European University Institute

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES

EUI Working Papers

RSCAS 2011/38

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES

Florence School of Regulation

A VISION FOR THE EU GAS TARGET MODEL:
THE MECO-S MODEL

Jean–Michel Glachant

EUROPEAN UNIVERSITY INSTITUTE, FLORENCE
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
FLORENCE SCHOOL OF REGULATION

A Vision for the EU Gas Target Model: the MECO-S Model

JEAN–MICHEL GLACHANT

EUI Working Paper **RSCAS** 2011/38

ISSN 1028-3625

Printed in Italy, June 2011
European University Institute
Badia Fiesolana
I – 50014 San Domenico di Fiesole (FI)
Italy
www.eui.eu/RSCAS/Publications/
www.eui.eu
cadmus.eui.eu

Robert Schuman Centre for Advanced Studies

The Robert Schuman Centre for Advanced Studies (RSCAS), created in 1992 and directed by Stefano Bartolini since September 2006, aims to develop inter-disciplinary and comparative research and to promote work on the major issues facing the process of integration and European society.

The Centre is home to a large post-doctoral programme and hosts major research programmes and projects, and a range of working groups and ad hoc initiatives. The research agenda is organised around a set of core themes and is continuously evolving, reflecting the changing agenda of European integration and the expanding membership of the European Union.

Details of the research of the Centre can be found on:
http://www.eui.eu/RSCAS/Research/

Research publications take the form of Working Papers, Policy Papers, Distinguished Lectures and books. Most of these are also available on the RSCAS website:
http://www.eui.eu/RSCAS/Publications/

Florence School of Regulation

The Florence School of Regulation (FSR) is a partnership between the Robert Schuman Centre for Advanced Studies (RSCAS) at the European University Institute (EUI), the Council of the European Energy Regulators (CEER) and the Independent Regulators Group (IRG). Moreover, as part of the EUI, the FSR works closely with the European Commission.

The objectives of the FSR are to promote informed discussions on key policy issues, through workshops and seminars, to provide state-of-the-art training for practitioners (from European Commission, National Regulators and private companies), to produce analytical and empirical researches about regulated sectors, to network, and to exchange documents and ideas.

At present, its scope is focused on the regulation of Energy (electricity and gas markets), of Communications & Media, and of Transport.

This series of working papers aims at disseminating the work of scholars and practitioners on current regulatory issues.

For further information
Florence School of Regulation
Robert Schuman Centre for Advanced Studies
European University Institute
Via Boccaccio, 151
I-50133 Firenze
Tel.: +39 055 4685 751
Fax: +39 055 4685 755
E-mail: fsr@eui.eu
http://www.eui.eu/RSCAS/ProfessionalDevelopment/FSR/

Abstract

The discussion on a target model for European gas network access started at the 18th Madrid Forum in 2010. This model shall provide a unifying vision on the future layout of the European gas market architecture. That vision shall assist all stakeholders in implementing the 3rd EU energy market package on the internal gas market in a consistent way. Here is my proposal for the European gas target model termed MECO-S Model. It is a "Market Enabling, Connecting and Securing Model" describing an end-state of the gas market to be achieved over time. It rests on three pillars that share a common foundation, being that economical investments in pipelines are realized: Pillar 1: Structuring network access to the European gas grid in a way that enables functioning wholesale markets; Pillar 2: Fostering short- and mid-term price alignment between the functioning wholesale markets by tightly connecting the markets; Pillar 3: Enabling the establishment of secure supply patterns to the functioning wholesale markets.

Keywords

Internal gas market; gas network access; gas security of supply: Third energy package.

1. Management summary

The discussion on a target model for European gas network access has been going on for a while now, officially starting with the conclusion of the 18th Madrid Forum in 2010 which invited "*the Commission and the regulators to explore, in close cooperation with system operators and other stakeholders, the interaction and interdependence of all relevant areas for network codes and to initiate a process establishing a gas market target model*".

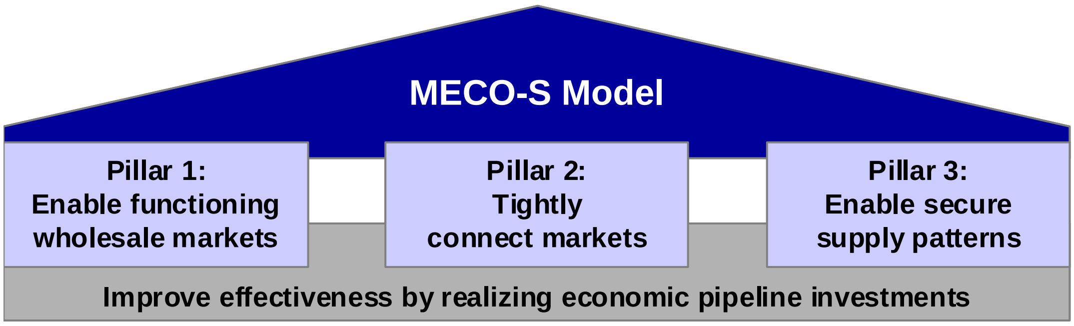
The desired target model shall provide a unifying vision on the future layout of the European gas market architecture. That vision shall assist all stakeholders in quickly and efficiently implementing the 3rd energy market package on the internal gas market in a consistent way.
The following text describes a proposal for the European gas target model with a special focus on market architectures and investment.

The proposed gas target model is termed MECO-S Model.

The MECO-S Model is a Market Enabling, Connecting and Securing Model describing an end-state of the gas market to be achieved over time.

The MECO-S Model rests on three pillars that share a common foundation, the latter making sure that economical[1] investments in pipelines are realized:

- Pillar 1: Structuring network access[2] to the European gas grid in a way that enables functioning wholesale markets so that every European final customer is easily accessible from such a market.
- Pillar 2: Fostering short- and mid-term price alignment between the functioning wholesale markets by tightly connecting the markets through facilitating cross-market supply and trading and potentially implementing market coupling as far as the (at any time) given infrastructure allows.
- Pillar 3: Enabling the establishment[3] of secure supply patterns to the functioning wholesale markets.



The MECO-S Model aims at the creation of a number of functioning wholesale markets within the EU (together enabling easy access to all European final customers of gas), at connecting these markets tightly in order to maximize short- and mid-term price alignment between those markets, at enabling secure supply patterns to those markets and at making sure that all economic investments in gas transmission capacity are done.

1 I am well aware of the fact, that there are other than economic reasons to invest into pipeline capacity, notably security of supply. The latter is dealt with under pillar 3.

2 I.e. the "commercial network model"

3 By shippers

Pillar 1 shall realize the goal of enabling functioning wholesale markets. Such markets are an essential feature of the internal market since they contribute to efficiency in managing gas and gas-related assets such as supply contracts, storage and gas-fired power stations. Additionally and no less important such markets are an essential basis for retail competition. Finally, functioning wholesale markets are a basis for market based balancing and market coupling. Without functioning markets, both of these concepts could not be harnessed.

Pillar 1 is realized by structuring Europe into markets that are sufficiently large[4] and well connected to sources of gas[5] so that the emergence of a competitive traded wholesale market is likely. Where necessary with a view to that goal, member states have to create cross-border markets in order to increase market size and connectivity. Two models are presented to realize these markets, both based on the entry/exit regime:

- market areas, that implement integrated balancing zones reaching down to the final customers; and
- trading regions that implement integrated wholesale markets which are tightly connected to national end user zones.

Both models may be used in parallel in Europe, whereby the market area model appears attractive for larger member states and the trading region model has specific merits for smaller member states that need to cooperate cross-border in order to gain sufficient market size and connectivity.

Pillar 2 aims at maximizing the efficiency of managing gas and gas-related assets on a European scale by making sure that the existing interconnecting infrastructure is put to the best use. The resulting tight connection of markets will lead to price alignment[6] between European markets as far as the – at any time existing – infrastructure allows. Price alignment virtually unifies all European markets by enabling cross-portfolio optimisation via those markets on a European scale. Measures are foreseen so that TSOs do not suffer any loss from price alignment.[7]

Pillar 2 is firstly realized by implementing hub-to-hub transport products and a number of harmonisation measures that make inter-market supply and trading significantly easier. The allocation of hub-to-hub transport products shall be by auction for the mid- and short-term markets and by first come first serve for the intra-day market.

Secondly it is proposed to implement pilot projects for day ahead market coupling to explore if the theoretical benefits of market coupling can be realized in practice for gas. If so, day ahead market coupling would become an integral part of the MECO-S Model.

Pillar 3 aims at enabling secure supply patterns to the European markets. Specifically Pillar 3 creates the preconditions for underpinning long-term supply contracts with appropriate transport products, taking into consideration that currently about 30% of all gas consumed in Europe crosses more than one border point. Additionally pillar 3 aims at providing a market based solution for realizing transport security of supply where collaboration with adjoining markets is required.

Pillar 3 is realized by foreseeing the execution (if demanded by shippers) of new long-term transport contracts. These contracts can be requested periodically in an open season style process for the full term of interest to the shipper, e.g. 15 years. If in the process the demand for long-term capacity proves higher than the availability of such capacities, then capacities will be expanded by investment if economical. In order to allow for such investment, the lead time for allocating long-term capacity shall always be at least as long as the time required for expanding capacity. Since in this structure capacity can always be expanded, long-term capacity is not a scarce good anymore and

---

4 I.e. ≥ 20 bcm of final customer consumption

5 I.e. at least three different sources of gas

6 I.e. the reduction of price spreads between markets

7 This is made sure by allocating any uncovered regulated tariffs directly to the beneficiaries.

auctioning of that capacity can be avoided.[8] Allocation questions at the fringe[9] of the allocation problem can be solved by an optimisation procedure.

In order to deal with shippers interested in long-distance transport (e.g. from a European border point to the next but one market) link chain products are introduced. Link chain products are packages of (hub-to-hub) transport products at several border points on a continuous route that may be requested by the shipper as a whole and are allocated at the same level of capacity on all requested border points. After allocation they may be used as separate hub-to-hub capacities.[10]

In the area of transport security of supply the instrument of the fallback capacity contract is introduced. It provides a means for member states to secure that sufficient capacity in a neighbouring market is made and kept available in order to cater to the security needs of said member states. Under a fallback capacity contract a TSO (A) of the member state in need of redundant transport capacity (as defined by a competent authority) books the required capacity long term with a neighbouring TSO (B). TSO B charges to TSO A only that part of the capacity that is not booked by shippers directly with TSO B (hence the name "fallback contract"). TSO A allocates the cost for this security measure to final customers in his market.

The common foundation of the MECO-S Model is economic investment. Investment aims at supporting the other pillars in realizing their respective goals e.g. in contributing to the creation of functioning markets (by new interconnection to these markets) or in contributing to improved price alignment between markets (by new/expanded interconnection between these markets). Several issues are discussed in the study regarding investment including the structuring of investment appraisal processes, the evaluation of investment in interconnection and intraconnection[11] pipelines and the financing of investment.

The key results on investment are:

- Investment appraisal and the allocation of long-term capacity should always (even on existing systems) be an integrated process in the style of an open season (see also above under pillar 3).
- The quantity of capacity that shall be reserved for the mid- and short-term market shall be created (and hence invested) *on top* of any investment required to satisfy (economic) long-term capacity requests.[12]
- The economic appraisal of investment shall take into account the return from long-term contracts as well as the value[13] expected to be generated by price alignment due to the capacity reserved for the mid- and short-term markets. The cost for mid- and short-term capacities that are not directly recovered by tariffs shall be allocated to the beneficiaries.
- In case TSOs declare that they can/will not invest in an otherwise economic investment project, the project shall be tendered to the market. The scope of the tender would be to build and finance the pipeline (or other asset) against a yearly fee paid long-term. After construction, the realized project would be integrated into the operational responsibility of the respective TSO.

---

8 There are also some structural problems that would arise, if long-term capacity was auctioned.

9 E.g. if 250 new capacity is requested and only 220 new capacity is economical.

10 I.e. link chain products are not captive transport; instead they are a means for a shipper to request (and get allocated) a meaningful and matching set of capacities to realized a long distance transport pattern in Europe if he so wishes.

11 I.e. debottlenecking pipelines within a market.

12 As opposed to turning down some requests for long-term capacity on grounds of reserving capacity fort the mid- and short-term markets.

13 I.e. social welfare.

2. Introduction, analysis of problems and operationalisation of goals

2.1 Introduction

As Director of the Florence School of Regulation I have been invited by E-Control, Bundesnetzagentur and NET4GAS, to give a vision on the EU Gas Target Model (GTM). This view is a personal one while I do thank all people having discussed it with me or having offered me contributions. Nevertheless the goal of this paper is not to nicely sum up the good and the bad, the pros and the cons of the many possible angles when addressing a controversial and disputed issue like the one of a gas target model for the EU. Various theories, analytical frames, combinations of interests or pure visions are possible and legitimate. I let the other people expressing themselves – better than me – what they believe or prefer. I am only willing here to give what became my own view after months of frank and friendly debate.[14]

In addition, ACER is expected to coordinate the Gas Regional Initiatives (GRI's), giving them top-down guidance, as expressed in the EU Commission's Communication on the Future Role of the Regional Initiatives.

A GTM will be a non-binding, top-down framework of principles and characteristics that are as broad as possible, providing a description of how the market is expected to develop lets say til 2020. This would serve as a tool for guiding and assessing the ongoing process of developing Framework Guidelines and Guidelines that are the foundations of the broader Network Codes under the Third Energy Market Package. In addition, its objective will also be to guide and assess the ongoing process of the Gas Regional Initiatives. A GTM will furthermore have to take due account of the wider energy policy objectives with regard to sustainability and supply security.

The 3rd energy market package set into force in 2010 defines a number of structural elements towards realizing an architecture for the internal market for gas.
The most notable among these elements being the mandatory entry/exit organisation of TSO network access and the processes that shall lead to a harmonized system of European TSO netcodes.

Now, many different stakeholders at European and national level are working on the implementation of the 3rd package. These include:

- Lawmakers in the 25 member states with natural gas
- Regulators in the 25 member states with natural gas
- ACER
- ENTSOG
- The EU Commission
- Members of comitology committees
- TSOs, DSOs and their associations
- Suppliers, wholesalers, retailers and traders and their associations

---

[14] I particularly thank Sergio Ascari (FSR gas advisor), Jacques de Jong and Leonie Meulman (Clingendael International Energy Programme), Albrecht Wagner (Wagner, Elbling and Company), Christophe Pouillon (GRT Gaz), Margot London (Eurogas) and Stephan Kamphues (ENTSOG). I want however to underline that the vision delivered in this paper is only mine and does not bind or tie any of these persons. Sergio Ascari, on the one hand, Jacques de Jong and Leonie Meulman, on the other hand, will publish separately their own conclusions.
I also want to warmly thank the experts of the Austrian and German National Regulatory Agencies notably: Michael Schmöltzer, Markus Krug and Stefanie Neveling. However the vision that I am expressing is mine and not theirs.

A challenge for these implementation efforts is that the 3rd energy market package does not include a comprehensive vision of the organisation of network access across the European Union.

For instance, the 3rd energy market package does not tell:

- if every single TSO shall set up its own entry/exit system or if the number of entry/exit networks shall be smaller then the number of TSOs;
- if the TSO balancing system shall include distribution networks or not;
- if entry/exit network access shall extend from transmission systems down to distribution networks or not;
- etc.

Depending on the answers to these questions certain issues need to be addressed on a European level or not.

- For instance if the TSO balancing system shall include distribution systems, the European balancing harmonization has a much wider scope (and requires much more detail) then otherwise; also national action would be required obligating DSOs to blend into that system.
- Or if the entry/exit systems shall include distribution systems, then action on a national level will be required to deal with the corollary cost (and tariff) issues for DSOs (which may receive a cost allocation from TSOs in such a system).

Now the risk is that – within a very limited timescale – a lot of policy makers and other stakeholders while doing their best to implement the 3rd energy market package – interpret and implement the package in a different way or work on different strands of implementation that – after having been elaborated in great detail – contradict each other.

This problem is aggravated by the fact that – inter alia due to resource limitations – not all European netcodes envisaged at the moment (e.g. for capacity allocation management, balancing, interoperability, tariffs, etc.) can be developed at the same time.
It is in this potential problem area where a gas target model can play a beneficial role by helping to make visions about the future of the internal gas market transparent and by enabling discussions about unifying those visions.

The discussion about the need for and the pros and cons of a gas target model started around the beginning of 2010 and found its first point of culmination in the conclusions of the 18th Madrid Forum in September 2010 which invited "*the Commission and the regulators to explore, in close cooperation with system operators and other stakeholders, the interaction and interdependence of all relevant areas for network codes and to initiate a process establishing a gas market target model*".

Based on this conclusion CEER started – by the end of 2010 – the process of developing a gas target model for Europe.

This paper is a contribution to that effort.

Before this introductory chapter is concluded a few words on the position of a gas target model are due.

A gas target model is not foreseen in any existing European legislation. Therefore it will be non-binding. This does not mean however that is not required or can not play a vital role in developing the internal gas market.

The role foreseen for the gas target model at the time being is that of a communication tool. It shall assist stakeholders in discussing the future of the internal gas market, in relating their work to that future and overall in streamlining the implementation work of the 3rd energy market package.

Unlocking the value of that tool requires the goodwill of all stakeholders. The rewards will be easier and better alignment of implementation work and overall a more successful (i.e. consistent, cost-efficient and quick) implementation of the 3rd energy market package.

2.2 Problems of European market integration

The development of the European gas market under the first and second liberalization packages has been kept under tight monitoring by National Regulatory Authorities and by the European Commission, also through the three Gas Regional Initiative regions. In particular, the 2006 Energy inquiry and several studies have analysed in depth the successes and difficulties of the gas market liberalisation. Overall, this monitoring effort has been mostly national in focus and driven by the national scope of NRA competences and by the institutional role of the EC to address lacking or ineffective implementation of European legislation by Member States. Even the important actions undertaken by DG Competition have usually addressed specific problems, although often with a far reaching impact as in the case of lifting destination clauses of gas supply contracts. In turn, the assessment resulting from the GRI tend to list more problems than successes, and the latter are often limited to pilot experiences, although of some relevance. In other words, the benchmarking of national cases has prevailed so far and European dimension of the market largely remains to be addressed. Most problems that were identified had been at the root of the Third Package itself, yet the Package does not always solve them as such.

It is those problems that shall be addressed by the gas target model as well.

Of course, not all of these problems exist everywhere, but most member states gas markets suffer at least from several of them.

These problems of gas market integration are:

- Ineffective congestion management procedures, also limiting access by new players and reducing the utilization factors of some facilities;
- Diverging capacity allocation criteria among the markets, often not market based but privileging access by incumbents' long term contracts, and sometimes foreclosing access to markets;
- Lack of coordinated procedures for access to adjacent infrastructure, except for traditional suppliers and infrastructure owners, hampering the provision of new cross-border supplies, notably from far origins;
- Reduced transparency of access tariff setting criteria, notably as regards tariff design, with a certain risk that tariff systems may overweight on transit flows with respect to domestic destinations;
- Lack of coordination of operational procedures, despite progress achieved through the EASEE-gas process, starting from the setting of the gas day and its main sessions and deadlines;
- Diverging balancing regimes, in terms of periods, tools, scope, and relationships with markets, sometimes creating an uneven playing field among national markets;
- In spite of some important achievements, connection practices at borders between Member States and transmission networks still require harmonization, and the lack of Interconnection Point and Operational Balancing Agreements in a few locations still hinders cross border trade and causes balancing problems for shippers;
- Whereas open seasons have become a generalised way of providing the necessary commitments for infrastructure investments, their regulation is still uneven and their planning suffers from lack of co-ordination, thereby jeopardising some supply procurement efforts;
- Whereas gas hubs and exchanges have fast developed in Europe, their legal and regulatory status as well as the criteria and transparency of price formation have been uneven, which has been one important (if not the main) reason of competitive markets developing at very different speeds.

- Limited interconnection infrastructure has also led to substantial isolation of e.g. the Iberian Peninsula, whereas the Baltic Republics and Finland are still not connected with the rest of Europe and totally dependent on Russian supplies.

Even though several issues have been solved or eased in some parts of Europe, a recent Commission non-paper[15] noticed that several of them are still fully applicable. In particular, a few quotes are relevant for wholesale markets:

- "interconnection capacity remains insufficient notably as regards the Baltics and the Iberian Peninsula";
- "Although Western Europe profited from the availability of cheap LNG, Central and Eastern Europe only received small amounts of that additional supply as gas systems remain relatively isolated from the rest of the continent. As a result, the difference of average prices between Central and Eastern Europe on one side and Western Europe on the other has increased from € 0.55 / MWh in 2008 to € 4.86 / MWh in 2009";
- Further, "even if interconnections exist, the absence of harmonisation of market rules in the different Member States leads to market segmentation and higher transaction costs, which constitutes a barrier in particular for smaller players. This can even lead to the inefficient situation where gas and electricity flow from high-price areas to low-price areas. Furthermore, too many hindrances remain to trade across borders: in gas integrated cross-border transmission services are not yet available, booked but un-used capacity is not offered to other market parties and trading and balancing rules create obstacles to market integration; in electricity the implementation of market coupling is still at an early stage and trading in longer term products can be difficult".

As a consequence the non-paper stresses the need to implement the 3rd Energy Package, and most thoroughly concludes:

- "In gas, the allocation of transmission capacities should become more efficient and market based. It should also facilitate trade across the border, rather than maintaining the common system applied today, where gas is traded at the border between Member States. At the same time harmonised mechanisms should be put in place to resolve congestion to the benefit of all network users and consumers. For example, cross-border transport capacities today are rarely ever fully used, even though price differences between adjacent markets should provide sufficient incentives to do so. Congestion management mechanisms will aim at resolving such contradictions and bring unused capacity back to the market. Artificially splitting up of markets by means of illicit instruments such as destination clauses in supply contracts or by applying specific conditions for transit of gas flows should no longer be tolerated".
- Moreover, "More interconnection capacity is needed to trade gas and electricity freely from Lisbon to Helsinki and from Bucharest to Dublin". "For gas, progress has been made since the January 2009 supply crisis which revealed dramatically the cost caused by the missing links, but overall the situation remains largely insufficient both from a security of supply perspective and from an internal market perspective".

2.3 A few criteria to assess the level of internal gas market integration towards 2014

Before a GTM is outlined, it would be useful to explore possible criteria for assessing the different options available and, especially, for later monitoring progress achieved on the way towards connecting the various markets into finally a single EU gas-market. These criteria will have to be:

- clear and objective so that their achievement can be monitored by observable measurable indicators;

[15] Non-Paper "The Internal energy market – time to switch to a higher gear", DG Energy, 2011.

- not too general in order to maintain their effectiveness and recognizing regional differences;
- independent of the measures adopted to foster their achievement, which will be discussed in the following sections.

I basically suggest three groups of criteria, i.e. relating to supply-security, to price-alignment and market integration and to infrastructure and investments. It should be underlined as well that in order to implement the assessment-mechanism, an adequate monitoring procedure is required together with a clear allocation of tasks. I will briefly discuss some of the key features of the three groups and the monitoring system.

2.3.1 Ample and secure supplies

Ample and secure supplies across the EU market are to be considered as a primary criterion for assessing the effectiveness and efficiency of the market. A distinction could, briefly speaking, be made at three levels: operational, technical and strategic. The first two are already covered in the Gas Supply Security Regulation with the "1-in-20" and "n-1" requirements for the operational and technical aspects. The more long-term oriented strategic level is not covered. This could be done via a periodical (forward) review of the EU gas supply structure, distinguishing for instance between both the commodity supply contracts reflecting market parties evaluation of market conditions, risks and their own positions (LT, OTC, Spot) and on the other hand the underpinning transmission, treatment and storage arrangements. Such a review could then be used as a tool to analyze the working of a GTM. The kind of indicators that are useful at this level may incorporate the market shares of main suppliers to the EU, if needed, specified by regions, the roles of the main importing wholesale companies together with the extent to which they are able to renew and replace their supply contracts and the conditions under which they are able to do so.

2.3.2 Price alignment and market integration

Using ***price indicators*** as a critical success factor for market integration is politically speaking a very easy and welcome tool. But it is also a very risky one, as underlying definitions and market structures are determinant factors for price formation and comparisons. A variety of price-information is available, rating from spot-prices in day-ahead markets and hub-prices for shorter-term transactions via commodity-only or transmission-including prices to end-users, all being regulated or not, with or without tax.

Price levels per se could be seen as one indicator of a successful and competitive GTM. Assessment however is not easy when the increasing globalization of gas markets with its unexpected or underestimated developments is taken into account, together with the uncertain relationships with related markets such as oil, coal, carbon and electricity. Public policies and investment cycles and the related expectations are playing major roles as well. Price levels per se are therefore a less reliable indicator.

Price comparisons, alignments and convergence are maybe more useful criteria for assessment, but always need an in-depth understanding of the underlying factors that are determining them. This having said, a number of considerations have to be taken into account when using price data:

- As gas transactions are largely based on long- and medium-term contracts, changing supply/demand conditions will not emerge immediately and lead to price changes. Only renegotiation of contracts will do, depending on the degree of competition. Moreover, in many EU markets end-use price regulation still exists. More immediate changes in prices can be expected in the traded markets.

- In theory, a hub-to-hub market can be regarded as properly working if prices in the hubs do not differ; this is called the absolute "Law of One Price" (LOP)[16]. If prices differ, it is often concluded that markets are not properly integrated. Yet, it may be that area spot prices vary in a systematic manner, reflecting structural differences between the markets; then the relative LOP holds. Differences may include transportation costs and levels of taxation. Prices in these markets may also only converge after some time, reflecting differences in arbitrage opportunities. Market integration could then be measured as the degree to which prices have converged after some days, or the degree of convergence after one day.
- Prices and the cost of transmission. Marginal transmission costs are generally rather small as markets can often be driven to equilibrium with limited net variations in transmission patterns, provided interconnections are not congested. If prices differ more than justified by marginal transmission costs, congested interconnections could play a role, lagging further market integration. This could then require a further discussion on solving congestion or expanding interconnection-capacity.
- Prices and liquidity. Sources of market liquidity may be manifold as market parties are always trying to balance their own supply/demand balances, using e.g. secondary markets, swaps, redirecting LNG or transferring title to inventories, using flexibility of local production, involving self-trading large consumers etc. In addition, in the liberalizing market, suppliers will diversify their portfolios to be able to react and exploit market opportunities. Most of these trades are based on OTC. For spot markets, depending on the amount of (potential) sellers and buyers, the liquidity of the market would be a meaningful indicator, in order to assess the potentials for more immediate changes in prices. Liquidity could be measured by the bid-ask spread, the amount of transactions being executed in the spot market, the number of market players, and by churn factors (expressing the ratio of physical transport versus traded volumes). Liquidity-indicators should not be seen as an objective, but merely as an indicator to assess for instance the relevance of market outcomes, i.e. prices.

All these arguments suggest that absolute spot price convergence between areas, hubs or exchanges could be a far too stringent criterion to monitor real progress in market integration. Given the factors above, however, it could be argued that a relative LOP is much more likely to hold and that partial or lagged price convergence of prices is definitely an acceptable second best outcome. Nevertheless, less than full price convergence of spot prices, taking into account actual transport costs, may point to the existence of solvable impediments to intra-hub trade, between existing hubs as well as for the new hubs that are expected to emerge in the Iberian peninsula as well as in Central and Eastern Europe.

As to ***Market integration,*** one could imagine that national and/or regional markets would integrate in the larger space of the EU. Balancing supply and demand over a larger number of such markets would extend the number of (potential) buyers and sellers and give rise to an even more efficient allocation and pricing of gas. Trading volumes of gas crossing borders can be undertaken via inter-area OTC contracts, which would reflect the preferred conditions of the buyers and sellers. The elimination of destination clauses and the recent tendency towards an increased flexibility of take or pay clauses are however reducing this effect, and an important contribution to market liquidity actually comes from usage of such flexibility. A more efficient solution would be to organize inter-area trade via gas hubs, which each would reflect the area's supply/demand balance in national/regional spot prices[17]. By facilitating trade between the hubs, these market outcomes can be rebalanced over a much larger area; this is called hub-to-hub trading. Such a system of hub-to-hub trading will function more or less effectively, depending on a variety of conditions.

---

16 Some would regard the apparent convergence of spot prices in the NW-EU market as a clear example of the LOP.

17 An area can be explicitly shaped as a formal entry/exit area, but it may also emerge as a consequence of geographical borders or the implicit "logic of the market".

Useful indicators might be the **market shares** of the main wholesales companies, the amounts of gas they supply under the different medium and shorter term contracts, their control over essential facilities in markets, like gas storage, LNG regasification terminals and access to exempted transmission pipelines. Regional wholesale gas prices – in comparison with others - are an indicator and a point of departure for raising questions on issues such as the accessibility of these markets via transport routes and their interconnection with adjacent markets; the regional structure of demand; the prevailing contract structures, and, lastly, the potential for abuses of market power. Interpretation of these indicators however is more an issue for competition policy, where the potential for market abuse might be assessed in relation to guaranteeing ample and secure supplies. Incumbents' market shares could be expected to fall as integrated markets become more competitive, but it is also to be noted that incumbents have seen market share reductions in one market and growth in other markets. Most economists agree that in the EU with its limited resource base and needs to import, further industry fragmentation is neither likely nor desirable. Therefore any simplified use of this indicator is risky. The same could be said of simple market structure indicator like the Herfindahl-Hirshmann index.

2.3.3 Infrastructure and investments

It is quite clear that effectively using existing interconnections and other infrastructures is a preferred route for markets to develop. However, market forces, including expanding demand and changing supply-structures, will push for increasing (cross border) transactions and resulting flows and hence might lead to various needs for expanding these infrastructures and therefore new investments. There are a number of indicators suggested and maybe appropriate to assess these needs and assess as well the case for new investments. In a GTM-context these indicators should be considered to play a role:

- **Using capacity load factors**. It could be expected that the opening up of trade and capacity leads to an increase in capacity use, at least as regards the capacity of interconnections between systems or national markets. However US experience has shown a reduced capacity use as a consequence of liberalisation, and a successful integration might well be related to renewed investment efforts. Further, capacity use should primarily follow demand, and if capacity is released to new market players usage by incumbent capacity holders may well be reduced as a consequence. Further, the increasing role of LNG and arbitrage and swaps conducted by means of its diversion may also indirectly affect pipeline load factors. Using capacity load factors therefore are not a very reliable indicator.
- Assessing the options for a more **effective use of existing capacity**, a tradeoff may emerge between the improvement of market liquidity and the need to ensure the availability of long term capacity, which is likely to be necessary to foster adequate investment. This potential conflict has already been noted in the power sector. For example, reservation of some capacity for long term allocation even if allocated by explicit auction could be liable to capacity hoarding or market power abuse, and poses the problem of a regulatory ex-ante decision about capacity shares by duration. There are several ways out of this conflict on the basis of solutions proposed in the electricity sector[18].
- Assessing the needs for new infrastructure capacity should be based on market needs and players should be in a position to take part in a procedure aimed at assessing market demand for capacity increase. The new 10YNDP from ENTSOG is an appropriate framework for this, but it should be going hand-in-hand with more specific Open Season procedures for different transmission corridors. The number of such Open Season procedures on an annual basis could be seen as a

[18] Such solutions already proposed include inter alia the allocation of financial rather than physical transmission rights, ensuring their tradability, so that investors may be able to hedge interconnection as well as energy prices and plan on an integrated basis; a strengthened anti-hoarding provision, whereas all capacity that is not nominated must be sold (Use it or sell it) and used in the implicit auctioning process (e.g. in market coupling, splitting, etc.). In principle any capacity could allocated long term provided that a strong UIOSI clause ensures that it is eventually used or prices are aligned.

useful indicator when market parties are committing to book such capacity. The achievement of this criterion would help to overcome the often highlighted vicious circle, through which hubs are not developed or are not liquid due to limited supply, due to lack of available capacity; but such capacity (including the necessary upstream investment) is hardly developed by market forces if no liquid market is working to reassure investors about the revenues that would arise from their investments. An additional indicator might be to assess the time-period between the successful conclusion of an Open Season and the final investment decision by the TSOs involved. If this time frame is more than a certain period (i.e. 2-3 years), then regulatory uncertainty might be a relevant feature. This could either be a too lengthy permitting process or a regulatory framework that is not able to accommodate shippers and TSOs to go forward. This uncertainty might also be due to cross-border characteristics and bordering NRA-inabilities.

2.3.4 Monitoring and implementation

Considering indicators and criteria for assessing developments towards an efficient and competitive EU Gas Market is one thing. Applying these tools in a reliable and effective way is the next step. It could be argued that defining and collecting the necessary data to do so is a task for ACER. This complies with other tasks of the new Agency, including the ones on monitoring market transparency and integrity in the expanding derivative markets. Analyzing the data and coming to recommendations for policy makers could also be seen as ACER responsibility. It might however be advisable to base these annual reports on independent expert overview and assessment, as ACER-conclusions can only come from its Board of Regulators. The BoR might be getting more stature and trust when an independent expert Market Monitoring Committee would be established and be used as a "first line of action" for applying the indicators and criteria in a coherent and meaningful way.

The desired target model shall provide a unifying vision on the future layout of the European gas market architecture. That vision shall assist all stakeholders in quickly and efficiently implementing the 3rd energy market package on the internal gas market in a consistent way.

The following text describes a proposal for the European gas target model with a special focus on market architectures and investment.

3. The MECO-S Model: an architecture for the gas target model

3.1 The MECO-S Model in a nutshell

The MECO-S Model is a Market Enabling, Connecting and Securing Model describing an end-state of the gas market to be achieved over time.

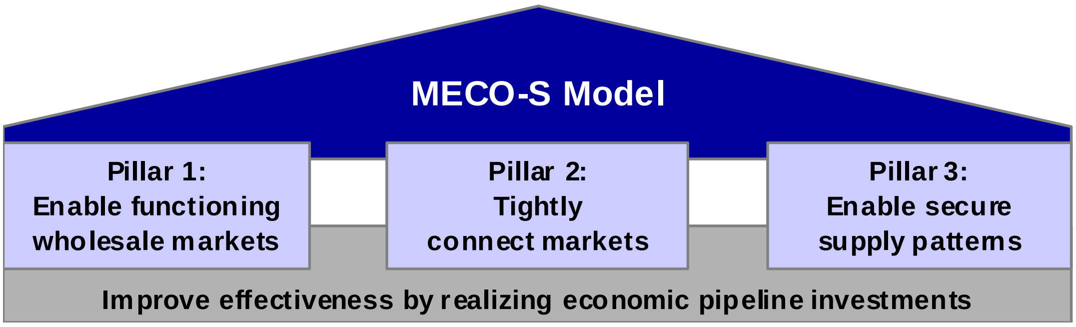
The MECO-S Model rests on three pillars that share a common foundation, the latter making sure that economic[19] investments in pipelines are realized:

- <u>Pillar 1</u>: Structuring network access[20] to the European gas grid in a way that <u>enables functioning wholesale markets</u> so that every European final customer is easily accessible from such a market.
- <u>Pillar 2</u>: Fostering short- and mid-term price alignment between the functioning wholesale markets by <u>tightly connecting the markets</u> through facilitating cross-market supply and trading and potentially implementing market coupling as far as the (at any time) given infrastructure allows.

[19] I am aware of the fact, that there are other than economic reasons to invest into pipeline capacity, especially security of supply. The latter is dealt with under pillar 3.

[20] I.e. the "commercial network model"

- Pillar 3: Enabling the establishment[21] of secure supply patterns to the functioning wholesale markets.



The MECO-S Model aims at the creation of a number of functioning wholesale markets within the EU (together enabling easy access to all European final customers of gas), at connecting these markets tightly in order to maximize short- and mid-term price alignment between those markets, at enabling secure supply patterns to those markets and at making sure that all economic investments in gas transmission capacity are done.

3.2 Operationalisation of objectives for the MECO-S Model

3.2.1 Introduction

The MECO-S Model is a target model for the "big picture" architecture of the gas market.

As a target model it describes a future state of the gas market. The discussion of the way that leads to this state is postponed to chapter 0. The goal of the MECO-S Model is to specify a European vision of an internal gas market that can serve as a common beacon for further implementation work.

When talking about market architecture in this paper, I especially focus on issues that are relevant for implementation in the ACER framework guidelines ("FWG") and subsequently in the ENTSOG network codes for gas transmission systems ("netcodes"). In addition to that, the MECO-S Model addresses some issues that go beyond the planned scope of the FWG, e.g. in the area of new infrastructure. Where required some hints are provided that even surpass the realm of the regulation of network access (e.g. when it comes to describing preconditions of market coupling[22]).

I am choosing the term "market architecture" to differentiate my view from the broader topic of market organisation that would include e.g. the issue of unbundling or aspects of retail market organisation.

The development of the MECO-S Model starts out with an operationalisation of the political goals. Those operationalised objectives – which in my opinion are essential for a well functioning internal gas market – are:

a) every European final customer shall be easily accessible from a functioning wholesale gas market; and

21 By shippers

22 Market coupling requires (among other things) a certain standardisation of the contracts traded on gas spot exchanges. This is clearly not an issue for FWG or the network codes, but a corollary of the application of market coupling for implicit auctioning of day ahead capacity in the MECO-S Model.

b) the alignment of short- and mid-term wholesale gas prices between those functioning wholesale markets shall be fostered as much as the (at any time) existing transport infrastructure allows; and

c) the establishment of secure supply patterns from gas sources to every functioning wholesale market shall be enabled; and

d) the effectiveness of pillars 1 to 3 shall be improved continuously by realizing every investment into pipeline capacity (new and extension) that is economic.

The following sections will elaborate on each of these objectives. Means to realize the ends will be discussed further down in this document.

3.2.2 Functioning wholesale markets

Objective 1: Every European final customer shall be easily accessible from a functioning wholesale gas market.

I assume that a functioning wholesale gas market is an essential prerequisite of a functioning retail gas market. The rationale for this assumption will be provided later in this section.

Due to the scope chosen for the MECO-S Model (mainly FWG, netcodes) the MECO-S Model focuses on the wholesale side of gas markets. I.e. the MECO-S Model does not immerse deeper into the issue of competitive retail gas markets than supporting their emergence through fostering functioning wholesale gas markets.

This focus is also in line with the black letter wording of Article 1: "Subject Matter and Scope" of Regulation EC 715/2009 (i.e the so called Gas Transmission Regulation), where it says in paragraph one that this (EC 715/2009) regulation aims at "*… facilitating the emergence of a well-functioning and transparent wholesale market …*".

I define a **functioning wholesale gas market** (for brevity also termed "market" in the rest of this chapter) as a single price zone that is accessible to incumbents and new entrants on equal (i.e. non-discriminatory) terms[23] and where trading is liquid (i.e. vivid and resilient at the same time), so that it creates reliable price signals in the forward and spot markets which are not distorted, even if substantial volumes are bought or sold in this market (in other words: no single transaction shall distort the market price).

As can be seen from the definition above a functioning wholesale gas market involves the criterion of liquidity but goes beyond that. I therefore prefer to use the term "functioning" instead of the narrower term "liquid" to denote the desired market properties.

I believe that a functioning wholesale gas market requires the following success criteria:

- a sufficient presence of wholesalers active in the market that "inject" gas into that market from national production and outside sources (e.g. from other markets within the EU or from outside the EU) and that engage in liquid trading among each other and with other market participants, optimally entailing an HHI[24] below 2000; and

[23] Such a market could also be called an „open market". For the avoidance of any doubt: This part of the definition of functioning wholesale markets does not hint at gas release programs.

[24] HHI is the Hirschmann-Herfindahl Index that is calculated by adding the squared market shares (in %points) of relevant industry participants. Therefore, a HHI of 2000 could e.g. be achieved by five wholesalers with each having a market share of 20%.

- the combined portfolios of those wholesalers comprising gas from at least three (3) different producers[25] (directly or indirectly); and naturally
- a multitude of final gas customers in that market.

Of course, regulation of gas networks cannot oblige wholesalers to enter a market or to shape their portfolios in a certain way, but it can create structural conditions regarding network access that make it more likely that they will do so.

I assume that implementing the following set of structural conditions would fertilize the later emergence – driven by market forces – of functioning gas wholesale markets:

- organising the market as an entry/exit network with a virtual point, the virtual point being the single place of trading induced change of ownership within that market (This pools trading activities and thus adds to liquidity and the relevance of the price signals generated.); and
- making sure that the market caters to final customers with a combined annual consumption normally[26] not below 20 bcm (This should ensure that the market is sufficiently attractive for a large number of wholesalers); and
- making sure that the market is linked to at least three entry points[27] originating from substantial and different EU or non-EU[28] gas sources or other functioning markets (or any combination of those). This ensures that the required diversity of gas sources is available so that gas to gas competition is spurred.

The MECO-S Model suggests (see below in this text) two optional models to realize the structural criteria listed above.

It is important to note, that all of these criteria focus on the development of a functioning *wholesale* market. I assume (and there is also evidence to that in the market) that a functioning – and therefore competitive – wholesale market that is easily accessible for incumbents and new competitors alike also drives competition in retail markets. This will at least to a certain extent be facilitated by new entrants into the retail market using the wholesale market on the virtual point as a point of price reference (for pricing of offers), as a point of piecemeal procurement (i.e. synchronised with sales activities), as a source / sink for physical portfolio balancing and for risk measurement and risk management purposes. In that regard, a functioning wholesale market may be considered as fertilizing retail competition.

An additional advantage of a functioning wholesale market deserves recognition. Every wholesaler draws on a portfolio of supply contracts and optimizes the use of these contracts according to cost within certain constraints. A functioning wholesale market provides wholesalers with the opportunity to not only optimize their supply contracts (and other assets) within their own portfolios, but also against the portfolios of others – mediated by the market. This yields economic efficiencies that in a competitive market will eventually trickle down to final customers as well.

The question may arise why the MECO-S Model suggests structuring Europe into more than one functioning market? The answer is quite simple. Entry/exit networks are not a physical reality, but a commercial overlay over those physical realities (the physical reality being gas pipelines, not market zones (aka "gas lakes")). Depending on the degree of interconnection of the existing pipelines,

[25] Which shall not only be different sales outlets of the same producer but distinct (groups of) companies.

[26] The 20 bcm are not a hard criterion. If the required number and quality of wholesalers is attracted by a market with lower volumes this market may also qualify as a functioning market.

[27] In this regard interconnection with gas storage would not count as an entry point.

[28] I.e. EU-import points.

maintaining this commercial overlay causes costs[29] (e.g. for constructing improved interconnection and for procuring flow commitments or system energy[30]). The larger an entry/exit network becomes, the higher this cost usually gets[31]. On the other hand, the creation of entry/exit zones is a precondition for the creation of functioning markets in the EU. I think that this dilemma is solved best by designing entry/exit zones as large as is required in order to enable a functioning market,[32] but to avoid the extra cost attached to going beyond that size (unless there is a specific reason to do so – e.g. a small market that is not yet a functioning market may (in order to become part of a functioning market) merge with an adjoining market that already qualifies as functioning before that merger).

Two more interesting questions in the context of creating functioning wholesales markets shall be briefly discussed:

a) Could a number of smaller markets that are tightly connected by bookable cross-market capacity also qualify as a functioning wholesale market?
b) Could a smaller market become functioning by simply "attaching" it via bookable cross-market capacity to a functioning wholesale market?

In my view the correct answer to both questions is "no".

In case (a) wholesale trading is split between various markets that are only connected by time-consuming and costly booking (or bidding) processes with uncertain outcomes which will in the future[33] only be available during given booking windows (e.g. once a year for yearly capacity). This neither enables the liquid trading patterns required to qualify as a functioning market nor does it create the sort of environment that really drives retail competition.[34] It would also prevent the implementation of market coupling since the most fundamental precondition for market coupling is a functioning market in *all* of the coupled markets. Therefore – even if it was physically possible – full price alignment is less likely in such a setup. Just about the same is true for market based balancing, because this concept is also based on a functioning wholesale (spot) market in *every* market where it shall be applied (and not only in the neighbouring market).

In case (b) the situation is better insofar as a functioning market exists in the larger market, but the problems for retail competitors in the smaller market (and in a similar way for all other market participants in the smaller market that are interested in structured procurement or trading – e.g. the operator of a gas fired power plant) remain the same. In fact, in this case the smaller market would not properly work as such, but all trading would occur in the larger one, to which the smaller one would be attached as if it was some sort of distribution zone that is segregated by bookable capacity. Also the

---

[29] I do not discuss the possible scenario here, that upon the creation of larger markets, existing firm capacity is reduced or deteriorated in its quality, because this runs the risk of thwarting the goal of creating functioning markets.

[30] These costs are sometimes termed „debottlenecking" costs.

[31] Additionally, the calculation of entry-exit tariffs always entails some regulatory decision about cost allocation that sometimes trigger disputes as some areas may feel discriminated. As the zones get bigger this risk is enhanced.

[32] Implicitly this means assuming that the value of a functioning market is higher than the cost of achieving it.

[33] After implementation of the principles laid out in the current draft of the FWG on capacity allocation management.

[34] From a retail competitor's perspective being trapped in a non-functioning market is a serious complication of business. Consider a retailer whose risk-aware business model involves the regular purchase of small quantities of gas, in every case including products for the full duration (e.g. one year) of the sales contracts that were successfully concluded. In a functioning market this could rather easily be accomplished at the virtual point of the market. In a bundle of well connected smaller markets the retailer would either have to settle for the smaller number of sellers in his home market or take the risk of setting up a portfolio of cross-market capacities that – if there is a booking window – he can book only once a year. So the retailer finds himself in a position where – before the booking window – he is in a risky position because he does not know if he will get sufficient capacity to fulfil his procurement contracts in adjoining markets or (if the capacity is auctioned off) at what price. Then – in the course of the booking or auctioning process – he has to decide if he books more capacity than he already needs in order to leave headroom for future sales (and therefore procurement) growth (taking on risk) or waive all respective prospects for the coming year. This is not exactly an attractive position to be in.

comments made above on market coupling and market based balancing apply to case b) in the same way.

3.2.3 Price alignment

Objective 2: Alignment of short- and mid-term wholesale gas prices between those functioning wholesale markets shall be fostered as much as the (at any time) existing transport infrastructure allows.

I define price alignment as the conformity of traded[35] gas prices prevalent in the wholesale markets that Europe is structured into under the MECO-S Model.

Full (also termed: absolute) price alignment would be achieved, if traded gas prices[36] (spot and forward, i.e. the full so called “price forward curve” aka “contract curve”) would be identical across all markets at all times. For the avoidance of doubt: This does not mean that the curve shall be flat, but merely that prices would be equal for every delivery date. This means that full price alignment is more than just a high correlation of prices[37] in neighbouring markets.

It is important to note, that conformity of European gas wholesale prices would not mean that retail prices become identical all over Europe. These may still differ[38] due to e.g. different local tax regimes and network cost.

Since I am focussing on the traded wholesale market here, price alignment will by and large be limited to the time horizon that is (actively) traded, i.e. the short- and the closer portion[39] of the mid-term markets. I expect this to suffice in order to achieve the economic benefits outlined below.
The limits to wholesale price alignment are transmission capacities and to a certain extent also transmission tariffs.

If prices are higher in market “A” and lower in an adjoining market “B”, then the degree to which price alignment can be achieved is on the one hand determined by the available (i.e. yet unused) transmission capacity. The higher the available unused transmission capacity for flows from market “B” to market “A” is, the higher the chances for full price alignment are.

On the other hand, it appears that the applicable transmission tariff sets a technical limit to price convergence that can be achieved by cross-market arbitrage. In practice this is only partly true. Consider e.g. the case of a shipper that has booked capacity for a medium term, say a year. Such a shipper could be inclined to use the capacity (as far as it is not required for other purposes) for cross-market arbitrage deals in the spot markets as long as there is a price spread a little[40] above zero.[41]

The benefit of price alignment is an increase in allocative efficiency. Consider that the gas transport business is to a very large extent a fixed cost business. In such a world, the “connection” of wholesalers’ portfolios via the market and their efficient use (brought forth by cross-portfolio optimization via the market) will be best, if the market prices (along the forward price curve) are equal

---

35 I am not talking about pricing formulas in long-term supply contracts here but about prices for standardized gas products bought and sold in the traded wholesale market.

36 Net of all taxes that do not reduce the profit of the seller.

37 This correlation with an intermediate spread might be termed “relative price alignment”.

38 Retail prices would then be subject to the “relative law of one price”.

39 Trading activity drops quickly for delivery periods lying more than say two years in the future.

40 To make the effort worthwhile.

41 If the transmission tariff includes a variable element, the price spread per unit would have to be a little higher then the variable cost for transmission per unit.

for all markets within the EU. As is well known, this also leads to an increase in total welfare (measured as grand total of consumer and producer rent over all connected markets).

The efficiency of the European wholesale market would be maximized, if gas wholesale prices within the EU were identical at all times for all traded products. This condition is apparently not[42] fulfilled at present, despite the (in some places) availability of unused cross-market capacity that could be utilized to this end. Therefore the MECO-S Model foresees measures that enable the best use of the (at any time) existing infrastructure in order to maximize price alignment between markets.
The expansion of pipeline capacity in order to improve price alignment even more than the existing capacity allows is dealt with in the section on new investment.

3.2.4 Secure supply patterns

Objective 3: The establishment of secure supply patterns from gas sources[43] to every functioning wholesale market shall be enabled.

In recent years there has been an intensive debate about the necessity and benefit of long-term supply contracts in the gas industry.

In such a contract a gas wholesaler would buy a substantial volume of gas for a long term (e.g. 10 to 20 years) usually directly from a producer.[44]

By now, it is generally agreed that in the gas industry long-term supply contracts will maintain an important role. Important reasons for this are:

- Due to decreasing indigenous production, Europe will likely[45] have to import an increasing quantity of gas in the future. In many cases this increase in import quantity will have to be procured from new production sources. Developing these production sources (and the sometimes required new pipelines) involves enormous investment. Consequently producers (and in some cases their banks) insist on risk allocation between producers and their customers to risk investing into new production sources and the pipelines required to transport the gas from the well head to a European border point (their argument goes: “no long-term contracts → no investment → no supply”).
- Some producers are increasingly faced with alternative options to sell their gas outside of Europe; long-term supply contracts bind them to Europe which in turn secures supplies.
- Some suppliers are selling gas to certain final customers (e.g. gas-fired power plants, chemical industry) on the basis of long-term supply contracts (with tenure of e.g. 5 or more years).

When analysing the issue of long-term supply contracts in the context of network access in a gas target model, the question arises, what a shipper needs from the transport sector in order to underpin his long-term supply contract?

The answer is straightforward. If long-term supply contracts shall be enabled, long-term transport contracts must be enabled too.

A corollary question is whether these long-term transport contracts need to be enabled only at EU import points or also at cross-market points within the EU. It appears unrealistic that wholesalers will settle for the opportunity to enter the first EU market “behind” the EU import point hoping that they

---

[42] Despite the remarkable tendency towards relative price alignment that has occurred in North-Western Europe in recent years.

[43] Indigenous production, EU border points interconnecting (directly or indirectly) to extra-European production, LNG terminals.

[44] In some cases also from another wholesaler.

[45] Depending on the demand scenario one assumes.

will find sufficient buyers in that market or hoping to be able to transport the gas into other markets by means of short- or mid-term capacity (which they would need to secure in the future at acceptable prices). Therefore I do assume that long-term transport contracts also have to be permitted at intra-EU cross-market points. One has to be careful though to not foreclose short- and mid-term market entry by allowing all of the available capacity to be contracted long-term.

Unfortunately allowing long-term transport contracts on all EU border points and intra-EU cross-market points is not enough. For several Member States at least part of the gas that they consume has to be transported through other Member States before, leading to approximately 30% of European gas consumption crossing at least two Member States' borders before it reaches the place of final consumption. This creates a serious challenge for structuring network access.

Take the example of a supplier buying pipeline gas from an eastern source for a member state in Central or Western Europe. This supplier will have to cross a number of market border points in order to deliver the gas to the market where he intends to sell it. For this supplier only a "chain" of entry-/exit transport products will provide the security she needs to underpin her long-term supply contract. At first glance this issue seems to be at odds with the principal of entry-/exit networks. On the other hand, if Europe is not structured into a single entry-/exit network (which is not foreseen in the 3rd Energy Package, nor in the MECO-S Model nor by no other source I am aware of) one has to deal with the issue of cross-market transports while of course avoiding any "captive transports" as they were practised in many countries in the past (and to a certain extent even nowadays).

The MECO-S Model therefore foresees measures to deal with long-term, long-distance transportation into and within Europe. Regarding long-distance products, these measures shall ensure, that shippers interested in long-distance transport have occasion to simultaneously book (or bid for) whole packages[46] of cross-market capacities[47] at different border points on their intended transport route while still making sure, that every cross-border point may be used separately and gas may be dropped[48] and picked up [49]on all virtual points en route.[50]

A completely different issue regarding secure supply patterns is the issue of redundant transport routes to a market. Some principles for this (esp. the "n-1" criterion) were laid out in Regulation (EU) No. 994/2010. The MECO-S Model devotes a brief section to this issue presenting some further thoughts on the practical realization of international network redundancy.

3.2.5 Improve by investing into pipeline capacity

A foundation common to all pillars of the MECO-S Model is that every investment into pipeline capacity (new and extensions) that is economic shall be realized. There are various economic reasons for investing into transmission pipeline capacity, the most important being:

- to connect a non-European gas source with a European market ("upstream connection");
- to connect gas markets with each other ("interconnection");

[46] The packages shall be allocated for several years at once.

[47] In this process, shippers requesting a package (aka "link chain products") would either be allocated with capacity on all requested border points or with no capacity at all in order to avoid shippers having to put up with capacity fragments unusable for them.

[48] E.g. to be sold on the respective virtual point.

[49] E.g. following a purchase on the respective virtual point.

[50] For the avoidance of doubt: This is not a reintroduction of captive transports through the backdoor, but a reflection of the practical problems of shippers that have to cross several market borders in order to reach the market where their customers are.

- to overcome congestion within a gas market ("intraconnection");
- to create new capacity for delivering gas to additional final customers ("downstream connection").

As can be deduced easily, all of these investments are not isolated in the sense of being objectives of their own, but they serve other objectives. That is why I consider investment a common foundation of the MECO-S Model.

For instance upstream connections, inter- and intraconnections can serve the emergence of a functioning wholesale market, interconnection can help to reduce price spreads between markets and downstream connections cater to the needs of physically supplying more end users. Downstream connection is insofar a special case, as it may also require investment in one or more of the other categories.

In theory one would expect widespread approval for the idea of realizing any pipeline investment that is economical in order to create markets that function better, or to align prices better, and so on. In practice I repeatedly observed widespread disagreement on the actual implementation of investment appraisals and decisions.

Therefore the MECO-S Model (while not trying to completely solve the investment conundrum) provides some hints on structuring and evaluating investment decisions in the areas of interconnection and intraconnection, both of which are of special importance to the creation of functioning markets and price alignment and some additional thoughts on financing investment in pipelines.

I conclude this chapter with some brief notes on the relation of "security of supply" type of investments in gas transmission capacity and "economic investments" in gas transmission capacity. At first glance, these investments appear to serve different purposes.[51] This is true only to a certain extent. Since "security of supply" driven investment creates extra capacity, it will in most cases have an impact on the market and therefore contribute to e.g. creating functioning markets or reducing price spreads between them. In other words: Security of supply investments create redundancy, and redundancy increases competition.

3.3 Outline of the MECO-S Model

The MECO-S Model rests on three pillars that share a common foundation. It aims at the creation of a number of functioning wholesale markets within the EU (together enabling easy access to all European final customers of gas) at connecting these markets tightly in order to maximize short- and mid-term price alignment between those markets, at enabling secure supply patterns to those markets and at making sure that all economic gas transmission investments are done.

The following chapter is devoted to describing the instruments used by the MECO-S Model in order to achieve its objectives. Unless explicitly stated, these measures are not a tool box to be chosen from but essential elements of the MECO-S Model that only in combination realize the models stated objectives.

It is worth reiterating that this paper describes the MECO-S Model as a desirable end state of the gas market architecture. The following sequence of representation of the MECO-S Model's pillars and foundation does not imply that this is necessarily a sequence of implementation. On the other hand, permanently omitting one pillar would lead to a different model with different properties. If for instance the pillar of "functioning wholesale markets" would be skipped, large groups of final customers would be excluded from the benefits of functioning wholesale markets and the adoption of

[51] Since security of supply criteria as defined by Regulation 994/2010 focus on peak capacity, or cater to the needs of selected customer groups under extreme conditions. These are not necessarily the priorities of market oriented infrastructure developers.

market coupling (which could be the capstone of price alignment as will be presented later in this section) would also be prevented for several Member States.

3.3.1 The creation of functioning wholesale markets

There are two ways of organizing the entry/exit zones that are (see above) an essential element of functioning gas wholesale markets:

1. Entry/exit zones that comprise a number of transmission and distribution systems in a single balancing zone (termed "market areas" in the rest of this document).
2. Entry/exit zones that comprise a number of transmissions systems in a single balancing zone which in turn is closely linked to one or several end user zones with their own balancing systems (this model will be termed "trading region model" in the rest of this paper).

Both of these models feature a virtual point (or "hub") where changes of ownership can be effected. Both of these models fit perfectly well into an overall picture of hub-to-hub-trading based on large hubs as has been discussed for a while now in the regulatory community.

The MECO-S Model incorporates these two models as options that may co-exist in Europe. They may be chosen at will in the course of implementation with some need of regional consistency. European consistency is not required though. Markets that implement the market area model can be connected perfectly well with other markets that are organised according to the trading region model.

3.3.1.1 The market area model

In the market area model transmission and distribution networks that are situated in the same geographical area and that are well interconnected, are forged into a single entry/exit system.[52]

From a structural perspective this entry/exit system (i.e. the market area):

- stretches from the entry points into the combined systems to the end user exit points on those systems; and
- integrates distribution systems into the joint entry/exit area (likely involving some cost allocation from TSOs to DSOs and requiring DSOs to send allocation data to the market area balancing entity so that balancing accounts can be settled); and
- features a single virtual point being a fictitious point in the market area where all gas that has entered the market area and that leaves the market area is accounted for and changes of ownership can be effected; and
- does not support any other place than the single virtual point of the market area for wholesale-related changes of ownership (i.e. no flange trading) with the exception of flange trading at EU import points; and
- features a single balancing system[53] with a single balancing entity and a single set of balancing rules for the whole market area (i.e. regarding: balancing period, prices for balancing energy, tolerances, rights and obligations of shippers regarding the management of their balancing accounts, …); and
- is based on a single set of rules for the measuring of (a) final customer consumption and (b) the exchange of gas with other markets and storage; and

---

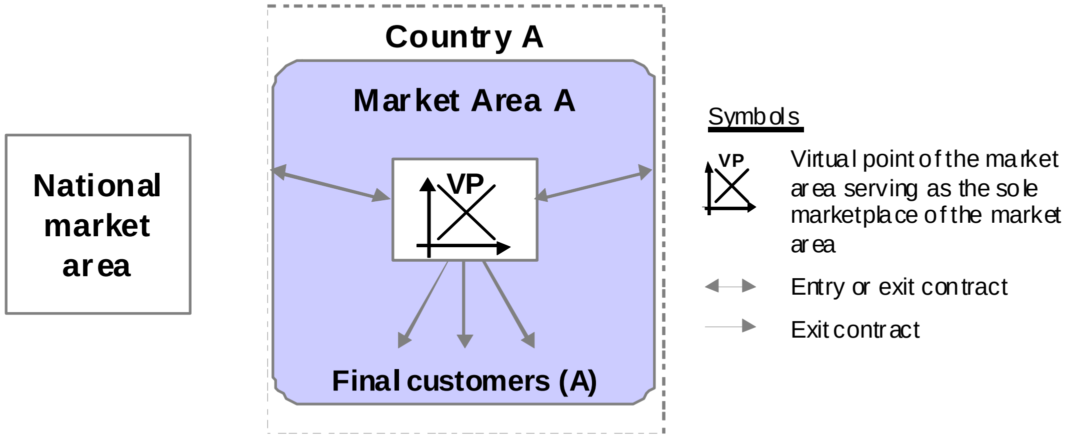
[52] For the avoidance of doubt: The market area model (as well as the trading region model) does not prejudice any choice of unbundling model.

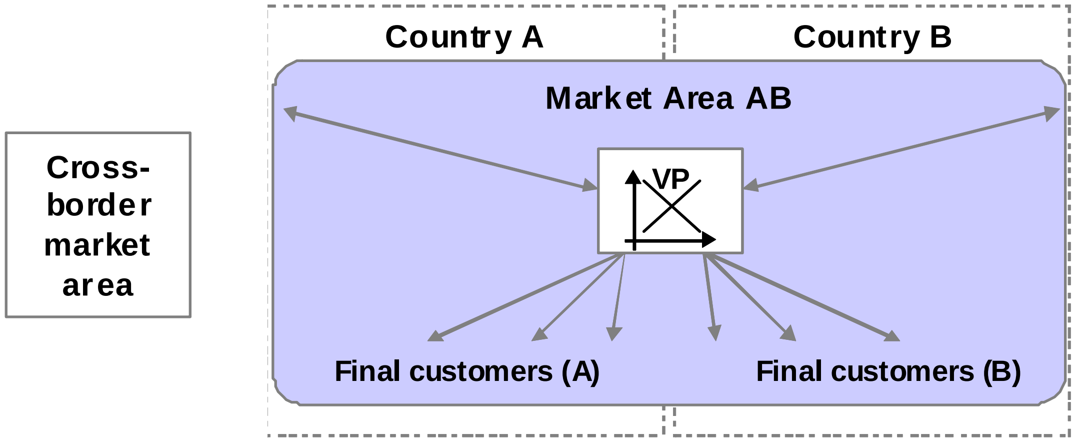
[53] For the avoidance of doubt: In the market area model the entry/exit system reaches from entry points to all exit points including exit points to final customers on TSO and DSO networks and is therefore identical to the balancing zone.

- is based on a single set of rules estimating small final customer consumption during the year (i.e. standardized load profiles) and the treatment of related estimation errors; and

In the market area model the virtual point of the market area would be the focal point of the wholesale gas market.

The market area model can be implemented within a member state or cross-border. The following graph visualizes one scenario where a member state implements a (one) national market area and a second scenario where two adjoining member states implement a cross-border market area.





The structural description above underlines that market areas can be realized better within a single jurisdiction (i.e. member state), and that creating cross-border market areas that span more than one member state requires substantial legal alignment between the participating countries.
Therefore the market area model might be considered the model of choice for larger Member States, where especially the gas consumption is large enough to allow the emergence of functioning wholesale markets within their own borders.

This does not mean that member states with smaller gas consumption may not implement the market area model. They only have to be aware that the following cross-border merger of their market area with other Member States, that will normally be required in order to enable a functioning wholesale market, necessitates alignment of national legislation and agreement on a single entity[54] for balancing all final customers in the cross-border market area. Ensuring proper legal protection for the citizens of all participating member states and establishing clear regulatory competence are special

[54] For some member states also the issue of different currencies would have to be dealt with.

challenges regarding such common balancing entities. Summarizing, the creation of a cross-border market area is likely an onerous and time consuming process.

3.3.1.2 The trading region model

The trading region model picks up on the difficulties of cross-border market areas. It reduces the requirements of legal coordination between participating countries as much as is possible while still creating a functioning gas wholesale market. In the following text, the trading region model is thus described in the context of a cross-border application.

In a cross-border trading region the TSOs of a number of member states establish a common entry/exit zone on the level of their transmission systems (the eponymous trading region) with closely connected national end user balancing zones (each comprising all final customers of the respective member state), with entry/exit zone and end user zones sharing the same virtual point.[55] In other words, the trading region is put on top of the national end user balancing zones to serve as a common wholesale market for all member states being part of the trading region.[56]

From a structural perspective the cross-border trading region model:

- creates a trading region as an integrated entry/exit system that stretches from the entry points into the participating transmission systems (crossing several countries) to virtual exit points[57] to each national end user zone; and
- integrates distribution systems into the respective national end user (exit) zone (possibly but not necessarily[58] involving some cost allocation from TSOs to DSOs and requiring DSOs to send allocation data to the national end user zone balancing entity so that balancing accounts can be settled); and
- features a single virtual point that is shared by the trading region and all attached national balancing systems and where changes of ownership and the accounting of gas flows in the trading region as well as to the national end user zones are effected; and
- does not support any other place than the single virtual point of the trading region for wholesale-related changes of ownership (e.g. flanges or further virtual points in the end user zones) with the exception of flange trading at EU import points; and
- structures the trading region as a fully nominated[59] system involving a trading account kept per shipper to (ex-ante) ensure an even balance of his nominations in the trading region; and
- assigns <u>all</u> national final customers to national end user balancing zones (“end user zones”) that may be operated by a national balancing entity according to national balancing, SLP and metrology regulations;[60] and

55 For the avoidance of doubt: The trading region model (as well as the market area model) does not prejudice any choice of unbundling model.

56 In the straightforward case, where no final customers are directly connected to transmission systems, the trading region would simply be a joint entry/exit network including the transmission systems of the participating TSOs.

57 The capacity from the trading region to an end user zone is automatically allocated to shippers in the course of the change of supplier process in the end user zone (→ capacity backpack; i.e. no booking required).

58 An alternative to allocating the cost for the virtual exit down to DSOs would be to charge it directly to the shipper. This would be possible in the trading region model because the amount of exit capacity from the trading region to each end user zone that is allocated to each shipper is known in this model.

59 Including the implementation of allocation according to the “allocated as nominated” principle also known as “allocation by declaration”.

60 Some harmonization of the balancing regime (e.g. the gas day) is still in order, even if the trading region model is applied.

- allows the shifting of gas from the trading region to an end user zone via a single (i.e. bundled) nomination at the common virtual point;[61] and

In the trading region model the virtual point of the trading region would be the focal point of the wholesale gas market.

Since the trading region model is an innovation in the ongoing discussion, some additional remarks are in order:

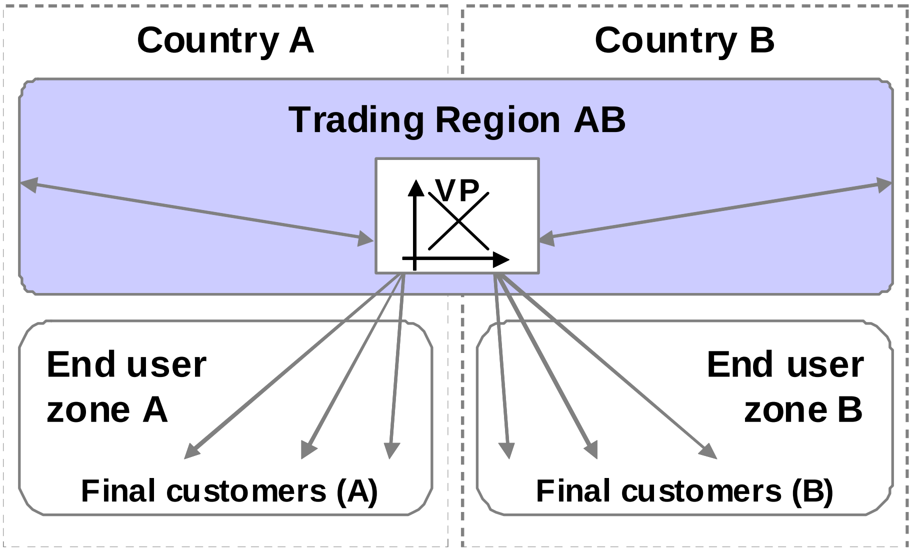
- The trading region model does not withstand the harmonization of national balancing regulations or the mandating of common cross-border end user balancing entities. But – as opposed to cross-border market areas – it does not depend on it.
- There are various ways to structure trading regions in detail (see an example below). The most important principle in creating a trading region is to merge the wholesale market horizontally across several markets with separate national end user balancing zones that are closely connected (via a virtual exit) to the trading region.
- There are two ways to organize roles in the trading region itself. In one model, the involved TSOs establish a central balancing operator for the trading region. As in the cross-border market area model, such cross-border entities raise some (but fewer) questions of legal alignment among the involved Member States. In the second approach all (interested) TSOs offer to keep an account (the "trading account") for the shipper in the trading region and effect the necessary exchange of information in the background based on cooperation contracts. The second model appears feasible because the trading region is a fully nominated (aka allocated as nominated) system; balancing of shippers imbalances involving the use of system energy is therefore not required. Problems due to the interruption of capacity in or out of the trading region can be sorted out between the TSO who interrupted the capacity and his customer, the shipper, or alternatively by the TSO chosen by the shipper for "balancing" his transports in the trading region.
- The choice of the national end user balancing entity involves a degree of freedom for implementation. It would be expected that Member States task TSOs at least with the physical balancing of the national end user zones. The keeping and settling of the balancing accounts for a national end user zone may be tasked to another entity. If another entity is mandated with that task, it will require close cooperation with the national TSO(s) in order to account for the use of system energy for purposes of the national end user zone.
- The trading region model foresees that all final customers in a member state – including those connected to transmission systems – are balanced in the national end user zone. This raises the legal question if not every final customer that is attached to a TSO system must also be balanced by that TSO? In that regard Regulation (EC) 715/2009 stipulates in Article 1 (4): "*The Member States may establish an entity or body set up in compliance with Directive 2009/73/EC for the purpose of carrying out one or more functions typically attributed to the transmission system operator, which shall be subject to the requirements of this Regulation.*" Therefore I see no legal obstacle in mandating a special entity for the balancing of all national final customers even if they are connected to transmission systems. NB: From a physical perspective the inclusion of final customers attached to the TSOs system into the balancing mechanism of the end user zone is fairly trivial. It simply means that the exits to those final customers are integrated into the virtual exit to the end user zone and thereby into the competence of the end user zone balancing entity and its

---

[61] This nomination would designate the shippers trading account (an instrument kept for every shipper to ensure that his nominations balance to zero in every hour) as the source and the shippers balancing account (in the respective national end user zone) as the sink.

usual balancing activities. The rest is mainly an issue of proper bookkeeping of gas in the trading region.[62]

The following graph visualizes the trading region model in a cross-border application:



Legend and Symbols

End user zone = National balancing zone for national final customers, no matter the system (distribution or transmission) they are connected to

Trading Region AB = Cross-border entry/exit system including all nominated points on the transmission systems of countries A and B

Entry or exit contract

Exit contract

VP Virtual point of the trading region serving as the sole marketplace of the trading region and all attached end user zones. Shifting of gas between trading region and end user zone is done by nominating a virtual exit on the VP.

Since the capacity on the exit points from the trading region to the end user zones is allocated in the course of the change of supplier process, the switch from the trading region to an end user zone poses no market entry barrier for retail competitors; instead it is a simple technicality in the nomination management processes. Therefore one can expect the impact of the trading region model on retail competition[63] on the same level as with the market area model.

As can be seen from the structural description above, the trading region model entails lower realization hurdles than the market area model, if – in order to achieve a functioning wholesale market – the wholesale markets of a number of Member States have to be consolidated.

Therefore the trading region model might be considered the model of choice for Member States with smaller gas consumption, not big enough to host functioning wholesale markets within their own borders. This does not mean that larger member states may not implement the trading region model. The rationale for this would require scrutiny though.

62 Depending on the network structure, the measured consumption of final customers connected to a TSO network may have to be factored into the online flow control from the transmission systems into the distribution networks.

63 The national requirements for supplying end users have to be fulfilled in the different Member States.

Of course, nothing in the trading region models prevents a group of member states that went for a trading region model in the first place (in order to speed up the development of a functioning wholesale market) to evolve their model into a full merger based on the market area model in a second step. Nevertheless, before this step is actually taken, the additional cost and benefits should be evaluated carefully.

3.3.1.3 National/regional policy options for the creation of functioning markets

How can member states that do not host a functioning wholesale market yet utilize the two models for the creation of functioning wholesale markets? They can either:

- wherever this is possible create market areas that fulfil the criteria for functioning wholesale markets within the borders of their own country (this may require investment in order to improve interconnection with other European or non-European markets); or
- act jointly with adjoining member states in creating trading regions that fulfil the criteria for functioning wholesale markets; or
- act jointly with adjoining member states in creating merged market areas that fulfil the criteria for functioning wholesale markets; or
- accede (based on mutual consent) to the market area of a neighbouring country that has already succeeded in creating a functioning wholesale market within its own borders.

3.3.1.4 Two parallel concepts for the creation of functioning markets in Europe?

The question may be raised whether the co-existence of the market area and the trading region model in Europe is an obstacle to market integration rather than an asset?

In my view, the trading region model is a clear asset. It:

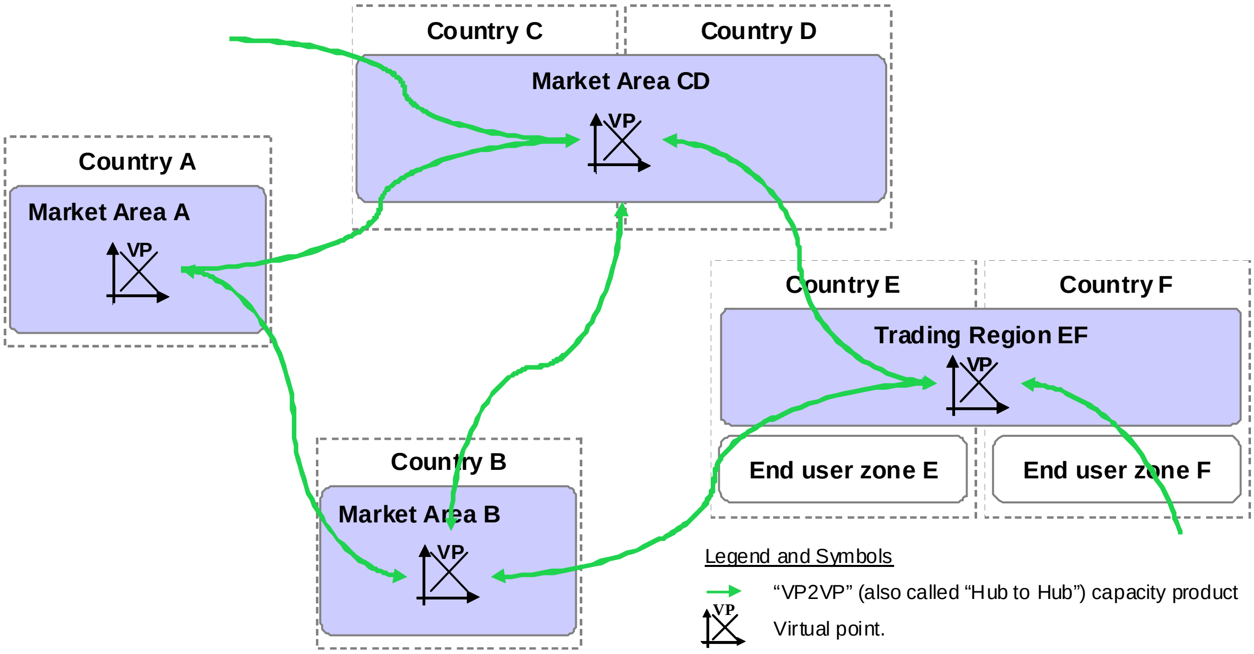
- has the potential of substantially speeding up the development of functioning wholesale markets;
- can be evolved into fully merged market areas in a second step after all problems (especially legal alignment and legal protection) regarding this matter have been solved;
- makes no difference in the methods (see next section) that may be used for market connection. Every single one of the methods described in the respective chapter of this paper that works between two market areas also works between a market area and a trading region or between two trading regions;
- does not require much differentiation in framework guidelines and the ENTSOG netcodes (e.g. all provisions regarding cross-border capacity, gas quality, network connection, interoperability, etc. will be identical for both models).
- does not obstruct the harmonisation of balancing systems.

3.3.2 The connection of markets

In order to achieve the maximum degree of short- and mid-term price alignment possible, markets have to be connected as tightly as the given transportation capacity between markets allows.

The connection of markets takes place between the transmission systems of adjoining markets using the (at any time) existing interconnection capacities. The methods used for connecting (and the results achieved for price alignment) are the same, no matter if the markets to be connected are organised according to the market area or the trading region model (or mixed). This is due to the fact that the connection always takes place between the two (or more, if more markets are involved) virtual points using the existing physical interconnection capacities. Now, since the virtual points are the "location" of the markets,[64] market connection is achieved in both cases.

The following graph shows connections (based on hub-to-hub capacity products; see details on connection methods below) between adjoining markets that are organized according to different principles. It has to be reiterated, that this picture would only display a proper application of the MECO-S Model, if <u>each</u> of the connected markets qualified as a functioning wholesale market.



When it comes to connecting markets, one has to consider, that the gas market is not one but several markets that exist simultaneously along the time axis.
For simplicity I split the gas markets into the following time segments:

1. Long-term market (i.e. more than 4 years ahead)
2. Mid-term market (from more than 1 year to maximum 4 years ahead)
3. Short-term market (from two days ahead to maximum 1 year ahead)
4. Day ahead (spot) market
5. Intra day (spot) market

For price alignment I focus especially on the time segments 2 through 5. As was already discussed in this paper, the issue of long-term (and long-distance) transport poses special challenges and is discussed in a separate chapter (see below).

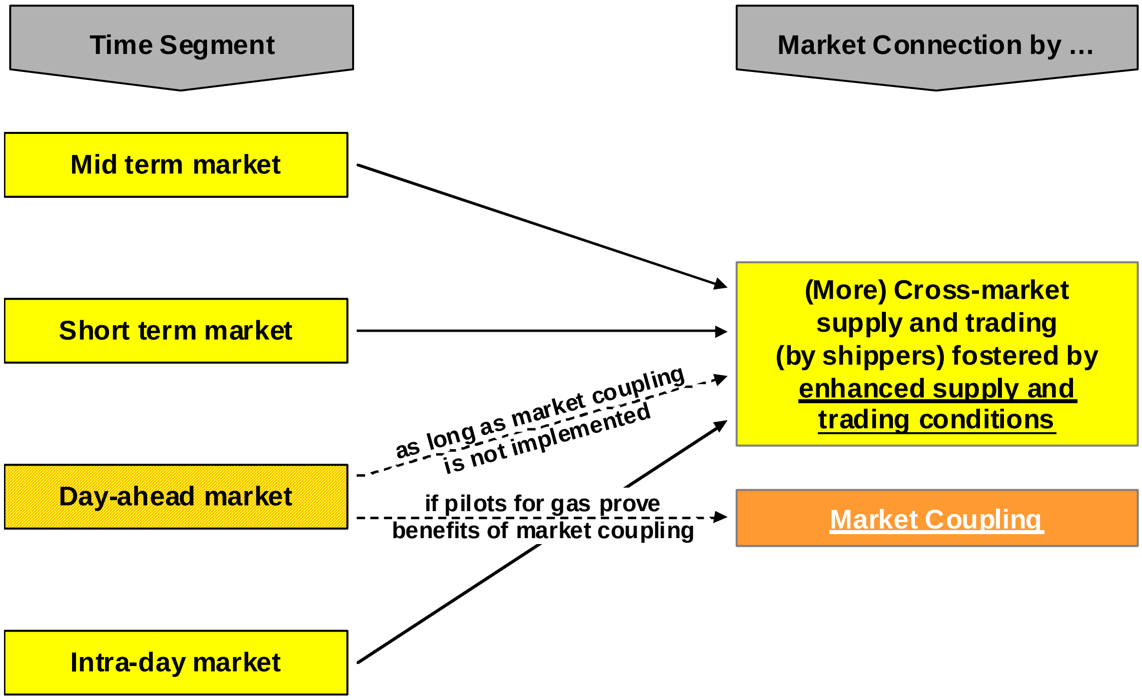
Regarding the means to achieve price alignment there are two essentially different ways to connect markets that may be applied differently on different time segments;

1. cross market supply and trading by shippers; and
2. market coupling

In the following chapters these means ways will be defined and described.

[64] Remember that „market" is used as an abbreviation for "wholesale market" in this paper.

The following graph shows the market connection method foreseen in the MECO-S Model per time segment of the gas market (excluding the long-term market for reasons given above).



3.3.2.1 Cross-market supply and trading by shippers

The theory behind connecting markets by cross-market supply and trading effected by shippers is that suppliers and traders will always be inclined to do a cross-market deal if the deal is economical, and they are given the opportunity to (more or less) safely do so. The more of these deals are done, the more the price differences between the affected markets will vanish.

I explicitly include supply activities here, because price alignment will be furthered by any activity of buying gas in a lower price market, shipping it to the higher price market and selling it there, even if the gas is directly sold to final customers in the higher price market.
Of course (as was the case with functioning markets above) suppliers and traders cannot (and shall not) be forced to do cross-market deals. But again, structural conditions can be put in place that make it safer and easier for suppliers and traders to do such deals. I term these structural conditions "enhanced supply and trading conditions" or "ESTC".

At lot of the issues regarding the establishment of ESTC are already being addressed by the currently ongoing framework guideline process and the CMP annex to Regulation (EU) 715/2009 undergoing comitology at the time of writing this paper.

Among those, the most important principles regarding ESTC in the context of the MECO-S Model are:

- the implementation of hub-to-hub capacity products between the virtual points of the market areas and trading regions; and
- the implementation of efficient capacity allocation mechanisms including auctioning of certain (but not all) types of capacities; and

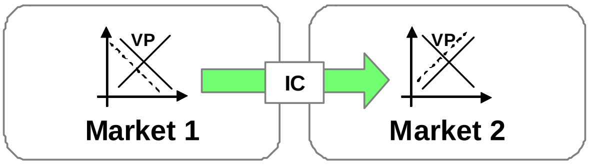
- the harmonization of essential elements of the balancing and nomination management system[65] (e.g. the gas day used for balancing and capacity products).

Details on individual elements of ESTC will be given in the section of this paper devoted to the implementation of the MECO-S Model.

3.3.2.2 Market Coupling

When it comes to market coupling, the connection of markets is effected by an administrative process that, acting as a principal arbitrageur between markets, is vested with special powers (usually monopoly access to some or all interconnection capacity of a time segment) in order to effect an "as much as is possible" connection of markets and thereby price alignment for the respective time segment of the market.

There are various ways of organising this administrative process (price or volume coupling, etc.) including in relation to the allocation of roles between the participating TSOs and gas market operators. An in depth discussion of this goes beyond the scope of this paper.
The following graph provides a brief introduction to day ahead market coupling.



- Adjoining day ahead spot markets (organised as exchanges operating on the respective virtual points) are connected by an administrative process in the course of which gas is bought in the cheaper market and sold in the pricier market with the goal of price alignment and within the capacity limits of the interconnection capacity available to the market coupling process.
- Market Coupling may involve more then two member states at once (multilateral market coupling).
- Market Coupling may be organized on the basis of auctioned spot markets or continuously traded spot markets.
- NB: Market Coupling is not synonymous with the limitation of renomination rights. The first is a process of capacity allocation, the latter is a process aiming at increasing the availability of day-ahead capacity. If available day-ahead capacity is not allocated by way of market coupling, it is auctioned off (explicit auction).

Legend and Symbols

IC	Interconnection capacity between markets
VP	Virtual point of the market

The implementation of market coupling has a number of prerequisites, the most notable being the existence of viable and resilient (i.e. liquid) wholesale spot markets usually operated by gas exchanges in both markets. These exchanges must operate on the same schedule and deploy largely harmonized contract specifications what in turn requires some of the balancing rules in the connected markets to be harmonized (especially the gas day, its time basis and the use of daylight saving time).

The potential application of market coupling in the MECO-S Model is another reason, why functioning wholesale markets are an essential element of the model. Without a functioning wholesale market, market coupling with its substantial price alignment merits would not be an option.

[65] Note that from a perspective focusing on fostering cross-market supply and trading, the amount of harmonization to be done in the balancing system is much smaller than from the perspective of creating market areas.

For a number of reasons I conclude, that market coupling is only an option for the short-term (i.e. spot) end of the market. The most important of these reasons being the apparent negative selection[66] by market players of exchange organised futures markets at least in some markets, leading to far lower liquidity on these markets than on spot markets.[67] Well, and without much liquidity in these markets, market coupling is not even an option for time segments with delivery further away than the day-ahead.

Therefore, the MECO-S Model foresees market coupling only for spot markets.

An interesting question is, whether market coupling should be implemented for the day-ahead market only or also for a potential within-day market? The answer to this is quite straightforward. If there is a liquid within-day market (e.g. organised as a "balance of day" market) and market coupling is implemented for the day ahead market (see conditions below) then within day market coupling has a high potential of progressing price alignment even more. Since achieving liquid within day markets can be quite hard though[68] I do not elaborate further on this question.

Another interesting question regarding market coupling is how much (if any) capacity shall be reserved for the coupling process. A detailed analysis of this goes beyond the scope of this paper. One thing in that regard is already clear though: If market coupling is applied for coupling the day ahead spot markets, then all capacity that is technically available and not required by shippers should be used for market coupling in order to maximize the price alignment effect. The legitimate interest of shippers being party to a longer-term transportation contract to not fully lose their renomination rights[69] should be considered when implementing this policy.

Two further merits of market coupling deserve mentioning.

For one thing, as can easily be shown by arbitrage arguments, price alignment in spot markets also drives price alignment in forward markets. Therefore, market coupling need not be implemented for all time segments in order to foster price alignment on the whole price forward curve. For the MECO-S Model I assume that price alignment between spot markets suffices to create satisfactory price alignment in the forward markets as well.

For another thing market coupling most effectively inhibits any conceivable scheme by market participants to influence market price differentials by not using cross-market capacity they purchased by FCFS or by auction. If the market coupling process is endowed with (basically) all unused capacity, the process will always use it as long as more price alignment can be achieved. A prior restraint by market participants on the use of capacity would therefore be rendered ineffective.

Concluding, market coupling has a number of prerequisites that will take time to realize, especially when it comes to the prerequisite of functioning spot markets for all Member States (or groups thereof, forming e.g. a joint trading region). From then on, it can contribute significantly to price alignment between markets, and even (where there is sufficient capacity) achieve full price alignment.

Although the theoretical benefits of market coupling are evident there is currently a lot of uncertainty about the optimal design and the resulting cost/benefit ratio of market coupling for gas. Therefore, before market coupling is considered an official element of the gas target model, pilot studies on market coupling should be conducted. In such studies alternative designs of market coupling (e.g. based on auctioned spot markets or on continuously traded spot markets) should be tried out. Also the issue of full reimbursement of TSOs for capacity they provide to the market coupling

---

66 Instead, market players seem to favour OTC deals.

67 Where such markets exist at all.

68 Which is the reason why within-day markets are not a core element of the MECO-S Model; they would fit in nicely though.

69 Which they may require to react on changes in their load e.g. due to changes in weather conditions.

process (for which they would only receive a congestion charge[70] which may be lower than the regulated tariff) needs to be addressed.

If the pilots prove that the theoretical benefits of market coupling can also be realized in practice, market coupling should be made an integral part of the gas target model.

Until then, explicit auctioning of day-ahead capacity should be implemented, and the capacity that would otherwise be used for market coupling should be auctioned off. If the pilots prove that market coupling does not deliver its theoretical benefits, explicit auctioning should be maintained for allocating day-ahead capacity.

3.3.3 The enablement of secure supply patterns

3.3.3.1 Long-term / long distance transports

As pointed out and justified in chapter 0**Error! Reference source not found.** on secure supply patterns, it is required to offer to shippers for booking:

- long-term contracts at EU border points and at cross-market points inside the EU; and
- long-distance transport (e.g. from an EU border point to the next but one market).

In the following chapter, some hints and caveats on structuring these capacity products will be given.

3.3.3.1.1 Long-term capacity contracts

In this chapter I will deal with the question of long-term capacity bookings on a single border point (e.g. EU import point or market border point).

I start with a set of requirements regarding long-term contracts under the MECO-S Model:

- Long-term capacity shall be offered for contract tenors of more than 4 years up to a maximum tenure (to be defined).
- Existing long-term capacity shall be sold with a lead time (sell-ahead period) matching the time required to expand that specific capacity if this should prove necessary and economic. In order to achieve this linkage of long-term capacity allocation with potential investment, existing long-term capacity shall only be allocated in open season style processes to be performed periodically.[71]
- New long-term capacity (which may be incremental capacity on existing systems) shall also be sold in open season style processes.
- The amount of capacity sold as long-term capacity shall be limited (e.g. to 65% as in Germany or less as required by the market) but this shall foremost be achieved by constructing enough capacity so that all economic[72] long-term capacity requests can be fulfilled and building the required[73] short- and mid-term capacity on top of that[74] (accompanied by a mechanism ensuring

[70] The congestion charge is basically the profit made by the arbitrage process from buying in the cheaper market and selling in the pricier market.

[71] See chapter 0 on that open season process.

[72] See chapter 0 on clues for assessing the economics of an investment.

[73] This requirement stems from underpinning the mid- and short-term traded markets with sufficient capacity.

[74] This method of providing capacity for short- and mid-term markets on top of the capacity requested for longer terms may (depending on the amount of long-term capacity requested) leads to a reduction in capacity utilization; put another way it may produce redundant capacity. At first glance, this looks like a waste of economic resources. Actually, these resources are not wasted, but they are an investment into competition. The rationale for this is that (by standard economic theory) for the emergence of competition a certain amount of redundancy is required. The difficult piece is of course to determine the efficient amount of redundancy.

that TSOs do not have to assume undue investment risk for the part of capacity that is built but not sold long-term[75]).

- Shippers shall be enabled to request long-term capacity in a single request (from start date to end date) and that single request shall be subject to allocation as a whole. (This is opposed to merely offering shippers the opportunity to bid for yearly capacity contracts for a long period into the future. For practical purposes (e.g. to ease secondary capacity marketing) TSOs may decide to contract long-term capacity – after their allocation as a package – in a series of e.g. yearly contracts).
- Long-term capacity shall be sold as flat capacity (i.e. not structured).
- Long-term capacity shall be allocated as requested wherever this can be achieved by realizing economic investments. Where this is not possible, acceptance shall be limited to – and related investments shall be realized – the portfolio of capacity requests (including the capacities to be reserved for the short- and mid-term markets) that maximize(s) capacity expansion while still achieving the set criteria for economic investment in gas transmission capacity.

Some rationale and clues on how to deal with the requirements stated above are given below, structured by the following questions:

1. For which contract tenors shall long-term capacity on EU import points or market border points be sold?
2. How long should the lead time be between the selling of such capacities and the first day of transport (i.e. the “sell-ahead period”)?
3. How much capacity shall be sold long-term?
4. In what increments shall long-term capacity be sold (e.g. in yearly increments or in longer increments)?
5. Shall long-term capacity be sold as flat capacity only or also (if demanded by a shipper) as structured capacity (i.e. with contracted capacities varying over time)?
6. By which allocation mechanism shall long-term capacity be sold?

1. For which contract tenors shall long-term capacity on EU import points or market border points be sold?

   Long-term capacity shall serve to underpin long-term supply contracts. Such contracts are regularly concluded for tenors derived from production profiles of specific gas fields and can easily have duration of 15 to 20 years. Therefore, in order to not unnecessarily limit (or increase the risk for) supply arrangements by network access rules, long-term bookings should be allowed with contract tenors up to 15 (better 20) years. This does not preclude that for secondary marketing (parts of) this capacity, it is split up into shorter time slices if the shipper so wishes at a later point of time

2. How long should the lead time be between the selling of such capacities and the first day of transport?

   Regularly, long-term supply arrangements are concluded well ahead of the first day of the actual delivery of gas. This is often triggered by the fact that substantive implementation efforts are required for e.g. preparing the supply field for production, building new pipelines to Europe or strengthening existing ones, etc. Therefore I assume that it should normally be possible to sign the required transport contracts with substantial lead time. This is good insofar as it makes a lot of sense to foresee a substantial lead time, because if the demand for long-term capacity was higher than the current availability, the TSOs would be in a position to add additional capacity (if

[75] See also chapter 0

economic) as opposed to rationing (by whatever means) the existing capacity on the requests filed. Against this backdrop a lead time between the execution of long-term capacity contracts and the first day of transport amounting to the expected investment cycle of the capacity in question would be reasonable.

Introducing such a (large) sell-ahead period would have a number of effects:

- There would be enough lead time for capacity increase if there is sufficient long-term demand to justify such investment.
- At any point of time any capacity that was not booked long-term in the past is – and fully remains – available for the short- and mid-term markets (e.g. four years ahead according to the respective definition in this paper).
- If on an existing system more than the limit foreseen for long-term capacity contracts is booked long-term, this is not a problem because investment can be triggered[76] to build additional capacity for the mid- and short-term market.[77]

3. How much capacity shall be sold long-term?

   On general principles a substantial amount of capacity shall be held free of long-term capacity contracts. This is required in order to provide the medium- and short-term capacity backbone for the desired emergence of a traded market in these time segments.

   The discussion on how much of capacity shall be offered long-term is still ongoing and the range of opinions is wide. As a point of reference for the discussion in this paper I refer to the German example, where in 2010 a limit on long-term capacity contracts of 65% of technical capacity was decreed.[78]

   This may appear too much to some and too little to others. In fact, if the sell-ahead period is sufficiently long, and the investment processes are working, it does not matter from the perspective of capacity management. Any desired limit can be realized by simply adding as much capacity as is required to achieve the targeted limit for long-term capacity.[79]

4. In what time-increments shall the long-term capacity be sold?

   Let us assume for the discussion in this section that a wholesaler signs a long-term supply contract (say 15 years) with a flat delivery profile (the question of structured profiles will be discussed below).

   Now this wholesaler (assuming the role of shipper) looks for long-term capacity to underpin his supply contract. What type of capacity offer would this shipper be interested in? Would he be interested in the opportunity to bid for 15 single yearly capacity contracts with the risk of receiving an uneven capacity profile over the years? Or would he be interested in the opportunity to request (and get allocated) an equal amount of capacity of the desired size in every one of those 15 years?

   The answer appears obvious. Having the opportunity to request and get allocated an equal amount of capacity for the full contract term (without any limitation in secondary capacity marketing of slices out of that contract) is more attractive for the shipper.

[76] Of course regulatory processes have to foresee that the investor is remunerated for that additional investment, if he is not allowed to sell the resulting capacity on a long-term basis.

[77] Example: If on an existing pipeline there are long-term requests for 100% of the capacity and there would be a threshold of e.g. 30% of capacity that shall be kept available for the short- and mid-term markets, then the requested 100% can be awarded to long-term capacity requestors and the then "missing" 30% of free capacity for the mid- and short-term market can be built (by increasing capacity by 42.8%).

[78] See §14 (1) of the German GasNZV

[79] See the example in footnote 77

So, from the buyer's side the solution is clear, but how does it look from the seller's perspective?

The TSOs selling the capacity are potentially challenged by a situation that is best explained by an example.[80]

Consider the following structure of long-term requests:

Start date	End date	(→ Tenure)
2015	2025	10
2017	2028	11
2015	2030	15

Now let's assume that the existing capacity does not suffice to fulfil all these requests and that the criteria for economic investment[81] are not sufficiently fulfilled so that meeting all capacity requests by capacity extension is not possible.[82]

In such a situation it is tempting to fall back to a solution where capacity is offered in yearly tranches, accepting that the allocation percentage of a shipper's request may vary over the years, and let the market sort out the rest (e.g. by secondary capacity trading). This solution would be associated with considerable risk for the long-term buyer of gas.

Another solution – and this is the one that would better fit the idea of underpinning long-term supply contracts – would be solve the allocation problem by optimisation. In this solution an optimisation model would be set up with the capacity requests and estimated capital expenditure per capacity step-up as inputs, with the criteria for economic investment (e.g. including an internal rate of return) as conditions to be met, with the constructed capacity as target function to be maximized,[83] and with the acceptance rate[84] per request as variables. The outcome of the optimisation would be a set of acceptance rates[85] (one per request) that can not be increased without violating at least one of the criteria for economic investment.[86] Of course in such a model, requests for a longer term have a higher likelihood to be accepted than requests for shorter terms. This may sound discriminating at first glance, but it is not. Because discrimination means that shippers are discriminated against because of who they are. Differentiating between shippers requests based on hard facts (e.g. the tenure of a specific request) is not discrimination, it only handles different things differently. And after all, all of this is done to enable long-term contracts, and shippers interested in shorter contract periods still have the opportunity to go for capacity in the mid-term market (which reaches four years into the future and capacity for that market is assuredly made available at a certain percentage of total capacity).

5. Shall long-term capacity be sold as flat capacity only or also (if demanded by a shipper) as structured capacity (i.e. with contracted capacities varying over time)?

80 For brevity I omit the issue of extra capacity for the short- and mid-term markets in the example.

81 How they look in detail is not relevant for the point to be made here.

82 This may easily happen due to the step-wise nature of capacity investment. For instance if shippers requests amount to 150 and the feasible capacity steps are 100 (which would be economical) and 200 (which would not be economical anymore) then 100 would be built and allocated to the requests. NB: A simple pro rata allocation would not work in this case, because the requested contract tenors differ.

83 By the structure of the model, the maximization would be constrained by the given capacity requests and the criteria for economic investment.

84 Shippers would be asked to file with their requests a minimum acceptance rate (e.g. 80%) of their requested capacity they would be prepared to accept as a minimum allocation (and below which they would retract their request).

85 Either between the minimum acceptance rate specified by the shipper and 100% or (if it would otherwise fall below the minimum acceptance rate of the shipper) zero.

86 Special (but solvable) problems can occur if more than one optimal set of acceptance rates exists.

Consider a shipper contemplating to sign a long-term supply contract with an upward delivery slope, a plateau phase and a downward slope. Such a shipper may be interested in signing a capacity contract that explicitly matches the supply profile to be transported.

On the other hand for TSOs offering such structured capacity is a challenge. It would lead to higher tariffs (if TSOs increased the tariff as much as was required in order to meet the criteria for economic investment) or to a higher risk of underutilisation for the TSO (or the final customers to who such risk is allocated).

I think that this issue is best solved by only offering flat capacity profiles under long-term capacity contracts. The arguments in favour of this view are:

- Capacity allocation (if one follows the approach of selling capacity packages spanning several years) is easier and the results of allocation (e.g. by optimisation as introduced above) are more comprehensible.
- Shippers can mitigate their risk of underutilizing the booked capacity on the upward and downward slope of their supply contracts by turning to the secondary capacity markets.
- Shippers are not in a (much[87]) worse position than if they (under an exemption) would build the capacity themselves (or in a joint venture with other interested shippers). In such a scenario shippers would also have to build (and pay) for the full capacity themselves.

6. By which allocation mechanism shall long-term capacity be sold?

The answers to this question have already been given above. The following paragraphs sum up the results and provide the rationale on an alternative that was not chosen.

First, if all capacity requests (including the required percentage of capacity to be set aside for the short- and mid-term markets) can be met by investment that meets the criteria for economic investment, all requests for long-term capacity shall be accepted without need for rationing. Remember that the sell-ahead period for long-term capacity shall be long enough to realize such investment. Therefore it is required to integrate the processes of long-term capacity allocation and investment appraisal even for existing capacity on existing systems into periodic open season style processes.[88];[89]

Second, if rationing is still required, e.g. due to the step-wise nature of investment in gas transmission systems, and long-term capacity shall be sold as flat profiles over a long term (i.e. not in yearly increments), there are two alternatives available to achieve this:

a) the “optimisation” approach introduced under question 4 above; and

b) auctioning.

For reasons given above, the proposed approach to allocating (meaning: rationing) long-term capacity is optimisation. In that regard it has to be noted that this optimisation would frequently have to be performed by two adjoining TSOs in cooperation, because the market connecting

---

87 Of course on the upward slope of the supply contract, shippers building their own pipeline would have the opportunity to time e.g. the installation of compressors to optimise the availability of capacity (and some of the related cost) against the need for this capacity. But although the investment timing effect (pay-out structure) of this may be interesting for the sponsors of such a project, the cost effect of this optimisation is in most cases small compared to the overall cost of the project.

88 For brevity I do not go into detail on the structure of the shippers requests for capacity. It may make sense to adopt a scheme here, were shippers are provided with a range of potential future tariffs (“price steps”) and the overall capacity (including new capacity) that can be made available at that price step. TSOs would determine these steps on the basis of estimated expenditure for capacity extension in various scenarios. Shippers would be asked to request capacity for every one of those price steps. This information would be used in the investment appraisal leading to an investment decision that is even more market based than providing only one estimated future tariff to shippers.

89 See chapter 0 for details.

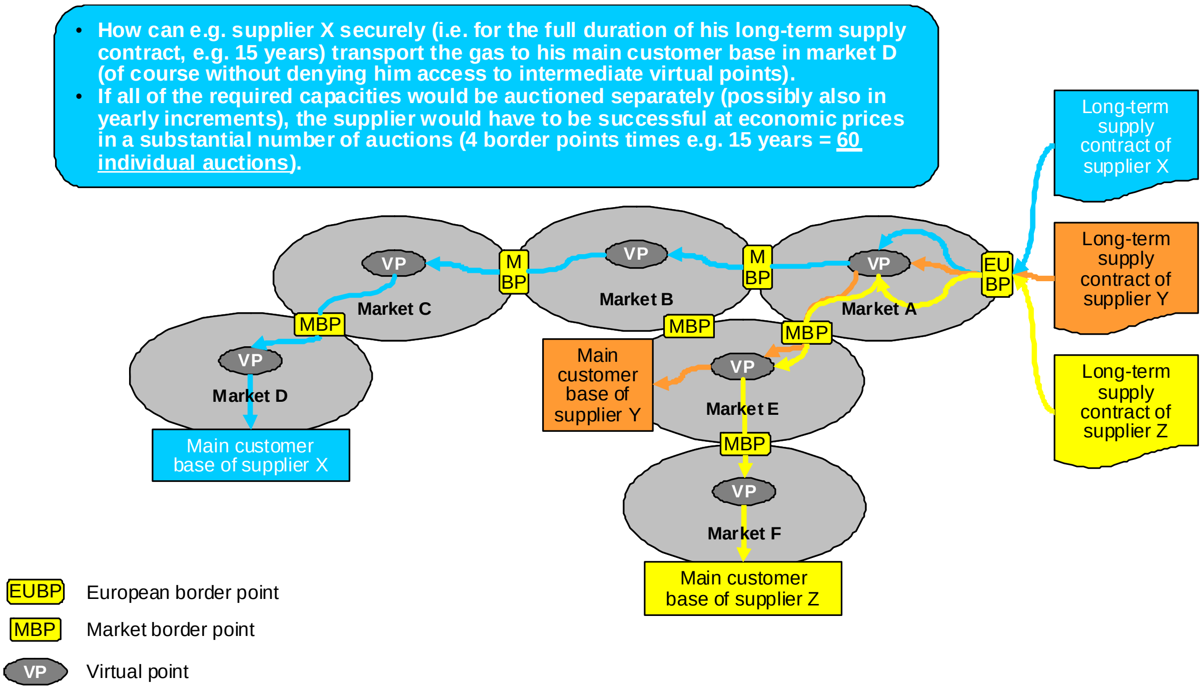
capacities foreseen in the MECO-S Model are hub-to-hub capacities including exit capacity from one TSO and entry capacity from the adjoining TSO.

Why is auctioning not considered for allocating long-term capacity? Well, in the standard auction designs one can only offer the same product and then determine the price bidders are prepared to pay for a given quantity (or the other way round). So given the notion that long-term capacity requests shall be allocated for the full requested term at the same level of capacity, auctioning would entail a preceding definition of the one unified tenure of long-term capacity products (e.g. a tenure of 15 years) that shippers can bid for. This would unnecessarily limit the choice of shippers. Another option would be to "stripe" the capacity (e.g. into a 20 year tranche that is auctioned first and a 15 year tranche that is auctioned second and so on). This "striping" has some arbitrariness to it, and it is even more difficult to do, if the capacity of the system in question can be expanded by investment.[90] The optimisation approach avoids all these problems.

3.3.3.1.2 Long-distance transport

In this chapter I will discuss the question of long-distance transport over several bookable points.

The following graph visualizes and describes the problem that shall be solved with long-distance transport products.



Now, how can one address this challenge without introducing captive transport through the back door? First let us narrow down the problem. It appears reasonable that the most severe long-distance transport problems (as displayed in the graph) arise in the context of long-term capacities. I will therefore focus on long-term long-distance transport in this paper. This does not preclude that TSOs offer long-distance transport products for mid-term markets or shorter terms according to the principles presented in what follows, if beneficial to the market.

So the problem to be discussed here is: How can shippers realize long-distance transport patterns that are contractually secured for a long term?

---

[90] The problem here is to determine the capacity to be offered per stripe since the total capacity is yet unknown.

A proposal frequently put forward to resolve the issue is to time-wise coordinate auctions of single-point capacities. There are two problems associated with this approach. Firstly, as outlined in chapter 0 on long-term capacity contracts, auctioning is probably not the best approach to allocate long-term capacity. Secondly, if the capacity on different points was allocated by separate procedures (e.g. by separate auctions), the results of these allocation procedures could vary widely leaving the shipper with an unwanted long-term "capacity profile" (due to differing success in the various allocation procedures) that does not match his needs and that he may not be able to rectify via the secondary capacity market. If the capacity was auctioned individually on every point, the shipper may of course bid such high prices that he receives an allocation amounting to the desired amount of capacity on all required border points; but in the end the price may be so high that the underlying supply deal is not economic any more. This in turn will lead the shipper to the conclusion that it is risky to sign the supply contract before he knows how much the capacity will cost him and on the other hand he will only know how much the capacity on the whole transport distance will cost him after the last auction was finished (and this will likely not be at the same point of time, leaving him with capacity booked at least on some points). This is a substantial chicken and egg problem when it comes to the execution of new long-term supply contracts for securing supply to European gas consumers.

So it appears that a mere time-wise coordination of single-point capacity allocations does not solve the problem. Before I come to the solution to this issue proposed by the MECO-S Model, I will discuss two facts that reduce the gravity of the problem.

Firstly the problem is decreased by investing. If capacity is increased wherever this is economic, situations where capacities need to be rationed should occur less frequently. But, as was discussed in chapter 0 on long-term capacity contracts, in certain cases it may not be possible to avoid rationing completely.

Secondly the problem is made smaller by the "functioning markets" feature of the MECO-S Model. If stakeholders cooperate to create cross-border trading regions or cross-border market areas this potentially (depending on the markets in question) reduces the number of bookable points between non-neighbouring markets and therefore reduces the complexity of the problem.
In order to solve the problem of long-distance transport, the MECO-S Model foresees the offering of "link chain capacity products" to interested shippers.

Link chain products feature the following properties:

- Link chain products are packages (i.e. strings) of bundled (i.e. hub-to-hub) capacities at different market border points.
- Link chain products may be requested for any combination of market border points (as long as they are on a specific route) and also for more than one year.
- Capacity under a link chain request is either awarded at the same level of capacity at all requested points and for all requested years, or not at all.
- The capacities awarded under a link chain capacity product may be used separately, i.e. gas may be dropped and picked up on all virtual points en route.

Let us look at those properties of link chain products in more detail on the basis of an example.

A shipper interested in transporting from the EU border point in market A to market D (see the graph above) could specify a request for the desired quantity of capacity for the desired number of years for the full transport from the EU border point in market A through markets B and C to market D. For instance the shipper might specify a capacity of 100 for 15 years (e.g. from 2015 to 2030). Together with his request he would be entitled to specify a minimum rate of allocation (e.g. 80%) that would be acceptable to him; below that he would retract his request. It is important to note that the shipper may only specify requests for capacities on a continuous (i.e. uninterrupted) route.

In the following allocation process (see notes on the logic of that process below) the shipper would either be allocated:

- his full capacity request (i.e. 100) for the full requested duration on all requested points; or
- a quantity of capacity between his (if specified) minimum acceptance rate (e.g. 80%) and his full request on all requested points; or
- no capacity at all on any point (e.g. because the allocation mechanism would (otherwise) allocate to the shipper a capacity below his minimum acceptance rate).

Of course, as was already discussed in chapter 0 on long-term contracts, all efforts would be made to allocate to the shipper his full request and to expand capacity wherever this was necessary to do so and economic at the same time.

The capacity allocated to the shipper would be structured as several individual capacities (e.g. in the above example a market entry capacity at the EU border point in market A, a hub-to-hub capacity from market A to market B, etc.) of the same size for the same number of years. These individual capacities put the shipper in the position to transport gas from the EU border point to market D (as desired) while at the same time the capacities may be nominated at different values enabling the shipper to drop and pick up gas on every virtual point on route.

The difficulty with long-term long-distance transport is the structure and logic of the allocation process.

So far,[91] an allocation mechanism was described for simultaneously allocating long-term capacity on single points with different contract tenures. Additionally, in the case of hub-to-hub capacities, the allocation involved two TSOs.

Now, adding link chain products, the allocation problem becomes more complicated because capacity on more points has to be allocated simultaneously.
Two solution strategies exist to deal with this problem:

a) Extending the optimisation procedure described in chapter 0 so that it includes long-distance contracts. In this case the optimisation would involve all affected TSOs and the target function would have to be adapted to simultaneously allow for capacities at different points considering that different transport routes compete for long-term capacity at specific points only.
b) Reverting to a strategy of “predetermining” transport routes (e.g. based on a market survey) and performing separate allocation procedures for each chosen transport route and also for individual points. Again this “predetermination” has some arbitrariness to it.

3.3.3.2. Security of supply investments

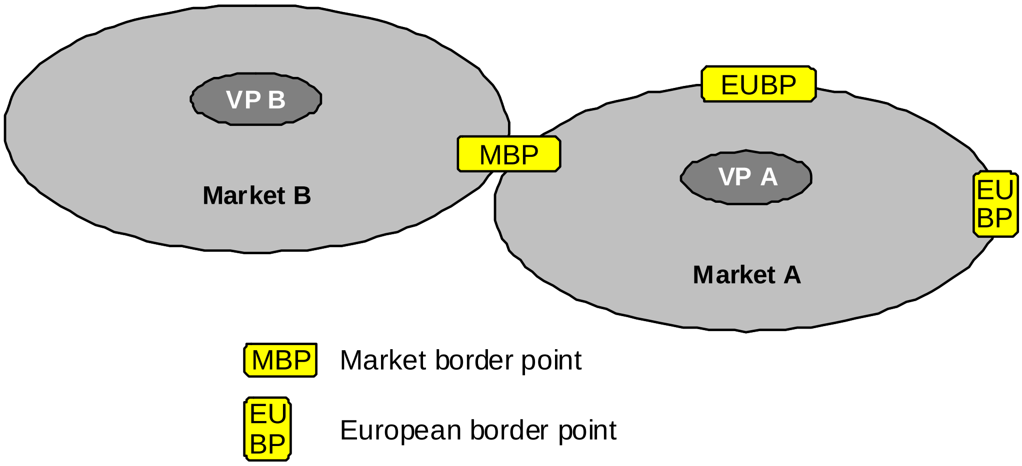
The second issue (in addition to long-term and long-distance transport) regarding the enablement of secure supply patterns is security of supply (“SoS”) according to REGULATION (EU) 994/2010.
While not trying to comprehensively address that complicated issue I will present a few thoughts on related network access issues which appear to be relevant for a gas target model.

Specifically I address the issue of how the cost for keeping SoS capacity available (or creating it) in a market different from the market having security requirements can be covered so that the TSO(s) in whose networks that capacity is located suffer no disadvantage from contributing to security of supply in other markets and also cross-subsidies between end users of different markets are avoided. The instrument for solving this problem I will put forward in what follows is termed the “capacity fallback contract”.

---

[91] See chapter 0

I will develop the concept based on a stylized example for the two markets displayed in the following graph.



Let us consider that markets A (with TSO A) and B (with TSO B) are in different member states and that market A in order to fulfil the "n-1" standard for transport infrastructure according to REGULATION (EU) 994/2010 requires capacity on the market border point ("MBP") from market B.

The current capacity on MBP shall be 100 and the SoS demands for that capacity shall be:

case a) 90 (i.e. less then the current capacity); or

case b) 120 (i.e. more then the current capacity).

These SoS requirements exist irrespective of the actual bookings of shippers. Therefore TSO B in market B would need to keep available (or even increase) capacity on MBP, even if he does not foresee a market for it. TSO B also should not (make and) keep the SoS capacity available based on cost allocation to final customers in his home market B, because it is not the SoS demands of market B that shall be catered to here, but those of market A.

Now, since there is bookable capacity between market A and market B, a contractual solution, i.e. the fallback capacity contract, to this problem exists that fits nicely into the general network access regime.

Under the concept of the fallback capacity contract the following procedures would be implemented:

- The competent authority in market A defines how much SoS capacity on MBP is required from the VP in market B to market A to serve as a fallback supply route in case not enough gas can be delivered through the EUBPs leading to market A.
- TSO A from market A books (based on a fallback contract) with TSO B long-term firm exit capacity from the virtual point in market B ("VP B") amounting to the requested SoS capacity.
- The fallback contract would oblige TSO B to (create and/or) maintain the booked capacity from the VP in his market to the exit point to market A whether it is booked by shippers or not.
- TSO A pays TSO B, on the basis of the regulated tariff of TSO B, for the capacity booked under the fallback contract minus the capacity on the same route that is booked by shippers. I.e. TSO A would only pay for the "redundant" part of that capacity.
- The extra cost TSO A takes on are considered in the cost recognition of TSO A in market A so that TSO A suffers no negative impact from booking the fallback capacity (he may e.g. be allowed to allocate these cost down to final customers in market A).

The solution presented above has a number of interesting features:

- The relation between the TSOs of different markets (and in the example even: of different member states) is purely contractual.
- TSO B is not forced to do anything that is not economical for him in the interest of another market.
- Market A can determine on its own how high the demand for SoS capacity for its market is and then long-term commission that capacity from the neighbouring TSOs.
- It does not matter, if the capacity from market B to market A is main flow or physical reverse flow capacity, the concept works in both cases.

The concept of the fallback contract can be extended to cater to the needs of member states that require capacity not only (as in the example) to the virtual point of a neighbouring market but to (e.g.) the virtual point of the next but one market or even specific entry points (e.g. EUBPs) to other markets. More TSOs would be involved in that case – but again it would be on a purely contractual basis.

3.3.4 The implementation of economic investments

When it comes to realizing economic investment in gas transmission capacity, a substantial number of questions arise. In the context of this paper and the MECO-S Model the following questions shall be addressed:

1. How shall projects for investing into interconnection capacity (i.e. between markets) be offered to the market and how shall the economic viability of these projects be determined?
2. How shall investment into intraconnection capacity (i.e. investment to overcome congestion within markets) be evaluated?
3. How can sufficient finance for investment into gas transmission capacity be secured?

3.3.4.1 Investment into interconnection capacity

Investment into interconnection capacity can be realized under the regulated regime or under the regime of exemptions.[92] In this chapter I will mainly address the process for investment in interconnection capacity under the regulated regime.

The background for investment into new or expanded regulated capacity is formed by the various network development plans foreseen in European legislation.

Against this backdrop a process of investment appraisal has to discover, if the market (i.e. the shippers) is really prepared to pay for the envisaged (additional) capacity.

I believe that appraising an investment project and allocating the capacity on that project should be integrated as tightly as possible. This ensures as much as is possible that the market really needs the envisaged capacity because it is prepared to pay for it. The consequence would be that investment projects into interconnection capacity are appraised on the basis of actual long-term capacity requests for that capacity (as filed by shippers).

The limit to this approach is the requirement to reserve some capacity for the mid- and short-term market in order to support the emergence of traded markets. The economic viability for this type of capacity can not be appraised on the basis of actual long-term capacity requests. Other benchmarks (described below) are needed to evaluate investment into such capacity.

---

92 In accordance with Article 36 of Directive 2009/73/EC

The best procedure known to me for dealing with the inherent uncertainties on the parts of all stakeholders with regard to investing into new capacity is the open season process, the details of which I assume are known.[93]

In order to fully integrate investment appraisal and capacity allocation, such open season style processes would have to be the only processes under which long-term interconnection capacity is allocated. This would have to be done not only for new projects but also for existing capacity – because if the demand is high enough the allocation of existing capacity should immediately evolve into an investment appraisal. Therefore these opens season style processes would have to be performed periodically for all existing interconnection capacity and on demand, if new interconnection projects are envisaged.

During the process shippers would be invited to file their requests for long-term capacity on the particular interconnection point.[94] For new and existing interconnection capacity alike the lead time[95] for the capacity sale would be long enough so that the system can be constructed (in the case of new systems) or expanded (in the case of existing ones) if economic. Requests for main as well as (physical) reverse flow capacities should be invited and treated equally in the process. Regarding the nature of acceptable requests and the allocation logic I refer to the discussion in chapter 0.

If in the case of an existing system not more capacity than already exists is requested and the set percentage of capacity to be reserved for the short- and mid-term market would is available on top of that, the process ends with a 100% allocation of all requests for long-term capacity.

The phase of investment appraisal (i.e. analyzing the economic viability of the investment project by putting revenues and investment/cost in relation to each other in various scenarios) is only entered if:

a) the capacity on an existing system does not suffice to fulfil all requests; and
b) in case of new projects.

When it comes to preparing the investment appraisal of the project it has to be considered (as already mentioned above) that long-term contracts are not the only source of income from the project, but that the capacity reserved for the short- and medium market represents an additional element of value.

Therefore the "revenue" appraisal of an investment into interconnection capacity has to consider two sources:

a) the "guaranteed" return from long-term contracts signed with shippers in the course of the open season process; and
b) the expected return from mid-and short-term contracts to be signed in the future (this may include a "congestion" rent accruing to TSOs from coupling day ahead markets).

These two sources of income have to be determined by different means. The revenue from long-term contracts is easily derived from the long-term capacity requests (provided at an estimated tariff) filed by shippers and the respective allocation per investment scenario appraised.

The revenue from future mid- and short-term contracts has to be estimated. One way of estimating the economic value of these contracts would be to study the impact this mid- and short-term capacity would have on the price differential between the two connected markets (taking into account that the new long-term capacity will also have an impact on said differential). The avoided price differential that comes about with the creation of capacity for the mid- and short-term markets would be an

---

93 I refer to the ERGEG Guidelines for Good Practice on Open Season Procedures (GGPOS) dated 21 May 2007 for an introduction.

94 Which may be filed as part of a link chain request (see chapter 0).

95 See also chapter 0 on the issue of lead time.

indicator of the value of that capacity. Of course it would have to be made sure that the investor into the (long-term) creation of capacity for the mid- and short-term market receives an adequate return.. This would have to be done e.g. by (long-term) accepting the respective part of the overall investment (and the pertaining financing and operating cost) into the cost base of the respective TSO (as a basis for regulated revenues or tariffs).

As a variant, regulators may offer, and TSOs may accept that TSOs bear a share of the utilization risk associated with constructing capacity for short- and mid-term markets in exchange for a higher rate of return on that part of the investment.

A brief digestion is due on the question who shall finally pay for investing into capacities that shall only be sold mid- and short-term? The answer is twofold. Firstly, those who contract that capacity shall (and will) pay for it. But what happens, if the capacities are not fully contracted or the revenues achieved from auctioning them are smaller than the regulated tariff so that the investor in those capacities is left with uncovered cost? In this case the market that benefits from those capacities shall pay the bill. If both markets benefit from the investment, then uncovered cost should be allocated to both markets (in an appropriate ratio). In order to avoid discussions when the problem (uncovered cost) has already arisen, investment of the latter type should be protected by fallback capacity contracts as discussed in chapter 0.

Now, after the (potential) revenues have been determined, how does one appraise whether the expected revenues justify the cost of constructing and operating the new (or expanded) system? Well, once cost (including cost of debt) and revenue (or value) streams (both over time) of an investment are known, the most important[96] missing component to evaluate the investment is a required return on equity. Based on this return figure, a net present value can be calculated (which would have to be at least zero) or the internal rate of return of the investment can be compared to that rate (which would have to be at least as high as the required return on equity). The details of both approaches would go beyond the scope of this discussion.

A final interesting question when it comes to "open-seasoning" long-term capacity is, if the tariff offered during the open season (that is the basis for the long-term requests by shippers) shall be adapted over time if actual cost rises or drops? This is a difficult question also going beyond the scope of this paper. I shall restrain myself to presenting the assumed views of shippers and TSOs to that question. From a shippers' perspective it is quite likely valuable to have a fixed tariff (maybe indexed with general inflation) over the full contract period that – if it is changed at all during the contract period – would only be lowered (e.g. in order to let the shipper participate in efficiency gains of the TSO). From a TSOs perspective all cost pertaining to constructing, financing and operating the system must be covered – and these cost are not completely clear at the time of the open season because the new system (or expansion of an existing system) is yet to be built. So if a TSO would be forced to keep the tariff fixed over the full contract period he would be incentivized to set a tariff for the open season that is high enough to securely cover all future cost and cost increases.

Summarizing, under the MECO-S Model the process of investment appraisal is fully integrated with the allocation of long-term capacity in an open season style process. No long-term capacity is awarded outside of such processes, not even capacity on existing systems. This makes sense because long-term requests shall lead to capacity expansion if economic and open seasons are a good way of dealing in a step-wise manner with the uncertainties of all affected stakeholders when it comes to investing until an economic solution is found. This type of long-term capacity allocation is made possible by choosing a sell-ahead period for long-term capacity (see chapter 0) that is as long as the (estimated) time requirement for expanding (or creating for the first time) capacity. This structuring avoids numerous problems of long-term capacity allocation that arise otherwise. A specific effect of this is also, that long-term capacities are not (need not be) auctioned in traditional ways because

[96] For brevity I exclude more complex issues such as capital structure, debt service cover ratios, etc. here.

auctioning is a way of allocating a scarce resource, but if investing is always an option, long-term capacity should not be scarce.[97] Instead it may be "auctioned" by a system similar to the price-step/volume-step system used in the United Kingdom for identifying efficient investment projects. Additionally the amount of capacity to be reserved for the short- and mid-term market is also planned in the course of the open season style process and the economic viability of that capacity is determined based on the expected reduction of price differentials between the connected markets.

3.3.4.2. Investment into intraconnection capacity

Intraconnection capacity within a market serves a completely different purpose than interconnection capacity between markets.

While interconnection capacity helps to connect markets better and thereby improve price alignment, intraconnection capacity fulfils its tasks within a market (i.e. within an entry/exit area). Intraconnection capacity can either serve increased demand in a market or can help to "debottleneck" an entry/exit area. In what follows, I focus on debottlenecking investment.

What is the goal of a debottlenecking investment in the context of an entry/exit network? In order to answer this question I have to digress into the challenges of calculating capacities in an entry/exit network. The problem with this type of networks is that capacity has to be calculated for every individual entry or exit point and the calculated entry capacity shall entitle shippers to enter gas at that point up to the designated capacity and to take it off again at any exit point of the same network. Since shippers do not have to designate their "transport path" beforehand, a lot of potential transport patterns ("scenarios") between the various entries and exits on the network have to be allowed for. When calculating the resulting entry and exit capacities under the various scenarios, it may (in most cases: will) occur that the capacities that can be offered in a network modelled according to the entry/exit logic are smaller than the point to point capacities formerly offered (or even contracted) on the same physical network. In order to avoid these results a number of actions may be taken, some of them are associated with costs. Among the more popular of the measures with costs (apart from investing; see below) are the purchase of flow commitments by the TSO from shippers and the use of localized system energy (aka "control energy") by the TSO in case a bottleneck should arise within the network. Usually the use of localized system energy entails cost for the TSO (e.g. for paying shippers to permanently keep the required system energy available for the TSO to call up or at least in the form of the price differential that the TSO looses, if he buys system energy on one side of the bottleneck and sells it on the other; another (also with costs) way to use localized system energy would be by the TSO using storage).

Having said that – where do intraconnection capacities come into play? Well, such capacities are a means of avoiding the purchase of flow commitments or of spending money on the use of localized system energy. And this also points to how these investments should be evaluated – by estimating how much cost for alternative measures, e.g. for flow commitments and localized system energy, are avoided by investing into the intraconnection capacity in question. This avoided cost is the economic "return" of the new intraconnection capacity. The rest is standard investment appraisal. Of course, since shippers can not book (and therefore TSOs can not sell) intraconnection capacity, it has to be made sure that the cost (including capital cost) associated with that investment is properly recognized in favour of the TSO. The Ten Year Network Development plans should be the framework within which the appraisals above are made and where the investment is finally approved of by regulators.

---

[97] Of course there may be some "scarcity" on the fringes of the allocation problem (e.g. regarding capacities between two possible steps of capacity extension) that require some sort of allocation (see chapter 0 for the proposed allocation by optimisation). But this certainly does not justify auctioning the full long-term capacity.

3.3.4.3 Financing investment into gas transmission capacity

One of the toughest problems when it comes to investing into gas transmission capacity is financing. At first glance it appears reasonable that companies taking over the role of TSO for a specific area shall also invest into new systems or capacity expansions wherever this is economic.

The problem with this approach is that there are numerous reasons why an investment that is economic from an economists view may not be economical (of even feasible) for the specific TSO affected. For instance the capital structure of that TSO may be such that he can not take on the additional debt required to finance the investment, or the regulated rate of return may be too small from the perspective of the TSO in order to take on the risk associated with the investment project and so on.

There has been much discussion on these issues, especially on the rate of return, and that discussion shall not be continued here. One thing is clear though. As long as TSOs are established as private companies, they should not be coerced to invest if they are not ready to do it. This would be command economy style and would run the risk of scaring away the private sector from the gas transmission business.

A solution that is frequently put forward when it comes to the question of financing investment is to harness exemptions in accordance with Article 36 of DIRECTIVE 2009/73/EC in order to attract private finance for gas transmission investments.

Two issues have to be mentioned in that regard. Firstly, exemptions for gas transmission systems based on Article 36 are limited to interconnection pipelines. So other capacity investment, notably investment in intraconnection capacity, is excluded from utilising that instrument. This is a substantial disadvantage insofar as the bigger markets get, the importance of interconnection capacity is reduced while the importance of intraconnection capacity rises.

Secondly, the “typical” exempted pipeline interconnecting two member states is a bit foreign to an integrated European gas network. This is due to the fact that exemptions for such pipelines may not only grant an exemption from regulated tariffs (which would be OK if required to attract finance) but may also grant exemption from the third party access rules that would otherwise apply. The latter is what makes such exempted pipelines hard to integrate in the European network access architecture. For instance, an exempted pipeline with its own (commonly point to point) network regime, based on its own network code would not integrate into bundled capacity products between markets which are a core element of the envisaged market architecture.[98] Also imposing other “public service obligations” on exempted pipelines (like reserving parts of capacity for the short- and mid-term market) is difficult, because it endangers the economics and bankability of such a project. Of course it would be possible to “pay” the investors of an exempted pipeline for taking on such public service obligations, for instance by the adjoining regulated TSOs signing a fallback contract (see chapter 0 for details on that concept and the required corollaries to protect those TSOs) with the operator of the exempted pipeline for the capacity to be reserved for short- and medium markets. The latter would indeed be a reasonable course of action if an exempted pipeline is built and where it would be uneconomic to build a parallel non-exempted line.

While not at all trying to do away with exempted pipelines – since they are an instrument foreseen by European law and they can play very important roles, consider e.g. long distance feeder lines like Nabucco that would not be built without an exemption – I suggest an additional instrument to attract private finance for pipeline investment that avoids many of the problems analysed above.

That instrument is the tendering of investment projects to the market.

[98] So instead of transporting gas from VP to VP with a single contract a shipper would require three contracts (exit contract, P2P contract on the exempted line, entry contract).

Tendering of investment projects is an option already foreseen in Article 22 (7) of DIRECTIVE 2009/73/EC. In what follows I will present how such a mechanism could work in practice on the basis of an example:

1. Investment project:

- An intraconnection capacity project is analysed. The appropriate investment appraisals show that the investment is economic and therefore the decision is made that the project shall be realised.
- The TSO in whose network the intraconnection capacity shall be built, declares (e.g. due to finance limitations) his inability to invest into the project at this point of time.
- Therefore it is decided to tender the investment project.

2. Tendering

- The investment project is worked up as much as is required to tender the project.
- The scope of the tender is procuring, building and financing the required gas transport assets (including land, rights of way, etc.) and leasing them out to the TSO for operation against the payment of an annual fee for the next xx years (e.g. matching the depreciation period).
- Companies with the necessary technical skills and financial clout are invited to bid for the project.
- NB: At this stage the TSO may file his own bid for the project as well.[99] If the TSO wants to participate in the tender, the tender would have to be conducted by a third party.
- The bids are made on the annual payment that the successful bidder would receive for building and financing the new assets.
- The contract is awarded to the (qualified) bidder ("the developer") that demands the lowest annual payment.

3. Construction and hand-over

- The developer constructs the new assets and organises the financing model for the lifetime of the contract that was awarded to him.
- After successful construction the new assets are handed over by way of a lease model to the TSO for operation.
- After the hand-over the TSO assumes full responsibility for operating and maintaining the new assets.
- Now that the riskiest phase of the project is over, the developer may decide to sell his shares in a project company that holds the new assets, the finance contracts and the lease contract with the TSO e.g. in order to release funds for new projects.

4. Operation

- The TSO integrates the new assets in his network access model and all network related processes as if he was their owner.
- The TSO maintains the new assets as if he was their owner.
- The lease fee for the new assets (for the full duration of the lease) and the cost for operating and maintaining the new assets are considered in the regulation of the TSO (→ cost recognition). NB: Further discussion is required on the issue if the TSO shall earn a service margin on the cost incurred for operating and maintaining the new assets.

5. End of lease

[99] This would only be relevant if the TSO refrained from investing in the first place due to rate of return issues.

- At the end of the lease period the leased assets are transferred to the TSO free of charge and enter his asset base with asset cost of zero.

The model presented above has a number of interesting features:

- New sources of finance are tapped for developing gas transmission projects; finance for those projects is no longer limited to the financial clout of the TSO himself.
- The model does not (re-)introduce an exclusive leasing of assets from the vertically integrated mother or sister company because the investment project is tendered to all interested and qualified parties.
- The number of TSOs is not unnecessarily increased, even if a TSO is not able or willing to invest into a specific gas transmission project, because the operation of the new capacity is still handled by that TSO.
- The model does not implement a market for capacity (which can be problematic for reasons given above) but a market for investment that likely will attract a larger number of players and therefore produce more efficient outcomes than a market for capacity.
- The model relieves TSOs and NRAs from cumbersome (and potentially endless) discussions about regulated rates of return for new investment. That number is decided by the market, based on current market conditions at the time of each tender.

I am aware that the lease part of the model presented in the example above is at odds with the black letter wording of Article 17 (1)a of DIRECTIVE 2009/73/EC. That article foresees that independent transmission system operators ("ITOs") own all assets that are "*necessary for the activity of gas transmission, including the transmission system*". But looking at the genesis of the discussion on ITOs I deem it likely that the true intention of said paragraph was only refraining ITOs from leasing assets exclusively from their (vertically integrated) mother or sister company and that the intention was not refraining ITOs from leasing assets at all. If this assumption is correct (also considering the provisions of Article 22 (7) of the same directive as cited above in this chapter) and given some political will to unleash finance for gas transmission systems, that problem should be a solvable one.

3.4 Ancillary questions

The following section deals with a few ancillary questions in the context of the MECO-S Model.

3.4.1 Impact on balancing and nomination management

Regarding the impact of the MECO-S Model on balancing and nomination management, I will discuss the minimum harmonisation required in the respective fields in order to realize the various concepts of the MECO-S Model. For brevity I will not discuss the issue of what could be gained by more harmonisation than the required minimum.

The discussion is structured by the pillars of the model.

PILLAR 1: ENABLING FUNCTIONING WHOLESALE MARKETS

Two architectures were presented to enable functioning wholesale markets: market areas and trading regions.

Market areas have the following minimum harmonisation requirements per market area as regards balancing:

- fully harmonised balancing system (i.e. one set of balancing accounts settled according to a single set of rules valid for the whole market area); and
- full harmonisation of the data provisioning system underlying the balancing system (i.e. the data regarding injection and withdrawal in/from the network that enters the balancing accounts should

be determined based on harmonised rules. Such rules would include the threshold for the use of standardized load profiles, the rules for determining and using these profiles, certain measurement provisions, etc.).

Trading regions have the following minimum harmonisation requirements per trading region as regards balancing:

- single set of trading accounts on the level of the trading region itself, implementing an ex-ante "no-imbalance" regime in the course of the nomination process; and
- implementation of allocation by declaration (aka "allocated as nominated") at all points leading into and out of the trading region;[100] and
- harmonised gas day for the trading region (NB: Implementing the same gas day for all national end user zones would make a lot of sense, but is not absolutely necessary in the model if the virtual exit from the trading region to the national end user zones is nominated in hourly time units).

  NB: Harmonising basic rules for keeping the trading accounts in the trading region and the balancing accounts in the national end user zones, though not an absolute necessity, would also be reasonable (e.g. harmonising the accounting unit (e.g. MWh)).

PILLAR 2: CONNECTING MARKETS

The two most essential concepts of pillar 2 impacting on balancing and nomination management are hub-to-hub transport products and (potentially) market coupling.

Hub-to-hub transport products (that include capacities in different markets) have the following minimum harmonisation requirements for the connected markets as regards nomination management:

- harmonised nomination system (nomination quantity unit (e.g. MWh), nomination time unit (e.g. hour), nomination schedule (including time basis and a harmonised decision on the use or non-use of daylight saving time), etc.).

Market Coupling has the following minimum harmonisation requirements for the coupled markets as regards balancing and nomination management:

- harmonised gas day (including a harmonised time basis and a harmonised decision on the use or non-use of daylight saving time); and
- harmonised nomination quantity unit (e.g. MWh); and
- allocation by declaration (aka "allocated as nominated") at all points subject to market coupling.

Pillar 3 (secure supply patterns) and the common foundation (investment) of the model do not require any specific harmonisation in the fields of balancing or nomination management.

More details on necessary and useful harmonisation in the fields of balancing and nomination management are provided in chapter 0.

As a final contribution to the ongoing European discussion on the balancing framework guideline and respective netcode I provide a short frame of reference on the impact areas of a balancing system (including nomination management) that may be useful to structure discussions on the issue.

Impact areas of a balancing (and nomination management) system:

- System integrity (i.e. keeping gas pressures on the network between the defined minimum and maximum limits, so that the transmission of natural gas is guaranteed from a technical standpoint).[101]

[100] Where this can not be achieved (e.g. on an EU border point where the adjoining non-EU TSO does not cooperate as required) some fallback balancing regime needs to be introduced (see also chapter 0).

[101] Based on the definition of system integrity in Article 2 (1) No. 9 of REGULATION (EC) No 715/2009

- Competitiveness (i.e. the (potentially) differing impacts of various types of balancing systems on market participants of e.g. differing sizes or on incumbents versus newcomers).
- Transaction cost (i.e. the cost for market participants of operating within the framework of a balancing system).
- Balancing efficiency (i.e. the cost for maintaining the balancing system that is (by various means) allocated to market participants and final customers).
- Externalities (i.e. the impact of the balancing system on other properties of the market, e.g. the liquidity on spot markets).

Formulating goals for these impact areas is not an easy and potentially contentious task, as can be illustrated by the following examples:

- Shall the balancing system ensure system integrity (including the delivery of gas to all final customers in accordance with their demand) at all times? In other words: Shall the balancing system make provisions for certain failures of market participants (e.g. substantially underestimating demand or not preparing for especially high demand situations) and become a supplier "of last resort" for the market and if yes: For how long?; and if no: What shall happen (to be effected by whom) after the "responsibility" of the balancing system has ended?
- Shall the balancing system only be "competition-neutral" or shall it actively support competition by new market entrants (e.g. by defining flat (daily) standardised load profiles, which may even (although temperature-sensitive) be determined one day in advance as is the case in Germany)?
- Shall the balancing system only have no negative externalities or shall it create positive externalities (e.g. by requiring hourly balancing from shippers in combination with little or no tolerances which could spur the emergence of a within-day market)?

I suggest that in the ongoing discussions on balancing and nomination management the impacts of the various implementation proposals are analysed by a framework similar to the one presented above.

3.4.2 Role of within-day markets

There is a discussion ongoing in Europe on the role of within-day markets. In this chapter I will briefly discuss the role of within-day markets in the context of the MECO-S Model.

Let us start with a definition of the term "within-day gas market":

> A within-day gas market is a market (either OTC or exchange-operated) where gas can be bought and sold for delivery on the current (or immediately forthcoming) gas day. A within-day gas market may either be structured as a "balance of day" market where gas is bought and sold with a flat delivery profile for the remaining (with some lead time) hours of the gas day or as an hourly market where the traded product is the delivery/take over of gas in a specific future hour.

When analysing the necessity of a within-day market, one has to look at the close interrelations between within-day markets and the balancing system of a market.

This interrelation shall be illustrated by two (hypothetic) examples.

Example 1: The balancing system foresees an hourly cash-out period with little (or no) tolerance:

> In this case, market players will either have to buy access to a source of hourly flexibility (e.g. storage or a flexible delivery contract) or turn to the within-day market to manage their hourly flexibility needs.
>
> Potentially (as always with markets) the within-day market can raise efficiency in bringing together market players with hourly flexibility requirements and those able to supply such flexibilities.
>
> Other interesting features of a within-day market (in the situation of example 1) are that market players with opposing flexibility needs (e.g. one player being (i.e. expecting to be) long the other

short for a future hour) may effectively cancel their positions via the market (which would be a very efficient action) and also that such markets are a way of efficiently integrating demand management measures into the balancing logic of a market.

Example 2: The balancing system foresees a daily cash-out period with no hourly limits and substantial tolerances for imbalances to be rolled over to the following day.

In this scenario (which may be efficient for markets with substantial line pack[102] potential), market players may find out that they do not have a need for within-day trading activities and that a day ahead spot market sufficiently satisfies their short-term flexibility requirements.

Since the MECO-S Model does not present its own proposal for the balancing system no specific conclusions regarding a within-day market need to be drawn.

It is for sure though that the concepts presented by the MECO-S Model do not depend on the existence of a within day market, but also, nothing in the MECO-S Model withstands the introduction of such a market. It may also be expected that the implementation of the MECO-S Model (since it generally supports the emergence of functioning wholesale markets) will also support the emergence of functioning within-day markets.

3.4.3 Role of physical gas hubs

"Physical gas hub" is a term not legally defined. Our working definition of physical gas hub involves a geographical point on one major pipeline or a crossing of several major pipelines where changes in ownership of gas can be effected. Usually ancillary services like back-up/down would be offered. In some cases gas exchanges have selected physical hubs as their delivery point. Examples of European physical hubs would be Zeebrugge Hub, Belgium or CEGH, Austria.

The trading procedures (and their effects on the market) on physical hubs are in general quite similar to those at virtual trading hubs[103] (examples for the latter would be NBP, TTF, NCG, Gaspool Hub, PEG Nord or Sud). However the trades that make it into delivery on the physical hubs are limited to such gas volumes as are physically passing through the respective hub.[104]

The question to be discussed here is what the role of physical hubs will be in the MECO-S Model (or any other hub-to-hub-model)?

For analysis I differentiate the following types of physical hubs:

- Physical hubs located outside European territory (i.e. before upstream pipelines enter European territory) ("Extrahubs")
- Physical hubs located at the border between two or more member states ("Interhubs")
- Physical hubs located within the borders of one member state ("Intrahubs")

Extrahubs are completely unaffected by the MECO-S Model, since the MECO-S Model only deals with issues taking place on European territory. They may continue to play their role of being a market place where gas can be traded before it enters the first European market, helping market participants in avoiding unnecessary transports in and out of a market.[105]

---

[102] In this case it would have to be line pack that is not required for transport purposes.

[103] Also termed "virtual points" or "VPs".

[104] Purely financial trades (or trades in physical instruments that are closed out before delivery) may be much higher though.

[105] Consider an extrahub that is located "before" two European markets. It provides shippers with the opportunity to decide to which market the gas they buy at the hub shall be brought to instead of always having to buy gas in one market and then transporting it to the other market.

Interhubs are not required anymore, after the full implementation of hub-to-hub-trading[106] based on hub-to-hub capacity products. In such a hub-to-hub scenario there would be no more gas at border-flanges that could be traded via the hub. Maintaining interhubs as a stopover between the virtual points of the adjoining markets does not seem to be efficient, because it shatters market liquidity and offers no service that could not also be offered on either (or all) of the affected virtual points. Instead it appears likely that operators of interhubs will relocate some of their service offerings to one (or all) of the virtual points of the markets whose borders they formerly where operating on.

Intrahubs are affected in a way quite similar to interhubs. After the creation of market areas and trading regions with virtual points, they vanish into the network making up the physical background of the market area or trading region (where their physical services – e.g. wheeling – may still be required in order to physically operate the market area or trading region). One would also expect that intrahub operators would try and relocate some of their service offerings to the virtual points of the markets they are situated in.

3.4.4 Impact on tariffs

Regarding the role of tariffs in the context of the MECO-S Model I will discuss how the various concepts of the MECO-S Model impact on tariff issues and what corollary measures may be required in the tariff sector.

The discussion is structured by the pillars of the model.

PILLAR 1: ENABLING FUNCTIONING WHOLESALE MARKETS

Pillar 1 foresees among other things that markets are organised as entry/exit networks of a certain size, possibly including several member states. This gives rise to a number of issues.

Firstly, more and more points that have been bookable points before will become points internal to the entry/exit zone (“internal points”). The TSOs on whose network these internal points are located will loose a source of revenue. In order to deal with such a potential loss of revenue a simple solution exists, called the “internal booking approach”. According to the internal booking approach, at every internal point the respective downstream TSO books[107] the required capacity from the upstream TSO (i.e. the exit capacity from the upstream TSO is booked) and integrates this cost into his own exit tariffs. If – between the affected networks – the gas flows interchangeably in both directions, then both TSOs book capacity on the respective other TSO’s network. By this mechanism the cost of transmission “flows with the gas” to the final customers which appears to be an equitable approach. One property of this approach – that may be deemed problematic by some – is that an increasing share of total network cost is collected at exits (because cost is always allocated downstream). If this becomes an issue another potential solution involves (partly) shifting the cost of internal points (partly) up to the entries of the (every) affected TSO. The actual solution for a specific market should be chosen with great care in order to avoid contortions in the commodity markets.

Secondly, the larger an entry/exit system becomes, the higher the risk gets that the entry/exit tariffs will blur the actual (i.e. “economic”) cost of delivering gas to a specific exit point. This risk is especially high, if an undifferentiated “postage stamp” approach to exit tariffs is implemented, whereby the exit of gas costs the same at every exit point no matter where this point is located. At the second glance the issue becomes less complicated – it even disappears – if every TSO determines the exit fees for his network separately taking into account his own cost plus the cost for “internal bookings” (see above paragraph). In that case, final customers supplied by TSOs close to market entry

[106] Remember that in the MECO-S Model every market has its own virtual hub, where trades can be effected.

[107] I note that Article 2 (1) No. 11 defines TSOs as network users “in so far as it is necessary for them to carry out their functions in relation to transmission”.

points would enjoy lower exit cost (which would also be in line with the economic fact that it costs less to transport the gas to them) and those further away from sources would have higher exit cost.

Thirdly, it is frequently put forward that the principles for calculating regulated network cost and/or regulated tariffs need to be harmonised among all TSOs participating in an integrated market. While not contending that this could not make some sense, I think it is not an absolute necessity for such markets to work well. Specifically I do not think that such harmonisation is a prerequisite of creating cross-border markets, it may just as well be done later. The functioning of a market (market area or trading region) does not depend on all participating TSOs employing the same principles for asset valuation, the same depreciation periods or the same rate of return on equity, etc.

PILLAR 2: CONNECTING MARKETS

Remember that the connection of markets for the medium and short(er) time segments is based on allocation of capacity by auctions. In most cases these will be explicit auctions, while under certain conditions an implicit auction by way of market coupling may be implemented for the day ahead time segment.

Now auctions (implicit and explicit) depend on the demand for a certain capacity and the amount of capacity available. Therefore, auction revenues will in most situations deviate from the fixed (regulated) tariffs that would be charged otherwise.

Hence auctions can result in:

- overrecovery (i.e. the auction revenue being higher than the fixed tariff); or
- underrecovery (i.e. the auction revenue being lower than the fixed tariff. NB: This situation can only occur, if auction minimum prices ("reserve prices") are set lower than the fixed tariff.

Measures for dealing with overrecovery are well known. They include setting the overrecovery aside for the relief or removal of congestion or the lowering of tariffs on other appropriate parts of the same network (or another network within the same market; this would necessitate intra-market inter-TSO compensation).

If the implementation of the gas target model should allow situations where underrecovery can occur (i.e. by setting low or zero reserve prices for certain capacity products), measures have to be implemented so that network operators do not suffer from this market design decision.

Measures for dealing with underrecovery include raising tariffs on appropriate parts of the same network (or another network within the same market, again necessitating intra-market inter-TSO compensation) or allocating cost to adjoining network operators of the adjoining market, that benefits from the transport (i.e. inter-market inter-TSO compensation). In the latter case the TSO receiving the cost allocation must be entitled to allocate this cost within his market.

The mechanism presented above can deal with any deviation of auction revenues from fixed tariffs that would be charged otherwise (i.e. if there was no auction).

PILLAR 3: ENABLING SECURE SUPPLY PATTERNS

Under the header of secure supply patterns the issues of long-term and long-term-long-distance transport were discussed at first. As was presented in the respective chapter I do not foresee the auctioning of long-term capacity. Therefore issues as presented above regarding auctions do not arise when it comes to long-term capacity. I also do not see any other tariffing issues arising from the instruments presented in that context.

Secondly, the concept of the fallback capacity contract was introduced.[108] As was already discussed in that chapter it is necessary that TSOs obligated by their competent national authority to perform

[108] See chapter 0

fallback capacity bookings for transport security of supply purposes are entitled to a full recognition of the cost arising from such action.

COMMON FOUNDATION: REALIZING ECONOMIC INVESTMENT

The open season style selling of long-term capacity and the – at the same time – appraisal of new investment presented in the chapter on economic investment[109] does not require any corollary action in the tariff sector apart from the recognition of cost incurred by TSOs creating and reserving capacities for the mid- and short-term markets.

The instrument of tendering investment projects to the market[110] does require reflection in the area of tariffs insofar as the lease fee charged by the developer of the investment project needs to be fully recognized in the cost basis of the TSO paying the lease fee.

3.4.5 Role of gas exchanges

What is the role of gas exchanges within the MECO-S Model?

Firstly gas exchanges are a valuable element of a functioning wholesale market. They provide an anonymous and counterparty-risk protected market place with transparent price formation rules. Additionally they are a valuable source of price information for all kinds of market participants and purposes.

So, even if functioning wholesale markets are not dependant on gas exchanges, since a lot can be and is done on the OTC market, they are a welcome and valuable element of any target market architecture.

There is one element of the MECO-S Model though that actually depends on an exchange organized market and that is day ahead market coupling.[111]
As described in the respective chapter,[112] market coupling is a process that includes actions on the two (or more in case of multilateral market coupling) coupled gas exchanges.

In order to realize the market coupling process with existing gas exchanges the collaboration of the affected gas exchanges is required especially with respect to the timing of the market coupling process, the required information flows, the harmonisation of price formation rules and certain essential spot contract specifications (to make the coupling process more or less riskless) etc.

Other than that, the MECO-S Model does not foresee any specific role for gas exchanges in the market architecture.

The MECO-S Model will have an indirect impact on gas exchanges though. Since, according to the pillar of functioning markets, smaller markets are integrated to (form) larger markets, the number of virtual points for exchanges to operate on will be reduced, potentially leading to (where they already exist) fewer, but more liquid and thereby relevant gas exchanges.

3.5 Implementation of the MECO-S Model

The following section provides clues on what would have to be done in order to realize the MECO-S Model. Of course – since the whole model is not prescriptive – these clues cannot and are not at all prescriptive but merely recommendations for stakeholders in charge of realizing gas network access.

---

[109] See chapter 0

[110] See chapter 0

[111] See chapter 0

[112] See chapter 0

3.5.1 General

The question of implementing the MECO-S Model can be separated into two areas:

a) In which sequence shall the elements of the model be implemented?

b) How shall the model be implemented?

The first question (a) can be dealt with rather briefly. The logical interrelations between the individual elements of the MECO-S Model (where they exist at all) are in most cases only beneficial[113] but do not enforce a specific order of implementation. This is only true with one substantial exemption though. Market Coupling can only be implemented once functioning spot markets exist[114]. Other than that I would not see any mandatory order of implementation.

The question (b) on how the model shall be implemented bears much more of a challenge.

It decomposes into a number of sub-questions, the most important being:

- Which legal instruments shall / may be used in order to implement the model?
- Who would have to do what in order to implement the model?

When analysing the issue of the legal instruments, one quickly realises that the "European processes" foreseen in the 3rd package – namely the framework guideline / network codes process is not sufficient to comprehensively implement the model. This is due to the fact, that the gas target model requires cooperation on the side of market participants not within the scope of the network codes or any other European[115] instrument made available by the 3rd package. These market participants are distribution systems operators and operators of gas exchanges.

The cooperation of distribution system operators is required in order to implement market areas and (but to a far lesser extent) trading regions. E.g. in a market area, distribution system operators get allocated transport cost from transmission system operators and have to provide timely allocation data to TSOs so that TSOs can provide balancing information to shippers. It appears highly unlikely that distribution system operators will accept those tasks without regulation[116] obliging them to do so or at least making sure they are permitted to recover the extra cost (e.g. from their own shippers). This type of regulation does (with a lot of variation) exist in a number of member states, but not on a European level. Enacting this regulation in a comprehensive and uniform way will either require another act of European legislation or (well coordinated) regulation[117] in several member states.

The cooperation of gas exchanges is required especially in order to get market coupling off the ground. Also gas exchanges cannot be obligated by the mentioned European processes, but I deem this a lesser problem because on the one hand exchanges should have a natural interest in participating in market coupling because it can further their business and on the other hand, exchanges are (although subject to network economics) not natural monopolies. So if the dominant exchange for a market does not want to cooperate on a voluntary basis, maybe another one will or even TSOs might take over that task.

The following section deals with the first issue of supporting and not preventing the model in the framework guidelines. It lists – per framework guideline – issues that are important for the model without regard to the fact that some of these issues may already be covered in current drafts of

---

[113] I.e. measure B helps in implementing or gaining or increasing the benefits from measure A, but measure A is not contingent on a prior implementation of measure B.

[114] Although the implementation of market coupling itself will help increasing the liquidity of spot markets. Therefore the introduction of market coupling may help markets to close to gap to becoming functioning markets.

[115] As opposed to legal instruments at the disposition of individual member states.

[116] By law or potentially regulatory decree.

[117] By NRAs or lawmakers, depending on the respective powers of NRAs.

framework guidelines. Additionally, in the next but one section, further issues are listed that in most cases will require additional, mostly legislative action, but for which the network codes are not the appropriate legal instrument.

3.5.2 Implementation in the framework guideline process

This section lists issues that may be implemented in the ACER framework guidelines and later on in the ENTSOG network codes.

The list focuses on issues that are of particular importance for implementing the MECO-S Model no matter if they are already reflected in existing drafts of framework guidelines.

3.5.2.1 Framework guideline on capacity allocation management

Regarding the structure of TSO's commercial network model:

- TSOs shall generally structure their networks as entry/exit zones (aka "entry/exit networks") where capacities at entries are not assigned to specific capacities at exits and may be bought separately;
- TSOs shall structure their entry/exit capacities in a way so that shippers may request redelivery of gas at any exit point of the entry/exit zone no matter on which entry point of the same entry/exit zone the gas was injected or if it was taken into possession at the virtual point of said zone;
- cross-border entry-/exit zones shall be permitted;
- TSOs implementing the market area model shall – in cooperation with the adjoining TSOs and DSOs in the market – create an (i.e. one integrated) entry-exit zone that includes transmission and distribution systems with no bookable capacity between them;
- TSOs implementing the trading region model shall – in cooperation with the adjoining TSOs in the market – create an (i.e. one integrated) entry-exit zone that includes all nominated points on their networks and features a virtual exit to the connected end user zones;
- TSOs shall implement a (i.e. one) virtual point in every entry/exit zone, where gas can be handed over from one shipper to another shipper;
- TSOs shall offer to shippers for booking only capacity at border points[118] of a market (i.e. market area or trading region); and
- TSOs shall, where two markets are connected by more than one interconnection point belonging on both sides to the same TSOs network respectively, zone these physical interconnection points into one virtual interconnection point.

Regarding capacity products:

- TSOs shall define and sell all capacity products as hourly capacities expressed in kWh based on gross calorific value;
- TSOs shall sell capacity at cross-market interconnection points only by way of bundled capacity products ("hub-to-hub-products") incorporating the exit-capacity from market A and the entry capacity of the adjoining market B in a single contract to be executed with either of the adjoining TSOs;
- TSOs shall – as an exemption to any contrary provision herein – sell at every market border point unbundled entry or exit capacity to every holder of unbundled exit or entry capacity at the same

[118] Including interconnection to storage and production and exits to final customers directly connected to transmission systems.

point on the system of the interconnecting TSO with a tenure no longer than the tenure of the existing capacity contract at the same market border point held by the requesting shipper.

- TSOs shall offer commercial (i.e. non-physical) backhaul capacity at every market border point, unless physical reverse-flow capacity is offered at that point;
- TSOs shall harmonize contract tenors (e.g. day, month, quarter, year), start dates and start hours for capacity products, whereby start dates for the same tenor shall have no overlap (e.g. only one start date and hour for yearly contracts and so on for the other contract terms);
- TSOs shall use reasonable endeavours to align tenors and start dates for transport contracts with commodity contracts traded on gas exchanges as far as these feature the virtual point of their "home" market as the delivery point;
- TSOs shall split the available technical capacity at every market border point to contract tenors (e.g. long-term, mid-term, short-term, …) in a harmonised way foreseeing at least […]% of technical capacity to be allocated to mid- and short-term requests whereby capacity that is not sold in a longer term category shall be offered in the next shorter term category;
- TSOs shall implement a harmonized interruption logic (especially triggers for and sequence/allocation of interruption of/to individual contracts) for interruptible capacity products (and equitably reflect that logic in the tariffs charged for interruptible products); and
- TSOs shall cooperate to offer link chain products between non-adjoining TSOs (e.g. from country A to the non-adjoining country D). Those products shall enable shippers to request and get allocated[119] a string of bundled[120] cross-market capacities and (if requested) entry capacities at an EU border point on a continuous transport route chosen by the shipper whereby the allocated capacities shall entitle the shipper drop gas and/or pick up gas at every intermediate virtual point.

Regarding the processes of selling capacity by TSOs (i.e. primary capacity):

- TSOs shall sell (primary) capacity at individual bookable points according to the following procedures:
- Long-term capacity:
- Long-term capacity (existing and potential new capacity) shall only be sold in the course of periodical open seasons.
- The lead time for the capacity sold (i.e. the time between the open season and the first transport day) shall be long enough so that capacity expansion can be realized if the demand is high enough and the investment is economic.
- In such open seasons requests for main flow and physical reverse flow capacity shall be invited and allocated and investments for both transport directions shall be considered alike.
- In addition to long-term capacity requests the required capacity to be reserved for the short- and mid-term markets shall be considered in the investment appraisals. They shall be valued based on their estimated effect (i.e. reduction) on price differentials between the connected markets.
- TSOs shall define and apply a harmonised set of minimum criteria for the acceptance of binding bids during the open season and the ensuing investment decision that is fair, concrete and transparent.
- If not all capacity requests can be fulfilled, the investment problem shall be solved by optimizing for maximum capacity with economic parameters as constraints to be kept.
- Mid- and short-term capacity: Auction

[119] Subject to an allocation procedure if not all requests for capacity (link chain and non-link chain) can be fulfilled.

[120] For the avoidance of doubt: This "bundling" refers to individual intra-EU cross-market points. The string may (depending on the route chosen by the shipper) be made up of several such capacities and also capacities at EU border points.

- Day ahead capacity:
  a) Once market coupling is implemented: Reserved for market coupling
  b) As long as market coupling is not yet implemented: Auction
- Day ahead capacity not required after the daily market coupling process: FCFS
- Within day capacity: First come first served;
- TSOs shall coordinate auction dates for mid- and short-term capacities on individual market border points in a way so that those auctions are not all concluded at the same day and time;[121] and
- TSOs shall devise a harmonized sales procedure for long-term link chain products[122] that is integrated with the open seasons foreseen for selling long-term capacities on individual bookable points, whereby an allocation to a link chain request would always involve the same amount of capacity at all requested points for all requested years.

Regarding secondary capacity:

- TSOs shall devise harmonized procedures for transferring the title to or the usage rights of primary capacity from one shipper to another shipper for all or parts of the contracted capacity and its tenor.

Regarding short-term use/sell it or loose it:

- TSOs shall devise harmonized procedures that make sure that at least the majority of capacity unused (or unsold) by shippers for the following day is made available to the market (or the market coupling process) as firm day ahead capacity.

Regarding short-term capacity management:

- TSOs shall cooperate every day to align as much as possible[123] for every market border point the amount of bookable day ahead capacity at least with the expected requests for day ahead capacity at that point in order to reduce or even avoid congestion at usually congested cross-market points.

3.5.2.2 Framework guideline on balancing

Regarding the general nomination and balancing regime:

- TSOs shall define a harmonized energy unit to be used in all nominations for physical and virtual points (e.g. MWh based on gross calorific value with two decimal places);
- TSOs shall require nominations to be made in hourly quantities (i.e. 24 hourly quantities to be nominated per gas day);[124]
- TSOs shall define a harmonized nomination and renomination schedule;
- TSOs shall define a harmonized nomination message format (including uniform provisions on the use of encryption and electronic signatures) and in any case support the exchange of nomination messages by electronic mail over the internet;

[121] This is required in order to not overburden (especially smaller) shippers with simultaneous auction procedures. Such procedures would also not help shippers in achieving a string of capacity they may be interested in, because there is no guarantee that a shipper will be successful at all relevant auctions even if they take place at the same time.

[122] Long-term link chain products are required especially on existing networks to underpin new long-term supply contracts signed by suppliers with the intention to sell (primarily) in certain (one or several) markets. Otherwise they would be forced to take a lot of (maybe too much) risk because they could never be sure to reach the markets they are interested in (e.g. because their consumption volume is large enough) with the gas they sign long-term.

[123] Taking due account of the required safety margins.

[124] This does NOT prejudice the length of the balancing cash out period, but only how the shipper communicates to the TSO the intended use of his capacity.

- TSOs shall use their reasonable endeavours to align the nomination and renomination schedule with trading hours on gas spot exchanges;
- TSOs shall define a harmonized gas day including a unified time basis (e.g. UTC) and a decision on the harmonized use or non-use of DST for the whole nomination and balancing system;
- TSOs shall accept bundled nominations for bundled capacities sold at cross-market points (i.e. a single nomination for the included entry- and the exit-capacity to be submitted to the TSO with which the shipper signed the bundled capacity contract);
- TSOs shall cooperate to implement balancing zones identical to the entry/exit zones they created according to the market area or trading region model;
- TSOs shall implement the "allocation by declaration" (aka "allocated as nominated") principle at all intra-EU market border points (i.e. interconnection with other European TSOs);
- TSOs shall use their reasonable endeavours to implement the "allocation by declaration" principle at all EU border points (aka "import points") and at all interconnection with European storage and indigenous production;
- TSOs implementing the trading region model shall implement the "allocation by declaration" principle at the virtual exit to the interconnected end user zones;
- TSOs shall (also) use existing liquid gas spot exchanges (day ahead and if available within day) for procuring or selling the energy required for the physical balancing of their respective markets (aka "external system energy");
- TSOs that require flows of gas at particular points on their networks for purposes of physical balancing shall either contract storage or contract the required flexibility as "flow commitments" not including the transfer of title to gas from the vendor of the flow commitment to the TSO or vice versa, whatever is technically available and more economic; and
- TSOs operating in markets without a liquid day ahead and within day gas spot market shall provide shippers with tolerances in their balancing accounts, whereby those tolerances shall utilize but not exceed the technical capabilities of their system.

Additional items in order to realize market areas or trading regions involving more than one TSO:[125,126]

- TSOs shall devise a harmonized balancing system involving uniform provisions on the following elements:
- Shippers' rights and obligations regarding the management of its balancing account
- Data provisioning by the and to the shipper
- Cash out period of the balancing system (e.g. hour or day)
- Free of charge tolerances to be applied on the account balance before cash out
- Potentially additional, fee-based tolerances[127]
- Pricing of balancing energy
- Additional financial or non-financial incentives in the balancing system

Additional items in order to enable trading regions:

[125] These harmonization items do not suffice to realize cross-border market areas (see other areas of required harmonization below in this paper).

[126] Trading regions alone would require less harmonization items than listed below.

[127] Such additional, fee based tolerances would be an "unbundled" network service with a price separate from transportation tariffs.

- TSOs implementing the trading region model shall be entitled to set up trading regions as fully "allocated as nominated" systems involving hourly settled trading accounts;[128]
- TSOs implementing the trading region model shall be obliged to settle imbalances resulting from interrupting capacity or from missing "allocation by declaration" agreements on EU border points directly with their shippers on the basis of a market based price; and
- TSOs implementing the trading region model shall either (depending on national legislation regarding the balancing of the end user zone) physically balance their national end user zone as a task separated from maintaining the trading region or provide the national end user balancing entity with access to the virtual point in the trading region.[129]

3.5.2.3 Framework guideline on interoperability

- TSOs shall – having due regard to the ongoing standardization work on a European gas quality standard – cooperate (and continue to cooperate) to harmonize gas quality specifications (including odorization) and where required the actual gas quality at all physical interconnection points as much as is economically reasonable and technically feasible without breaching national legislation on gas quality so that physical reverse flow is not prevented by gas quality issues; and
- adjoining TSOs at market border points shall align their network maintenance activities in the way required so that interruption of bundled capacity products due to maintenance is kept at the necessary minimum.

3.5.2.4 Framework guideline on tariffs

Note: The following items are subject to the assumption that the ENTSOG netcodes – once set into force by comitology – rank higher than national law also in the area of setting tariffs.

- TSOs shall set the harmonized start date of the yearly capacity product (see above) as the only day on which tariffs for network access may be changed;
- TSOs shall define harmonized criteria for allocating network cost to entry- and exit points;
- TSOs shall define harmonized methods for pricing capacity products (no matter the method they are sold by) ("regulated tariffs").
- TSOs shall define harmonized auction[130] procedures (i.e. the auction method) for selling capacity products including a uniform provision on the consideration of regulated tariffs as reserve prices that may be differentiated per contract term;
- TSOs shall define harmonized procedures for splitting among the involved TSOs the proceeds from auctioning off bundled capacity products;
- TSOs shall define harmonized procedures for dealing with over- or underrecovery of their regulated tariffs due to auctions (e.g. by building investment allowances or by adapting cost allocation to other network operators);

[128] This helps to keep the trading region free of imbalances and therefore free of a system that deals with those imbalances. This is a special advantage in case trading regions shall be implemented involving member states with differing currencies. On the other hand, a fully nominated trading region does not deprive shippers of anything they need, since end user load balancing is taken care of in the national end user zones. Settling of deliberate imbalances (e.g. caused by the shipper deliberately nominating entry and exit quantities in and out of a trading region that do not match) is also not foreseen by Regulation (EU) 715/2009 and generally not a reasonable application of a balancing system (markets should be used for that).

[129] This is required to deal with unexpected interruptions of capacity that lead in and out of the trading region. Until the shipper has had the opportunity to renominate (in order to balance his account in the trading region) some imbalance may occur. This needs to be settled. Since such interruptions have a clear causer (the interrupting TSO) settlement can easily be effected between this TSO and his shipper.

[130] For those capacity products for which auctioning is applicable.

- TSOs shall define harmonized procedures for inter-TSO compensation required due to transporting gas from TSO “A” to TSO “B” (in the same or another market) either without receiving any proceeds from shippers[131] or against auction proceeds lower than the regulated tariffs. These procedures shall make sure that TSOs and national final customers are not put at a financial disadvantage from TSOs cooperating with other TSOs or from TSOs implementing auctions. These procedures shall not lead to TSOs rolling over their capacity risk (i.e. underutilization) to other TSOs unless this is foreseen by national legislation and no cross-border roll over of these cost occurs outside of capacity fallback contracts concluded for reasons of transport security of supply.

3.5.3 Implementation in other processes

The following list contains further items that need to be ensured for the implementation of the MECO-S Model.

Items regarding the realization of national market areas:

- DSOs to cooperate with TSOs in order to form market areas involving cost allocation (i.e. the TSOs exit cost) from TSOs to DSOs;
- DSOs to integrate the final customers attached to their systems into the balancing system set up by the upstream TSO(s) in the market area; and
- DSOs to deliver data required for balancing to the TSOs in accordance with the balancing system described in the ENTSOG netcodes.

Items regarding the realization of trading regions:

- DSOs to cooperate with each other to form a national end user zone; and
- appointment of an entity tasked with balancing the national end user zones, which may be the national TSO.
- Further harmonization required in order to realize cross-border market areas:
- Harmonization of the following elements of the “data generating system” underlying the balancing system:
- Deployment and structure of standardized load profiles (SLP) (incl. the threshold above which SLPs may not be used)
- Handling of estimation errors of SLPs
- Quality parameters for end user consumption metering devices (especially acceptable measurement errors)
- Regulations for converting measured quantities into energy units (considering pressure, temperature, altitude, calorific value)
- Regulations for measuring (and / or calculating) the calorific value required for converting metered values into energy units; and
- Harmonization / clarification of legal protection for all stakeholders being part of or participating in a cross-border market area.

Items regarding TSO cost recognition:

- TSOs shall be entitled to regulatory cost recognition of the following activities:

[131] This would be the case for any market-internal interconnection point between TSOs.

- (creating and) reserving transmission capacity for the short- and mid-term markets that is later on not (or not fully) booked by shippers or where the proceeds from auctioning these capacities do not cover the cost (including capital cost) of the TSO; and
- leasing parts/elements of transmission systems constructed and financed long-term by third parties determined by tender; and
- paying for capacities reserved under fallback-capacity contracts for purposes of realizing “n-1” transport security of supply; and
- paying fees to other TSOs by way of inter-TSO compensation (e.g. between several TSOs within a market)

Items regarding capacity extension:

- TSOs shall be obliged to tender any investment project that is foreseen in a binding network development plan and that they are not willing or able to realize themselves to the market for development including long-term financing by the developer. TSOs shall long-term lease the resulting gas transmission assets, operate and maintain them and integrate them into their network access models as if they were owned by the TSO.
- TSOs shall develop a standardized business, process and contract model for the procedure described immediately above.

Items regarding TSO cooperation in the area of transport security of supply:

- TSOs shall develop a standardized capacity fallback contract to be used for inter-market transport security of supply;
- TSOs shall be obliged to perform fallback capacity bookings with neighbouring TSOs in other markets at the request of the competent national authority if a full recognition of the cost incurred by the TSO is guaranteed;
- TSOs shall be obliged to accept long-term fallback capacity bookings by adjoining TSOs at the level demanded by the neighbouring TSO for existing main and physical reverse flow capacity;
- TSOs shall be required to invest in – or tender for investment – the capacity extensions becoming necessary by fallback capacity requests in main and reverse flow direction – if the requested fallback capacity contract securely covers (as a fallback) all ensuing cost; and
- TSOs shall cooperate in order to enable fallback capacity bookings that include more than one market border point.

Further tasks of TSOs regarding the organisation of markets:

- TSOs shall – in order to foster market coupling and paying due attention to national legislation on exchanges – establish spot gas exchanges where these do not exist or operators of existing exchanges do not cooperate as required to realize market coupling

Further harmonization required regarding trading arrangements:

- Gas exchanges shall harmonize their commodity contract specifications and their price formation algorithms (at least) for the day ahead product;[132]
- Gas exchanges shall align their product offering and trading hours with the requirements of the TSO balancing system as defined in the netcodes; and
- Gas exchanges shall align the commercial properties of the traded products (e.g. start dates and hours, quantity parameter, size increments, etc.) with TSOs’ capacity products (and vice versa).

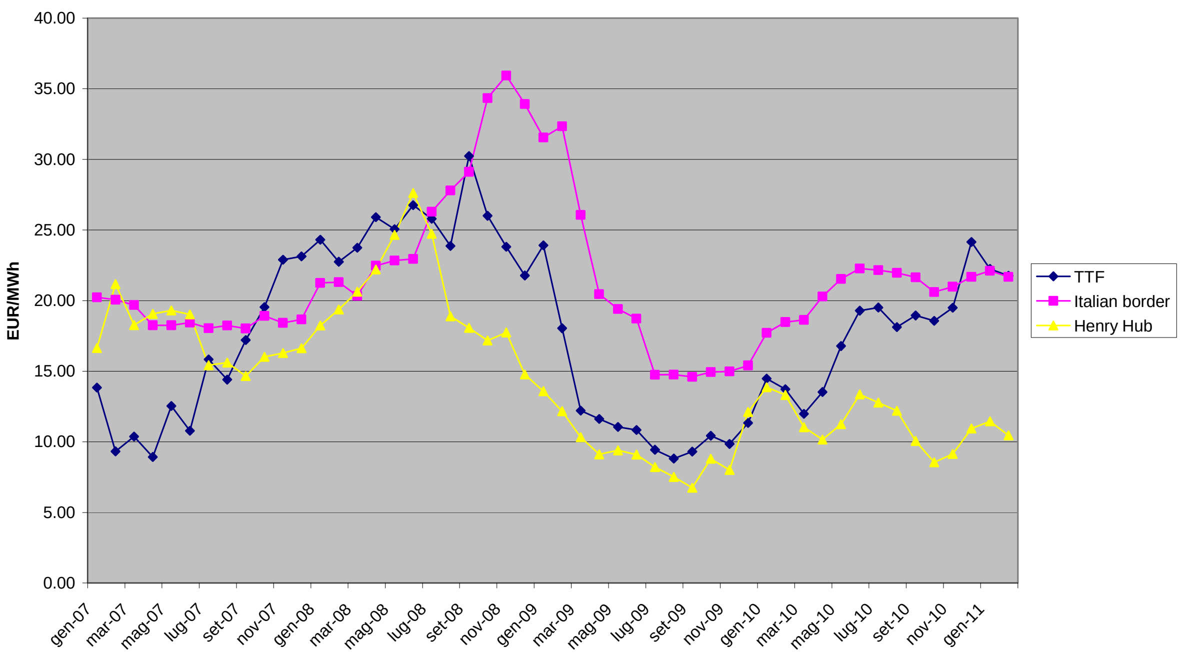
[132] This is required in order to enable market coupling.

4. An American Model for the European gas market?

For numerous academics and experts the most natural alternative to the European target model described in this paper is the North-American model. While I do agree that the US model is the most serious alternative worldwide to MECO-S I do think that it could never be implemented in the EU. However it is true that it is not another theoretical model that may be proposed, it is a working one, it has been developed as the result of a long historical process, it is widely regarded as a success story, and I would like to give here a flavour of it. An extensive presentation can be found in Sergio Ascari "*An American Model for the European Gas Market?*" (Policy Papers at Florence School of Regulation).

The American model has delivered secure supplies at prices which have been generally lower than those found in Europe, despite objective supply costs (in terms of production and long distance transportation) that have been roughly the same, at least before the shale gas boom of the last three years, when the gap has indeed deepened (see Chart 1).

Chart 1 - U.S. and European wholesale prices



Yet the fact that innovation leading to the shale development has been more effective in North America is no chance, but it is just another positive feature of the industry. Although it must be partly attributed to the peculiar U.S. upstream regime where any underground production belongs to the land owner (rather than the State as in Europe), it also shows that the private sector does not fear undertaking technological revolution and substantial investment in North America, as it knows that it will be able to transport the product to the market, and sell it.

Trading has developed in the U.S. and Canada far more than in any European hub[133] and the development of market centres based on hubs is playing a major role in the development of industry efficiency, in a way that is only starting to be imitated in Europe.

Despite these undisputed positive outcomes, the American model is usually dismissed as not applicable in the institutional framework of the EU. Each observer from the Eastern shore of the

[133] The North-American forward market is 2,600 times as large as the European one, according to Makholm (2011).

Atlantic usually points at his preferred features of the American models as the reasons of its success. Regulators usually mention the arm lengths' operation of pipelines and supply, which is equivalent to ownership unbundling in the EU legal framework, and the political unity of the U.S. The gas industry focuses on the federal rather than state nature of tariff regulation and its continuous reliance on distance based tariffs, with TSOs notably underlining America's more generous transportation tariffs as the main triggers for its significant pipe-to-pipe competition, as well as abundant capacity that underpins its far more vibrant gas commodity market[134]. In any case, it would not be wrong to take up some features of the American model, even though – being not perfect – it draws its success and appeal probably from the combination of its regulatory choices rather than any single feature.

Apart from discussions about the American “preferred features”, there is widespread agreement that the EU market (resulting from implementation of the 3rd Energy Package) lacks the main institutional features that would allow it to imitate the American model. In fact Europe is notably characterised by:

- no ownership unbundling provisions;
- no single continental regulatory authority;
- mandatory entry-exit rather than distance based tariffs;
- mostly national or sub-national TSOs rather than long distance interstate pipelines.

Since these characteristics are clearly not present in the current market organisation, and will not be even after full implementation of the 3rd Energy Package, there is a widespread tendency to dismiss the American model as not applicable in Europe (lately on this LECG, 2011), but only as a possible source of “lessons”, which are mostly bound to be promptly forgotten.

People willing to challenge such widespread conclusion should show:

- which lessons are most relevant and should be recalled and possibly imported from the North American experience as “Model Propositions”;
- how these lessons could be turned into an alternative Gas Target Model which, while fully respecting the 3rd Energy Package, retains the main features that have fostered the American success in terms of competition and trading development;
- what would be the main consequences of such alternative model for the regulatory framework of the EU, and in particular for the priorities of the European Network Code that should be developed and adopted according to the 3rd Energy Package.

The North American liberalisation experience, as well as the shorter European one, has shown that regulators, however powerful, cannot tailor the market to their own wishes[135]. Rather, the resulting market design is the joint product of forces which interact to yield a certain outcome.

---

[134] The predominantly national nature of US production has also been noticed, whereas this is no reason for (e.g.) a Canadian producer to give in to U.S. customers, the most competitive and market friendly organisation of import sources in their native country has helped to integrate it into a single American market space. This has been far from easy with some of Europe's external suppliers.

[135] See Makholm (2005, 2011); for an illustration how it developed see also Jensen (2007).

Abbreviations

Abbreviation	Explanation
10YNDP	10 year network development plan
ACER	Agency for the Cooperation of Energy Regulators
aka	also known as
bcm	Billion cubic meters
CAM	Capacity allocation management
CMP	Congestion management procedures
CMT	Cross market trading
DAM	Day ahead market
DSO	Distribution system operator
DST	Daylight saving time
ENTSOG	European Network of Transmission System Operators for Gas
ERGEG	European Regulators' Group for Electricity and Gas
ESTC	Enhanced supply and trading conditions
EU	European Union
FCFS	First come, first serve
FWG	Framework guidelines
GRI	Gas Regional Initiative
IDM	Intraday market
ITC	Inter TSO compensation
LTM	Long-term market
MBP	Market Border Point
MTM	Medium term market
MWh	Megawatthour
NB	Nota bene
NRA	National regulating authority
NWC	Network Code Gas of ENTSOG
OTC	Over the counter
P2P	Point to Point
SLP	Standardized load profile
SoS	Security of supply
STM	Short term market
TPA	Third party access
TSO	Transmission system operator
UIOLI	Use it or loose it
UTC	Universal time coordinated
VP	Virtual Point

Glossary

Term	Explanation
Flow commitment	A typical example for a flow commitment would be a pledge by a shipper to a TSO to produce (nominate) a gas flow in a certain direction at a certain physical location that is contractually agreed on and for which the shipper receives a fee.
Market	*Where used in the context of network access structures:* A combination of gas transmission and distribution networks that is structured for network access either according to the market area or the trading region model.
Netcodes	The European transmission netcodes to be drafted by ENTSOG based on the framework guidelines provided by ACER.
Shipper	A company or individual contracting capacity on a gas transmission system.
Spot Market	Markets (OTC or exchange) for standardized gas products that are delivered at the day of the trade or one or two days thereafter (in case of weekends and bank holidays the time period between the trade and actual delivery may extend to a few days).
Storage	Means as defined in DIRECTIVE 2009/73/EC: "'storage facility' means a facility used for the stocking of natural gas and owned and/or operated by a natural gas undertaking, including the part of LNG facilities used for storage but excluding the portion used for production operations, and excluding facilities reserved exclusively for transmission system operators in carrying out their functions"
Ten Year Network Development Plan	A plan for network development introduced by Article 22 of DIRECTIVE 2009/73/EC
Wholesale market	The OTC or exchange based market where wholesalers buy (and other wholesalers sell) gas in order to be resold (e.g. to final customers). Large so called "self-trading" final customers (e.g. a large steel producer) may also be participants of the wholesale market.
Wholesaler	A company or individual active on the wholesale market e.g. with a view to supplying to final customers, to supplying to retail organisations or for pure speculative trading purposes.

References

The Internal Energy Market – Time To Switch Into Higher Gear (non-paper)

- Available for download under:

  http://ec.europa.eu/energy/gas_electricity/legislation/doc/20110224_non_paper_internal_nergy_market.pdf

Sector inquiry:

- Material available for download under:

  http://ec.europa.eu/competition/sectors/energy/inquiry/index.html

Market design for natural gas: the Target Model for the Internal Market, Boaz Moselle, LECG, 2011

Makholm Jeff 2005 and 2011

Author contacts:

Jean-Michel Glachant

Director of Florence School of Regulation, Robert Schuman Centre for Advanced Studies, EUI

Villa Malafrasca, Via Boccaccio, 151

I - 50133 Firenze (IT)

Email: jean-michel.glachant@eui.eu

European
University
Institute

European University Press