted, and DEPA is the sole user. He estimates that up to now only one potential Shipper has requested capacity in the LNG Terminal and the grid, in order to feed with gas one of his power generation plants, but access was denied, since the legislation was not in place. He assumes that with the publication of the Transmission Code, all the details and provisions for the entrance of new Shippers in the Greek Market have been set, and new entrants are expected within 2010, requesting capacity mainly from the LNG terminal.

When Mr. Katsis was asked to evaluate the operation of the regional EPAs under the exclusive supply license in their regions, he replied that derogation for the existing and the three new EPAs has been requested by DEPA and granted by European as it was fully compatible with European Legislation (Article 28_Directive 2003/55/EC). The derogation serves as an incentive for new entrants in a new market with the goal to develop distribution grids. Although for 30 years the end-users cannot switch supplier, new private companies investing in the distribution are projected to enhance the liberalization of the market.

5. ANALYSIS

In this chapter selected discussion areas are presented along with the data analysis where the results of the interviews are compared to each other. By conducting semi-structured interviews with open-ended questions, the objective is to collect unbiased information to ensure the validity of the findings. The semi-structured interview process ensures that “issues of structured interviews such as misunderstandings due to different knowledge levels as well as issues of unstructured interviews such as leaving out important questions” will be avoided. (Bryman & Bell, 2007).

The insight offered by the representatives of the Public Power Corporation, the Transmission System Operator, the Hellenic Competition Commission, the Regulatory Authority of Energy, METKA S.A., Public Gas Company, and the Natural Gas System Operator is presented in the following chapters. The opportunities, the impediments, the progress so far achieved and the future developments are additionally analyzed. A cross-sectional analysis is performed under the following sections: Regulatory Framework, Competition Field, Security of Supply and Country-specific attributes and challenges, where the insight and opinions of the interviewees are collectively presented and compared.

5.1 THE DOMESTIC ELECTRICITY MARKET

5.1.1 Regulatory Framework

The Greek regulatory framework is in accordance to the stipulations of the Energy Legislative Packages, issued by the European Commission. The harmonization with the First EU Directive 96/92 begun with the enactment of 2773/99 Law, which in legislation level officially initiated the liberalization process. The law was complemented by codes and ministerial decrees arranging the implementation details. Although the basis was set, all interviewees agree that actual progress was not accomplished. The new legislative act, Law 3175/2003, altered provisions of the 2773/99 Law, in order to eliminate hindering factors and attract new entrants in the domestic market. Two years later, Law 3426/2005 taking into account the provisions of the Second 2003/54 EU Directive grants the right to all domestic customers choosing their supplier resolving all contradictory issues, which were brought

forward by practical implementation. Furthermore, the issuance of the Grid and Power Exchange Code regulated all issues about non-discriminatory access to the national grid. Today, the regulatory environment by all participants in this study is deemed as sufficient to promote competition.

According to Directive 2003/54/EC, ex-ante competencies are granted to national regulators over monitoring the energy sector. As the level of regulators' surveillance in European-wide spectrum was practically considered ineffective, according to the sector inquiry, the latest EC 2009/72 Directive enhances their role and ensures their independence. National regulatory authorities should be active in the authorization and tendering processes, and their decisions should be binding. As the later Directive is being transposed to the Greek setting, the Regulator, according to RAE's representative, will have broader responsibilities in the energy issues over time, and not just advisory role. As Mr. Aslanoglou states, RAE has the qualified staff to cope with the current and future challenges, while the only missing piece of the puzzle is the more active involvement in the energy setting.

Concerning the prices which remain regulated, as long as PPC has more than 70% market share, RAE's view is that having a binding opinion, instead of an advisory role to the relevant Ministry, is an essential step towards the convergence of the Greek market to the single European one. Concerning the tariff reform, RAE since June 2009 has proposed a set of standards for price unbundling. Prices should be segmented in the use of high-medium-low grid and the Public Service Obligations (PSO) charges. PPC has proceeded in distinguishing the bundled price to its elements, making public of what the customers pay, in the bills they receive. According to Mrs. Politopoulou, the representative of the Public Power Company, PPC has also put forward guidelines for the tariff policy, which will allow the company to be competitive in the new liberalized setting. According to the suggested new tariff structure, PSO should be excluded from the bundled price that end users are today paying, and also the private companies which are active in the supply sector should be burdened.

Furthermore, the challenges that the incumbent company has to face are diverse. PPC's operation regime before the initiation of the liberalization, allowed for cross-subsidies to the clients. After the restructuring, PPC is entering a dire position as end-users for instance who pay more money for their consumption in their professional office and may have a reduced

price structure for their household, choose to switch supplier for their professional electricity consumption.

As from 2013 the Emission Trading System (ETS) will trigger increases in the electricity generation cost, and since PPC massively uses lignite, the gradual increase in the prices charged to end-users will not be avoided. According to PPC's proposal to RAE, the prices charged should reflect the generation cost. Electricity rates with big profit margin should be reduced and subsidies should be eliminated. However assistance to the sensitive population groups will not be removed.

The new business plan of the company expected within the next two months, will lay emphasis in the Renewable Energy Sources. PPC considers of making up for the revenue that is expected to lose over the next years due to the gradual liberalization, by penetrating in new markets, or other countries, or in the fields of energy saving, waste management, natural gas, and real estate. Furthermore since the funding opportunities are becoming scarce due to the financial crisis, PPC declares that excluding the lignite-based power units, is willing to cooperate with private investors in the generation field and also has under consideration the natural gas-fired generation facility that will construct with Halivourgiki S.A. in the south part of Attiki, Eleysina.

Additionally, the issue that still needs to be resolved in regulatory level is the distribution network's dismantlement from the incumbent company's control. According to the law 3426/2005 that transposed the 17th article of 2003/54 EU Directive, by July 2007 the management and operation of the distribution grid should be granted to HTSO, which will be renamed into HTSDO. This has not yet been realized and PPC is still in charge for the operation of the distribution channels. According to the representative of PPC, such delay is due to the particular way the distribution network functions and in lack in human resources that will facilitate the proper function of the market. The distribution grid is more customer-oriented, since it contains approximately 7.500.000 counters and it has been designed in a different way than the transmission networks. To *Mrs. Politopoulou's* view, although the general regulatory framework exists, additional legislative actions are needed as well. Firstly the distribution license should be granted by the Ministry of Environment, Energy and Climate Change after the opinion of RAE, in order to be followed by the restructuring of the Hellenic Transmission System Operator. The issuance of the Distribution Grid Code, which is

expected in the instant future and the detailed terms concerning the producers', retailers' and eligible customers' access to the networks will clarify the electricity landscape.

5.1.2 Competition Field

According to the Hellenic Competition Committee during 2000-2004, significant entry barriers isolated the Greek electricity market from the other regional markets. Theoretically on the supply side, all companies that are active in the European area are allowed to enter the Greek power market. Eligible customers can sign contracts with licensed suppliers, or import electricity for their own use. They have the right to choose more than one suppliers for covering parts of the total load, or cover part of its energy needs from a supplier and part from imports. Practically, according to the first Electricity Law 2773/1999, suppliers were required to own power facilities in an EU member State with installed capacity at least equal to the demand of the clients in Greece. The active importers from 2000 to 2004 did not choose to supply end users, limiting their activities to selling electricity to PPC or a couple of major industrial clients. During that period, PPC's generated load was transmitted exclusively to its own supply segment. Private supply companies, which were active in the Greek territory, could only rely on electricity imports through the national interconnections. As a result, end-users were limited in meeting their energy needs, only through the Public Corporation.

Additionally, the limited interconnection capacity was a hindering factor to the penetration of competitor companies, which were established outside the Greek territory. Due to uncertainty in the constant and unhampered interconnections' operation, it was reasonable that new suppliers would not enter the Greek market and only occasionally importers would be active. The irregular flow of the interconnections contributed in the concentrated market share of the incumbent company.

Within the domestic area, the network use of the importers was actually less than the tendered capacity, implying the potential inefficiency of the regulatory framework. Using the network infrastructure requires securing transmission capacity in the relevant interconnection line, whether on a long term basis or daily. Since the private suppliers are not installations' owners, the maximum theoretical imports cannot exceed 1100 MW due to limited interconnection capacity. As indicated by the System Operator (HTSO), from 2002 till 2004, PPC was granted 370MW from the total 600MW capacity of the north interconnections. From the tendering procedures conducted during that time period, transmission capacity was tendered to three

more companies (ATEL Hellas, Ginery Global Trading and AGET Iraklis). According to competitor companies' reports, technical weaknesses in the System or denial on behalf of HTSO to facilitate their connection to the System are not witnessed.

Although supply licenses were granted to experienced, in the retail sector, electricity companies, they had limited activity in the Greek territory, despite the fact that they had the opportunity to import electricity from the north interconnections to lower prices compared to PPC. Furthermore, exports from the domestic market can only be conducted by generating companies that have power plants in the Greek territory and consequently PPC can only transport electricity to Italy, and the interconnected Balkan countries.

Back to the Greek inland, the two responsible entities for ensuring competition and a healthy market structure, are the Hellenic Competition Commission (HCC) and the Regulatory Authority for Energy (RAE) both sharing competencies with the final decision on competition issues lying upon HCC (Law 703/1977 about monopolies and oligopolies). HCC investigates whether mergers and acquisitions can strengthen the dominance of one company in the energy setting, or whether practices of the market players can possibly distort competition. RAE's role is value-adding for matters concerning the unbundling process, the price setting, and the two entities are cooperating.

The Hellenic Competition Committee has so far investigated two cases that were potentially hindering the healthy competition of the electricity sector. On 3rd of April 2008 its decision was published, concerning the allegation that the Public Power Corporation took undue advantage of the incumbent position in the Greek power market, changing the terms of the supply contracts with its high voltage eligible customers. According to competitors, PPC was willing to change the terms of the contract within the technical standards of the client and the functional capabilities of the System, on the condition that PPC would remain the exclusive supplier of the customer. PPC's practice on attempting to maintain the niche market of the high-voltage clients was deemed as competition impeding.

PPC argues that granting the right to monthly redefining maximum and minimum voltage zones, under the term of exclusive supply did not affect competition. This right was granted only to a certain segment of high voltage clients, the steel and cement industries, that represent 6% on the total of eligible customers. In the Greek territory, there are 25 high-

voltage customers mainly in the heavy industrial sector and the Hellenic Railways group of companies. According to HCC the real entry barrier consists of the limited capacity of the existing interconnections. During the period PPC was implementing this practice, the possible supply of the Greek market through imports was 7-8% of the total consummated energy.

PPC cooperated with HCC during the investigation period, and set end to this practice, which lasted 3 months, before the infringement procedure begun. It is regarded that these preferential contract terms did not impair the private investors' initiatives in the Greek market, and did negatively affected the liberalization process on the long term.

The second case, which was examined by the Hellenic Competition Committee, was the establishment of a generation power plant, in which the Halivourgiki Steel Company would participate with 51% capital share and PPC S.A. with 49%. Halivourgiki S.A. is one of the biggest Greek industrial corporations, active is the steel production and distribution, and does not have any subsidiaries or any other way connected companies. Taking into account the argumentation of the competitors, who were against the abovementioned consortium, the 29th May 2009 decision of HCC did not reckon the joint-venture as competition hampering and counter to consumers' interests.

According to RAE's records, as the rate of companies requiring generation licenses is increasing. until the second half of 2009, 10 companies had already acquired 13 generation licenses for producing electricity in combined cycle power plants of total capacity 5.375.962 MW. Many of these companies were also licensed for constructing generation facilities, as they covered the necessary environmental terms although so far only ENERGEIAKI THESSALONIKIS S.A. (subsidiary company of Hellenic Petroleum S.A.) begun in February 2004 the construction of a power plant of 390MW in the region of Thessaloniki. It is considered that the number of entries of new players in the next years will be multiple, and the process of the liberalization will be accelerated.

5.1.3 Country-specific attributes and challenges

Evaluating the development of the electricity market after 1999, the representative of RAE asserts that the market rules are essential in the kick start of the liberalization process. The

regulatory framework is the prerequisite, though it is not enough. In order new investors and entrepreneurs to be attracted to invest in the domestic market, they should be confident that a transparent level playing field exists, and the incumbent companies will not be on an advantageous position against the new entrants. According to Mr. Aslanoglou, the fact that three new licensed power plants will start functioning in 2010, and the estimation that they will have the 10% of installed power capacity, is an important step in the power generation segment. Although they don't have a physical hedge with potential customers yet, it is a proof of their trust in the market rules.

The views of the EPC contractor METKA S.A., which serves as an observer, following the developments in the deregulation of the electricity market are value-adding. The company until 2003 was dependent on PPC's infrastructure projects construction at 70% percentage. In the course of time and as private companies required Engineering, Procurement and Construction services, today the percentage of cooperating with PPC is less than 20%. Being part of the rapidly expanding Mitilneos Group of Companies, the company's representative states that, the investments in the Greek electricity market are and will be done mainly through joint venture partnerships. Since the infrastructure projects are capital intensive, the funding is an important issue. The joining of forces with foreign partners, who are experienced in the electricity generation, is essential, since the Greek companies have the know-how on constructing power plants and facilities, but lack the expertise of functioning in liberalized conditions.

In an attempt to detect the reasons for the limited market opening of the domestic electricity market, the operation scheme of the merchant plant could be argued that is a suspending factor. As power purchase agreements (PPA) are not the case and the electricity produced is being sold in the wholesale market, investors undertake a risky bet: the market is still national, the incumbent company does not need to depreciate its plants, and can offer subsidies to many consumer categories. Concerning the low prices PPC charges, it is a fact that the uniform-to-all-customers -tariff structure is among the lowest in the EU Member States. The prices are regulated and set according to the average cost that PPC faces. In addition, the power plants owned by PPC are already depreciated, and the resources used are not estimated according to cost principles. On the contrary, every new market entrant has to estimate and decide upon the marginal cost he faces, which is always higher than the average cost. Furthermore, every new entrant has to compete with an incumbent company that does not face credit risk.

RAE has proposed to change the pricing policy, as the current environmental requirements (CO₂ – natural gas certificates) put pressure on the situation of PPC. Considerations of increasing the price during the summer time (peak load) and differentiate the prices depending on the different zones are deemed as measures that will promote energy efficiency. But the uniform supply tariffs will not change as long as the market share of PPC remains above 70%.

5.2 THE DOMESTIC NATURAL GAS MARKET

5.2.1 Regulatory Framework

According to the Third Energy Package, the alternative routes that the Member States can choose, in order to accelerate liberalization and effectively separate the activities of the incumbent companies are the following: The ownership unbundling (OU), the Independent System Operator (ISO) according to which the restructuring of the electricity sector is organized, and the Independent Transmission Operator, which is the existing model for the natural gas market. The Public Gas Corporation is the commercial company, undertaking the competitive functions (import, supply) of the market, whereas DESFA is the owner and operator of the grids, responsible for the third-party access. The activities of the two companies are legally unbundled.

By all interviewees the model of the Independent Transmission Operator is deemed as adequate, taking into account the present conditions. The domestic market is still in its infancy, with developing the network being the first priority. For that reason the market's progress cannot directly be comparable to mature markets, such as UK. As the key infrastructure further develops, all interviewees agree that, in order 'real liberalization' to be achieved, the ownership unbundling should be followed. It is considered the most reliable method that ensures transparency and that does not require detailed and extensive regulation. In any case, the decision making and the timing is upon the Greek government, and the representatives of the main stakeholders do not have information on how and when such development will occur.

A recent step of progress is the issuance of the Grid Code for the Transmission System, which enhances transparency and facilitates the entry of new market players in the National Natural Gas Transmission System. Published as a Ministerial Decree on 24th March, 2010, it deals with TPA issues, such as the transportation agreements for time periods less than one year, transmission capacity and short-term congestion management rules. According to all interviewees the Grid Code was the missing part of the puzzle, which practically solves issues that have arisen. Mr. Katsis from DESFA mentions that so far only one potential shipper requested access to the LNG terminal in Revythoussa Island in November 2009, in order to feed on of its gas-fired generation power plant. As the relevant secondary legislation was not enacted yet, the use of the LNG facility was not allowed, since potential access to more than one user to the short-term capacity Revythoussa tank jeopardize the security of supply for the end-consumers. In 2010, as the framework allows transparent and unimpeded access to third parties, it is anticipated new entrants to request capacity mainly from the LNG station in Revythoussa. DESFA based on the call of interest to LNG users, will publish program for unloading LNG loads, from 01.06.2010 until 31.12.2010.

Further legislation acts are anticipated: RAE has already consented on the Licensing Regulation, and according to Mr. Aslanoglou within the following weeks, will be issued as a Ministerial Decree. The Supply Code is currently under the examination of RAE, and the deadline for the publication of the document is expected in the second semester of 2010. Further regulations will be issued with the passage of time, taking into account the gaps in existing rules, the requirements of the market and the need for development. RAE's ex-ante competencies and role in the domestic markets are projected to expand, as the latest EC 2009/72 Directive for additional powers to the national energy regulators, will be transposed to Greek legislation.

The issue that seems contradictory to the doctrines of liberalization is the 30-year license granted in 2001 to the three Gas Supply Companies of Attiki, Thessaloniki, and Thessaly. Functioning under accounting unbundling regime, the supply companies undertake the activities of developing the regional network, distributing natural gas and supplying it to customers. As currently DEPA is preparing the tendering procedure for the three new EPAs in Sterea Ellada, Central Macedonia and Eastern Macedonia & Thrace, the same structure to the existing ones will apply. As the emergent nature of the Greek market was incorporated in the derogation period granted for applying the EU provisions to its domestic legislation, this

special operating regime makes sense. The reasoning behind is that EPAs will have to create the urban network from the outset. 30 years is deemed as adequate time frame to “be protected” from competition and provided with commercial guarantees. The long-term licenses of the supply companies are compatible with the EU Directives provisions (Article 28_Directive 2003/55/EC). During this ‘protection’ period it is expected the foundations of the market to be set, in order the following years the market liberalization to become reality.

5.2.2 Competition Field

Today DEPA is the sole user of the national network system and supplier of large customers. The representatives from the incumbent natural gas companies agreed that there are many reasons for that: As the Greek natural gas sector is a nascent market, the focus of all stakeholders is placed on developing the necessary infrastructure. A liberalized market cannot exist without the physical network. The lack of physical interconnections with the neighboring countries sets as priority the signing of intergovernmental agreements for the designing and the pipeline construction. Furthermore, as the secondary regulations and rules are applied in the Greek setting, entrants in the import and sale segment are anticipated to request network access.

The model we observe in many European countries is quite common in Greece as well. Energy companies are interrelated through cross-shareholdings, and the oil, electricity and natural gas sectors are dominated by few companies. Typical examples are the Italian company Edison, which is the main national power producer, possessing 15% of the Italian gas market as well. In Germany the energy giant RWE has recently merged with EON. In the Greek setting DEPA is owned by Hellenic Petroleum at 35%. The Public Power Corporation has the option to buy 30% of DEPA’s shares, while being its major client with a supply contract valid until 2016. According to DEPA it is not certain if or when PPC would exercise its right, as it is a decision depending on the Greek State, which is the main shareholder of the two companies. All interviewees do not consider cross-shareholdings as a hindering factor to the market transparency.

According to Mr. Aslanoglou from RAE, “the concession contract signed with the three EPAs along with including provisions of maintaining and expanding the distribution network, grants them the right to choose their pricing policy. The structural differences among the distribution

networks indicate the differences in the prices charged. Part of the distribution grid was already existent before the establishment of the EPA Attiki, while the construction of the networks of Thessaloniki and Thessaly begun after the foundation of EPAs Thessaloniki and Thessaly. EPA Attiki decided on its pricing policy, in order to be competitive to the substitute fuel, oil, and based on its obligation to cover the operational cost since a number of DESFA employees was transferred to EPA Attiki and additionally has to pay DESFA stranded costs. EPAs Revenue cap requirements have a 30-year timeframe, according to their license to collect a definite amount of money. RAE's role is not to designate how the 30-year income should be distributed and realizing the individuality of the situation, agreed on the pricing policy of EPA Attiki for the first years of its operation.

According to the latest EU Directive and depending on the end-use of natural gas, a minimum, non-zero tax level is promoted, as long as the percentage of natural gas in the total national energy mix is less than 15%. The tax policy concerning natural gas, according to the Greek Law 2364/95 grants tax relief until 31/12/2010 and since the percentage of natural gas in the energy mix is less than 25% target, it is expected to be taxed less than the substitutes. More concretely according to the baseline scenario of the Long-Term Energy Planning of Greece, in 2010 the percentage of natural gas in the energy mix will be 10.2% According to *Mr. Aslanoglou* it is expected until the end of 2012 the natural gas to be under special tax regime. The most effective instrument that allows individual households and companies to benefit is the reduction in the consumption tax.

5.2.3 Security of Supply

Security of supply is a major issue that concerns all active stakeholders in the domestic market. The responsibility cannot only lie on the incumbent companies, since they operate only the domestic grid. The Energy Regulator and the European Union can set the TPA access terms and the Member States can assist in creating the framework and in undertaking intergovernmental initiatives. Since it is imported and its penetration is estimated to increase in domestic end-users and in generation of electricity, the restructuring of the sector is organized around these dimensions. The gradual expiration of the supply contracts makes urgent the infrastructure development and the diversification of sources.

According to DEPA, the energy crisis taught us that the interruption of supply can coincide with low temperatures and bad weather conditions, while the EU member states were not adequately equipped in order to deal with a crisis of such magnitude. Had not been the global financial crisis with the subsequent energy demand decrease, the energy crisis would have been more intense. Concerning the lack in infrastructure structures, it was not possible reverse of flows to be allowed. As additional measures, the further LNG use is promoted, whereas increase in underground storage NG capacity can assist in tackling similar crises.

DEPA, the Bulgarian Energy Holding and Edison International Holding on 4th March 2010 signed the agreement for the construction and exploitation of the natural gas pipeline Greece-Bulgaria Pipeline (IGB) that will connect the Greek and Bulgarian market. The pipeline will have 160km length and it is estimated to be operating in 2013. The 140million euro budget is estimated to be partially funded by the EU. The initial annual capacity is estimated between 3 and 5 billion cubic meters with the potential to expand at a later time. The Greek-Bulgarian interconnection is a branch of the Greece-Italy-Turkey pipeline, that when completed is estimated to provide Europe with 8 billion cubic meters natural gas from Caspian Sea per annum. The pipeline will transport natural gas from Azerbaijan, from Middle East, LNG from Revythoussa and in the future from LNG terminals planned to be constructed in the Greek territory. With the construction of this pipeline a new interconnection is being created, the security of supply will be increased and new prospects are ahead for DEPA increased role of DEPA in the region.

The undersea pipeline Poseidon, when completed will facilitate the import of 8 billion cubic meters, quantity representing 10% of the total consumption of the country. As the time required for such magnitude projects is longer than their construction time, the necessary design and detailed marine survey for the undersea part are in process. For the onshore part in the Greek territory the procedure for assigning the contractor that will undertake the pre-project planning (Front End Engineering Design, FEED) is under development. As DEPA and Edison are granted a 25-year special operating regime concerning TPA provisions, they initiated an Open Season Procedure (June 2008), for interested parties to have access in additional capacity of the undersea pipeline, beyond the 8 billion cubic meters that are exempted. 17 companies expressed interest, and the national regulatory authorities of Greece and Italy will examine them, before the tendering procedure begins.

Apart from the consortium with Edison and the official talks with Azerbaijan concerning the Greek-Bulgarian pipeline, contacts with SOCAR, the state-owned gas company of Azerbaijan have been conducted for the supply of 1 billion cubic meters. A prerequisite for the import of quantities is the interconnection agreement and the terms of TPA access and supply contracts with Turkey, and towards that direction the political and diplomatic efforts are intense. Among the fundamental projects for the national security of supply that have already been completed is the upgrading of the two storage tanks in the Revythoussa LNG station.

Further investments in infrastructure, with projects that will diversify the import routes, or increase the transmission capacity, will ensure security of supply and also offer a leeway to competition in the national gas market. The amendments in the metering stations in the Greek-Bulgarian and Greek-Turkish borders, when completed, will increase the import capacity. The third tank in the Revythoussa Island that is estimated to start operating in 2013, will increase the storage capacity of the terminal, will grant diversification, a way to deal with emergency situations, and will also increase the natural gas quantity that feeds the national and the Balkan markets.

According to RAE, the import capacity of the country with the existing entry spots theoretically can meet the projected long-term demand. RAE in order market transparency to be ensured suggests to DESFA to calculate the actual capacity of the entry points, taking into account the possible impediments since the actual import and transmission capacity are influenced by the national demand distribution and the lack of a compressor in the main grid. The designed construction of a compressor in the main grid will amplify the transmission capacity from the northern regions to the southern ones, where the demand is higher.

5.2.4 Country-specific attributes and challenges

Greece, being an emergent market, sets the basis for becoming a key player in the southeastern region, by investing in its network infrastructure. Compared to other European countries, where the percentage of the natural gas production that reaches end-users is high, the percentage of the consumed natural gas by end-users is relatively low. Progress though has been realized, as according to RAE's "Report on the Security of Natural Gas Supply in Greece" the natural gas demand has been increasing at a compound annual rate of 12% for the last five years. In 2007 it was almost double in comparison to 2001 levels. The number of

household and commercial customers has increased during the same period of time, as a result of the distribution network expansion that has been realized by the EPAs of Attiki, Thessaloniki, and Thessaly.

Furthermore, the penetration of natural gas to industrial and domestic sector is not as wide as in other European countries. The goal that DEPA has set of supplying 1 million domestic clients in 2010 is deemed as reachable. According to EPAs the data concerning the applications for new connections are encouraging. DEPA is setting the foundations on expanding the natural gas use to new areas, apart from the urban regions of Athens, Thessaloniki, Larisa, Volos, Karditsa and Trikala. According to estimations, approximately 400.000 domestic clients have been using natural gas nation-wide. Based on the reports of DEPA, DESFA, EPAs and the licensees of power plants, RAE projects for the medium-term horizon that the demand of the power generation and the commercial sector along with the households' will increase, while industrial customers' will remain in the same levels.

Answering to the question of, whether the global financial crisis and the subsequent demand fall, will delay the construction of the South Energy Corridor infrastructure projects, DEPA is familiar with the fact that energy demand according to the International Energy Agency has dropped 3,1% on a global scale. Additionally the decrease in the gas companies' revenues, due to low prices, may indeed postpone investment in infrastructure projects. Despite the dire economic circumstances, Europe in the future will need additional gas quantities to cover its needs. The diversification of sources, in order to enhance security of supply and foster competition among the different suppliers, require infrastructure projects. More specific, delays in the Greek part construction of the Greek-Bulgarian pipeline are not expected to occur, due to the fact that its length is relevantly small (20-25 km). On the supply side, DEPA as the main gas supplier of the country has 3 long-term contracts imports gas from Russia, Turkey and Algeria. In 2007 the percentages of imports from the three supply countries are presented in Table 1.

Origin	% of total
Russia	76.7%
LNG (Algeria)	22.5%
Turkey	0.8%

Source: RAE, 'Report on the Security of Natural Gas Supply in Greece'

Table 1: The Natural Gas Sources during 2007

As more gas-fired power plants are planned to be constructed and consequently power generation and gas supply are becoming more interrelated, the security of supply measures directly influence each other.

6. DISCUSSION

6.1 RESULTS AND LITERATURE REVIEW

In this chapter the examined previous literature and the interview findings are combined. The factors that have been identified, as influencing powers to the domestic energy markets, are augmented by the views of the interviewees, which represent the major stakeholders in the electricity and natural gas setting.

As the foundations of the Greek electricity liberalization were set 10 years ago, the provisions of the three European Energy Packages have been transposed to the Greek setting. Taking into account the circumstances and the distinct characteristics of the country, the issued laws were followed by secondary legislation and codes, regulating practical issues. The actual market opening of the country depends on the practical application of these regulations, while the role of State is considered crucial in providing the initiatives.

According to HCC, the market opening during 2000-2004 was 34% of the total consumption, as the First Electricity Directive was transposed in the Greek legislative environment. The implementation of the Second Directive increased this percentage to 65%, and today all end-users in the inter-connected system are eligible customers, and are able to choose their supplier. As most the domestic electricity generation comes from lignite-based power plants, the national energy policy promotes the adoption of cleaner sources, mainly natural gas and renewable means. As the infrastructure in the natural gas sector is being developed, increasing its use in the electricity production, offers diversification of resources, enhancing the security of supply. The EU Directive 2001/77, which promoted the Renewable Energy Sources (RES) and Combined Heat and Power plants (CHP), was transposed to the Greek framework by the law 3468/2006. In 2006 it is estimated that 3% of the domestic demand was covered by RES. Investment incentives are provided for investing in cleaner technologies, inter alia by

competitive feed-in tariffs and expanding the validity of power purchase agreements to 20 years.

Although a substantial segment of the domestic electricity market has been liberalized since 2001, limited new entries in the generation and retail segments of electricity reveal that the domestic market remains rigidly national. The Public Power Corporation still possesses the biggest share in the supply market, functioning as a vertically-integrated entity, and barriers for new entrants still exist. For instance, the contract between PPC and the Public Gas Corporation (DEPA) provides for the most favored customer clause, depriving other clients from purchasing natural gas on better prices and terms. Additionally the privileged access of PPC to the lignite reserves does not facilitate the entry of new investors, since it is difficult for new entrants to compete generation with the low-cost lignite.

According to the Greek legislation, the ownership of the transmission and distribution networks remains under PPC, while the operation of the distribution grids was supposed to be granted to HTSO from July 2007. HTSO would be renamed to HTSDO, and by that way the further unbundling of the incumbent company's accounts would be realized. Such dismantlement has still not taken place, although the main stakeholders anticipate that such development, since is EU-mandated, is on the way and the details should be fixed, before the announcement.

Furthermore, the geographical position of Greece in combination to the limited interconnection capacity restrains the new market players from entering the domestic level field. Due to the definite interconnection capabilities, and the reserves on behalf of PPC, the imports are limited. Especially concerning the flows with Italy, due to the substantial deviation in the electricity prices between Greece and Italy, almost no exports are realized from Italy to Greece. Likewise, the existing monopolistic conditions in the electricity market, in combination with the slow structural and regulatory reforms do not provide an environment of initiative undertaking. The high cost of capital, required for investment in generation facilities construction is already a barrier for entry in the sector, since the risk is increased and the sunk costs significant. The number of potential competitors is restricted to those with sufficient capital for investing and experience in the building and operation of electricity production units.

The last factor that delays the market opening of the electricity market is the time-consuming and bureaucratic procedure of license such as environmental, land planning, and operation permits. New entrants have to wait long time periods, in order to be granted the necessary licenses. Exemptions from this labyrinthine are power units constructed from the Center for Renewable Energy Sources (CRES), and units with capacity till 20KW.

In the natural gas sector and amidst the conflict for the energy dominance, the region of Southeastern Europe obtains important geopolitical role. Greece due to its geographical position has the potential to be a strategic player, connecting the East to the West. The major oil and natural gas pipeline projects create a new set of opportunities and challenges. The existence of the LNG terminal in Revythoussa, the projected increases in capacity by adding an additional tank, and the future construction of one more terminal in Northern Greece that will feed the domestic and neighboring (Bulgaria, Romania) markets are projects of strategic significance. In January 2009 the European Commission published a list of the crucial infrastructure projects that would enhance security of supply in Europe. Inter alia, the interconnection Greece-Bulgaria and the undersea pipeline Greece-Italy are included. The European Investment Bank will assist in funding part of these projects.

DEPA has strategic value in the Southeastern Europe, as participates in the construction of the ITGI pipeline, and in the of South Stream branch that runs the Greek territory. According to the Greek Ministry of Economy and Finance, the government plans to let the 35% of the possessed share capital (65%) to private investors. Energy companies, which have expressed interest, are the German EON and the French Gaz de France. Corporations, as the Italian ENI and Edison and the German RWE, are also deemed as potential strategic buyers. According to analysts, today the value of DEPA is estimated to be 2.5 billion euro. As the current government favors the privatization of the public utilities, finding a strategic buyer is reckoned that will happen in the immediate future.

Furthermore the penetration of gas to the domestic clients is a priority for EPAs and in order to be enhanced, measures in pricing policy are promoted. The end-users tariffs that all three EPAs charge are competitive to the oil and electricity prices. The installation costs differ depending on the technical characteristics of each region, but as a general rule EPAs offer a discount from 50%-80% in the connection fee. EPA Attiki, in particular, has erased this fee, and offers competitive terms in the new contracts. The price, which end-users pay, consists of

a fixed and a variant element. The price that the EPAs of Thessaloniki and Thessaly charge is dependent on the annual consumption of each client, irrespectively of the use. There is also a volume discount, in order customers with high consumption to have lower prices. According to the pricing policy of EPA Attikis, the natural gas price depends on the price of the competitive fuels, and as a result the price depends on the use, whether is household, commercial or industrial use. So end-users with similar annual consumption but different use of the natural gas may pay a different tariff. DEPA and Bulgargaz signed on 24th April 2009 a memorandum, in order not to lose valuable time in negotiations and typical adjustments, in case a similar situation would jeopardize security of supply.

The financial crisis, hitting most of the globe, did not leave Europe unaffected. In the energy landscape, the two most significant consequences were the substantial decrease in electricity and gas demand and the uncertainty concerning investing in infrastructure projects. The conflict between Russia and Ukraine over natural gas prices deteriorated the already fragile situation, leading to interruption of supply in many European countries, jeopardizing security of supply as well. In the aftermath of the crisis, energy consumption presents recovery signs, although staying in lower levels compared to the previous year. According to European Commission's "Report on progress in creating the internal gas and electricity market", as oil prices begun to decline, due to the financial crisis, wholesale electricity and gas prices followed with the anticipated time lag. The retail prices though did not expose the same pattern, implying that the market harmonization still lags behind and remained higher compared to the 2008 levels.

Greece in particular, is going through an unprecedented crisis that affects all industrial sectors. Although the domestic circumstances are not the most favorable, macroeconomic variables are not affected. The planning of infrastructure projects is not based on the level of domestic consumption, which could be argued that is relatively small, but on the fact that through Greece the rest of Europe can have access to natural gas sources from Africa and Asia. On the global setting the LNG market is more liquid compared to transportation through pipelines and globally there are big investments in LNG infrastructure. As Greece decides to further develop the LNG infrastructure, by adding a third tank in the Revythoussa Island, by planning to construct LNG facilities in other places, such as the island of Crete, and in a location in the Western part of Greece, in order to be close to the IGT pipeline makes a

strategic choice, within the context of the national energy strategy. As the maritime industry in Greece is well developed, and many LNG ships are in the ownership of Greek entrepreneurs, Greece can be promoted to an energy hub.

In a nutshell, the underdeveloped forward energy market and machineries that would allow effective risk management, the monopolistic presence of PPC, although nine years after the official initiation of the liberalization have passed, the limited openness of the domestic natural gas market creates uncertainty conditions, and explains the reluctance of new markets players entering the domestic market.

6.2 Advanced Conceptual Models for the domestic electricity market

In the following two sections the advanced conceptual models for the domestic markets of electricity and natural gas are presented. The additional aspects that have emerged through the semi-structured interview cases are presented in the schemas of Figure 5 and 6. Completing the overview of the electricity and natural gas market, the elements not being mentioned in the relevant literature are presented.

The schemas provide a better insight for the potential and the obstacles inherent in the conventional energy markets of Greece. Along with the hindering factors already mentioned, the significant delays in the PPC's unbundling and the company's increased market share describe the current electricity landscape. Furthermore the restricted presence of private companies is due to the bureaucratic procedures especially concerning the license granting.

6.2.1 Advanced Conceptual Model for the domestic electricity market

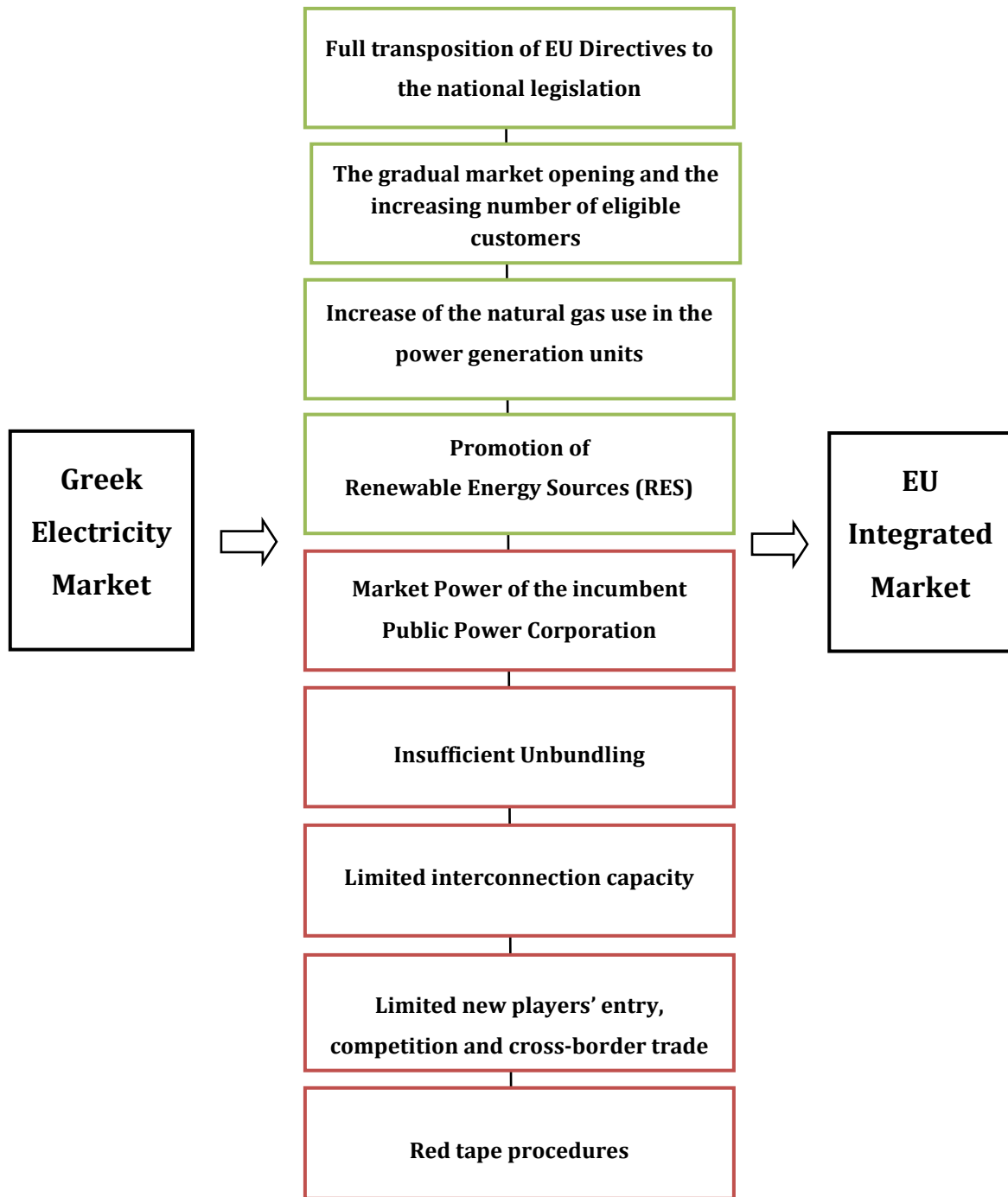


Figure 5: Dynamics and Barriers* of the integration process to the single EU Market (Advanced Conceptual Model for the electricity market)

**The Dynamics are presented in the green text boxes, while the Barriers in the red text boxes.*

6.2.2 Advanced Conceptual Model for the domestic natural gas market

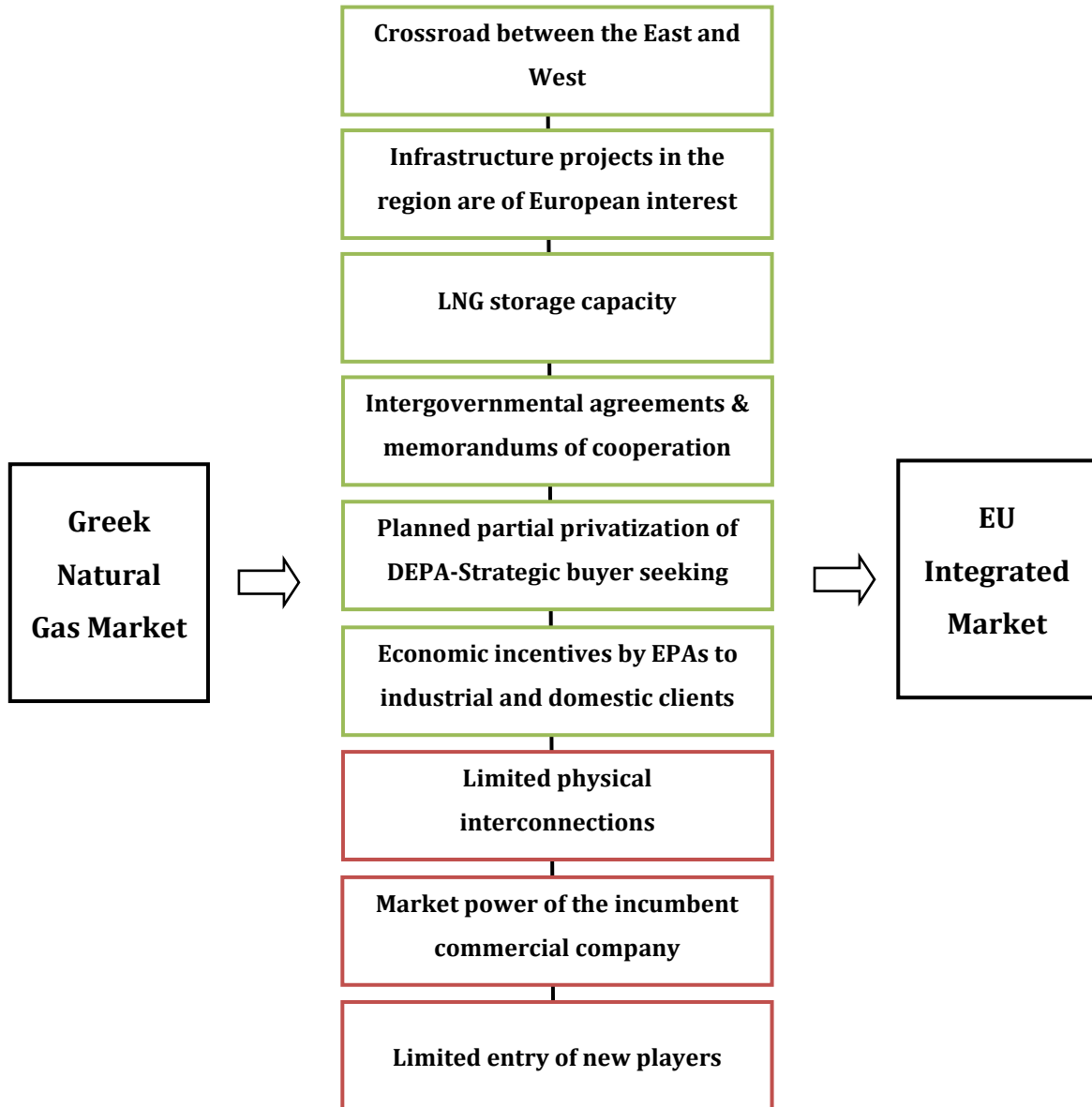


Figure 6: Dynamics and Barriers* of the integration process to the single EU Market (Advanced Conceptual Model for the natural gas market)

**The Dynamics are presented in the green text boxes, while the Barriers in the red text boxes.*

7. CONCLUSION

According to the EU Directives, Greece is subject to electricity liberalization at the same time schedule along with Italy and Latvia, while for the natural gas market opening has been granted a derogation period, together with Finland, Latvia and Portugal. The general direction of the domestic electricity liberalization is aligned with the EU provisions. Officially since July 2007 all electricity customers in the interconnected system would have the choice of supplier. Real competition though does not exist, as PPC remains vertically-integrated, owning 96% of the market share. The prices are regulated, sending distorted signals to potential new entrants. PPC also owns most of the generation capacity, and the transmission and distribution networks. The operation of the transmission grids has been assigned to HTSO, but the dismantlement of the distribution network lags behind. Although its operation should have been transferred to HTSDO since July 2007, it has not been known when such development will occur. Since 2006, an infringement procedure against the country, from the European Commission, is pending for failing to impose PSOs and clarifying the conditions concerning supply licenses.

The unbundling of the Public Power Company in order to function effectively in the liberalized setting, along with the need to shut down the lignite-fired plants and invest in greener technologies require bold reforms. The slack restructuring of the incumbent company, together with the bureaucratic processes for new market players, declares that PPC continues to function as a state-political company and the Greek regulatory framework does not provide incentives for new participants respectively. The lack of imports due to restricted interconnections deprives the country from competition from abroad. The cross-shareholdings between the oil, electricity and natural gas incumbent companies strengthen their bargaining position, posing barriers to new entrants and resulting in negligible market opening.

From the above it is concluded that the structural, regulatory, and market barriers hinder the domestic electricity market from reaching its full liberalized potential. Although it is a mature market with developed infrastructure in the mainland, the slow reforms, the delayed issuance of codes and the prices that do not reflect the cost, preserve monopolistic conditions in the spirit, although in the letter it is liberalized. Thus the research hypothesis of timely electricity liberalization is rejected.

In the natural gas market, Greece's geopolitical position serves as the crossroad between the abundant-at-natural-gas East and the demanding West. The natural gas enters the domestic market from the North, through Russia, from the East, through Turkey and Azerbaijan, and from the South, through Algerian LNG supply, with future prospects from Libya and Egypt. The infrastructure projects of pipelines interconnecting Bulgaria, Italy and Turkey offer source diversification and security of supply, eliminating the danger of a energy crisis similar to the ones that Europe has witnessed in the past.

The development of the market is shaped around the liberalization process, despite the fact that the supply segment of the chain is protected by the monopoly regime, in order the infrastructure to be created. Today, the regulatory framework encompasses all necessary provisions to facilitate the imports and the network use from third parties. Further privatization plans of the incumbent company DEPA reveal the political will on creating a liberalized regional market.

EU having realized the nascent status of the domestic natural gas market had granted a derogation period, according to which Greece was not required to liberalize its market before 2006. The fields that the natural gas market can be open are the import and transportation segments, as the supply is granted to regional monopolies. New suppliers will be able to be active in the end-user domestic and small industrial supply after 2030, as the operation licenses of the three existing regional supply companies expire.

Realizing that the natural gas sector is in its infancy, the prospects of the natural gas market are encouraging. But certain impediments question the timely liberalization of the sector. The pricing system could be questionable, since PPC can buy natural gas in more favorable terms, than any other buyer, potentially impairing competition in the electricity field as well. The three energy companies (PPC, DEPA and Hellenic Petroleum) are related in ways that encourage practices of manipulating the market. Concerning the networks, the delay in issuing secondary legislation and codes has been hampering market transparency (the Network Code was issued in March 2010), and justifies the reluctance of third parties using the domestic pipeline grid. The single time a private shipper requested admission to the LNG terminal was in November 2009, and the access was denied. The reasoning was that clear market and pricing rules would not apply for short-term importers. Drawing conclusions from

the above research, the nature of the barriers inherent in the Greek natural gas market delay the liberalization process and thus the research hypothesis is rejected.

Although the electricity and natural gas markets differ on the operational regime and the level of development facing dissimilar challenges, both markets are considered as delaying to keep up the pace of the European integrating plan. Their relative progress is moderate, and the steps taken, in order to overcome the barriers are weak for a truly open, deregulated and liberalized market to be established.

Limitations and Future research

Although this study has shed light to the current status quo of the conventional markets in Greece, it is value-adding to mention the limitations of this research. Firstly, the views expressed in this study stem only from the major stakeholders of the corresponding markets. However, it can be argued that the interview sample is rather limited because of the also limited number of market players. In addition, the results of the research are based on the opinion of representatives from the incumbent companies and authorities, and the perspective of the private stakeholders with minor presence that are or desire to be active in the Greek environment is not taken into account.

Furthermore, this paper is based on the views of the Greek side, while the European perspective in the progress and the current situation of the energy markets is not considered for the formation of the most advanced conceptual model. It would be of much interest and it is suggested for future research to include the outlook of European organizations, through other methods of research, and not only through the analysis of European Directives and relevant literature. European regulatory bodies, commissions who conduct sector inquiries and independent international institutions could offer a more holistic point of view on the liberalization process and the future developments.

Additionally, a cross-country case study would be enlightening, with Greek energy markets being compared to countries with similar resources participating in the energy mix, in order to evaluate the degree of market opening and the procedures followed, serving as a paradigm for the domestic ones.

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