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EVALUATION AND OPTIMIZATION OF LONG TERM TRANSPORT AND STORAGE CAPACITY CONTRACTS IN EUROPEAN NATURAL GAS MARKET

Analysis of current and future situation of midstream segment in the European market.

Author: María Alejandra De la Cruz Ospino (Student Id. 782155)
Academic Supervisor: Prof. Riccardo Mangiaracina
Company Supervisor: Eng. Roberto Borghetti
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ABSTRACT

The purpose of this project is to analyze the European natural gas market, focusing on the midstream segment, in order to identify the main opportunities and threats a company in this segment, as ENOI S.p.A., faces nowadays. This analysis will be a starting point for a further evaluation of possible scenarios for the future of midstream segment in the European natural gas market and the proposal of strategies to deal with long term capacity contracts which are no longer profitable for shippers and/or traders.

The idea of this project came from a proposal of a Logistic Expert in ENOI S.p.A. to support in the evaluation and analysis of long term transport and storage capacity contracts. The first part of the project includes the introduction to the topic and a general description of the European natural gas market, including the characterization of its commercial and logistics chain, the description of the regulatory framework and liberalization process it is going through, and a more detailed description on storage, transportation and long term capacity contracts.

Subsequently, the problem subject of study will be presented, identifying the possible causes and providing examples of the situation. Moreover, in this fourth chapter it is presented a designed tool, named Robotrader, to evaluate the possible profit and losses due to the optimal use of capacity contracts in the past.

Besides, Chapter 5 contains a market outlook to 2020 and the identification of possible scenarios for the future of midstream segment and long term capacity contracts. Finally, some strategies to release or give value to long term capacity contracts are presented.

During the development of the project it was possible to discuss the main topics with professionals on European Natural Gas Market, who have progressed many years of experience in the energetic sector and which have been witnesses of the evolution of the market in the last 10 years. These are: Paolo Pasquini, who is actually working as Logistics Expert in Centrex Italia; Alexander Frank, who is in charge of Energy Balancing and Transportation in Econgas; Alexandros Papageorgiou, employee at Gas Logistics Desk at Energetic Source; Roberto Borghetti, Senior in Logistics and Operations Europe in ENOI S.p.A.; Ermanno Baraggia, main advisor of 2B Energia; and Silvia Branda, Transportation and Storage Manager in 2B Energia and member of AIGET. Most of their comments are exposed in this document.

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1. INTRODUCTION

We are facing nowadays a world that is constantly changing in many aspects; world is being even more dynamic that before: there have been climatic changes, legislations and regulations are being constantly questioned, technological and scientific breakthroughs are being introduced almost every day, new resources are being discovered and new uses are being identified for existing ones. Therefore, living in this world means being able to react rapidly and adapt to these changes in order to survive and outstand among the others.

European natural gas market is a clear example of this dynamic world; constant changes in legislations, demand, market structure, and market prices, between others, have led to the uncertainty of its future. Hence, companies operating on this market must be able to understand and foresee possible evolution of the market, including current and potential threats, in order to evaluate potential risks and plan better ways to manage its operations (production, supply, trade, distribution).

Particularly in the following project it will be presented and analyzed European midstream gas companies which are facing big dilemmas as their market evolves quickly in unpredictable directions, and they need to make strategic choices that will definitely shape their fortunes. Midstreamers have been born due to the market changes in the earliest 2000, result of the liberalization process, which at the same time has brought the market to a context in which the activity of trading is not being as profitable as before.

This project has been developed under the proposal and tutoring of ENOI S.p.A., which is an Italian natural gas trading company operating internationally in the midstream segment and the sixth importer of natural gas in Italy.

2. COMPANY OVERVIEW - ENOI S.p.A.

ENOI is a privately owned European Energy Company, founded in 2000 at the beginning of the new European open market and operating as a physical commodity merchant in the midstream segment.

ENOI's core business is the acquisition, transport, storage and sale of gas & power to European trading companies, utility companies, power generators and industrial customers.

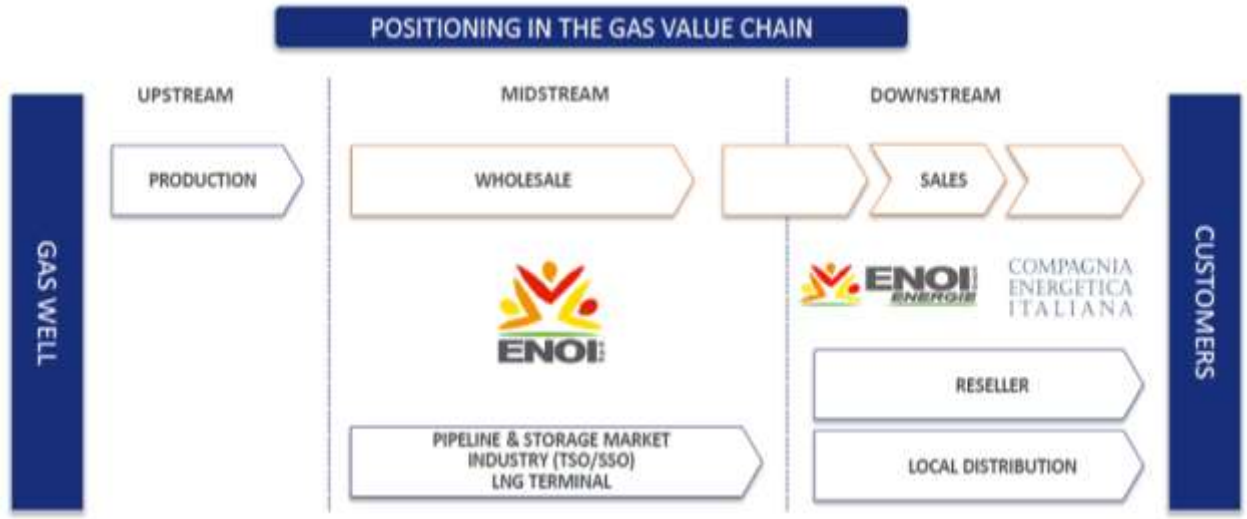


Figure 1 ENOI's position in the European Natural Gas Value Chain

ENOI has developed a network of transportation and storage gas contractual assets, which allows the company to connect different delivery points between virtual trading points, physical border points and remi, and which enables it to reach the key European markets (NBP, TTF, GASPOOL, CEGH, between others). In particular, ENOI operates on 19 virtual trading points and 18 nations and it also imports LNG from different producers, mainly on the spot market.

Figure 2 ENOI's Active Virtual Trading Points and Physical Border Delivery Points

The company started its activities mainly by importing natural gas to Italy from Northern Europe. In the first years, ENOI increased the number of counterparties also outside Italy and obtained the license to operate as a gas merchant in various European countries.

Between 2006 and 2011, ENOI experienced a strong growth of volumes sold (CAGR 2006-2011=81%) and a strong geographical diversification. Whilst Italy accounted for approximately 85% of sales in 2005, this percentage decreased to 12% in 2011. Main trading markets became Netherlands, Germany and, to some extent, UK, notably the most liquid European hub. In 2011 the company sold 21,3 bcm of natural gas, compared to just 1,1 bcm of 5 years before. Today, its network of counterparties includes more than 300 among gas producers, energy utilities, financial institutions, midstream and downstream players.

3. BACKGROUND: EUROPEAN GAS MARKET

In this section a general overview of the European natural gas industry will be provided, starting with a short description of natural gas characteristics and its various uses, to then give a briefly explanation of how natural gas industry is composed and how it works. Moreover, the topics of transportation and storage on the natural gas industry will be mentioned, to finally introduce the concept of long term capacity contracts and its importance to increase the efficiency and sustainability of the natural gas supply.

NATURAL GAS

Natural gas is a combustible mixture of hydrocarbon gases, which has become a vital component of the world's supply of energy. It is also known as the main protagonist of the sustainable develop of energy sector, as the it is one of the cleanest, safest, and most useful of all energy sources. Unlike other fossil fuels, natural gas is clean burning and emits lower levels of potentially harmful products into the air. We require energy constantly, to heat our homes, cook our food, and generate our electricity; this need for energy has elevated natural gas to such a level of importance in our society, and in our lives.[1]

Natural gas, with a contribution of energetic needs of 24%, is still one of the steady options from the European energetic offer. As far as natural gas is concerned, an increase in consumption was observed, in both relative and absolute terms, between 2009 and 2010. The share rose from 24.5% to 25.1% and the quantity consumed rose from 417 Mtoe to 442 Mtoe.[2]

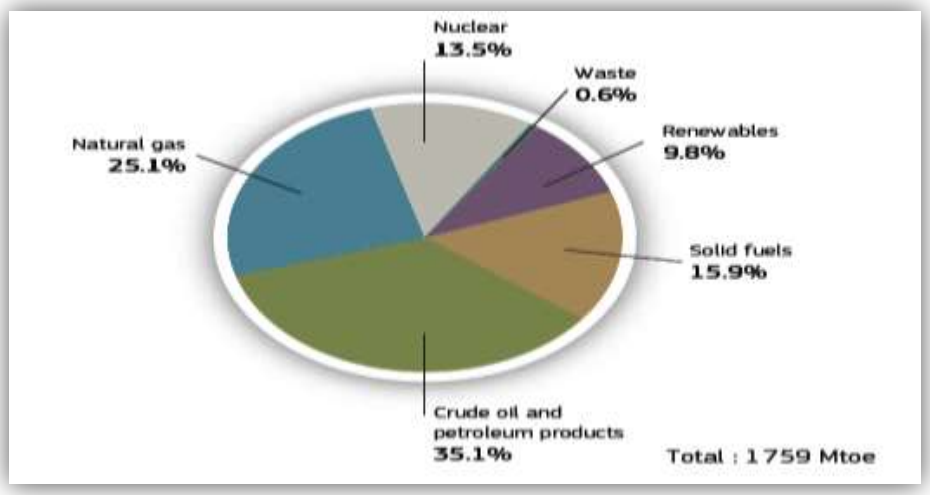


Figure 3 EU-27 Gross Inland Consumption (as % of total Mtoe), 2010[3]

[1] NaturalGas.org: http://www.naturalgas.org/overview/background.asp
[2] European Commission – Energy markets in the European Union 2011: http://ec.europa.eu/energy/gas_electricity/
[3] Data from Eurostat

Natural gas is the most efficient energy source with a total energetic trajectory efficiency of 91.2%, followed by liquefied petroleum gas with an efficiency of 90.7%[4]. Therefore it is not a surprise that its consumption share has been increasing steadily every year.

There are so many different applications for this fossil fuel that it is hard to provide an exhaustive list of everything it is used for. And no doubt, new uses are being discovered all the time. Natural gas has many applications, commercially, in your home, in industry, and even in the transportation sector. It is used across all sectors, in varying amounts. The graph below gives an idea of the proportion of natural gas use per sector. As seen below, on 2012 the domestic sector is the main destination of the natural gas offer in EU, with a quote slightly lower than 40% of total demand. It is followed by power generation, with approximately 30% of share and the industrial market, which absorbs 20% of the gas offer.[5]

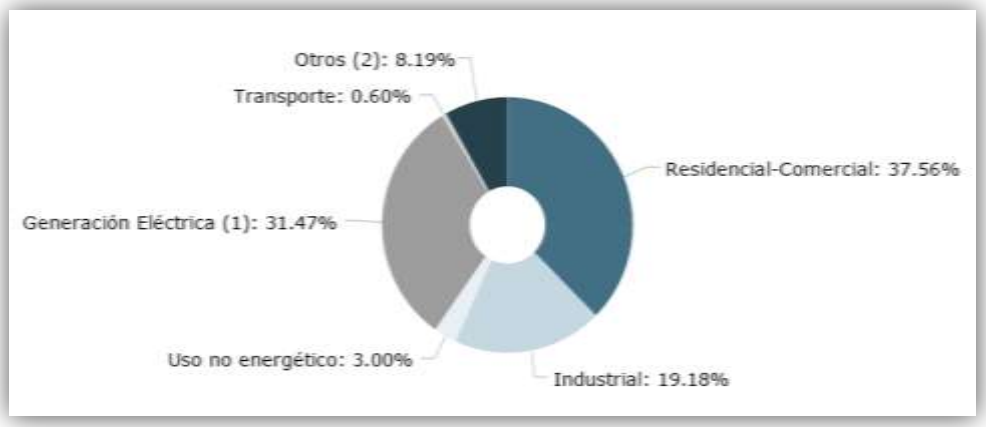


Figure 4 Use of Natural Gas by sector (as % of total Mtoe), 2012[6]

NATURAL GAS VALUE CHAIN

In this section the different elements of the natural gas value chain on the European market are briefly described, including production, transportation, processing, contract management and sales.

Found in reservoirs underneath the earth, natural gas is often associated with oil deposits. Production companies search for evidence of these reservoirs by using sophisticated technology that helps to find the location of the natural gas, and drill wells in the earth where it is likely to be found. Once brought from underground, the natural gas is refined to remove impurities such as water, other gases, sand, and other compounds. Some hydrocarbons are removed and sold separately, including propane and butane. Other impurities are also removed, such as hydrogen sulfide. After refining, the clean natural gas is transmitted through a network of pipelines, from which natural gas is delivered to its point of use.[7]

[4] Comisión Nacional de Energía, España - La liberalización de los sectores energéticos. El futuro del gas natural en España. November 2000.
[5] Sedigas – Informe Annual 2012: http://www.sedigas.es/pagina.php?p=11
[6] Data from Annual Report 2012 - Sedigas
[7] NaturalGas.org - http://www.naturalgas.org/overview/background.asp

Therefore, natural gas value chain is composed by exploration, production, processing, transport and marketing as shown and explained in Figure 5. Instead in Figure 6 it is shown another representation of gas value chain by ENI, in which there are three main phases: supply, infrastructure and sales & trading.

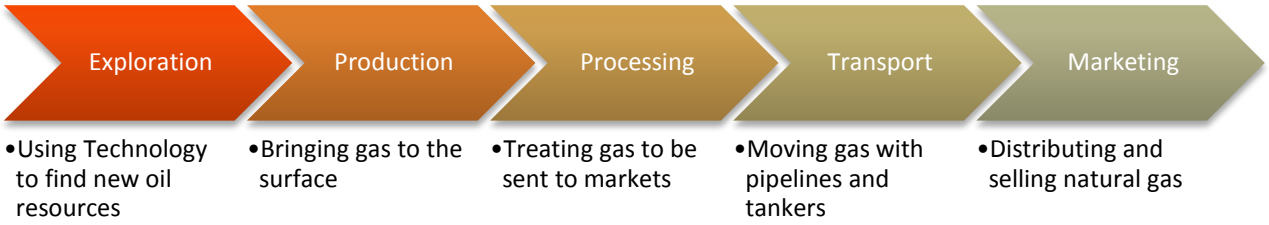


Figure 5 Natural Gas Value Chain

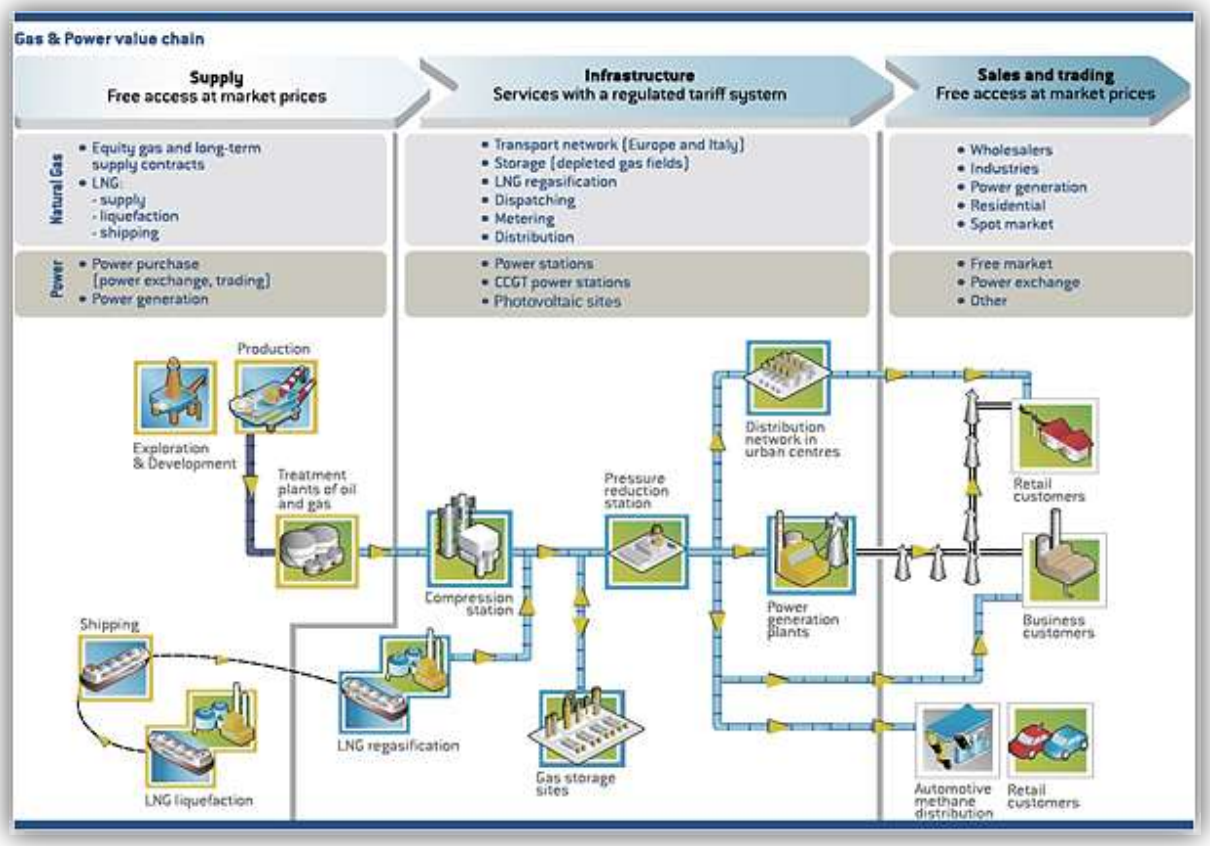


Figure 6 Gas & Power Value Chain[8]

Anyway, it is important to make a distinction between the logistic structure and the commercial structure of the European natural gas market.

[8] *ENI - http://factbook2011.eni.com/areas/gas-and-power/gas-power-value-chain.aspx?sc_lang=en*

Commercial Market Structure

The natural gas market is composed by upstream, midstream and downstream levels; each one of them targets different market players and clients.

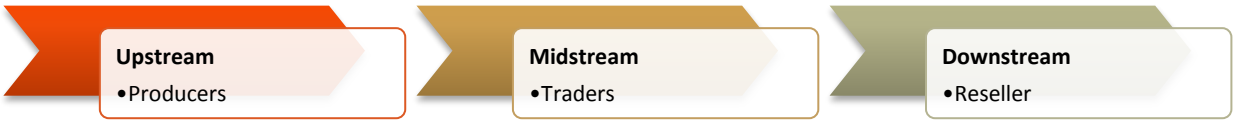


Figure 7 Commercial structure - European natural gas market

- Upstream: Natural gas, as it exists underground, is not exactly the same as the natural gas that comes through the pipelines to our homes and businesses. When natural gas underground is found, it comes associated with a variety of other trace compounds and gases, as well as oil and water, which must be removed. Natural gas transported through pipelines must meet quality specifications to be allowed in, so most natural gas processing occurs near the well.

  Upstream segment comprises the processes of exploration and extraction of natural gas to posteriorly taking it from underground formations (production) and processing it into pipeline quality gas, ready for transportation.[9]

- Midstream: Midstream segment includes main players involved in the natural gas transactions occurring at the virtual trading points and physical border points, known as wholesalers, traders or shippers, whose main role is to facilitate the matching between natural gas demand and offer and to create a liquid market.

  Traders acquire natural gas from producers or other traders/shippers and sell it to its different clients (shippers, industrial clients, end customers) in freely agreed conditions. It uses the facilities of transporters, storage operators and distributors for ensuring the supply of natural gas to its clients in a sustainable way.

- Downstream: Players in the downstream segment are involved in the sale of natural gas to final customers, industrial and/or residential. They are usually linked to the served territory and they are becoming more present in the virtual trading points, especially at national level, even if they still rely much on midstream or upstream players for the gas purchase.

[9] http://www.naturalgas.org/naturalgas/production.asp

Logistics Chain

From a logistics point of view, the main players making part of the natural gas supply to final customers are:

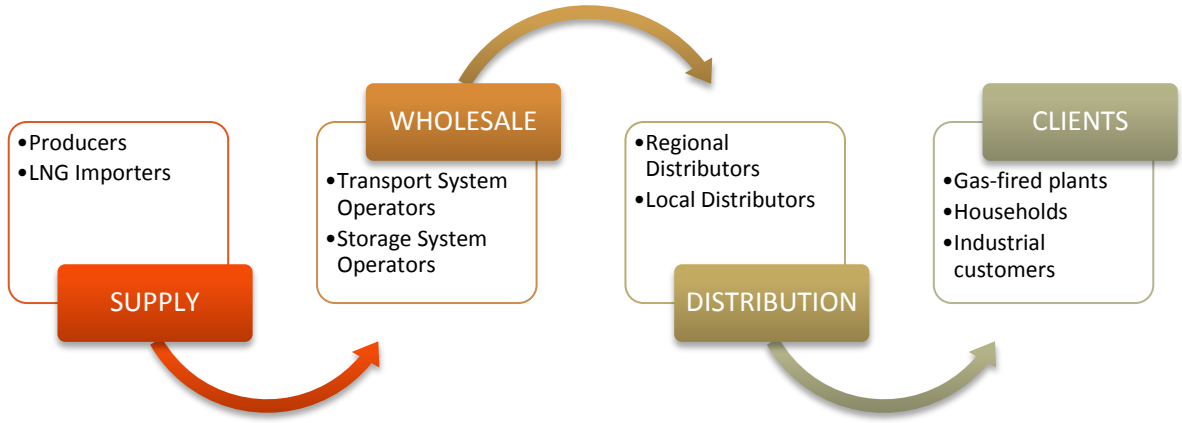


Figure 8 Logistics chain - European natural gas market

- Producers: In charge of the exploration, research and exploitation of hydrocarbon fields. Norway is the main producer in Europe, followed by Netherlands with 2,257 billion cubic feet in 2012 and United Kingdom with an annual production of 1448. In 2012, Russia had the largest natural gas reserves in the world, about 18% of the world's total, was the leading exporter of natural gas, and placed second in production and consumption behind the United States.[10]

- Liquefaction Plants: LNG is simply an alternative method to transport methane from the producer to the consumer. Methane (C1H4) gas is cooled to –161.5° C (–260° F), converting its gaseous phase into an easily transportable liquid whose volume is approximately 600 times less than the equivalent volume of methane gas. (The exact shrinkage is closer to 610 times, but 600 is commonly quoted.) Thus 600 ft3 of methane gas will shrink to a volume of around 1 ft3 of clear and odorless LNG. It is usually stored and moved at cold temperatures and at low pressure.

  Gas converted to LNG can be transported by ship over long distances where pipelines are neither economic nor feasible. At the receiving location, liquid methane is offloaded from the ship and heated, allowing its physical phase to return from liquid to gas. This gas is then transported to gas consumers by pipeline in the same manner as natural gas produced from a local gas field.[11]

- Regasification Plants: LNG receiving terminals, also called regasification facilities or regas facilities, receive LNG ships, store the LNG until required, and send out gaseous methane into the local pipeline grid. The main components of a regas facility are the offloading berths and port facilities, LNG storage tanks, vaporizers to convert the LNG into gaseous phase, and pipeline link to the local gas grid. LNG tankers may also be offloaded offshore, away from congested and shallow ports. This is accomplished using a floating mooring system (similar to that used for oil imports) via undersea insulated LNG pipelines to a land-based regas facility.

[10] Europe's Energy Security: Options and Challenges to Natural Gas Supply Diversification
[11] Natgas.info: http://www.natgas.info/html/liquefiednaturalgaschain.html

- Transportation and Storage System Operators: TSOs as Italian company Snam Rete Gas are the owner of the regasification, pipelines (with pressure higher than 16 bar) facilities and connections with other market areas. Instead, SSOs as Stogit in Italy operate storage facilities; Astora is one of the main storage operators in Europe, owning the largest natural gas storage facility in Western Europe is at Rehden in Northern Germany with a working gas volume of more than four billion cubic meters and occupies around eight square kilometers of space underground.[12]

  Both TSOs and SSOs are obliged to offer their services to any market operator on an equal treatment basis. On the other hand, their services prices (capacity tariffs) are usually set by the different Energy National Authorities, as AEEG in Italy. In addition, TSOs and Market Area Managers are the managers of the virtual trading points and can be considered a sort of guarantors of the right functioning of the system and the effective delivery of natural gas.

- Local and Regional Distributors: they are the title holders of the natural gas distribution facilities (with pressure lower or equal to 16 bar or feeding only one consumer). Companies involved in the natural gas transportation and distribution from high pressure pipelines to the local distribution networks are called regional distributors; instead the ones involved in its delivery to the final consumer are local distributors. Most of them are focused on small geographical areas and they are usually owned by local national institutions such as municipalities, regions, provinces. As TSOs, they are obliged to offer their services to any market operator – third party access rules – and service prices are set by Energy Authorities.

- Gas consumers: Since 1st of July 2003, all the natural gas consumers can acquire gas to any trader, in freely agreed conditions or in market protected regime. Consumers of natural gas may be: gas-fired plants, households and industrial customers.

- Market Area Manager: It is the entity in charge of making the balancing and managing the virtual point. For instance, in Italy the virtual point is known as Punto di Scambio Virtuale (PSV) which is managed by Snam Rete Gas, which is also the company in charge of the balancing.

LIBERALIZATION OF THE EUROPEAN ENERGY MARKET

European regulatory changes have accelerated market liberalization. As a result, wholesale gas markets have become much more liquid. In this section it will be summarized the process by which European natural gas market has been going through.

On June 22, 1998 all EU Member States unanimously approved Directive 98/30/EC, the so-called Gas Directive, which paved the way for changes in the European gas sector and for the establishment of an internal gas market. The key objective of the Gas Directive was "to provide fluidity in gas flows and improve security of supply and industrial competitiveness" in Europe[13]. The Gas Directive lays down a set of

[12] Astora - http://www.astora.de/en/storage-locations/rehden-storage-facility.html
[13] Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 - http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0030:EN:HTML

common rules and procedures relating to the organization and functioning of the national gas sector. Its objectives are to:

- Establishing a single natural gas market in Europe that is integrated, competitive and regulated at EU level. This objective was stated in the declaration made by the European Council in Lisbon (2000) aiming to make the EU economy the most competitive in the world. In order to create an internal gas market, national markets must be harmonized to some extent and new rules must be adopted to run the gas sector, previously managed at national level.

- Boosting the competitiveness of European energy undertakings against international competitors by allowing the market to operate freely.

- Improving the overall structural efficiency of the European gas market and ensure that households and industrial users are free to choose their supplier. Competitive pressure must be such that operators are forced to realize productivity gains and/or decrease their margins, i.e. via economies of scale.

The political driver behind all these efforts is the goal to transform the European gas market by integrating the various national markets, into a single liberalized market. The legislation to achieve that goal was set out in the 3rd Package Directive. This package provides for legally binding network codes in order to create a single gas market, and the various national energy regulators were given the task of supplying the detail of the new market structure. From there, the regulators went a step further and, through the Council of European Energy Regulators, they set out their vision of the future gas market structure. This vision came to be known as the Gas Target Model. Not surprisingly, as this vision is set out by regulators, the GTM focuses on operational issues such as enhancements in capacity allocation, congestion management, interoperability and balancing, to achieve market linking and integration.

Since July 2009 progress has been fairly swift considering the task involved and the implications that this radical change will have. Anyway, there is still a long way to go in defining the rules and regulations that will permit such a unified market, in ironing out capacity bottlenecks to allow a market mechanism to work properly, and in writing and implementing coordinated Network Codes across EU and, not least, getting the approval of all the Member states. However, much has already been achieved and it now looks as though the overriding goal as set out in the 3rd Package may indeed be achieved.

Another important piece of legislation was passed in October 2011, known as REMIT. This sets out the rules to prevent market abuse and to reinforce transparency in the traded markets. Furthermore, it will permit coordinated investigations into cross-border manipulation. This is seen as an important piece of legislation and is expected to assist the regulatory bodies in adopting and enforcing the new market structure as set out in the 3rd Package and the GTM.

Regulatory Entities

There are three main bodies overseeing and implementing the legislation involved in delivering the 3rd Package: CEER, ACER and ENTSOG.

- Council of European Energy Regulators (CEER): was formed to facilitate the creation of a single competitive, efficient and sustainable EU internal energy market that works in the public interest. It

was CEER that was tasked by the European Commission to deliver a target model for a European gas market which was delivered in December 2011 and it was endorsed in March 2012. The Gas Target Model contains a suite of recommended steps to achieve a single EU gas market by the 2014 deadline as set by the European Council, as well as dealing with longer term issues. However, it is evident that for now it is actually unrealistic to hope that Europe could have just one entry/exit system; however they think it is possible to have 7 regional markets by 2014-15. Their vision for a sustainable Internal Energy Market in gas is founded on three pillars: to enable functioning wholesale markets; to tightly connect the markets; to enable secure supply patterns. These pillars are to be supported by improving the effectiveness of integrated markets by realizing economic pipeline investments. CEER works closely with and supports the work of ACER.

- Agency for the Cooperation of Energy Regulators (ACER): was set up following the introduction of the 3rd Package. Their role is to work towards a competitive, sustainable, secure and transparent Internal Energy Market to the benefit of all EU consumers. Their mission is to assist National Regulatory Authorities in exercising, at EU level, the regulatory tasks that they perform in the Member states and, where necessary, to coordinate their action. Therefore, ACER cooperates closely with NRAs but also EU institutions, and European Transmission System Operators (ENTSOs), to deliver a series of instruments for the completion of a single EU energy market. Their activities are focused on three main areas: supporting European market integration; advising EU institutions on trans-European Energy infrastructure issues; Energy market monitoring.

- European Network of Transmission Operators for Gas (ENTSOG): is the grouping of 39 gas TSOs and 2 Associated Partners from 24 European countries and 3 observers from EU affiliate countries to ensure early progress towards the single European gas market. The organization's objectives were defined in an EU Parliamentary Regulation, introduced alongside the 3rd Package Directive. ENTSOG hope to promote the completion and functioning of the internal market and cross-border trade for gas by ensuring the optimal management, coordinated operation and sound technical evolution of the European natural gas transmission network. They differ from CEER and ACER in that they take a far more commercial approach to meeting their objectives, which includes: enhancing cross-border transmission access and the promotion of gas trading; supporting interoperability of the European transmission systems; supporting development of policy to promote market solutions and security of supply; contributing to the setting of a stable public policy framework; contributing to a safe and reliable European transmission system suitable for meeting present and future transportation needs.

Milestones of Market Liberalization Process

To summarize the evolution of the liberalization process of European natural gas market, following the most important milestones in the development of the European natural gas market:

1. Directive 1998/30 (Gas Market Directive): stipulated the right of free access to the existing network for producers, distributors and large scale customers. Conditions of access to the network were as follows: the member states chose between a negotiated or regulated third-party access both for transport, and access to LNG terminals and for distribution.

2. Directive 2003/55 (Gas Market Directive II): Measures to improve the gas market, such as the obligation to keep separate accounts for eligible customers and non-eligible ones, obligation to separate transport operations from other activities, deadline for nation states for opening their gas market to full competition for industries and final households, between others.

3. Commission Decision 2003/796: Establishment of the European regulators Group for electricity and gas (ERGEG).

4. Directive 2004/67: Measures to safeguard an adequate level for the security of gas supply, which contribute also to the proper functioning of the internal gas market. It establishes a common framework within which Member States shall define general, transparent and non-discriminatory security of supply policies compatible with the requirements of a competitive internal gas market; clarify the general roles and responsibilities of the different market players and implement specific non-discriminatory procedures to safeguard security of gas supply.[14]

5. Com 2007/0528/0529 etc. (The European Commission's third legislative package): Proposal for new amendments to the electricity and gas market directives to create more efficient markets for electricity and gas in Europe. Nondiscriminatory rules of access and tariffication for transmission and distribution network, LNCG plants and storage facilities. Transmission and distribution networks are regarded to be natural, regulated monopolies. To secure free access to all interested parties, the incumbent operators had to set apart their transportation and distribution operations (unbundling).

6. Congestion Management Procedures (CMP): a principle established by the European Regulators' Group for Electricity and Gas (ERGEG)[15]. These rules were adopted in August 2012 aim to reduce congestion in the EU's gas transmission pipelines and optimize efficient use of existing capacity. They state that unused capacity at interconnection points between adjacent entry-exit systems should be brought back to the market to be reassigned in the course of the regular allocation process, in order to reduce contractual congestion. The oversubscriptions and buy-back stipulation requires that transmission system operators make more capacity available and then buy it back in case of oversubscription. Surrender of capacity requires operators to return booked but unused transport capacity to the market. Long-term use it or lose-it requires that the long-term capacity that is not used is returned to the market on a firm basis.

7. Capacity Allocation Mechanisms (CAM): A network code agreed in April 2013, by the ERGEG, provides rules for the efficient allocation of transport capacity in gas transmission pipelines, setting out requirements for standardized auction procedures, standard cross-border capacity products, and co-operation between TSOs. Provisions also cover the bundling of cross-border capacity and allocation of interruptible capacity.

The implementation of all these legislations and regulations has already substantially changed the market structure. Indeed, the European markets used to be separated and structured around national operators that often enjoyed a monopoly, as the common model of quasi-vertically integrated, regulated monopoly.

[14] COUNCIL DIRECTIVE 2004/67/EC of 26 April 2004 concerning measures to safeguard security of natural gas supply - http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:127:0092:0092:EN:PDF

[15] ERGEG is an advisory group to the European Commission on internal energy market issues in Europe.

Vertical downstream integration gave one player on the domestic market, or a small number of players, a monopoly on import, transport, distribution/storage and supply operations.

Allowing customers to freely choose their supplier promoted competition between the market players and helped new entrants gain market access: shippers and traders, and regulatory authorities.

- Midstream players (shippers and traders) positioned themselves on the gas supply chain to handle the exchange of gas in volume between producers and suppliers. Shippers have also enabled the transfer of transport capacity between transporters and suppliers. Moreover, the tendency in the commercial strategies adopted by operators, inducing broad horizontal integration and vertical disintegration trends in response to unbundling obligations, changed the industrial structure of gas markets.

- At national level, the liberalized gas market is regulated by an independent authority responsible for undertaking and organizing the implementation of competition. Regulatory authorities supervise the separation of accounts for the different gas industry activities and guarantee fair business practices. In particular, they have ensured that TPA procedures are implemented in accordance with transparent, nondiscriminatory criteria.

STORAGE OF NATURAL GAS

The storage of natural gas is a strategic issue, since it makes possible the modulation of supply flow into the distribution network according to demand and contributes to the diversification of supply sources, while these storages are connected to different origins and have commercial agreements with storage operators. Four main objectives lead to the use of natural gas storage facilities:

- Meeting seasonal demand requirements: natural gas has been a seasonal fuel, i.e. demand for natural gas is usually higher during winter, because it is used for heat in residential and commercial settings. Stored natural gas plays a vital role in ensuring that any excess supply delivered during the summer months is available to meet the increased demand of the winter months. However, with the recent trend towards natural gas fired electric generation, demand for natural gas during the summer months is now increasing (due to the demand for electricity to power air conditioners and the like).

- Being more responsive: exploration, production and transportation of natural gas take time, and the natural gas that reaches its destination is not always needed right away, so it is injected into underground storage facilities. These storage facilities can be located near market centers that do not have a ready supply of locally produced natural gas.

- Facing any unexpected supply disruption: it also serves as insurance against any shortage due to unforeseen accidents, natural disasters, or other occurrences that may affect the production or delivery of natural gas. An example of this situation is the energy crisis experienced in 2006, when Russia cut off gas supply to Europe by 60% due to disputes with Ukraine and most of European nations were completely or highly dependent of Russian supplies; in this case a precious help for the natural gas needs was obtained by the quantity available in storages.

- Giving flexibility to shippers for the modulation of the deliveries on a short term basis: owning storage capacity allows shippers to better manage the deliveries, since it has the possibility to react to certain

events in shorter periods (balancing needs, increase or reduction on prices, and any other event requiring the urgent delivery of natural gas).

TRANSPORTATION OF NATURAL GAS

Companies involved in the transport of natural gas throughout the European network, the so called Transport Operators (TSO), offer an integrated service which involves, on one hand, providing transport capacity and, on the other hand, the transport of the gas delivered to the transport operators at the entry or exit points of the National Network (connected with the different import lines, with the re-gasification plants and the production and storage centers located in each country).

The transport capacity, which can be expressed in standard cubic meters per day (smc/day) or kilowatt-hour per day (kwh/day), represents the maximum volume of gas that each User can inject or withdraw daily from the system at the different points; standardization of European system is going towards the use of kilowatt-hour as standard measure unit.

Transport Operators (TSO) provide transport capacity to the entities that request it; consequently, they acquire the right to inject and withdraw on any day of the thermal year a quantity of gas not exceeding the daily flow provided, to and from the entry and exit points of the National Network, the redelivery points along the TSO network and to the virtual point.

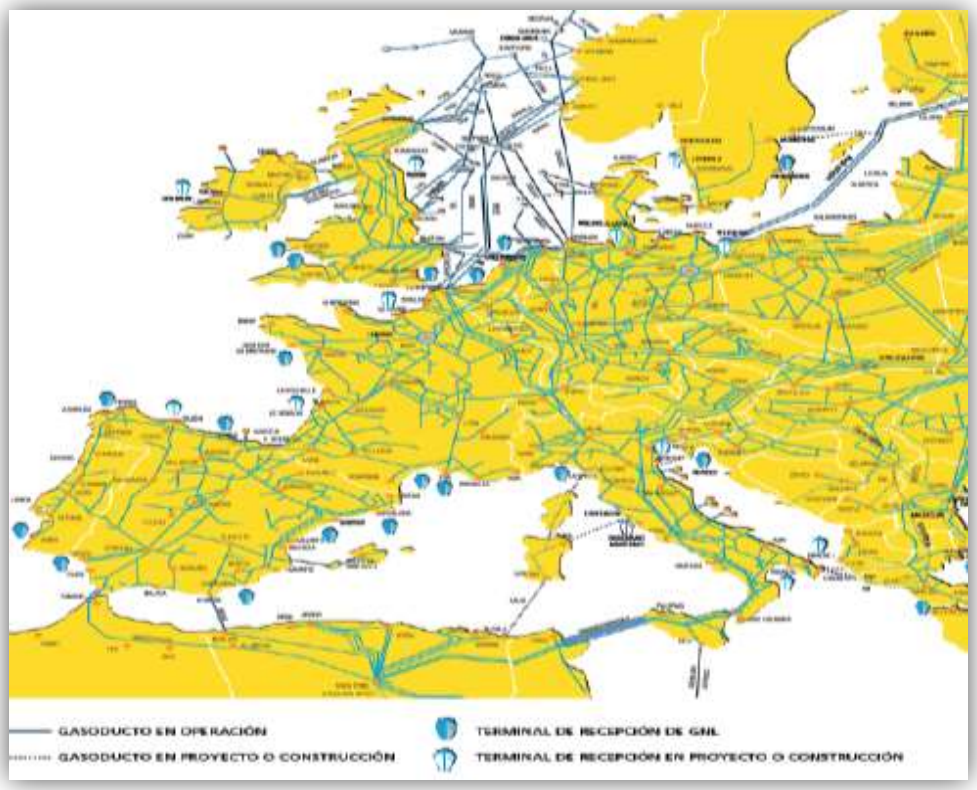


Figure 9 European Natural Gas Network

LONG TERM TRANSPORT AND STORAGE CAPACITY CONTRACTS

By a long term contract it is intended an agreement between two players within the natural gas logistics chain for more than one year (for players as ENOI), in which the seller commits to put at buyer's disposition a transport or storage capacity and buyers instead commit to pay it during the lifetime of the contract.

As it may be induced, advantages and disadvantages of signing these kind of agreements are various; companies are always looking for a way to guarantee supply for the upcoming years and, moreover, shippers as ENOI make use of these contracts to take advantage of the volatile prices of natural gas, but unstable market conditions have turned long term contracts into a headache for its owners since the margin that can be gained from the usage of this capacity is, in the most of the cases, no longer covering the expenses of the capacity itself.

Advantages of Long Term Capacity Contracts

The main advantages of acquiring long term capacity are:

- Rapid reaction against prices/spread changes: As mentioned above, signing a long term contract will allow a company to react quickly in front of prices or spread changes; for instance, if a shippers owns entry capacity in one point and the price in the relevant virtual point increases, the company will be able to sell natural gas in that point since it is able to transport it immediately. Different logistics' experts agree on this point; Alexandros Papageorgiou states "For the transport the advantages of owning long term capacity are limited to the fact of being able to take advantage of the possible jump of the spread between the relevant markets, even if it is for a short period"; while Roberto Borghetti considers as a main advantage "the availability of flexibility for catching market opportunities". The same advantage can be foreseen for the storage capacity; long term contracts enable a company to inject or withdraw natural gas whenever they want, modifying their pre-established injection/withdrawal plans in case any sudden decrease or increase of price occurs; as indicated by Alexandros Papageorgiou: "For storage instead, it is the possibility of being able to exploit an increase/decrease of prices for selling/buying withdrawing/injecting at the maximum of the own capacities".

- Lower costs due to economies of scale: When acquiring long term capacity companies are supposed to take advantage of economies of scale; when analyzing and evaluating current portfolios of transport and storage operators it is noticeable that buying annual capacity is the most convenient option in terms of price. For instance, OMV's tariff for the Etzel bundled classic product as of April 1, 2013 are: for one month it is 10,000 unit price (EP0)/ EUR / unit / month, and for one year it is equal to 15,000 unit price (EP0)/ EUR / unit / month; so in case a shipper wants to acquire 5 units of product it would pay 75,000 €/month for monthly product or 50,000 €/month for annual product[16].

[16] OMV Group - http://www.omv.com/portal/01/com/omv/OMVgroup/Products/Natural_Gas/Gas_Storage/Storage_Germany/Tariffs/Bundled_Services

- Better management of balancing and of sudden external event: as stated by Borghetti there is a possibility of reacting rapidly to sudden portfolio balancing needs or system disruptions; as occurred in 2009 when Gazprom, the state-owned Russian gas group, cut off all supplies to Europe travelling through Ukrainian pipelines. A company already owning storage and/or transport capacity in the European network was able to allocate the natural gas according to the eventual needs.

- Plan supply of final customers for upcoming years: Moreover, for companies with a solid base of final customers, it provides them the possibility to plan the supply to its clients for the following years; such as mentioned by Ermanno Baraggia: "Owning long term capacity gives us the opportunity to plan for 2 or 3 years considering that the contracts with clients are normally of one year. For more than 3 years, this advantage doesn't apply anymore". In fact, Borghetti also mentioned that owning long term capacity "gives the shippers the possibility of planning more efficiently the supply campaign for pools of end customers".

Risks of Long Term Capacity Contracts

On the other hand, there are as well some risks that are being perceived by shippers when contracting capacity for a long term period. It is obvious that when signing a contract, the shippers agree and commit to pay a specific monthly amount, tariff, so there is a financial obligation for a specific period of time which is, in most of the cases, very difficult to break up. Actually, Roberto Borghetti mentioned "the main disadvantage is that there is a financial commitment even if the contract could not be (fully) used, which is in different ways valid for both transport and storage" and Alexander Frank stated "there might be a high cost exposure while short term bookers utilize spreads only when they are appearing".

It is important to take into consideration that natural gas market is very volatile, as it has been stated before there may be changes in legislations and politics; in European market it is a common topic since European Union is in a continuous process of market liberalization, which is translated into legislative uncertainty for the different players. Moreover, prices, demand, infrastructure and climate are adding also a certain uncertainty to the natural gas market. Consequently, there is a huge risk associated to the acquisition of long term capacity; there might be periods in which the capacity will be sub-used, bringing losses for the shippers. In fact, Paolo Pasquini identified as disadvantages: legislation and politic uncertainty; demand and offer evolution (new alternative infrastructures), prices and spreads and the climatic uncertainty which makes each year of difficult interpretation.

4. PRESENTATION OF THE PROBLEM

After having a general description of the natural gas industry and its functioning, the problem subject to study will be presented, as well as the main causes affecting this situation.

DESCRIPTION OF THE PROBLEM

ENOI is a company working in the midstream segment of the European natural gas market, in which it trades natural gas and ships it through the European network taking advantage of the volatility of the markets, the variety of products and services offered and requested by the counterparts and the seasonal and geographical spread in order to make profit.

ENOI has been a player in this segment since 2000, when new players were entering to the market due to the liberalization process by which the energetic sector was going through. This process, led by the Committee on Industry, Research and Energy of the European Parliament, allowed new independent commercial companies to be born, national monopolies to be taken apart and vertical integration figure to be demolished.

Since the very beginning of its activities until 2010 the use of long term capacity for both storage and transportation was a main driver for companies' success on making profit since the geographical and/or seasonal spreads were high enough to support the cost of the acquired capacity, i.e. it allowed shippers to optimize their portfolio. Nevertheless, the market context did not remain stable; various agents led to the decrease in margins obtained from the use of long term storage and transportation contracts: lower natural gas demand, reduction of market (geographical and seasonal) spreads and the constant antitrust procedures established by the European Union, between others.

In the following figure it is evidenced how the profit has been reduced. As it may be seen in the graph there has been a sudden and continuous reduction of the profit since 2011; gross operating profit has dropped by approximately 70% in the last three years.

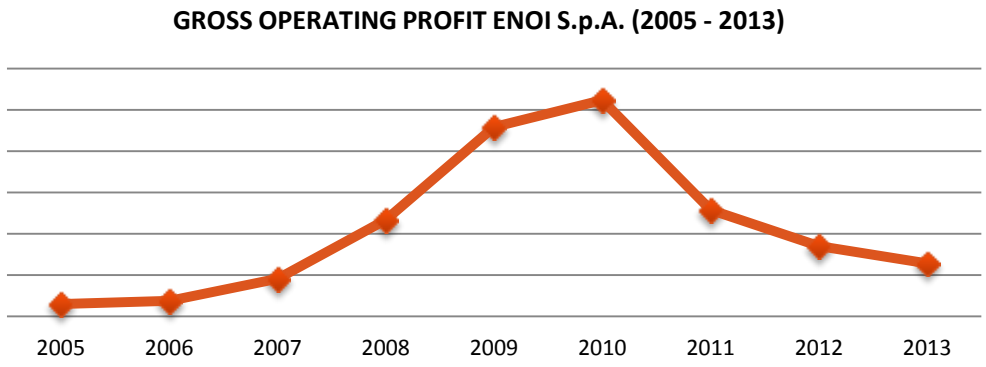


Figure 10 Gross Operating Profit from 2005 to 2013 - ENOI S.p.A[17]

Anyway, it is important to point out that this is a general problem being faced nowadays in Natural Gas Sector; even big companies as ENI have been harmed by the radical change of the market conditions. For instance, Gionata Picchio[18] states, in one of his publications, "It seems obvious, that once the group goes out from the tunnel will anyway find a radically changed outlook, as recognized by Scaroni (Chief Executive Officer and General Manager of ENI) on April 14th in London: there was a time in which the group has done lot of profit buying and selling gas, practically without efforts. That time unfortunately is already over. And it accounts not only for Eni". Figure 11 shows the recent trends in the value chain marginality in Europe.

Figure 11 Recent Trends in Industry Value Chain Marginality

[17] Exact values for P&L cannot be displayed due to privacy policies

[18] Gionata Picchio is an italian journalist in energetic sector. His articles are being published in Staffetta Quotidiana, il quotidiano delle fonte di energia.

MAIN CAUSES OF MARGIN REDUCTION FOR MIDSTREAM SEGMENT

With the help of logistics' experts it was possible to identify the main drivers of the reduction on the midstream players' margin, making use as well of a fishbone analysis in order to go deeper into the possible causes. The interviewed experts agreed on pointing out that the main causes of midstream players' margin reduction are: the overcapacity of the system, the reduction of both natural gas consumption and market spreads, and the increase of shippers/traders in the market. For instance, Roberto Borghetti mentioned "The causes of the spread reduction of companies operating in the midstream segment are: 1. Availability of capacity over the needs of the market; 2. Decrease of consumptions (above all in comparison to the forecasts of last years for the future); 3. Increase of the liquidity of the market, because of the entrance of many traders (also banks); 4. New regulation which increased the transport capacity; and 5. The merging of some TSOs in market areas". Paolo Pasquini also agreed on most of Borghetti's comments, he identified as main causes "High negotiation power of vendors, vertical integration of vendors, mature liberalization, infrastructure ampliation, economic crisis".

Figure 12 is a fishbone analysis, in which it is represented the main causes of margin reduction, as well as the causes of them. Subsequently, each of the drivers of midstreamers' margin reduction will be explained.

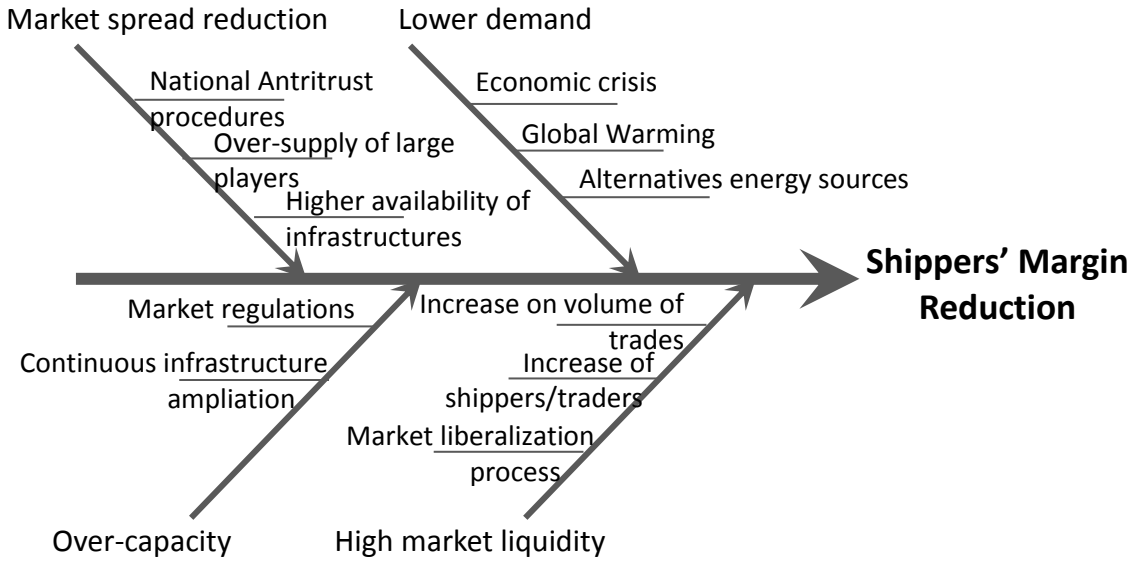


Figure 12 Fishbone Analysis: Causes of shippers' margin reduction

Decrease in natural gas demand

One of the main reasons pushing the reduction of the margin in the midstream segment is the latest decrease of natural gas demand in the European market. If we analyze the trend during the last years, we can realize about the decrease in the demand during 2011 and 2012, as evidenced in Figure 13. In 2009 a decrease in the consumption was perceived, when the full effects of the global economic crisis were fully felt. Nonetheless, in 2010 it increased but on 2011 an even more dramatic decrease in demand of natural gas in Europe was seen; consumption in 2011 dropped by approximately 10% compared to 2010. The decline in the EU's natural gas consumption continued over the course of 2012 when it declined by a 3.6%, reaching a new lowest level in annual consumption in the last decade of 17,610 thousand terajoules. The

biggest falls in consumption compared with 2011 were in Belgium (-30.5 %), Sweden (-12.7 %), Finland (-10.5 %), Portugal (-9.6 %), Denmark (-8.4 %) and Greece (-7.7 %). Increases in consumption in comparison with 2011 were recorded only in Estonia (+11.3 %), Poland (+6.2 %), Germany (+3.4 %) and Luxembourg (+1.5 %).[19]

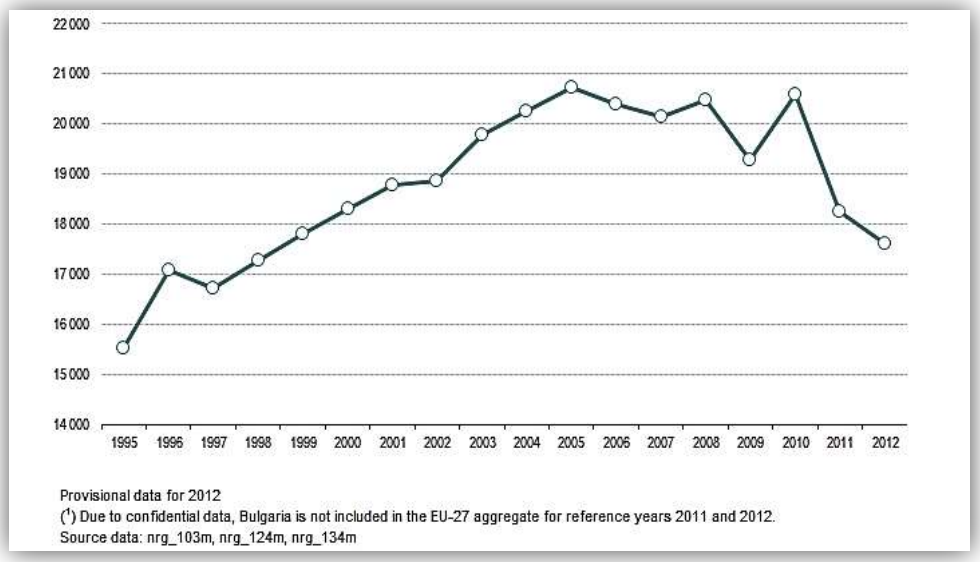


Figure 13 Gross inland consumption in EU-27 2012, in thousand terajoules (Gross Calorific Value)

The following chart and graph shows us data about natural gas consumption in Europe obtained from the World Oil and Gas Review 2013 of ENI, in which it is also supported the latest decreasing trend.

Year	Consumption	Delta
1995	514,37	
2000	591,06	14,91%
2005	672,58	13,79%
2008	663,80	-1,31%
2009	610,80	-7,98%
2010	673,75	10,31%
2011	676,71	0,44%
2012	597,04	-11,77%

[19] Eurostat - http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Natural_gas_consumption_statistics

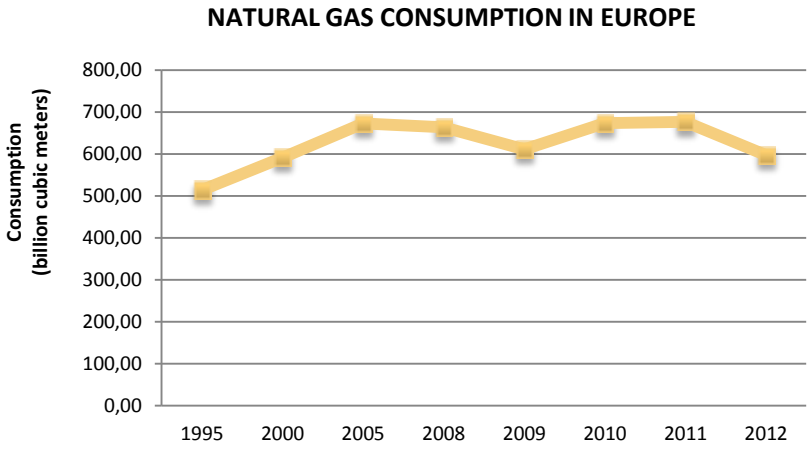


Figure 14 Figura 3 Natural Gas Consumption in Europe[20]

The drivers for this situation might be multiple:

1. The economic crisis has limited the performance of European economies and reduced demand for gas and electricity (generated, among others, by combined cycle gas power plants).

   The financial crisis has hit the entire euro area and has widened the spreads between the yields paid on the government securities of peripheral European countries and German interest rates. The worsening in the way markets view the risk of sovereign debt default by many European countries has the following consequences: on one hand, there is a rationing of credit due to the higher cost of bank loans since it is harder to obtain financing which increase the cost of funding for banks; on the other hand, consumers' expectations of incomes are pessimistic so the rate of savings tends to increase, while a fall in consumption is evident.

2. A decrease on demand from gas-fired plants due to, on one hand an increase in electricity production using renewable resources (primarily solar and wind) driven by generous subsidy policies, and on the other hand the coal supplanting natural gas in electricity production.

3. Warmer winters and an overall increase in the average ambient temperature have lowered electricity demand for heating which in turn has contributed to a decline in natural gas demand.

4. An Increase on energetic efficiency

Anyway, the highest impact of demand reduction on the profitability of the healthiness of midstream segment is not the reduction itself, but the fact that the consumption for coming years was forecasted to be higher than what has been experienced. The following graph shows the forecast results for aggregate natural gas consumption in OECD until 2020 from a study in 2010, in which it is possible to see that in the worst case the demand would have been remained stable, and that reference forecast showed a slow but continuous growth on consumption.

[20] World Oil and Gas Review 2013, ENI

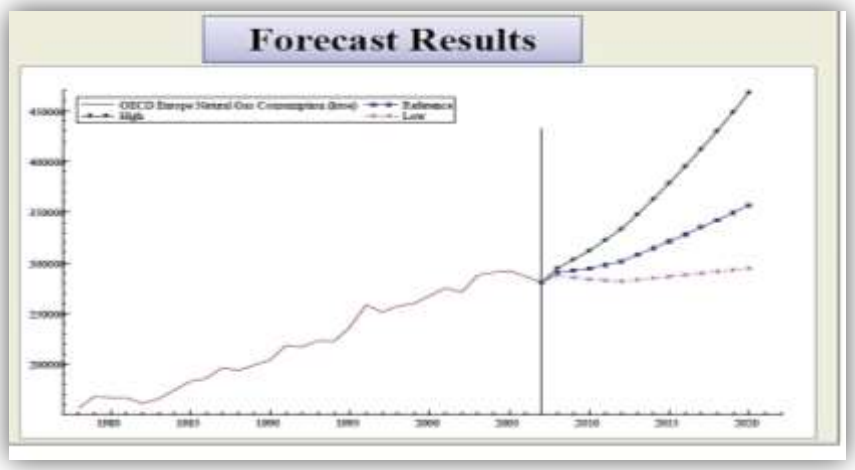


Figure 15 OECD-Europe Natural Gas Demand[21]

Reduction of market spreads

The combined effects of natural gas slowing demand, the national antitrust procedures, the over-supply of large energy players and the higher availability of infrastructures, leaded to a reduction of price differentials between European hubs or "geographical spreads" and between winter/summer periods "seasonal spreads". For instance, location spread between PSV and Northern European hubs decreased in the last years. As a consequence, the opportunities of exploiting arbitrages between markets are much lower than in the past.

In the following graphs it is possible to visualize how this market spread between TTF (Netherlands) and NCG (Germany) market areas.

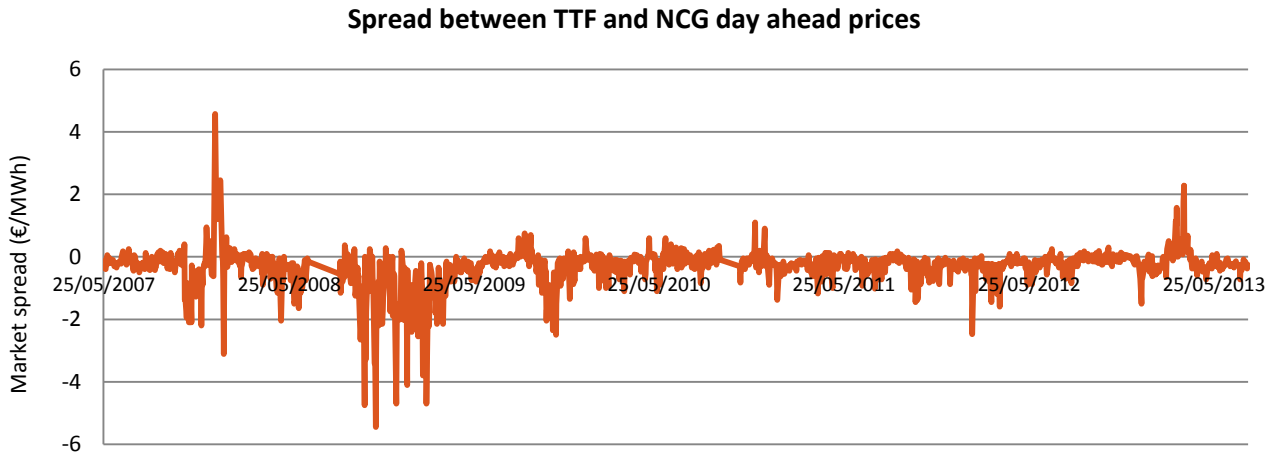


Figure 16 Market spread between TTF and NCG for day-ahead settlement prices

[21] An Outlook To 2020, Mr Zafer Dilaver, Surrey Energy Economics Centre, University of Surrey, 2010

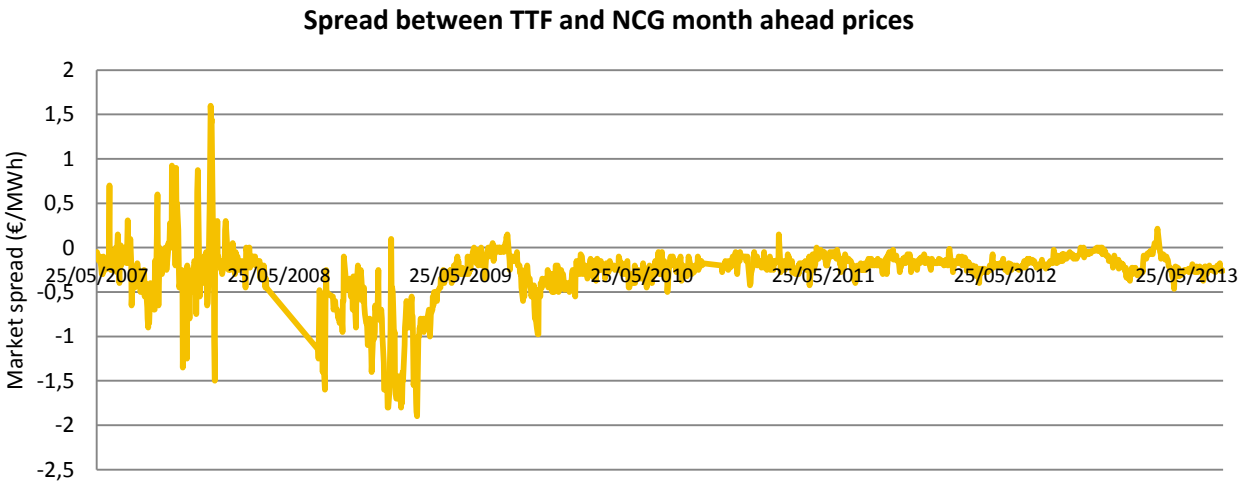


Figure 17 Market spread between TTF and NCG for month-ahead settlement prices

Increase on Market Liquidity

By market liquidity it is intended an asset's ability to be sold without causing a significant movement in the price and with minimum loss of value.[22] Liquidity in the wholesale gas sector rises when there is an increase on: the number of players active on the market, price transparency, volumes traded and the number of trades that take place. The following graph shows the evolution of OTC trading in European hubs, which evidences the fact that there has been an increase on volumes of trades during the last years.

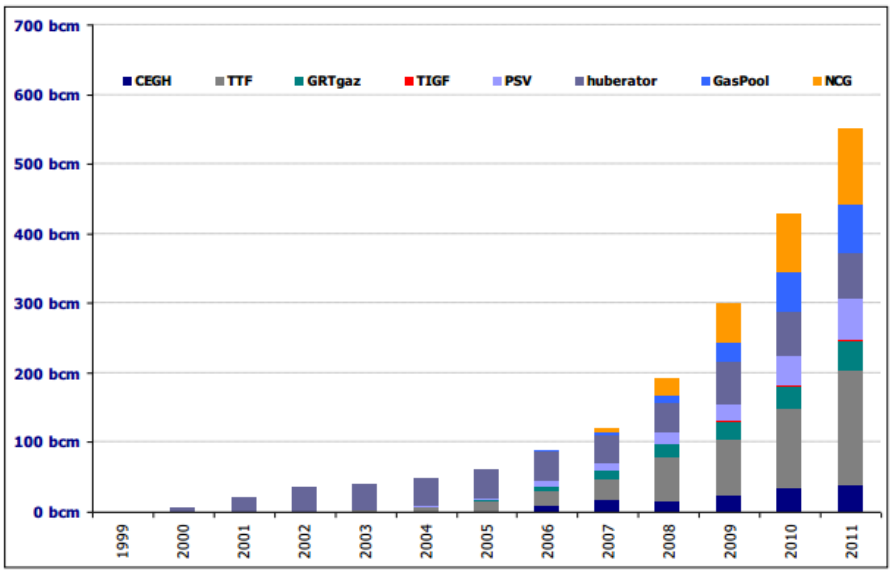


Figure 18 Continental European hubs OTC volumes: 2000-2011[23]

[22] http://economics.about.com/cs/economicsglossary/g/liquidity.htm
[23] CEGH - http://www.cegh.at/otc-market

As European Union efforts remain underway to attempt to unify the continent's natural gas markets, trading and hedging activity by physical participants has been increasing across mainland European gas hubs, which is translated into less volatility in wholesale prices. While a number of hubs have benefited from the rise, the biggest advancement has come at the Dutch Title Transfer Facility (TTF), which has become the focal point for continental gas and could eventually challenge the UK National Balancing Point (NBP) for dominance of the broader European market. The growth figures demonstrate that the Netherlands is becoming a European market place and is increasingly attractive to gas traders and suppliers.[24]

In order to understand the evolution of European gas volatility we focus on data from Europe's most liquid hub, the UK NBP. Figure 19 shows the evolution of the historical NBP System Average Price (SAP) and associated price volatility; SAP represents the 24:7 within-day market clearing price and is very highly correlated to the NBP day-ahead contract.[25] The figure evidences the fact that in average the NBP price has raised but its volatility has been reduced since 2010.

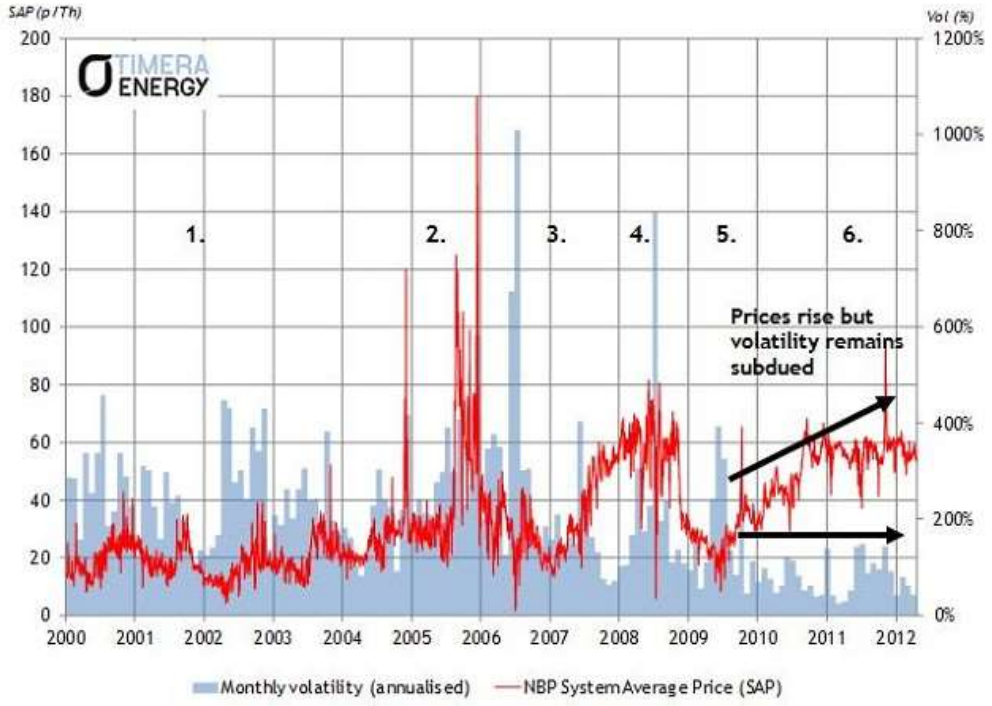


Figure 19 Historical NBP prices and volatility

Over-capacity

It is generally recognized that a degree of multiple source capacity and even overcapacity are preferable in gas networks in order to guard against unforeseen or low probability events. Overcapacities are a means to provide physical insurance for the gas market, whether in the form of larger pipelines than absolutely necessary, additional storage capacities, or multiple supply routes or LNG terminals. They help also to

[24] Government of Netherlands - http://www.government.nl/issues/energy/gas

[25] Timera-energy: Advisory on value and risk in energy markets. - http://www.timera-energy.com/uk-gas/the-death-of-gas-volatility-in-europe/

increase the flexibility and resilience of a given network and increase the number of potential supply routes, thus increasing competition in the market. In order for a competitive market to deliver these overcapacities, their benefits must be internalized and priced. In the last years, there has been big investments and projects on upstream pipelines in order to diversify the demand in Europe, moreover each country has tried to broaden their connections with other countries as well as their internal network.

VALUATION OF A LONG TERM TRANSPORT CAPACITY CONTRACT

In order to understand the real reduction of the profit due to the use of long term capacity, it is necessary to develop some tools which consider the variation of prices and tariffs to simulate the usage of this capacity during the last years. These analyses will allow us to quantify the effect of the change of market conditions and foresee the possible results for upcoming years.

In the following section, the detailed description of a tool developed for transport capacity contract valuation will be given; then we will provide an example of its use.

Analysis Tool for Transport Capacity Contracts - Robotrader

Robotrader is a tool for determining the present value of a long term transport capacity contract; it intends to simulate a trader which is available 24h per day, which means that he/she is able to catch the best spread during the day. Consequently, the result we obtain from the use of this tool is considered an optimal, even better, ideal value.

Consider two transport capacity contracts, one of them corresponding to the acquisition of capacity in the exit point of Market Area 1 and the second one in the entry point of Market Area 2; the following figure shows the flow of natural gas. Robotrader is provided with information regarding the Mid Prices, which is the mid-price between selling (bid) and buying (ask) price for a determined market area in a specific period of time (P_1 and P_2) of both market areas; therefore, it is able to determine the quantity that must be bought at market area 1, transported through the pipeline connecting both entry/exit points to finally sell it in market area 2; the margin obtained from this deal is therefore the difference between both prices.

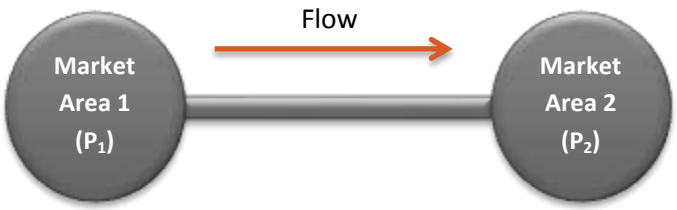


Figure 20 Representation of natural gas transportation

The logic behind Robotrader is linear programming, in which our objective function is to maximize the value of a contract by defining the quantity to be injected and withdrawn every day considering the different products sold over the counter, which are presented in the following table.

Product	Description
DA	Day ahead
WKND	Weekend
BOM	Missing days of the month
M1	One month ahead
M2	Two months ahead
M3	Three months ahead
Q1	First quarter of the year (January – March)
Q2	Second quarter of the year (April – June)
Q3	Third quarter of the year (July – September)
Q4	Fourth quarter of the year (October-December)
SUM	Summer ahead
WIN	Winter ahead
GASY	Gas year (April – March)
CAL	Calendar year (January – December)

Robotrader optimizes the usage of the transport capacity, by filling and emptying the pipeline when the spread of settlement prices is higher than a so called "activation spread". By activation spread, it is meant the minimum spread of settlement prices that must be accepted to fill the pipeline, i.e. a deal must be done if the spread is equal or greater than this value. The activation spread is a managerial decision; anyway one of the main analyses that can be done by using Robotrader is determining which the activation spread must be in order to maximize the profit or minimize the loss.

- Variable: Q_{jp}; quantity of natural gas as product p that must be acquired at market area 1 and transported through the pipeline until market area 2 at day j.

- Objective function: Maximize the value of a long term transport capacity contract.

$$Value = \sum_{i=1}^{n} M_i - TFC_i - TVC_i \; ; \; where:$$

$$M_i: margin\ year\ i = \sum_{j=1}^{365}\sum_{p=1}^{14} Q_{jp}\left(P_{1jp} - P_{2jp}\right);$$

$$being\ P_1, P_2: settlement\ prices\ of\ market\ areas\ 1\ and\ 2\ respectively$$

$$TFC_i: fixed\ cost\ at\ year\ i = \sum_{k=1}^{12} ft_k \; ; being\ ft_k: fixed\ tariff\ for\ month\ k$$

$$TVC_i: variable\ cost\ at\ year\ i = \sum_{j=1}^{365}\sum_{p=1}^{14} Q_{jp} \times vt_k \; ; \; being\ vt_k: variable\ tariff\ for\ month\ k$$

- Restrictions: this allocation has as restrictions the available capacity.

Capacity: $\forall k = 1, 2, \dots, 365; \sum_{p=1}^{14} Q_{jp} \leq Capacity$

$\forall\, k = 1, 2, \dots, 365\ and\ p = 1,2,3, \dots, 14; if\ Q_{jp} = 1,$
$then\ Q_{jp} = Q_{j+1,p} = Q_{np}; being\ n\ the\ number\ of\ days\ of\ product\ p\ and\ Q_{jp} = 1, when\ a\ deal\ of\ product\ p\ is\ done\ at\ day\ j, otherwise\ Q_{jp} = 0$

$\forall\, k = 1, 2, \dots, 365\ and\ p = 1,2,3, \dots, 14; if\ \left(P_{1kp} - P_{2kp}\right) \leq s_{act}, then\ Q_{jp} = 0$

$Q_{jp} \geq 0$

In a nutshell, Robotrader is intended to give us as an output the effect of the market spread and the profit & losses obtained from the use of the long term capacity, by optimizing the deals that could have been done taking into account the settlement prices perceived for the different market areas.

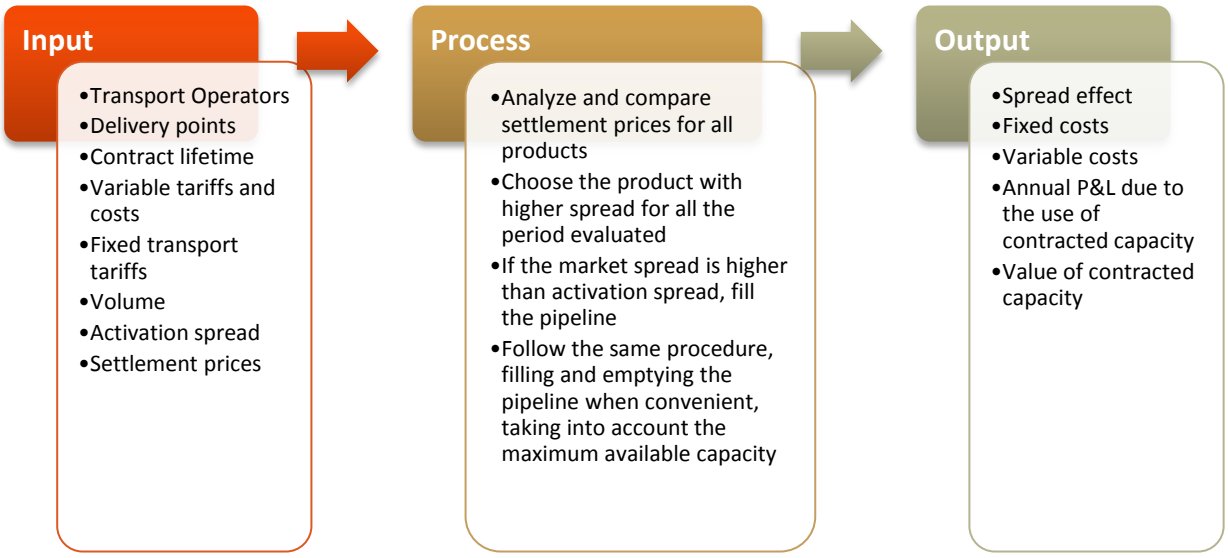
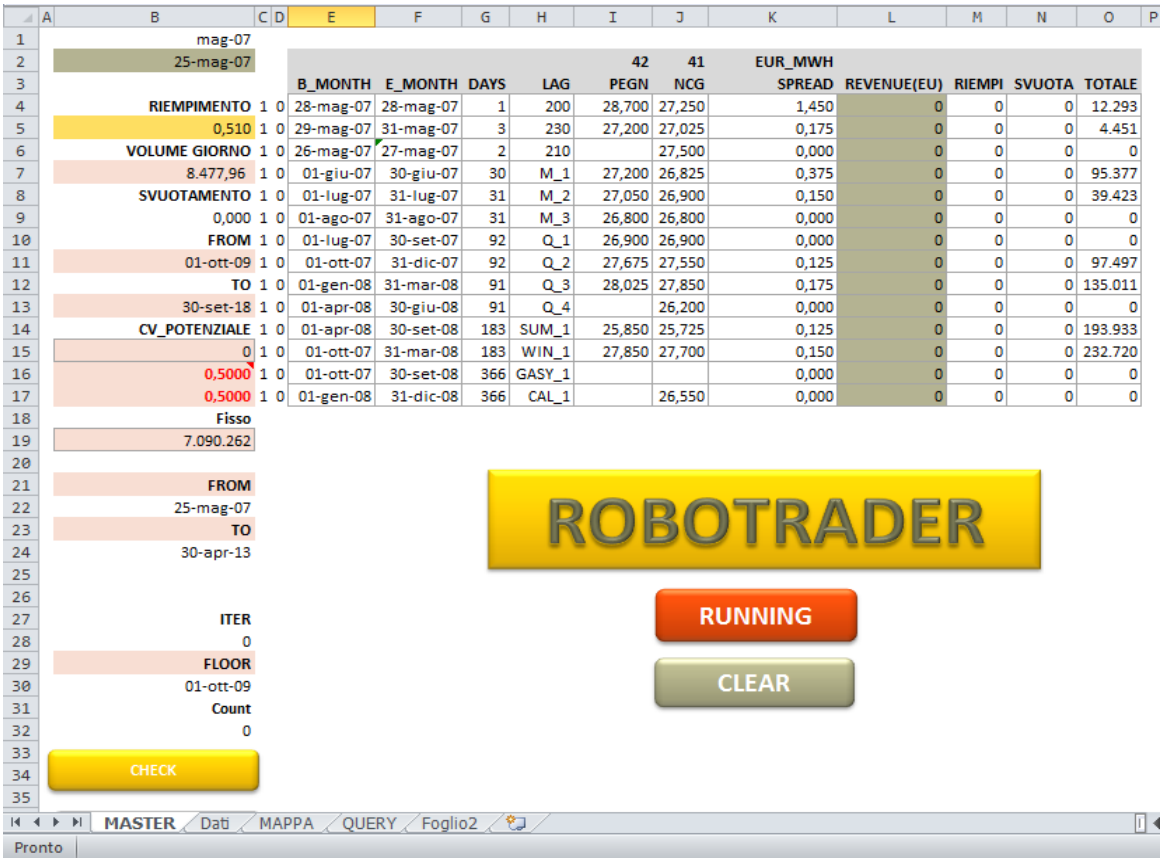
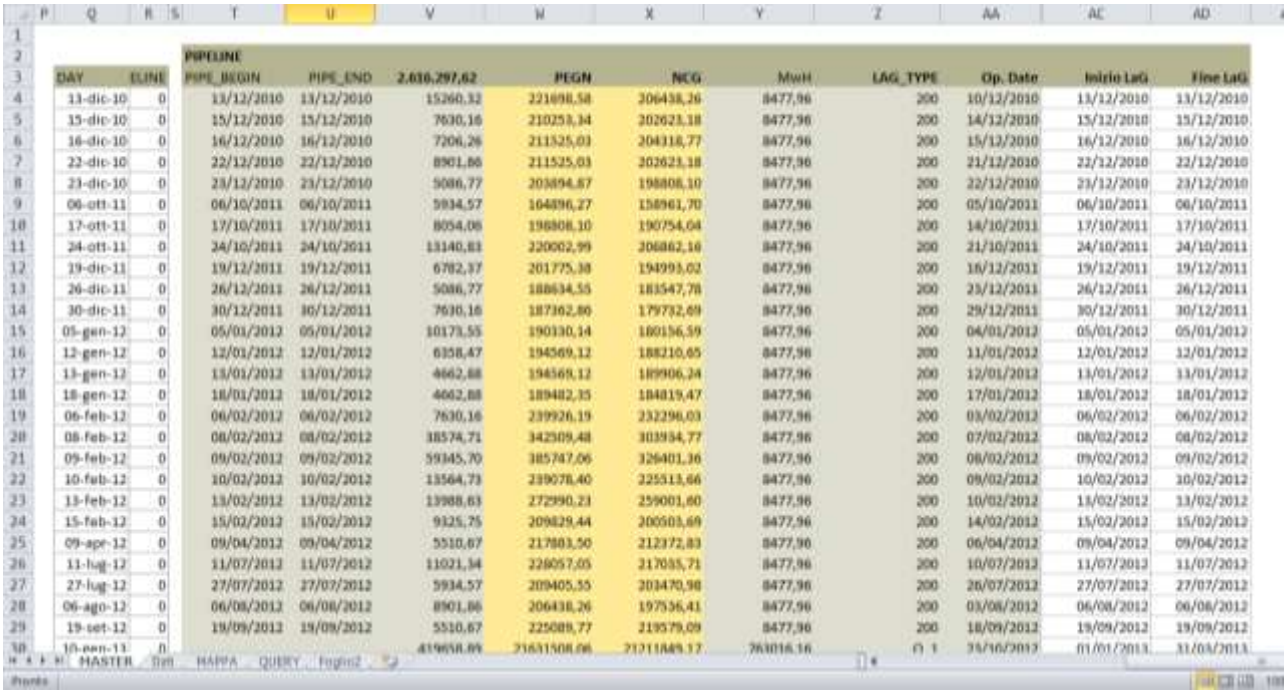


Figure 21 Logical process of Robotrader



B_MONTH	E_MONTH	DAYS	LAG	42 PEGN	41 NCG	EUR_MWH SPREAD	REVENUE(EU)	RIEMPI	SVUOTA	TOTALE
28-mag-07	28-mag-07	1	200	28,700	27,250	1,450	0	0	0	12.293
29-mag-07	31-mag-07	3	230	27,200	27,025	0,175	0	0	0	4.451
26-mag-07	27-mag-07	2	210		27,500	0,000	0	0	0	0
01-giu-07	30-giu-07	30	M_1	27,200	26,825	0,375	0	0	0	95.377
01-lug-07	31-lug-07	31	M_2	27,050	26,900	0,150	0	0	0	39.423
01-ago-07	31-ago-07	31	M_3	26,800	26,800	0,000	0	0	0	0
01-lug-07	30-set-07	92	Q_1	26,900	26,900	0,000	0	0	0	0
01-ott-07	31-dic-07	92	Q_2	27,675	27,550	0,125	0	0	0	97.497
01-gen-08	31-mar-08	91	Q_3	28,025	27,850	0,175	0	0	0	135.011
01-apr-08	30-giu-08	91	Q_4		26,200	0,000	0	0	0	0
01-apr-08	30-set-08	183	SUM_1	25,850	25,725	0,125	0	0	0	193.933
01-ott-07	31-mar-08	183	WIN_1	27,850	27,700	0,150	0	0	0	232.720
01-ott-07	30-set-08	366	GASY_1			0,000	0	0	0	0
01-gen-08	31-dic-08	366	CAL_1		26,550	0,000	0	0	0	0

Figure 22 Valuation tool for transportation: Robotrader's input data



PIPELINE

DAY	FLINE	PIPE_BEGIN	PIPE_END	2.610.297,62	PEGN	NCG	MwH	LAG_TYPE	Op. Date	Inizio LaG	Fine LaG
13-dic-10	0	13/12/2010	13/12/2010	15260,32	221698,58	206438,26	8477,96	200	10/12/2010	13/12/2010	13/12/2010
15-dic-10	0	15/12/2010	15/12/2010	7630,16	210253,34	202623,18	8477,96	200	14/12/2010	15/12/2010	15/12/2010
16-dic-10	0	16/12/2010	16/12/2010	7206,26	211525,03	204318,77	8477,96	200	15/12/2010	16/12/2010	16/12/2010
22-dic-10	0	22/12/2010	22/12/2010	8901,86	211525,03	202623,18	8477,96	200	21/12/2010	22/12/2010	22/12/2010
23-dic-10	0	23/12/2010	23/12/2010	5086,77	203894,87	198808,10	8477,96	200	22/12/2010	23/12/2010	23/12/2010
06-ott-11	0	06/10/2011	06/10/2011	5934,57	164896,27	158961,70	8477,96	200	05/10/2011	06/10/2011	06/10/2011
17-ott-11	0	17/10/2011	17/10/2011	8054,06	196808,10	190754,04	8477,96	200	14/10/2011	17/10/2011	17/10/2011
24-ott-11	0	24/10/2011	24/10/2011	13140,81	220002,99	206862,18	8477,96	200	21/10/2011	24/10/2011	24/10/2011
19-dic-11	0	19/12/2011	19/12/2011	6782,37	201775,38	194993,02	8477,96	200	16/12/2011	19/12/2011	19/12/2011
26-dic-11	0	26/12/2011	26/12/2011	5086,77	188634,55	183547,78	8477,96	200	23/12/2011	26/12/2011	26/12/2011
30-dic-11	0	30/12/2011	30/12/2011	7630,16	187362,80	179732,69	8477,96	200	29/12/2011	30/12/2011	30/12/2011
05-gen-12	0	05/01/2012	05/01/2012	10173,55	190330,14	180156,59	8477,96	200	04/01/2012	05/01/2012	05/01/2012
12-gen-12	0	12/01/2012	12/01/2012	6358,47	194569,12	188210,65	8477,96	200	11/01/2012	12/01/2012	12/01/2012
13-gen-12	0	13/01/2012	13/01/2012	4662,88	194569,12	189906,24	8477,96	200	12/01/2012	13/01/2012	13/01/2012
18-gen-12	0	18/01/2012	18/01/2012	4662,88	189482,35	184819,47	8477,96	200	17/01/2012	18/01/2012	18/01/2012
06-feb-12	0	06/02/2012	06/02/2012	7630,16	239926,19	232296,03	8477,96	200	03/02/2012	06/02/2012	06/02/2012
08-feb-12	0	08/02/2012	08/02/2012	18574,71	342509,48	303934,77	8477,96	200	07/02/2012	08/02/2012	08/02/2012
09-feb-12	0	09/02/2012	09/02/2012	59345,70	385747,06	326401,36	8477,96	200	08/02/2012	09/02/2012	09/02/2012
10-feb-12	0	10/02/2012	10/02/2012	13564,73	239078,40	225513,66	8477,96	200	09/02/2012	10/02/2012	10/02/2012
13-feb-12	0	13/02/2012	13/02/2012	13988,63	272990,23	259001,60	8477,96	200	10/02/2012	13/02/2012	13/02/2012
15-feb-12	0	15/02/2012	15/02/2012	9325,75	209829,44	200503,69	8477,96	200	14/02/2012	15/02/2012	15/02/2012
09-apr-12	0	09/04/2012	09/04/2012	5510,67	217803,50	212372,83	8477,96	200	06/04/2012	09/04/2012	09/04/2012
11-lug-12	0	11/07/2012	11/07/2012	11021,34	228057,05	217035,71	8477,96	200	10/07/2012	11/07/2012	11/07/2012
27-lug-12	0	27/07/2012	27/07/2012	5934,57	209405,55	203470,98	8477,96	200	26/07/2012	27/07/2012	27/07/2012
06-ago-12	0	06/08/2012	06/08/2012	8901,86	206438,26	197536,41	8477,96	200	03/08/2012	06/08/2012	06/08/2012
19-set-12	0	19/09/2012	19/09/2012	5510,67	225089,77	219579,09	8477,96	200	18/09/2012	19/09/2012	19/09/2012

Figure 23 Valuation tool for transportation: Robotrader's results

Example of Transport Capacity Contract Valuation

For instance, the analysis of the main transport capacity contracts was done; its results are shown as follows. (Exact values and data cannot be provided due to privacy policies).

NCG (Germany) – PEG NORD (France)

For NCG-PEG transport the analysis was done from 2008 until 2013, taking into account that Robotrader is not able to forecast the settlement prices. In the following graph, it is represented the relation between the total profit or losses gained and the margin obtained for the analysis period for each of the considered activation spread. It is possible to conclude that with an expected margin lower than the transport tariff it is possible to make more profit.

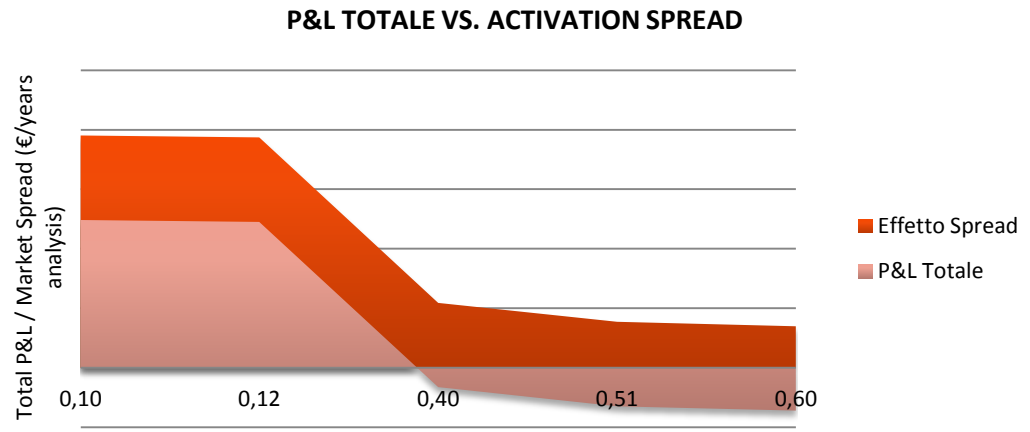


Figure 24 Total P&L/Market Spread vs. Activation spread obtained from the optimal transport capacity contract usage during the period of analysis – NCG-PEGN

This second graph instead represents the annual profit and losses gained from the use of the capacity contract; it is possible to visualize it for different activation spreads.

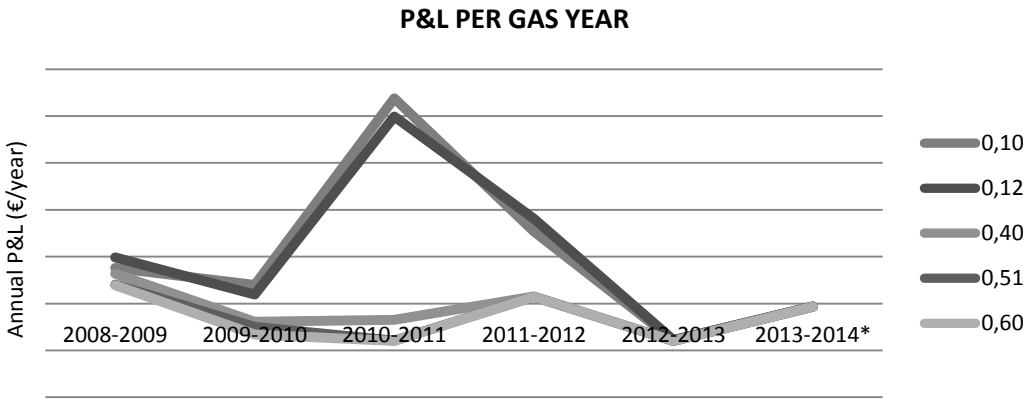


Figure 25 Annual P&L per gas year (October – September) obtained from the optimal transport capacity contract usage during the period of analysis – NCG-PEGN

TTF (Netherlands) – NCG (Germany)

For TTF-NCG the analysis was done from 2008 until the present year, taking into account that Robotrader is not able to forecast the settlement prices. In the following graph, it is represented the relation between the total profit or losses gained and the margin obtained for the analysis period for each of the considered activation spread. It is possible to conclude that with an expected margin lower than the transport tariff it is possible to make more profit.

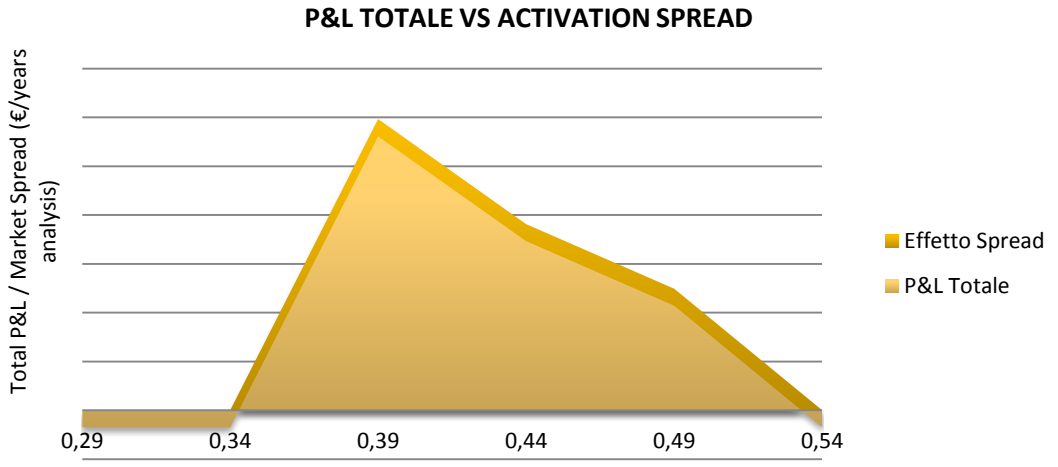


Figure 26 Total P&L/Market Spread vs. Activation spread obtained from the optimal transport capacity contract usage during the period of analysis – TTF-NCG

Moreover, the second graph shows a decrease on the total P&L per gas year which remained stable, and approximately 0 €/year, since 2011.

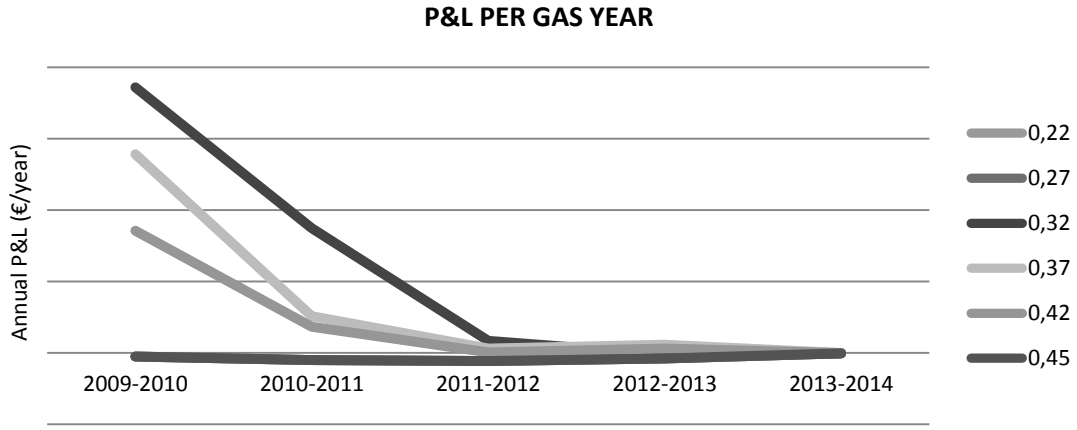


Figure 27 Annual P&L per gas year (October – September) obtained from the optimal transport capacity contract usage during the period of analysis – TTF-NCG

Analysis of Results

In both cases from the results, we can conclude the following:

1. To optimize the margin obtained from the use of the contracted transport capacity, activation spread should be even lower than the transport tariff, since the high number of deals will allow the company to cover the transportation costs. In other words, the activity of trading must be focused on increasing the quantity of deals rather than on the unitary spread gained from them. Furthermore, these deals are always on spot market, i.e. products as day ahead, weekend, bom and month ahead.

2. It is evident that, as mentioned before, the profit gained from the use of long term contracted capacity has been decreasing in the last years, as seen in the Figure xxxx.

Limitations of Robotrader

The main limitation of this tool, which in fact is not related to limitations of its development but of the realism of its results, stands in the fact that Robotrader simulates a trader which is able to see all the settlement prices during a day and all deals are supposed to be feasible, i.e. there is a probability of 100% to get the deals closed.

On the other hand, there are particular products that cannot be included in an automated program since it depends on the ability of the trader to negotiate with other shippers; these products include nonstandard profiled supplies, so the quantity of natural gas can vary hourly and the length of these supplies is standard.

Moreover, some analysis must be implemented and integrated in order to include the limitations on volumes traded; it must be considered that every bid has a volume and a price associated which limits the quantity that can be traded at a determined price. Robotrader is not able to consider if a deal can be closed or not depending on the volume offered by the counterparts.

Finally, Robotrader does not allow the company to perform forecast of future value of contracts, since prices' forecast are not available, so it is not possible to use it as a tool for future risk evaluation.

5. ANALYSIS

In the following section it is developed an analysis of European Natural Gas Outlook to 2020, in order to identify the possible scenarios which a company like ENOI S.p.A. may face in the coming years and define the prospects for midstream segment. Finally, thanks to all the analysis already performed the possible and implemented strategies to release or value the long term capacity contracts

PROJECTIONS FOR EUROPEAN NATURAL GAS MARKET UNTIL 2020

European Commission's answer to the question *what do we want to achieve?* is: "The EU aims to fully integrate national energy markets by 2014, to give consumers and businesses more and better products and services, more competition, and more secure supplies. Progress has already been made: consumers can switch suppliers for gas and electricity, and suppliers must provide clear explanations of terms and conditions. Work still to be done includes aligning national market and network operation rules for gas and electricity as well as making cross-border investment in energy infrastructure easier"[26]. The main objectives for the creation of an Internal Energy Market are shown in the following figure.

Figure 28 Objectives of IEM[27]

In the following section, the different market drivers will be analyzed in order to identify the potential scenarios in which a company as ENOI S.p.A. may operate in the following 10 years.

Demand

The milder 2012, along with anaemic economic growth and higher gas prices, indeed saw an 8% decline in demand. Neither the economic nor the pricing environment has improved in 2013, and demand is estimated to have declined by 2%. Seasonally-adjusted gas consumption has actually lost ten years of gains, and a few countries, such as the United Kingdom, are back to levels unseen since 1995. As mentioned by

[26]European Commission http://ec.europa.eu/energy/gas_electricity/index_en.htm
[27] CEER, Walter Boltz. Vision for a European Gas Target model, State of discussion. Brussels, 28 June 2011

the International Energy Agency (IEA) in its World Energy Outlook 2012: "Europe takes almost a decade to get back to 2010 levels of gas demand".

In fact, the International Energy Agency also points out that the economic crisis, persistent high gas prices and the still-unabated growth of renewable energy completely changed the prospective of growth on consumption, and some analysts consider a recovery to 2010 levels by the end of this decade quite optimistic[28].

After the long freeze a slow thaw is under way for the European economy. Across the 28-strong European Union, GDP will stagnate this year (after falling by 0.5% in 2012) and expand by 1.4% in 2014 and by 1.9% in 2015, according to new forecasts from the European Commission on November 5th 2013. Across the 17-strong euro area a recovery has got under way following a double-dip recession lasting 18 months, but it is a weak one. For 2013 as a whole GDP will fall by 0.4% (after declining by 0.6% in 2012). It will then rise by 1.1% in 2014 and by 1.7% in 2015.[29]

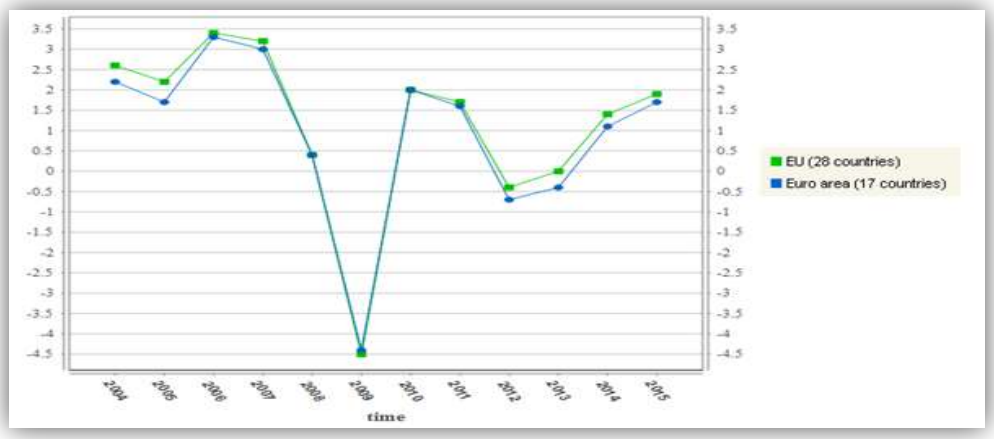


Figure 29 Real GDP Growth Rate (volume) – Percentage change on previous year[30]

Anyway, even if overall prospects for natural gas consumption are negative it is important to analyze all consumer sectors individually.

1. The residential/commercial sector, the backbone of European gas consumption with approximately 40% share of the market, as seen in Figure 19, looks unlikely to make huge gains, given only modest population growth and governmental efforts to incentivize energy efficiency in existing and new houses. Moreover, increasing prices in most countries are prompting users to lower thermostats whenever they can. Unless the European climate gets much colder, which is opposite to the global warming, there is little hope for major gains in this sector. The temperature effect helps to explain the basic stagnation of expected demand from the regional distribution networks. It is assumed that

[28] IEA (International Energy Agency) – A lost decade for European natural gas?: http://www.iea.org/newsroomandevents/news/2013/may/name,37375,en.html
[29] The Economist – Taking Europe's Pulse: http://www.economist.com/blogs/graphicdetail/2013/11/european-economy-guide
[30] Eurostat: http://epp.eurostat.ec.europa.eu/tgm/graph.do?tab=graph&plugin=1&pcode=tec00115&language=en&toolbox=data

temperatures will be in line with the average for the last ten years and that the number of heating degrees days over the winter will be more or less the same as in the previous thermal years. In summary, companies are counting on stabilization for the upcoming years.[31]

2. Industry has never quite recovered from the economic crisis. Indices on production in manufacturing are below their 2007 levels in most European countries, which are translated into lower energy consumption. Only an improved economic outlook or much lower gas prices would trigger a recovery in this sector, and both look relatively unlikely in the medium term.

3. Power generation is where much hopes lies, even if it was the major driver for the recent sharp drop in demand. Gas-fired plants are suffering not only from low growth in electricity demand, but also continued strong growth of renewables, including an almost 30% increase over the first nine months of 2012, and a lack of competitiveness against coal-fired plants. Ironically, the United States, where low gas prices are prompting a switch from coal, is exporting cheap coal and triggering a golden age of coal in Europe. For instance, Walter Boltz on his webinar "The European Gas Market at a crossroads" states: "Europe has also looked for the cheapest fuel, which is coal; basically the import of coal from the US has increased massively over the last year and this coal has replaced gas used for power generation. When you look at the generation mix between gas and coal in 2010 you saw that we used about twice as much gas as coal and in 2011 we used about the same amount of coal and gas; so coal has gained a significant market share in power generation".

   Moreover, the progressive improvement is expected to occur in the efficiency of power generation. The efficiency of the overall power and steam generation system is expected to increase by around 12 percentage points and to reach 66% by 2020. This is the combined effect of adopting more efficient technologies and co-generation of heat and power.[32] In the World Energy Outlook 2012, by International Energy Agency, is stated: "A steady increase in hydropower and the rapid expansion of wind and solar power has cemented the position of renewables as an indispensable part of the global energy mix; by 2035, renewables account for almost one-third of total electricity output".

   In the following graph, it is shown the demand outlook until 2025 by the International Energy Agency on its presentation of the Medium-term oil and gas markets 2011.

[31] IEA (International Energy Agency) – A lost decade for European natural gas?: http://www.iea.org/newsroomandevents/news/2013/may/name,37375,en.html
[32] European Comission - Energy Outlook 2020: http://ec.europa.eu/dgs/energy_transport/figures_archive/energy_outlook_2020/execsum.pdf

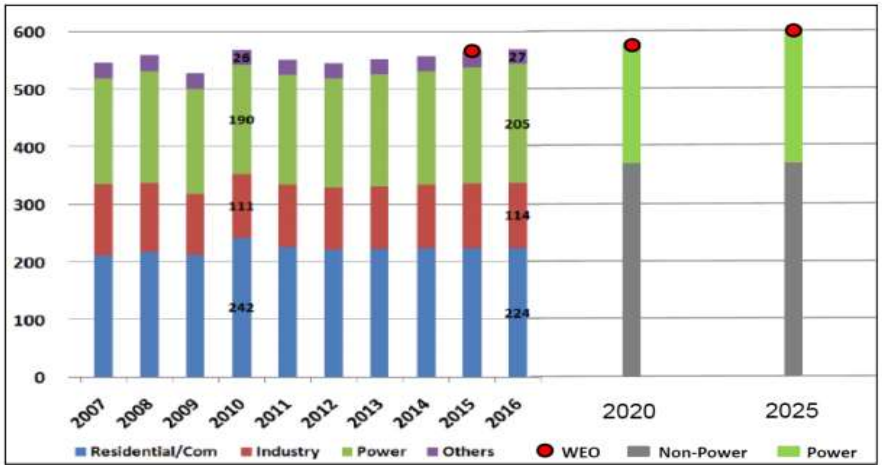


Figure 30 Gas Demand in Europe, by sector, in bcm: 2007-2025[33]

Seasonal and geographical spreads

Giving a certain projection of prices at which gas will be traded in European hubs may be inaccurate, since it depends on numerous factors which are in continuous development such as European and national legislation and regulations, the demand in the different delivery points, the available capacity to transport gas to the delivery points, the gas available in the system, the market concentration level, the control to market access, the evolution of the energy mix in Europe, between others. During our interview, Roberto Borghetti stated "Considering the current level of gas consumptions in Europe, the low forecasts of their increase, the overcapacity and also the projects already confirmed and ongoing (which will bring to an additional increase of capacity available), market prices should stay relatively low and also spread with that."

In this regard, the Energy Information Agency (EIA) also listed some key factors affecting gas market prices and supplies in Europe: Competition for LNG from Japan, China, and South Korea; pricing structure indexed to oil; Norwegian gas production; supply disruptions due to regional conflict in Algeria and Libya; non-uniform pricing by Russian gas suppliers; limited storage capacity availability, especially in northwest Europe; coal price in Europe are affected by abundant supply due to favorably priced US exports of coal; and, electric power sector changes following the Fukushima disaster and the retirement of nuclear power reactors, and environmental initiatives by the carbon price.

A deeper analysis is given as follows, trying to go into the current and potential development of all the mentioned factors.

First of all, as it has been explained before, legislation is pushing Europe towards a Gas Target Model in which there is only one entry/exit point, which means creating a unique market; anyway it is almost impossible to be achieved in the next years. However it may be possible that 7 regional markets will be consolidated by 2015; therefore, pricing systems in different parts of the European market will be

[33] IEA, Presentation of the Medium-term oil and gas markets 2011, R.H. Jones, London, October 2011; WEO New Policy Scenario 2010

interlinked through free trade and network integration but prices at the different trading points in Europe may not be identical. Wholesale price differentials between the different locations are justified essentially by transportation costs.

On the other hand, the increase of transport capacity to move natural gas from one point to another may be another factor playing a major role in driving the price of natural gas. Nowadays, many EU countries do not have interconnected networks to their neighbors, but are still required to implement a market structure based on multiple suppliers and multiple customers. Particularly in Eastern Europe, this is a significant problem to the development of a competitive market. Regarding Europe as a whole, clearly this problem must be solved through much greater interconnection capacity before a single European internal market can be realized; therefore, there will be an even greater need than at present to strengthen the gas infrastructure to allow for the free flow of gas according to both physical requirements and also pricing signals. From a purely trading point of view, the more flexibility there is in the transportation system, the more optionality there is to trade between hubs and to arbitrage differentials, thereby equalizing both the price and the volumes across areas larger than the individual hubs. Some of these changes will result from legislation linked to the Gas Target Model and some from commercial investment by system operators or even shippers.

The future organization of the common internal EU gas market at medium term, according to 3rd Energy Package, foresees all market areas to be organized as entry-exit points with virtual hubs with uniform capacity allocation mechanisms ("bundled products")[34] and with an effective management of possible congestions in the network.

Moreover, last year ACER's monitoring report had found out that legacy long-term capacity allocation contracts cause system congestion and pose a major barrier to integrate wholesale gas markets in southern and central-eastern Europe[35]. In order to solve cross border transport capacity congestion, ERGEG set some guidelines for the European natural gas grid operators which went into force last September (see Chapter 2). They state that unused capacity at interconnection points between adjacent entry-exit systems should be brought back to the market to be reassigned in the course of the regular allocation process, in order to reduce contractual congestion.

Most European natural gas grid operators were behind the 1 October deadline for fully meeting the EU-wide congestion management procedures' requirements: the oversubscription and buy-back, surrender of capacity and long-term use-it or lose-it (UIOLI), while conflicting implementation of the rules already caused disagreements between two member states. If congestion remains, EU states can apply the use it or lose it on the Day-ahead contract from July 2016. It is evident that CMP will definitely add much more transport capacity to the system.

As in North America, wholesale gas prices will vary with time more than at present because gas demand and supply varies faster than oil, though less than electricity. Such variations, especially transparent predictable ones, will encourage investment in flexibility mechanisms, especially storage.

The overcapacity in the system would create an increase of the flexibility and resilience of a given network; therefore traders would have more optionality to move gas from one point to another or the same facility

[34] See more details: http://europa.eu/legislation_summaries/energy/internal_energy_market/l27077_en.htm
[35] See ESGM 30 November 2012

to supply a market in summer or winter, and consequently competence to get the capacity would be reduced. In fact, Roberto Borghetti thinks that "spreads should be generally staying low from a geographical point of view because of the availability of much capacity on the cross border routes, and on summer-winter point of view, because of great availability of storage capacity."

Furthermore, it should be highlighted that Europe is a strongly dependent country in terms of supply of natural gas; its internal supplies, which come mainly from Norway and Netherlands, have experienced a decrease by approximately 0,8% in the last two years[36]. In the following figure it is represented the production/consumption ratios in the world, in which it is evident that Europe is the most dependent area in the world, since it needs to import more than the half of its natural gas necessities.

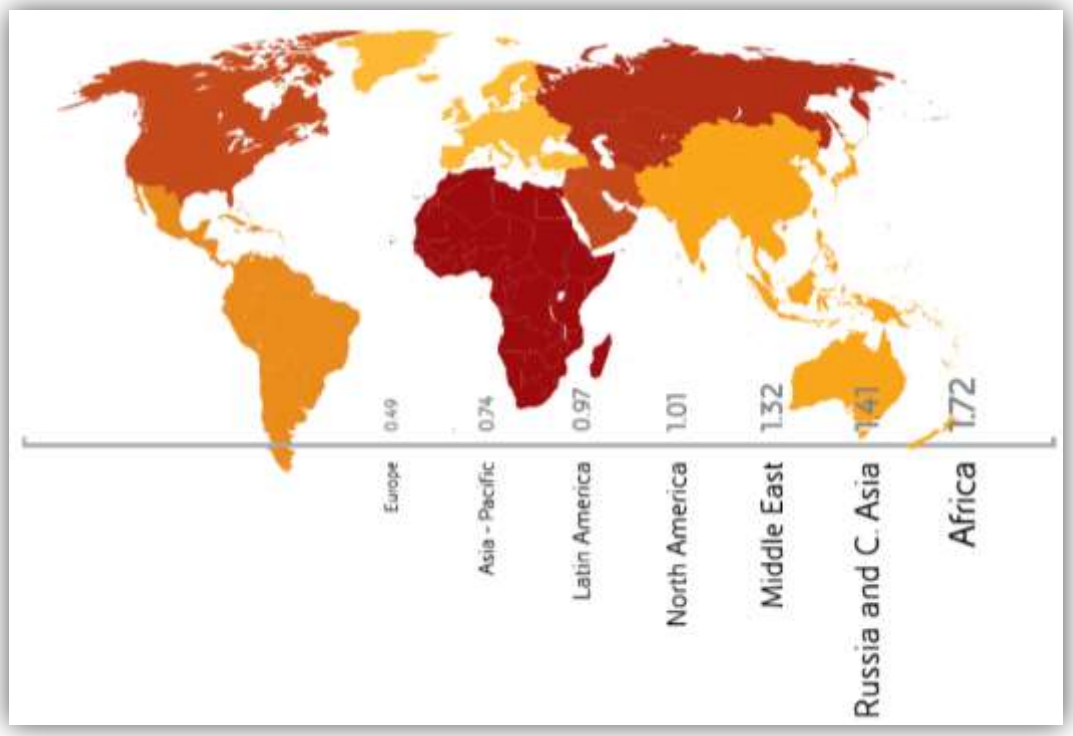


Figure 31 Production/Consumption Ratios 2012[37]

Nevertheless, projections in these terms are not so optimistic; unless European countries authorize the production of shale gas, it will not be able to see major shares of conventional or unconventional gas to be developed that fast. Therefore, production/consumption ratios will stay relatively low, since the demand seems to increase steadily in the following years and internal supply seems to keep stabile. In the following figure, historical data of European production and consumption is shown.

[36] Data from World Oil and Gas Review 2013, ENI
[37] World Oil and Gas Review 2013, ENI

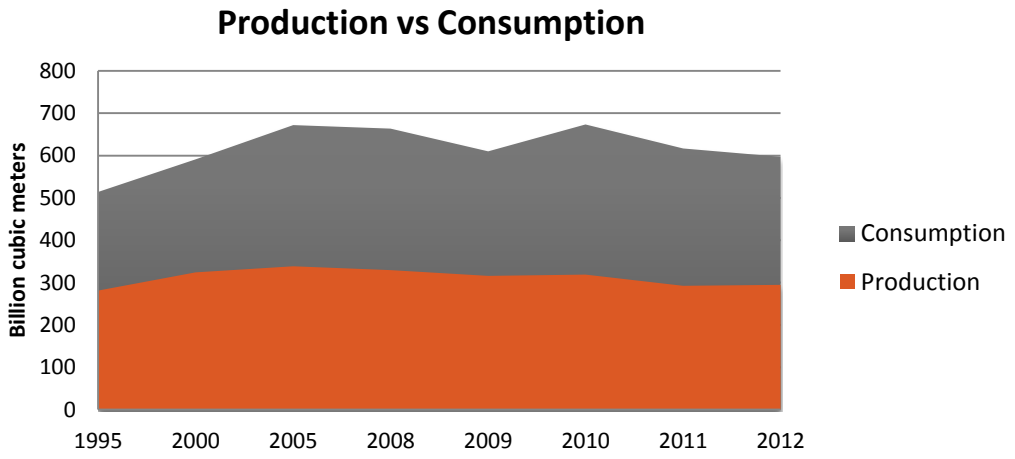


Figure 32 Production in Europe 1995-2012 (bcm) [38]

Thus, it is important to highlight that Europe is currently facing two main problems: a high and increasing dependence on external gas supply and a dependence on a few number of suppliers, in other words high market concentration. It may be important then to analyze the situation of current and potential natural gas suppliers.

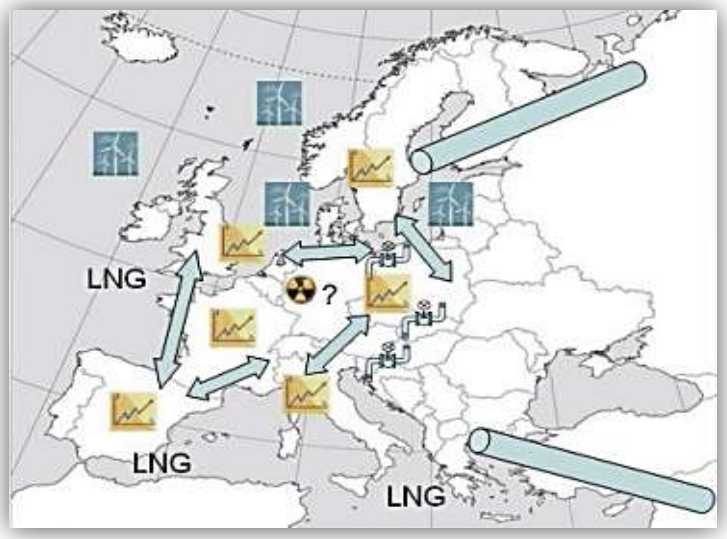


Figure 33 European Natural Gas Supply

On one hand, the shale gas revolution in North America, where the unexpectedly rapid ramp up in the production of shale gas has reversed the previously observed decline trend and restored that market to effective self-sufficiency. On the other hand, the entry into service of significant new liquefaction capacities, in particular in Qatar, which had been built with a view to filling the emerging supply deficit in the United States, and whose volumes have effectively been displaced onto the world market by the rapid increase in shale gas production.

[38] Data from World Oil and Gas Review 2013, ENI

For instance, Walter Boltz on its webinar *The European Gas Market at a crossroads* states that there will be a changing landscape of world gas trade until 2017; he makes special emphasis on US being a net exporter by 2017, Australia's LNG exports increasing, as well as Russian exports, exports from Africa increasing mostly of shale gas but also from new sources discovered, and Europe's import dependence growing heavily. It seems that Europe has to put more efforts not only on diversifying its supplies, which also means increasing its upstream transport capacity and the construction of regasification plants, but also on fostering its attractiveness as a market against Asia whose demand is increasing.

Anyway, it is expected that overall supply will remain constant since the demand will remain stable, so it will not have a greater impact on wholesale prices; anyway in countries where supply is limited as Eastern Europe, prices may be higher. Thus, a price differential between different market areas may be explained by the difference on supply options, spreads between Western-Central Europe and Eastern Europe may be higher than between Western-Central European countries.

In addition, the increase on upstream capacity may have an impact on seasonal spread, since it will be able to better manage the flows of natural gas by increasing the flexibility and resilience of a given network and increasing the number of potential supply routes. In this regard, Roberto Borghetti argues that "the big availability of transport capacity from upstream zones is decreasing the summer-winter spreads, as the importers can increase/decrease the import quantities optimizing their take or pay obligations by transports, as the capacity used for big part of the year is less than totally needed."

Tariffs for transport and storage capacity

Transport and storage capacity tariffs may increase due to investments on infrastructures that may be amortized across the coming years, inflation, workforce costs, optimization mechanisms that can be imposed by the authority and even strategic decision when the level of income of the transport and storage operators is lower than expected.

Therefore, taking into account the investments that may be done (previously exposed) and the foreseeable positive inflation and increase on costs, it is expected to experience an increase on transport and storage tariffs.

In effect, as mentioned by Roberto Borghetti, "transport tariffs should basically increase: technological and workforce costs are increasing because of inflation. Also, the merging of market areas decided by European Authorities will require investments in physical infrastructures which shall be repaid someway by the market operators".

In terms of storage, Ermanno Baraggia mentioned in the interview that "there are many ongoing projects for the construction of storage sites; this will increase the tariffs of the storage capacity to the highest level of the history, since these costs must be somehow split between the different market operators". Instead, Roberto Borghetti stated "In my opinion storage tariffs could decrease, in order to be closer to the seasonal spreads; there is anyway a limit that can't be overtaken, given by current cost for the management of the storage activity, otherwise the SSO would be operating in loss. On the other side I foresee a further evolution of the storage products offer to the market, to meet shippers' need of flexibility at acceptable costs. Examples of this are storage auction with prices liked to summer-winter spreads, or, more

innovative, is the recent offer by EWE of storage capacity priced by a basic + performance fee. Anyway the feedback from the market is still to come for a proper evaluation".

Legislation

There are several political and regulatory efforts now in place to help deliver efficient and competitive energy markets within Europe. This may seem like an awkward structure to achieve the goal but is in keeping with the European Political model and, although it may take a little longer to reach the target, the result is sure to have been thoroughly researched and tested and, of course, approved by all the Member states.

The political driver behind all these efforts is the goal to transform the European gas market by integrating the various national markets, into a single liberalized market. The Council of European Energy Regulators, they set out their vision of the future gas market structure, the Gas Target Model. Their vision is illustrated in Figure 34 and acknowledges that for now it is actually unrealistic to hope that Europe could have just one entry/exit system; however they think it is possible to have 7 regional markets by 2014-15. Their vision for a sustainable Internal Energy Market in gas is founded on three pillars: to enable functioning wholesale markets; to tightly connect the markets; to enable secure supply patterns.

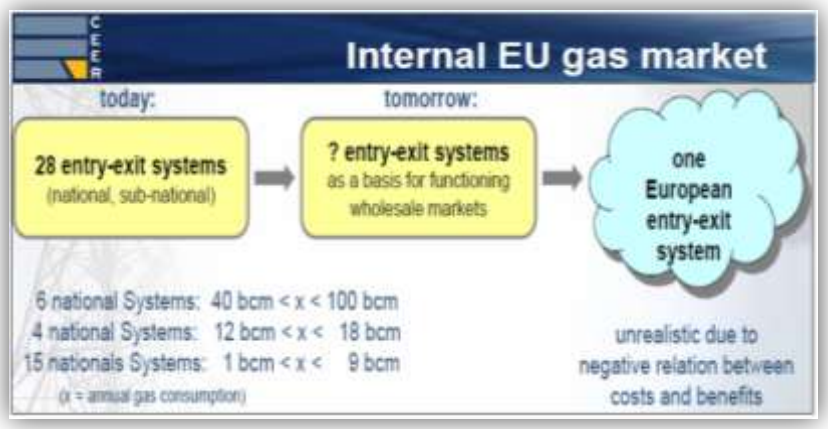


Figure 34 European Gas Target Model vision: towards a single EU gas market[39]

Not surprisingly, as this vision is set out by regulators, the GTM focuses on operational issues such as enhancements in capacity allocation, congestion management, interoperability, balancing and transport tariffs to achieve market linking and integration.

Roberto Borghetti mentioned: "European authorities will continue with the application of rules decided on international basis, bringing to a bigger quantity of transport capacity available for the market and increase opportunities for shipper to transport gas on a very short basis. I don't think that the merging of market

[39] Council of European Energy Regulators (CEER)

areas on 7 total is Europe is feasible in time as planned; it could take place but slowly and reasonably with bigger number of MAMs".

The current version of CAM and CMP shouldn't give big effects in the medium term, so limits should be made stricter in order to be really useful for the planned purposes. In the figure 35, the evolution of Network Codes until July 2013 is shown. CMP should have been implemented by EU member states by October 2013, and CAM must be implemented no later than November 2015. Instead Interoperability, Balancing and Tariffs Network Codes are still in development.

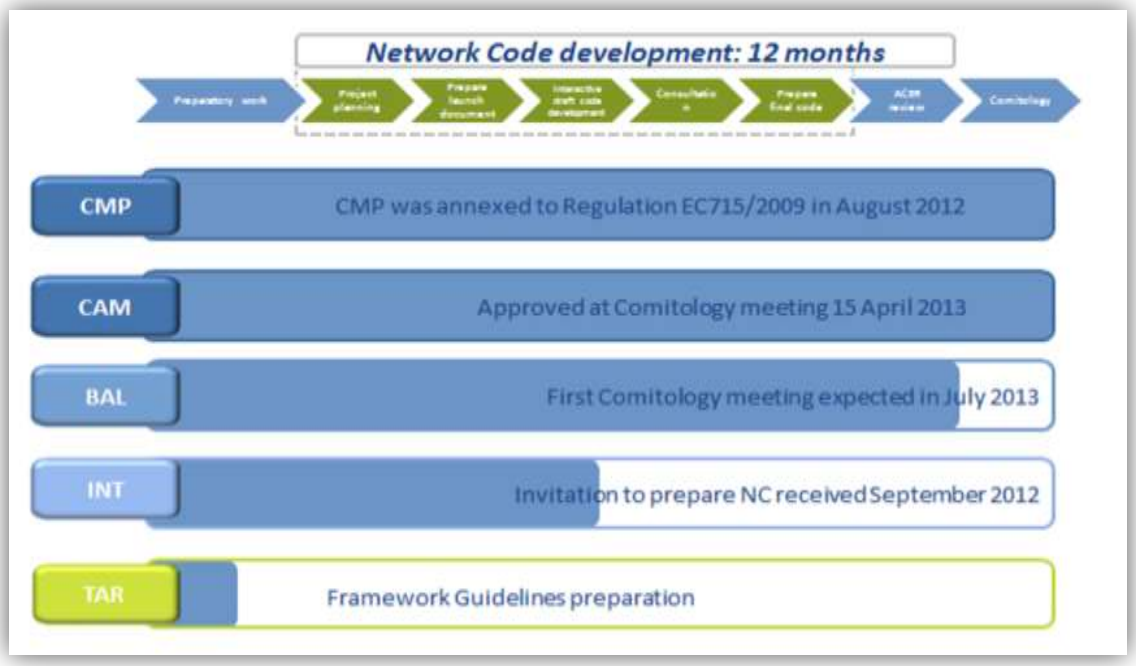


Figure 35 Network Code to EU law - Current Status[40]

Walter Boltz, CEER Vicepresident stated on his presentation *Vision for a European Gas Target model*[41]: "FG and Codes on CAM, Balancing, etc. and CMP guidelines have the aim that capacity between those functioning markets will be used as effective as possible leading to improved price alignment between the markets. This will maximize efficiency and thereby public welfare in / from supply & trading on a European scale by making sure that all gas assets (procurement contracts, storage, transport) are used in the most economic manner".

The future organization of the common internal EU gas market at medium term, according to 3rd Energy Package, foresees all market areas to be organized as entry-exit points with virtual hubs with uniform capacity allocation mechanisms ("bundled products")[42].

[40] Comission for Energy Regulation (CER) - Impact of EU Network Codes on the Gas Market, Gas and Electricity Workshop, July 2013
[41] CEER, Brussels, 28 June 2011
[42] See more details: http://europa.eu/legislation_summaries/energy/internal_energy_market/l27077_en.htm

Therefore, the Commission adopted the first EU-wide gas network code on the allocation of capacity in gas pipelines on 14 October 2013 (see Chapter 2). The Network Code determines that the operators of the gas grid apply harmonized auctions, a transparent and fair way of ensuring third party access. The auctions are held at the same time, under the same rules and selling the same products across the EU, facilitating the acquirement of access to pipelines for interested network users in Europe. Online-based booking platforms shall be established to support the allocation process. Moreover, capacity products will be standardized and will be sold in a bundled manner, eliminating the risk of being stuck with capacity rights for just one side of a cross-border point.[43]

Figure 36 CAM Implementation Timeline[44]

Anyway, the main question is: How will existing 'unbundled' capacity contracts be treated? In this regard, CAM NC states that upon entry into force of the CAM Regulation (expected Aug/Sep 2013), Shippers and TSOs shall undertake reasonable endeavors to bundle capacity via contractual arrangements.

Sector Concentration Level

As already explained before, the liberalization process favored the entrance of new market players, being midstreamers one of them. Since then, midstreamers have played an important role on the development of the market; the attractiveness of this segment due to the high margins that were perceived by earliest 2000 pushed the consolidation of companies dedicated to trading of natural gas, even banks and public entities.

Market concentration level in the midstream segment seems to keep on increasing due to the many efforts on obtaining the best price for each ones' clients. In effect, Roberto Borghetti mentioned "The main direct effect of a liberalization is the increase of the trading companies working in such market; an outcome is the

[43] European Commission http://ec.europa.eu/energy/gas_electricity/codes/gas_en.htm
[44] Comission for Energy Regulation CER - Impact of EU Network Codes on the Gas Market . Gas & Electricity Workshop. 3rd July 2013

reduction of margins for operations, as it is foreseeable an increase of offers to retailers for the same product".

Moreover, if wholesale prices are set by hub pricing, it will be possible to trade gas at prices set by the supply and demand of gas at that moment, taking into account future supply and demand as it is assessed. This will reflect the true market value of gas in a dynamic way.

For instance, the main drivers of an increase on competition in the European natural gas market are:

- Sourcing diversification and increased competition within segments (e.g. LNG and producers in midstream and retail)
- Markets will be even more liquid, result of a more efficient and effective capacity allocation and congestion management.
- Traders arbitraging between markets
- Interconnection and reverse flow projects (PL, N-S, BEMIP)
- Market-based balancing systems, harmonized tariff structures and interoperability (level playing field)

In a competitive market it is important that prices are subjected to competitive forces to ensure they are cost-reflective. In particular, price regulation of a potentially competitive market will distort the ability of the market to respond to supply interruptions, reducing collective security. Futures prices represent an opportunity to reduce price exposure for several years (up to say five) but, even when the market is fully mature, are unlikely to be able to offer insurance for one business cycle of 15 to 20 years.

SCENARIOS FOR EUROPEAN NATURAL GAS MARKET 2014-2020

As mentioned by Cosimo Corsini on its paper *Strategic choices for midstream gas companies*: "The strategic challenge facing midstreamers is exacerbated because it is unclear how gas-pricing mechanisms might evolve in the future. As well as the determinants of basic gas-market economics, there are several key uncertain external influences on the future gas price. These include the production strategy of upstreamers, the evolution of the global LNG market, the completion of new planned import and transport gas infrastructure into Europe, and the regulatory push toward further market integration. In addition, technology, particularly the extraction of shale gas, will drive supply in unpredictable ways".

Market integration, sourcing diversification and effective market rules should enable competitive markets to develop in order to benefit EU consumers and allow sustainable business models for market players.

It is generally believed that in the next years the performance of gas marketing activities in a company will be at risk based on weakening demand due to macroeconomic headwinds, possible new hikes in the oil-linked costs of supplies, large gas availability on the marketplace and ongoing competitive pressures leading to continuing price and margin erosion. Those trends are expected to negatively affect future results of operations and cash flow also considering the take-or-pay obligations provided by the companies' long term supply or capacity contracts.

However, the main incognita is: Where will we be when Gas Target Model is finally implemented? Looking forward, one can identify, in broad terms, three possible scenarios:

Scenarios	Demand	Supply	Transport & Storage Capacity	Transport & Storage Tariffs	Midstream Concentration Level
Optimistic	↑	↑	→	↓	→
Reference	→	↑	↑	↑	↑

Optimistic Scenario

This first scenario supposes an increase on demand to the values of 2010, an increase on supply, not many investments on infrastructure and the incompliance of CMP, a reduction of transport and storage tariffs and thus a lower market concentration level. In this scenario, midstreamers would still struggle to get high margins as before; this is because the market is almost fully liberalized and pricing mechanisms point to the market-based pricing.

Reference Scenario

The reference scenario, which takes into account the trends in the market already analyzed, represents the most probable outlook for the coming years.

First of all, as mentioned in the last section, demand seems to increase steadily since Europe is not recovered from the crisis yet and gas-fired plants are losing against coal-fired ones. Moreover, supply sources may increase due to European efforts to diversify it and due to the changes in world landscape. In terms of transport and storage capacity, they definitely will increase because Gas Target Model supposes the investment on cross-border pipelines to interconnect different market areas and allow the free flow of gas in Europe, and on the other hand because of the implemented Network Codes which obliges TSOs to implement use-it-or-lose-it policies and to implement oversubscription. Besides, tariffs will tend to increase due to inflation and amortization of the investments on storage and/or transport capacity. Finally, market concentration level will stay high, or will even increase, due to the high liquidity of markets and the vertical integration of many market players.

Midstreamers have been harmed by the market liberalization processes and they will keep on suffering its effects, since the main efforts of the EU are put in creating a market with standard products and tariff mechanisms. Moreover, the uncertainty of market future leads to a more short-term approach rather than a long-term one. Midstreamers, then, must be ready to diversify the risk by integrating vertically, by looking different ways to add value or by diversifying its assets and supply portfolio.

With this scenario, midstreamers will hardly get high margins due to trading activity; once markets will tend to stabilize and equalize prices differentials will not be the same as before market liberalization. Furthermore, storage will neither be exploited to get high margins from season spreads; the increase of upstream capacity will make producers able to optimize its supplies.

STRATEGIES TO DEAL WITH LONG TERM CAPACITY CONTRACTS

As it was stated in the presentation of the problem, the main target of this project is, besides analyzing the current and future trends of the European natural gas market, to figure out which measures can be implemented by midstreamers in order to release or give value to the existing long term transport and storage capacity contracts and reduce the evident losses that may occur due to the disuse of this capacity.

Strategies to Release Long Term Capacity Contracts

Trading companies owning long term capacity contracts have been dealing with this situation since 2010; since then the efforts to avoid take advantage of this capacity have been infinite. The main strategies implemented so far by these companies are:

- Renegotiation: shippers have tried to renegotiate the products, duration and/or tariffs of the contract with the TSOs and SSOs.

- Termination: operators and shippers agree on the termination of a contract when there are some specific terms and conditions by which in particular situations it may be possible to terminate a contract. An example of these situations is an increase on tariffs higher than inflation.
- Legal Succession: it allows the owners of the capacity to find interested and eligible counterparties to assign transport or storage capacity, even partially or for a fractioned period.
- Secondary trading, transfer of capacity: it allows the owners of the capacity to transfer its capacity to a third party. Its main difference with legal succession is that the transfer of capacity implies an economical compensation.
- Assets swap: two shippers agree on interchanging a specific capacity contract at a price agreed by both parts.

However, in most of the cases the process has been tedious and slow; it is not sure that operators are collaborative in this regard and finding a third party to acquire such capacity may take some time, since the most of the shippers are not interested on making a commitment for a long term due to the current situation of the market. Releasing a contract, except in the case of termination, reduces the potential loss due to the disuse of these capacities; a renegotiation may include a reduction of tariffs, and secondary trading and assets swap may suppose the offer of these capacity at a value much lower than real one.

Strategies to Value Long Term Capacity Contracts

Sometimes a company decides to keep the long term capacity contracts, whether because they were not able to release it using the above mentioned strategies or because they decided to keep these capacities in their portfolio.

In the interview section it was asked to the Logistics experts which strategies may be implemented to face with the decreasing margins obtained by the use of transport and storage capacity; these are their advices for companies working in the midstream segment:

- Paolo Pasquini: “Selling directly to end customers having the possibility to make upstream supply and taking advantage of trading to take home a part of the margin taken by the transport and storage”.
- Alexander Frank: “Regulators should step in to make capacity affordable and attractive”
- Alexandros Papageorgiou: “Increasing traded volumes, business diversification, subletting contracted capacity, indexing TOP contracts at hub and not at oil and lowering Take or Pay”
- 2B Energia: “Covering the capacity contract with an existing supply contract, subletting the infrastructure, renegotiating contracts with the transport/storage operators”
- Roberto Borghetti: “Increase of the commitment on the downstream market; offer of flexibility product to the market; offer of capacity on the secondary capacity market; terminations (where possible) or attempts of renegotiations”

First of all it is important to highlight, as explained in Chapter 1, that owning long term capacity for both storage and transport allows a shipper to have greater flexibility; this flexibility can be exploited not only to be positioned in a market area and arbitraging geographical and seasonal price differentials, but also to use it on behalf of its clients.

Therefore, a shipper may give value to a contract by using it to add flexibility to the system; i.e. a shipper can offer flexible products to different market players, whether other shippers or final clients. Like so, it is given a brief explanation of the possible strategies that a shipper may utilize to give value to its long term capacity contracts.

- Offering flexible products in downstream segment: Shippers can also integrate vertically and start to sell natural gas downstream; for example if a shipper owns capacity at an entry point in Germany it can serve industrial customers located in that market area.
- Offering flexible products in midstream segment: shippers positioned in a market area can take advantage of this situation to offer to other shippers products in market areas in which they do not have access or in periods when natural gas in scarce or costly. Moreover, they can

4. CONCLUSIONS

European gas market is undergoing radical change, a process that is catching midstream players in a classic strategic squeeze; answering at the question *What can they do about it?* is though since market outlook is not 100% clear, but definitely there are different ways by which a company in this segment must survive. Nevertheless, it must be said that it is almost impossible for shippers or traders to get high margins as in 2008.

In terms of portfolio management midstreamers need to make sure that they include in their analysis the systematic evaluation of their assets (usually, long term capacity agreements), including transmission pipelines, both domestic and interconnections; storage, both seasonal and short-term; and LNG terminals. There are complex options that need to be understood in order to determine on the one hand the additional value that an asset can give to a gas portfolio, and on the other hand the value of that asset independently. It is important then to highlight the different ways by which long term contracts can be exploited, even in though market context.

In addition, all the analysis performed may serve as an alert for midstreamers to look for different ways to diversify its business; the extent of the challenges facing midstreamers as the market continues to evolve requires these firms to develop a clear perspective and strategy to sustain their role in the value chain. Midstreamers need to design, and perhaps redefine, their value proposition if they are to succeed.

Finally, I would like to highlight the importance of an internship opportunity in the learning process of any professional; ENOI S.p.A. have given me the opportunity not only to being part of a company and using my knowledge on behalf of their mission, but also to see the broad picture of market which was completely unknown for me and understanding how strategic managerial decisions are critical for the correct operation and success of a company.

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